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Approved for use through 10/31/2002 OMB 0651-0032
 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. 1203
First Inventor Han-gyoo Kim
Title Disk System Adapted to Be Directly Attached to Network
Express Mail Label No. ET843788088 US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
 Box Patent Application
 Washington, DC 20231

- 1. Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
- 2. Applicant claims small entity status.
 See 37 CFR 1.27.
- 3. Specification [Total Pages **59**]
(preferred arrangement set forth below)
 - Descriptive title of the invention
 - Cross Reference to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to sequence listing, a table, or a computer program listing appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
- 4. Drawing(s) (35 U.S.C. 113) [Total Sheets **24**]
- 5. Oath or Declaration [Total Pages
- a. Newly executed (original or copy)
 Copy from a prior application (37 CFR 1.63 (d))
 (for continuation/divisional with Box 18 completed)
- b. DELETION OF INVENTOR(S)
 Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b)
- 6. Application Data Sheet. See 37 CFR 1.76
- 7. CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix)
- 8. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
 - a. Computer Readable Form (CRF)
 - b. Specification Sequence Listing on:
 - i. CD-ROM or CD-R (2 copies); or
 - ii. paper
 - c. Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

- 9. Assignment Papers (cover sheet & document(s))
- 10. 37 CFR 3.73(b) Statement of Power of Attorney
(when there is an assignee)
- 11. English Translation Document (if applicable)
- 12. Information Disclosure Statement (IDS)/PTO-1449
- 13. Preliminary Amendment
- 14. Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
- 15. Certified Copy of Priority Document(s)
(if foreign priority is claimed)
- 16. Nonpublication Request under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent.
- 17. Other: _____

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:

Continuation
 Divisional
 Continuation-in-part (CIP)
 of prior application No. _____

Prior application information: Examiner _____ Group Art Unit _____

For CONTINUATION OR DIVISIONAL APPLS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

Customer Number or Bar Code Label (Insert Customer No. or Attach bar code label here)
 or Correspondence address below

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Name (Print/Type)	Chung K. Ko	Registration No. (Attorney/Agent)	42,753
Signature	<i>Chung K. Ko</i>	Date	10/09/01

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<h1 style="margin: 0;">FEE TRANSMITTAL</h1> <h2 style="margin: 0;">for FY 2002</h2> <p style="font-size: small; margin: 5px 0;">Patent fees are subject to annual revision.</p>	Complete if Known	
	Application Number	
	Filing Date	October 9, 2001
	First Named Inventor	Han-gyoo Kim
	Examiner Name	
	Group Art Unit	
TOTAL AMOUNT OF PAYMENT	(\$) 1333.00	
		Attorney Docket No. 1203

METHOD OF PAYMENT	FEE CALCULATION (continued)																																																																																																																																																																																						
<p>1. <input type="checkbox"/> The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:</p> <p>Deposit Account Number <input style="width: 100%;" type="text"/></p> <p>Deposit Account Name <input style="width: 100%;" type="text"/></p> <p><input type="checkbox"/> Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17</p> <p><input type="checkbox"/> Applicant claims small entity status See 37 CFR 1.27</p> <p>2. <input type="checkbox"/> Payment Enclosed:</p> <p><input checked="" type="checkbox"/> Check <input type="checkbox"/> Credit card <input type="checkbox"/> Money Order <input type="checkbox"/> Other</p>	<p>3. ADDITIONAL FEES</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Fee Code</th> <th>Large Entity (\$)</th> <th>Small Entity (\$)</th> <th>Fee Description</th> <th>Fee Paid</th> </tr> </thead> <tbody> <tr><td>105</td><td>130</td><td>205</td><td>65</td><td>Surcharge - late filing fee or oath</td><td></td></tr> <tr><td>127</td><td>50</td><td>227</td><td>25</td><td>Surcharge - late provisional filing fee or cover sheet</td><td></td></tr> <tr><td>139</td><td>130</td><td>139</td><td>130</td><td>Non-English specification</td><td></td></tr> <tr><td>147</td><td>2,520</td><td>147</td><td>2,520</td><td>For filing a request for <i>ex parte</i> reexamination</td><td></td></tr> <tr><td>112</td><td>920*</td><td>112</td><td>920*</td><td>Requesting publication of SIR prior to Examiner action</td><td></td></tr> <tr><td>113</td><td>1,840*</td><td>113</td><td>1,840*</td><td>Requesting publication of SIR after Examiner action</td><td></td></tr> <tr><td>115</td><td>110</td><td>215</td><td>55</td><td>Extension for reply within first month</td><td></td></tr> <tr><td>116</td><td>400</td><td>216</td><td>200</td><td>Extension for reply within second month</td><td></td></tr> <tr><td>117</td><td>920</td><td>217</td><td>460</td><td>Extension for reply within third month</td><td></td></tr> <tr><td>118</td><td>1,440</td><td>218</td><td>720</td><td>Extension for reply within fourth month</td><td></td></tr> <tr><td>128</td><td>1,960</td><td>228</td><td>980</td><td>Extension for reply within fifth month</td><td></td></tr> <tr><td>119</td><td>320</td><td>219</td><td>160</td><td>Notice of Appeal</td><td></td></tr> <tr><td>120</td><td>320</td><td>220</td><td>160</td><td>Filing a brief in support of an appeal</td><td></td></tr> <tr><td>121</td><td>280</td><td>221</td><td>140</td><td>Request for oral hearing</td><td></td></tr> <tr><td>138</td><td>1,510</td><td>138</td><td>1,510</td><td>Petition to institute a public use proceeding</td><td></td></tr> <tr><td>140</td><td>110</td><td>240</td><td>55</td><td>Petition to revive - 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Express Mailing No. ET 843 788 088 US

Chung K. Ko

1263 Lakeside Drive #2190

Sunnyvale, California 94085

Reg. # 42,753

Tel: 408-655-4678

Fax: 408-749-0782

Date: October 9, 2001

To: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231
Tel: 800-786-9199

Re: Utility Patent Application
Title: Disk System Adapted to Be Directly Attached to Network
Docket No. 1203
Inventors: Han-gyoo Kim

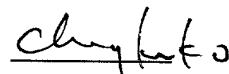
Dear Sir or Madam:

Enclosed please find

- (1) utility patent application
- (2) executed inventor declaration
- (3) cover sheet for utility patent application
- (4) fee transmittal sheet
- (5) a self-stamped post card to be returned
- (6) a check of \$1333 (small entity)

Thank you very much for your attention.

Sincerely,



Chung K. Ko

105007 2844650

**DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED
TO NETWORK**

Inventor: Han-gyoo Kim

RELATED APPLICATION

This application claims the benefit of co-pending U.S. Provisional Application Ser. No. 60/240,344, filed October 13, 2000, entitled "Disk System Adapted to Be Directly Attached to Network."

BACKGROUND OF THE INVENTION

Technical Field

This invention in general relates to computer systems. More specifically, this invention relates to a disk system or interface that can be directly attached to a network.

Description of the Related Art

As the Internet becomes popular, the amount of data that needs to be stored has drastically increased. Especially, there is a high demand for a high-capacity disk drive to store multimedia data. For example, a demand for a disk system having a disk capacity of terabytes per server is not unusual.

A tape drive or a CD drive may be used to store such amount of data, but its performance and user convenience are not matched to those of a hard disk drive. However, increasing the capacity of a hard disk in a conventional server system presents some problems.

There are NAS (Network Attached Storage) products that can be connected to

Petitioners Microsoft Corporation and HP Inc. - Ex. 1009, p. 4

EXHIBIT 1009-10001

a network, usually Ethernet, to provide a pre-configured disk capacity along with integrated system/storage management using the NFS (Network File System) protocol, the CIFS (Common Internet File System) protocol, or both on top of the IP protocol used on the Internet. The primary purpose of these protocols is to exchange files between independently operating computers. Therefore, the client using the NAS for file access experiences the difference between its local storage and the storage in the NAS systems.

The NAS is basically a stripped-down version of a file server having mainly the functions of storing and retrieving files. Accordingly, increasing a disk capacity using a NAS product amounts to adding a separate file server in practice, which presents many shortcomings. Since an NAS disk is not seen as a local disk to the client, the installation, movement, and administration of an NAS disk should be done only through the operating system and software offered as part of the NAS system. An NAS disk is installed in the inside bus of the NAS system, leading to a limitation to the number of disks that can be installed. Since the NAS system has a hard disk under its own operating system, the client cannot use an arbitrary file system to access the hard disk. Further, the NAS system requires an IP address. Overall, not only the installation and administration costs per disk are more expensive than those of a local disk, but also user convenience is severely restricted.

There is SAN (Storage Area Network) that uses the Fibre Channel technology. To use the devices connected to a SAN, a special-type of switch is needed. For example, Fiber Channel uses a Fibre Channel hub or a Fibre Channel switch. The SAN has some shortcomings. Typically, a separate file server is used. In general, the SAN equipment is expensive, and so is the administration cost of the SAN system

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because, for example, it often requires an administrator with a specialized knowledge on the system.

Therefore, there is a need for an interface that allows a disk system to be directly attached to a network, while still being accessed like a local disk without the need of adding an additional file server or special equipment.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a disk system that can be directly attached to a network connecting to a host without going through a network file system.

Another object is to provide a disk system that can be recognized and used as a local disk to a host without requiring additional facility such as an additional file server, a special switch, or even an IP address, if appropriate.

Still another object of the present invention is to provide a disk system that can be conveniently connected to a server without much intervention of network/server administration.

Yet another object is to provide a low-cost disk system, many of which can be plugged into existing network ports to readily satisfy a disk capacity demand.

Further object is to provide an interface that allows a device attachable to a bus to be plugged into a network port.

The foregoing and other objects are accomplished by providing a network-attached disk (NAD) system that includes an NAD device for receiving a disk access command from a host through a network, a device driver at the host for controlling the NAD device through the network, where the device driver recognizes the NAD device

as a local device. The host may run the UNIX or Windows family of operating systems. The NAD device includes a disk for storing data, a disk controller for controlling the disk, and a network adapter for receiving a disk access command from the host through a network port.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an environment where a network-attached disk (NAD) system of the present invention is used.

FIG. 2 is an illustration of how multiple NAD devices may be accessed by multiple hosts through a network.

FIG. 3 is an example of how multiple NAD devices are accessed by multiple hosts.

FIG. 4 is another example of how each disk inside an NAD may be treated as a separate disk.

FIG. 5 is an illustration of how a block device driver, specifically an NAD device driver, is registered and unregistered under the UNIX operating system.

FIG. 6 is an illustration of the relation among the directory, device file, device driver, and device.

FIG. 7 is an illustration of how a request function directly issues a command to a device.

FIG. 8 is an illustration of how a request function activates a device accessing thread.

FIG. 9 is a block diagram of a local disk system and that of an NAD device running under UNIX.

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FIG. 10 is an illustration of a device searching thread for identifying the attached NAD devices and for providing the NAD information to the NAD device management program.

FIGS. 11A and 11B are examples of network connections made between an NAD device driver and its corresponding NAD device using a connection setting thread.

FIG. 12 is an illustration of a method of implementing an NAD device driver, using a device accessing thread.

FIG. 13 is an illustration of a method of implementing an NAD device driver, without using a device accessing thread.

FIG. 14 is an example of an NAD device construction.

FIG. 15 is a functional block diagram of an NAD controller.

FIG. 16 is a simplified state transition diagram of a state machine used by the main controller of an NAD controller.

FIG. 17 is an illustration of how a disk inside an NAD device may be divided into disk partitions to which a device driver is assigned.

FIG. 18 is an illustration of how separate NAD device drivers may be generated so that a physically single disk can be assessed by different file systems.

FIG. 19 is an illustration of how the NAD system can recognize physically separate, several NAD disks as a logically single disk.

FIGS. 20A and 20B are illustrations of the hierarchies of the disk driver layers in the conventional disk system and the NAD system under the Windows 2000 operating system.

FIG. 21 is an illustration of a network environment where the NAD system of the present invention is used in the Windows 2000 operating system.

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FIG. 22 is an example of a device stack created in the Windows 2000 operating system.

FIG. 23A is an illustration of the flow of IRP, SRB, and CDB in a conventional disk system in the Windows 2000 operating system.

FIG. 23B is an illustration of the flow of IRP, SRB and CDB in an NAD system in the Windows 2000 operating system.

FIG. 24 is an illustration of NDIS (Network Device Interface Specification) in the Windows 2000 operating system.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows an environment where the present invention is used. A host 100 has a file system 101, which may contain a local disk device driver 102 that controls a local disk 104 connected to an internal system bus 103. A local device is defined as a device inside a standard-alone system as opposed to a network device connected to a network. Local devices are directly connected to a system bus often through an adapter called a host bus adapter allowing the host to communicate with the devices without going through any network, whereas network devices are not directly connected to a system bus, rather connected through an interface called a network interface card (NIC) installed on system bus. The local disk 104 may be a conventional IDE (Integrated Drive Electronics) disk or SCSI (Small Computer System Interface) disk.

The file system 101 also contains a network-attached disk (NAD) device driver 105 of the present invention that controls an NAD device 108 connected through a network adapter device driver 106 and a network 107 such as Ethernet. The NAD device 108 of the present invention contains one or more disks 109. The network 107

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is an existing general-purpose network for carrying storage traffic as well as other application traffic. This so called “front-end” network for carrying general-purpose network traffic is distinguished from a “back-end” network dedicated to storage such as that used in the conventional Storage Area Network (SAN) scheme.

The present invention features two main components: one is the NAD device driver 105 at the host and the other is the NAD device 108 attached to the network.

FIG. 2 shows an example of how multiple NAD devices are accessed by multiple hosts through a network. NAD device #1 123 with disk(1,1) 126 and NAD device #2 124 with disk(2,1) 127 and disk(2,2) 128 are accessed by Host #1 120 through a network 122, while NAD device #3 125 with disk(3,1) 129, disk(3,2) 130, disk(3,3) 131 is accessed by Host #2 121 through the same network 122.

Each disk appears to the host as if it is a local disk to connected to the system bus of the host so that each disk can be dynamically installed or removed. The present invention achieves this by creating a virtual host bus adapter in purely software means that recognizes an NAD device as if it is connected to the system bus although there is no physical host bus adapter connected the NAD. This is distinguished from the conventional Network Area Storage (NAS) scheme where a NAS device connected through the NIC is still recognized as an independent file server connected to a network.

The Open Systems Interface (OSI) model defines 7 layers of protocols: a physical layer for electrical interface definitions, a data link layer for communication using data frames, a network layer for routing packets from one end to another, a transport layer for dividing messages into packets, a session layer for establishing communication session, a presentation layer for data presentation format, and an application layer for application programs. The present invention uses a data link

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layer protocol to contain storage commands into data link frames. Because the NAD device is not acting as an independent devices to the host, there is no need to use a network address such as IP address.

Since the specific configuration of the hosts and the disk systems can be dynamically changed, user convenience and portability is preserved as in the case of using a local disk. There is virtually no restriction to the number of disk systems that can be attached to the network, thus providing an unlimited disk storage capacity for a host.

FIG. 3 shows another example of how multiple NAD devices are accessed by multiple hosts through a network. NAD device #1 143, NAD device #2 145, and NAD device #5 147 are accessed by Host #1 140 through a network 142, while NAD device #2 144 and NAD device #4 146 are accessed by Host #2 141 through the same network 142.

The disks contained in an NAD may be treated as separate disks so that each of them can be independently accessed by a host. FIG. 4 shows an example of treating each disk inside an NAD device as separate disks. Disk(1,1) 166 inside NAD device #1 163, disk(2,2) 168 inside NAD device #2, and disk(3,2) 170 inside NAD device #2 are accessed by Host #1 160 through a network 122 while disk(2,1) 167 inside NAD device #2 164 and disk (3,1) 169 and disk (3,3) 171 inside NAD device #3 165 are accessed by Host #2 161 through the same network 162. Note that disk (2,1) 167 and disk (2,2) 168, inside NAD device #2 164, are independently accessed by Host #1 160 and Host #2 161 respectively.

Block Device Driver

An embodiment of the NAD system will be explained with an example running the UNIX family of operating systems although other operating systems such as Windows may also be used.

Each block device for block data storage, such as a disk device, is assigned a major device number to distinguish among different kinds of block devices, and a minor device number to distinguish among same kinds of block devices. In UNIX, each device is accessed through a device file, which provides an interface for accessing the real device. Device files are usually generated in advance, each with a major device number and a minor device number as well as information on a block device driver.

The purpose of the device driver is to handle the requests made by the kernel with respect to a device. The device driver isolates device-specific codes to provide a consistent interface for the kernel. In order to activate the operation of a device driver, a device file and device driver routines must be prepared, after which the functions of the driver routines must be registered so that the operating system such as UNIX can understand their availability. This is usually done by passing the major number assigned to the device and the functions of the driver routines as parameters.

Registration and Unregistration of Block Device Driver

Once a block device driver is registered by passing the device's major device number and the driver functions as parameters, it may be unregistered by passing the major number.

Table 1 lists the functions used to either register or deregister a device driver.

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Functions	Description
Register_blkdev()	- register a driver by taking a major number and driver functions as parameters
Unregister_blkdev()	- unregister a driver by taking a major number

[Table 1]

Table 2 lists the general functions used by the local driver and the NDA driver.

Driver Function	Description
Read()	- used to read data in the device
write()	- used to write data in the device
ioctl()	- used to change a particular value of a structure for a driver or to control input/output with respect to a device
open()	- used to initialize a driver
release()	- used to eliminate a driver
fsync()	- used to reflect the content of buffer cache to the real device driver
check_media_change()	- used to sense a change in the device condition
revalidate()	- used to update device managed by the deriver and device driver itself

[Table 2]

Table 3 lists examples of the driver functions specific to the IDE local disk driver and the NAD driver.

Driver Function	IDE Local Driver Function	NAD Driver Function

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read()	ide_read()	netdisk_read()
write()	ide_write()	netdisk_write()
ioctl()	ide_ioctl()	netdisk_ioctl()
open()	ide_open()	netdisk_open()
Release()	ide_release()	netdisk_release()
fsync()	ide_fsync()	netdisk_fsync()
check_media_change()	ide_check_media_change()	netdisk_check_media_change()
revalidate()	ide_revalidate()	netdisk_ide_revalidate()

[Table 3]

FIG. 5 shows an example where a block device driver, specifically an NAD device driver, is registered and unregistered. Initially, an IDE device driver 181 with major device #3 is created as well as some null device drivers such as major device #0 180 and major device #n 182. Major device #60, 183, the NAD device driver that is assigned a major device number of 60, is registered by using a device registration function of register_blkdev(60, fops) 185. Later the NAD device driver is de-registered into major device #60 184, a null device driver, by using a device de-registration function of unregister_blkdev(60) 186. The figure shows that NAD device driver of the present invention is installed in the same way as the existing block device drivers.

Use of Block Device

Once a block device driver is registered and its device file is generated, read/write is done to the device file to access the real device. The device file, however, is not directly called by the user, rather called after being mounted to the file system. Before being mounted, each block device file must be formatted according to a

particular file system. Since the NAD device driver of the present invention is prepared in the same way as a conventional local disk driver, the set of I/O commands used to format a conventional local disk can also be used to format a disk in the NAD device. In addition, since NAD devices are controlled in the device driver level, they can be formatted in a required format independent of the file system used.

FIG. 6 shows the relation among the directory, device file, device driver, and device. The left side shows attachment of a conventional local disk system where a device file 201 mounted on a directory 200 is used by a local disk device driver 202 to control a local disk 203. The right side shows an NAD system of the present invention where a device file 204 mounted on the directory 200 is used by an NAD device driver 205 to control a NAD device 207 through a local area network (LAN) 206 such as Ethernet. The two relations are similar except that the NAD device is accessed through the network.

Structure of Block Device Driver

Each block device driver has an I/O request queue to store the I/O requests to the device. The stored requests may be re-scheduled for the purpose of improving the performance. Besides the I/O request queue, each block device driver needs a request function to process the I/O requests in the queue.

FIG. 7 shows a situation where the request function directly issues a command to a block device. An NAD device driver 220, using a device 222 and a file system 223, has a queue 224 that stores I/O requests 225 through 228. The NAD device driver 220 has a request function 229 that issues a command to the NAD device 221 by

taking a currently processed request 225.

FIG. 8 shows a situation where the request function 229, instead of directly issuing a command, activates a device accessing thread 230 so that the device accessing thread 230 can issue a command based on the information in the request queue. A thread refers to a single use of a program that can handle multiple users.

Constitution of Local Disk System and NAD System

FIG. 9 shows the constitution of a conventional local disk system and that of the NAD system operating under UNIX. Under a file system 260, a conventional local disk 264 attached to a local bus 263 is accessed by a conventional local disk device driver 261 through a bus interface 262. Under the same file system 260, an NAD device 272 with a disk 273, attached to a network 271, is accessed by an NAD device driver 265 through a network interface including a network protocol stack 266, a network adapter device driver 267, a bus interface 268, and a network adapter 270.

Since an NAD device is to be used like a local disk, the conventional local disk system and an NAD system of the present invention share a basic structure. The difference is that since an NAD system must communicate with an NAD device through a network, a protocol stack is added for network communication. The NAD driver delivers an I/O command to an NAD device through a network adapter and receives a response from the NAD device.

When an NAD device is accessed, either DMA (Direct Memory Access) or PIO (Programmed Input/Output) may be used. A conventional disk device driver operates in a DMA mode by issuing a DMA I/O command to a local disk with a starting buffer address and a byte transfer count. The local disk then takes over the data

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transfer, after which it interrupts the CPU. Similarly, the NAD device driver may be implemented to operate in a DMA mode by having the NAD device driver deliver an I/O command to an NAD device, which then completes the data transfer, after which it interrupts the CPU.

The conventional disk driver operates in a PIO mode by the CPU transferring data directly through data registers of the disk device until a particular data block is processed. Similarly, the NAD driver may be implemented to operate in a PIO mode by having the NAD device driver deliver a command to an NAD device and continue to transmit/receive data until a particular block of data is processed.

The network protocol that can be used in the present invention is not restricted to a particular protocol. It can be any connection-oriented protocol including TCP/IP. A connection-oriented protocol ensures that packets are not lost and packets are received in the order they are transmitted. If TCP/IP is used, an IP address must be used for each NAD device.

Local Disk Driver and Generation of NAD Driver

Once UNIX starts, if hardware scan detects any conventional local disks, their corresponding drivers are generated according to the units of the local disks or according to the units of disk partitions. In a similar fashion, NAD devices are identified during initial hardware scan and their corresponding drivers acting as a virtual host bus adapter must be generated. The drivers may be generated automatically by using a device searching thread that periodically identifies NAD devices attached to the network or manually by a system administrator using an NAD management program.

FIG. 10 shows a device searching thread for identifying the attached NAD

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devices and for providing the NAD device information to an NAD device management program. A thread 280 is run in a host 290 through a network protocol stack 282 and a network adapter driver 283 to identify NAD devices 285 through 289 together with the size and device file of each NAD to provide the information 281 to NAD device management program. Once informed of NAD device files available, the user then mounts a selected NAD device file to use a particular NAD device as a local disk.

Network Connection between NAD Device Driver and NAD Device

In a conventional local disk, disk I/O is performed by reading/writing to I/O ports of the disk controller attached to the internal system bus. But the NAD device driver performs I/O to the corresponding NAD device through a network link. Instead of read/write to an I/O port, I/O is performed by read/write to a network connection such as a socket in UNIX. Therefore, a network connection such as a UNIX socket must be set up between the NAD device driver and NAD device.

FIGS. 11A and 11B show examples of network connections between an NAD device driver and the corresponding NAD device using a connection setting thread. NAD device #1 302 is connected to NAD device driver #1 301 through a network connection #1 303 created by the `ioctl()` function, 304 while NAD device #2 307 is connected to NAD device driver #2 306 through a network connection #2 308 created by the `ioctl()` function 309.

Implementation of NAD Driver

FIG. 12 and FIG. 13 show two methods of implementing an NAD device driver, the former with a device accessing thread, and the latter without a device accessing

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thread.

FIG. 12 shows three NAD drivers 320, 321 and 322 with the device files of “/dev/nd0”, “/dev/nd1”, “/dev/nd2” to access NAD device #1 323, NAD device #2 324, and NAD device #3 325, respectively. Each device file is mounted to “/tmp”, “/var”, “/” directory in the file system 326, respectively. User threads 327, 328 and 329 for accessing the file may read/write on the NAD device through the file system 326. A connection setting thread 331 provides the list of NAD devices available to an NAD device management program 330. Based on the user’s input, the connection setting thread 331 creates network connections 332, 333 and 334, as necessary.

Referring to FIG. 12, when the user thread requests a file through a file system, the file system first checks the buffer cache to find out whether the requested file block is in the buffer. If the block is in the buffer, the user thread refers to the block. But if the block is not in the buffer, data must be read from the NAD device. The user thread puts the request on the request queue, activates an NAD accessing thread 335 (or 336, 337) responsible for NAD device control through a request function, and the user thread blocks itself. The user thread blocked is awakened later by the NAD accessing thread, such as 335, that received the corresponding data.

FIG. 13 is similar to FIG. 12 except that the user thread now directly requests data from the NAD device rather than using an NAD accessing thread. For example, the user thread puts the request on the request queue, activates a software interrupt that will actually handle block data transfer between the NAD device and the host, and the user thread blocks itself. Once the data transfer is done, an interrupt is generated to wake up the blocked thread.

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Communication Protocol between Host and NAD Device

When a host NAD device driver accesses an NAD device for I/O, the position of the first block and the number of blocks are given as parameters of the I/O command. Or, in the case of SCSI, the I/O command may be in the form of a CDB (Command Descriptor Block).

To transfer the CDB or the block transfer information, a reliable communication protocol is necessary. The present invention is not limited to a particular kind of communication protocol as long as a connection-oriented protocol is used including TCP/IP. A connection-oriented protocol means that packets can be retransmitted in the case packets are lost, and received packets are arranged at the receiver end in the order they were sent.

NAD Device

FIG. 14 shows a functional block diagram of the NAD device of the present invention. A preferred embodiment of the NAD device is comprised of an NAD controller 401 for controlling the whole NAD device, memory 402, a disk controller 403 for executing a disk access command, one or more disks 405, 406, and a LAN adapter 403 for receiving a disk access command from a host through a network. The NAD controller 401, the memory 402, the disk controller 403, and the LAN adapter 404 are all connected to a bus 419 internal to the NAD device.

The disk controller 403 is a module that performs disk I/O operations by controlling the disks 405 and 406 over internal disk channels. The disk controller 403 is further comprised of one or more disk channels 407 and 408 controlled by a channel controller 409, a buffer manager 410, some registers 411, and a bus interface 412. The

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buffer manager 410 consults the registers 411 to obtain a disk sector number and a channel to execute a disk access command. The buffer manager 410 also commands the channel controller 409 to transfer data from the memory to disk channel 407 or 408 or vice versa as a result of executing a disk access command. The channel controller 409 actually accesses the disk over the disk channel 407, 408 to transfer data from the disk to the memory or vice versa.

The LAN adapter 404 is a module that receives disk I/O command packets from the host and transmits replay packets over the network. The LAN adapter 404 is further comprised of a physical network interface 413 for interfacing with the network, a MAC (media access control) controller 414, transmit buffer 415 for storing transmit data, a receive buffer 416 for storing receiving data 416, registers 417, and a bus interface 418.

The bus interface 418 transfers data from the bus to the transmit buffer 415, the receive buffer 416, and the registers 417, or vice versa. The MAC controller 414 transfers data to the physical network interface 413 so that the physical network interface can transmit the data to the host computer. When the physical network interface 413 receives a disk I/O request packet from the host computer, it transfers the packet to the MAC controller 414 so that the MAC controller can extract necessary data from the packet and transfer the data to the receive buffer 416.

FIG. 15 shows that the NAD controller 401 may be comprised of a main control 420 for controlling the NAD, a buffer management module for caching data in the disk 421, a memory management module for managing assignment of memory space 422, a disk controller driver 423 for interfacing with the disk controller, a network adapter driver 424 for interfacing with the network adapter, and a bus interface 425 for

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interfacing with the bus inside the NAD.

The NAD controller 401 mainly executes I/O commands from the host's NAD device driver, but it can perform other additional functions. For example, a filter program can be installed to NAD so as to provide features that are not offered in the host, for example, a back up operation. Other examples include access control, access share, access right transfer, etc. Specifically, a filter program can be installed to limit access to an NAD device to a certain time period, to allow several hosts simultaneously access an single NAD, or to transfer one host's access rights to another host. The NAD device driver at the host can request to execute the filter program at the time of I/O command execution through the `ioctl()` function in UNIX.

FIG. 16 shows a simplified state transition diagram of a state machine used by the main controller 420. At the 'init' state 440, the state machine initializes all the NAD hardware and allocates memory for the disk controller 403 and the LAN adapter 404. Upon completing the initialization process, the state machine makes a transition to 'wait-command' state 441 where the NAD system waits for an incoming I/O command from the host computer over the network. When such I/O command is received from the host computer, the state becomes the 'disk_access' state 442 where an appropriate disk I/O operation is performed through the disk controller. Upon completing the disk I/O, the state moves to the 'transmit_reply' state 443 where the NAD device sends the result to the host computer through the LAN adapter 404. A person skilled in the art would appreciate that the state machine can be readily realized with a CPU and memory.

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Network Adapter Driver and Disk Controller Driver

The network adapter and the disk control driver can be implemented at least in two ways. One uses an interrupt mechanism through DMA (Direct Memory Access) and the other uses polling through PIO (Programmable I/O). The former has the advantage of easy programming so that other jobs can be executed without a complete disposition of disk controller data. The latter has the advantage of dispensing with time delay due to interrupts, but has the disadvantage of an inefficient processor usage due to the time spent for continuous read and write.

Additional Embodiments of NAD Drivers

Usually, an NAD device driver is generated for each disk unit attached. However, just as a local disk may be partitioned, the disk inside an NAD device may also be partitioned into several disk partitions where each disk partition can be accessed by a separate device driver. Alternatively, several disks located in the physically separate NAD devices may be combined for use as a logically single disk.

FIG. 17 shows an example where the disk inside an NAD device may be divided into several disk partitions where all of the partitions are assigned a single device driver. An NAD driver A 462, for example, is assigned to four partitions 463-466 so that the NAD driver A 462 refers the partition table in order to handle I/O requests directed to specific partitions 468 through 471 of a disk 461 inside a NAD device 460, respectively, using a same network connection 467. Similarly, an NAD driver B 473 is assigned to two partitions 474 and 475 so that the NAD driver B 473 can be used to control two disk partitions 477 and 478 of a disk 472 inside the NAD device 460.

FIG. 18 shows an example where separate NAD device drivers may be generated so that a physically single disk can be assessed by different file systems. Disk A 481 inside an NAD device 480 is divided into four partitions 490 through 493, and four separate NAD driver(a,0) through driver (a,3) 482 through 485 are created so that each NAD driver can control each disk partition through a separate network connection 486 (487, 488, or 489). Similarly, disk B 494 inside the NAD device 480 is divided into two partitions 499 and 500, and two separate NAD drivers(b,0) and NAD drive (b,1) 495 and 496 are created so that each NAD driver can control each disk partition through a separate network connection 497 (or 498). Since different network connections are used, this configuration enables a physically single hard disk to be mounted to different file systems.

FIG. 19 shows an example of how the present invention can recognize physically separate, multiple disks in different NAD devices as a logically single disk. Specifically, FIG. 19 shows that three lower-level NAD device drivers 521, 522 and 523 controlling NAD device #1 527 of 5 GB, NAD device #2 528 of 10 GB, and NAD device #3 529 of 5GB, respectively, through separate network connections 524, 525 and 526, are united into a single upper-level NAD driver 520 partitioned into a configuration 530. The file system mounts “/dev/nda” to access the total space of 20 GB.

NAD System Running under Windows Operating System

The foregoing system and method explained using examples running under the UNIX family of operating systems can equally be applied to implement an NAD system running under the WindowsTM family of operating systems so that it can be recognized

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as a local disk. For example, an NAD device may be treated as a local disk per se by a Windows 2000™ host so that all disk operations exercised by the host control a local disk, including formatting and partitioning, can be done to the NAD device.

This feature differentiates the present invention from other solutions, such as those provided by the NAS technology, which expand disk space through the intervention of a file system instead of directly adding individual disks at the device level of the host system. At the same time, since the NAD device is to be accessed through the network, the present invention redirects the disk I/O request to the network interface otherwise would be directed to the disk controller connected to the inside system bus in the case of using conventional local disks.

In other words, the present invention creates a virtual host bus adapter in purely software means by modifying a driver at the host so that the host recognizes the NAD device as if it is connected to the system bus through a physical host adapter although actually there is no physical host adapter connected to the bus. Since an NAD device is accessed as if it is a local device connected to the internal bus of a host, there is no need to use network addresses such as IP addresses for the host to communicate with the NAD device. Instead, data link frames containing storage commands are exchanged between the host and the NAD device.

FIGS. 20A and 20B shows a comparison of the hierarchy of the disk driver between the conventional disk system and the NAD system of the present invention. FIG. 20A shows conventional disk driver layers in Windows 2000, which are organized in a hierarchy comprising a disk partition manager 601, a disk class driver 602, a port driver 603, and a bus driver 604.

In the Windows 2000 operating system, the generic term, 'bus', refers to a

piece of hardware to which devices connect electronically. Not only does it include things like the PCI bus, but it also includes anything that can have multiple devices plugged into it such as a SCSI adapter, a parallel port, a serial port, a USB hub, and so on. One responsibility of the bus driver is to enumerate devices attached to the bus and to create physical device objects for each of them as necessary in Windows 2000. Therefore, the bus driver is a collection of software routines that contain the information about the specific bus and the functions that allocate system resources such as port addresses and IRQ numbers to the devices connected to the bus. It is the port driver that contains routines required to perform most of the actual disk I/O operations.

The major feature of the present invention is to replace the conventional bus driver and the port driver with a new bus driver and a new port driver so that the NAD devices can be recognized as the same as the local disks and the disk I/O operations can be performed to the NAD devices through the network port of the Windows 2000 host.

FIG. 20B shows the driver layers of the present invention, which have an NAD port driver 613 and an NAD bus driver 614 replacing the corresponding conventional Windows 2000 driver layers of FIG. 20A. The NAD bus driver 614 implements a virtual host bus adapter, through which disk I/O operations are to be done to and from a set of NAD devices. The NAD port driver 613 implements a set of routines required to perform actual disk I/O operations by redirecting the I/O requests to the NAD devices through the network port of a Windows 2000 host.

FIG. 21 shows an example of a network environment where NAD devices of the present invention are attached to multiple hosts. The example shows that both Host #1 621 and Host #2 622 run Windows 2000 connected to Network #1 623 and Network #2 624. Host #1 uses disk(1,1) 631 and disk(1,3) 633 through Network #1,

disk (2,1) 636, and disk(2,2) 637 through Network #2 625. Similarly, Host #2 uses disk(1,2) 632, disk(1,4) 634 and disk(1,5) 635.

Given the NAD bus driver and the NAD port driver, a Windows 2000 system creates device stacks as specified in Windows 2000 in order to be able to process I/O requests. Each device in Windows 2000 is expressed in terms of device objects organized in a stack structure. Device objects are data structures that the Windows 2000 system creates to help software manage hardware. Many of these data structures can exist for a single piece of physical hardware. The lowest-level device object in a stack is called a physical device object (PDO). Above a PDO in a device object stack is an object called a functional device object (FDO). There may be a collection of filter device objects below and above the FDO. The Plug and Play (PnP) Manager component of Windows 2000 constructs the stack of device objects at the command of device drivers. The various drivers that occupy the stack for a single piece of hardware perform different roles. The function driver manages the device, and the bus driver manages the connection between the device and the computer.

FIG. 22 shows an example of device stacks that may be created to implement the present invention, where all filter device objects are omitted for the simplicity. Shown on the left half is a layer of recursively enumerated SCSI devices on top of the PCI bus, which is typically the case when SCSI disks are connected to the host's PCI bus. In the first instance, a PnP Manager has a built-in driver for a virtual root bus that conceptually connects computer to all the hardware that can't electronically announce its presence including hardware bus such as PCI. The root bus driver 640 gets information about the PCI bus from the registry to create a PCI bus PDO 641, a PDO for the PCI bus, where the registry was initialized by a Windows 2000 setup program.

Having created the PCI bus PDO 641, the PnP Manager then loads functional drivers for the PCI bus, thus creating a PCI bus FDO 642. The functional driver of the PCI bus can then enumerate its own hardware devices attached to the PCI bus, where the example system in FIG. 21 assumes to have a set of SCSI devices, to create a SCSI port PDO 643. Once the SCSI port PDO 643 is created, the PnP Manager then loads drivers for SCSI port device, thus creating a SCSI port FDO 644. Similarly, SCSI disk PDOs, such as 645 and 646, are created for each of the individual SCSI disks on top of the SCSI port, and SCSI disk FDOs, such as 647 and 648, are in turn created by loading the disk class driver.

Shown on the right half of FIG. 21 is the corresponding device stacks for the NAD devices that would be created by using the NAD bus driver and NAD port driver replacing the PCI bus driver and the SCSI port driver, respectively. On top of the root is a NAD BUS PDO 651, the PDO of the NAD bus that is not conventional hardware bus such as PCI, but a bus required to fit in the Windows 2000 device stack in order to provide virtual bus for NAD devices. On top of the NAD bus PDO 651, the PnP Manager creates a NAD bus FDO 652 by loading a NAD bus driver.

A set of NAD Port PDOs 653 and 654 for each of individual network interface cards (NICs) of the Windows 2000 host are then created recursively since one NAD port is implemented to correspond to one NIC of the host in the present invention. On top of each NAD port PDO such as 653 or 654, each NAD port FDO such as 655 or 656 is created by loading a NAD port driver. It is the NAD port driver that performs the actual NAD disk I/O operations. The NAD port driver should handle the NAD device I/O requests by redirecting the I/O requests and obtaining the I/O replies to and from the corresponding NAD devices through the specific NIC. The NAD port FDO such as

655 or 656 then creates individual NAD device PDOs such as 657, 658, 659 or 660 on top of the specific NAD port for individual NAD devices that can be accessed through the specific NAD port bound to a specific NIC.

FIG. 22 shows that for the example in FIG. 21, two stacks of NAD port objects 653 and 654 are created because Host #1 has two NICs. Host #1 also has four NAD device PDOs 657 through 660, two for each NAD port, because NAD devices, i.e., disk(1,1) 631 and disk(1,3) 633 and disk(2,1) 636 and disk(2,2) 637 are to be accessed through the NIC(1,1) and NIC(1,2) respectively. For each individual NAD device PDO such as 657, 658, 659 or 660, the PnP Manager loads disk class driver to create a NAD device FDO such as 661, 662, 663 or 664.

Note here that the only NAD bus driver and NAD port driver are to replace the conventional bus driver and SCSI port driver respectively in order to substitute the NAD devices for the conventional local disks. Disk class driver and other higher level drivers of Windows 2000 should remain intact without a single change in order for the Windows 2000 system to recognize the NAD device as same as a local disk.

In Windows 2000, each request for an operation affecting a device uses an I/O request packet (IRP). IRPs are normally sent to the topmost driver of a stack for the device and can percolate down the stack to the other drivers. At each level, the driver decides what to do with the IRP. Sometimes, the driver does nothing except passing the IRP down. The driver may completely handles the IRP without passing it down or process the IRP and pass it down. In the case of disk I/O, for example as shown in FIG. 20B, an IRP for a file I/O sent to the file system driver is passed to a volume manager, a disk class partition manager, to a partition manager, and to disk class driver.

It is the disk class driver where a SCSI Request Block (SRB) is created to be

included in the IRP as necessary. An SRB is a data structure specified in the Windows 2000 for SCSI device I/O. If the IRP is for the conventional local disk, the disk class driver passes the new IRP down to a SCSI port driver that completes actual disk I/O operation. If the IRP is for the NAD device connected to the network, the disk class driver passes the IRP down to NAD port driver that completes NAD device I/O through the network interface.

Without regard to the particular device type of the disk, local or NAD device, it is the feature of the Windows 2000 device stack as shown in FIGS. 20A and 20B that an IRP for a specific disk, local or network-attached, is directed eventually to the corresponding disk. This is because separate disk object stacks are created for each of the individual disks. FIG. 22 shows that separate SCSI disk FDO/PDOs and NAD device FDO/PDOs are bound to each of the individual local disks and NAD devices, respectively.

The present invention replaces the conventional disk bus driver and port driver with the new NAD bus and port drivers as shown in FIG. 20B so that NAD devices would be recognized as local disks by the Windows 2000 system.

All of the Windows 2000 device drivers have functions to create and remove the FDO for each device and dispatch functions to handle IRP passed down from the above driver layer. The major and minor function numbers in the IRP specify which of the dispatch functions will be invoked.

The following is an explanation of the actual software modules implemented in the NAD bus driver and port driver of the present invention in order to implement the NAD system for Windows 2000.

NAD Bus Driver

The NAD bus driver is a set of software modules that implement a virtual host bus adapter to which NAD ports are to be attached, where the individual NICs of a host are realized as NAD ports. The functions of the NAD bus driver are basically the same as those of a conventional PCI bus driver in Windows 2000. The NAD bus driver performs the functions of finding out the number of the NICs installed in the host computer and enumerating those NICs to create an NAD port PDO for each of the existing NICs. It also performs the functions of creating, starting, stopping, and removing an NAD port. In the NAD system, an individual NIC is regarded as an independent NAD port so that NAD disk ports for NAD devices are created according to the number of independently operating network units. See the example configuration shown FIG. 22.

The difference between the NAD bus driver and a conventional PCI bus driver is that the NAD bus driver is for NAD devices that are physically separated from the system bus of the host but are connected through network ports. Unlike a conventional Windows 2000 system that detects plug-in of a device to or removal of a device from the hardware bus through a hardware interrupt, the NAD bus driver is implemented by creating a kernel thread to install and remove an NAD port on the NAD bus. The kernel thread created by the NAD bus driver starts to work when an IRP with IRP_MJ_PNP as its major function number and IRP_MN_START_DEVICE as its minor function number is sent to the NAD bus FDO from the PnP Manager. The thread terminates when the NAD bus FDO is removed. The thread periodically detects existence of NICs. If a new NIC is detected, the thread creates a new NAD port PDO for the NIC and includes the newly created NAD port PDO into its own list of NAD

port PDOs. The thread then invokes the PnP Manager to have the NAD port PDO recognized by the system. Removal of an NIC is also detected by the thread since the thread can detect the absence of the NIC of which NAD port PDO previously created would be found in the above mentioned list without the corresponding NIC. If an NIC is found to have been removed from the host, the thread removes the corresponding NAD port PDO from its list and invokes the PnP Manager to remove the NAD port from the Windows 2000 system.

The software routines implemented in the NAD bus driver can be classified into five categories. The following tables list some of the routines implemented in the NAD bus driver with brief explanations.

Basic functions	
DriverEntry()	<ul style="list-style-type: none"> - executed when the driver is initially loaded - registers dispatch routines of the NAD bus driver - initializes the variables used by the driver
NADBusUnload()	<ul style="list-style-type: none"> - recovers resources occupied by the driver when the driver is unloaded
NADBusAddDevice()	<ul style="list-style-type: none"> - creates NAD bus FDO - initializes the value of the NAD bus FDO

[Table 4]

Dispatch functions	
NADBusCreate()	<ul style="list-style-type: none"> - processes the 'IRP_MJ_CREATE' IRP
NADBusClose()	<ul style="list-style-type: none"> - processes the 'IRP_MJ_CLOSE' IRP
NADBusPnp()	<ul style="list-style-type: none"> - processes the 'IRP_MJ_PNP' IRP - determines whether the IRP passed is to NAD bus FDO or to NAD port PDO, and invokes NADFDOPnP() or

	NADPDOPnP() accordingly
NADBusPower()	- processes 'IRP_MJ_POWER' IRP

[Table 5]

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NAD bus FDO related functions	
NADBusFDOpnp()	- invoked when IRP_MJ_PNP is sent to NAD bus FDO - processes various minor functions according to the minor function number sent together
IRP_MN_START_DEVICE	-transfer NAD bus FDO to 'started' state -invokes NADBusStartFDO()
IRP_MN_QUERY_STOP_DEVICE	-invoked to query if NAD bus FDO can be stopped -transfer NAD bus FDO to 'stop pending' state
IRP_MN_CANCEL_STOP_DEVICE	-invoked to cancel IRP_MN_QUERY_STOP_DEVICE
IRP_MN_STOP_DEVICE	-stops NAD bus FDO -transfers NAD bus FDO to 'stopped' -blocks NADBusHW() thread
IRP_MN_QUERY_REMOVE_DEVICE	-invoked to query if NAD bus FDO can be removed from the system
IRP_MN_CANCEL_REMOVE_DEVICE	-invoked to cancel IRP_MN_QUERY_REMOVE_DEVICE

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	IRP_MN_SURPRISE_REMOVAL	-invoked when NAD bus FDO is removed abnormally
	IRP_MN_REMOVE_DEVICE	-invoked when NAD bus FDO is removed normally
	IRP_MN_QUERY_DEVICE_RELATIONS	-passes list of NAD port PDO to PnP manager
NADBusStartFdo()	- allocates resources to NAD bus FDO	
NADBusRemoveFdo()	- recovers resources occupied by NAD bus FDO - removes the NADBusHW() thread	
NADBusGetDeviceCapabilities()	- passes DeviceCapability data dtructure to PnP manager	

[Table 6]

NAD port PDO related functions	
NADPortPDOPnp()	- processes minor functions related to PnP - invoked when IRP_MJ_PNP is sent to NAD port PDO

	Minor functions: IRP_MN_START_DEVICE IRP_MN_QUERY_STOP_DEVICE IRP_MN_CANCEL_STOP_DEVICE IRP_MN_STOP_DEVICE IRP_MN_QUERY_REMOVE_DEVICE IRP_MN_CANCEL_REMOVE_DEVICE IRP_MN_SURPRISE_REMOVAL IRP_MN_REMOVE_DEVICE IRP_MN_QUERY_CAPABILITIES IRP_MN_QUERY_ID IRP_MN_QUERY_DEVICE_RELATIONS IRP_MN_QUERY_DEVICE_TEXT IRP_MN_QUERY_RESOURCES_REQUIREMENTS IRP_MN_QUERY_RESOURCE
NADPortPDOQueryDeviceCaps()	- returns DEVICE_CAPABILITIES data structure of NAD port
NADPortPDOQueryDeviceId()	- returns device ID, instance ID, hardware ID of NAD port
NADPortPDOQueryDeviceText()	- returns location and description of NAD port
NADPortPDOQueryDeviceRelations()	- returns target device relation value
NADPortInitializePdo()	- initialize NAD port PDO value - invoked when NAD port attached to NAD bus is detected
NADPortDestroyPdo()	- removes NAD port PDO and recovers resources

[Table 7]

Function to detect NAD port	
NADBusHW()	- routine for the kernel thread to detect NAD ports attached to NAD bus - periodically detects the existence of NICs - if a new NIC is detected, creates NAD port PDO

TABLE 8

	and invokes NADPortInitializePdo() - if a NIC is detected to have been removed, removes NAD port PDO by invoking NADPortDestroyPdo()
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[Table 8]

NAD Port Driver

A port driver is a lower-level driver that responds to a system-defined device control request or a driver-defined device I/O control request from a corresponding class driver.

The NAD port driver is capable of basic functions to initialize the driver and create an NAD port FDO and dispatch functions to process IRP passed down from the disk class driver layer. The IRP passed down from the disk class driver may contain a SCSI request block (SRB), which specifies the actual I/O command to be performed onto the SCSI device.

Tables 9 and 10 list the basic functions and some of the dispatch functions, of which roles are basically the same as those of the NAD bus driver described earlier, are presented with brief explanations.

Basic functions	
DriverEntry()	- initializes driver - registers driver functions
NADPortAddDevice()	- invoked by PnP manager to create NAD port FDO
NADPortDriverUnload()	- invoked when to remove driver - recovers resources

[Table 9]

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Dispatch functions for initialization, creation, and removal of the NAD port	
NADPortCreateClose()	- processes IRP_MJ_CREATE and IRP_MJ_CLOSE IRP
NADPortCleanup()	- processes IRP_MJ_CLEANUP IRP - recovers resources
NADPortPnp()	- processes IRP_MJ_PNP IRP
NADPortPower()	- processes IRP_MJ_POWER IRP

[Table 10]

In Windows 2000, a device I/O control command is included in an IRP as a device I/O control number, and the device I/O control functions are implemented in the port driver to handle the corresponding device I/O control numbers.

Besides the regular device I/O control functions in Windows 2000, additional device I/O control functions are implemented in the NAD port driver so that the NAD can be added or removed dynamically without stopping the Windows 2000 system. With conventional local disks, addition or removal of the local disk can be directly detected by the Windows 2000 system at the time of the system booting because the local disks are physically connected to the physical hardware bus. Therefore, the creation of a disk PDO for a local disk is basically initiated from the hardware interrupt at the time of the system booting. So the conventional port driver does not have to have functions that initiate addition or removal of the PDO of a disk device in the middle of the system operation.

However, in an NAD system, addition and removal of an NAD device can occur while the Windows 2000 system is running. Therefore, there should be a mechanism that can create/remove a disk PDO for the newly attached/removed disk.

The device I/O control functions implemented in the present invention handle such dynamic addition and removal of the NAD as follows. If a device control IRP that tells a new NAD hardware device is hooked up to the network is passed to the NAD port FDO, the NAD port FDO creates an NAD device PDO for the new NAD thus letting the system recognize the disk. For the removal of the NAD device, device control IRP to remove the disk is sent to and processed by NAD port FDO similarly.

The dispatch functions that handle device I/O control IRPs are summarized in the following table. Note that the device I/O control functions, NASPortFdoDeviceControl(), NADPortPlugInDevice(), and NADPortUnplugDevice() are the functions particular to the present invention for the purpose of dynamic addition and removal of the NAD.

NAD port device control dispatch functions	
NADPortDeviceControl()	<ul style="list-style-type: none"> - invoked when I/O control IRP is passed - processes IRP_MJ_DEVICE_CONTROL IRP - invokes NADPortFdoDeviceControl() for FDO control - invokes NADPortPdoDeviceControl() for PDO control
NADPortFdoDeviceControl()	<ul style="list-style-type: none"> - registers new NAD device or removes an NAD device - processes I/O control functions
	<p>IOCTL_NADPORT_PLUGIN_HARDWARE</p> <p>Invokes NADPortPlugInDevice() to register new NAD hardware</p> <p>IOCTL_NADPORT_UNPLUG_HARDWARE</p> <ul style="list-style-type: none"> - invokes NADPortUnplugDevice() to remove an NAD hardware

<p>NADPortPdoDeviceControl()</p>	<ul style="list-style-type: none"> - processes I/O controls for PDO - invokes I/O control functions according to the device I/O control function numbers in the IRP
	<p>IOCTL_STORAGE_QUERY_PROPERTY</p> <ul style="list-style-type: none"> - queries NAD device property <p>IOCTL_GET_DISK_DRIVE_GEOMETRY</p> <ul style="list-style-type: none"> - returns DISK_GEOMETRY data structure containing geometry information of the NAD device <p>IOCTL_GET_SCSI_ADDRESS</p> <ul style="list-style-type: none"> - NAD device does not use SCSI address, so sets the values of PathID and TargetID 0s and returns enumeration number of NAD device to LUN in CDB

[Table 11]

FIG. 23A shows the flow of IRP, SRB, and CDB where the IRP is to a SCSI disk connected to a conventional hardware bus such as PCI bus in a Windows 2000 system. A disk class driver 681 passes down to a SCSI port driver 682 and a SCSI bus driver 683 an IRP that may contain an SRB. The SRB is a data structure that contains information about the requested I/O and a command descriptor block (CDB) containing a SCSI-2 standard command. Receiving the IRP with SRB from the disk class driver, the SCSI port driver 682 and the SCSI bus driver 683 deliver the CDB extracted from the SRB to the SCSI host adapter 684 to complete an actual device I/O to a SCSI disk 685.

In a conventional local disk, disk I/O commands are delivered to a disk controller at the host adapter using the SRB data structure. But, in the NAD system of the present invention, disk input/output commands are delivered to the NIC of the host.

FIG. 23B shows the flow of IRP, SRB, and CDB (or some other types of I/O

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commands) in the NAD system. A disk class driver 691 passes down an IRP with an SRB to a NAD port driver 692 and a NAD bus driver 693, which then deliver the CDB extracted from the SRB to NIC 694 to complete an actual device I/O to a NAD device 695 through a network 696.

In the present invention, the NAD system supports various types of disks including SCSI and IDE. If the NAD device is composed of SCSI disks only, the CDB is delivered as is to the host NIC so that the network-attached SCSI disks can perform the requested disk I/O.

If the NAD device, however, is composed of disk devices of other type than SCSI such as IDE, the CDB must be translated into the commands that can be processed by the specific devices. The translation of the CDB, in such a case, can be done either at the NAD port driver or at the NAD device. If the translation is to be done at the NAD, the Windows 2000 host simply delivers a CDB to the host NIC as if it delivers a CDB to a SCSI disk. If the translation is to be done at the NAD port driver, the NAD port driver functions must translate the CDBs into a set of disk I/O commands appropriate to the specific hardware disk types.

The NAD system of the present invention supports both cases, and the type of the commands, i.e., CDB or hardware-specific commands, is determined at the time of the installation of the specific NAD. Some of the dispatch functions that process SRB with mandatory CDB operation codes are given in table 12 to show how the NAD port driver functions are implemented to handle the SRB and CDB in the present invention. Such SRB processing functions are required if the NAD port driver has to translate the CDB into a set of hardware specific I/O commands.

NADPortInternalDeviceControl() - executes SrFunctionExecuteScsi() when SRB_FUNCTION_EXECUTE_SCSI is passed as the SRB function value	
SrbFunctionExecuteScsi()	-processes CDB -invokes CDB processing functions according to the CDB operation codes given below
	SISCOP_TEST_UNIT_READY - tests if an NAD device is accessible
	SCSIOP_MODE_SENSE - returns configuration of NAD device
	SCSIOP_READ - reads a block from NAD
	SCSIOP_WRITE - write a block to NAD
	SCSIOP_MODE_SELECT - sets parameter to NAD
	SCSIOP_READ_CAPACITY - returns size of the next block or address of the last block
	SCSIOP_REASSIGN_BLOCKS - relocates block
	SCSIOP_RESERVE/SCSIOP_RELEASE - changes status information
	SCSIOP_START_UNIT - starts NAD
	SCSIOP_STOP_UNIT - stops NAD
	SCSIOP_VERIFY - verifies data stored in NAD

[Table 12]

Communication between the host and the NAD

Disk I/O commands in the NAD system are delivered to the host NIC instead of the local disk host adapter because the I/O should be done over the network rather than over the bus. Windows 2000 provides a Network Driver Interface Specification

(NDIS), a set of specifications defined to specify network interface drivers.

FIG. 24 shows a NDIS driver layer defined in Windows 2000. It consists of a NDIS protocol driver 701 for specifying a high-level protocol to be used, a NDIS intermediate driver 702, an NDIS miniport 703 for managing hardware specifics, and a network interface card (NIC) 704.

In the present invention, all the NAD port driver functions that deliver I/O commands to the NAD devices are implemented to deliver the commands to a NDIS (network driver interface specification) protocol driver layer through which the commands are delivered to the NAD devices over the network.

Upon receiving from the disk class driver the IRP containing an SRB or an I/O control command for specific disk I/O operation, the NAD port driver passes down a new IRP containing the corresponding CDB to the protocol driver. Then the protocol driver sends the CDB, which is the SCSI-2 standard I/O command, to the NAD device and, in turn, receives and handles the reply from the NAD device. Note here that if the host computer has to send some hardware specific I/O commands other than CDB as is pointed out in FIG. 23B, the NAD port driver passes down an IRP containing the hardware specific commands instead of the CDB to the NDIS protocol driver.

The NDIS provides transport-independence for network vendors because all drivers that require communication over the network calls the NDIS interface to access the network, thus providing a ready solution for the communication between the host computer and the NAD devices in the present invention.

The actual protocol implemented in the protocol driver of the NDIS may adopt a standard protocol or a non-standard protocol. Since a standard protocol such as IP (Internet Protocol) involves an overhead, a non-standard protocol may be preferred in

terms of performance and security. The present invention follows the NDIS specification of the Windows 2000 network system to implement a proprietary communication protocol into the NDIS protocol driver in order to provide a communication protocol between a Windows 2000 host and NAD devices to reliably handle the NAD I/O commands.

NAD Device

The technical constitution of the NAD device running under the Windows family of operating systems is the same as that of the NAD device running under the UNIX family of operating systems shown in FIG. 14.

Advantages of the NAD System over NAS and SAN

Either running the UNIX or Windows family of operating systems, the NAD system of the present invention has numerous advantages over the NAS system and the SAN system. Unlike the NAS system that provides file storage service by way of an additional file server, the NAD device is attached to a host computer as if it is a local disk connected to the system bus of the host. Unlike the SAN system, the NAD device of the present invention is simply plugged into a network port without requiring any additional special switch or network equipment. Therefore, the NAD system provides better user convenience, system flexibility, scalability, economy, and performance.

All the disk-related operations, including formatting, partitioning, sharing, and mounting, can be done to NAD devices just as they can be done to a local disk. Since NAD devices are directly available to the host as local disks, the NAD system provides better manageability and user convenience. In the NAS system, addition, deletion, or

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any change to the disk configuration should be consulted to the NAS operating system through human or software intervention. In the NAD system, addition or deletion of an NAD device is instantly achieved by plugging or unplugging the NAD device to and from a network port. The NAD system even provides a superior user convenience in installing and uninstalling the disks, eliminating the need of opening and closing the case of the host computer.

The NAD system provides almost unlimited scalability to the disk capacity. The number of NAD devices that can be attached to the network is virtually unlimited, whereas the number of disks available through the NAS system is severely limited because of an economical reason and the inconvenience involved in the management of the multitudes of NAS servers.

The NAD system is intrinsically more economical than the NAS or SAN system because each NAD device does not employ file server software and other additional special hardware equipment.

Media Changeable NAD system

An NAD system of the present invention can be alternatively implemented as a media changeable storage device. A media changeable storage device is a special storage device that is physically separated two parts, one being the media containing the data and the other being the driver performing an I/O operation to the media. Floppy disk drivers, CD-ROM drivers are examples of media changeable storage devices. Whether a media is installed or not, a media changeable storage device can be registered to a host computer so that a media such as a diskette can be inserted into a driver dynamically.

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Since NAD devices can be plugged in or removed from a network port dynamically, a virtual driver that uses NAD as a media can be implemented in the form of a media changeable storage device. Windows 2000 provides the changer class driver model to implement a media changeable storage device. In order to implement a media changeable NAD system, a class driver for the NAD system is implemented according to the model of the changer class driver of Windows 2000. The two lower-level drivers, i.e. the NAD port driver and the NAD bus driver, are used to implement such media changeable NAD system.

Alternative Embodiment using Converter and Counter-Converter

Instead of using a network interface card (NIC) and new virtual host bus adapter, the network attached disk of the present invention may be implemented by providing in the host side a protocol converter that converts storage commands into data link frames containing the storage commands so that the frames can be sent through a network, and by providing in the device side a counter-converter that converts the data link frames containing the storage commands received through the network into the storage commands.

Since a converter is a specialized network interface, the converter encapsulates the I/O commands and data to data link frame so as transmit them to an I/O device through a network without the overhead of processing communication protocols in general.

Tape System, CD Juke Box

The kinds of storage devices that can be directly connected to a network using

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the interface of the present system are not limited to disk systems. Tape systems and CD drives use IDE or SCSI interface, the same bus interface as disk systems. For example, the present invention may be used to connect multiple CD drives directly to a network, enabling a cost-effective implementation of a CD-Juke box.

While the invention has been described with reference to preferred embodiments, it is not intended to be limited to those embodiments. It will be appreciated by those of ordinary skilled in the art that many modifications can be made to the structure and form of the described embodiments without departing from the spirit and scope of this invention.

WHAT IS CLAIMED IS:

1. A network-attached disk (NAD) system where a host, having a system bus and running an operating system, controls a disk through a front-end network connecting the host and other devices for carrying general-purpose network traffic including storage as well as other application traffic using a certain network protocol, comprising:

a network interface card (NIC) installed at the host for providing a general-purpose network connection;

a network-attached disk (NAD) device having one or more disks to store data, the NAD device attached to the network, for receiving disk access commands from the host in data link frames through the network; and

a device driver, running at the host, for creating a virtual host bus adapter in software controlling the NAD device through the network via the NIC;

wherein the virtual host bus adapter controls the NAD device in a way indistinguishable from the way as a physical host bus adapter device controls a device so that the host recognizes the NAD device as if it is a local device connected directly to the system bus of the host.

2. The NAD system of claim 1, wherein the network is a wired network.
3. The NAD system of claim 1, wherein the network is a wireless network.
4. The NAD system of claim 1, wherein the NIC is an Ethernet card.
5. The NAD system of claim 1, wherein the operating system is the UNIX family

of operating systems.

6. The NAD system of claim 5, wherein the device driver comprises a device file and device driver routines for the device driver to register the device driver to the host.

7. The NAD system of claim 6, further comprising a device accessing thread for accessing the NAD device.

8. The NAD system of claim 6, further comprising a device searching thread for searching for a device attached to the network.

9. The NAD system of claim 6, further comprising a network connection setting thread for making a connection between the device driver and the NAD device.

10. The NAD system of claim 6, wherein the NAD disk further comprises a plurality of individual disk partitions.

11. The NAD system of claim 10, wherein the device driver comprises a plurality of individual device drivers, each individual device driver for controlling the individual disk partition whereby each individual disk partition is accessed as an independent local disk.

12. The NAD system of claim 10, wherein the device driver comprises a plurality of individual partitions, each driver partition for controlling each individual disk

partition.

13. The NAD system of claim 1, further comprising a second NAD device, a second device driver, and a unified device driver combining the device driver and the second device driver so that the NAD device and the second NAD device are recognized as logically a single local device.

14. The NAD system of claim 1, wherein the driver includes:
a bus driver for creating the virtual host adapter to access the NAD device as if it is a local device connected directly to the system bus of the host; and
a port driver for communicating the disk access command from the host to the NAD device through a network port.

15. The NAD system of claim 14, wherein the operating system is the Windows family of operating systems.

16. The NAD system of claim 1, wherein the NAD device further comprises:
a disk controller for controlling the disk; and
a network adapter for receiving the disk access command through the network.

17. The NAD system of claim 16, wherein said one or more disks are formatted as local disks.

18. The NAD system of claim 16, further comprising a filter program providing a

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utility function.

19. The NAD system of claim 18, wherein the utility function includes the function of controlling sharing of access among multiple hosts.

20. The NAD system of claim 18, wherein the utility function includes the function of controlling transfer of access right of one host to another.

21. The NAD system of claim 18, wherein the utility function includes the function of providing automatic back-up of the NAD device.

22. The NAD system of claim 18, wherein the utility function includes the function of controlling access to the NAD device.

23. A disk interface at a host, having a system bus and running an operating system, for controlling a network-attached disk (NAD) device having a disk through a front-end network connecting the host and other devices for carrying general-purpose network traffic including storage as well as other application traffic using a certain network protocol, comprising:

a network interface card (NIC) installed at the host for providing a general purpose network connection; and

a device driver, running at the host, for creating a virtual host bus adapter in software controlling the NAD device through the network via the NIC;

wherein the virtual host bus adapter controls the NAD device in a way

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indistinguishable from the way a physical host bus adapter device controls a device so that the host recognizes the NAD device as if it is a local device directly connected to the system bus of the host.

24. The disk interface of claim 23, wherein the operating system is the UNIX family of operating systems.

25. The disk interface of claim 24, further comprising a device file and device driver routines for the device driver to register the device driver to the host

26. The disk interface of claim 25, further comprising a device accessing thread for accessing the NAD device.

27. The disk interface of claim 25, further comprising a device searching thread for searching for a device attached to the network.

28. The disk interface of claim 25, further comprising a connection setting thread for making a connection between the device driver and the NAD device.

29. The disk interface of claim 25, wherein the NAD device has a disk partitioned into a plurality of individual disk partitions.

30. The disk interface of claim 29, wherein the device driver further comprises a plurality of individual device drivers, each individual device driver for controlling the

individual disk partition whereby each individual disk partition is accessed as an independent local disk.

31. The disk interface of claim 29, wherein the device driver comprises a plurality of partitions, each driver partition for controlling each individual disk partition..

32. The disk interface of claim 23, wherein the device driver comprises:
a bus driver for creating the virtual host bus adapter to access the NAD device as a local device connected directly to the system bus of the host; and
a port driver for communicating a disk access command through a network port.

33. The disk interface of claim 32, wherein the operating system is the Windows family of operating systems.

34. A network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising:

a network adapter for receiving disk access command in data link frames through the network;

a disk controller, connected to the LAN adapter, for executing disk access commands; and

a disk for storing data; and

a controller, connected to the network adapter and the disk controller, for

controlling the operation of the NAD device.

35. The NAD device of claim 34, wherein the network runs Ethernet.

36. The NAD device of claim 34, wherein said disk is formatted as a local disk.

37. The NAD device of claim 34, wherein said disk is partitioned as a local disk.

38. The NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller.

39. The NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device.

40. The NAD device of claim 34, wherein the controller has a filter for controlling access to the disk.

41. The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions.

42. The NAD device of claim 41, wherein each disk partition is controlled by a separate driver.

43. A storage interface at a host having a system bus for controlling a storage device through a front-end network connecting the host and other devices for carrying general-purpose network traffic, comprising:

a network interface card (NIC) installed at the host for providing a general-purpose network connection;

a bus driver for creating a virtual host bus adapter for recognizing the network port as if the storage device is a local device connected directly to the system bus of the host; and

a port driver for communicating a storage command through a network port.

44. The storage interface of claim 43, wherein the storage device is a disk.

45. The storage interface of claim 43, wherein the storage device is a tape system.

46. The storage interface of claim 43, wherein the storage device is a memory system.

47. The storage interface of claim 43, wherein the storage device is a CD drive.

48. The storage interface of claim 43, wherein the host runs the UNIX family of operating system.

49. The storage interface of claim 43, wherein the host runs the Windows family of operating system.

50. A network-attached storage device adapted to be connected through a network to host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the storage device comprising:

- a storage device;
- a network adapter for receiving a storage command through the network; and
- a storage controller for executing the storage command.

51. The network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device.

52. The network-attached storage device of claim 50, wherein the storage device is a disk.

53. The network-attached storage device of claim 50, wherein the storage device is a tape device.

54. The network-attached storage device of claim 50, wherein the storage device is a CD drive.

55. The network-attached storage device of claim 50, wherein the storage device is a memory device.

56. A disk interface at a host having a system bus and running an operating system for controlling a disk device through a network, comprising:

a protocol converter as a host bus adapter for converting protocols from disk access commands to data link frames containing the disk access commands; and

wherein the device driver recognizes the disk device as if it is a local device connected to the system bus of the host.

57. The disk interface of claim 56, wherein the operating system is the UNIX family of operating systems.

58. The disk interface of claim 56, wherein the operating system is the Windows family of operating systems.

59. A network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host having a system bus recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising:

a disk for storing data;

a disk controller for executing a disk access command; and

a network adapter, connected to the network, for receiving data link frames containing the disk access command through the network; and

a counter-protocol-controller, connected to the network adapter and the disk controller, for retrieving the disk access commands from the received data link frames.

60. A storage interface at a host having a system bus for controlling through a network a storage device attached to the network, comprising:

a protocol converter as a host bus adapter for converting storage commands to data link frames for controlling the storage device through the network;

a device driver for creating a virtual host bus adapter controlling the storage device through the network so that the host computer recognizes the storage device as if it is a local device connected directly to the system bus of the host.

61. The storage interface of claim 60, wherein the storage device is a disk.

62. The storage interface of claim 60, wherein the storage device is a tape device.

63. The storage interface of claim 60, wherein the storage device is a CD drive.

64. The storage interface of claim 60, wherein the storage device is a memory device.

65. A network-attached storage device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter so that the host recognizes the device as if it is a local device connected directly to the system bus of the host, the network-attached storage device comprising:

a network adapter for receiving data link frames containing storage commands through the network;

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a storage controller, connected to the network adapter, for executing the storage commands; and

a storage device for storing data; and

a counter-converter, connected to the network adapter and the storage controller, for retrieving the storage commands from the data link frames received by the network adapter.

66. The network-attached storage device of claim 65, wherein the storage device is a disk.

67. The network-attached storage device of claim 65, wherein the storage device is a tape device.

68. The network-attached storage device of claim 65, wherein the storage device is a CD drive.

69. The network-attached storage device of claim 65, wherein the storage device is a memory device.

70. A computer juke box for playing multimedia content, comprising:
a network;
a host computer having a system bus and a network interface card (NIC) for providing a network connection;
a plurality of multimedia player for playing multimedia content attached to the

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network; and

a device driver, running at the host, for creating a virtual host bus adapter whereby the computer recognizes each multimedia player as if it is a local device connected directly to the system bus of the computer.

71. The compute juke box of claim 70, wherein said network is a local area network.

72. The computer juke box of claim 70, wherein said network runs Ethernet.

73. The computer juke box of claim 70, wherein said multimedia players include a CD drive.

74. The computer juke box of claim 70, wherein said multimedia players include a DVD drive.

75. A method of accessing a disk device through a network from a host having a system bus, comprising the steps of:

creating a virtual host bus adapter whereby the host recognizes the disk device as if it is a local device connected to the system bus of the host;

receiving a disk access command from the host through the network;

executing the disk access command; and

sending the result of the command to the host through the network

76. The method of claim 75, wherein the step of creating a virtual host bus adapter includes the step of detecting presence of a network interface card installed at the host.

77. The method of claim 75, wherein the step of creating a virtual host bus adapter includes the step of detecting removal of a network interface card at the host.

78. A method of accessing a storage device connected through a network to a host having a system bus, comprising the steps of:

creating a virtual host bus adapter whereby the host recognizes the storage device as if it is a local device connected directly to the system bus of the host; and
communicating a storage command through the network port.

79. The method of claim 78, wherein the storage device is a disk.

80. The method of claim 78, wherein the storage device is dynamically installed.

81. The method of claim 78, wherein the host runs the UNIX family of operating systems.

82. The method of claim 78, wherein the host runs the Windows family of operating systems.

83. The method of claim 78, wherein said step of communicating a storage command includes the step of sending an I/O request packet (IRP) containing an I/O

transaction to be performed by the storage device.

84. The method of claim 78, wherein said step of communicating a storage command includes steps for translating a storage command to a command specific to an IDE storage device.

85. The method of claim 78, wherein said step of communicating a storage command includes steps for translating a storage command to a command specific to a SCSI storage device.

Microsoft Corporation

ABSTRACT

A network-attached disk (NAD) system is disclosed that includes an NAD device for receiving a disk access command from a host through a network, and a device driver at the host for controlling the NAD device through the network, where the device driver creates a virtual host bus adapter so that the host recognizes the NAD device as if it is a local device to the host. The host may run the UNIX or Windows family of operating systems. The NAD device includes a disk for storing data, a disk controller for controlling the disk, and a network adapter for receiving a disk access command from the host through a network port.

EXHIBIT 2004.650

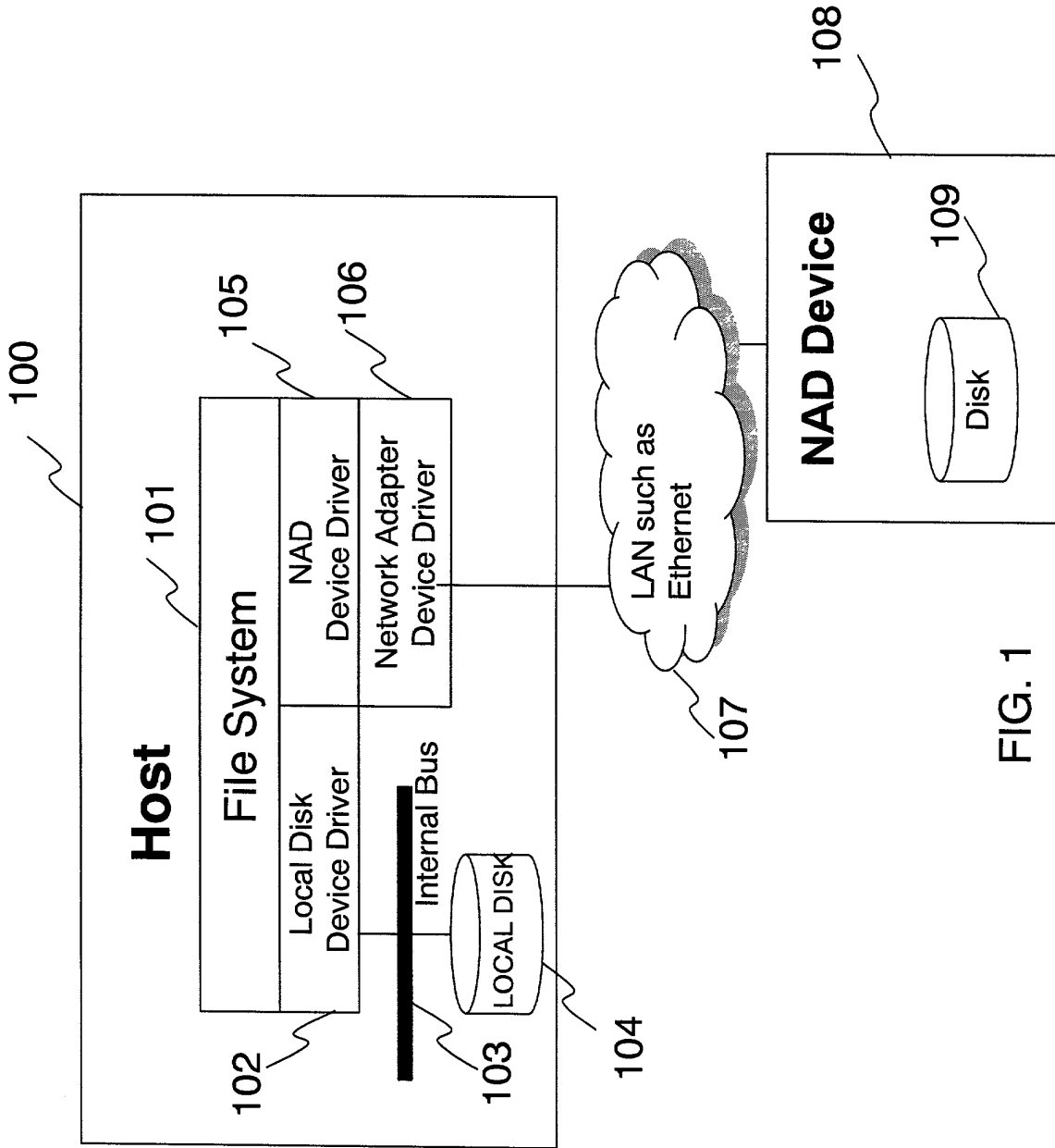


FIG. 1

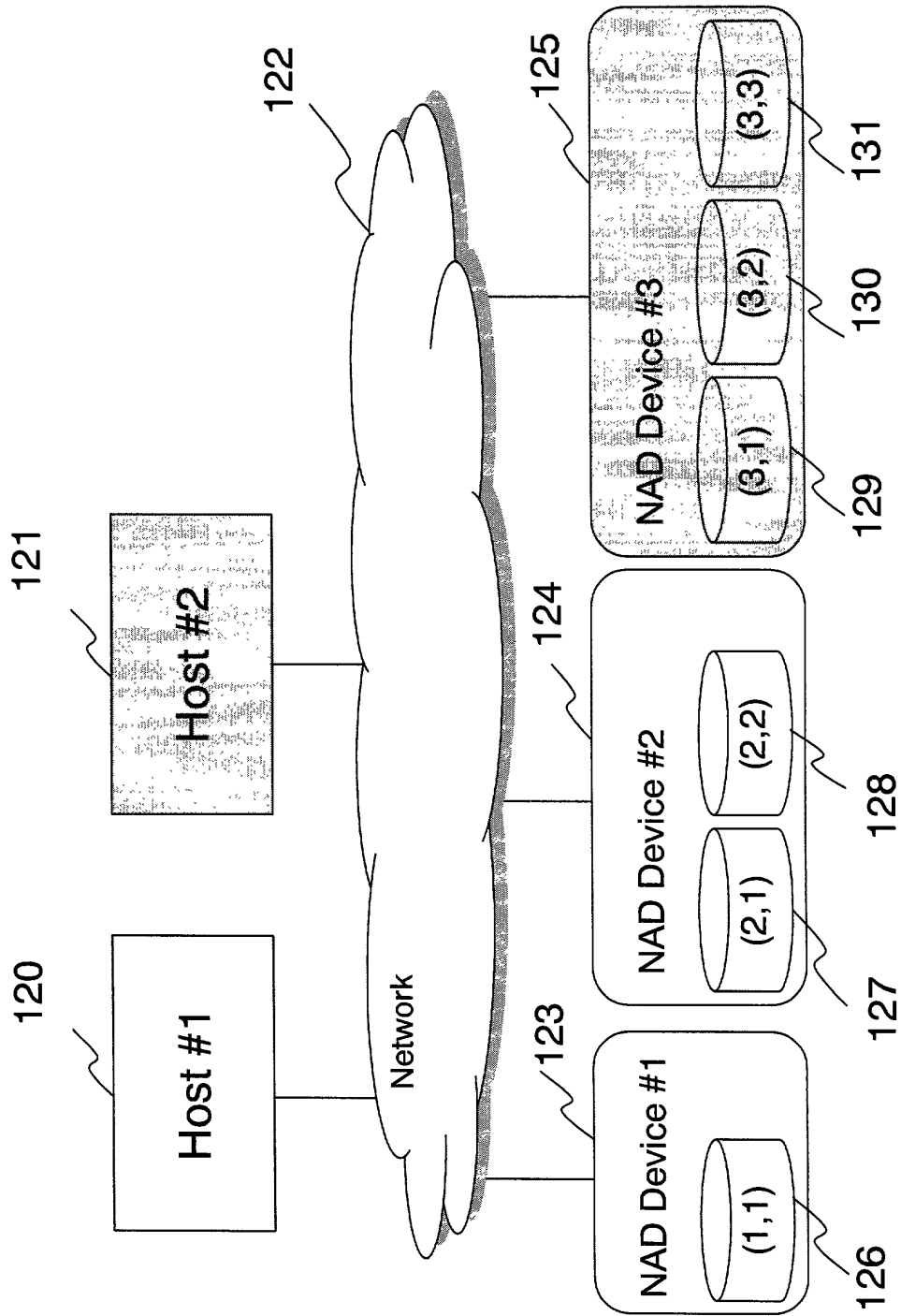


FIG. 2

FIG. 3

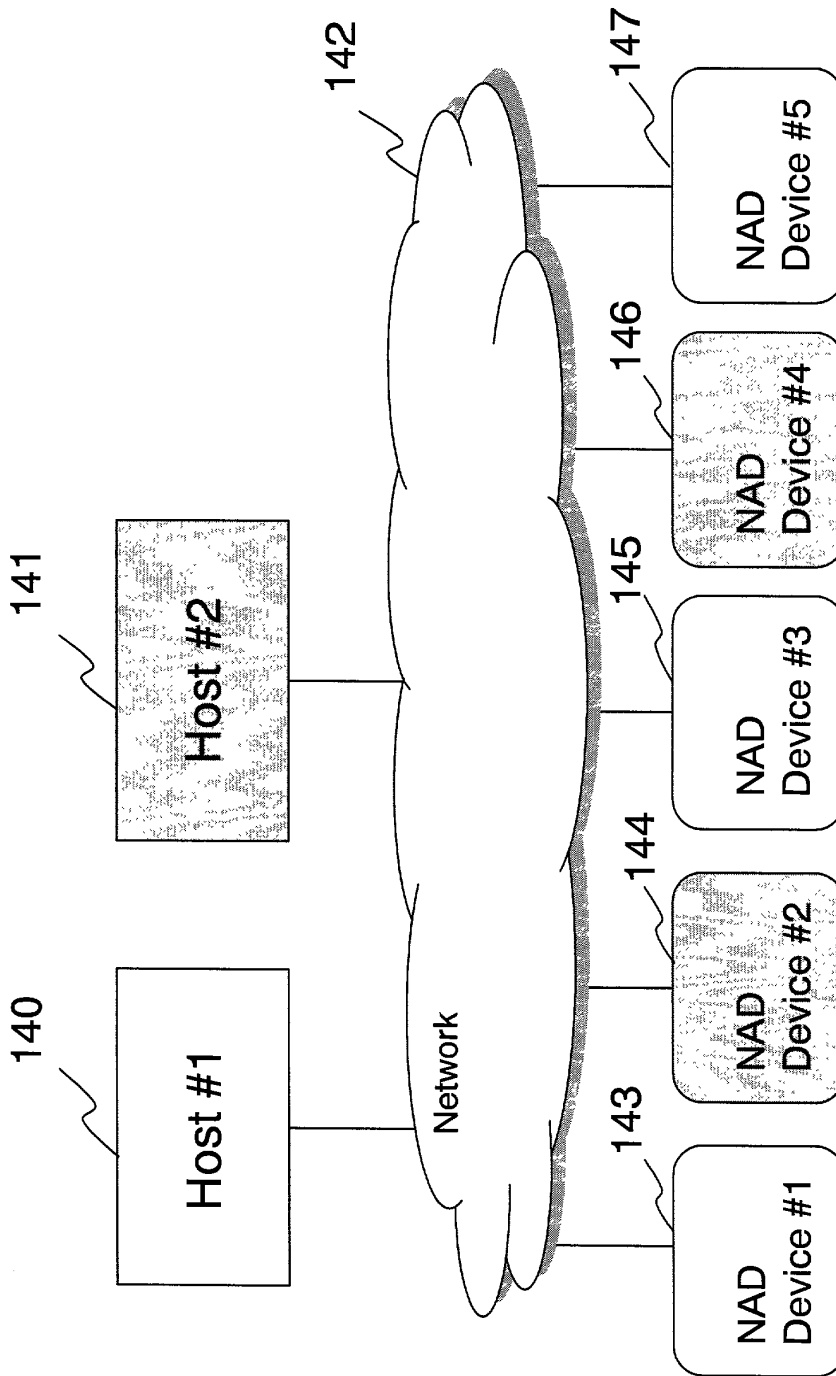


FIG. 3

FIG. 4

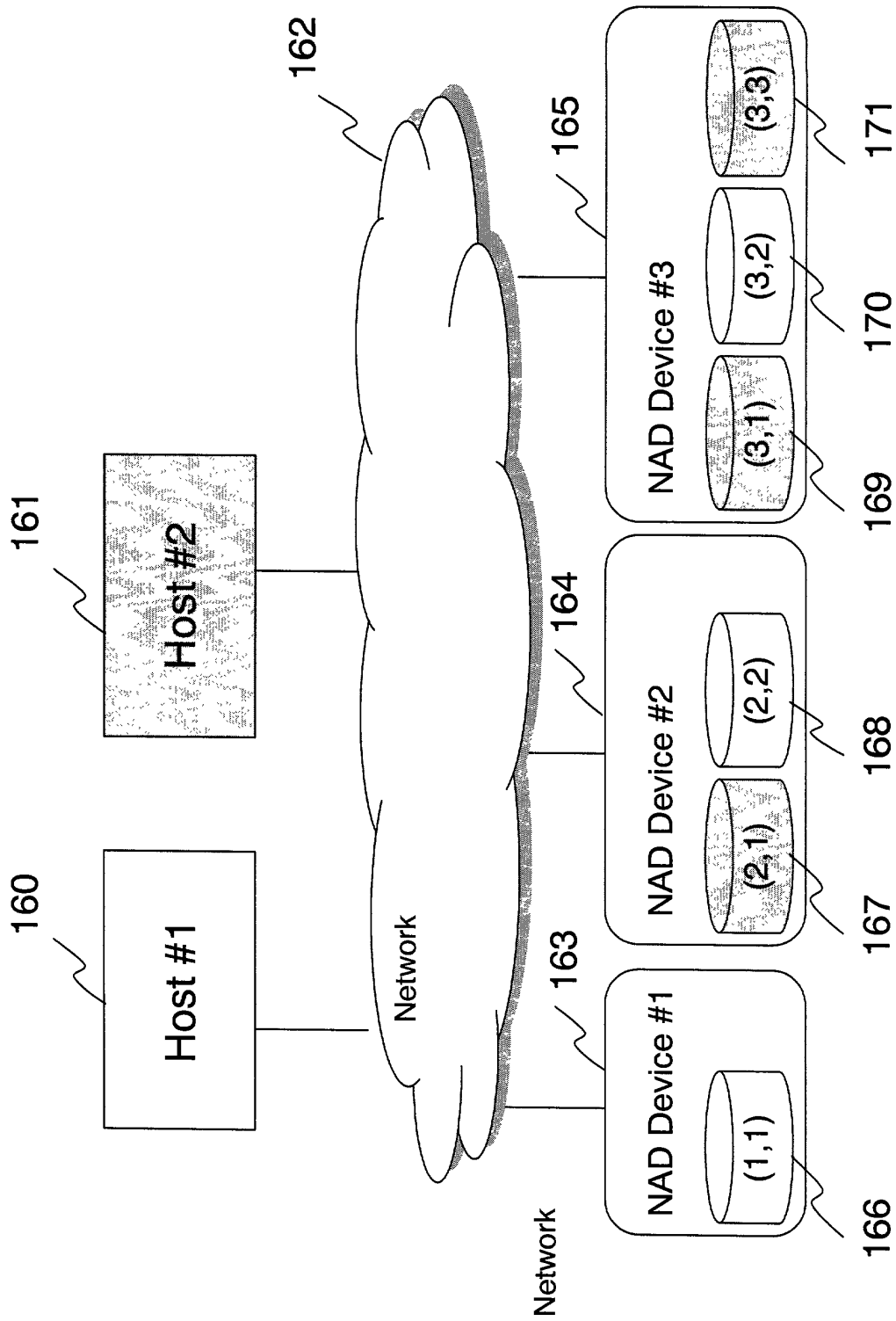


FIG. 4

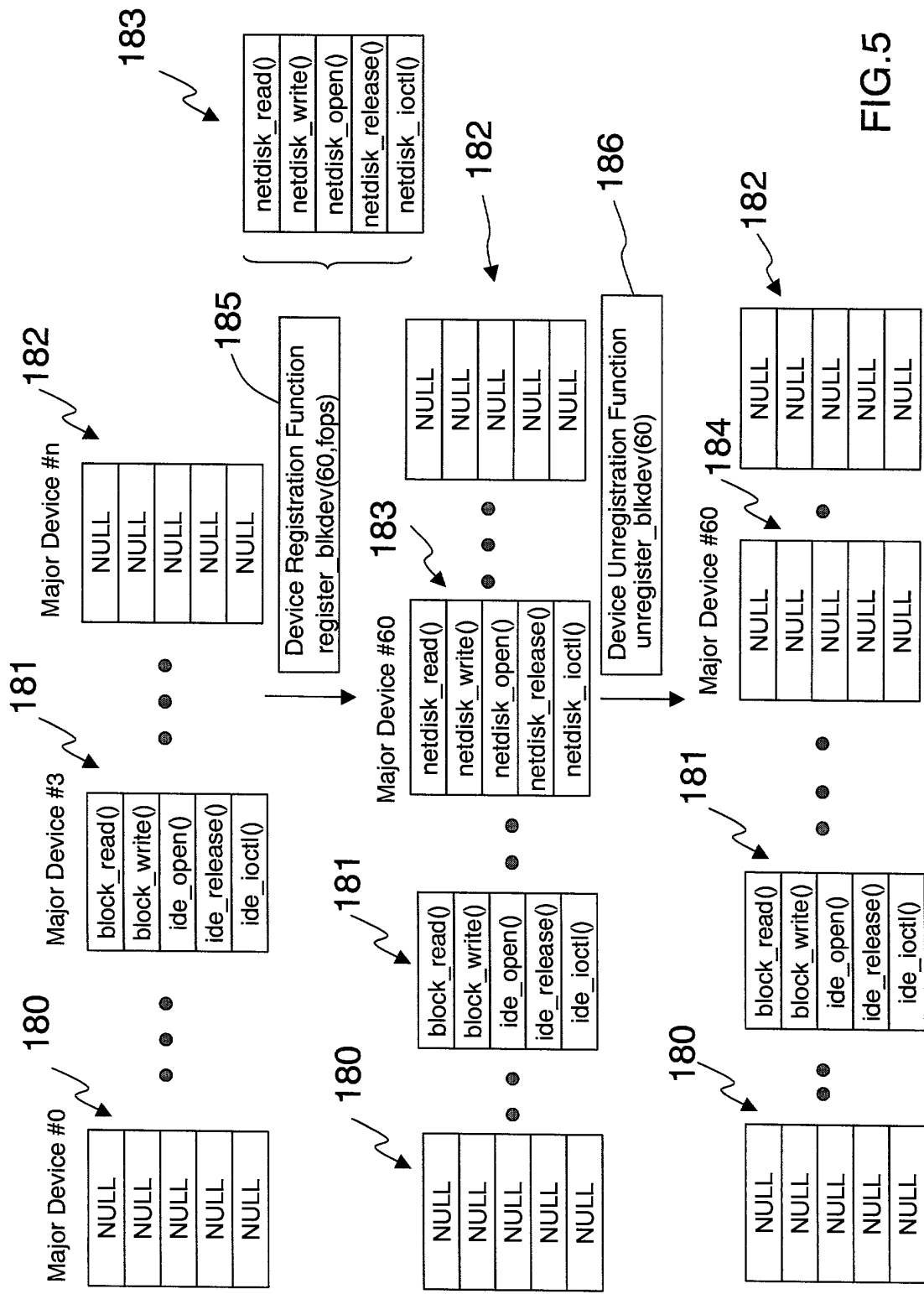


FIG. 5

FIG. 6

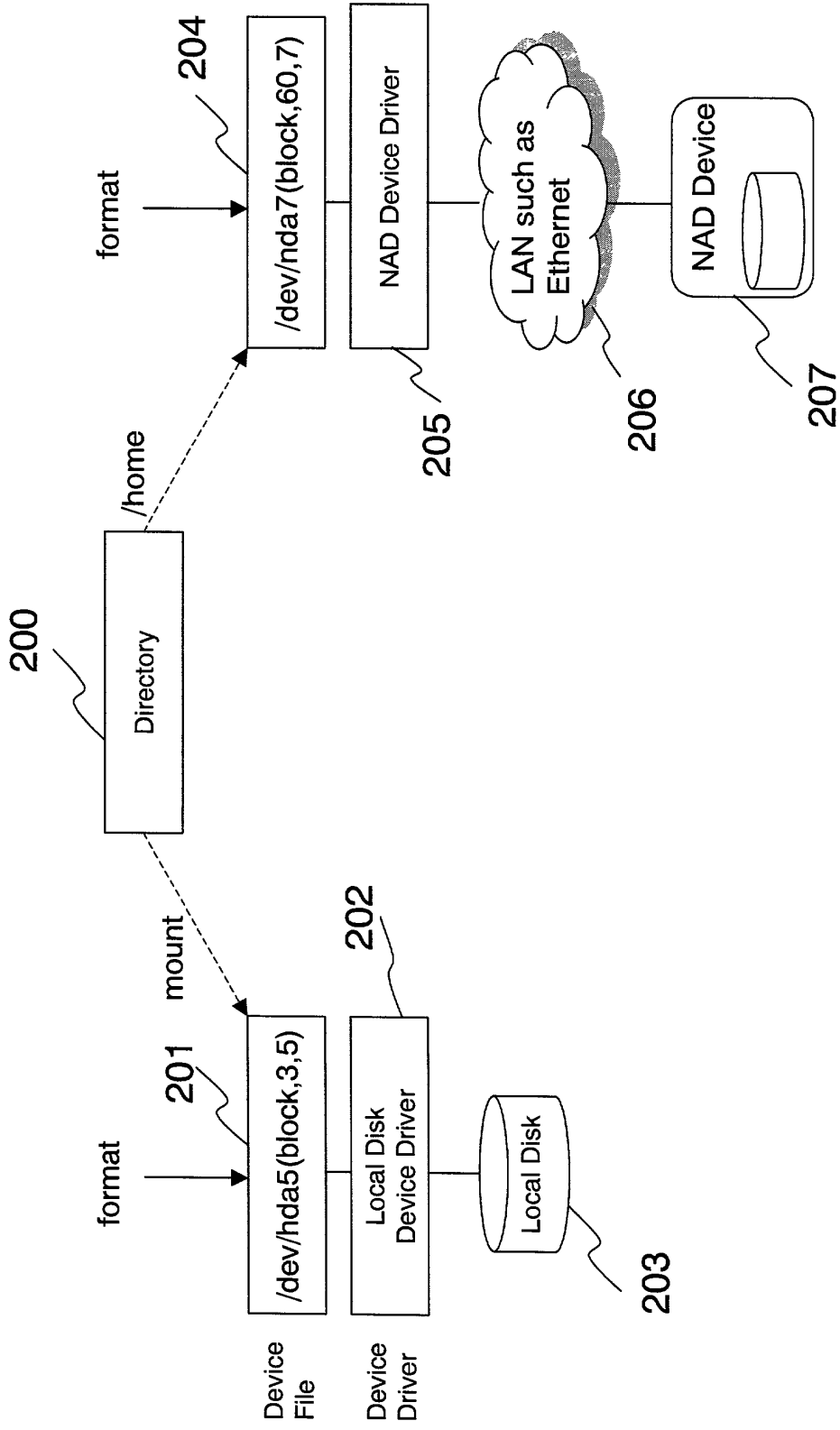


FIG. 6

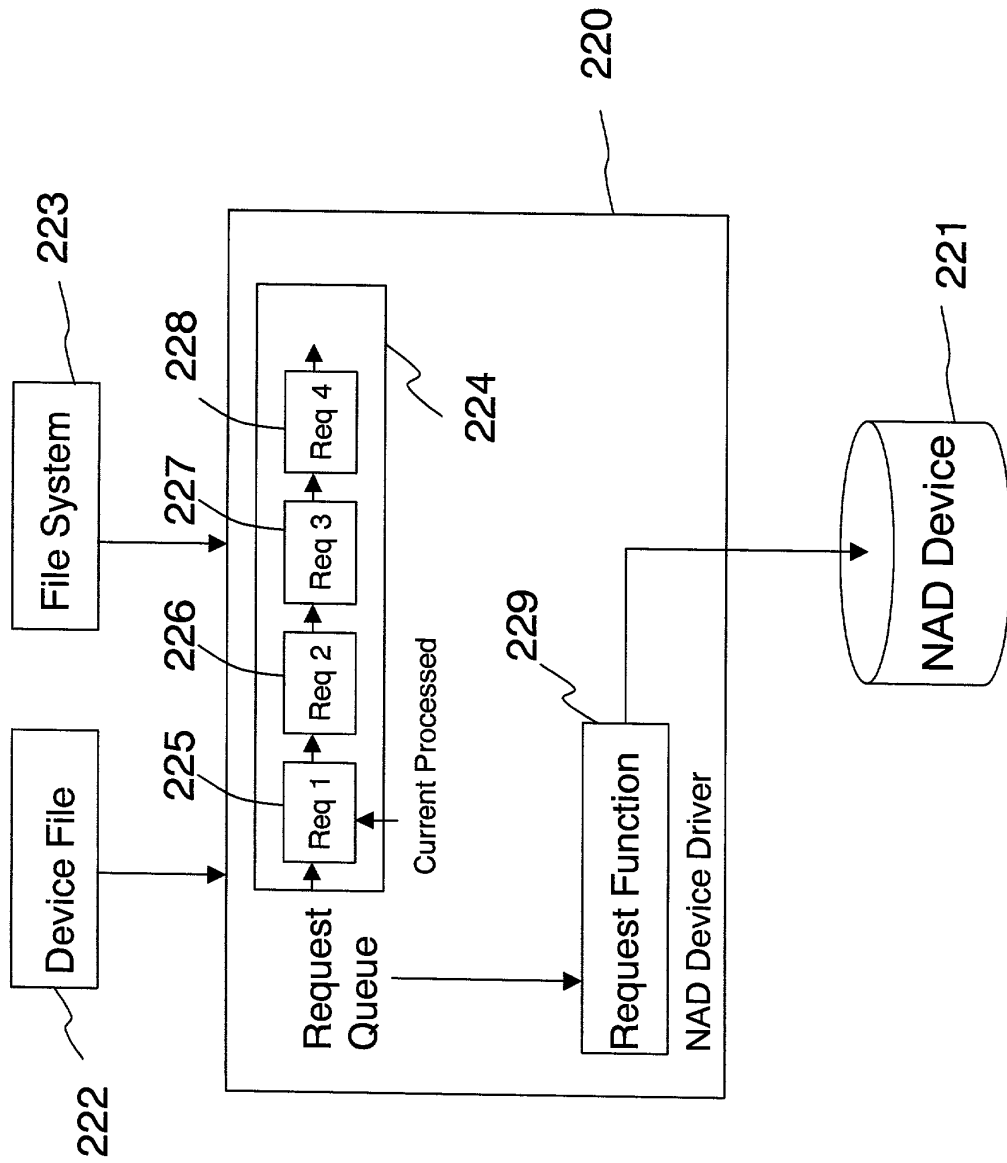


FIG. 7

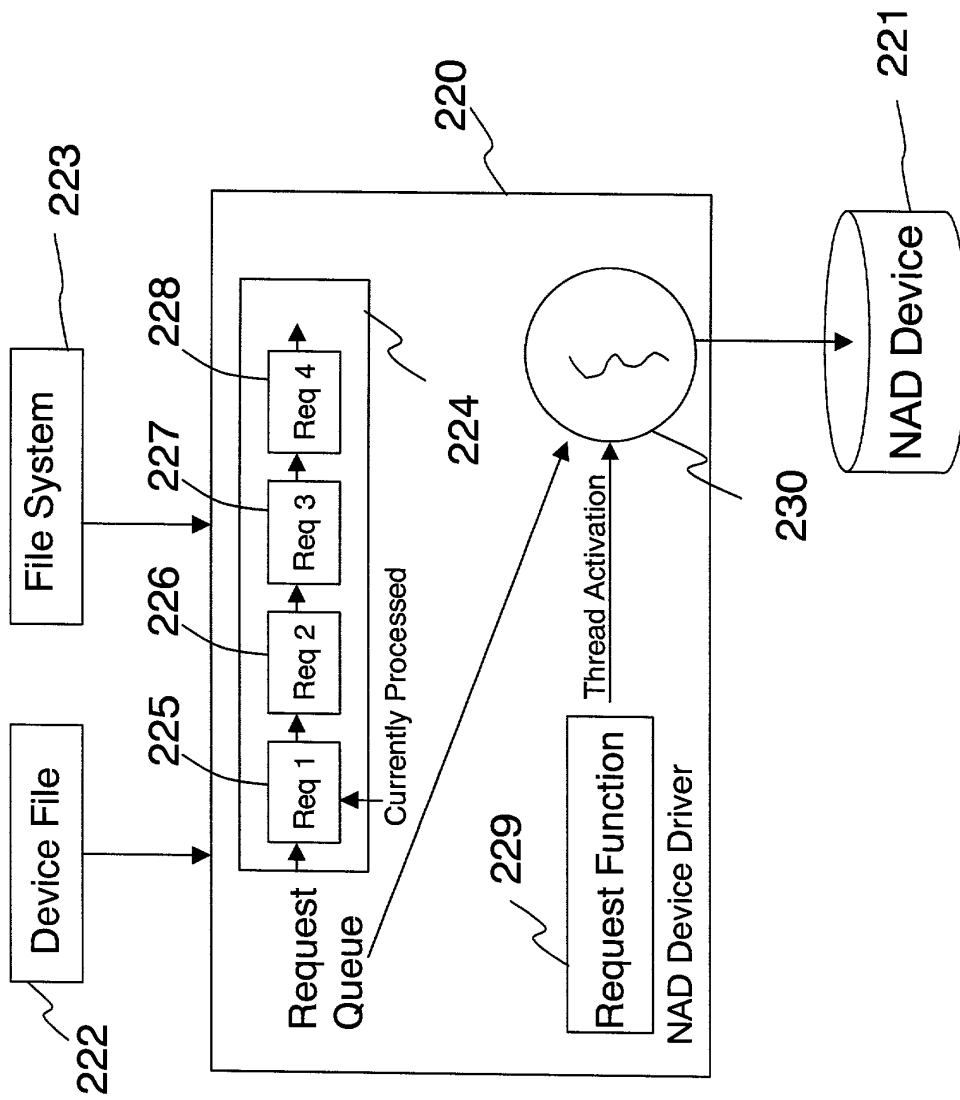


FIG. 8

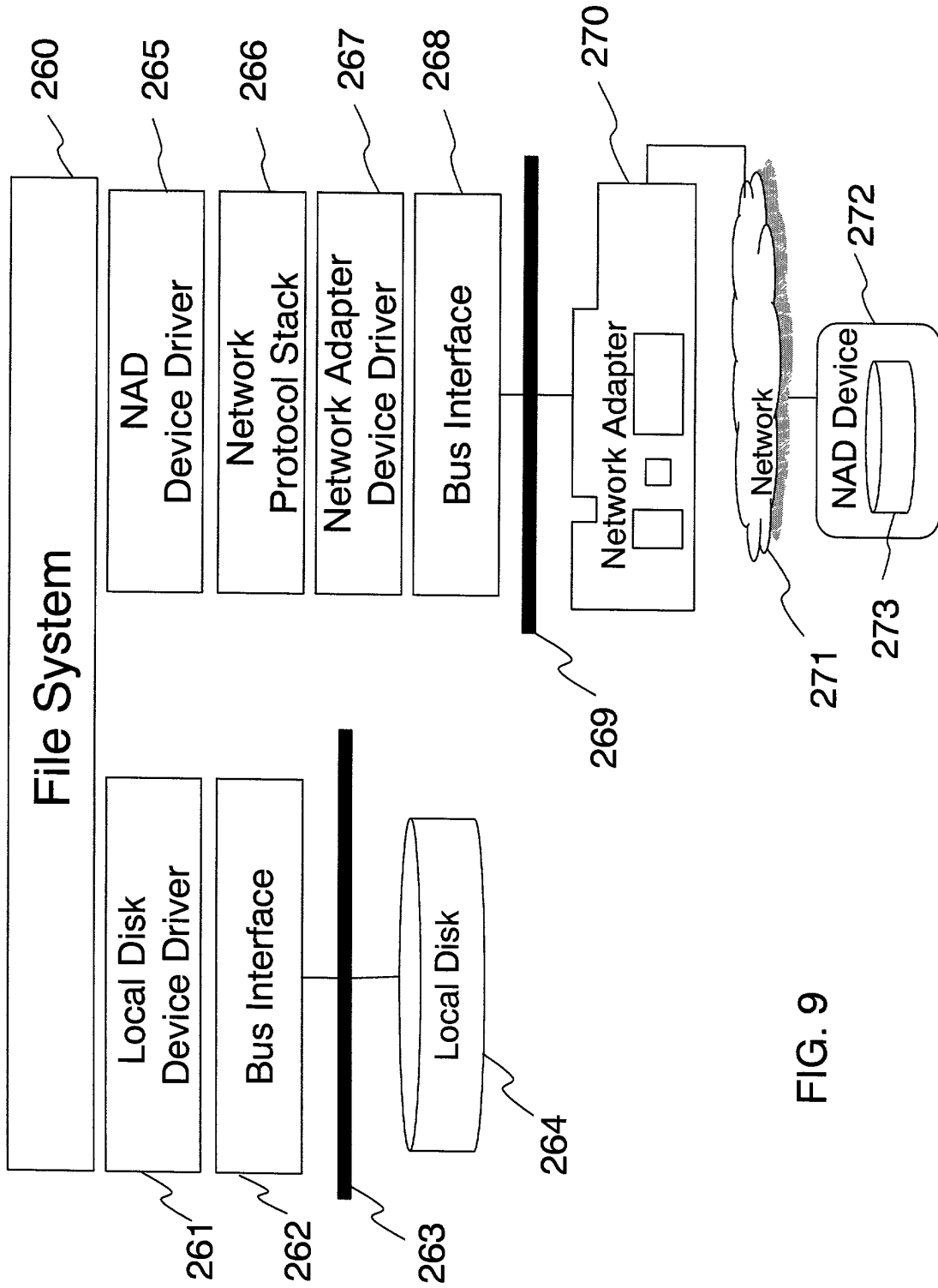


FIG. 9

FIG. 10

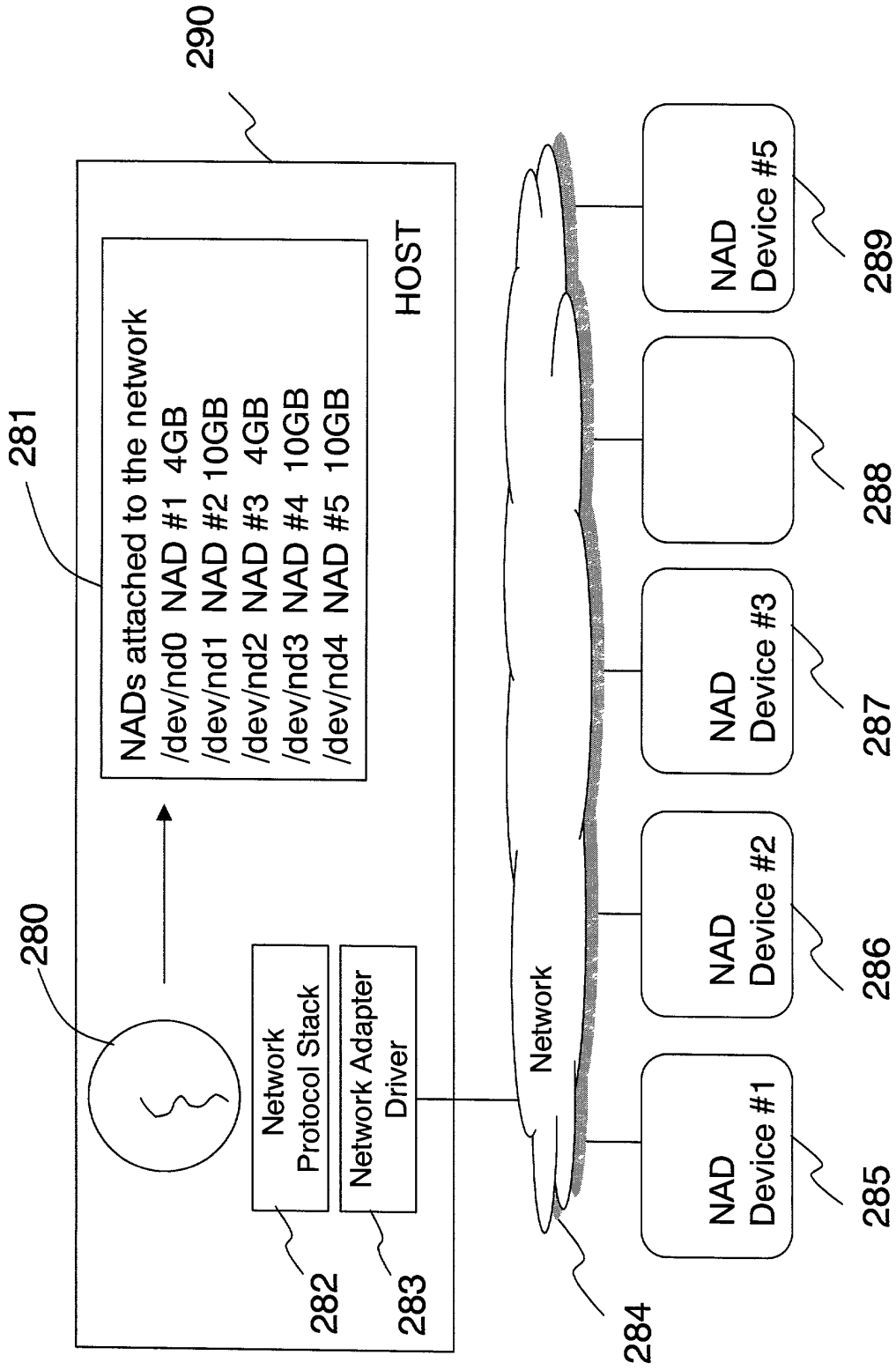


FIG. 10

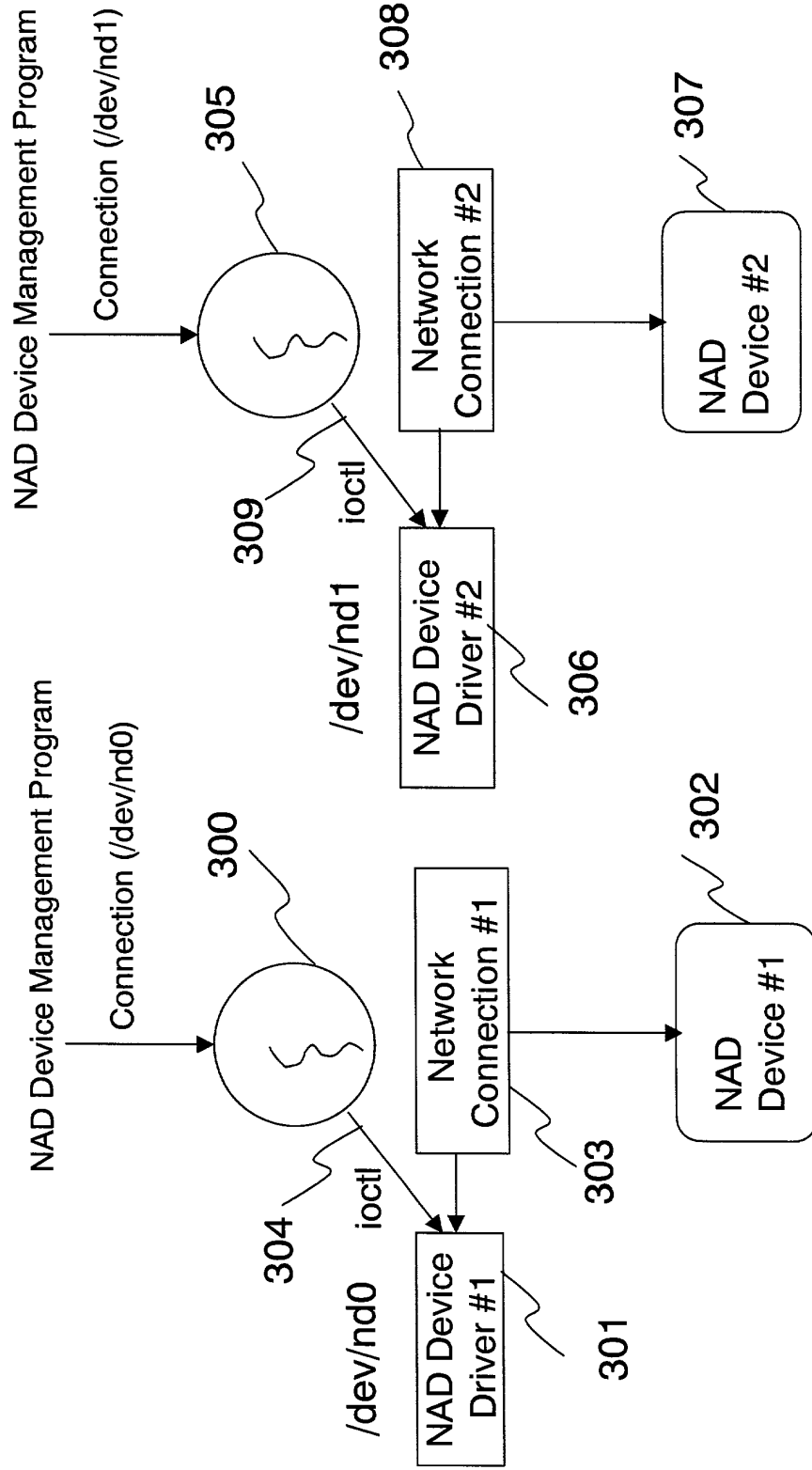


FIG. 11A

FIG. 11B

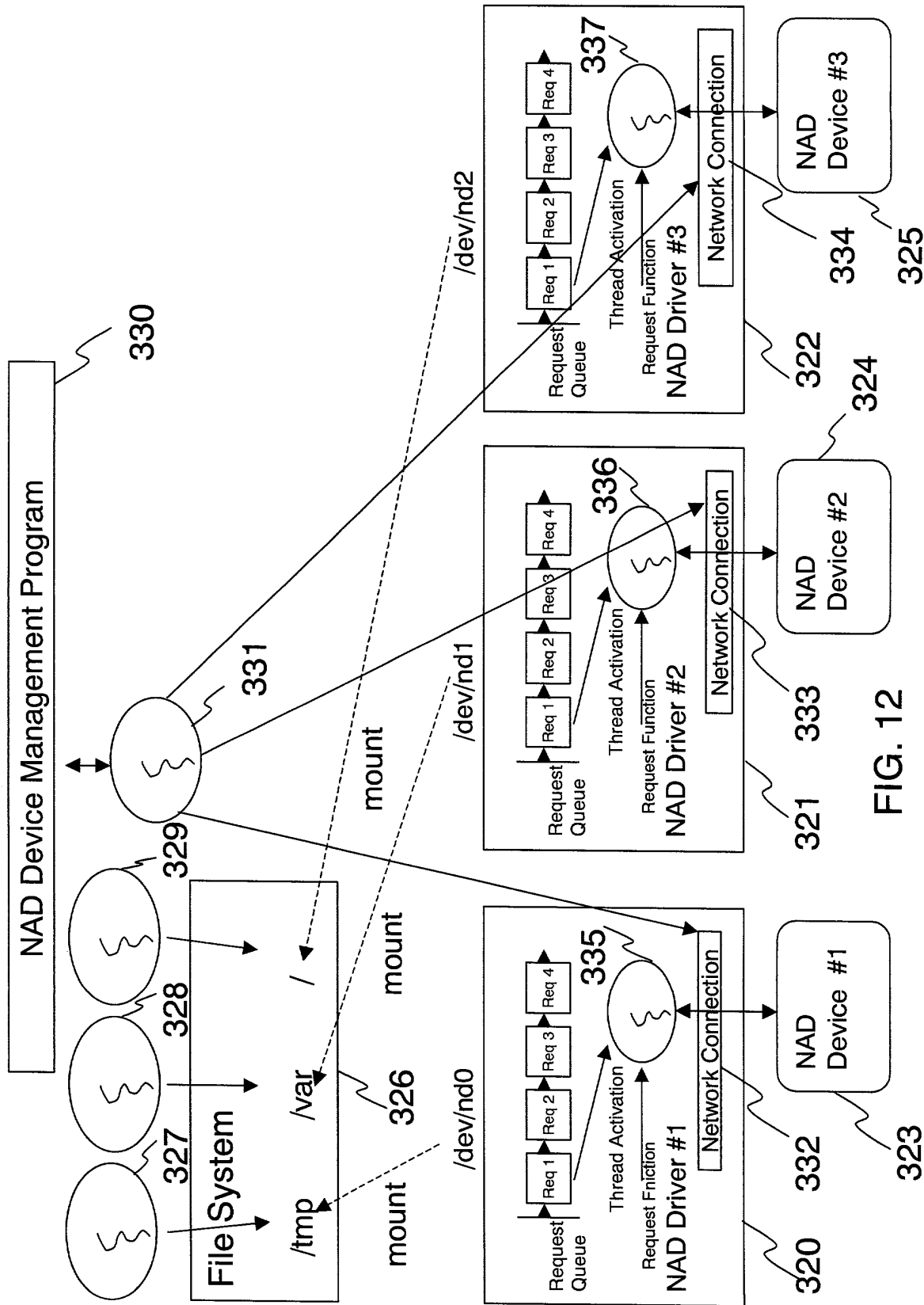


FIG. 12

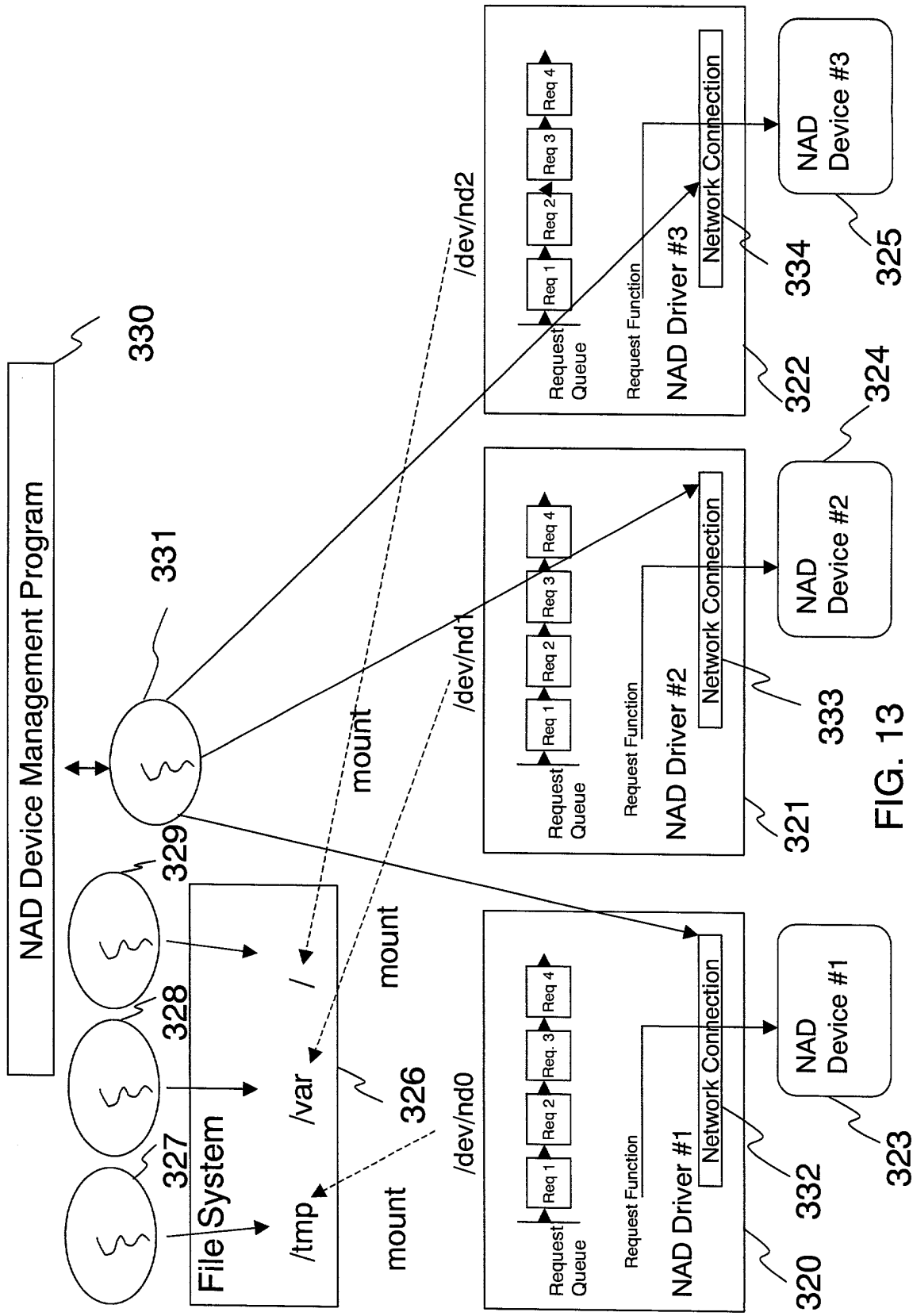


FIG. 13

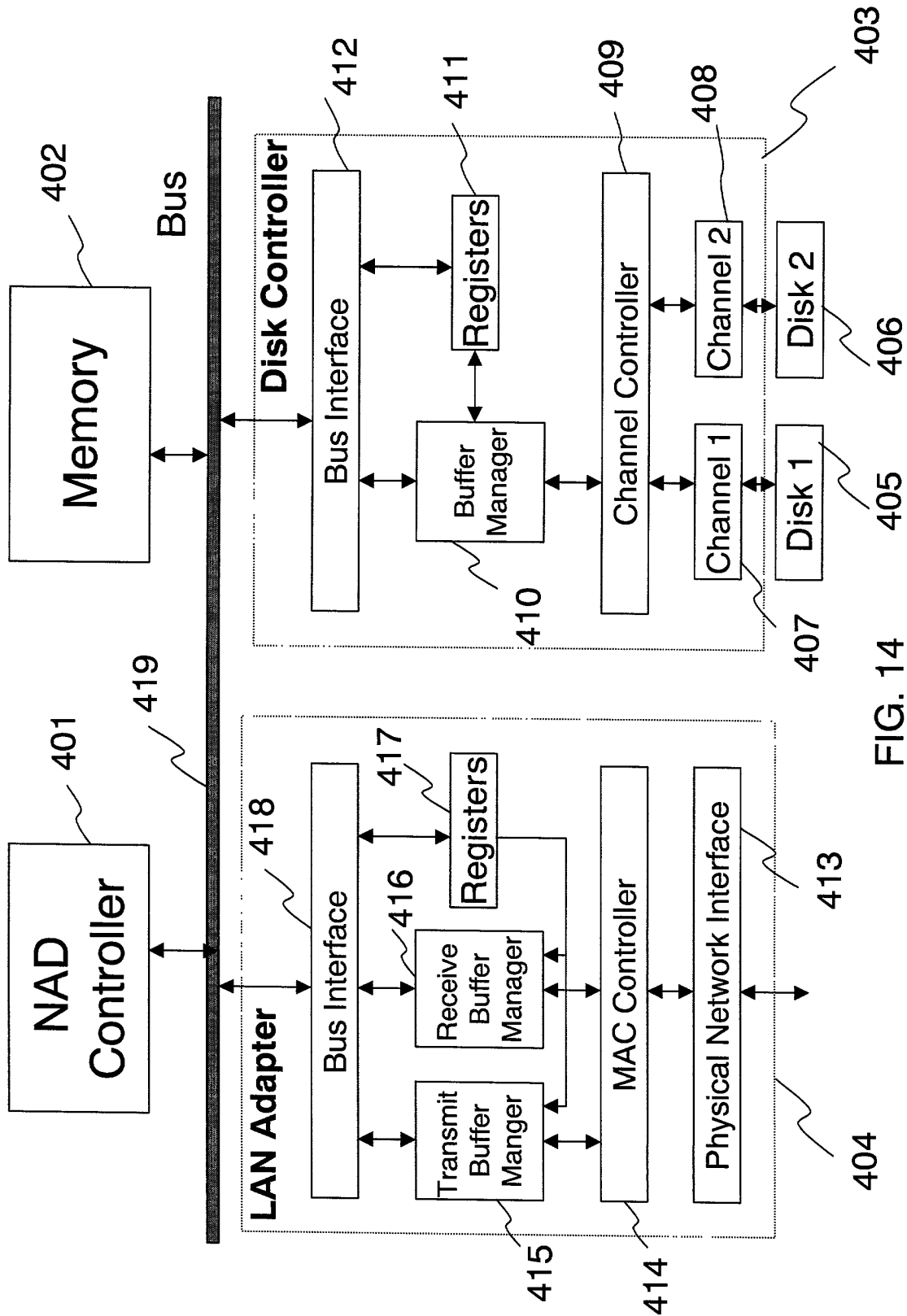


FIG. 14

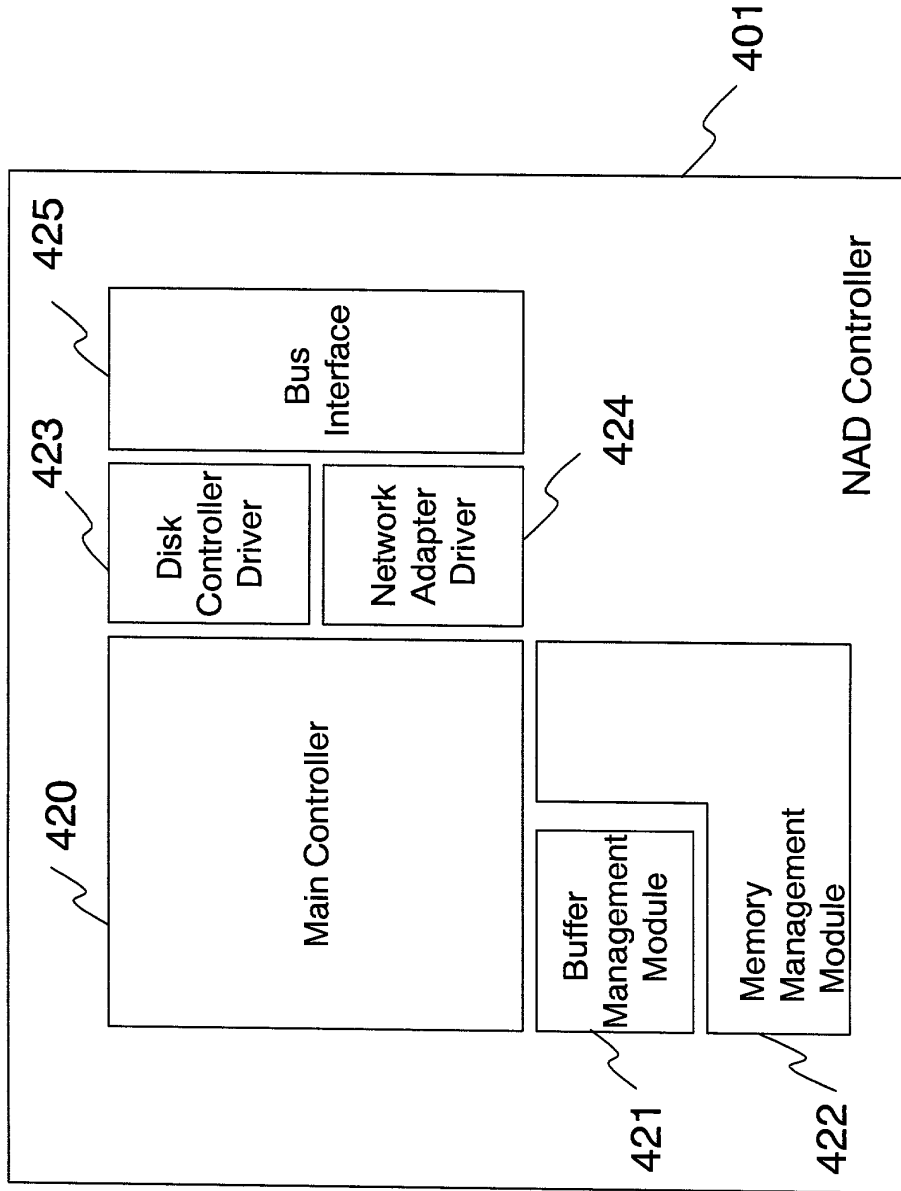


FIG. 15

FIG. 16

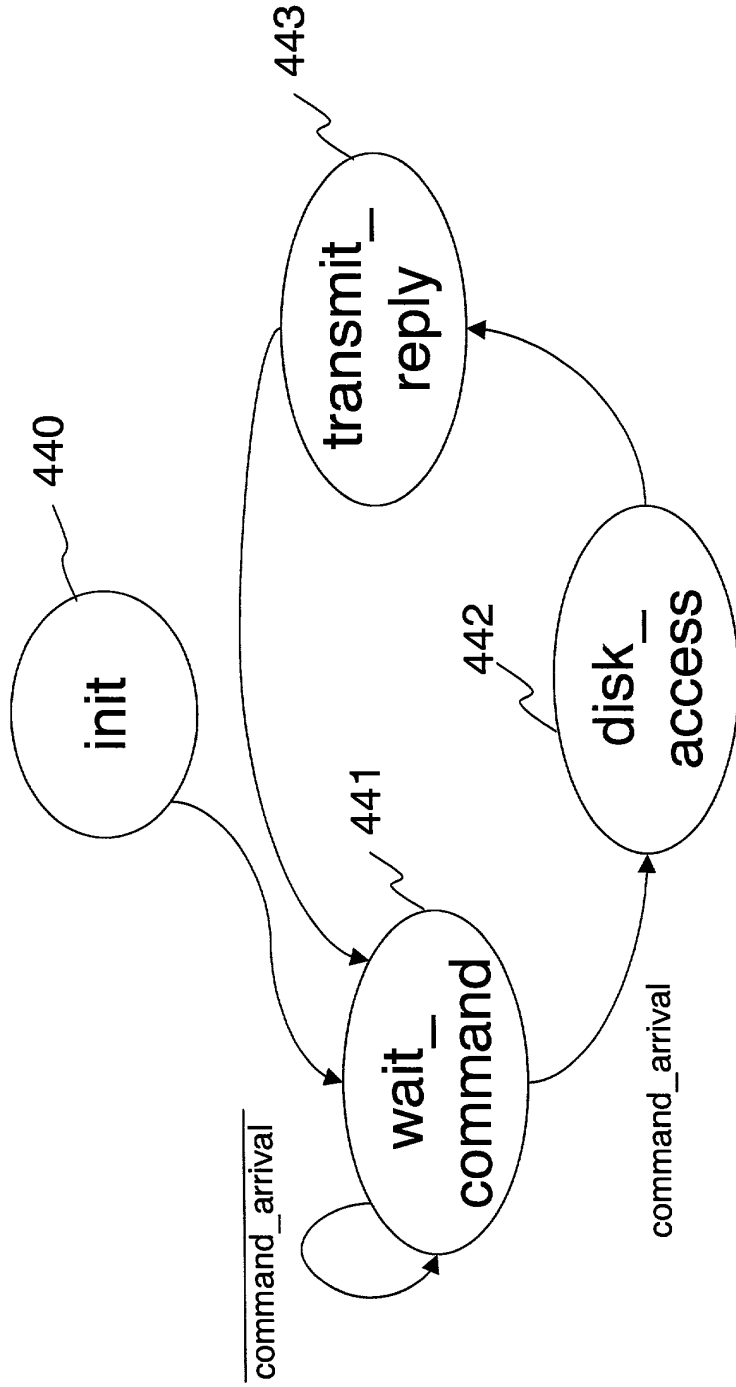


FIG. 16

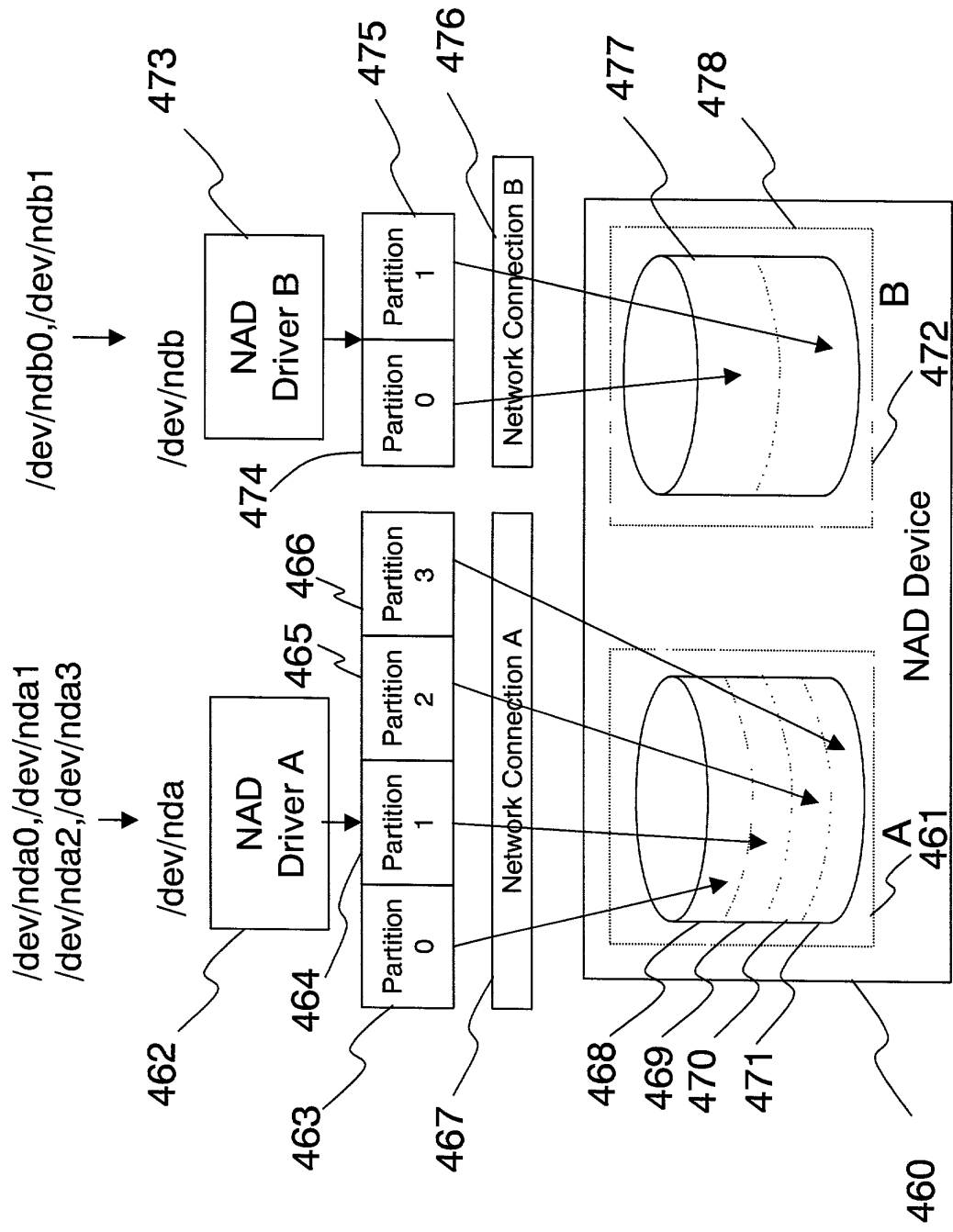


FIG. 17

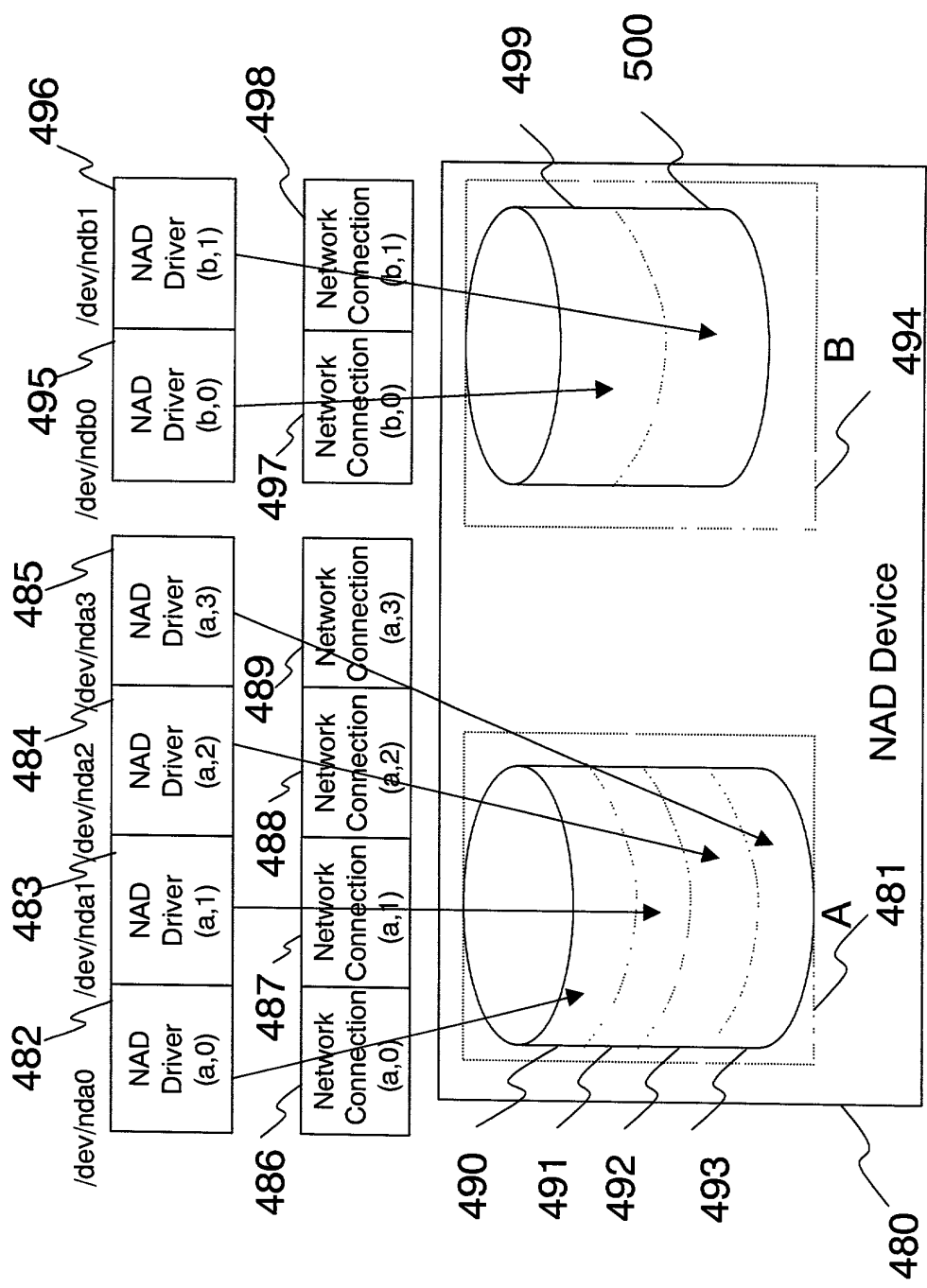


FIG. 18

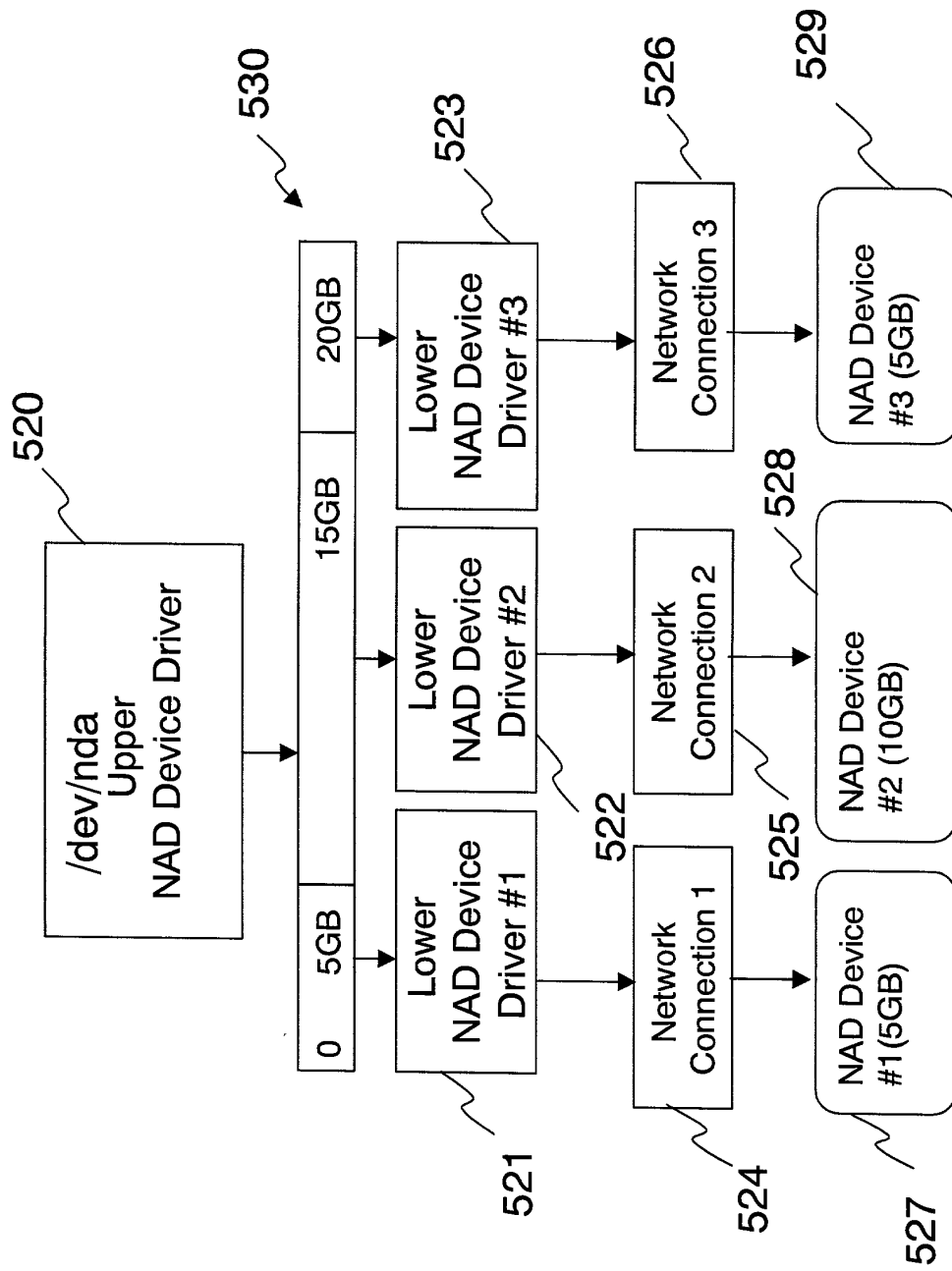


FIG. 19

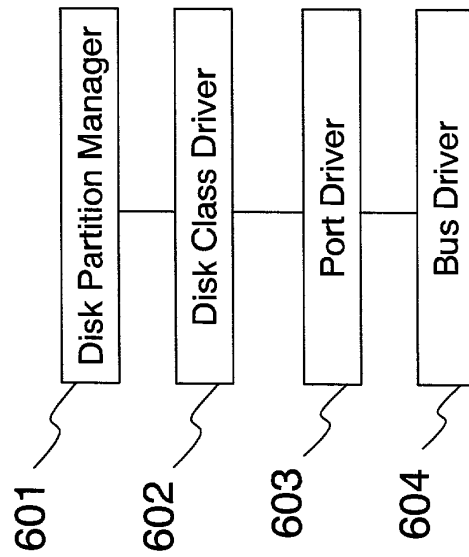


FIG. 20A

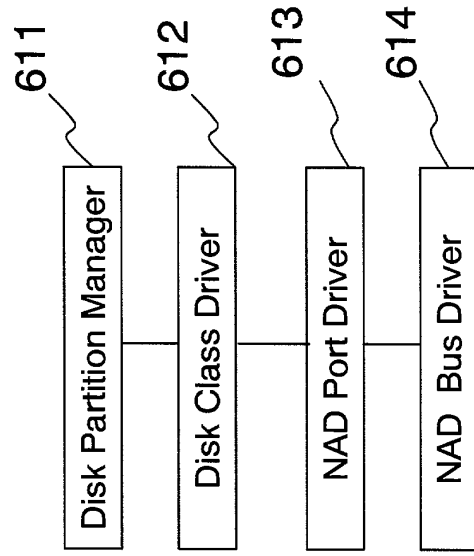


FIG. 20B

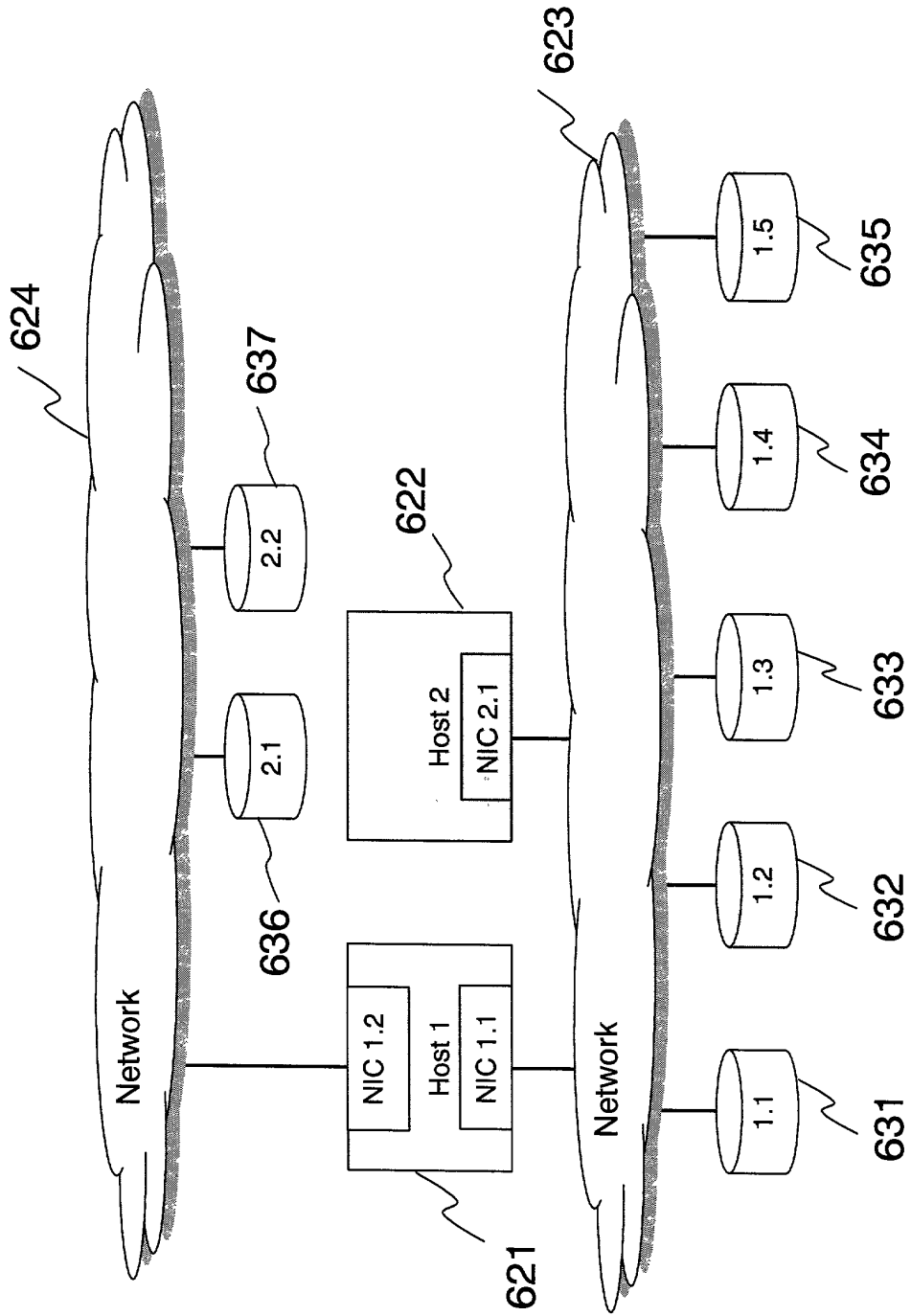


FIG. 21

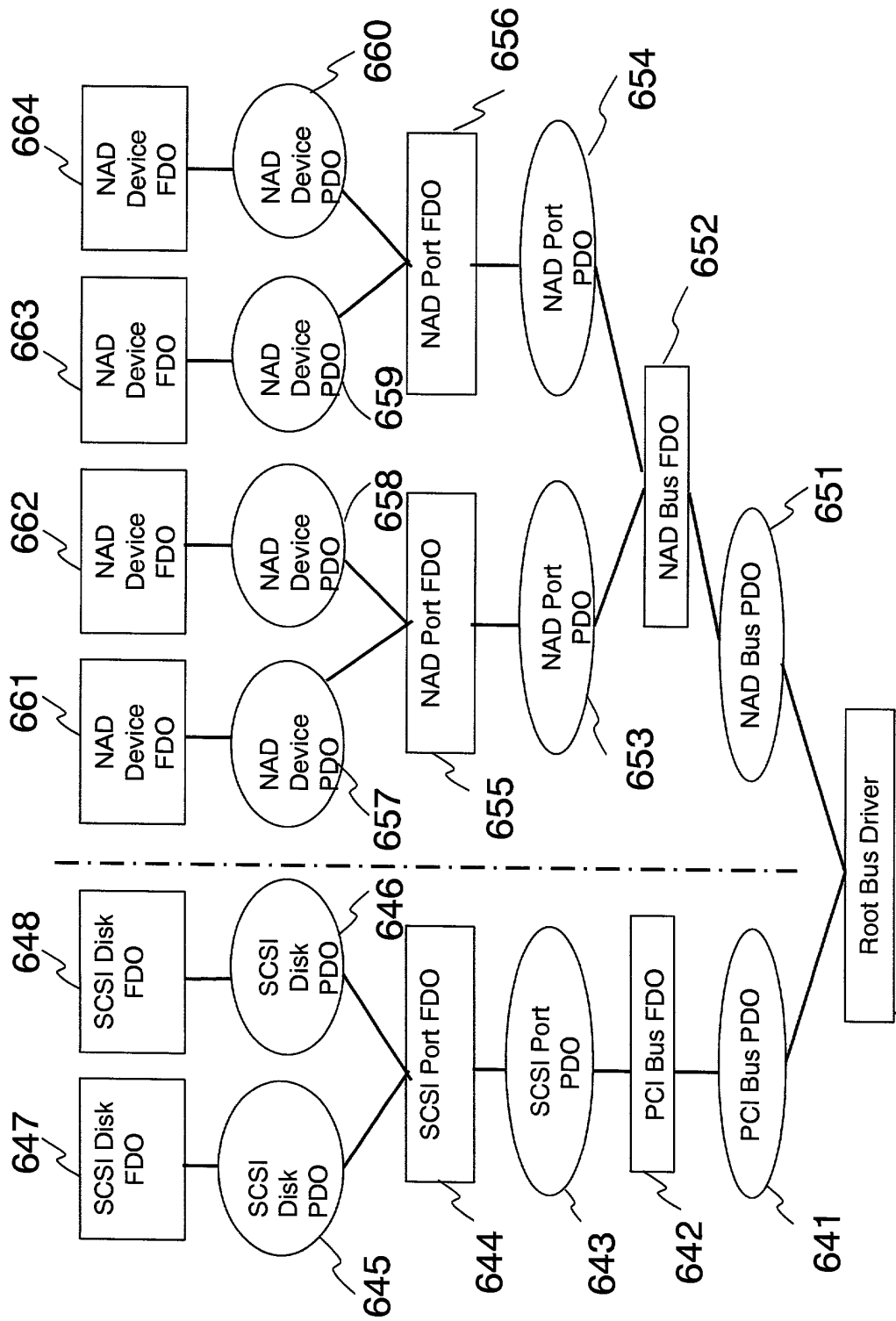


FIG. 22

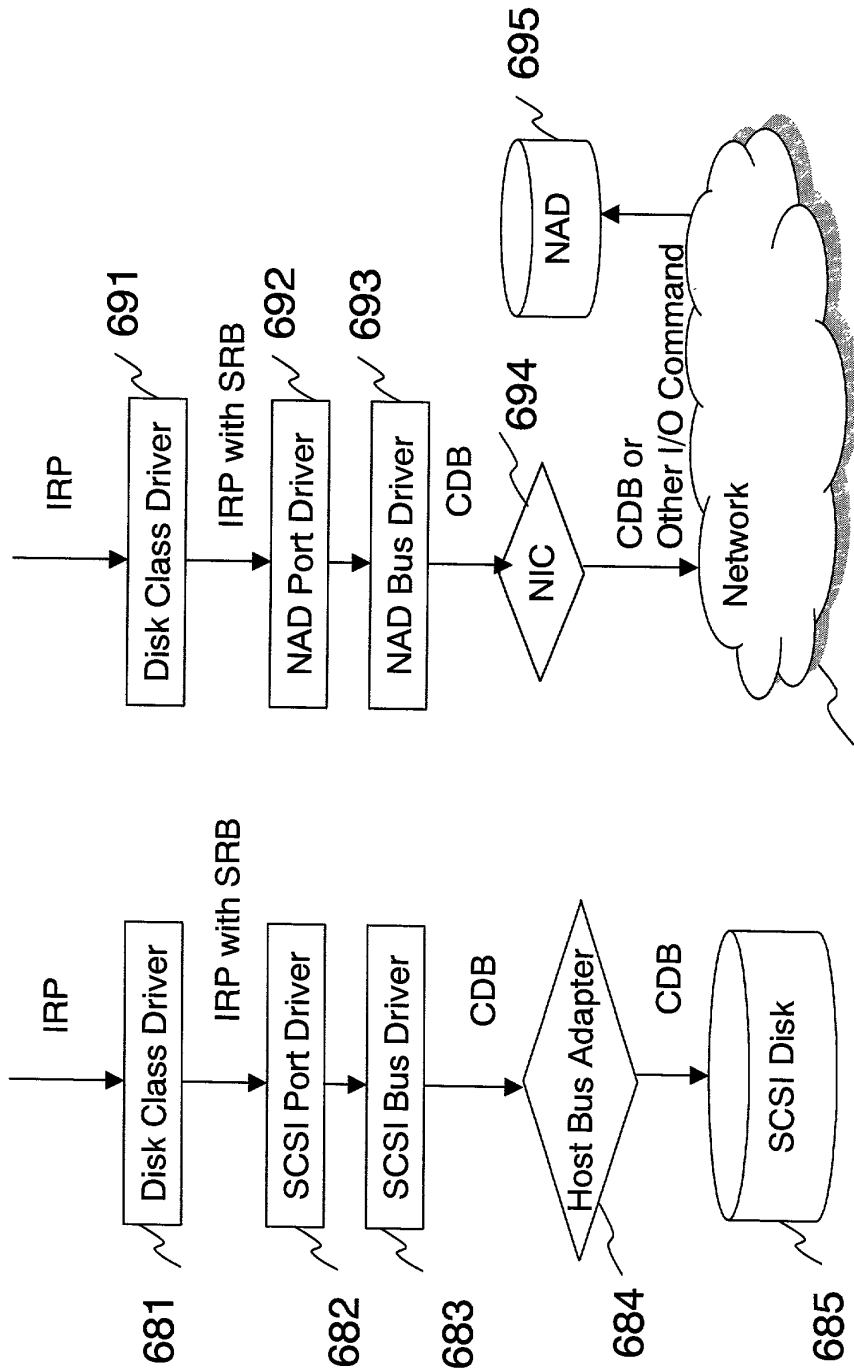


FIG. 23A

FIG. 23B

FIG. 24

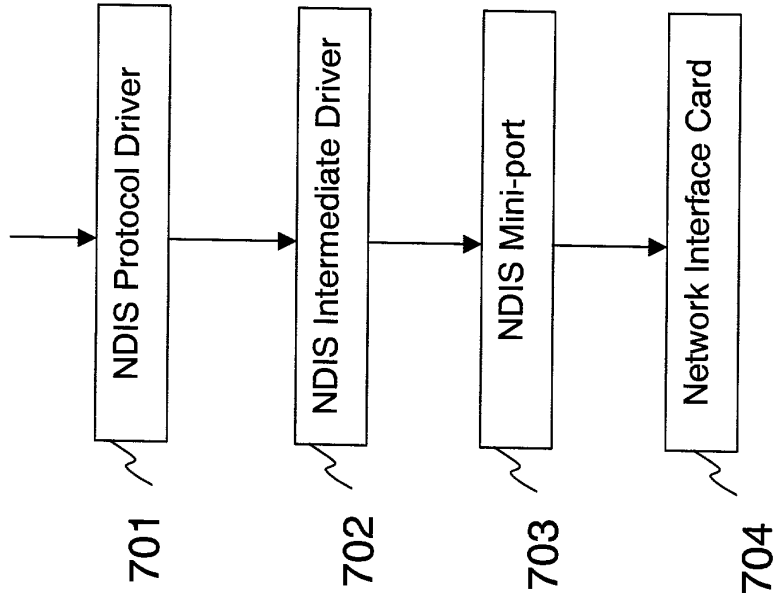


FIG. 24

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number

<p>DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)</p> <p><input checked="" type="checkbox"/> Declaration Submitted with Initial Filing OR <input type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)</p>	Attorney Docket Number	1203
	First Named Inventor	Han-gyoo Kim
	<i>COMPLETE IF KNOWN</i>	
	Application Number	/
	Filing Date	
	Group Art Unit	
	Examiner Name	

As a below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Disk System Adapted to Be Directly Attached to Network

(Title of the Invention)

the specification of which

is attached hereto

OR

was filed on (MM/DD/YYYY) [] as United States Application Number or PCT International

Application Number [] and was amended on (MM/DD/YYYY) [] (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
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			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

Burden Hour Statement: This form is estimated to take 21 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

09974082-10090

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DECLARATION — Utility or Design Patent Application

Direct all correspondence to: <input checked="" type="checkbox"/> Customer Number or Bar Code Label		<input type="checkbox"/> OR <input type="checkbox"/> Correspondence address below	
Name Chung K. Ko			
Address 1263 Lakeside Drive #2190			
City Sunnyvale		State CA	ZIP 94085
Country U.S.A.	Telephone 408-655-4678	Fax 408-749-0782	
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.			
NAME OF SOLE OR FIRST INVENTOR :		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name Han-gyoo (first and middle [if any])		Family Name Kim or Surname	
Inventor's Signature <i>Han-gyoo Kim</i>		Date 10/02/01	
Residence: City Seoul	State	Country Korea	Citizenship Republic of Korea
Mailing Address 72-1 Sangsu-dong, Mapo-gu, Hongik University, Computer Eng. Dept.			
City Seoul	State	ZIP 121-791	Country Korea
NAME OF SECOND INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])		Family Name or Surname	
Inventor's Signature		Date	
Residence: City	State	Country	Citizenship
Mailing Address			
City	State	ZIP	Country
<input type="checkbox"/> Additional inventors are being named on the _____ supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.			

2001-03-01 10:00:00

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

10/15/2001 MWOLDER1 00000049 09974082

01 FC:201	370.00 OP
02 FC:202	378.00 OP
03 FC:203	585.00 OP

PTO-1556
(5/87)

*U.S. GPO: 2000-468-987/39595

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 2001

Application or Docket Number

1203

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	85	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	85 minus 20 = * 65	
INDEPENDENT CLAIMS	12 minus 3 = * 9	
MULTIPLE DEPENDENT CLAIM PRESENT	<input type="checkbox"/>	

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE OR

OTHER THAN SMALL ENTITY

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X42=	378
+140=	
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RATE	FEE
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X84=	
+280=	
TOTAL	

CLAIMS AS AMENDED - PART II

	(Column 1)	(Column 2)	(Column 3)
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	Independent *	Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

SMALL ENTITY OR

OTHER THAN SMALL ENTITY

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X\$ 9=	
X42=	
+140=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
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TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
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TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X84=	
+280=	
TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

CLAIMS ONLY

SERIAL NO. 09974082 FILING DATE 10-09-01
 APPLICANT(S)

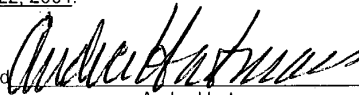
CLAIMS

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TOTAL IND.		↓		↓		↓						↓
TOTAL DEP.		←		←		←						←
TOTAL CLAIMS												
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52		/										
53		/										
54		/										
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* MAY BE USED FOR ADDITIONAL CLAIMS OR ADMEENDMENTS



PATENT
Attorney Docket No. 34253/US/2 - RMA
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Han-Gyoo KIM, Serial No.: 09/974,082 Filing Date: 10/09/2001 For: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK	Examiner: ALAM, HOSAIN T. Group Art Unit: 2155 <u>CERTIFICATE OF MAILING</u> I hereby certify that this correspondence and its listed enclosures is being deposited with the United States Postal Service as First Class Mail addressed to Commissioner for Patents; P.O. Box 1450; Alexandria, VA 22313-1450 on <u>June 22, 2004.</u> Signed  Audra Hartman
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Technology Center 2100

PRELIMINARY AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Following is Applicants' Preliminary Amendment filed prior to receipt of a first office action. Please amend the application as indicated on the following pages, and consider the remarks herein. Enclosed is our check to cover the cost of added claims not already paid for. While Applicant believes that no further fees are due at this time, the Commissioner is authorized to charge any fees that may be due as a result of filing this amendment, including additional claims fees not already paid for, or other fees that have not been separately paid, or credit any overpayments to Deposit Account 50-2319 (Order No. 34253/US/2 - RMA).

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AMENDMENTS TO THE CLAIMS

1 1. (Amended) A network-attached ~~device~~disk (NAD) ~~access~~ system wherein a host, having an
2 internal host system bus and running an operating system, controls an external device~~disk~~ through a
3 ~~front-end network connecting the host and other devices for carrying~~ general-purpose network traffic
4 ~~including storage as well as other application traffic using~~ a certain network protocol, the system
5 comprising:

6 a network interface card (NIC) installed at the host for providing a general purpose network
7 connection between the host and the network and via the network to other devices coupled to the network;

8 a network-attached ~~device~~disk (NAD) ~~device~~ having a data ~~storage~~one or more disks to store
9 data, the NAD ~~device attached~~coupled to the network; for receiving device level~~disk~~ access commands
10 from the host in data link frames according to the certain network protocol through the network; and

11 a device driver, running at the host, for creating a virtual host bus adapter in software controlling
12 the NAD ~~device~~ through the network via the NIC, the device driver enumerating NAD that are available
13 over the network, not directly attached to the host internal system bus, to make the host recognize the
14 NAD as a host local device;

15 ~~wherein~~ the virtual host bus adapter controllings the NAD ~~device~~ in a way indistinguishable from
16 the way as a physical host bus adapter device controls the same type of a device so that the host recognizes
17 the NAD ~~device~~ as if it is a local device connected directly to the system bus of the host

1 2. (Original) The NAD system of claim 1, wherein the network is a wired network.

1 3. (Original) The NAD system of claim 1, wherein the network is a wireless network.

1 4. (Original) The NAD system of claim 1, wherein the NIC is an Ethernet card.

1 5. (Original) The NAD system of claim 1, wherein the operating system is the UNIX family of
2 operating systems.

1 6. (Original) The NAD system of claim 5, wherein the device driver comprises a device file and
2 device driver routines for the device driver to register the device driver to the host.

1 7. (Original) The NAD system of claim 6, further comprising a device accessing thread for
2 accessing the NAD device.

1 8. (Original) The NAD system of claim 6, further comprising a device searching thread for
2 searching for a device attached to the network.

1 9. (Original) The NAD system of claim 6, further comprising a network connection setting thread
2 for making a connection between the device driver and the NAD device.

1 10. (Original) The NAD system of claim 6, wherein the NAD disk further comprises a plurality of
2 individual disk partitions.

1 11. (Original) The NAD system of claim 10, wherein the device driver comprises a plurality of
2 individual device drivers, each individual device driver for controlling the individual disk partition
3 whereby each individual disk partition is accessed as an independent local disk.

1 12. (Original) The NAD system of claim 10, wherein the device driver comprises a plurality of
2 individual partitions, each driver partition for controlling each individual disk partition.

1 13. (Original) The NAD system of claim 1, further comprising a second NAD device, a second
2 device driver, and a unified device driver combining the device driver and the second device driver so that
3 the NAD device and the second NAD device are recognized as logically a single local device.

1 14. (Original) The NAD system of claim 1, wherein the driver includes: a bus driver for creating the
2 virtual host adapter to access the NAD device as if it is a local device connected directly to the system bus
3 of the host; and a port driver for communicating the disk access command from the host to the NAD
4 device through a network port.

1 15. (Original) The NAD system of claim 14, wherein the operating system is the Windows family of
2 operating systems.

1 16. (Original) The NAD system of claim 1, wherein the NAD device further comprises:
2 a disk controller for controlling the disk; and
3 a network adapter for receiving the disk access command through the network.

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- 1 17. (Original) The NAD system of claim 16, wherein said one or more disks are formatted as local
2 disks.
- 1
1 18. (Original) The NAD system of claim 16, further comprising a filter program providing a utility
2 function.
- 1 19. (Original) The NAD system of claim 18, wherein the utility function includes the function of
2 controlling sharing of access among multiple hosts.
- 1 20. (Original) The NAD system of claim 18, wherein the utility function includes the function of
2 controlling transfer of access right of one host to another.
- 1 21. (Original) The NAD system of claim 18, wherein the utility function includes the function of
2 providing automatic back-up of the NAD device.
- 1 22. (Original) The NAD system of claim 18, wherein the utility function includes the function of
2 controlling access to the NAD device.
- 1 23. (Original) A disk interface at a host, having a system bus and running an operating system, for
2 controlling a network-attached disk (NAD) device having a disk through a front-end network connecting
3 the host and other devices for carrying general-purpose network traffic including storage as well as other
4 application traffic using a certain network protocol, comprising:
5 a network interface card (NIC) installed at the host for providing a general purpose network
6 connection; and
7 a device driver, running at the host, for creating a virtual host bus adapter in software controlling
8 the NAD device through the network via the NIC;
9 wherein the virtual host bus adapter controls the NAD device in a way indistinguishable from the
10 way a physical host bus adapter device controls a device so that the host recognizes the NAD device as if
11 it is a local device directly connected to the system bus of the host.
- 1 24. (Original) The disk interface of claim 23, wherein the operating system is the UNIX family of
2 operating systems.

1 25. (Original) The disk interface of claim 24, further comprising a device file and device driver
2 routines for the device driver to register the device driver to the host.

1 26. (Original) The disk interface of claim 25, further comprising a device accessing thread for
2 accessing the NAD device.

1 27. (Original) The disk interface of claim 25, further comprising a device searching thread for
2 searching for a device attached to the network.

1 28. (Original) The disk interface of claim 25, further comprising a connection setting thread for
2 making a connection between the device driver and the NAD device.

1 29. (Original) The disk interface of claim 25, wherein the NAD device has a disk partitioned into a
2 plurality of individual disk partitions.

1 30. (Original) The disk interface of claim 29, wherein the device driver further comprises a plurality
2 of individual device drivers, each individual device driver for controlling the individual disk partition
3 whereby each individual disk partition is accessed as an independent local disk.

1 31. (Original) The disk interface of claim 29, wherein the device driver comprises a plurality of
2 partitions, each driver partition for controlling each individual disk partition.

1 32. (Original) The disk interface of claim 23, wherein the device driver comprises:
2 a bus driver for creating the virtual host bus adapter to access the NAD device as a local device
3 connected directly to the system bus of the host; and
4 a port driver for communicating a disk access command through a network port.

1 33. (Original) The disk interface of claim 32, wherein the operating system is the Windows family of
2 operating systems.

1 34. (Original) A network-attached disk (NAD) device adapted to be connected through a network to
2 a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if
3 it is a local device connected directly to the system bus of the host, the NAD device comprising:
4 a network adapter for receiving disk access command in data link frames through the network;

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5 a disk controller, connected to the LAN adapter, for executing disk access commands; and
6 a disk for storing data; and
7 a controller, connected to the network adapter and the disk controller, for controlling the
8 operation of the NAD device.

1 35. (Original) The NAD device of claim 34, wherein the network runs Ethernet.

1 36. (Original) The NAD device of claim 34, wherein said disk is formatted as a local disk.

1 37. (Original) The NAD device of claim 34, wherein said disk is partitioned as a local disk.

1 38. (Original) The NAD device of claim 34, wherein the network adapter has a physical network
2 interface for receiving data from a host and a media access control (MAC) controller.

1 39. (Original) The NAD device of claim 34, wherein the controller has a state machine for
2 controlling the operation of the NAD device.

1 40. (Original) The NAD device of claim 34, wherein the controller has a filter for controlling access
2 to the disk.

1 41. (Original) The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk
2 partitions.

1 42. (Original) The NAD device of claim 41, wherein each disk partition is controlled by a separate
2 driver.

1 43. (Original) A storage interface at a host having a system bus for controlling a storage device
2 through a front-end network connecting the host and other devices for carrying general-purpose network
3 traffic, comprising:

4 a network interface card (NIC) installed at the host for providing a general purpose network
5 connection;

6 a bus driver for creating a virtual host bus adapter for recognizing the network port as if the
7 storage device is a local device connected directly to the system bus of the host ; and

8 a port driver for communicating a storage command through a network port.

- 1 44. (Original) The storage interface of claim 43, wherein the storage device is a disk.
- 1 45. (Original) The storage interface of claim 43, wherein the storage device is a tape system.
- 1 46. (Original) The storage interface of claim 43, wherein the storage device is a memory system.
- 1 47. (Original) The storage interface of claim 43, wherein the storage device is a CD drive.
- 1 48. (Original) The storage interface of claim 43, wherein the host runs the UNIX family of operating
2 system.
- 1 49. (Original) The storage interface of claim 43, wherein the host runs the Windows family of
2 operating system.
- 1 50. (Original) A network-attached storage device adapted to be connected through a network to host
2 having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a
3 local device connected directly to the system bus of the host, the storage device comprising:
4 a storage device;
5 a network adapter for receiving a storage command through the network; and
6 a storage controller for executing the storage command.
- 1 51. (Original) The network-attached storage device of claim 50, further comprising a state machine
2 controlling the operation of the storage device.
- 1 52. (Original) The network-attached storage device of claim 50, wherein the storage device is a disk.
- 1 53. (Original) The network-attached storage device of claim 50, wherein the storage device is a tape
2 device.
- 1 54. (Original) The network-attached storage device of claim 50, wherein the storage device is a CD
2 drive.

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1 55. (Original) The network-attached storage device of claim 50, wherein the storage device is a
2 memory device.

1 56. (Original) A disk interface at a host having a system bus and running an operating system for
2 controlling a disk device through a network, comprising:
3 a protocol converter as a host bus adapter for converting protocols from disk access commands to
4 data link frames containing the disk access commands; and
5 wherein the device driver recognizes the disk device as if it is a local device connected to the
6 system bus of the host.

1 57. (Original) The disk interface of claim 56, wherein the operating system is the UNIX family of
2 operating systems.

1 58. (Original) The disk interface of claim 56, wherein the operating system is the Windows family of
2 operating systems.

1 59. (Original) A network-attached disk (NAD) device adapted to be connected through a network to
2 a host having a system bus, wherein the host having a system bus recognizes the device as if it is a local
3 device connected directly to the system bus of the host, the NAD device comprising:
4 a disk for storing data; a disk controller for executing a disk access command; and
5 a network adapter, connected to the network for receiving data link frames containing the disk
6 access command through the network; and
7 a counter-protocol-controller, connected to the network adapter and the disk controller, for
8 retrieving the disk access commands from the received data link frames.

1 60. (Original) A storage interface at a host having a system bus for controlling through a network a
2 storage device attached to the network, comprising:
3 a protocol converter as a host bus adapter for converting storage commands to data link frames
4 for controlling the storage device through the network;
5 a device driver for creating a virtual host bus adapter controlling the storage device through the
6 network so that the host computer recognizes the storage device as if it is a local device connected
7 directly to the system bus of the host.

- 1 61. (Original) The storage interface of claim 60, wherein the storage device is a disk.
- 1 62. (Original) The storage interface of claim 60, wherein the storage device is a tape device.
- 1 63. (Original) The storage interface of claim 60, wherein the storage device is a CD drive.
- 1 64. (Original) The storage interface of claim 60, wherein the storage device is a memory device.
- 1 65. (Original) A network-attached storage device adapted to be connected through a network to a
2 host having a system bus, wherein the host has a virtual host bus adapter so that the host recognizes the
3 device as if it is a local device connected directly to the system bus of the host, the network-attached
4 storage device comprising:
5 a network adapter for receiving data link frames containing storage commands through the
6 network;
7 a storage controller, connected to the network adapter, for executing the storage commands; and
8 a storage device for storing data; and a counter-converter, connected to the network adapter and
9 the storage controller, for retrieving the storage commands from the data link frames received by the
10 network adapter.
- 1 66. (Original) The network-attached storage device of claim 65, wherein the storage device is a disk.
- 1 67. (Original) The network-attached storage device of claim 65, wherein the storage device is a tape
2 device.
- 1 68. (Original) The network-attached storage device of claim 65, wherein the storage device is a CD.
2 drive.
- 1 69. (Original) The network-attached storage device of claim 65, wherein the storage device is a
2 memory device.
- 1 70. (Original) A computer juke box for playing multimedia content, comprising:
2 a network;
3 a host computer having a system bus and a network interface card (NIC) for providing a network
4 connection;

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5 a plurality of multimedia player for playing multimedia content attached to the network; and
6 a device driver, running at the host, for creating a virtual host bus adapter whereby the computer
7 recognizes each multimedia player as if it is a local device connected directly to the system bus of the
8 computer.

1 71. (Original) The compute juke box of claim 70, wherein said network is a local area network.

1 72. (Original) The computer juke box of claim 70, wherein said network runs Ethernet.

1 73. (Original) The computer juke box of claim 70, wherein said multimedia players include a CD
2 drive.

1 74. (Original) The computer juke box of claim 70, wherein said multimedia players include a DVD
2 drive.

1 75. (Original) A method of accessing a disk device through a network from a host having a system
2 bus, comprising the steps of:

3 creating a virtual host bus adapter whereby the host recognizes the disk device as if it is a local
4 device connected to the system bus of the host;

5 receiving a disk access command from the host through the network;

6 executing the disk access command; and

7 sending the result of the command to the host through the network.

1 76. (Original) The method of claim 75, wherein the step of creating a virtual host bus adapter
2 includes the step of detecting presence of a network interface card installed at the host.

1 77. (Original) The method of claim 75, wherein the step of creating a virtual host bus adapter
2 includes the step of detecting removal of a network interface card at the host.

1 78. (Original) A method of accessing a storage device connected through a network to a host having
2 a system bus, comprising the steps of :

3 creating a virtual host bus adapter whereby the host recognizes the storage device as if it is a local
4 device connected directly to the system bus of the host; and

5 communicating a storage command through the network port.

- 1 79. (Original) The method of claim 78, wherein the storage device is a disk.
- 1 80. (Original) The method of claim 78, wherein the storage device is dynamically installed.
- 1 81. (Original) The method of claim 78, wherein the host runs the UNIX family of operating systems.
- 1 82. (Original) The method of claim 78, wherein the host runs the Windows family of operating
2 systems.
- 1 83. (Original) The method of claim 78, wherein said step of communicating a storage command
2 includes the step of sending an I/O request packet (IRP) containing an I/O transaction to be performed by
3 the storage device.
- 1 84. (Original) The method of claim 78, wherein said step of communicating a storage command
2 includes steps for translating a storage command to a command specific to an IDE storage device.
- 1 85. (Original) The method of claim 78, wherein said step of communicating a storage command
2 includes steps for translating a storage command to a command specific to a
3 SCSI storage device.
- 1 86. (New) The NAD system of claim 1, wherein the device driver enumerates NAD that are
2 available over the network by listening for a particular signal communicated by the NAD over the
3 network and received by the host NIC.
- 1 87. (New) The NAD system of claim 1, wherein the network attached device comprises a device
2 providing data storage.
- 1 88. (New) The NAD system of claim 1, wherein the network attached device comprises a device
2 providing data storage includes a hard disk drive storage device.
- 1 89. (New) The NAD system of claim 1, wherein the general-purpose network traffic includes
2 network storage traffic and other network application network traffic.

1 90. (New) The NAD system of claim 1, wherein the data frame packets have a conventional format
2 but encapsulate device level commands and data for the NAD.

1 91. (New) The NAD system of claim 1, wherein the network attached device includes a hard-wired
2 logic circuit connected directly to the network and receiving a data frame packet that contains device level
3 commands and that bridges the device level commands to the NAD.

1 92. (New) The NAD system of claim 91, wherein the bridging includes stripping a command out of
2 the data link frames.

1 93. (New) The NAD system of claim 1, wherein the NAD comprises a hard disk drive and the device
2 level commands are hard disk drive device level commands for controlling and accessing the hard disk
3 drive.

1 94. (New) The NAD system of claim 1, wherein the device level commands contained in and
2 stripped from the data link frames are the same device level commands that are used to access the same
3 type of device when such same type of device is connected to the host over the internal host system bus.

1 95. (New) The NAD system of claim 1, wherein the network attached device comprises:
2 a hard disk drive;
3 a hard disk drive controller for receiving hard disk drive device level commands and controlling
4 the operation and accessing of the hard disk drive in response thereto;
5 a network adapter for receiving the disk access command as data frame packets through the
6 network; and
7 a non-programmable logic circuit: (i) receiving the data frame packets encapsulating device level
8 commands from the network adapter over the network and generating unencapsulated device level
9 commands that can be understood by the hard disk drive controller and the hard disk drive, and (ii)
10 receiving unencapsulated device level commands from the hard disk drive controller and generating
11 outgoing data frame packets encapsulating device level commands that can be communicated to the
12 network adapter and understood by the host over the network.

1 96. (New) The NAD system of claim 95, wherein the NAD system further includes a protocol
2 converter as a host bus adapter for converting protocols from disk access commands to data link frames
3 containing the disk access commands.

- 1 97. (New) The NAD system of claim 95, wherein the data link frames further include data.
- 1 98. (New) The NAD system of claim 97, wherein the network attached device comprises a storage
2 device and the data included in the data link frames include data to be written from the host to the storage
3 device and data to be read from the storage device by the host.
- 1 99. (New) The NAD system of claim 95, wherein the NAD operates without the use of a network
2 address.
- 1 100. (New) The NAD system of claim 1, wherein NAD includes a hard disk drive, the network
2 includes the Internet and the NAD operates without the use of an Internet Protocol (IP) address for read
3 and write access with the hard disk drive.
- 1 101. (New) The NAD system of claim 95, wherein the non-programmable logic circuit is a wired
2 logic circuit.
- 1 102. (New) The NAD system of claim 95, wherein the non-programmable logic circuit is a hard-wired
2 logic circuit.
- 1 103. (New) The NAD system of claim 95, wherein the non-programmable logic circuit does not
2 include a central processing unit, does not include a random access memory, and does not execute an
3 operating system.
- 1 104. (New) The NAD system of claim 1, wherein the NAD comprises a storage device.
- 1 105. (New) A method of accessing a network coupled device through a network carrying general-
2 purpose network traffic using a certain network protocol from a host having an internal host system bus
3 and running an operating system, the method comprising:
4 operating a virtual host bus adapter at a device driver level for controlling the device through the
5 network via a network interface, the virtual host bus adapter including a device driver enumerating
6 devices that are available over the network, not directly attached to the host internal system bus, so that
7 the host recognizes the device as a host local device, the virtual host bus adapter controlling the device in
8 a way indistinguishable from the way it is controlled as a physical host bus adapter device controls the

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9 same type of device so that the host recognizes the device as if it is a local device connected directly to
10 the system bus of the host;
11 encapsulating device level commands and optional data for controlling the device into outgoing
12 data link frames for communication over the network;
13 communicating the outgoing data link frames on the network;
14 receiving the outgoing data link frames and extracting the device level commands and optional
15 data;
16 communicating the extracted device level commands and optional data to the device and
17 operating the device in accordance with the extracted device level commands;
18 generating an incoming command and optional data and encapsulating it into an incoming data
19 link frame for communicating to the host over the network;
20 sending the incoming data link frame to the host; and
21 extracting the device level command and optional data from the host received data link frame and
22 processing the device level command in accordance with predetermined rules.

1 106. (New) The method of claim 105, wherein the device level commands contained in and extracted
2 from the data link frames are the same device level commands that are used to access the same type of
3 device when such same type of device is connected to the host over the internal host system bus.

1 107. (New) A method for operating an external device of a particular type using non-network host
2 device level commands for operating the same type of device when the type of device is connected to the
3 host system bus, both the host and the device connected to the network and the device not connected to
4 the host system bus, the method characterized in that:

5 device level commands and responses to commands and optional data, of a kind used to operate
6 the device in the host when the device is coupled to the host system bus, are generated in the host and in
7 the device;

8 the device level commands and responses to commands and optional data are converted into a
9 data link frame format for communication from the host to the device and from the device to the host;

10 the data link frames are communicated between the host and the device over the network using a
11 network protocol;

12 the conversion between device level commands and data link frames in the host is accomplished
13 with a software, hardware, or combination of software and hardware; and

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14 the conversion between device level commands and data link frames in the device is
15 accomplished without a processor, processor coupled random access memory, or an operating system
16 executing in the processor or processor coupled random access memory.

1 108. (New) The method in claim 107, further characterized in that the network includes Internet
2 network segments and the device is operable with the host without an Internet Protocol (IP) address.

1 109. (New) The method in claim 107, further characterized in that the device includes a storage
2 device for storing data.

1 110. (New) The method in claim 108, further characterized in that the storage device for storing data
2 comprises a hard disk drive storage device.

1 111. (New) A computer program product for operating an external device of a particular type using
2 non-network host device level commands for operating the same type of device when the type of device is
3 connected to the host system bus, both the host and the device connected to the network and the device
4 not connected to the host system bus, the computer program product including instructions for:
5 generating device level commands and responses to commands and optional data, of a kind used
6 to operate the device in the host when the device is coupled to the host system bus, in the host and in the
7 device;
8 converting the device level commands and responses to commands and optional data into a data
9 link frame format for communication from the host to the device and from the device to the host; and
10 communicating the data link frames between the host and the device over the network using a
11 network protocol

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REMARKS

This Preliminary Amendment is submitted prior to receipt of a first Office Action. Consideration of the now pending claims 1-111 with an eye toward allowance is respectfully requested.

Claim Status


Claims 1-111 are pending after entry of the present amendment. A complete listing of all claims that are, or were in the application, along with an appropriate status identifier, is provided above in the section entitled "Amendments to the Claims". Markings are provided on claims amended in the present amendment.

Support for the above claim amendments can be found in the application as originally filed.

CONCLUSION

Prompt and favorable consideration of this Preliminary Amendment is respectfully requested. If the Examiner believes, for any reason, that personal communication will expedite prosecution of the application, the Examiner is invited to call the undersigned at (650) 494-8700.

Respectfully submitted,
DORSEY & WHITNEY LLP


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PATENT
Attorney Docket No. 34253/US/2 - RMA
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Han-Gyoo KIM,	Examiner: ALAM, HOSAIN T.
Serial No.: 09/974,082	Group Art Unit: 2155
Filing Date: 10/09/2001	<u>CERTIFICATE OF MAILING</u>
For: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK	I hereby certify that this correspondence and its listed enclosures is being deposited with the United States Postal Service as First Class Mail addressed to Commissioner for Patents; P.O. Box 1450; Alexandria, VA 22313-1450 on <u>June 22, 2004.</u>
	Signed  Audra Hartman

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P. O. Box 1450
Alexandria, VA 22313-1450

JUL 01 2004
Technology Center 2100

Sir:

In satisfaction of the duty of disclosure under 37 C.F.R. § 1.56, and in accordance with the provisions of 37 C.F.R. §§ 1.97 and 1.98, Applicants wish to draw the attention of the U.S. Patent and Trademark Office to the reference cited on the accompanying substitute for form PTO/SB/8A-B. Copies of the references are enclosed herewith.

None of the foregoing references is believed to disclose the invention as claimed. Nothing herein shall constitute an admission concerning the contents of any of the cited references, nor shall the inclusion of a reference herein be considered an admission that the reference constitutes prior art against the invention claimed in the above-identified application. Submission of the present document shall not be construed as an admission that a search has been made or that better art does not exist.

As far as is known to the undersigned, this Information Disclosure Statement is being filed within three months of the filing date of a national application, within three months of the date of entry of the national state in an international application, or before the mailing date of a first Office Action on the merits as set forth in 37 C.F.R. § 1.97(b), and therefore no fee is required.

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Serial No.: 09/974,082
Filing Date: 10/09/2001

While no fee is believed to be due, if this belief is in error the Commissioner is authorized to charge any additional fees, including extension fees or other relief which may be required, or credit any overpayment to Deposit Account No. 50-2319 (Our Order No. 473628-9 [33513/US/2 - RMA]).

Please direct any calls in connection with this application to the undersigned at (415) 781-1989.

Respectfully submitted,

DORSEY & WHITNEY LLP



BY:

R. Michael Ananian, Reg. No. 35,050

Dated: June 22, 2004

Dorsey & Whitney LLP
Intellectual Property Department
Four Embarcadero Center, Suite 3400
San Francisco, CA 94111-4187
Telephone: (415) 781-1989
Facsimile: (415) 398-3249

Customer Number: **32940**

Filed under 37 C.F.R. §1.34(a)

Attachments:

Return receipt postcard
Form PTO/SB/8A-B
Four (4) References

PA-1075008

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Substitute for form 1449A/PTO (Modified) INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)		Complete if Known			
		Application Number	09/974,082		
		Filing Date	10/09/2001		
		First Named Inventor	HAN-GYOO KIM		
		Art Unit	2155		
		Examiner Name	ALAM, HOSAIN T.		
Sheet	1	of	2	Attorney Docket Number	34253/US/2 - RMA

U.S. PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	U.S. Patent Document Number-Kind Code ² (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	
	A1	US 2003/0028614 A1	FEB. 06, 2003	JEON		
	A2	US 6,167,490	DEC. 26, 200	LEVY ET AL.		
	A3	US 5,838,916	NOV. 17, 1998	DOMENIKOS ET AL		
	A4	US 6,128,690	OCT. 03, 2000	PURCELL ET AL		
	A5					
	A6					

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FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Foreign Patent Document Country Code ² Number ⁴ Kind Code ⁵ (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
	B1					
	B2					

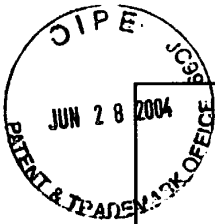
NON PATENT LITERATURE DOCUMENTS						
Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.				T ⁶
	C1					
	C2					
	C3					
	C4					
	C5					
	C6					
	C7					
	C8					
	C9					
	C10					

Examiner Signature	Date Considered
--------------------	-----------------

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹Applicant's unique citation designation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English Language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the complete application form to the USPTO. Time will vary depending on the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.



30 21557

TRANSMITTAL FORM (to be used for all correspondence after initial filing)		Application No.	09/974,082
		Filing Date	October 9, 2001
		First Named Inventor	Han-Gyoo Kim
		Examiner Name	Alam, Hosain T.
		Group Art Unit	2155
Total Number of Pages in This Submission	21*	Attorney Docket No.	34253/US/2 - RMA

ENCLOSURES (check all that apply)		
<input checked="" type="checkbox"/> Fee Transmittal Form <input checked="" type="checkbox"/> Fee Attached <input checked="" type="checkbox"/> Preliminary Amendment, 16 pages <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input checked="" type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Notification of Missing Requirements	<input type="checkbox"/> Assignment Papers (for an Application) <input type="checkbox"/> Submission of Drawings <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, No. of CD(s) _____	<input type="checkbox"/> After Allowance Communication to Group <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): Check No. 6731 for \$363.00 Form 1449 and four (4) references Return receipt postcard
Remarks		RECEIVED JUL 01 2004
		*Does not include page count of four (4) references

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT		
Firm or Individual name	R. Michael Ananian DORSEY & WHITNEY LLP 4 Embarcadero Center, Suite 3400 San Francisco, CA 94111 Telephone : 415 781 1989	Technology Center 2100 Customer Number 32940
Signature	<i>R. Michael Ananian</i>	
Date	June 22, 2004	

CERTIFICATE OF MAILING			
I hereby certify that this correspondence is being deposited with the United States Postal Service with Sufficient postage as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this date:			6/22/04
Typed or printed name	Audra Hartman		
Signature	<i>Audra Hartman</i>	Date	June 22, 2004

1075012_1

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**FEE CALCULATION
TRANSMITTAL 2004**

<i>Complete if Known</i>	
Application No.	09/974,082
Filing Date	October 9, 2001
First Named Inventor	Han-Gyoo Kim
Group Art Unit	2155
Examiner Name	Alam, Hosain T.
Atty. Docket Number	34253/US/2 - RMA

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METHOD OF PAYMENT (Check One)		AMENDMENT FEE CALCULATION (Continued)			
1. <input type="checkbox"/> The Commissioner is hereby authorized to charge indicated fees and credit any over payments to: Deposit Account No.: 50-2319 Deposit Account Name: DORSEY & WHITNEY LLP <input checked="" type="checkbox"/> Charge any additional fee required under 37 C.F.R. 1.16 and 1.17 <input checked="" type="checkbox"/> Applicant claims small entity status (see 37 C.F.R. 1.27)		3. ADDITIONAL FEES			
2. <input checked="" type="checkbox"/> Check Enclosed		Large Entity Fee	Small Entity Fee	Fee Description	Fee Paid
		110	55	Extension for reply within first month	
		420	210	Extension for reply within second month	
		950	475	Extension for reply within third month	
		1,480	740	Extension for reply within fourth month	
		2,010	1,005	Extension for reply within fifth month	
		330	165	Notice of Appeal	
		330	165	Filing a brief in support of an appeal	
		290	145	Request for oral hearing	
		110	55	Terminal Disclaimer Fee	
		110	55	Petition to revive – unavoidable	
		1,330	665	Petition to revive – unintentional	
		130	65	Late Declaration Surcharge	
		130	130	Petitions to the Commissioner	
		180	180	Submission of IDS	
		770	385	Request for Continued Examination (RCE)	
		Other fee (specify):			
		Subtotal (2)			
		Total Amount of Payment: 363.00			

AMENDMENT FEE CALCULATION					
1. EXTRA* CLAIM FEES					
Claims Remaining after Amendment	Highest Number Previously Paid for	Present Extra	Fee from Below*	Additional Fee	
Total	111	- 85	= 26	x 9	= 234.00
Indep.	14	- 11	= 3	x 43	= 129.00
First Presentation of MultipleDependent Claim				x	= 0
Subtotal (1)					363.00

*Calculation of Extra Claim Fees		
Large Entity Fee	Small Entity Fee	Fee Description
18	9	Claims in excess of 20
86	43	Independent claims in excess of 3
290	145	Multiple dependent Claim
86	43	Reissue independent claims over original patent
18	9	Reissue claims in excess of 20 and over original patent

Submitted by:

Name: R. Michael Ananian	Reg. No.: 35,050	Telephone: 650-494-8700
DORSEY & WHITNEY LLP	Four Embarcadero Center, Suite 3400 San Francisco, California 94111-4187	CUSTOMER NUMBER 32940
Signature: <i>R. Michael Ananian</i>	Date: June 22, 2004	

1075013v1-*****

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,082	10/09/2001	Han-Gyoo Kim	1203	6653
	7590	02/02/2005	EXAMINER KOROBOV, VITALI A	
Chung K. Ko 1263 Lakeside Dr. #2190 Sunnyvale, CA 94085			ART UNIT 2155	PAPER NUMBER
DATE MAILED: 02/02/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/974,082	KIM, HAN-GYOO	
	Examiner	Art Unit	
	Vitali Korobov	2155	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 13 October 2000.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-111 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) _____ is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) 1-111 are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.

2. Certified copies of the priority documents have been received in Application No. _____.

3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input checked="" type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____	6) <input type="checkbox"/> Other: _____

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C.

121:

- I. Claims 1 – 33, 43 – 49 and 86 - 104, drawn to a network interface card and a network-attached device, classified in class 709, subclass 250, network-to-computer interfacing.
- II. Claims 34 – 42 and 50 - 55, drawn to a controller, connected to a network adapter and a disk controller, classified in class 711, subclass 111, accessing dynamic storage device.
- III. Claims 56 – 58, 60 – 64 and 105 - 111, drawn to a protocol converter, classified in class 709, subclass 236, computer-to-computer data framing.
- IV. Claim 59 and 65 – 69 drawn to counter – protocol – controller and counter – converter, classified in class 709, subclass 246, computer-to-computer data modifying.
- V. Claim 70 – 74 drawn to a computer juke box, classified in class 369.30.01 and 369, subclass 30.06, plural storage medium.
- VI. Claim 75 – 85 drawn to sending, receiving and executing disk access commands, classified in class 710, subclass 5, input/output command process.

Inventions I through VI are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention I has separate utility such as a network host computer, capable of carrying out a variety of network-related tasks without the features of invention II. Invention II has a separate utility as a dynamic storage device. Invention III has a separate utility and a method of utilization of one of the network layers for relaying commands to a network component. Invention IV has a separate utility as a method for protocol conversion/modification. Invention V has a separate utility as a juke box, and invention VI has a separate utility as a process for issuance of input/output commands. See MPEP § 806.05(d).

The inventions are distinct, each from each other because of the following reasons:

- a. These inventions have acquired a separate status in the art as shown by their different classifications and their recognized divergent subject matter.
- b. The search required for one Group is not required for the other Group.

For the reasons given above, restriction for examination purposes as indicated is proper.

A telephone call was made to the applicant's representative (Mr. Michael R. Ananian) on January 24th, 2005 to request an oral election to the above restriction requirement, but did not result in an election being made.

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

Applicant is given **ONE (1) MONTH, or THIRTY (30) DAYS** from the mailing date of this communication, whichever is longer, within which to respond to this restriction requirement in order to avoid abandonment (35 U.S.C. § 133). Extensions of this time period may be granted under 37 CFR 1.136(a).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vitali Korobov whose telephone number is 571-272-7506. The examiner can normally be reached on Mon-Friday 8a.m. - 4:30p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hosain Alam can be reached on 571-272-3978. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 09/974,082
Art Unit: 2155

Page 5

Vitali Korobov
Examiner
Art Unit 2155

01/31/2005


HOSAIN ALAM
SUPERVISORY PATENT EXAMINER

Examiner-Initiated Interview Summary	Application No. 09/974,082	Applicant(s) KIM, HAN-GYOO	
	Examiner Vitali Korobov	Art Unit 2155	

All Participants:

(1) Vitali Korobov.

(2) R. Michael Ananian, attorney for the applicant.

Date of Interview: 24 January 2005

Status of Application: 30

(3) _____

(4) _____

Time: afternoon

Type of Interview:

Telephonic

Video Conference

Personal (Copy given to: Applicant Applicant's representative)

Exhibit Shown or Demonstrated: Yes No

If Yes, provide a brief description:

Part I.

Rejection(s) discussed:

Claims discussed:
1-111

Prior art documents discussed:

Part II.

SUBSTANCE OF INTERVIEW DESCRIBING THE GENERAL NATURE OF WHAT WAS DISCUSSED:
See Continuation Sheet

Part III.

It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview directly resulted in the allowance of the application. The examiner will provide a written summary of the substance of the interview in the Notice of Allowability.

It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview did not result in resolution of all issues. A brief summary by the examiner appears in Part II above.

V. Korobov
(Examiner/SPE Signature)

(Applicant/Applicant's Representative Signature – if appropriate)

Continuation of Substance of Interview including description of the general nature of what was discussed:
Election/Restriction discussed. Mr. Ananian states that his repeated attempts to contact the applicant were not successful. The examiner will forward Election/Restriction forms to the attorney of the applicant my mail. The application will be put on hold pending response from the applicant. .



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
 UNITED STATES PATENT AND TRADEMARK OFFICE
 WASHINGTON, D.C. 20231
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Bib Data Sheet

CONFIRMATION NO. 6653

SERIAL NUMBER 09/974,082	FILING DATE 10/09/2001 RULE	CLASS 369	GROUP ART UNIT 2651	ATTORNEY DOCKET NO. 1203	
APPLICANTS Han-Gyoo Kim, Seoul, KOREA, REPUBLIC OF;					
** CONTINUING DATA ***** THIS APPLN CLAIMS BENEFIT OF 60/240,344 10/13/2000					
** FOREIGN APPLICATIONS *****					
IF REQUIRED, FOREIGN FILING LICENSE GRANTED.. SMALL ENTITY ** ** 11/08/2001					
Foreign Priority claimed <input type="checkbox"/> yes <input type="checkbox"/> no	35 USC 119 (a-d) conditions met <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after Allowance	STATE OR COUNTRY KOREA, REPUBLIC OF	SHEETS DRAWING 24	TOTAL CLAIMS 85	INDEPENDENT CLAIMS 12
Verified and Acknowledged Examiner's Signature _____ Initials _____					
ADDRESS Chung K. Ko 1263 Lakeside Dr. #2190 Sunnyvale ,CA 94085					
TITLE Disk system adapted to be directly attached to network					
FILING FEE RECEIVED 1333	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		



Attorney Docket No. 34253/US/2
Express Mail Label No. EV 622974243 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

Applicant	: Han-Gyoo Kim	Confirmation No: 6653
Appln. No.	: 09/974,082	Group Art Unit: 2155
Filed	: October 9, 2001	Examiner: Korobov, Vitali A.
Title	: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK	

AMENDMENT AND RESPONSE TO RESTRICTION REQUIREMENT

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Please amend the above-identified application as follows:
Amendments to the Claims begin on page 2 of this paper.
Remarks begin on page 6 of this paper.

Amendments to the Claims:

1-33. (canceled)

34. (original) A network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising: a network adapter for receiving disk access command in data link frames through the network; a disk controller, connected to the LAN adapter, for executing disk access commands; and a disk for storing data; and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device.

35. (original) The NAD device of claim 34, wherein the network runs Ethernet.

36. (original) The NAD device of claim 34, wherein said disk is formatted as a local disk.

37. (original) The NAD device of claim 34, wherein said disk is partitioned as a local disk.

38. (original) The NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller.

39. (original) The NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device.

40. (original) The NAD device of claim 34, wherein the controller has a filter for controlling access to the disk.

41. (original) The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions.

42. (original) The NAD device of claim 41, wherein each disk partition is controlled by a separate driver.

43-49. (canceled)

50. (original) A network-attached storage device adapted to be connected through a network to host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the storage device comprising: a storage device; a network adapter for receiving a storage command through the network; and a storage controller for executing the storage command.

51. (original) The network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device.

52. (original) The network-attached storage device of claim 50, wherein the storage device is a disk.

53. (original) The network-attached storage device of claim 50, wherein the storage device is a tape device.

54. (original) The network-attached storage device of claim 50, wherein the storage device is a CD drive.

55. (original) The network-attached storage device of claim 50, wherein the storage device is a memory device.

56-111. (canceled)

112. A network attached disk device, comprising:
a first disk device;
a network attached disk device controller operative to receive across a network an input/output command for the first disk device;
a disk controller operative to control the operation of the disk device in response to the input/output command;
a network adapter operative to receive the input/output command from the network attached disk device controller; wherein
the network attached disk device is operative to be recognized as a local device by the remote host.

113. The network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host.

114. The network attached disk device of claim 112, further comprising a second disk device.

115. The network attached disk device of claim 114, wherein the first and second disk devices are both operative to be recognized as unique local devices by the remote host.

116. The network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command.

117. The network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication.

118. The network attached disk device of claim 116, wherein the protocol stack comprises a TCP/IP connection.

119. The network attached disk device of claim 112, wherein the disk controller comprises:

a channel controller;

at least one disk channel operatively connected to the channel controller;

a buffer manager operatively connected to the channel controller; and

a bus interface operatively connected to the buffer manager and the network

attached disk device controller.

120. The network attached disk device of claim 112, wherein the network attached disk device controller comprises:

a main controller operative to generally control the operation of the network attached disk device;

a buffer management module operative to cache data associated with the first disk device;

a disk controller driver for interfacing with the disk controller; and

a network adapter driver for interfacing with the network adapter.

121. The network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote hose.

122. The network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk.

123. The network attached disk of claim 112, wherein the first disk device comprises a compact disk.

124. The network attached disk of claim 112, wherein the first disk device comprises a digital versatile disk.

REMARKS

The Applicant submits this Amendment and Response to Restriction Requirement in response to the Office action dated February 2, 2005, setting a shortened statutory period of reply of one month. Thus, this Amendment was due on or before March 2, 2005. Accordingly, a request for three-month extension of time is enclosed herewith. Please charge the appropriate fee to Deposit Account no. 04-1415. If any additional fees or petitions are required, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 as necessary.

Restriction Requirement

Claims 1-111 are currently pending in the application. After entry of this paper, claims 34-42 and 50-55 will be pending.

In the Office action, the Examiner asserted six distinct inventions are claimed in the above-referenced application:

I. Group I (claims 1-33, 43-49 and 86-104), drawn to a network interface card and a network-attached device, classified in class 709, subclass 250, network-to-computer interfacing;

II. Group II (claims 34-42 and 50-55), drawn to a controller, connected to a network adapter and a disk controller, classified in class 711, subclass 111, accessing dynamic storage device;

III. Group III (claims 56-58, 60-64 and 105-111), drawn to a protocol converter, classified in class 709, subclass 236, computer-to-computer data framing;

IV. Group IV (claims 59 and 65-69), drawn to counter – protocol – controller and counter – converter, classified in class 709, subclass 246, computer-to-computer data modifying;

V. Group V (claims 70-74), drawn to a computer juke box, classified in class 369.30.01 and 369, subclass 30.06, plural storage medium; and

VI. Group VI (claims 75-85), drawn to sending, receiving and executing disk access commands, classified in class 710, subclass 5, input/output command process.

In response to the Examiner's restriction requirement, Group II (claims 34-42 and 50-55) is hereby elected, without traverse, for prosecution on the merits. Accordingly, claims 1-33, 43-49 and 56-111 are hereby cancelled.

New Claims

The Applicant has added claims 112-122 in this Amendment and Response. These new claims are generally drawn to the same subject matter as Group II, and accordingly are properly considered part of Group II under the outstanding restriction requirement. The Applicant respectfully requests the Examiner issue an Office action addressing the merits of claims 112-122 when the claims of Group II are considered.

Conclusion

The Applicant thanks the Examiner for a careful review of the claims. The Applicant respectfully submits the present Amendment and Response responds to the restriction requirement and places the application in condition for further substantive review.

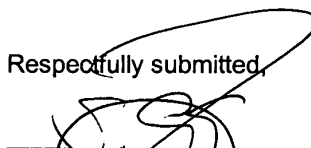
This Amendment is submitted contemporaneously with a petition for a two-month extension of time in accordance with 37 CFR § 1.136(a). The Applicant notes the present Restriction Requirement was not mailed to the Applicant's counsel, despite the Examiner contacting Applicant's counsel by telephone on January 24, 2005 as noted in the Office action. Accordingly, the Applicant did not learn of the Restriction Requirement's issuance until mid-April. Thus, the Applicant respectfully requests the Patent Office waive the extension of time fee required for this response.

However, should the Patent Office feel the fee is appropriate, please charge Deposit Account No. 04-1415 for a two-month extension of time fee. The Applicant believes no further fees or petitions are required. However, if any such petitions or fees are necessary, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 accordingly.

If the Examiner should require any additional information or amendment, please contact the undersigned attorney.

Dated: June 2, 2005

Respectfully submitted,


S. Craig Hemerway, Registration No. 44,759
Attorney for Applicant
USPTO Customer No. 20686

DORSEY & WHITNEY LLP
370 Seventeenth Street, Suite 4700
Denver, Colorado 80202-5647
Tel: 303-629-3400
Fax: 303-629-3450

06-06-05

21534



Attorney Docket No. 34253/US/2
Express Mail Label No. EV 622974243 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicant	: Han-Gyoo Kim	Confirmation No.:	6653
Appln. No.	: 09/974,082	Group Art Unit:	2155
Filed	: October 9, 2001	Examiner:	Korobov, Vitali A.
Title	: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK		

CERTIFICATE OF MAILING BY EXPRESS MAIL

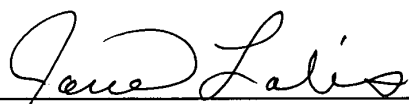
MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The undersigned hereby certifies that the following documents:

1. Combined Amendment and Petition for Extension of Time (2 pages);
2. Amendment and Response to Restriction Requirement (7 pages);
3. Certificate of Mailing by Express Mail (1 page); and
4. Return Card

relating to the above application, were deposited as "Express Mail" under 37 CFR § 1.10, Mailing Label No. EV 622974243 US, with the United States Postal Service addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on June 2, 2005.


 Mailer's Signature _____
 Print Name: Jane Lalis

Dorsey & Whitney LLP

Tel: 303-629-3400
Fax: 303-629-3450

EV622974243US

COMBINED AMENDMENT & PETITION FOR EXTENSION OF
TIME UNDER 37 CFR 1.136(a) (Small Entity)

Docket No.
34253/US/2



The fee for the amendment and extension of time is to be paid as follows:

- A check in the amount of _____ for the amendment and extension of time is enclosed.
- Please charge Deposit Account No. **04-1415** in the amount of **\$510.00**
- The Director is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. **04-1415**
 - Any additional filing fees required under 37 C.F.R. 1.16.
 - Any patent application processing fees under 37 CFR 1.17.
- If an additional extension of time is required, please consider this a petition therefor and charge any additional fees which may be required to Deposit Account No. **04-1415**
- Payment by credit card. Form PTO-2038 is attached.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Signature

S. Craig Hemenway, Registration No. 44,759
Dorsey & Whitney LLP
Republic Plaza Building, Suite 4700
370 Seventeenth Street
Denver, CO 80202-5647
Phone: (303) 629-3400
Fax: (303) 629-3450
USPTO Customer No. 20686

cc:

Dated: June 2, 2005

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~~(Date)~~
~~Signature of Person Mailing Correspondence~~
~~Typed or Printed Name of Person Mailing Correspondence~~

P28SMALL/REV05

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number

09/974,082
1203

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	85	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	85 minus 20 =	* 65
INDEPENDENT CLAIMS	12 minus 3 =	* 9
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* 28 Minus ** 11	=
	Independent	* 3 Minus *** 14	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* Minus **	=
	Independent	* Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* Minus **	=
	Independent	* Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

SMALL ENTITY TYPE OR OTHER THAN SMALL ENTITY

RATE	FEE	OR	RATE	FEE
BASIC FEE	370.00	OR	BASIC FEE	740.00
X\$ 9=	585	OR	X\$18=	
X42=	378	OR	X84=	
+140=		OR	+280=	
TOTAL	1333	OR	TOTAL	

SMALL ENTITY OR OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
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+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
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+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

06-22-05

2155
02



Attorney Docket No. 34253/US/2
Express Mail Label No. EV 622975703 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicant	: Han-gyoo Kim	Confirmation No.:	6653
Appln. No.	: 09/974,082	Group Art Unit:	2155
Filed	: October 9, 2001	Examiner:	Korobov, Vitali A.
Title	: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK		

CERTIFICATE OF MAILING BY EXPRESS MAIL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The undersigned hereby certifies that the following documents:

1. Transmittal Letter (1 page);
2. Copy of Executed Power of Attorney by Assignee (2 pages);
3. Copy of Notice of Recordation of Assignment and Assignment (4 pages);
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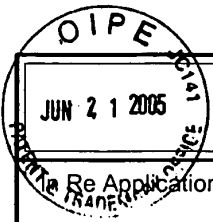
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Mailer's Signature
Print Name: Jane M. Lalis

EV622975703US

Dorsey & Whitney LLP

Tel: 303-629-3400
Fax: 303-629-3450



TRANSMITTAL LETTER
(General - Patent Pending)

Docket No.
34253/US/2

Re Application Of: Han-gyoo Kim

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/974,082	October 9, 2001	Korobov, Vitali A.	20686	2155	6653

Title: **DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK**

COMMISSIONER FOR PATENTS:

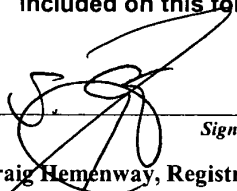
Transmitted herewith is:

- Combined Power of Attorney by Assignee and Submission Under 37 C.F.R. 3.71 & 3.73(b) (2 pages); and
- Notice of Recordation of Assignment and Assignment (4 pages)

in the above identified application.

- No additional fee is required.
- A check in the amount of _____ is attached.
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Signature

Dated: June 21, 2005

S. Craig Hemenway, Registration No. 44,759
Dorsey & Whitney LLP
Republic Plaza Building, Suite 4700
370 Seventeenth Street
Denver, CO 80202-5647
Phone: (303) 629-3400
Fax: (303) 629-3450
USPTO Customer No. 20686

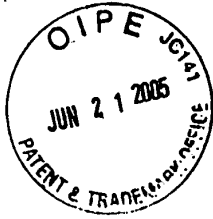
CC:

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~~(Date)~~

~~Signature of Person Mailing Correspondence~~

~~Typed or Printed Name of Person Mailing Correspondence~~



PATENT
Attorney Docket No. 34253/US/2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Han-gyoo KIM

Application No. 09/974,082

Filed: October 9, 2001

For: DISK SYSTEM ADAPTED TO BE
DIRECTLY ATTACHED TO A NETWORK

Confirmation No.: 6653

Examiner: Korobov, Vitali A.

Art Unit: 2155

**COMBINED POWER OF ATTORNEY BY ASSIGNEE
AND SUBMISSION UNDER 37 C.F.R. §§ 3.71 AND 3.73(b)**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

As an officer of XiMeta Technology, Inc. ("assignee"), a British Virgin Islands corporation, I hereby certify that the undersigned is a representative authorized and empowered to sign on behalf of the assignee, and that to the best of assignee's knowledge and belief it is the assignee of the entire right, title and interest in and to the above-referenced patent application by virtue of either:

- A. An assignment from the inventor(s) of the patent application identified above,
 - 1. a copy of which is attached; or
 - 2. which is recorded in the U.S. Patent and Trademark Office at Reel _____, Frame _____, a copy of which is attached.

OR

- B. A chain of title from the inventor(s), of the patent application identified above, to the current assignee as shown below:
 1. From: Han-gyoo Kim To: XiMeta Technology, Inc.
The document was recorded in the U.S. Patent and Trademark Office at Reel 015505, Frame 0906, a copy of which is attached.
 2. From: _____ To: _____
The document was recorded in the U.S. Patent and Trademark Office at Reel _____, Frame _____, or a copy of which is attached.

Assignee hereby appoints on its behalf the following patent attorneys to prosecute the patent application identified above and to transact all business in the Patent Office connected therewith:

Dorsey & Whitney LLP
USPTO Customer No. 32940

Pursuant to 37 C.F.R. § 3.71, the assignee hereby states that prosecution of the above-referenced patent application is to be conducted to the exclusion of the inventors.

Send all correspondence relating to this matter to:

Dorsey & Whitney LLP
USPTO Customer No. 32940

Direct all telephone calls to **R. Michael Ananian** at **(650) 494-8700**.


The undersigned hereby authorizes its legal representative to complete the caption of this document, including the Application No. and filing date.

The undersigned hereby declares that all statements made herein of his/her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 25 day of May, 2005.

ASSIGNEE:

XIMETA TECHNOLOGY, INC.,
a British Virgin Islands corporation

By 
Name: HAN G. YOU KIM
Title: Chairman

Address: Nerine Chambers
5 Columbus Centre
Road Town, Tortola
British Virgin Islands
4820-9071-7184\1



UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

JANUARY 03, 2005

PTAS



102780108A

DORSEY & WHITNEY LLP
R. MICHAEL ANANIAN, ESQ.
FOUR EMBARCADERO CENTER, SUITE 3400
SAN FRANCISCO, CA 94111-4187

UNITED STATES PATENT AND TRADEMARK OFFICE
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THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, CG-4, 1213 JEFFERSON DAVIS HWY, SUITE 320, WASHINGTON, D.C. 20231.

RECORDATION DATE: 06/28/2004

REEL/FRAME: 015505/0906
NUMBER OF PAGES: 3

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:

KIM, HAN-GYOO

DOC DATE: 06/21/2004

ASSIGNEE:

XIMETA TECHNOLOGY, INC.
NERINE CHAMBERS, 5 COLUMBUS CENTRE
ROAD TOWN, TORTOLA
BR.VIRGIN
ISLANDS

SERIAL NUMBER: 60240344

FILING DATE: 10/13/2000

PATENT NUMBER:

ISSUE DATE:

TITLE: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK

SERIAL NUMBER: 09974082

FILING DATE: 10/09/2001

PATENT NUMBER:

ISSUE DATE:

TITLE: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK

015505/0906 PAGE 2

TARA WASHINGTON, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

ASSIGNMENT

WHEREAS, I the undersigned, (1) Han-Gyoo Kim, hereinafter termed "Inventor" residing at Irvine, State of California, has/have invented certain new and useful improvements in **DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK**, and has executed a United States provisional patent application disclosing and identifying the invention filed 10/13/2000 and assigned Serial No. 60/240,344, and a United States utility patent application disclosing and identifying the invention filed 10/09/2001 and assigned Serial No. 09/974,082, as well as the following related international and foreign patent applications:

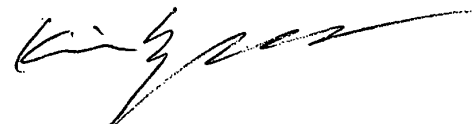
International PCT Application	PCT/KR01/01976 (WO 02/054266),
European Patent Office Application	EP 01272932 (EP1348164),
Japanese Patent Application	JP 2002 555298, and
Korean Patent Application	KR 10-2001-0000086;

and

WHEREAS, XiMeta Technology, Inc. hereinafter termed "Assignee", a British Virgin Islands corporation, having a place of business at Nerine Chambers, 5 Columbus Centre, Road Town, Tortola, British Virgin Islands, is desirous of acquiring the entire right, title and interest in and to said applications and the inventions disclosed therein, and in and to all embodiments of the inventions, heretofore conceived, made or discovered by said Inventor (all collectively hereinafter termed "said inventions"), and in and to any and all patents, inventor's certificates and other forms of protection (hereinafter termed "patents") thereon granted in the United States, internationally, and foreign countries.

NOW, THEREFORE, in consideration of good and valuable consideration acknowledged by said Inventor to have been received in full from said Assignee:

1. Said Inventor does hereby sell, assign, transfer and convey unto said Assignee, the entire right, title and interest (a) in and to said patent applications and said inventions; (b) in and to all rights to apply for international and foreign patents on said inventions pursuant to the International Convention for the Protection of Industrial Property or otherwise; (c) in and to any and all patent applications filed and any and all patents granted on said inventions in the United States, internationally, or any foreign country, including each and every patent application filed and each and every patent granted on any application which is a division, substitution, or continuation of any of said applications; and (d) in and to each and every reissue or extensions of any of said patents or patent applications; and (e) all claims for damages by reason of past infringement of said patents and patent applications, with the right to sue for and collect the same for its own use and enjoyment, and for use and enjoyment of its successors, assigns or other legal representatives.



2. Said Inventor hereby covenants and agrees to cooperate with said Assignee to enable said Assignee to enjoy to the fullest extent the right title and interest herein conveyed in the United States, internationally, and foreign countries. Such cooperation by said Inventors shall include prompt production of pertinent facts and documents, giving of testimony, execution of petitions, oaths, specifications, declarations or other papers, and other assistance all to the extent deemed necessary or desirable by said Assignee: (a) for perfecting in said Assignee the right, title and interest herein conveyed; (b) for prosecuting any of said applications; (c) for filing and prosecuting substitute, divisional, continuing, continuation, continuation-in-part, or additional applications covering said inventions; (d) for filing and prosecuting applications for reissuance of any said patents; (e) for interference or other priority proceedings involving said inventions; and (f) for legal proceedings involving said inventions and any applications therefor and any patents granted thereon, including without limitation opposition proceedings, cancellation proceedings, priority contests, public use proceedings, infringement actions and court actions; provided, however, that the expense incurred by said Inventor in providing such cooperation shall be paid for by said Assignee.

3. The terms, covenants and conditions of this assignment shall inure to the benefit of said Assignee, its successors, assigns and other legal representatives, and shall be binding upon said Inventor, his heirs, legal representatives and assigns.

IN WITNESS WHEREOF, the said Inventor has executed and delivered this instrument to said Assignee:

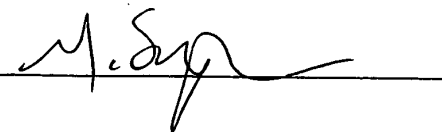
Dated: 21th day of June, 2004

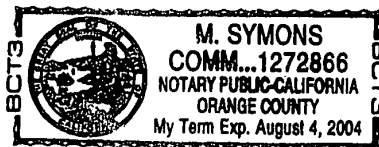
(1) 
Han-Gyoo Kim

County of Orange)
) ss.
State of CALIFORNIA)

On this 21 day of June, in the year 2004, before me, M. Symons, Notary Public of the State of California, personally appeared Han-Gyoo Kim, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person whose name is subscribed to the within instrument, and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

Signature 



(Seal)

1074877

06-22-05

2155
02



Attorney Docket No. 34253/US/2
Express Mail Label No. EV 622975703 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicant	: Han-gyoo Kim	Confirmation No.:	6653
Appln. No.	: 09/974,082	Group Art Unit:	2155
Filed	: October 9, 2001	Examiner:	Korobov, Vitali A.
Title	: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK		

CERTIFICATE OF MAILING BY EXPRESS MAIL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

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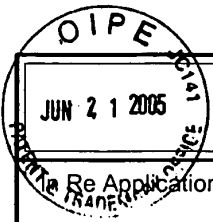
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Mailer's Signature
Print Name: Jane M. Lalis

EV622975703US

Dorsey & Whitney LLP

Tel: 303-629-3400
Fax: 303-629-3450



TRANSMITTAL LETTER
(General - Patent Pending)

Docket No.
34253/US/2

Re Application Of: Han-gyoo Kim

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/974,082	October 9, 2001	Korobov, Vitali A.	20686	2155	6653

Title: **DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK**

COMMISSIONER FOR PATENTS:

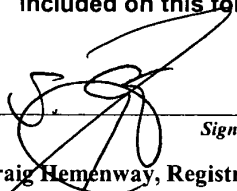
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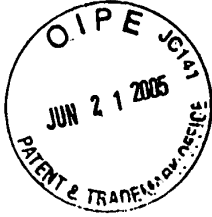
Signature

Dated: June 21, 2005

S. Craig Hemenway, Registration No. 44,759
 Dorsey & Whitney LLP
 Republic Plaza Building, Suite 4700
 370 Seventeenth Street
 Denver, CO 80202-5647
 Phone: (303) 629-3400
 Fax: (303) 629-3450
 USPTO Customer No. 20686

CC:

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PATENT
Attorney Docket No. 34253/US/2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Han-gyoo KIM

Application No. 09/974,082

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DIRECTLY ATTACHED TO A NETWORK

Confirmation No.: 6653

Examiner: Korobov, Vitali A.

Art Unit: 2155

**COMBINED POWER OF ATTORNEY BY ASSIGNEE
AND SUBMISSION UNDER 37 C.F.R. §§ 3.71 AND 3.73(b)**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

As an officer of XiMeta Technology, Inc. ("assignee"), a British Virgin Islands corporation, I hereby certify that the undersigned is a representative authorized and empowered to sign on behalf of the assignee, and that to the best of assignee's knowledge and belief it is the assignee of the entire right, title and interest in and to the above-referenced patent application by virtue of either:

- A. An assignment from the inventor(s) of the patent application identified above,
 - 1. a copy of which is attached; or
 - 2. which is recorded in the U.S. Patent and Trademark Office at Reel _____, Frame _____, a copy of which is attached.

OR

- B. A chain of title from the inventor(s), of the patent application identified above, to the current assignee as shown below:
 1. From: Han-gyoo Kim To: XiMeta Technology, Inc.
The document was recorded in the U.S. Patent and Trademark Office at Reel 015505, Frame 0906, a copy of which is attached.
 2. From: _____ To: _____
The document was recorded in the U.S. Patent and Trademark Office at Reel _____, Frame _____, or a copy of which is attached.

Assignee hereby appoints on its behalf the following patent attorneys to prosecute the patent application identified above and to transact all business in the Patent Office connected therewith:

Dorsey & Whitney LLP
USPTO Customer No. 32940

Pursuant to 37 C.F.R. § 3.71, the assignee hereby states that prosecution of the above-referenced patent application is to be conducted to the exclusion of the inventors.

Send all correspondence relating to this matter to:

Dorsey & Whitney LLP
USPTO Customer No. 32940

Direct all telephone calls to **R. Michael Ananian** at **(650) 494-8700**.


The undersigned hereby authorizes its legal representative to complete the caption of this document, including the Application No. and filing date.

The undersigned hereby declares that all statements made herein of his/her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 25 day of May, 2005.

ASSIGNEE:

XIMETA TECHNOLOGY, INC.,
a British Virgin Islands corporation

By 
Name: HAN G. YOU KIM
Title: Chairman

Address: Nerine Chambers
5 Columbus Centre
Road Town, Tortola
British Virgin Islands
4820-9071-7184\1



UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

JANUARY 03, 2005

PTAS



102780108A

DORSEY & WHITNEY LLP
R. MICHAEL ANANIAN, ESQ.
FOUR EMBARCADERO CENTER, SUITE 3400
SAN FRANCISCO, CA 94111-4187

UNITED STATES PATENT AND TRADEMARK OFFICE
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PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, CG-4, 1213 JEFFERSON DAVIS HWY, SUITE 320, WASHINGTON, D.C. 20231.

RECORDATION DATE: 06/28/2004

REEL/FRAME: 015505/0906
NUMBER OF PAGES: 3

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:

KIM, HAN-GYOO

DOC DATE: 06/21/2004

ASSIGNEE:

XIMETA TECHNOLOGY, INC.
NERINE CHAMBERS, 5 COLUMBUS CENTRE
ROAD TOWN, TORTOLA
BR.VIRGIN
ISLANDS

SERIAL NUMBER: 60240344

FILING DATE: 10/13/2000

PATENT NUMBER:

ISSUE DATE:

TITLE: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK

SERIAL NUMBER: 09974082

FILING DATE: 10/09/2001

PATENT NUMBER:

ISSUE DATE:

TITLE: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK

015505/0906 PAGE 2

TARA WASHINGTON, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

ASSIGNMENT

WHEREAS, I the undersigned, (1) Han-Gyoo Kim, hereinafter termed "Inventor" residing at Irvine, State of California, has/have invented certain new and useful improvements in **DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK**, and has executed a United States provisional patent application disclosing and identifying the invention filed 10/13/2000 and assigned Serial No. 60/240,344, and a United States utility patent application disclosing and identifying the invention filed 10/09/2001 and assigned Serial No. 09/974,082, as well as the following related international and foreign patent applications:

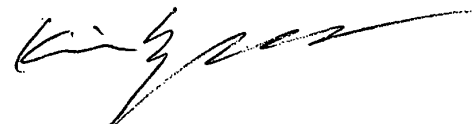
International PCT Application	PCT/KR01/01976 (WO 02/054266),
European Patent Office Application	EP 01272932 (EP1348164),
Japanese Patent Application	JP 2002 555298, and
Korean Patent Application	KR 10-2001-0000086;

and

WHEREAS, XiMeta Technology, Inc. hereinafter termed "Assignee", a British Virgin Islands corporation, having a place of business at Nerine Chambers, 5 Columbus Centre, Road Town, Tortola, British Virgin Islands, is desirous of acquiring the entire right, title and interest in and to said applications and the inventions disclosed therein, and in and to all embodiments of the inventions, heretofore conceived, made or discovered by said Inventor (all collectively hereinafter termed "said inventions"), and in and to any and all patents, inventor's certificates and other forms of protection (hereinafter termed "patents") thereon granted in the United States, internationally, and foreign countries.

NOW, THEREFORE, in consideration of good and valuable consideration acknowledged by said Inventor to have been received in full from said Assignee:

1. Said Inventor does hereby sell, assign, transfer and convey unto said Assignee, the entire right, title and interest (a) in and to said patent applications and said inventions; (b) in and to all rights to apply for international and foreign patents on said inventions pursuant to the International Convention for the Protection of Industrial Property or otherwise; (c) in and to any and all patent applications filed and any and all patents granted on said inventions in the United States, internationally, or any foreign country, including each and every patent application filed and each and every patent granted on any application which is a division, substitution, or continuation of any of said applications; and (d) in and to each and every reissue or extensions of any of said patents or patent applications; and (e) all claims for damages by reason of past infringement of said patents and patent applications, with the right to sue for and collect the same for its own use and enjoyment, and for use and enjoyment of its successors, assigns or other legal representatives.



2. Said Inventor hereby covenants and agrees to cooperate with said Assignee to enable said Assignee to enjoy to the fullest extent the right title and interest herein conveyed in the United States, internationally, and foreign countries. Such cooperation by said Inventors shall include prompt production of pertinent facts and documents, giving of testimony, execution of petitions, oaths, specifications, declarations or other papers, and other assistance all to the extent deemed necessary or desirable by said Assignee: (a) for perfecting in said Assignee the right, title and interest herein conveyed; (b) for prosecuting any of said applications; (c) for filing and prosecuting substitute, divisional, continuing, continuation, continuation-in-part, or additional applications covering said inventions; (d) for filing and prosecuting applications for reissuance of any said patents; (e) for interference or other priority proceedings involving said inventions; and (f) for legal proceedings involving said inventions and any applications therefor and any patents granted thereon, including without limitation opposition proceedings, cancellation proceedings, priority contests, public use proceedings, infringement actions and court actions; provided, however, that the expense incurred by said Inventor in providing such cooperation shall be paid for by said Assignee.

3. The terms, covenants and conditions of this assignment shall inure to the benefit of said Assignee, its successors, assigns and other legal representatives, and shall be binding upon said Inventor, his heirs, legal representatives and assigns.

IN WITNESS WHEREOF, the said Inventor has executed and delivered this instrument to said Assignee:

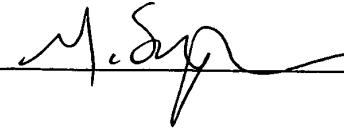
Dated: 24th day of June, 2004

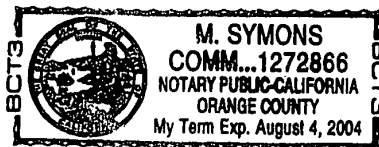
(1) 
Han-Gyoo Kim

County of Orange)
) ss.
State of CALIFORNIA)

On this 24 day of June, in the year 2004, before me, M. Symons, Notary Public of the State of California, personally appeared Han-Gyoo Kim, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person whose name is subscribed to the within instrument, and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

Signature 



(Seal)

1074877

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	4741	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).cls.	USPAT	AND	ON	2005/08/10 20:07
S1	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/02 21:18
S2	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/02 21:18
S3	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/02 21:37
S4	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/10 20:08
S5	8535	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/02 22:10
S7	38	S5 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/02 22:37
S8	63	S5 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/02 22:20
S10	116	S5 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 12:10

S11	4235	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/09 18:03
S12	132	S11 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 13:54
S13	421	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 13:54
S14	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:43
S15	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:44
S16	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:44
S17	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:44
S18	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:44

S19	8535	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:45
S20	38	S19 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:45
S21	63	S19 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:46
S23	116	S19 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:46
S24	4235	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:47
S25	132	S24 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:47
S26	421	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:48
S27	1146	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 15:01

S28	1	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 15:02
S29	2826	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 18:38
S30	1148	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:31
S31	611	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 18:57
S32	195	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:31
S33	198	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:32
S34	225	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:36
S35	58	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:42

S37	26	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:55
S38	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:55
S39	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 20:00
S40	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2005/08/04 18:20
S42	190	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2005/08/04 21:14
S43	111	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2005/08/04 21:14
S44	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2005/08/04 21:14
S45	11146	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 14:27
S46	76	S45 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 14:27
S47	189	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2005/08/08 15:28
S48	11	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2005/08/08 15:20
S49	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2005/08/08 15:29

S50	17	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2005/08/08 18:16
S51	1	"6389432".pn.	USPAT	AND	ON	2005/08/08 15:34
S52	11146	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 15:37
S53	76	S52 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 15:37
S54	1	"6216202".pn.	USPAT	AND	ON	2005/08/08 16:38
S55	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2005/08/08 16:39
S56	14	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2005/08/08 19:15
S57	3	S50 not S56	USPAT	AND	ON	2005/08/08 19:16
S58	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2005/08/09 17:11
S59	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2005/08/09 17:11
S60	21	"Network Attached Storage" "as local"	USPAT	AND	ON	2005/08/09 18:05
S61	268	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2005/08/09 18:06
S62	138	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2005/08/09 18:08
S63	45	"Network Attached Storage" (dvd)	USPAT	AND	ON	2005/08/09 19:51
S64	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2005/08/09 19:51



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6

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,082	10/09/2001	Han-Gyoo Kim	1203	6653
32940	7590	08/15/2005	EXAMINER	
DORSEY & WHITNEY LLP 555 CALIFORNIA STREET, SUITE 1000 SUITE 1000 SAN FRANCISCO, CA 94104			KOROBOV, VITALI A	
			ART UNIT	PAPER NUMBER
			2155	

DATE MAILED: 08/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

8

Office Action Summary	Application No. 09/974,082	Applicant(s) KIM, HAN-GYOO	
	Examiner Vitali Korobov	Art Unit 2155	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 02 June 2005.
- 2a) This action is **FINAL**.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 34-42,50-55 and 112-124 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 34-42,50-55 and 112-124 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 09 October 2001 is/are: a) accepted or b) objected to by the Examiner. Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a). Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 06/28/2004.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

AD

DETAILED ACTION

1. This Office Action is in response to the documents filed on 06/02/2005. Claims 1-33, 43-49 and 56-111 were canceled. Claims 112-124 were added. Claims 34-42, 50-55 and 112-124 are pending in this Office Action.

Paper Submitted

2. It is hereby acknowledged that the following papers have been received and placed of record in the file: **Information Disclosure Statement** as received on 06/28/2004 was considered.

Claim Objections

3. Claim 113 is objected to because of the following informalities: Claim 113 recites "the remote hose". For the purposes of this Office Action, the Examiner assumed this to mean "the remote host".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 112-124 are rejected under 35 U.S.C. 112, second paragraph.

Claim 112 recites the limitation "the remote host" in the last line of the claim.

There is insufficient antecedent basis for this limitation in the claim.

All dependent claims are rejected as having the same deficiencies as the claims they depend from.

Claim 118 recites the limitation "the protocol stack" in the first line of the claim.

There is insufficient antecedent basis for this limitation in the claim.

Claim 119 recites the limitation "the buffer manager" in the next to last line of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 34-42, 50-52, 55, 112-120 and 122 are rejected under 35

U.S.C. 102(e) as being anticipated by the U. S. Patent No. 6,807,581 to Starr et al. (hereinafter Starr).

Regarding claim 34, Starr teaches a network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device

connected directly to the system bus of the host, the NAD device comprising: a network adapter for receiving disk access command in data link frames through the network (Fig. 1, Intelligent NIC 22; Col. 5, lines 31-39 – data link layer connection between the INIC and one of the networks); a disk controller, connected to the LAN adapter, for executing disk access commands (Fig. 1, I/O controller 64, connected to the LAN adapter (INIC 22) through the INIC I/O bridge 50); and a disk for storing data (Fig. 1, INIC Storage Unit 70); and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device (Fig. 1, I/O controller 72).

Regarding claim 35, Starr teaches the NAD device of claim 34, wherein the network runs Ethernet (Col. 3, lines 52-57 – compatibility to the Ethernet-based networks).

Regarding claim 36, Starr teaches the NAD device of claim 34, wherein said disk is formatted as a local disk (As per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23).

Regarding claim 37, Starr teaches the NAD device of claim 34, wherein said disk is partitioned as a local disk (As per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23. Also, as per col. 6, lines 30-35, the file system 23 supports logical file format, and therefore is inherently capable of supporting partitions, partitions being nothing more than logical subdivisions of a physical disk space).

Regarding claim 38, Starr teaches the NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a

media access control (MAC) controller (Col. 5, lines 35-39 and Fig. 1 – Media Access Control 60).

Regarding claim 39, Starr teaches the NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device (Fig. 1, I/O controller 72).

Regarding claim 40, Starr teaches the NAD device of claim 34, wherein the controller has a filter for controlling access to the disk (Col. 7, lines 23-26 – filtering based on authentication and other connection initialization procedures).

Regarding claim 41, Starr teaches the NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions (Col. 5, line 67, col. 6, lines 1-4 – optional boot partition).

Regarding claim 42, Starr teaches the NAD device of claim 41, wherein each disk partition is controlled by a separate driver (Col. 5, lines 59-64 – RAID. The disks (partitions) in RAID are independent by definition, since RAID stands for “redundant array of independent disks”).

Regarding claim 50, Starr teaches a network-attached storage device adapted to be connected through a network to host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the storage device comprising: a storage device (Fig. 1, storage 70); a network adapter for receiving a storage command through the network (Fig. 1, sequencers 52, physical layer hardware 58 and MAC 60); and a storage controller for executing the storage command (Fig. 1, INIC I/O controller 72).

Regarding claim 51, Starr teaches the network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device (Fig. 1, INIC I/O controller 72).

Regarding claim 52, Starr teaches the network-attached storage device of claim 50, wherein the storage device is a disk (Col. 5, lines 59-60).

Regarding claim 55, Starr teaches the network-attached storage device of claim 50, wherein the storage device is a memory device (Col. 6, lines 9-14).

Regarding claim 112, Starr teaches a network attached disk device, comprising: a first disk device (Fig. 1, INIC storage unit 70); a network attached disk device controller operative to receive across a network an input/output command for the first disk device (Fig. 1, INIC I/O controller 72); a disk controller operative to control the operation of the disk device in response to the input/output command (Fig. 1, INIC I/O controller 72); a network adapter operative to receive the input/output command from the network attached disk device controller (Fig. 1, INIC 22); wherein the network attached disk device is operative to be recognized as a local device by the remote host (As per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23. As per col. 5, line 67 and col. 6, lines 1-4, INIC I/O controller 72 may be connected to the I/O bus 40).

Regarding claim 113, Starr teaches the network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host (Col. 5, lines 53-67 and col. 6, lines 1-4 disclose various configurations for connecting I/O controller 72 to the host 20. If the connection is

implemented through a Fibre Channel, and the I/O controller is not connected to the I/O bus of the host, then the INIC storage unit 70 is recognized by the host as a local drive attached to the system bus 48 of the remote host).

Regarding claim 114, Starr teaches the network attached disk device of claim 112, further comprising a second disk device (Col. 5, lines 53-54 – collection of disk drives).

Regarding claim 115, Starr teaches the network attached disk device of claim 114, wherein the first and second disk devices are both operative to be recognized as unique local devices by the remote host (Col. 5, lines 53-54 – collection of disk drives).

Regarding claim 116, Starr teaches the network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command (As per col. 5, line 67 and col. 6, lines 1-4, INIC I/O controller 72 may be connected to the local I/O bus 40).

Regarding claim 117, Starr teaches the network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication (Col. 5, lines 17-21 – protocol stack 38).

Regarding claim 118, Starr teaches the network attached disk device of claim 116, wherein the protocol stack comprises a TCP/IP connection (Col. 7, lines 26-29).

Regarding claim 119, Starr teaches the network attached disk device of claim 112, wherein the disk controller comprises: a channel controller (Col. 5, lines 53-57 – controller 72); at least one disk channel operatively connected to the channel controller (Col. 5, lines 53-57 – INIC storage unit 70 connected to INIC controller 72 via parallel

channel 75); a buffer manager operatively connected to the channel controller (Fig. 1, buffers 77 are connected to controller 72 via bus 48); and a bus interface operatively connected to the buffer manager and the network attached disk device controller (Fig. 1, buffers 77 are connected to controller 72 via bus 48).

Regarding claim 120, Starr teaches the network attached disk device of claim 112, wherein the network attached disk device controller comprises: a main controller operative to generally control the operation of the network attached disk device (Fig. 1, controller 72); a buffer management module operative to cache data associated with the first disk device (Fig. 1, INIC memory manager 46, buffers 77, cache 74 of the Communication Control Block (CCB)); a disk controller driver for interfacing with the disk controller (Fig. 1, INIC driver 39); and a network adapter driver for interfacing with the network adapter (FIG. 13 is a diagram of a Microsoft.RTM. TCP/IP stack and Alacritech command driver configured for NetBios communications).

Regarding claim 120, Starr teaches the network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk (Col. 7, lines 23-26 – authentication).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 53-54, 121, 123 and 124 are rejected under 35 U.S.C. 103(a) as being unpatentable over Starr in view of the U. S. Patent No. 6,389,432 to Pothapragada et al. (hereinafter Pothapragada).

Regarding claim 53, Starr teaches the network-attached storage device of claim 50.

Starr further teaches that the INIV I/O controller 72 may be a SCSI controller (Col. 5, lines 62-64), known in the art to support tape drives, but does not explicitly teach the network-attached storage device of claim 50, wherein the storage device is a tape device.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, where one of the virtual volumes is a tape farm (Fig. 2, tape farm 204), which may be controlled by a SCSI controller (Pothapragada, col. 4, lines 19-24).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach the SCSI-controlled tape farm of Pothapragada to remote storage SCSI controller of Starr in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 54, Starr teaches the network-attached storage device of claim 50.

Starr further teaches that the INIV I/O controller 72 may be a SCSI controller (Col. 5, lines 62-64), known in the art to support CD-ROM drives, but does not explicitly teach the network-attached storage device of claim 50, wherein the storage device is a CD drive.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, where one of the virtual volumes is a CD drive (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of Starr in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 121, Starr teaches the network attached disk device of claim 120.

Starr does not explicitly teach the network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote host.

However, Pothapragada a network attached disk device that is operative to provide back-up functionality to the remote host (Pothapragada, col. 13, lines 8-12).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made combine the teaching of Starr with the teachings of

Pothapragada in order to enhance the functionality of the network attached disk with additional function of performing backups for the host.

Regarding claim 123, Starr teaches the network attached disk of claim 112.

Starr further teaches that the INIV I/O controller 72 may be a SCSI controller (Col. 5, lines 62-64), known in the art to support CD-ROM drives, but does not explicitly teach the network attached storage device of claim 112, wherein the first disk device comprises a compact disk.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of Starr in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 124, Starr teaches the network attached disk of claim 112.

Starr further teaches that the INIV I/O controller 72 may be a SCSI controller (Col. 5, lines 62-64), known in the art to support DVD-ROM drives. Starr, in combination with Pothapragada further teaches the network-attached storage devices of claim 112, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16). Starr does not explicitly teach the network attached storage device of claim 112, wherein the first disk device comprises a digital versatile disk.

“Official Notice” is taken that the concept and the advantages of substituting a digital versatile disk for compact disk is old and well known in the art.

Therefore, it would have been obvious to one of ordinary skills in the art at the time the invention was made to modify Starr by replacing a compact disk with a digital versatile disk. One of ordinary skills in the art would be motivated to do so in order to provide a higher storage capacity per disk.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of Starr in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

7. **Examiner’s note:** Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant is reminded that in amending in response to a rejection of claims, the patentable novelty must be clearly shown in view of the state of the art disclosed by the references cited and the objection made. Applicant must show how the amendments avoid such references and objections. See 37 CFR § 1.111(c).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vitali Korobov whose telephone number is 571-272-7506. The examiner can normally be reached on Mon-Friday 8a.m. - 4:30p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached on (571)272-4006. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

08/10/2005
VAK



SALEH NAJJAR
PRIMARY EXAMINER

Vitali Korobov
Examiner
Art Unit 2155



Substitute for form 1449A/PTO (Modified)		Complete if Known	
		Application Number	09/974,082
INFORMATION DISCLOSURE STATEMENT BY APPLICANT		Filing Date	10/09/2001
		First Named Inventor	HAN-GYOO KIM
		Art Unit	2155
		Examiner Name	ALAM, HOSAIN T.
Sheet	1	of	1
		Attorney Docket Number	34253/US/2 - RMA

(use as many sheets as necessary)

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	U.S. Patent Document Number-Kind Code ² (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
VAK	A1	US 2003/0028614 A1	FEB. 06, 2003	JEON	RECEIVED JUL 01 2004 Technology Center 2100
VAK	A2	US 6,167,490	DEC. 26, 200	LEVY ET AL.	
VAK	A3	US 5,838,916	NOV. 17, 1998	DOMENIKOS ET AL	
VAK	A4	US 6,128,690	OCT. 03, 2000	PURCELL ET AL	
	A5				
	A6				

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No.	Foreign Patent Document Country Code ³ Number ³ Kind Code ³ (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁴
	B1					
	B2					

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁴
	C1		
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	C5		
	C6		
	C7		
	C8		
	C9		
	C10		

Examiner Signature	<i>Vitali A. Korobov</i>	Date Considered	08/08/2005
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
¹ Applicant's unique citation designation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 18 if possible. ⁶ Applicant is to place a check mark here if English Language Translation is attached.
 This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the complete application form to the USPTO. Time will vary depending on the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Notice of References Cited	Application/Control No. 09/974,082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO	
	Examiner Vitali Korobov	Art Unit 2155	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
A	US-6,807,581	10-2004	Starr et al.	709/250
B	US-6,389,432	05-2002	Pothapragada et al.	707/205
C	US-6,356,915	03-2002	Chetkine et al.	707/200
D	US-6,594,677	07-2003	Davis et al.	707/204
E	US-6,216,202	04-2001	D'Errico, Matthew J.	711/112
F	US-5,566,331	10-1996	Irwin et al.	707/10
G	US-6,529,996	03-2003	Nguyen et al.	711/114
H	US-5,987,627	11-1999	Rawlings, III, Joseph H.	714/48
I	US-6,366,988	04-2002	Skiba et al.	711/165
J	US-5,463,772	10-1995	Thompson et al.	707/101
K	US-6,834,326	12-2004	Wang et al.	711/114
L	US-6,732,104	05-2004	Weber, Bret S.	707/10
M	US-			

FOREIGN PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
N					
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S					
T					

NON-PATENT DOCUMENTS

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
U	
V	
W	
X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims



Application/Control No.

09/974,082

Examiner

Vitali Korobov

Applicant(s)/Patent under Reexamination

KIM, HAN-GYOO

Art Unit

2155

✓	Rejected
=	Allowed

-	(Through numeral) Cancelled
+	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim		Date			
Final	Original	8/10/05			
	1	-			
	2	-			
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BIBDATASHEET

CONFIRMATION NO. 6653

Bib Data Sheet

Table with 5 columns: SERIAL NUMBER (09/974,082), FILING DATE (10/09/2001), CLASS (709), GROUP ART UNIT (2155), ATTORNEY DOCKET NO. (1203). Includes a 'RULE' field.

APPLICANTS: Han-Gyoo Kim, Seoul, KOREA, REPUBLIC OF;
** CONTINUING DATA ** Yes VAK
This appln claims benefit of 60/240,344 10/13/2000
** FOREIGN APPLICATIONS ** none VAK
IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** SMALL ENTITY **
** 11/08/2001

Table with 4 columns: Foreign Priority claimed, 35 USC 119 (a-d) conditions, STATE OR COUNTRY, SHEETS, TOTAL CLAIMS, INDEPENDENT CLAIMS. Includes Examiner's Signature (V. Korobov) and Initials (VAK).

ADDRESS
32940
DORSEY & WHITNEY LLP
555 CALIFORNIA STREET, SUITE 1000
SUITE 1000
SAN FRANCISCO , CA
94104

TITLE
Disk system adapted to be directly attached to network

FILING FEE RECEIVED 1696
FEES: Authority has been given in Paper
No. _____ to charge/credit DEPOSIT ACCOUNT
No. _____ for following:
List of fee options: All Fees, 1.16 Fees (Filing), 1.17 Fees (Processing Ext. of time), 1.18 Fees (Issue), Other, Credit.

Search Notes



Application/Control No.

09/974,082

Examiner

Vitali Korobov

Applicant(s)/Patent under Reexamination

KIM, HAN-GYOO

Art Unit

2155

SEARCHED

Class	Subclass	Date	Examiner
709	250, 236 246	8/10/2005	VAK
707	204, 205	8/10/2005	VAK
710/5	5	8/10/2005	VAK
711/111	111	8/10/2005	VAK

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
EAST TEXT Searches: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	8/9/2005	VAK
Discussed the case with Bharat Barot, PE	8/8/2005	VAK



Attorney Docket No. 34253/US/2
Express Mail Label No. EV 622972959 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicant	: Han-gyoo Kim	Confirmation No.:	6653
Appln. No.	: 09/974,082	Group Art Unit:	2155
Filed	: October 9, 2001	Examiner:	Korobov, Vitali A.
Title	: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK		

CERTIFICATE OF MAILING BY EXPRESS MAIL

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The undersigned hereby certifies that the following documents:

1. Amendment Transmittal Letter (1 page);
2. Amendment and Response to Office Action (10 pages);
3. Certificate of Mailing by Express Mail (1 page); and
4. Return Card

relating to the above application, were deposited as "Express Mail" under 37 CFR § 1.10, Mailing Label No. EV 622972959 US, with the United States Postal Service addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on November 15, 2005.

Mailer's Signature
Print Name: Jane M. Lalis

EV622972959US)

Dorsey & Whitney LLP

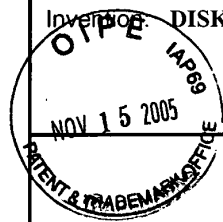
Tel: 303-629-3400
Fax: 303-629-3450

11-16-05 THW 2155

AMENDMENT TRANSMITTAL LETTER (Small Entity) Applicant(s): Han-gyoo Kim	Docket No. 34253/US/2
----------------------------------------------------------------------------------	--------------------------

Application No. 09/974,082	Filing Date October 9, 2001	Examiner Korobov, Vitali A.	Customer No. 20686	Group Art Unit 2155	Confirmation No. 6653
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Inventor: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK



COMMISSIONER FOR PATENTS:

Transmitted herewith is an amendment in the above-identified application.

Applicant claims small entity status. See 37 CFR 1.27

The fee has been calculated and is transmitted as shown below.

CLAIMS AS AMENDED

	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST # PREV. PAID FOR	NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE
TOTAL CLAIMS	28	111	0	x \$25.00	\$0.00
INDEP. CLAIMS	3	14	0	x \$100.00	\$0.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT					\$0.00

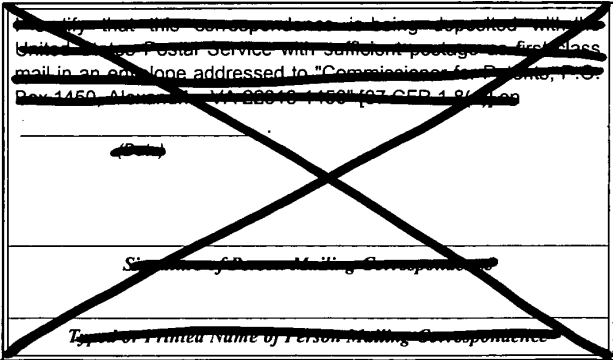
- No additional fee is required for amendment.
- Please charge Deposit Account No. _____ in the amount of _____
- A check in the amount of _____ to cover the filing fee is enclosed.
- The Director is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 04-1415
 - Any additional filing fees required under 37 C.F.R. 1.16.
 - Any patent application processing fees under 37 CFR 1.17.
- Payment by credit card. Form PTO-2038 is attached.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Dated: November 15, 2005

Signature

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 USPTO Customer No. 20686



cc:



Attorney Docket No. 34253/US/2
Express Mail Label No. EV 622972959 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

Applicant	: Han-gyoo Kim	Confirmation No: 6653
Appln. No.	: 09/974,082	Group Art Unit: 2155
Filed	: October 9, 2001	Examiner: Korobov, Vitali A.
Title	: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK	

AMENDMENT AND RESPONSE TO OFFICE ACTION

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office action dated August 15, 2005, please consider the following remarks and amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Claims

1-33. (canceled)

34. (Currently Amended) A network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising: a network adapter for receiving disk access command in data link frames through the network; a disk controller, connected to the LAN adapter, for executing disk access commands; ~~[[and]]~~ a disk for storing data; and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device~~[[.]]; wherein access to the disk is operatively controlled by the disk controller.~~

35. (original) The NAD device of claim 34, wherein the network runs Ethernet.

36. (original) The NAD device of claim 34, wherein said disk is formatted as a local disk.

37. (original) The NAD device of claim 34, wherein said disk is partitioned as a local disk.

38. (original) The NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller.

39. (original) The NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device.

40. (original) The NAD device of claim 34, wherein the controller has a filter for controlling access to the disk.

41. (original) The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions.

42. (original) The NAD device of claim 41, wherein each disk partition is controlled by a separate driver.

43-49. (canceled)

50. (original) A network-attached storage device adapted to be connected through a network to host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the storage device comprising: a storage device; a network adapter for receiving a storage command through the network; and a storage controller for executing the storage command.

51. (original) The network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device.

52. (original) The network-attached storage device of claim 50, wherein the storage device is a disk.

53. (original) The network-attached storage device of claim 50, wherein the storage device is a tape device.

54. (original) The network-attached storage device of claim 50, wherein the storage device is a CD drive.

55. (original) The network-attached storage device of claim 50, wherein the storage device is a memory device.

56-111. (canceled)

112. (Currently Amended) A network attached disk device, comprising:
a first disk device;
a network attached disk device controller operative to receive across a network an input/output command for the first disk device;
a disk controller operative to control the operation of the disk device in response to the input/output command;
a network adapter operative to receive the input/output command from the network attached disk device controller; wherein
the network attached disk device is operative to be recognized as a local device by [[the]]a remote host.

113. (Previously Presented) The network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host.

114. (Previously Presented) The network attached disk device of claim 112, further comprising a second disk device.

115. (Previously Presented) The network attached disk device of claim 114, wherein the first and second disk devices are both operative to be recognized as unique local devices by the remote host.

116. (Previously Presented) The network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command.

117. (Previously Presented) The network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication.

118. (Currently Amended) The network attached disk device of claim 116, wherein [[the]] protocol stack comprises a TCP/IP connection.

119. (Previously Presented) The network attached disk device of claim 112, wherein the disk controller comprises:

- a channel controller;
- at least one disk channel operatively connected to the channel controller;
- a buffer manager operatively connected to the channel controller; and
- a bus interface operatively connected to the buffer manager and the network

attached disk device controller.

120. (Previously Presented) The network attached disk device of claim 112, wherein the network attached disk device controller comprises:

- a main controller operative to generally control the operation of the network attached disk device;
- a buffer management module operative to cache data associated with the first disk device;
- a disk controller driver for interfacing with the disk controller; and

a network adapter driver for interfacing with the network adapter.

121. (Currently Amended) The network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote host.

122. (Previously Presented) The network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk.

123. (Previously Presented) The network attached disk of claim 112, wherein the first disk device comprises a compact disk.

124. (Previously Presented) The network attached disk of claim 112, wherein the first disk device comprises a digital versatile disk.

REMARKS/ARGUMENTS

This Amendment is responsive to the Office action dated August 15, 2005, setting forth a shortened three month statutory period for reply expiring November 15, 2005.

Response to Claim Objections/Rejections

I. Claim Objections

The Examiner objected to claim 113 for reciting the limitation "the remote hose." The Applicant notes claim 113 was submitted in response to the Restriction Requirement dated February 2, 2005. As submitted in the Amendment and Response filed June 2, 2005, claim 113 reads, "The network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host." Applicant is uncertain how the limitation "the remote hose" appeared in claim 113 as examined by the Examiner.

However, Applicant notes that new claim 121, also submitted in response to the Restriction Requirement, recites "the remote hose" as a limitation. Accordingly, claim 121 has been amended to recite "the remote host" as a limitation in order to correct a typographical error.

II. Claim Rejections Under 35 U.S.C. § 112, paragraph 2

The Examiner rejected claim 112 under 35 U.S.C. § 112, second paragraph, as lacking sufficient antecedent basis for the limitation "the remote host." In response to the rejection, the Applicant hereby amends claim 112 to change the phrase "the remote host" to "a remote host" to correct this typographical error. Accordingly, the Applicant respectfully requests the Examiner withdraw his rejection and allow claim 112.

Claims 113-124 are rejected as inheriting the deficiency of claim 112, from which they depend. Insofar as claim 112 has been amended to overcome the Examiner's §112 rejection, the Applicant respectfully requests the Examiner withdraw his rejection and allow these claims.

The Examiner rejected claim 118 under 35 U.S.C. § 112, second paragraph, as lacking sufficient antecedent basis for the limitation "the protocol stack" in the first line of the claim. In response to the rejection, the Applicant hereby amends claim 118 to change "the protocol stack" to "a protocol stack" to correct this typographical error. As amended, the Applicant respectfully submits claim 118 is patentable under 35 U.S.C. § 112.

The Examiner rejected claim 119 under 35 U.S.C. § 112, second paragraph, for insufficient antecedent basis for the limitation “the buffer manager” in the next to the last line of the claim. This objection is respectfully traversed. The antecedent basis for this may be found in the claim at line 5.

III. Rejections Under 35 U.S.C. § 102 – Claims 34-42, 50-52, 55, 112-120 and 122

The Examiner rejected claims 34-42, 50-52, 55, 112-120 and 122 under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,807,581 to Starr et al. (hereafter “Starr”). For at least the following reasons, the Applicant respectfully disagrees.

A. Claims 34 and 50

Initially, the Applicant addresses the rejection of independent claims 34 and 50. Independent claims 34 and 50 both require “a network-attached disk (NAD) device adapted to be connected through a network to a host.” The Applicant respectfully submits Starr does not teach this limitation, and thus cannot anticipate independent claims 34 and 50.

Starr teaches a NAD device (INIC storage unit 70 connected to INIC 22) connected to a host 20 via a local input/output (I/O) bus 40 (Fig. 1). Particularly, Starr teaches: “The host 20 is connected to the INIC 22 by an I/O bus 40, such as a PCI bus, which is coupled to the host bus 35 by a host I/O bridge 42” (col. 5, lines 25-27). Starr does not teach a NAD device “connected through a network to a host” as required by claims 34 and 50. At most, Starr teaches an INIC storage unit 70 attached to the host via a local bus 40 (Fig. 1).

Similarly, Starr does not teach a host having “a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host,” as required by claims 34 and 50. Indeed, the Examiner has not cited any portion of Starr as teaching the virtual host adapter required by these claims, nor can the Applicant find any such teaching. Thus, Starr cannot (and does not) anticipate either claim 34 or 50.

The Applicant also respectfully disagrees that Starr teaches “a disk controller, connected to the LAN adaptor, for executing disk access commands,” as used in the context of the present claims. (Fig. 1, I/O controller 64, connected to the LAN adaptor (INIC 22) through the INIC I/O bridge 50). As taught by Starr, the I/O controller 64 is part of the host. By contrast, claim 34 requires the controller be part of the NAD, not the host. Furthermore, Starr’s I/O controller 64 does not control access to an NAD storage device. Instead, I/O controller 64 controls access to the host storage unit 66.

Insofar as Starr does not teach all the limitations of either independent claims 34 or 50, it cannot anticipate either claim. Accordingly, Applicant respectfully requests the Examiner withdraw his rejections and allow claims 34 and 50 over the cited reference.

B. Claim 112

With respect to independent claim 112, Starr fails to teach "a network attached disk device controller operative to receive across a network an input/output command for [a] first disk device" as part of a "network attached disk device," as required by claim 112. Starr's INIC is part of a device attached to a host across a standard, local bus, as explained above. There is no teaching or suggestion in Starr that the INIC may "receive across a network an input/output command" while operating as part of a "network attached disk device."

Further, independent claim 112 requires the "network attached disk device [be] operative to be recognized as a local device by a remote host." While Starr may disclose a local device that is attached to a system bus of a local host (see, e.g., col. 5, lines 53-67 and col. 6, lines 1-4), it does not disclose a network attached disk device recognized as a local device by a remote host. The Examiner has cited portions of Starr that explicitly teach a storage device 70 connected across a data channel 75 to an I/O controller 72 (see., e.g., Fig. 1) as anticipating this limitation. In particular, the Examiner explains, "If the connection [75] is implemented through a Fibre Channel, and the I/O controller [72] is not connected to the I/O bus of the host, then the INIC storage unit 70 is recognized by the host as a local drive attached to the system bus 48 of the remote host." The Applicant respectfully disagrees.

First, Starr explicitly states that the bus 40 running between the INIC 22 and the host 20 is "an I/O bus 40, such as a PCI bus" (col. 5, lines 26-28). In turn, the I/O controller 72, as part of the INIC and as shown in Fig. 1, is connected to the I/O bus 40. There is absolutely no teaching or suggestion in Starr that this connection may be omitted or replaced with a connection to something else, despite the Examiner's assertion. Indeed, Starr explicitly requires the INIC (and thus the I/O controller 72) be connected to the host I/O bus.

Second, even were the I/O controller somehow connected to a host through another connection, there is not even a suggestion in Starr that the host would accordingly recognize the corresponding storage unit 70 as a "local device," as required by claim 112. The Examiner asserts this, but this is simply a presumption he makes rather than a teaching of the reference. Starr makes no reference whatsoever to exactly how the host "sees" or recognizes the storage unit 70. Accordingly, in the absence of any such disclosure, the Examiner is improperly applying the teachings of Starr against independent claim 112 as a form of hindsight. The Applicant respectfully submits, insofar as Starr is silent on the matter, that Starr's host 20 would view the storage unit 70 as a remote storage unit if the bus 40 were a Fibre Channel because the storage unit would in fact be remote from the host in such a setup.

The remaining rejected claims all depend, either directly or indirectly, from one of independent claims 34, 50 and 112. Accordingly, these dependent claims are themselves patentable. The Applicant makes this statement without reference to or waiving the independent bases of patentability within each dependent claim. The Applicant therefore requests the Examiner withdraw his rejections of the dependent claims under 35 U.S.C. § 102.

IV. Rejections Under 35 U.S.C. § 103 – Claims 53-54, 121, 123 and 124

The Examiner rejected claims 53-54, 121, 123 and 124 under 35 U.S.C. § 103 as unpatentable over Starr in view of the U.S. Patent No. 6,389,432 to Pothapragada et al. For at least the following reason, the Applicant respectfully disagrees.

Each of claims 53-54 depend from independent claim 50, which has been shown to be patentable over the cited references. Likewise, each of claims 121, 123 and 124 depend from independent claim 112, which also have been shown to be patentable over the cited references. Accordingly, these dependent claims are also patentable. The Applicant makes this statement without reference to or waiving the independent bases of patentability within each dependent claim. The Applicant therefore requests the Examiner withdraw his rejections allow the rejected dependent claims.

Claims 113-124 are rejected as inheriting the deficiency of claim 112 from which they depend. Insofar as claim 112 has been amended to overcome the Examiner's §112 rejection, the Applicant respectfully requests the Examiner withdraw his rejection and allow these claims.

V. Conclusion

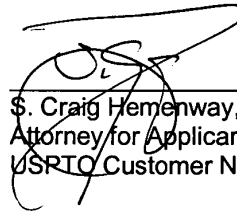
The Applicant thanks the Examiner for his careful review of the present application and pending claims. Further, the Applicant respectfully submits the present application is now in condition for allowance. Therefore, the Applicant respectfully requests the issuance of a Notice of Allowability at the Examiner's earliest convenience.

The present Amendment and Response is submitted on November 15, 2005, within three months from the mailing date of the Office action. Accordingly, the Applicant respectfully submits no fees or petitions for extensions of time are required. Should, however, any fee or petition be necessary in connection with this paper, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 as needed.

If the Examiner should require any additional information or amendment, please contact the undersigned attorney.

Dated: 15 November 2005.

Respectfully submitted,



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Fax: 303-629-3450

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number

09/974,082
1203

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	85	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	85 minus 20 =	65
INDEPENDENT CLAIMS	12 minus 3 =	9
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

(Column 1) 06-02-05 (Column 2) (Column 3)

AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	28 Minus	11	
Independent	3 Minus	14	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

11/15/05

(Column 1) (Column 2) (Column 3)

AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	28 Minus	11	
Independent	3 Minus	14	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

(Column 1) (Column 2) (Column 3)

AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	Minus		
Independent	Minus		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

SMALL ENTITY TYPE OR **OTHER THAN SMALL ENTITY**

RATE	FEE	OR	RATE	FEE
BASIC FEE	370.00	OR	BASIC FEE	740.00
X\$ 9=	585	OR	X\$18=	
X42=	375	OR	X84=	
+140=		OR	+280=	
TOTAL	1333	OR	TOTAL	

SMALL ENTITY OR **OTHER THAN SMALL ENTITY**

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	7296	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2006/02/13 02:47
L2	56	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual with local with (storage or disk))	USPAT	AND	ON	2006/02/13 02:51
L3	327	(virtual with local with (storage or disk))	USPAT	AND	ON	2006/02/13 02:53
L4	13	(virtual adj local adj (storage or disk))	USPAT	AND	ON	2006/02/13 02:57
L5	7	(virtual adj disk) dell.as.	US-PGPUB; USPAT	AND	ON	2006/02/13 02:58
S1	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/02 21:18
S2	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/02 21:18
S3	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/02 21:37
S4	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/10 20:08
S5	8535	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/02 22:10
S7	38	S5 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/02 22:37

S8	63	S5 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/02 22:20
S10	116	S5 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 12:10
S11	4235	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/09 18:03
S12	132	S11 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 13:54
S13	421	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 13:54
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S16	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:44

S17	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:44
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S20	38	S19 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:45
S21	63	S19 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:46
S23	116	S19 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:46
S24	4235	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:47
S25	132	S24 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:47

S26	421	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:48
S27	1146	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 15:01
S28	1	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 15:02
S29	2826	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 18:38
S30	1148	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:31
S31	611	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 18:57
S32	195	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:31
S33	198	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:32

S34	225	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:36
S35	58	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:42
S37	26	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:55
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S40	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2005/08/04 18:20
S42	190	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2005/08/04 21:14
S43	111	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2005/08/04 21:14
S44	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2005/08/04 21:14
S45	11146	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 14:27
S46	76	S45 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 14:27

S47	189	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2005/08/08 15:28
S48	11	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2005/08/08 15:20
S49	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2005/08/08 15:29
S50	17	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2005/08/08 18:16
S51	1	"6389432".pn.	USPAT	AND	ON	2005/08/08 15:34
S52	11146	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 15:37
S53	76	S52 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 15:37
S54	1	"6216202".pn.	USPAT	AND	ON	2005/08/08 16:38
S55	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2005/08/08 16:39
S56	14	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2005/08/08 19:15
S57	3	S50 not S56	USPAT	AND	ON	2005/08/08 19:16
S58	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2005/08/09 17:11
S59	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2005/08/09 17:11
S60	21	"Network Attached Storage" "as local"	USPAT	AND	ON	2005/08/09 18:05
S61	268	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2005/08/09 18:06
S62	138	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2005/08/09 18:08

S63	45	"Network Attached Storage" (dvd)	USPAT	AND	ON	2005/08/09 19:51
S64	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2005/08/09 19:51
S65	4741	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2005/08/10 20:07
S66	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2006/02/11 23:13
S68	9	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2006/02/12 00:56
S69	792	(channel with attach\$4 with storage)	USPAT	AND	ON	2006/02/12 01:17
S70	43	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2006/02/12 01:18
S71	29	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2006/02/12 02:32
S72	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2006/02/12 02:32
S73	9	(virtual adj local adj storage)	USPAT	AND	ON	2006/02/12 02:49
S74	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 02:59
S75	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S76	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S77	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S78	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15

S79	13573	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S80	55	S79 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S81	95	S79 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S82	194	S79 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S83	7242	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S84	224	S83 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S85	597	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S86	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15

S87	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S88	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S89	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S90	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S91	13573	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S92	55	S91 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S93	95	S91 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S94	194	S91 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15

S95	7242	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S96	224	S95 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S97	597	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S98	1506	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S99	2	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S100	3562	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S101	1646	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S102	853	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15

S10 3	295	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 4	276	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 5	309	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 6	78	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 7	29	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 21:36
S10 8	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 9	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S11 0	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2006/02/12 16:15
S11 1	203	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2006/02/12 16:15
S11 2	121	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2006/02/12 16:15
S11 3	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2006/02/12 16:15

S11 4	13573	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S11 5	85	S114 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S11 6	214	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2006/02/12 16:15
S11 7	11	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2006/02/12 16:15
S11 8	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/02/12 16:15
S11 9	19	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/02/12 16:15
S12 0	1	"6389432".pn.	USPAT	AND	ON	2006/02/12 16:15
S12 1	13573	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S12 2	85	S121 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S12 3	1	"6216202".pn.	USPAT	AND	ON	2006/02/12 16:15
S12 4	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2006/02/12 16:15

S12 5	16	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2006/02/12 16:15
S12 6	3	S119 not S125	USPAT	AND	ON	2006/02/12 16:15
S12 7	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2006/02/12 16:15
S12 8	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2006/02/12 16:15
S12 9	22	"Network Attached Storage" "as local"	USPAT	AND	ON	2006/02/12 16:15
S13 0	362	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2006/02/12 16:15
S13 1	181	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2006/02/12 16:15
S13 2	60	"Network Attached Storage" (dvd)	USPAT	AND	ON	2006/02/12 16:15
S13 3	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2006/02/12 16:15
S13 4	5121	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2006/02/13 02:46
S13 5	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2006/02/12 16:15
S13 6	9	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2006/02/12 16:15
S13 7	792	(channel with attach\$4 with storage)	USPAT	AND	ON	2006/02/12 16:15
S13 8	43	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2006/02/12 16:15
S13 9	29	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2006/02/12 16:15
S14 0	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2006/02/12 16:55
S14 1	9	(virtual adj local adj storage)	USPAT	AND	ON	2006/02/12 16:15
S14 2	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15

S14 3	26	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; IBM_TDB	AND	ON	2006/02/12 16:49
S14 4	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. (controller with access)	USPAT	AND	ON	2006/02/12 18:39
S14 7	0	(John "L." Sloan).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 21:37



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,082	10/09/2001	Han-Gyoo Kim	1203	6653
32940	7590	02/21/2006	EXAMINER	
DORSEY & WHITNEY LLP 555 CALIFORNIA STREET, SUITE 1000 SUITE 1000 SAN FRANCISCO, CA 94104			KOROBOV, VITALI A	
			ART UNIT	PAPER NUMBER
			2155	

DATE MAILED: 02/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/974,082	Applicant(s) KIM, HAN-GYOO	
	Examiner Vitali Korobov	Art Unit 2155	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 15 November 2005.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 34-42, 50-55 and 112-124 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 34-42, 50-55 and 112-124 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

RESPONSE TO AMENDMENT

1. This Office Action is in response to the documents filed on 11/15/2005. Claims 34, 112, 118 and 121 were amended. Claims 34-42, 50-55 and 112-124 are pending in this Office Action.

Paper Submitted

2. It is hereby acknowledged that the following papers have been received and placed of record in the file: **Information Disclosure Statement** as received on 06/28/2004 was considered.

Claim Objections

3. Objection to claim 113 has been withdrawn.

Claim Rejections - 35 USC § 112

4. Rejection of claims 112-124 under 35 U.S.C. 112, second paragraph has been withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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5. Claims 34-35, 50 and 112-117 are rejected under 35 U.S.C. 102(b) as being anticipated by the U. S. Patent No. 5,566,331 to Irwin, Jr. et al., hereinafter Irwin.

Regarding claim 34, Irwin teaches a network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host (Col. 2, lines 54-61), the NAD device comprising: a network adapter for receiving disk access command in data link frames through the network (Encapsulating data in the form required by the channel-switching fabric (col. 10, lines 58-63) transmitted using lower levels of protocol (col. 12, lines 30-35). Implementation of Ethernet that Irwin teaches in col. 13, lines 59-64 inherently requires a storage device connected to the Ethernet to have a network adapter); a disk controller, connected to the LAN adapter (col. 15, line 67 and col. 16, lines 1-7 - controller of the direct access storage device), for executing disk access commands (col. 16, lines 1-7 - controller of the direct access storage device decapsulates and executes access commands); and a disk for storing data (Fig. 1, direct access storage devices 40-1 to 40-m); and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device (Fig. 1, control path 13); wherein access to the disk is operatively controlled by the disk controller (col. 15, lines 59-67 and col. 16, lines 1-7).

Regarding claim 35, Irwin teaches the NAD device of claim 34, wherein the network runs Ethernet (col. 13, lines 59-64).

Claim 50 does not teach or define any new limitations above claim 34 and therefore is rejected under the same rationale as claim 34.

Regarding claim 112, Irwin teaches a network attached disk device, comprising: a first disk device (Fig. 1, 40-2); a network attached disk device controller operative to receive across a network an input/output command for the first disk device (col. 15, line 67 and col. 16, lines 1-7 - controller of the direct access storage device); a disk controller operative to control the operation of the disk device in response to the input/output command (col. 16, lines 1-7 - controller of the direct access storage device decapsulates and executes access commands); a network adapter operative to receive the input/output command from the network attached disk device controller (Implementation of Ethernet that Irwin teaches in col. 13, lines 59-64 inherently requires a storage device, connected to the Ethernet to have a network adapter); wherein the network attached disk device is operative to be recognized as a local device by the remote host (col. 2, lines 54-61).

Regarding claim 113, Irwin teaches the network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host (col. 2, lines 54-61).

Regarding claim 114, Irwin teaches the network attached disk device of claim 112, further comprising a second disk device (Fig. 1, any of the devices 40-1, or 40-3 to 40-m).

Regarding claim 115, Starr teaches the network attached disk device of claim 114, wherein the first and second disk devices are both operative to be

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recognized as unique local devices by the remote host (Col. 8, lines 49-60 - mass storage system 10 allows each client data processor the possible use of many file-systems located on many different direct access storage devices).

Regarding claim 116, Starr teaches the network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command (Col. 10, lines 46-52).

Regarding claim 117, Starr teaches the network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication (Fig. 3, protocol stack 209).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 36-42, 51-52, 55, 118-120 and 122 are rejected under 35 U.S.C. 103(a) as being unpatentable over Irwin in view of the U. S. Patent No. 6,807,581 to Starr et al., hereinafter Starr.

Regarding claim 36, Irwin teaches the NAD device of claim 34.

Irwin does not explicitly teach such device wherein said disk is formatted as a local disk.

However, Starr in analogous art, related to a network attached storage unit, teaches such device wherein said disk is formatted as a local disk (As per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Starr into the teachings of Irwin in order to reduce overhead associated with accessing data stored in different file formats. (Irwin with incorporated teachings of Starr is hereinafter referred to as "modified Irwin")

Regarding claim 37, modified Irwin teaches the NAD device of claim 34, wherein said disk is partitioned as a local disk (Starr, as per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23. Also, as per col. 6, lines 30-35, the file system 23 supports logical file format, and therefore is inherently capable of supporting partitions, partitions being nothing more than logical subdivisions of a physical disk space).

Regarding claim 38, modified Irwin teaches the NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller (Starr, col. 5, lines 35-39 and Fig. 1 – Media Access Control 60).

Regarding claim 39, modified Irwin teaches the NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device (Starr, Fig. 1, I/O controller 72).

Regarding claim 40, modified Irwin teaches the NAD device of claim 34, wherein the controller has a filter for controlling access to the disk (Starr, col. 7, lines 23-26 – filtering based on authentication and other connection initialization procedures).

Regarding claim 41, modified Irwin teaches the NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions (Starr, col. 5, line 67, col. 6, lines 1-4 – optional boot partition).

Regarding claim 42, modified Irwin teaches the NAD device of claim 41, wherein each disk partition is controlled by a separate driver (Col. 5, lines 59-64 – RAID. The disks (partitions) in RAID are independent by definition, since RAID stands for “redundant array of independent disks”).

Regarding claim 51, modified Irwin teaches the network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device (Starr, Fig. 1, INIC I/O controller 72).

Regarding claim 52, modified Irwin teaches the network-attached storage device of claim 50, wherein the storage device is a disk (Starr, col. 5, lines 59-60).

Regarding claim 55, modified Irwin teaches the network-attached storage device of claim 50, wherein the storage device is a memory device (Starr, col. 6, lines 9-14).

Regarding claim 118, modified Irwin teaches the network attached disk device of claim 116, wherein the protocol stack comprises a TCP/IP connection (Starr, col. 7, lines 26-29).

Regarding claim 119, modified Irwin teaches the network attached disk device of claim 112, wherein the disk controller comprises: a channel controller (Starr, col. 5, lines 53-57 – controller 72); at least one disk channel operatively connected to the channel controller (Starr, col. 5, lines 53-57 – INIC storage unit 70 connected to INIC controller 72 via parallel channel 75); a buffer manager operatively connected to the channel controller (Starr, Fig. 1, buffers 77 are connected to controller 72 via bus 48); and a bus interface operatively connected to the buffer manager and the network attached disk device controller (Starr, Fig. 1, buffers 77 are connected to controller 72 via bus 48).

Regarding claim 120, Irwin teaches the network attached disk device of claim 112, wherein the network attached disk device controller comprises: a main controller operative to generally control the operation of the network attached disk device (Starr, Fig. 1, controller 72); a buffer management module operative to cache data associated with the first disk device (Starr, Fig. 1, INIC memory manager 46, buffers 77, cache 74 of the Communication Control Block (CCB)); a disk controller driver for interfacing with the disk controller (Starr, Fig. 1, INIC driver 39); and a network adapter driver for interfacing with the network adapter (Starr, Fig. 13 is a diagram of a Microsoft.RTM. TCP/IP stack and Alacritech command driver configured for NetBios communications).

Regarding claim 122, modified Irwin teaches the network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk (Starr, Col. 7, lines 23-26 – authentication).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 53-54, 121, 123 and 124 are rejected under 35 U.S.C. 103(a) as being unpatentable over modified Irwin in view of the U. S. Patent No. 6,389,432 to Pothapragada et al. (hereinafter Pothapragada).

Regarding claim 53, Irwin teaches the network-attached storage device of claim 50.

Modified Irwin further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support tape drives, but does not explicitly teach the network-attached storage device of claim 50, wherein the storage device is a tape device.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, where one of the virtual volumes is a tape farm (Fig. 2, tape farm 204), which may be controlled by a SCSI controller (Pothapragada, col. 4, lines 19-24).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach the SCSI-controlled tape farm of Pothapragada to remote storage SCSI controller of modified Irwin in order to meet the increasing demand for storage and continually lower prices of storage,

along with providing seamless expansion of online storage capacity
(Pothapragada, col.1, lines 49-57).

Regarding claim 54, Irwin teaches the network-attached storage device of claim 50.

Modified Irwin further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support CD-ROM drives, but does not explicitly teach the network-attached storage device of claim 50, wherein the storage device is a CD drive.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, where one of the virtual volumes is a CD drive (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of modified Irwin in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 121, modified Irwin teaches the network attached disk device of claim 120.

Modified Irwin does not explicitly teach the network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote host.

However, Pothapragada a network attached disk device that is operative to provide back-up functionality to the remote host (Pothapragada, col. 13, lines 8-12).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made combine the teaching of modified Irwin with the teachings of Pothapragada in order to enhance the functionality of the network attached disk with additional function of performing backups for the host.

Regarding claim 123, Irwin teaches the network attached disk of claim 112.

Modified Irwin further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support CD-ROM drives, but does not explicitly teach the network attached storage device of claim 112, wherein the first disk device comprises a compact disk.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of modified Irwin in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

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Regarding claim 124, Irwin teaches the network attached disk of claim 112.

Modified Irwin further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support DVD-ROM drives. Starr, in combination with Pothapragada further teaches the network-attached storage devices of claim 112, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16). Modified Irwin does not explicitly teach the network attached storage device of claim 112, wherein the first disk device comprises a digital versatile disk.

“Official Notice” is taken that the concept and the advantages of substituting a digital versatile disk for compact disk is old and well known in the art.

Therefore, it would have been obvious to one of ordinary skills in the art at the time the invention was made to enhance the functionality of modified Irwin by replacing a compact disk with a digital versatile disk. One of ordinary skills in the art would be motivated to do so in order to provide a higher storage capacity per disk.

9. **Examiner’s note:** Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

Response to Arguments

10. Applicant's arguments with respect to claims 34-42, 50-55 and 112-124 have been considered but are moot in view of the new ground(s) of rejection, necessitated by the Applicant's amendment.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vitali Korobov whose telephone number is 571-272-7506. The examiner can normally be reached on Mon-Friday 8a.m. - 4:30p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached on (571)272-4006. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Vitali Korobov
Examiner
Art Unit 2155

VAK
02/12/2006


SALEH NAJJAR
SUPERVISORY PATENT EXAMINER

Notice of References Cited	Application/Control No. 09/974,082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO	
	Examiner Vitali Korobov	Art Unit 2155	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
A	US-6,807,581	10-2004	Starr et al.	709/250
B	US-6,389,432	05-2002	Pothapragada et al.	707/205
C	US-6,356,915	03-2002	Chtchetkine et al.	707/200
D	US-6,594,677	07-2003	Davis et al.	707/204
E	US-6,216,202	04-2001	D'Errico, Matthew J.	711/112
F	US-5,566,331	10-1996	Irwin et al.	707/10
G	US-6,529,996	03-2003	Nguyen et al.	711/114
H	US-5,987,627	11-1999	Rawlings, III, Joseph H.	714/48
I	US-6,366,988	04-2002	Skiba et al.	711/165
J	US-5,463,772	10-1995	Thompson et al.	707/101
K	US-6,834,326	12-2004	Wang et al.	711/114
L	US-6,732,104	05-2004	Weber, Bret S.	707/10
M	US-			

FOREIGN PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
N					
O					
P					
Q					
R					
S					
T					

NON-PATENT DOCUMENTS

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
U	
V	
W	
X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims



Application/Control No.

09/974,082

Examiner

Vitali Korobov

Applicant(s)/Patent under Reexamination

KIM, HAN-GYOO

Art Unit

2155

✓	Rejected
=	Allowed

-	(Through numeral) Cancelled
+	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim		Date			
Final	Original	8/10/05	2/12/06		
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Search Notes



Application/Control No.

09/974,082

Examiner

Vitali Korobov

Applicant(s)/Patent under Reexamination

KIM, HAN-GYOO

Art Unit

2155

SEARCHED

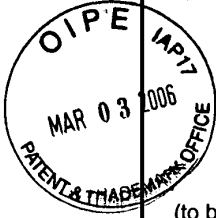
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709	250, 236 246, 217	2/12/2006	VAK
707	204, 205	2/12/2006	VAK
710/5	5	2/12/2006	VAK
711/111	111	2/12/2006	VAK

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
EAST TEXT Searches: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2/12/2006	VAK
Searched for double patenting	2/12/2006	VAK



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TRW 2/55 #

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Complete if Known

Application No.	09/974,082
Filing Date	October 9, 2001
First Named	Han-gyoo KIM
Examiner Name	Korobov, Vitali A
Group Art Unit	2155
Attorney Docket No.	34253/US/2(473628-9)

Total Number of Pages in This Submission **71**

ENCLOSURES (check all that apply)

<input type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Assignment Papers (for an Application)	<input type="checkbox"/> After Allowance Communication to Group
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> Amendment / Reply	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Extension of Time Request	<input type="checkbox"/> Change of Correspondence Address	<input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):
<input checked="" type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> Request for Refund	Return postcard
<input checked="" type="checkbox"/> Form SB/08A and SB/08B with references	<input type="checkbox"/> CD, No. of CD(s)	
<input type="checkbox"/> Certified Copy of Priority Document(s)		
<input type="checkbox"/> Response to Missing Parts/ Incomplete Application	Remarks	
<input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52, 1.121(b)(3), 1.125		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

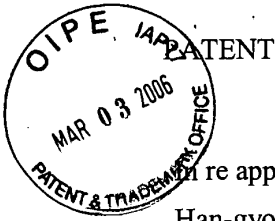
Firm or Individual Name	R. Michael Ananian, Reg. No. 35,050 DORSEY & WHITNEY LLP 555 California Street, Suite 1000 San Francisco, CA 94104-1513 (415) 787-1989	Customer Number 32940
Signature	<i>R. Michael Ananian</i>	
Date	February 27, 2006	

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Typed or printed name	Vikki Athen		
Signature	<i>Vikki Athen</i>	Date	February 28, 2006

4833-0387-2512\1



Attorney Docket No. 34253/US/2 (473628-9)
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

is re application of:

Han-gyoo KIM

Application No. 09/974,082

Filed: October 9, 2001

For: **DISK SYSTEM ADAPTED TO BE
DIRECTLY ATTACHED A
NETWORK**

Examiner: Korobov, Vitali A.

Art Unit: 2155

Confirmation No.: 6653

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By: Vikki Athen
Vikki Athen

**SECOND SUPPLEMENTAL INFORMATION
DISCLOSURE STATEMENT SUBMITTED PRIOR TO FINAL ACTION**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir or Madam:

This Information Disclosure Statement is hereby submitted in accordance with 37 CFR 1.98 and pursuant to Applicant's continuing duty under 37 CFR 1.56 to bring any information which may be material to patentability of this application to the Examiner's attention.

Applicant submits herewith patents which may be material to the examination of this application and in respect of which there may be a duty to disclose in accordance with 37 C.F.R. §1.56. While this Statement may be "material" pursuant to 37 C.F.R. §1.56, it is not intended to constitute an admission that any patent, publication, or other information referred to therein is "prior art" for this invention unless specifically designated as such. In accordance with 1287 Off. Gaz. Pat. Office 163, 10/19/2004, no copies of U.S. patents and U.S. published applications are enclosed. Copies of all other references are enclosed. The attached documents were first cited in International Search Reports on related PCT applications.

This information disclosure statement is being filed in compliance with 37 CFR 1.97(c)(2) and we state that each patent was known by an individual designated in 37 CFR 1.56(c) more than three months prior to the filing date of this Information Disclosure Statement. In accordance with 37 CFR 1.97(c)(2), Applicant submits the required fee under 37 CFR 1.17(p) in the amount of \$180. While no additional fee is believed to be due, if this belief is in error the

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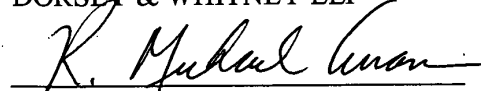
PATENT

Attorney Docket No. 34253/US/2 (473628-9)

Commissioner is authorized to charge any additional fees or other relief which may be required,
or credit any overpayment to Deposit Account No. 50-2319 (Order No. 34253/US/2 (473628-9)).

Respectfully submitted,

DORSEY & WHITNEY LLP

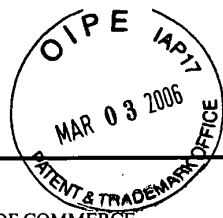


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Dated: Feb 27, 2006

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Attorney Docket No. 34253/US/2 (473628-9)

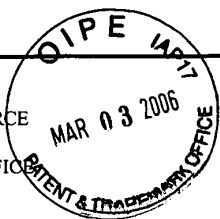
PTO/SB/08A U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE Substitute for form 1449A/PTO		ATTY. DOCKET NO.: 34253/US/2	APPLICATION NO.: 09/974,082
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)		FIRST NAMED INVENTOR: Han-gyoo KIM	
		FILING DATE: October 9, 2001	ART UNIT: 2155
Sheet	1	of	3
		EXAMINER NAME: Korobov, Vitali A.	

U.S. PATENT OR PUBLISHED PATENT APPLICATION DOCUMENTS

EXAMINER INITIALS*	Cite No. ¹	DOCUMENT NUMBER	PUBLICATION DATE	Name of PATENTEE or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ^{2 (if known)}	MM-DD-YYYY		
		5,329,619	07-12-1994	Page et al.	
		6,404,766	06-11-2002	Kitai et al.	
		5,513,314	04-30-1996	Kandasamy et al.	
		5,774,660	06-30-1998	Brendel et al.	
		6,128,644	10-03-2000	Nozaki	
		6,175,869 B1	01-16-2001	Ahuja et al.	
		6,314,465 B1	11-06-2001	Paul et al.	
		6,345,300 B1	02-05-2002	Bakashi et al.	
		6,317,775 B1	11-13-2001	Colie et al.	
		6,360,265 B1	03-19-2002	Falck et al.	
		6,449,647 B1	09-10-2002	Colby et al.	
		6,470,389 B1	10-22-2002	Chung et al.	
		6,510,164 B1	01-21-2003	Ramaswamy et al.	
		5,999,808	12-07-1999	Ladue	

PATENT

Attorney Docket No. 34253/US/2 (473628-9)



PTO/SB/08A U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	ATTY. DOCKET NO.: 34253/US/2	APPLICATION NO.: 09/974,082
	FIRST NAMED INVENTOR: Han-gyoo KIM	
	FILING DATE: October 9, 2001	ART UNIT: 2155

FOREIGN PATENT DOCUMENTS

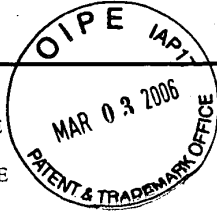
EXAMINER INITIALS*	Cite No. ¹	FOREIGN PATENT DOCUMENT	PUBLICATION DATE	Name of PATENTEE or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
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		KR 10-2001-0088528	09-28-2001	Necster Co.		
		KR 10-2000-72493	12-05-2000	Leem Dong Hee		
		DE 19610840	09-25-1997	Siemens AG		
		JP 11-114224	04-27-1999	Takeshi		
		JP 10-113469	05-06-1998	Takeshi		
		JP 10-271562	10-06-1998	Taito Corp		
		DE 10038142	02-15-2001	Samsung Elec. Co.		
EXAMINER				DATE CONSIDERED		

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3) ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

PATENT

Attorney Docket No. 34253/US/2 (473628-9)



PTO/SB/08B U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE Substitute for form 1449B/PTO				ATTY. DOCKET NO.: 34253/US/2	APPLICATION NO.: 09/974,082
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				FIRST NAMED INVENTOR: Han-gyoo KIM	
				FILING DATE: October 9, 2001	ART UNIT: 2155
Sheet	3	of	3	EXAMINER NAME: Korobov, Vitali A.	

NON PATENT LITERATURE DOCUMENTS

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PORTABLE MEMORY DEVICE AND METHOD FOR USING MEMORY, LOCATED AT REMOTE LOCATION, AS AUXILIARY MEMORY OF LOCAL COMPUTER

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Inventor: JUN DAE SIK (KR)
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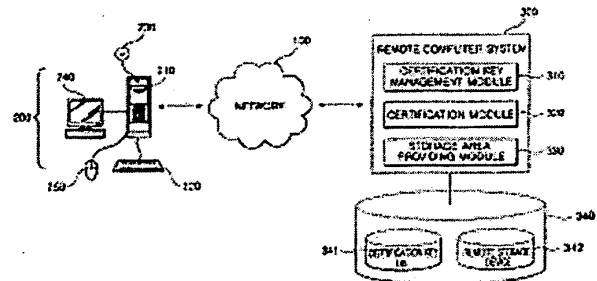
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A computer-readable portable storage medium that stores information to certify access to a remote computer and a program used to utilize a remote storage device managed by the remote computer. The program executes a procedure of being driven when the medium is mounted to the local computer, determining whether the local computer is connected to the network, reading a URL of the remote computer from the storage medium, connecting the local computer to the remote computer, reading and transmitting a certification key from the storage medium to the remote computer, and registering the remote storage device as an auxiliary memory of the local computer when access to the remote computer is allowed.



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(54) 휴대형 기억매체 및 이 기억매체를 이용하여 네트워크상의 리모트 저장장치를 로컬 컴퓨터의 보조기억장치로 활용하는 방법

요약

본 발명은 휴대형 기억매체 및 이 기억매체를 이용하여 네트워크상의 리모트 저장장치를 로컬 컴퓨터의 보조기억장치로 활용하기 위한 방법에 관한 것이다.

본 발명의 방법은 인증정보와 특정 프로그램을 수록한 휴대형 기억매체를 로컬 컴퓨터의 드라이브내에 삽입하는 단계와; 상기 드라이브가 상기 프로그램을 구동하는 단계와; 상기 프로그램이 상기 로컬 컴퓨터의 네트워크 연결 유무를 파악하는 단계와; 로컬 컴퓨터가 네트워크에 연결되어 있는 경우 상기 리모트 저장장치를 관리하는 컴퓨터에 접속하는 단계와; 상기 기억매체로부터 인증정보를 읽어들이고, 이 인증정보를 상기 리모트 컴퓨터에 전송하는 단계와; 상기 리모트 컴퓨터가 상기 인증정보에 근거하여 상기 리모트 저장장치에 대한 액세스를 허락하는 단계; 및 상기 리모트 저장장치로 로컬 컴퓨터의 외부 보조기억장치로 등록하는 단계를 포함한다.

대표도

도 1

색인어

리모트 저장장치, 휴대형 기억매체, 보조기억장치

명세서

도면의 간단한 설명

본 명세서에 첨부되는 다음의 도면들은 본 발명의 바람직한 실시예를 예시하는 것이며, 후술하는 발명의 상세한 설명과 함께 본 발명의 기술사상을 더욱 이해시키는 역할을 하는 것이므로, 본 발명은 그러한 도면에 기재된 사항에만 한정되어 해석되어서는 아니된다.

도 1은 본 발명의 바람직한 실시예에 따른 리모트 저장장치에 액세스하는 과정을 구현하기 위한 시스템구성도이다.

도 2는 본 발명의 바람직한 실시예에 따른 컴팩트 디스크의 구성도이다.

도 3은 본 발명에 의한 인증키 데이터베이스의 데이터 저장구조를 나타내는 테이블이다.

도 4는 본 발명의 바람직한 실시예의 컴팩트 디스크를 제작하는 과정을 설명하기 위한 흐름도이다.

도 5 및 도 6은 본 발명의 바람직한 실시예에 따라 제작된 컴팩트 디스크를 이용하여 리모트 저장장치에 액세스하는 과정을 설명하는 흐름도이다.

도 7은 저장장치 탐색 인터페이스내에 리모트 저장장치에 액세스하기 위한 네트워크 디스크 드라이브가 생성된 모습을 나타낸다.

< 도면의 주요 참조부호에 대한 설명 >

200: 클라이언트 정보단말 230: 컴팩트 디스크

300: 디스크 관리자 310: 인증키 관리모듈

320: 인증 실행모듈 330: 저장영역 제공모듈

341: 인증키 데이터베이스 342: 리모트 저장공간

발명의 상세한 설명

발명의 목적

발명이 속하는 기술 및 그 분야의 종래기술

본 발명은 휴대형 기억매체 및 이 기억매체를 이용하여 네트워크상의 리모트 저장장치를 로컬 컴퓨터의 보조기억장치로 활용하기 위한 방법에 관한 것이다.

인터넷과 같은 개방형 네트워크망의 등장과 더불어 로컬(local area)에 존재하는 컴퓨터 시스템과 원격지(remote area)에 존재하는 컴퓨터 시스템 사이에서 자유로운 정보의 교환이 가능하게 되었다. 특히, 다수의 컴퓨터 시스템에 대해 다양한 정보와 실행 프로그램을 제공하는 컴퓨터가 등장하면서 전자를 클라이언트컴퓨터로 후자를 서버 컴퓨터로 지칭하게 되었다.

따라서, 사용자는 자신의 컴퓨터내에 특정 소프트웨어 자원 또는 하드웨어 자원이 존재하지 않더라도 네트워크만 연결되어 있다면 언제든지 상기 서버 컴퓨터에 접속하여 상술한 자원들을 이용하는 것이 가능하다.

이러한 개방형 통신망은 컴퓨터 사용자 하여금 거리에 상관없이 언제든지 원하는 자원(resource)에 액세스 가능하게 하지만, 온라인 서비스업자에게는 유용한 자원을 무상으로 제공하게 하는 환경을 만든다. 따라서, 인터넷을 통해 소프트웨어 자원 또는 하드웨어 자원을 제공하는 서비스업자들은 사용자들의 무조건적인 액세스를 방지하기 위해 인증 절차를 요구하고, 일정한 금액을 지불한 유료 사용자에게 대해서만 액세스 권한을 부여하는 방법을 채택하고 있다. 그러나, 이 방법은 무료 서비스에 익숙한 네티즌들을 유료 서비스로 유인하는데 실패하고 있다.

일반 소비자들은 유형의 상품을 구매함에 있어 댓가를 지불하는데 익숙하지만, 무형의 정보나 프로그램을 구매함에 이서는(특히, 인터넷을 통해 구매함에 있어) 정당한 댓가를 지불하는 것이 익숙하지 않다. 따라서, 인터넷과 같은 개방형 네트워크를 통해 제공되는 무형의 정보, 콘텐츠, 데이터 및 프로그램 등을 마치 유형의 상품처럼 가공하는 기술이 요구된다.

그 대안으로 제시되는 것이 콤팩트 디스크와 같은 기록매체이다. 소비자들은 비디오나 오디오 데이터를 담은 CD나 소프트웨어 프로그램을 수록한 CD를 유료로 구매하는데 아무런 저항감을 갖지 않는다. 즉, 무형의 정보가 CD라는 매체를 통해 유형의 상품으로 가공된 것이다.

그러나, 일부 정보나 프로그램은 CD라는 한정된 저장공간내에 모두 담을 수 없다. 즉, 기록매체에 수납해서 유통하는 것이 불가능한 정보와 프로그램이 존재하는 것이다.

따라서, CD에 수납해서 유통할 수 없는 온라인 서비스들을 휴대형 기억매체를 통해 유형화시킬 수 있는 새로운 대안이 요청된다.

이러한 요청을 구현하기 위해 다양한 방법들이 시도되었다.

예를들어, 대한민국 공개특허 제 2001-39267 호는 암호화기법으로 입력된 인증정보를 저장하는 콤팩트 디스크를 이용하여 네트워크에 대한 액세스 여부를 확인하는 시스템 및 방법을 개시한다. 그러나, 이 방법은 단순히 콤팩트 디스크 내에 인증정보만을 포함하고 있기 때문에 온라인상에서 로그인을 요구하는 종래의 유료 사이트와 차별성을 갖기가 힘들다.

또한, 대한민국 공개특허 제 2001-1022 호는 휴대형 기억매체에 오프라인으로 액세스 가능한 프로그램과, 온라인 네트워킹을 위한 프로그램을 수록하여 그 휴대형 기억매체의 장착상태에서 오프라인 또는 온라인으로 필요한 정보에 액세스하는 방법을 개시한다. 그러나, 이 방법은 클라이언트 시스템내에 별도의 인터페이스를 설정해서 클라이언트 시스템내에서 로그인을 실행하는 점만 다를뿐 기존 온라인 서비스에서의 유료화 방법과 별다른 차이점이 없다. 즉, 상기 온라인 네트워킹 프로그램은 기존 무료 서비스를 유료화하기 위한 것이 아니라 단순히 오프라인 프로그램의 한계를 극복하기 위해 부가된 것에 불과하다.

따라서, 네트워크상의 서버 컴퓨터에 존재하는 온라인 서비스가 마치 휴대형 기억매체내에 기록된 것처럼 이 휴대형 기억매체를 장착한 컴퓨터가 상기 온라인 서비스를 로컬에서 자연스럽게 실행할 수 있는 방법이 요청된다.

특히, 근래에는 네트워크상의 원격 저장장치에 사용자별 저장공간을 확보하고, 사용자들로 하여금 인터넷을 통해 상기 저장공간에 액세스하여 저장장치를 사용하도록 하는 온라인 서비스가 실행되고 있다.

그러나, 이러한 서비스의 경우 사용자가 여전히 온라인을 통해 상기 저장공간에 액세스해야 하기 때문에 사용자들은 상기 저장공간을 돈을 지불하고 구매해야 하는 유형의 매체로 인식하지 않는다.

발명이 이루고자 하는 기술적 과제

따라서, 본 발명의 목적은 네트워크를 통해 액세스 가능한 원격 저장장치를 모뎀 컴퓨터에서 유로로 사용할 수 있도록 하는 방법을 제시하는 것이다.

본 발명의 다른 목적은 예들 들어, 윈도우 디스크와 같은 휴대용 기어메체용 이용가능한 리모트 저장장치를 마치 모뎀 컴퓨터의 보조기억장치와 같이 사용할 수 있도록 하는 데 있다.

본 발명의 다른 목적 및 장점은 하기의 설명될 것이며, 본 발명의 실시예의 의해 알게 될 것이다. 또한, 본 발명의 목적 및 장점은 첨부된 청구범위에 나타난 수단 및 조합에 의해 실현될 수 있다.

발명의 구성 및 작용

상술한 목적을 달성하기 위해 본 발명의 바람직한 실시예에 의한 휴대용 기어메체용 모뎀 컴퓨터를 통해 원격 리모트 컴퓨터에 액세스하기 위한 권한을 인증하는 정보와; 상기 리모트 컴퓨터가 관리하는 저장장치에 액세스하여, 이 저장장치에 저장된 데이터를 모뎀 컴퓨터로 전송하기 위하여 기어메체용 모뎀 컴퓨터에 저장하고;

상기 프로그램은 컴퓨터로 단독 가능한 클라이언트 프로그램으로서,

상기 휴대용 기어메체용 모뎀 컴퓨터에 장착되는 중간 구성요;

상기 모뎀 컴퓨터가 네트워크에 연결되어 있는지 여부를 판단하는 절차와;

네트워크에 연결되어 있는 경우 상기 휴대용 기어메체용 모뎀 컴퓨터의 위치정보를 읽어들이고 상기 리모트 컴퓨터에 전송하는 절차와;

상기 휴대용 기어메체용 모뎀 컴퓨터와 상기 리모트 컴퓨터에 전송하는 절차, 및

상기 리모트 컴퓨터의 타한 액세스가 허용되면, 상기 리모트 컴퓨터의 저장장치를 모뎀 컴퓨터의 외부 보조기억장치로 등록하는 절차를 수행한다.

이때, 상기 등록절차는 다시 상기 리모트 저장장치를 작동시키기 위한 드라이버를 설정하는 절차와; 모뎀 컴퓨터의 저장장치 탐색 인터페이스상에 이 드라이버에 대한 고유의 식별자를 지정하는 절차를 포함한다.

또한, 상기 프로그램은 모뎀 컴퓨터가 네트워크에 연결되어 있지 않은 경우 자동으로 네트워크에 접속시키는 절차를 더 수행할 수 있다.

이때, 상기 인증정보는 상기 리모트 저장장치의 특정 저장장역을 지시하는 주소정보를 정의하고, 상기 고유 식별자는 특정 저장장치를 위해 사용되지 않는 식별자중에서 선택되는 것을 특징으로 한다.

또한, 본 발명의 바람직한 다른 실시예로서 네트워크상에 존재하는 리모트 저장장치를 모뎀 컴퓨터의 보조기억장치로 활용하는 방법은

인증정보와 특정 프로그램은 수백한 휴대용 기어메체용 모뎀 컴퓨터의 드라이버에 삽입하는 단계와;

상기 드라이버가 상기 프로그램을 구동하는 단계와;

상기 프로그램이 상기 모뎀 컴퓨터의 네트워크 연결 여부를 확인하는 단계와;

모뎀 컴퓨터가 네트워크에 연결되어 있는 경우 상기 리모트 저장장치를 관리하는 컴퓨터에 접속하는 단계와;

상기 기어메체용 모뎀 컴퓨터 인증정보를 읽어들이고, 이 인증정보를 상기 리모트 컴퓨터에 전송하는 단계와;

상기 리모트 컴퓨터가 상기 인증정보에 근거하여 상기 리모트 저장장치에 대한 액세스를 허락하는 단계; 및

상기 리모트 저장장치를 로컬 컴퓨터의 외부 보조기억장치로 등록하는 단계를 포함한다.

또한, 본 발명의 방법은 상기 리모트 저장장치에 대한 액세스가 허락될 때,

상기 리모트 저장장치를 작동시키기 위한 드라이브를 설정하는 단계와;

상기 로컬 컴퓨터의 저장장치 탐색 인터페이스상에 이 드라이브에 대한 고유 식별자를 지정하는 단계를 더 포함할 수 있다.

또, 본 발명의 방법은 상기 리모트 저장장치로부터 상기 로컬 컴퓨터로 데이터를 다운로드하거나 상기 로컬 컴퓨터의 데이터를 상기 리모트 저장장치로 업로드하는 단계를 더 포함한다.

상기 리모트 컴퓨터에 있어서의 인증방법은 다시

상기 인증정보에 대응되는 저장영역이 존재하는지 여부를 판별하는 단계와;

저장영역이 존재하는 경우 저장용량과 사용기한이 남아 있는지 여부를 판별하는 단계와;

저장용량과 사용기한이 남아 있는 경우 상기 리모트 저장장치에 대한 액세스를 허락하는 단계를 포함한다.

이와, 관련된 도면들을 참조로 본 발명의 바람직한 실시예를 상세히 설명하기로 한다.

먼저, 도 1은 본 발명의 방법을 구현하기 위한 시스템의 구성을 나타내는 도면이다.

도면에 도시된 바와 같이, 본 발명의 시스템은 리모트 컴퓨터 시스템(300)과, 로컬 컴퓨터 시스템(230)이 네트워크를 (100)를 통해 상호 연결되어 있다.

상기 로컬 컴퓨터 시스템(200)은 네트워크에 접속할 수 있는 통신장치와, 플로피디스크, 콤팩트 디스크와 같은 보조기억장치를 구동시키기 위한 드라이브를 갖는 정보단말장치이다. 이 정보단말장치는 데이터의 입력 또는 기능의 설정을 위한 키보드(220), 마우스(250)와 같은 입력장치와, 입력신호에 응답하여 데이터처리기를 실행하는 정보단말본체(210) 및 데이터 처리상태를 시각적으로 표시하는 모니터(240)를 주변장치로 구비한다.

또한, 상기 정보단말본체(210)에는 전체 계어를 담당하는 중앙처리장치(CPU), 상기 CD-ROM과 같은 외부 보조기억장치에 수록된 정보나 프로그램에 접근하기 위한 칩셋의 프로그램이 저장되어 있는 ROM, 상기 프로그램이나 처리된 응용 프로그램을 실행하는 정보단말장치를 구성하는 PC를 채택하는 것이 바람직하지만, 반드시 이에 한정되는 것은 아니며 외부로부터 기억매체를 수용하는 것에 의해 네트워크상의 리모트 컴퓨터와 정보통신, 수신함으로써 본 발명의 로컬 컴퓨터 시스템으로서 열람 컴퓨터나 핸드헬드 PC를 채택하는 것이 바람직하지만, 반드시 이에 한정되는 것은 아니며 외부로부터 기억매체를 수용하는 것에 의해 네트워크상의 리모트 컴퓨터와 정보통신, 수신함으로써 본 발명의 목적을 달성할 수 있다. 유, 무선상의 모든 정보통신단말을 포함하는 것으로 해석되어야 한다.

또한, 상기 로컬 컴퓨터의 의미는 리모트 컴퓨터에 상반되는 의미로서 원격지에 존재하는 PC로, 그래픽, 컨트롤, 하드웨어 등에 네트워크를 통해 액세스할 수 있도록 사용자를 안내하는 모든 정보통신단말을 지칭한다. 즉, 사용자가 직접 사용 하는 정보단말장치를 로컬 컴퓨터로 지칭하고, 사용자가 PC로 그래픽, 컨트롤 등과 같은 소프트웨어 및 저장장치와 같은 하드웨어를 제공하는 정보단말장치를 리모트 컴퓨터로 지칭한다.

상기 로컬 컴퓨터 시스템에는 도면부호 230과 같은 휴대형 기억매체가 장착되는데, 이 기억매체는 도 2에 도시된 바와 같은 콤팩트 디스크가 채택되는 것이 바람직하다. 특히, 상기 기억매체는 사용자가 복제기로 복제하거나 간편하게 출 령할 수 있도록 직경 64mm 이하의 미니 디스크(MD: Mini Disk)인 것이 더욱 좋다. 또한, 이 미니 디스크를 반드시 원 형일 필요는 없고, 네모난 카드형태로 제작할 수도 있다.

본 실시예에서는 휴대형 기억매체로서 콤팩트 디스크를 예로들어 설명하고 있으나 본 발명이 반드시 이러한 기억매체로 한정되는 것은 아니며, 본 발명의 목적을 달성함에 있어 기술적 문제가 없다면 플로피디스크, 휴대형 하드디스크, 스마트 카드 등과 같은 다른 기록매체도 채택 가능하다.

본 발명의 휴대형 기억매체(예를들어, 콤팩트 디스크)(230)는 도 2와 같이 인증키 저장영역(232), 자동접속 프로그램 저장영역(233) 및 클라이언트 프로그램 저장영역(234)을 포함한다.

상기 인증키 저장영역(232)에는 리모트 컴퓨터 시스템에 대한 액세스 권한을 인증하는 정보가 기록된다. 이 인증정보는 리모트 컴퓨터 시스템(300)으로부터 부여되어 기록된 것이다. 또한, 상기 인증정보와 동일한 인증키가 리모트 컴퓨터 시스템의 인증키 데이터베이스(341)에 저장된다.

또한, 상기 자동접속 프로그램은 상기 기억매체(230)가 장착된 로컬 컴퓨터(200)가 네트워크(100)에 연결되어 있지 않을 경우 자동적으로 이 로컬 컴퓨터를 네트워크에 연결시킨다.

상기 클라이언트 프로그램은 기억매체(230)가 로컬 컴퓨터(200)에 장착됨과 동시에 구동되어 로컬 컴퓨터의 네트워크 연결 유무를 확인하고, 연결이 되어 있지 않은 경우 상기 자동접속 프로그램을 실행시키며, 로컬 컴퓨터(200)를 리모트 컴퓨터(300)에 접속시킨 후에 상기 인증키를 읽어들이어 이 인증키를 상기 리모트 컴퓨터에 전달하는 기능을 수행한다.

또한, 상기 클라이언트 프로그램은 상기 리모트 컴퓨터에서 제공하는 다양한 자원(resource) 특히, 하드웨어 자원(예를들어, 저장공간)을 상기 로컬 컴퓨터에서 사용할 수 있도록 지원하는 응용 프로그램을 포함한다.

본 발명의 휴대형 기억매체(230)는 도 2에 도시된 정보 및 프로그램 이외에 다른 데이터나 프로그램을 더 포함할 수도 있다.

상기 리모트 컴퓨터 시스템(300)은 상기 기억매체(230) 및 리모트 저장장치(342)를 관리하는 컴퓨터로서 도 1에 도시된 바와같이 인증키 관리모듈(310), 인증 실행모듈(320), 저장영역 제공모듈(330)과 같은 프로그램 모듈과 인증키 데이터베이스(341), 원격 저장공간(342)과 같은 저장장치를 포함한다.

이 리모트 컴퓨터 시스템(300) 즉, 디스크 관리서버는 중앙처리장치, 램(RAM), 롬(ROM), 네트워크 인터페이스, 데이터 기억장치 등을 포함하는 대용량의 컴퓨터 시스템이다. 상당한 양의 메모리와 처리능력을 갖춘 전통적인 개인 컴퓨터나 워크스테이션이 디스크 관리서버로 사용될 수 있다.

디스크 관리서버(300)는 정보처리나 데이터베이스 탐색에 있어 엄청난 양의 수학적 계산을 실행함으로써 대량의 업무 처리를 할 수 있다. 주로 인텔사에서 생산되는 펜티엄 마이크로프로세서가 중앙처리장치로 사용될 수 있다.

이하에서, 상기 디스크 관리서버(300)의 구체적인 기능을 도 1을 참조하여 상세하게 살펴보기로 한다.

상기 디스크 관리서버의 인증키 관리모듈(310)은 기억매체에 수록되는 인증키를 생성하고, 이 인증키에 대응되는 리모트 저장장치의 저장용량 및 사용기한 등의 정보를 후술하는 인증키 데이터베이스(341)에 저장한다. 또한, 인증키 관리모듈(310)은 상기 인증키 데이터베이스(341)에 저장되어 있는 리모트 저장장치의 인증키별 저장용량 및 사용기한에 관한 정보를 수시로 갱신, 관리한다.

상기 인증 실행모듈(320)은 로컬 컴퓨터(200)로부터 인증키가 전송되면, 이 인증키에 대응하는 인증키가 인증키 데이터베이스(341)에 존재하는지 여부를 판단하고, 만약 대응 인증키가 존재하는 경우에는 로컬 컴퓨터의 액세스를 허락하고, 그렇지 않은 경우에는 로컬 컴퓨터의 액세스를 불허한다.

상기 저장영역 제공모듈(330)은 인증 실행모듈(320)에 의해 액세스가 허락된 인증키로부터 원격 저장공간(즉, 리모트 저장공간)(342)의 저장주소를 추출하고, 이 저장주소에 해당하는 저장영역을 로컬 컴퓨터(200)의 가상 보조기억장치로 제공한다.

따라서, 사용자는 상기 기억매체(230)를 로컬 컴퓨터(200)에 삽입하는 행위만으로 리모트 저장장치(342)의 데이터를 로컬로 다운로드하거나 로컬에 있는 데이터를 리모트 저장장치(342)에 업로드할 수 있게 된다.

상기 데이터베이스 시스템의 인증키 데이터베이스(341)는 도 3에 도시된 바와 같은 데이터 구성을 갖는다. 즉, 인증키 데이터베이스(341)는 인증키정보, 허용된 저장용량 정보, 사용기간정보, 대응 저장주소정보, 남은 사용기간, 남은 저장용량 등의 데이터를 저장한다.

상기 원격 저장공간(342) (즉, 리모트 저장공간)에는 각 인증키별로 할당된 용량의 저장영역이 다수 존재하고, 각 저장영역내에는 해당 사용자가 업로드한 데이터나 파일이 저장되어 있다.

상기 로컬 컴퓨터(200)와 리모트 컴퓨터(300)를 연결하는 네트워크망(100)은 대표적으로 유, 무선 인터넷을 지칭하는 것으로서, 반드시 이에 한정되지 않고, 인트라넷, 엑스트라넷, LAN(근거리 통신망), WAN(원거리 통신망), 전용선망 등을 모두 포함하는 것으로 이해되어야 한다.

이하에서는 상술한 시스템 구성에 근거하여 본 발명의 방법을 상세히 설명한다.

먼저, 도 4에는 본 발명에 따른 기억매체가 제작되는 과정이 도시되어 있다.

리모트 컴퓨터 시스템(300)을 통해 불특정의 잠재적인 네티즌들에게 원격 저장공간을 제공하고자 하는 서비스업자는 예를들어, 임의의 난수형태로 인증키를 생성하고(S100) 이 인증키에 대해 저장용량 및 사용기한을 설정한다.(S110)

인증키와 이 인증키에 대응되는 저장용량 및 사용기한이 결정되면, 이 정보를 이용하여 도 3과 같은 형태의 인증키 데이터베이스(341)를 리모트 컴퓨터(300)상에 구축한다.(S120)

또한, 생성된 인증키별로 대응되는 저장공간을 데이터 저장장치내에 확보한다.(S130)

이와같이, 인증키의 생성과 저장공간의 할당이 완료되면, 생성된 인증키별로 도 2와 같은 형태의 휴대형 기억매체(230) (예를들어, 콤팩트 디스크)를 제작한다.

이때, 이 콤팩트 디스크(230)에는 상기 단계 S100을 통해 생성된 인증키와, 상기 자동접속 프로그램 및 상기 클라이언트 프로그램이 기록되어 있다.(S140)

이렇게 인증키 정보와 프로그램이 수록된 콤팩트 디스크가 제작되면, 서비스업자는 이 콤팩트 디스크를 오프라인 또는 온라인을 통해 다수의 네티즌들에게 유료로 판매한다. 이때, 이 디스크의 외부에는 사용기한과 저장용량이 기재되는데, 네티즌들은 마치 이 디스크가 기재된 용량만큼의 저장공간을 갖는 기억매체인 것으로 믿게 될 것이다.

즉, 예를들어 디스크의 외부에 "저장용량 - 30GB" 라는 기재가 있다면, 이를 구매한 네티즌은 이 디스크내에 30GB의 저장공간이 존재하는 것으로 인식하게 될 것이다.

따라서, 네티즌은 이 디스크를 마치 기존의 대용량 하드디스크와 마찬가지로 인식하기 때문에 유료로 구매하는데 있어 아무런 저항감을 가지지 않을 것이다.

이와같이, 상기 콤팩트 디스크(이하, CD)로 약칭한다)를 구매한 네티즌은 이 대용량 기억장치를 사용하기 위해 자신의 컴퓨터 또는 다른 특정 컴퓨터(이하, 로컬 컴퓨터로 약칭한다)의 CD-ROM 드라이브내에 상기 CD를 삽입한다.(S200)

CD가 CD-ROM 드라이브내에 삽입되면, CD내의 프로그램이 로컬 컴퓨터(200)의 네트워크 환경을 검색하여 해당 로컬 컴퓨터가 네트워크에 연결되어 있는지 여부를 확인한다.(S205)

이때, 네트워크 접속이 되어 있지 않은 경우, CD내의 자동접속 프로그램이 호출되어 실행된다.(S215)

로컬 컴퓨터로 호출된 자동접속 프로그램은 로컬 컴퓨터의 네트워크 접속 도구를 이용하여 해당 로컬 컴퓨터를 네트워크에 자동 접속시킨다. (S220)

상기 단계 S210에서 로컬 컴퓨터가 이미 접속되어 있거나, S215~S220루틴을 거쳐 로컬 컴퓨터가 네트워크에 접속되면, CD로부터 리모트 컴퓨터(300)의 위치정보(즉, IP어드레스)가 판독되고, 이 위치정보에 근거하여 로컬 컴퓨터(200)를 리모트 컴퓨터(300)(즉, 디스크 관리자서버)에 접속시킨다. (S225)

로컬 컴퓨터가 리모트 컴퓨터에 접속되면, 오토 런(Auto-Run) 프로세스에 따라 CD내의 클라이언트 프로그램이 구동된다. (S230)

이때, 클라이언트 프로그램은 로컬 컴퓨터에 상주를 위해 설치되지 않는 것이 바람직하다.

오토 런을 이용하여 구동된 클라이언트 프로그램은 디스크(즉, CD)의 인증키저장영역으로부터 인증키를 읽어들이고(S235), 이 인증키를 리모트 컴퓨터 시스템에 전송한다. (S240)

로컬 컴퓨터(200)로부터 인증키를 전송받은 리모트 컴퓨터의 인증 실행모듈(320)은 전송된 인증키에 대응하는 키가 인증키 데이터베이스(341)내에 존재하는지 여부를 확인한다. 즉, 인증키의 정당성 여부를 확인한다. (S245)

인증키의 정당성 여부 확인 프로세스를 보다 상세하게 설명하면, 대응 인증키가 데이터베이스(341)내에 존재하는 것으로 확인되면, 상기 인증 실행모듈(320)은 데이터베이스(341)내의 인증키에 대한 남은 저장용량 및 사용기한을 확인한다. 이때, 남은 저장용량이 없거나 사용기한이 지난 경우, 해당 네트즌의 액세스를 불허하고 새로운 휴대형 기억매체를 구매하게 하거나 기존 기억매체의 충전을 요구한다.

반면에, 대응 인증키에 대한 잔류 저장 용량과 사용기한이 남아 있는 경우, 해당 네트즌의 리모트 저장장치에 대한 액세스를 허락한다.

또한, 도 5의 단계 S250에서 전송된 인증키가 데이터베이스(341)내에 존재하지 않는 경우에는 로컬 컴퓨터에 에러 메시지를 출력하고, 서비스 제공을 종료한다. (S255)

반면에, 상기 단계 S250에서 전송된 인증키가 정당한 경우(대응 키가 존재하고, 잔류 저장용량 및 사용기한이 남아 있는 경우)에는 네트 바이오스(NetBios) (또는 SMB 공유)에 접근한다. (S260)

이와같이, 리모트 저장장치(342)에 대한 액세스가 허락된 상태에서 CD내의 클라이언트 프로그램은 로컬 컴퓨터(200)가 지정 저장공간에 액세스할 수 있도록 로컬 컴퓨터내에서 상기 리모트 저장장치(200)를 작동시키기 위한 별도의 드라이브(Drive)를 설정한다.

리모트 저장장치의 드라이브가 로컬 컴퓨터내에 설정되면, 도 7에서와 같이 윈도우 탐색기와 같은 저장장치 탐색 인터페이스(400)상에 상기 드라이브에 대응하는 고유 식별자(430)를 지정한다. (S265)

도 7에 있어서, 도면부호 410으로 표현되는 "(A:)"는 플로피디스크 드라이브에 대한 고유 식별자를 나타내고, 도면부호 420으로 표현되는 "(C:)"는 하드디스크 드라이브에 대한 고유 식별자를 나타내며, 도면부호 430인 "(G:)"는 상기 리모트 저장장치 드라이브에 대한 고유 식별자를 나타낸다. 도 7에서는 리모트 저장장치 드라이브를 "(G:)"로 지정하고 있지만, 리모트 저장장치 드라이브는 도면에 도시된 식별자로 한정되는 것이 아니고 사용되지 않은 식별자중에서 임의로 선택될 수 있다.

이에 따라, 로컬 컴퓨터(200)는 상기 리모트 저장장치(342)를 마치 새로운 보조기억장치로 인식하게 되고, 사용자는 콤팩트 디스크(230)내에 상기 리모트 저장장치(342)에 상응하는 대용량의 저장공간이 존재하는 것으로 생각하게 된다.

이렇게 저장장치 탐색 인터페이스(400)내에 리모트 저장장치(342)를 작동시키는 드라이브의 식별자가 지정되면, 사용자는 상기 저장장치의 해당 저장공간에 있는 데이터를 로컬 컴퓨터로 다운로드하여 사용하거나 로컬 컴퓨터의 주기억장치 또는 다른 보조기억장치에 저장되어 있는 데이터를 리모트 저장장치(342)로 업로드하여 사용하는 것이 가능하다.(S270)

따라서, 사용자는 상기 휴대형 기억매체(230)를 구내하여 로컬 컴퓨터(200)에 삽입하는 것만으로 리모트 컴퓨터(300)가 보장하는 사이즈의 저장공간을 확보할 수 있다.

한편, 사용자가 상기 CD를 로컬 컴퓨터의 CD-ROM 드라이브에서 제거하면(S275), 상기 리모트 저장장치(342)의 드라이브가 로컬 컴퓨터에서 자동적으로 삭제되고 로컬 컴퓨터에는 어떤 프로그램이나 정보도 남지 않은 상태에서 모든 서비스가 종료된다.(S280) 즉, CD내에 있는 정보나 프로그램은 로컬 컴퓨터에 상주하지 않는다.

이상, 본 발명의 바람직한 실시예를 첨부된 도면들을 참조로 설명하였다. 여기서, 본 명세서 및 청구범위에 사용된 용어나 단어는 통상적이거나 사전적인 의미로 한정해서 해석되어서는 아니되며, 발명자는 그 자신의 발명을 가장 최선의 방법으로 설명하기 위해 용어의 개념을 적절하게 정의할 수 있다는 원칙에 입각하여 본 발명의 기술적 사상에 부합하는 의미와 개념으로 해석되어야만 한다. 따라서, 본 명세서에 기재된 실시예와 도면에 도시된 구성은 본 발명의 가장 바람직한 일 실시예에 불과할 뿐이고 본 발명의 기술적 사상을 모두 대변하는 것은 아니므로, 본 출원시점에 있어서 이들을 대체할 수 있는 다양한 균등물과 변형예들이 있을 수 있음을 이해하여야 한다.

발명의 효과

본 발명에 따르면, 네트워크상에 대용량의 저장장치를 두고, 사용자는 이 저장장치에 자유롭게 액세스할 수 있는 휴대형 기억매체를 소지함으로써 자신만의 대용량 저장공간을 확보할 수 있다.

또한, 기존의 온라인 저장공간 제공 서비스를 유료화하는데 있어 네티즌의 저항감을 최소화하는 것이 가능해진다.

(57) 청구의 범위

청구항 1.

컴퓨터에 의해 독출 가능한 휴대형 기억매체로서,

상기 기억매체가 장착된 로컬 컴퓨터를 통해 특정 리모트 컴퓨터에 액세스하기 위한 권한을 인증하는 정보와;

상기 리모트 컴퓨터가 관리하는 원격 저장장치를 상기 로컬 컴퓨터의 가상 보조기억장치로 활용하기 위한 프로그램을 저장하고;

상기 프로그램은 컴퓨터로 판독 가능한 클라이언트 프로그램으로서,

상기 휴대형 기억매체가 로컬 컴퓨터에 장착되는 순간 구동되어;

상기 로컬 컴퓨터가 네트워크에 연결되어 있는지 여부를 판별하는 절차와;

네트워크에 연결되어 있는 경우 상기 기억매체로부터 상기 리모트 컴퓨터의 위치정보를 읽어들이어 상기 리모트 컴퓨터에 접속하는 절차와;

상기 기억매체로부터 인증정보를 읽어들이어 상기 리모트 컴퓨터에 전송하는 절차; 및

상기 리모트 컴퓨터에 대한 액세스가 허락되면, 상기 원격 저장장치를 로컬 컴퓨터의 외부 보조기억장치로 등록하는 절차를 수행하는 것을 특징으로 하는 휴대형 기억매체.

청구항 2.

제 1 항에 있어서, 상기 등록절차는 다시

상기 원격 저장장치를 로컬 컴퓨터내에서 작동시키기 위한 드라이브를 설정하는 절차와;

로컬 컴퓨터의 저장장치 탐색 인터페이스상에 이 드라이브에 대한 고유의 식별자를 지정하는 절차를 포함하는 것을 특징으로 하는 휴대형 기억매체.

청구항 3.

제 1 항에 있어서, 상기 프로그램은

로컬 컴퓨터가 네트워크에 연결되어 있지 않은 경우, 로컬 컴퓨터를 네트워크에 자동 접속시키는 절차를 더 수행하는 것을 특징으로 하는 휴대형 기억매체.

청구항 4.

제 2 항에 있어서,

상기 인증정보는 상기 리모트 저장장치의 특정 저장영역을 지시하는 주소정보를 정의하는 것을 특징으로 하는 휴대형 기억매체.

청구항 5.

제 4 항에 있어서,

상기 고유 식별자는 특정 저장장치를 위해 사용되지 않는 식별자중에서 선택되는 것을 특징으로 하는 휴대형 기억매체.

청구항 6.

제 1 항 내지 제 5 항중 어느 한 항에 있어서,

상기 휴대형 기억매체가 미니 콤팩트 디스크인 것을 특징으로 하는 휴대형 기억매체.

청구항 7.

인증정보와; 컴퓨터로 판독 가능한 프로그램이 기록되어 있는 휴대형 기억매체를 이용하여 네트워크상에 존재하는 리모트 저장장치를 로컬 컴퓨터의 가상 보조기억장치로 활용하는 방법으로서,

상기 휴대형 기억매체를 로컬 컴퓨터의 드라이브내에 삽입하는 단계와;

상기 드라이브가 상기 프로그램을 구동하는 단계와;

상기 프로그램이 상기 로컬 컴퓨터의 네트워크 연결 유무를 확인하는 단계와;

로컬 컴퓨터가 네트워크에 연결되어 있는 경우 상기 리모트 저장장치를 관리하는 컴퓨터에 접속하는 단계와;

저장영역이 존재하는 경우 저장용량과 사용기한이 남아 있거나 의무를 편별하는 단계와;

상기 인증정보에 대응되는 저장영역이 존재하는지 여부를 편별하는 단계와;

상기 인증정보를 전송받은 리모트 컴퓨터에 있어서,

제 7항에 있어서,

청구항 12.

지역장치로 활용하는 방법.
지역장치로 업로드하는 단계를 더 포함하는 것을 특징으로 하는 네트워크상의 리모트 저장장치를 로컬 컴퓨터의 보조
상기 리모트 저장장치로부터 상기 로컬 컴퓨터로 데이터를 다운로드하거나 상기 로컬 컴퓨터의 데이터를 상기 리모트
저장장치로 업로드하는 것을 포함하는 방법.

제 10항에 있어서,

청구항 11.

상기 로컬 컴퓨터의 저장장치 탑재 인터페이스에 이드라이브에 대한 고유 소련자를 지정하는 단계를 더 포함하는 것
을 특징으로 하는 네트워크상의 리모트 저장장치를 로컬 컴퓨터의 보조지역장치로 활용하는 방법.
상기 리모트 저장장치를 작동시키기 위한 드라이브를 설정하는 단계와;

상기 리모트 저장장치에 대한 액세스가 허락되면,

제 9항에 있어서,

청구항 10.

상기 리모트 저장장치는 인증정보별로 다수의 저장영역을 갖는 것을 특징으로 하는 네트워크상의 리모트 저장장치를
로컬 컴퓨터의 보조지역장치로 활용하는 방법.

제 8항에 있어서,

청구항 9.

상기 인증정보는 리모트 저장장치의 특정 저장영역을 지시하기 위한 주소정보를 정의하는 것을 특징으로 하는 네트워크
상의 리모트 저장장치를 로컬 컴퓨터의 보조지역장치로 활용하는 방법.

제 7항에 있어서,

청구항 8.

상기 리모트 저장장치를 로컬 컴퓨터의 외부 보조지역장치로 등록하는 단계를 포함하는 것을 특징으로 하는 네트워크
상의 리모트 저장장치를 로컬 컴퓨터의 보조지역장치로 활용하는 방법.

상기 인증정보에 근거하여 리모트 저장장치에 대한 로컬 컴퓨터의 액세스를 허락하는 단계, 및

상기 기액체로부터 인증정보를 읽어들이고, 이 인증정보를 상기 리모트 컴퓨터에 전송하는 단계와;

저장용량과 사용기한이 남아 있는 경우 상기 리모트 저장장치에 대한 액세스를 허락하는 단계를 더 포함하는 것을 특징으로 하는 네트워크상의 리모트 저장장치를 로컬 컴퓨터의 보조기억장치로 활용하는 방법.

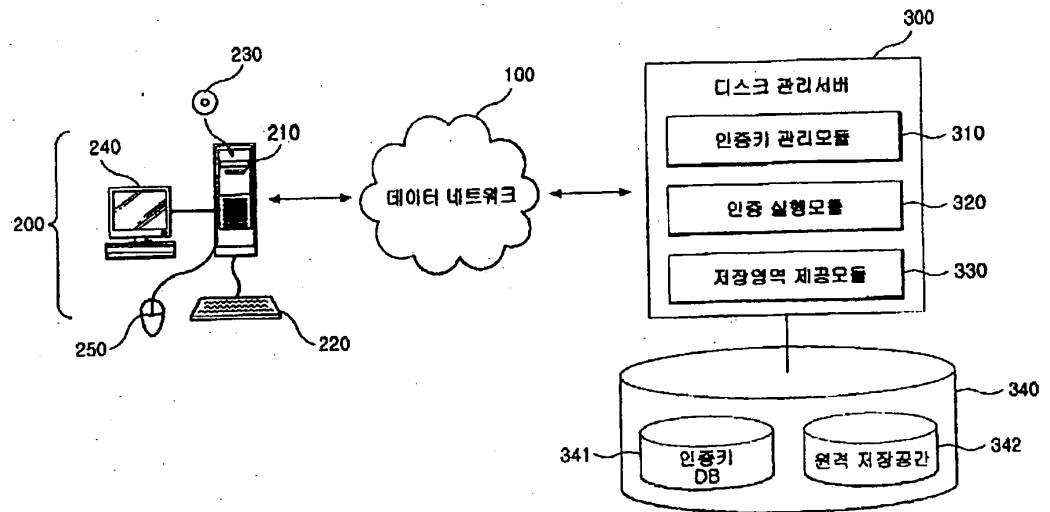
청구항 13.

제 7 항에 있어서,

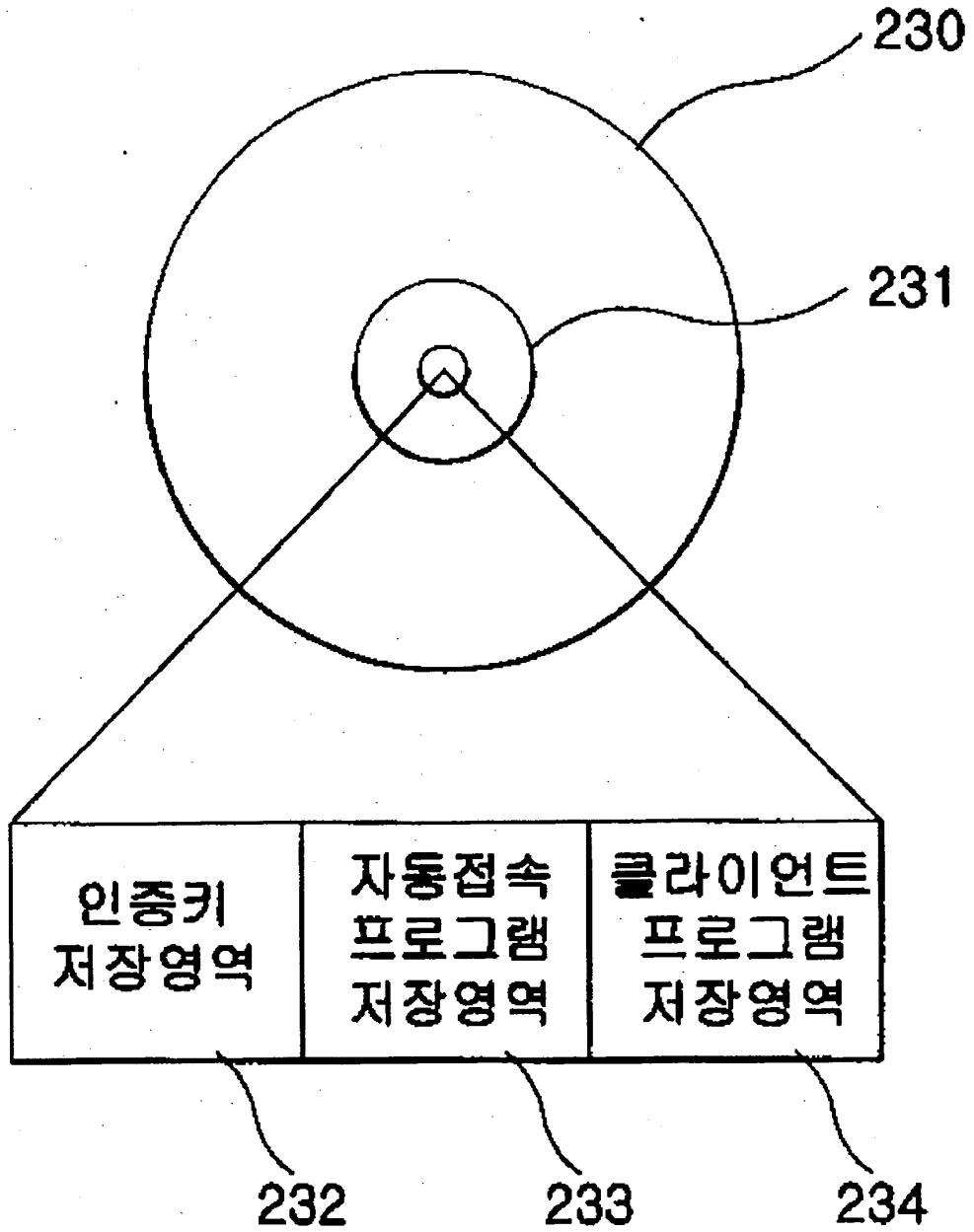
상기 로컬 컴퓨터가 네트워크에 연결되어 있지 않은 경우 자동으로 네트워크에 접속하는 단계를 더 포함하는 것을 특징으로 하는 네트워크상의 리모트 저장장치를 로컬 컴퓨터의 보조기억장치로 활용하는 방법.

도면

도면 1



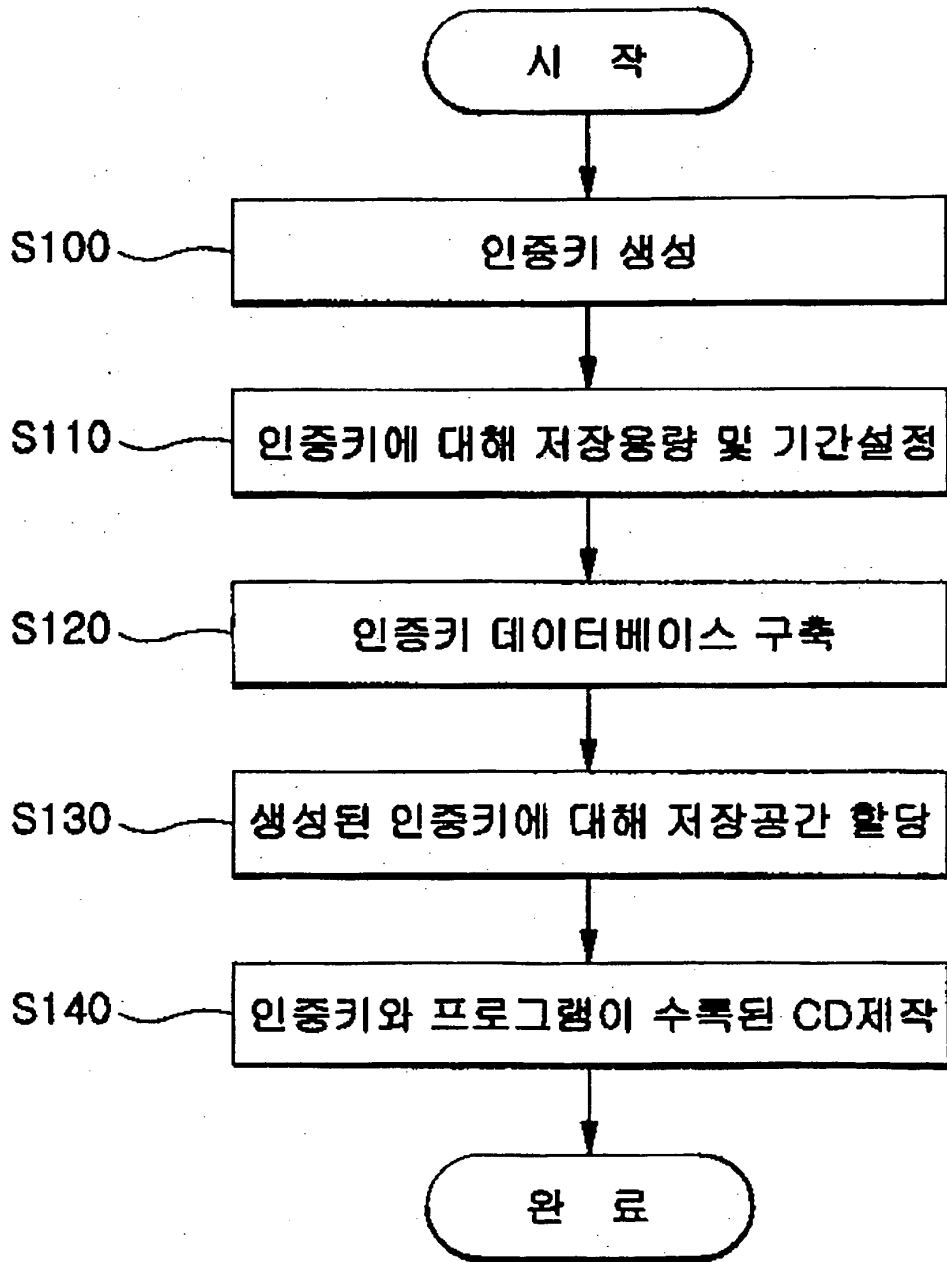
도면 2



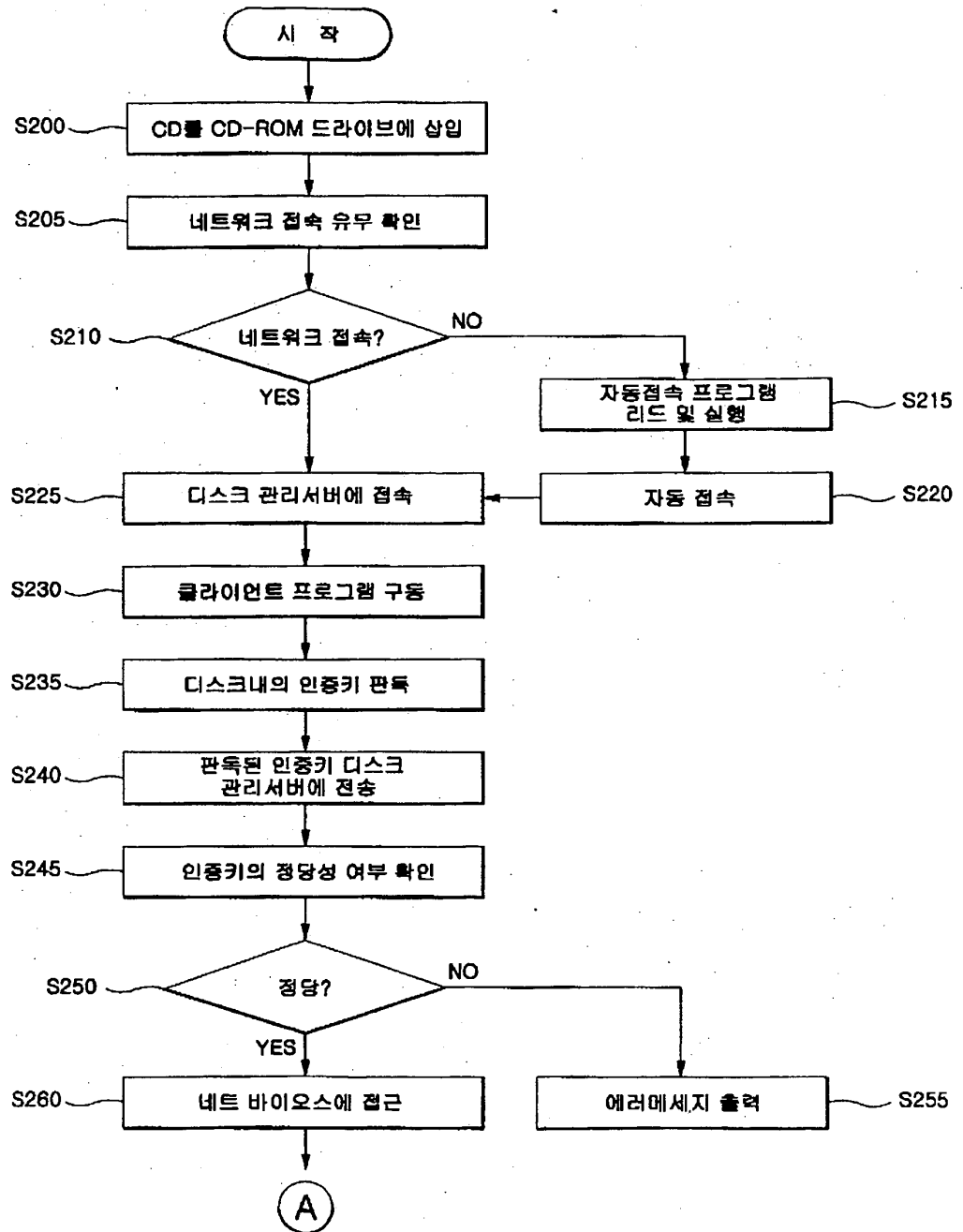
도면 3

인증키	용량	사용기간	남은시간	남은저장용량
*****	3MB	2500시간	500시간	1MB
00000	8MB	5000시간	1200시간	3MB
⋮	⋮	⋮	⋮	⋮	⋮

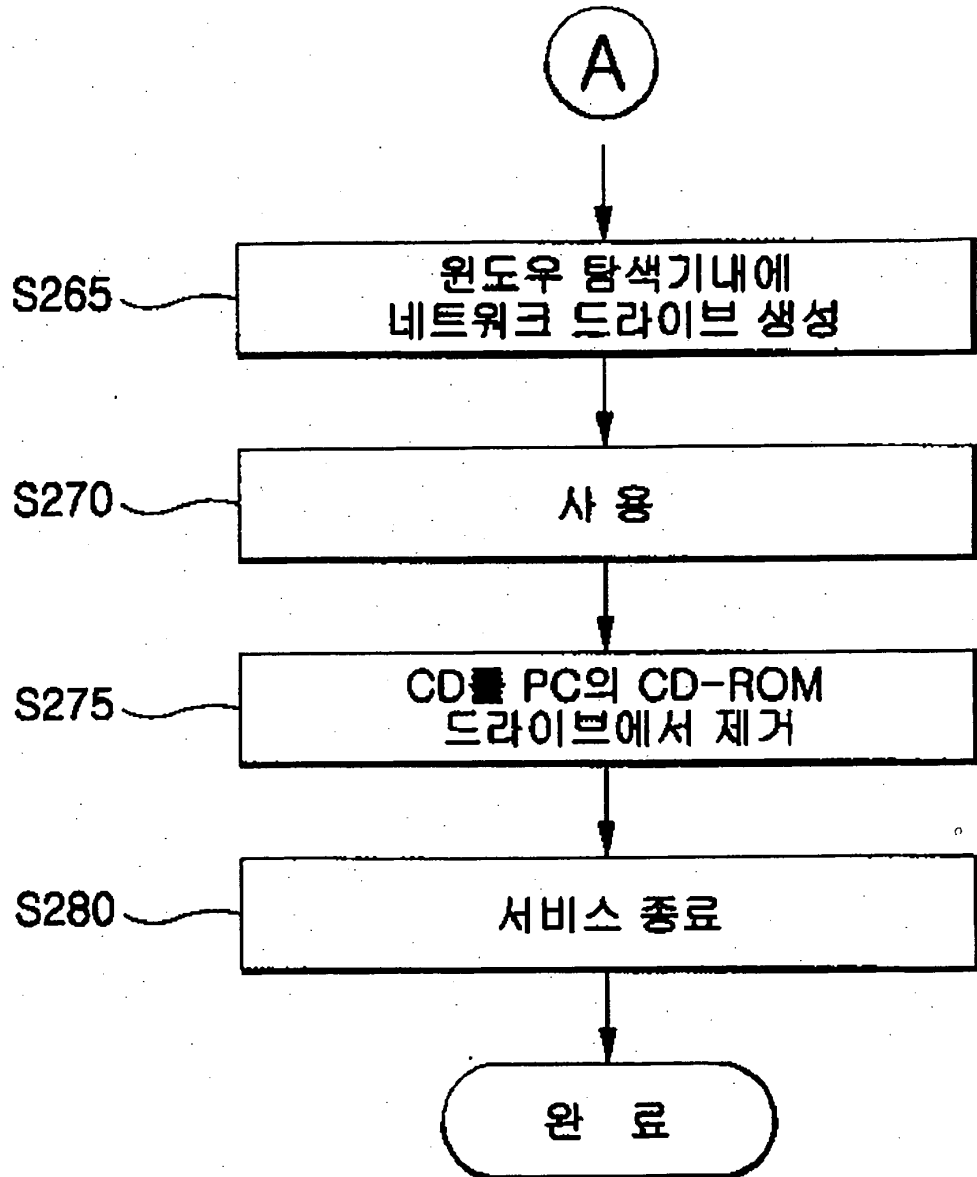
도면 4



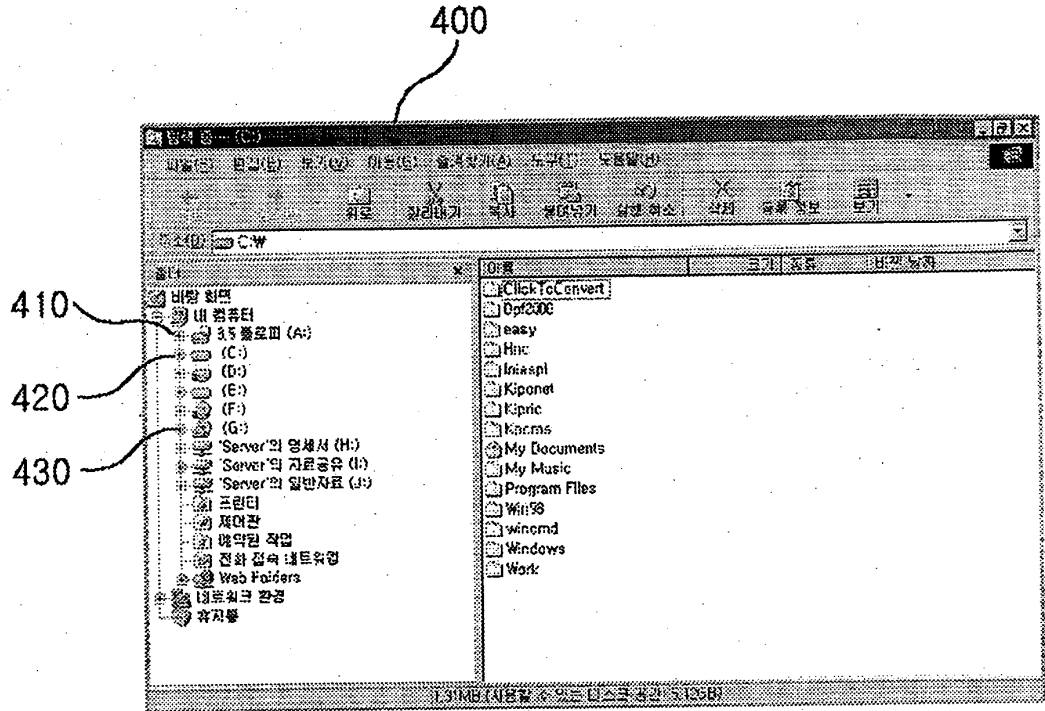
도면 5



도면 6



도면 7



Abstract

This invention has the purpose that a user uses personal hand held terminal to remotely control the user's computer connected over the wireless Internet.

A user accesses to a server (A-2) that contains user information by way of his/her personal hand held terminal (A-1), and requests a connection to his/her computer. The server searches for the user information to authenticate the user and to connect him/her to his/her computer (A-4). Upon authentication and connection to the computer, the user searches and controls the information he/she wants to explore in real time through his/her personal hand held terminal.

A separate program runs for the efficient sharing and control of the information between the server (A-2) and the user computer (A-4), and the server (A-2) receives commands from personal hand help terminal of the user (A-1) and redirects the commands to user computer (A-4), and the user computer (A-4) executes the commands transferred from the server (A-2) and sends the result of the commands back to the server (A-2).

The server (A-2) transforms the result received from the user computer (A-4) to the data that can be recognized by the personal hand held terminal (A-1) before the server sends the data to the personal hand held terminal.

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심사청구 : 있음

(54) 무선인터넷 기반에서 개인휴대용단말기를 사용자 컴퓨터의터미널로 이용하여 원격 제어하여 사용할 수 있는 방법

요약

본 발명은 무선인터넷을 사용할 수 있는 개인휴대용단말기를 이용하여 인터넷에 접속된 사용자컴퓨터를 원격 제어하여 사용할 수 있도록 하는데 그 목적이 있다.

사용자는 자신의 개인휴대용단말기(A-1)를 이용하여 사용자 정보가 저장된 서버(A-2)에 접속하고 사용자컴퓨터에 연결을 요청하면 서버에서는 사용자에 대한정보를 검색하여 사용자에 대한 인증 및 사용자컴퓨터(A-4)에 접속시켜준다. 사용자에 대한 인증 및 사용자컴퓨터에 연결되면 사용자는 개인휴대용단말기(A-1)로 원하는 정보를 실시간으로 검색하고 제어할 수 있다.

서버(A-2)와 사용자컴퓨터간(A-4)에는 원활한 정보 공유 및 제어를 위해 별도의 프로그램으로 연결되어 있으며, 서버(A-2)에서는 사용자의 개인휴대용단말기(A-1)에서 요청하는 정보를 접수하여 사용자컴퓨터(A-4)로 전송해주며, 사용자컴퓨터(A-4)에서는 서버(A-2)에서 전송된 명령을 직접 수행하며 그 결과를 다시 서버(A-2)로 전송한다.

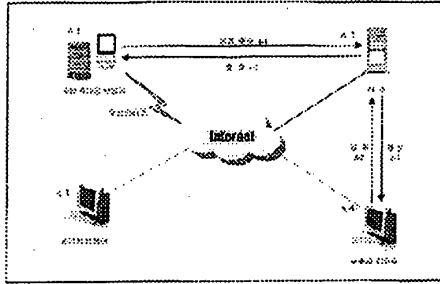
사용자컴퓨터(A-4)에서 전송된 결과를 서버(A-2)에서는 개인휴대용단말기(A-1)에서 인식할 수 있는 데이터로 변환하여 그 결과를 전송한다.

대표도

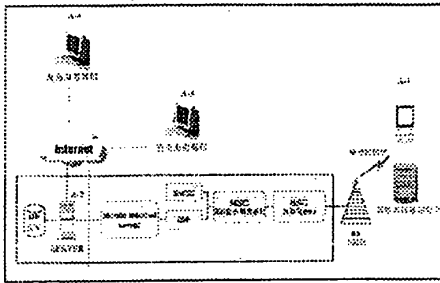
도면

도면 1. 시스템 구성도

무선인터넷 기반에서 개인휴대용단말기를 사용자 컴퓨터의 터미널로 적용하여 원격 제어하여 사용할 수 있는 구성도



도면 1. - 시스템 구성도



색인어

무선인터넷, 인터넷, 개인휴대용단말기, 핸드폰, Mobile, WAP, Palm, PDA, IMT2000

명세서

도면의 간단한 설명

도1은 무선인터넷 기반에서 개인휴대용단말기를 사용자 컴퓨터의 터미널로 이용하여 원격 제어하여 사용할 수 있는 구성도이다.

< 도면의 주요부분에 대한 설명 인터페이스 형태 >

A1 : 무선인터넷을 사용할 수 있는 개인휴대용단말기로 Mobile Phone, PDA 등으로 사용자가 지정한 사용자컴퓨터의 터미널 기능을 수행한다.

A2 : 개인휴대용단말기와 사용자컴퓨터간의 데이터를 전송하는 역할을 담당한 서버로서 회원DB관리, 사용자인증과 IP 주소관리, 데이터 변환 등의 기능을 수행한다.

A3 : 인터넷ASP를 통해 컴퓨터간 네트워크를 연결 조작할 수 있는 컴퓨터

A4 : 사용자가 개인휴대용단말기에서 제어할 수 있는 사용자컴퓨터로 지정해 놓은 컴퓨터이다.

1-1 : 개인휴대용 단말기로 인터넷서버로 접속하여 사용자인증과정을 거친후 연결 사용자컴퓨터에서 작업실행에 필요한 명령을 서버로 전송

1-2 : 실행명령을 받은 사용자컴퓨터에서 작업을 실행한 후 작업결과를 서버를 통해 개인휴대용 단말기로 변환/출력

2-1 : 개인 휴대용 단말기에서 받은 작업명령을 사용자컴퓨터로 입력/실행

2-2 : 실행명령을 받은 사용자컴퓨터에서 작업을 실행한 후 작업결과를 서버로 전송

발명의 상세한 설명

발명의 속역

발명이 속하는 기술 및 그 분야 종래기술

본 발명은 무선인터넷을 사용할 수 있는 개인휴대용단말기를 이용하여 인터넷에 접속된 사용자컴퓨터를 원격 제어하여 사용할 수 있도록 하는데 그 목적이 있다. 기존 웹기반에서 PC를 이용한 원격 제어 기술은 이미 상용화되어 사용되고 있지만 무선인터넷 기반에서는 전송속도 및 단말기의 메모리 용량의 한계로 인하여 아직 서비스가 구현되고 있지 않다.

따라서 본 발명은 향후 이러한 전송속도 및 메모리의 한계를 극복한다는 전제 하에 지금의 무선인터넷 전송기술 및 단말기 용량에 맞는 서비스를 구현하고자 한다.

발명이 이루고자하는 기술적 과제

본 발명은 상기한 바와 같이 무선인터넷을 이용할 수 있는 단말기를 이용해 사용자컴퓨터의 원격제어를 목적으로 하고 있기 때문에 우선 사용자컴퓨터가 항상 인터넷에 연결되어 있어야하며 서버에서는 사용자컴퓨터의 위치를 정확히 알고 있어야 명령을 수행할 수 있게 되는 것이다.

따라서 본 발명을 수행하기 위해 기본적으로 클라이언트/서버 프로그램과 개인휴대용 단말기에서의 인터페이스 프로그램으로 운영이 가능하다.

발명의 구성 및 작용

상기한 바와 같은 목적을 달성하기 위한 본 발명에 따른, 무선인터넷 기반에서 개인휴대용단말기를 사용자 컴퓨터의 터미널로 이용하여 원격 제어하여 사용할 수 있는 방법의 실시예는;

개인휴대용단말기(A-1)의 무선인터넷 서비스 기능을 이용해 서버(A-2)로 접속하는 단계; 서버(A-2)에서 회원DB를 통해 사용자 인증과 사용자컴퓨터(A-4)로의 접속단계; 및 사용자컴퓨터(A-4)에서의 명령수행 단계로 이루어진다.

본 발명의 일 실시예로서, 일반적으로 사용자컴퓨터는 고정된 장소에서 주로 업무를 처리하기 때문에 외부에서 사용자컴퓨터를 제어한다는 것은 불가능한 일이다. 하지만 휴대가 간편한 개인휴대용단말기를 이용해 사용자컴퓨터를 제어할 수 있다면 상당한 업무의 효율성 증대를 기대할 수 있다.

외부에서 이동 중에 급한 이메일 발송이나 중요한 파일의 다운로드, 게임 등을 개인휴대용단말기를 이용해 처리 할 수 있기 때문에 시간과 장소에 제약 없다.

본 발명은 다양하게 변형될 수 있고, 여러 가지 형태를 취할 수 있지만, 상기 발명의 특별한 실시 예에 대해서만 기술하였다. 하지만 본 발명은 명세서에서 언급된 특별한 형태로 한정되는 것이 아닌 것으로 이해되어야 한다.

발명의 효과

상기와 같이 구성된 본 발명은, 무선인터넷을 이용할 수 있는 모든 개인휴대용단말기를 이용하여 사용자가 지정해 놓은 온라인상의 모든 컴퓨터를 원격으로 제어할 수 있으므로 기존 개인휴대용단말기의 기능상의 한계성을 극복할수있어 업무 효율의 혁신을 가져올 수 있다.

(57)청구의 범위

청구항1

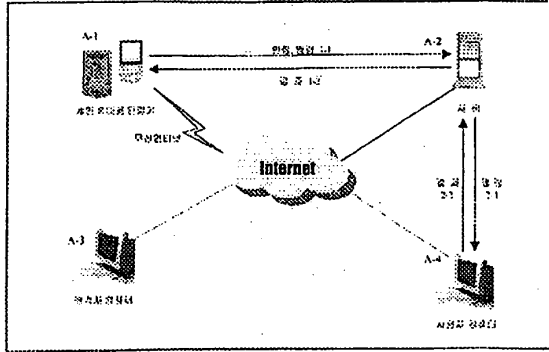
무선인터넷을 사용할 수 있는 개인휴대용단말기를 이용하여 웹기반에서 사용자가 지정한 사용자컴퓨터를 원격제어할 수 있는 방법

도면

도면2

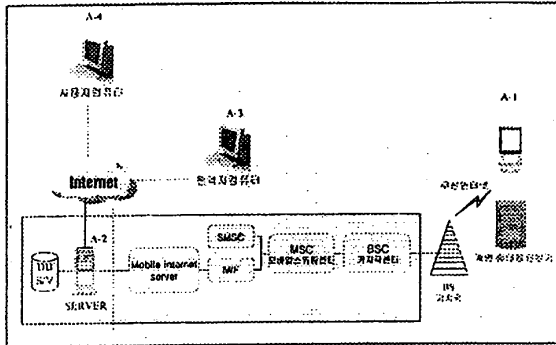
- 인터넷 접속 형태

무선인터넷 기법에서 개인휴대용단말기를 사용자 컴퓨터의 터미널로 이용하여 원격 제어하여 사용할 수 있는 구성도

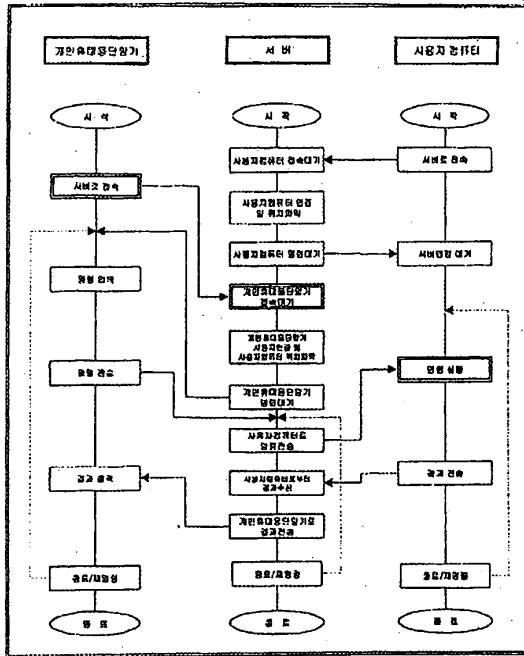


도면3

- 시스템 구성도



도면3



Electronic game loading method for mobile communication terminal

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Applicant: SIEMENS AG (DE)
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Application number: DE19961010840 19960319
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Abstract of DE19610840

The communication terminal requests electronic games from a control device and controls a dialog to select at least one game. The data associated with the game and/or the game program are transmitted from the control device to the communication terminal where they are stored. The control device is in the form of a service control unit for services in an intelligent network. The communication terminal is connected to the control device via a message switching centre of the mobile communication network. The game results are stored in the terminal or in a memory associated with the mobile communication terminal.

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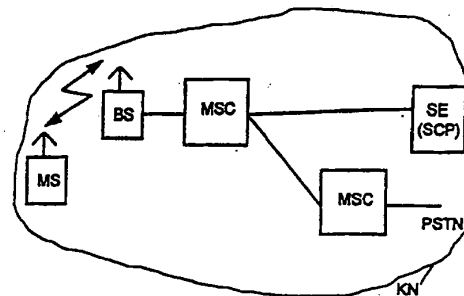
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54 Verfahren zum Laden von elektronischen Spielen auf ein mobiles Kommunikationsendgerät eines Mobil-Kommunikationsnetzes

57 Für ein mobiles Kommunikationsendgerät eines Mobil-Kommunikationsnetzes wird ein Verfahren zum Laden von elektronischen Spielen angegeben. Das Kommunikationsendgerät fragt bei einer Steuereinrichtung angebotene elektronische Spiele nach, worauf über einen vom Kommunikationsendgerät gesteuerten Dialog zumindest ein Spiel ausgewählt wird und daraufhin die dem Spiel zugeordneten Daten und/oder das Spielprogramm von der Steuereinrichtung zum Kommunikationsendgerät übertragen und dort gespeichert werden.



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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen
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9/27

Beschreibung

Die Erfindung betrifft ein Verfahren zum Laden von elektronischen Spielen auf ein mobiles Kommunikationsendgerät eines Mobil-Kommunikationsnetzes.

In Mobil-Kommunikationsnetzen, wie zum Beispiel dem GSM Mobilfunknetz (Global System for Mobile Communications), wird die Mobilität der Teilnehmer dadurch erreicht, daß mobile Kommunikationsendgeräte mit Basisstationen über eine Funkverbindung verbindbar sind. Diese Basisstationen sind üblicherweise drahtgebunden mit Vermittlungseinrichtungen verbunden, welche wiederum untereinander vernetzt sind bzw. einen Netzübergang zu einem Festnetz oder anderen Kommunikationsnetzen ermöglichen. Ein solches Mobilkommunikationsnetz ist beispielsweise aus M.Mouly, M.-B.Pautet, "The GSM System for Mobile Communications", 49, rue Louise Bruneau, F-91120 Palaiseau, Frankreich, 1992, S.231—237 bekannt. Zur Übertragung von Sprache und Daten stehen dabei über die Luftschnittstelle der Funkverbindung verschiedene Kanäle bereit. Zu diesen Kanälen gehören die Sprachkanäle zur Übertragung von Sprache und Steuerkanäle zur Übertragung von Signalisierungs- und sonstigen Informationen.

Die mobilen Kommunikationsendgeräte eines Mobilkommunikationsnetzes sind programmgesteuerte Endgeräte, die über Eingabe- und Ausgabeeinrichtungen und über zumindest eine Speicher- und Steuereinheit verfügen. Ein derartiges Kommunikationsendgerät ist in "Schnurloses Telefon Sinus 33", Telekom Unterrichtsblätter, Jg. 48, 10/1995, S. 560—571 für ein drahtloses Kommunikationsendgerät anschaulich vorgestellt. Ein weiteres bekanntes Kommunikationsendgerät für ein Mobilfunknetz ist das Siemens S4, siehe http://www.siemens.de/pn/product/our_rod/terminal/term3.htm vom 18.3.1996, S. 1—3.

Ein solches Kommunikationsendgerät verfügt über vielfältige Mittel zur Übertragung von Sprach- und Signalisierungsinformationen, sowie Daten.

Weiterhin ist es aus der Deutschen Offenlegungsschrift DE 41 36 065 A1 bekannt, ein tragbares, programmgesteuertes Gerät der Telekommunikationstechnik mit Spielfunktionen auszurüsten. Dazu weist dieses tragbare Gerät einen Betriebsarten-Wählschalter zur Umschaltung des Gerätes auf eine Betriebsart "Spiel" auf. Die vom Benutzer durch Tastenbetätigung eingebaren Signale werden mittels Programm- und Arbeitsspeicher sowie einer Anzeigevorrichtung in ein vom Benutzer gesteuertes elektronisches Spiel umgesetzt. Es ist dabei vorgesehen, einen Teil des Programmspeichers austauschbar zu gestalten, wodurch eine größere Anzahl von Spielprogrammen nutzbar ist. Der Austausch von Teilen des Programmspeichers erfordert jedoch mechanische Eingriffe in das Kommunikationsendgerät, die störend sind. Hinzu kommt, daß der Benutzer die austauschbaren Datenspeicher zur Hand haben muß, wenn er ein anderes als das geladene Spiel nutzen will.

Der Erfindung liegt die Aufgabe zugrunde, das Laden von elektronischen Spielen auf ein mobiles Kommunikationsendgerät zu vereinfachen. Diese Aufgabe wird durch das Verfahren nach Patentanspruch 1 gelöst. Vorteilhafte Weiterbildungen sind den Unteransprüchen zu entnehmen.

Erfindungsgemäß wird die Einbindung des mobilen Kommunikationsendgerätes in ein Mobil-Kommunikationsnetz genutzt, um elektronische Spiele zu laden. Dazu wird vom Kommunikationsendgerät mittels eines

über die Eingabeeinrichtung des Kommunikationsendgerätes gesteuerten Dialogs mit einer Steuereinrichtung zumindest ein Spiel ausgewählt und schließlich die dem Spiel zugeordneten Daten und/oder das Spielprogramm zum Kommunikationsendgerät übertragen und dort gespeichert.

Da das mobile Kommunikationsendgerät bereits über einen Funkteil verfügt und damit eine Funkverbindung zur Übertragung von Informationen aufbauen kann, ist kein zusätzlicher schaltungstechnischer Aufwand im mobilen Kommunikationsendgerät erforderlich. Mittel zur Durchführung der Spiele können dabei durch die vorhandenen Eingabe- bzw. Ausgabeeinrichtungen des Kommunikationsendgerätes bereits verwirklicht sein. Auch kann ein bereits im Kommunikationsendgerät vorhandener Speicher und die Steuereinheit für die Durchführung der Spiele genutzt werden. Die weitere Ausgestaltung der Mittel zur Durchführung der Spiele kann jedoch erforderlich sein, wenn ein höherer Spielkomfort, zum Beispiel durch den Anschluß zusätzlicher Eingabe- oder Ausgabeeinrichtungen erwünscht ist. Das Kommunikationsendgerät kann dabei Elemente z. B. eines Gameboys enthalten und eine Vielzahl zusätzlicher Spielfunktionen verwirklichen.

Das erfindungsgemäße Verfahren schafft die Möglichkeit, auf Steuereinrichtungen eine große Vielfalt von elektronischen Spielen anzubieten, die von jedem Kommunikationsendgerät abgefragt und genutzt werden können. Um innerhalb der Vielfalt der angebotenen elektronischen Spiele eine Auswahl zu treffen, ist ein Dialog vorgesehen. Während des Dialoges wird zum Beispiel entsprechend einer Menüführung ein Anzeigen von angebotenen elektronischen Spielen auf dem Kommunikationsendgerätes durchgeführt. Mit der Eingabeeinrichtung wird dieser Dialog im Sinne einer Auswahl gesteuert und letztlich eine Auswahl zumindest eines Spieles ausgeführt. Im einfachsten Fall besteht der Dialog durch Anwahl einer speziellen Rufnummer durch das mobile Kommunikationsendgerät, wodurch bei einer Steuereinrichtung ein vorbestimmtes Spiel abgerufen wird. Durch die Steuereinrichtung wird schließlich die Übertragung der ausgewählten elektronischen Spiele zum Kommunikationsendgerät veranlaßt.

Vorteilhafterweise wird zur Durchführung des Auswahldialogs und/oder zur Übertragung der Daten bzw. des Spielprogramms eines elektronischen Spiels eine Verbindung zwischen dem mobilen Kommunikationsendgerät und der Steuereinrichtung aufgebaut. Im Gegensatz zur verbindungslosen Übertragung können so größere Datenmengen schnell übertragen werden.

Gemäß einer weiteren vorteilhaften Ausgestaltung ist die Steuereinrichtung im Mobil-Kommunikationsnetz als eine Dienststeuerungseinheit für Dienste im Sinne eines intelligenten Netzes ausgestaltet. Über weitere Einrichtungen des Mobil-Kommunikationsnetzes, zum Beispiel Basisstationen und Vermittlungseinrichtungen, wird eine Verbindung zwischen Kommunikationsendgerät und Dienststeuerungseinheit aufgebaut. Dienststeuerungseinheiten dienen üblicherweise zur Unterstützung von zusätzlichen Diensten innerhalb eines intelligenten Netzes und können vorteilhafterweise auch für das Anbieten von elektronischen Spielen im Mobil-Kommunikationsnetz genutzt werden.

Alternativ ist es jedoch auch möglich, die Steuereinrichtung als eine separate Einrichtung auszugestalten, die durch eine direkte Verbindung mit dem mobilen Kommunikationsendgerät das Laden von elektronischen Spielen sicherstellt. Eine solche Steuereinrichtung

kann zum Beispiel eine Basisstation in einem Drahtlos-Kommunikationsnetz sein. Vorteilhafterweise erfolgt die Verbindung zwischen mobilen Kommunikationsendgerät und Steuereinrichtung derart, daß die funktions-technischen Ressourcen des Mobil-Kommunikationsnetzes nicht beeinträchtigt werden. Dies wird zum Beispiel dadurch erreicht, daß bei geringen Entfernungen zwischen Steuereinrichtung und Kommunikationsendgerät mit minimaler Leistung gesendet wird oder ungenutzte oder zusätzliche Kanäle für diese Übertragung genutzt werden.

Gemäß einer vorteilhaften Ausgestaltung des erfindungsgemäßen Verfahrens wird vom Kommunikationsendgerät zuerst eine Übersicht über die durch einen Serviceanbieter angebotenen Spiele angefordert. Der Serviceanbieter wird im Mobil-Kommunikationsnetz durch eine Steuereinrichtung repräsentiert. Daraufhin wird zwischen dem Serviceanbieter und dem Kommunikationsendgerät über eine auf der Ausgabebereinrichtung des Kommunikationsendgerätes dargestellte Menüführung zumindest ein Spiel ausgewählt. Dies kann durch ein oder mehrmaligen Meldungsaustausch erfolgen. Sind das oder die Spiele ausgewählt, wird durch den Serviceanbieter eine Aufforderung an die das oder die Spiele verwaltende Steuereinrichtung zur Übermittlung des Spiels ausgelöst. Der Serviceanbieter tritt hiermit als Mittler zwischen die die Spiele verwaltende Steuereinrichtung und das Kommunikationsendgerät und kann unter Umständen mehrere Steuereinrichtungen verwalten. Ein Serviceanbieter kann auch durch eine einzige Steuereinrichtung realisiert sein.

Die zum Meldungsaustausch bzw. zur Übermittlung der elektronischen Spiele ausgewählten Kanäle werden vorteilhafterweise aus den bereits vorhandenen Datenkanälen oder Sprachkanälen des Mobil-Kommunikationsnetzes ausgewählt. Für den Meldungsaustausch eignen sich insbesondere Kanäle mit niedrigerer Datenrate, wie zum Beispiel ein Kanal für einen Kurznachrichtenservice oder ein Steuerkanal. Für die Übertragung der elektronischen Spiele ist unter Umständen eine höhere Datenrate nötig, so können hier kodierte Signale in einem Sprach- oder Datenkanal genutzt werden.

Ein elektronisches Spiel kann in Spielprogramme und zugehörige Daten untergliedert sein. Hierzu können sich im Kommunikationsendgerät bereits gespeicherte Spielprogramme befinden und lediglich für ein weiteres elektronisches Spiel die zugehörigen Daten übermittelt werden.

Zur vorteilhaften Nutzung eines Kommunikationsendgerätes für eine Durchführung von elektronischen Spielen ist die Betriebsart des Kommunikationsendgerätes zwischen der Durchführung des Spieles und der Nutzung des Endgerätes zum Empfang und zum Senden von Informationen innerhalb des Mobil-Kommunikationsnetzes umschaltbar. Während der Betriebsart Spiel ist dabei ein Stand-by-Betrieb für ankommende Rufe im Mobilkommunikationsnetz vorgesehen. Der Teilnehmer ist dadurch auch während der Durchführung eines elektronischen Spieles für ankommende Anrufe erreichbar. Vorteilhafterweise wird bei einem ankommenden Ruf das Spiel unterbrochen und eine automatische Speicherung von Spielresultaten bewirkt. Das Speichern von Spielresultaten kann jedoch auch manuell über die Eingabebereinrichtung ausgelöst werden. Gemäß einer weiteren Ausgestaltung können die Spielresultate im Kommunikationsendgerät selbst oder in einer dem Mobil-Kommunikationsnetz zugehörigen Speichereinrich-

tung gespeichert werden. Beim Speichern innerhalb des Mobil-Kommunikationsnetzes werden dabei bekannte Mail-Box-Systeme genutzt.

Zur Gebührenabrechnung für das Laden der Spiele kann durch den Dienst-Anbieter eine Festlegung des Gebührentaktes der Verbindung zwischen Kommunikationsendgerät oder Steuereinrichtung vorgesehen sein. Alternativ kann jedoch eine separate Zahlungsaufforderung und Rechnungslegung erfolgen.

Unter Bezugnahme auf die Figuren wird nachfolgend das erfindungsgemäße Verfahren näher erläutert.

Dabei zeigen

Fig. 1 ein Mobil-Kommunikationsnetz,

Fig. 2 ein mobiles Kommunikationsendgerät, das über eine Funkverbindung mit einer Steuereinrichtung verbunden ist,

Fig. 3 den schematisierten Aufbau eines mobilen Kommunikationsendgerätes,

Fig. 4 den Meldungsaustausch zwischen mobilen Kommunikationsendgerät und Steuereinrichtung sowie die Übertragung der elektronischen Spiele, und

Fig. 5 den Meldungsaustausch zwischen mobilem Kommunikationsendgerät und Dienst-Anbieter bzw. Steuereinrichtung.

Das Mobil-Kommunikationsnetz KN nach Fig. 1 umfaßt zwei miteinander verbundene Vermittlungseinrichtungen MSC, wobei eine Vermittlungseinrichtung MSC den Netzübergang zu einem Festnetz PSTN gewährleistet und die andere Vermittlungseinrichtung MSC jeweils mit einer Steuereinrichtung SE und einer Basisstation BS verbunden ist. An die Basisstation BS und damit an die weiteren Einrichtungen des Mobil-Kommunikationsnetzes KN ist ein mobiles Kommunikationsendgerät MS über eine Luftschnittstelle anschließbar. Ein Mobil-Kommunikationsnetz KN verfügt über eine Vielzahl solcher Einrichtungen, von denen zur Erläuterung des erfindungsgemäßen Verfahrens nur eine Auswahl dargestellt wird.

Die Steuereinrichtung SE ist dabei als Dienststeuerungseinheit SCP ausgebildet. Eine solche Dienststeuerungseinrichtung SCP bietet dem Mobil-Kommunikationsnetz KN separat administrierbare zusätzliche Dienste an. Solche zusätzlichen Dienste, die unabhängig von den Basisdiensten des Mobil-Kommunikationsnetzes KN änderbar und gestaltbar sind, sind auch unter dem Begriff Dienste in einem intelligenten Kommunikationsnetz bekannt.

Eine alternative Variante für die Verbindung zwischen mobilem Kommunikationsendgerät MS und Steuereinrichtung SE ist in Fig. 2 dargestellt. Hier ist eine direkte Verbindung zwischen dem Kommunikationsendgerät MS und der Steuereinrichtung SE vorgesehen. Die Steuereinrichtung SE ist, um diese direkte Verbindung zu ermöglichen, wie eine Basisstation ausgestaltet oder einer Basisstation direkt zugeordnet. Zusätzlich zu den Funktionen einer Basisstation sind jedoch auch Signalisierungs-, Ermittlungs- und Speicherfunktionen vorgesehen. Die Steuereinrichtung SE kann dabei als eigenständige Einheit, die nur zur Bereitstellung von Programmen, zum Beispiel Spielprogrammen, ausgestaltet sein. Es ist jedoch auch möglich, die Steuereinrichtung SE wiederum mit einem Kommunikationsnetz, sei es einem Festnetz PSTN oder einem Mobilkommunikationsnetz KN zu verbinden.

Das schematisch dargestellte Mobil-Kommunikationsendgerät MS nach Fig. 3 enthält eine Antenneneinheit mit Sende- und Empfangseinrichtungen AE, eine Speicher- und Steuereinheit SSM, Ausgabebereinrich-

gen AM und Eingabeeinrichtungen EM. Die programmgesteuerte Speicher- und Steuereinheit SSM steuert die Funktionen des Kommunikationsendgerätes MS, d. h. die Empfangsbereitschaft des Kommunikationsendgerätes MS innerhalb des Mobil-Kommunikationsnetzes KN auch während der Nutzung des Kommunikationsendgerätes für elektronische Spiele. Die zur Realisierung des Funkteils und der Sprachcodierung bzw. Decodierung vorgesehenen Einrichtungen des Kommunikationsendgerätes sind nicht dargestellt.

Ein mobiles Kommunikationsendgerät MS stellt standardmäßig eine Ausgabeeinrichtung, zum Beispiel in Form einer LCD-Anzeige und einer Eingabeeinrichtung EM, zum Beispiel in Form einer Tastatur, bereit. Schon diese Einrichtungen genügen, um ein elektronisches Spiel für einen Teilnehmer auf dem Kommunikationsendgerät MS nutzbar zu machen. Diese Einrichtungen AM, EM dienen dabei auch für das elektronische Spiel als Benutzeroberfläche. Für einen höheren Komfort können jedoch zusätzliche Mittel zur Durchführung der Spiele im mobilen Kommunikationsendgerät verwirklicht sein. Diese Mittel können sowohl separate Speicherbereiche in der Speicher- und Steuereinheit SSM oder auch zusätzliche Ausgabeeinrichtungen AM bzw. Eingabeeinrichtungen EM sein. Gegebenenfalls sind diese zusätzlichen Einrichtungen EM, AM über Anschlußbuchsen an das Kommunikationsendgerät MS anschließbar.

Die Fig. 4 und 5 verdeutlichen den Meldungs- 30
tausch zwischen der Mobilstation MS und einer Dienststeuerungseinheit SCP, die als Steuereinrichtung SE im Sinne des erfindungsgemäßen Verfahrens betrieben wird. Beispielsweise gibt der Teilnehmer am mobilen Kommunikationsendgerät MS eine die Dienstvermittlungseinrichtung SCP kennzeichnende Rufnummer ein und eine Verbindungsanforderung ergeht über die Basisstation BS zur Vermittlungseinrichtung MSC, in deren Versorgungsbereich sich das Kommunikationsendgerät MS befindet. Die Vermittlungseinrichtung MSC 40
wertet die gewählte Rufnummer aus und veranlaßt den Verbindungsaufbau zur Dienstvermittlungseinrichtung SCP. Daraufhin findet ein Dialog zwischen der Dienststeuerungseinheit SCP und dem mobilen Kommunikationsendgerät MS statt. Dieser Dialog kann dabei über einzelne kodierte Meldungen in einem Sprachkanal erfolgen. In diesem Fall sind sowohl die Dienststeuerungseinheit SCP als auch das Kommunikationsendgerät MS mit entsprechenden Kodier- und Dekodiermitteln ausgestattet.

In einem alternativen Fall besteht zwischen mobilem 50
Kommunikationsendgerät MS und Dienststeuerungseinheit SCP keine aufgebaute Verbindung. Für den Dialog werden zum Beispiel Meldungen mit dem GSM Mobilfunksystem bekannten Kurznachrichtenservice (Short-Message-Service) oder anderen Meldungen in einem Steuerkanal benutzt. Eine zwischen mobilen Kommunikationsendgerät MS und Dienststeuerungseinheit SCP aufgebaute Verbindung kann jedoch auch nach dem Dialog für die anschließende Übertragung der Spielprogramme und/oder Daten aufgebaut werden. 60

Während des Dialoges zur Auswahl von elektronischen Spielen werden dem Teilnehmer von der Dienststeuerungseinheit SCP Spiele in Form eines Menüs oder einer Tabelle angeboten, ggf. ergänzt durch Angaben zum Preis und zur benötigten Speicherkapazität. Der Teilnehmer kann daraufhin über die Eingabemittel EM 65
des Kommunikationsendgerätes MS zumindest ein Spiel auswählen. Die zu diesem ausgewählten elektroni-

schem Spiel gehörigen Daten bzw. das Spielprogramm selbst werden daraufhin von der Dienststeuerungseinrichtung SCP zum Kommunikationsendgerät MS übertragen. Zur Übertragung der Daten und des Programmes wird die aufgebaute Verbindung genutzt oder es werden die Daten und das Programm über mehrere Nachrichten in Steuerkanälen oder über den Kurznachrichtenservice übertragen.

Nach Fig. 5 kann auch eine Trennung zwischen 10
Diensteanbieter SP für die elektronischen Spiele und der Dienststeuerungseinrichtung SCP vorgesehen sein. In diesem Fall erfolgt die Anfrage des Kommunikationsendgerätes MS bezüglich der elektronischen Spiele nicht direkt bei der die elektronischen Spiele bereithaltenden Steuerungseinrichtung SE, sondern beim Diensteanbieter SP. Der Diensteanbieter SP stellt im Kommunikationsnetz KN womöglich auf mehreren Dienstvermittlungseinrichtungen SCP elektronische Spiele zur Verfügung. Der Dialog zur Auswahl von Spielen findet nun zwischen dem mobilen Kommunikationsendgerät MS und dem Diensteanbieter SP statt. Ist ein Spiel ausgewählt worden, veranlaßt der Diensteanbieter SP durch eine Aufforderung zur Übertragung an eine Dienststeuerungseinheit SCP, die Daten bzw. das Programm zum mobilen Kommunikationsendgerät MS zu übertragen. Dazu wird von der Dienststeuerungseinheit SCP ein Nutzkanal zum mobilen Kommunikationsendgerät MS aufgebaut.

Patentansprüche

1. Verfahren zum Laden von elektronischen Spielen auf ein mobiles Kommunikationsendgerät (MS) eines Mobil-Kommunikationsnetzes (KN), wobei das Kommunikationsendgerät (MS)
 - zumindest eine Eingabeeinrichtung (EM), eine Ausgabeeinrichtung (AM), eine Speicher- und Steuereinheit (SSM), und Mittel (SM) zur Durchführung der Spiele aufweist,
 mit den folgenden Schritten:
 - über einen durch die Eingabeeinrichtung (EM) des Kommunikationsendgerätes (MS) gesteuerten Dialog mit einer Steuereinrichtung (SE) wird zumindest ein Spiel ausgewählt, und
 - das zumindest eine elektronische Spiel wird zum Kommunikationsendgerät (MS) übertragen und dort gespeichert.
2. Verfahren nach Anspruch 1, bei dem eine Verbindung zwischen dem Kommunikationsendgerät (MS) und der Steuereinrichtung (SE) zur Übertragung der Nachrichten des Auswahldialogs und/oder der Daten bzw. des Spielprogramms aufgebaut wird.
3. Verfahren nach Anspruch 1 oder 2, bei dem die Steuereinrichtung (SE) als eine Dienststeuerungseinheit (SCP) für Dienste im Sinne eines intelligenten Netzes ausgestaltet ist und das Kommunikationsendgerät (MS) die Verbindung zur Dienststeuerungseinheit (SCP) über weitere Einrichtungen (BS, MSC) des mobilen Kommunikationsnetzes (KN) aufbaut.
4. Verfahren nach Anspruch 1 oder 2, bei dem das Laden der Spiele von der Steuereinrichtung (SE) durch eine direkte Verbindung zwischen dem Kommunikationsendgerät (MS) und der Steuereinrichtung (SE) erfolgt.
5. Verfahren nach einem der vorhergehenden An-

sprüche, bei dem der Dialog zwischen dem Kommunikationsendgerät (MS) und der Steuereinrichtung (SE) derart ausgestaltet ist, daß vom Kommunikationsendgerät (MS) zuerst eine Übersicht über die durch einen Serviceanbieter (SP) angebotene Spiele angefordert wird, dann zwischen dem Serviceanbieter (SP) und dem Kommunikationsendgerät (MS) über eine auf der Ausgabeeinrichtung (AM) des Kommunikationsendgerätes (MS) dargestellte Menüführung zumindest ein Spiel durch zumindest einmaligen Meldungsaustausch ausgewählt wird, und durch den Serviceanbieter (SP) eine Aufforderung an die das oder die Spiele verwaltende Steuereinrichtung (SE) zur Übermittlung des Spiels erfolgt.

6. Verfahren nach einem der vorhergehenden Ansprüche, bei dem zum Meldungsaustausch zwischen dem Kommunikationsendgerät (MS) und dem Serviceanbieter bzw. der Steuereinrichtung (SE) ein Datenkanal, ein kodiertes Signal in einem Sprachkanal und/oder ein Kurznachrichtenservice verwendet wird.

7. Verfahren nach einem der vorhergehenden Ansprüche, bei dem im Kommunikationsendgerät (MS) mindestens eine Anschlußbuchse zum Anschluß zusätzlicher Ausgabeeinrichtungen (AM) und/oder Eingabeeinrichtungen (EM) vorgesehen ist.

8. Verfahren nach einem der vorhergehenden Ansprüche, bei dem mit Hilfe eines Auswahlmittels die Betriebsart des Kommunikationsendgerätes (MS) auf die Durchführung von elektronischen Spielen eingestellt werden kann, wobei eine Betriebsart Spiel mit Stand-by-Betrieb für ankommende Verbindungen im Mobil-Kommunikationsnetz (KN) vorgesehen ist.

9. Verfahren nach Anspruch 8, bei dem eine ankommende, ein Spiel unterbrechende Verbindungsaufbauanforderung ein Umschalten auf eine endgerätespezifische Betriebsart und ein Speichern von Spielresultaten bewirkt.

10. Verfahren nach Anspruch 8 oder 9, bei dem ein Speichern von Spielresultaten über die Eingabeeinrichtung (EM) ausgelöst wird.

11. Verfahren nach Anspruch 9 oder 10, bei dem die Spielresultate im Kommunikationsendgerät (MS) oder eine dem Mobil-Kommunikationsnetz (KN) zugehörigen Speichereinrichtung gespeichert werden.

12. Verfahren nach einem der vorhergehenden Ansprüche, bei dem das elektronische Spiel in Form von dem Spiel zugeordneten Daten und/oder durch ein Spielprogramm übertragen wird.

13. Verfahren nach einem der vorhergehenden Ansprüche, bei dem eine Abrechnung für das Laden der Spiele über die Festlegung eines Gebührentaktes der Verbindung zwischen Kommunikationsendgerät (MS) und Steuereinrichtung (SE) oder über eine separate Zahlungsaufforderung erfolgt.

Hierzu 3 Seite(n) Zeichnungen

60

65

Fig 1

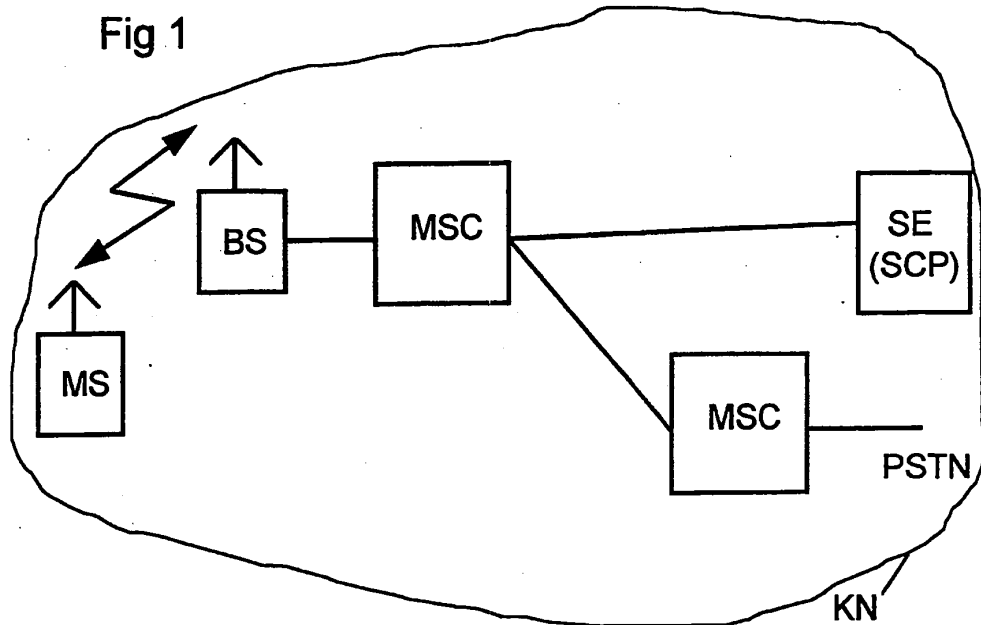


Fig 2

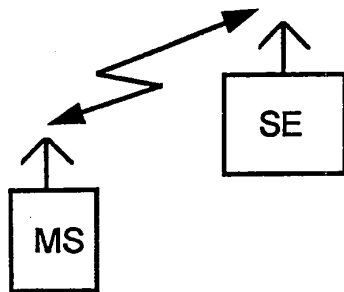


Fig 3

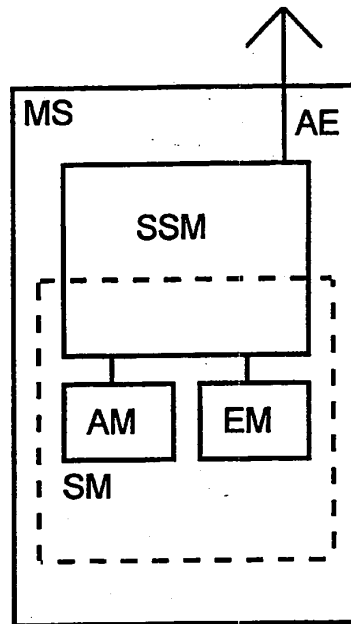


Fig 4

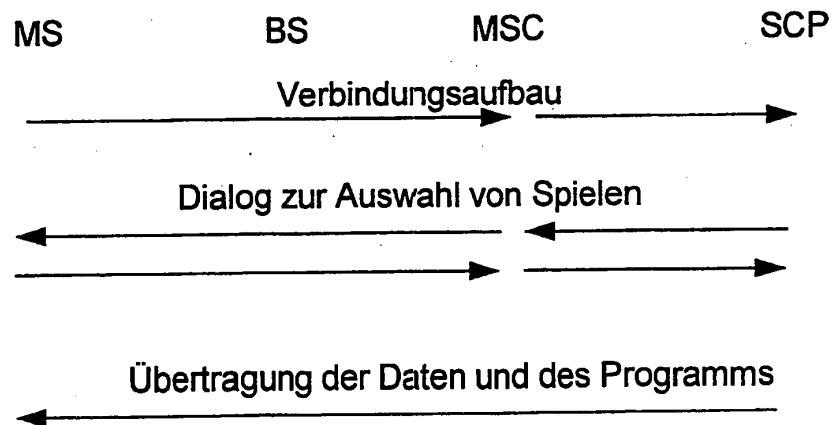
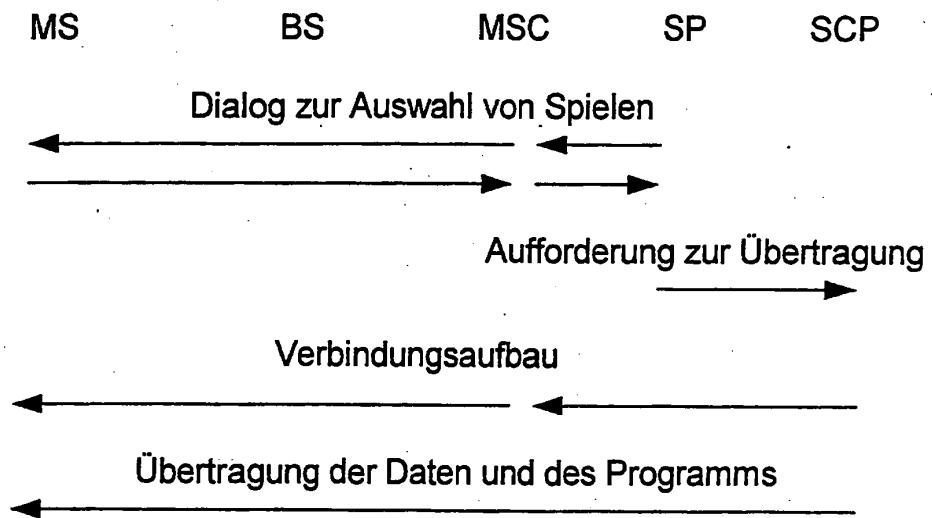


Fig 5



PATENT ABSTRACTS OF JAPAN

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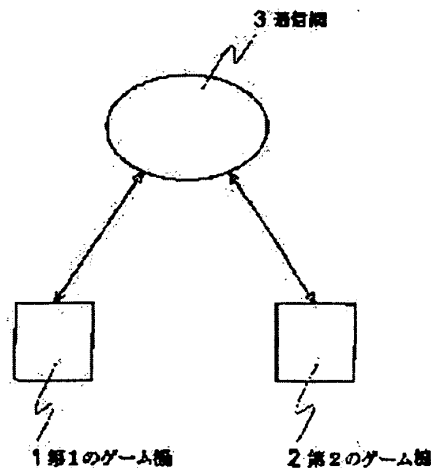
(72)Inventor : NAKANISHI HIROYUKI
MATSUYAMA MASAOKI
HAYASHI SHIGEKI

(54) COMMUNICATION TYPE GAME SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a communication type game system which allows a plurality of operators to carry out match type game.

SOLUTION: This communication type game system comprises a communication network 3, a first game machine 1 and a second game machine as a plurality of game machines which transmit or receive data through the communication network 3. The communication network 3 contains at least a digital wireless telephone network and the first game machine 1 and the second game machine 2 contain communication circuit establishing means, data display means, data input means and data processing means for match type games.



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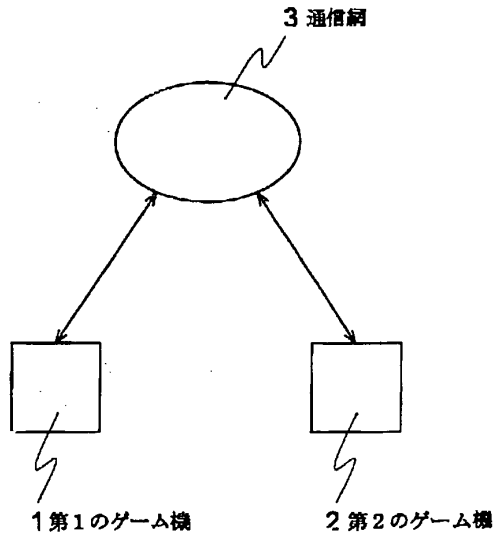
(74) 代理人 弁理士 朝日奈 宗太 (外1名)

(54) 【発明の名称】 通信式ゲームシステム

(57) 【要約】

【課題】 複数の操作者で1つの対戦型ゲームを行うことができる通信式ゲームシステムを提供する。

【解決手段】 通信網3と、該通信網3介してデータを送受信する複数のゲーム機である第1のゲーム機1および第2のゲーム機2とからなり、前記通信網3が少なくともデジタル無線電話網を含み、前記第1のゲーム機1および第2のゲーム機2が、通信回線確立手段と、データ表示手段と、データ入力手段と、対戦型ゲーム用データ処理手段とを含む。



【特許請求の範囲】

【請求項1】 通信網と、該通信網を介してデータを送受信する複数のゲーム機とからなり、前記通信網が少なくともデジタル無線電話網を含み、前記複数のゲーム機が、通信回線確立手段と、データ表示手段と、データ入力手段と、対戦型ゲーム用データ処理手段とを含む通信式ゲームシステム。

【請求項2】 前記ゲーム機がキャラクター作成手段を備えている請求項1記載の通信式ゲームシステム。

【請求項3】 前記キャラクター作成手段が、中央演算処理手段と、キャラクター作成用ソフトウェア記憶手段と、キャラクター記憶手段とからなる請求項2記載の通信式ゲームシステム。

【請求項4】 前記対戦型ゲーム用データ処理手段が、中央演算処理手段と、対戦型ゲーム用ソフトウェア記憶手段と、基本データ記憶手段と、ゲーム履歴記憶手段とからなる請求項1記載の通信式ゲームシステム。

【請求項5】 前記デジタル無線電話網が移動通信網であり、前記複数のゲーム機のうちの少なくとも1つが携帯電話システム端末機を含み、該携帯電話システム端末機が前記通信回線確立手段、前記データ表示手段および前記データ入力手段を備える請求項1記載の通信式ゲームシステム。

【請求項6】 前記デジタル無線電話網が簡易型携帯電話システム通信網であり、前記複数のゲーム機のうちの少なくとも1つが簡易型携帯電話システム端末機を含み、該簡易型携帯電話システム端末機が前記通信回線確立手段、前記データ表示手段および前記データ入力手段を備える請求項1記載の通信式ゲームシステム。

【請求項7】 前記通信網がさらにアナログ線路電話網を含み、前記複数のゲーム機のうちの少なくとも1つがアナログ方式の固定電話機およびゲーム用付属装置からなり、前記アナログ方式の固定電話機が前記通信回線確立手段であり、前記ゲーム用付属装置が前記データ表示手段、前記データ入力手段および前記対戦型ゲーム用データ処理手段を備え、前記アナログ方式の固定電話機およびゲーム用付属装置が、分配器を介してアナログ線路電話網に接続される請求項1記載の通信式ゲームシステム。

【請求項8】 通信網と、該通信網を介してデータを送受信する複数のゲーム機とからなり、前記通信網が少なくともデジタル無線電話網とプロバイダとを含み、前記複数のゲーム機が、通信回線確立手段と、データ表示手段と、データ入力手段と、対戦型ゲーム用データ処理手段とを含み、該対戦型ゲーム用データ処理手段が、中央演算処理手段と、基本データ記憶手段と、ゲーム履歴記憶手段とからなり、前記プロバイダが、複数のゲーム機のうちの1つのゲーム機と他の不特定のゲーム機とのあいだの通信回線を確立し、かつ、対戦型ゲーム用ソフトウェア記憶手段を含む通信式ゲームシステム。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、通信網を介して複数のゲーム機間で対戦型ゲームを行うための通信式ゲームシステムに関する。さらに詳しくは、携帯電話システム端末機または簡易型携帯電話システム端末機を含むゲーム機を用いて対戦型ゲームを行うことが可能な通信式ゲームシステムに関する。

【0002】

【従来の技術】通常、複数の操作者が1つの対戦型ゲームを行うには、1つのゲーム機本体にケーブルを介して接続された複数の操作者入力装置を用いて操作が行われている。そして、ゲームの進行は、ゲーム機本体に内蔵された、またはゲーム機本体に接続された1つの表示装置により確認する。一方、操作者入力装置および表示装置を内蔵した複数のゲーム機本体をケーブルを介して接続し、対戦型ゲームを行うばあいもある。

【0003】

【発明が解決しようとする課題】従来、複数の操作者が1つの対戦型ゲームを行うには、複数のゲーム機をケーブルを介して接続する必要がある。したがって、ゲーム機本体が置かれた場所に複数の操作者が移動する必要がある。その結果、地理的要因により操作者が移動不可能なばあいや移動に時間がかかるばあいは、ゲームができないばあいがある。

【0004】本発明はかかる問題を解決し、地理的要因により制約されることなく複数の操作者で1つの対戦型ゲームを行うことができる通信式ゲームシステムを提供することを目的とする。

【0005】

【課題を解決するための手段】本発明の通信式ゲームシステムは、通信網と、該通信網を介してデータを送受信する複数のゲーム機とからなり、前記通信網が少なくともデジタル無線電話網を含み、前記複数のゲーム機が、通信回線確立手段と、データ表示手段と、データ入力手段と、対戦型ゲーム用データ処理手段とを含むものである。

【0006】また、前記ゲーム機がキャラクター作成手段を備えているものである。

【0007】さらに、前記キャラクター作成手段が中央演算処理手段と、キャラクター作成用ソフトウェア記憶手段と、キャラクター記憶手段とからなるものである。

【0008】また、前記対戦型ゲーム用データ処理手段が、中央演算処理手段と、対戦型ゲーム用ソフトウェア記憶手段と、基本データ記憶手段と、ゲーム履歴記憶手段とからなるものである。

【0009】また、前記デジタル無線電話網が移動通信網であり、前記複数のゲーム機のうちの少なくとも1つが携帯電話システム端末機を含み、該携帯電話システム端末機が前記通信回線確立手段、前記データ表示手段

および前記データ入力手段を備えるものである。

【0010】また、前記デジタル無線電話網が簡易型携帯電話システム通信網であり、前記複数のゲーム機のうち少なくとも1つが簡易型携帯電話システム端末機を含み、該簡易型携帯電話システム端末機が前記通信回線確立手段、前記データ表示手段および前記データ入力手段を備えるものである。

【0011】また、前記通信網がさらにアナログ線路電話網を含み、前記複数のゲーム機のうち少なくとも1つがアナログ方式の固定電話機およびゲーム用付属装置からなり、前記アナログ方式の固定電話機が前記通信回線確立手段であり、前記ゲーム用付属装置が前記データ表示手段、前記データ入力手段および前記対戦型ゲーム用データ処理手段を備え、前記アナログ方式の固定電話機およびゲーム用付属装置が、分配器を介してアナログ線路電話網に接続されるものである。

【0012】本発明の通信式ゲームシステムは、通信網と、該通信網を介してデータを送受信する複数のゲーム機とからなり、前記通信網が少なくともデジタル無線電話網とプロバイダとを含み、前記複数のゲーム機が、通信回線確立手段と、データ表示手段と、データ入力手段と、対戦型ゲーム用データ処理手段とを含み、該対戦型ゲーム用データ処理手段が、中央演算処理手段と、基本データ記憶手段と、ゲーム履歴記憶手段とからなり、前記プロバイダが、複数のゲーム機のうち1つのゲーム機と他の不特定のゲーム機とのあいだの通信回線を確立し、かつ、対戦型ゲーム用ソフトウェア記憶手段を含むものである。

【0013】

【発明の実施の形態】つぎに、本発明の通信式ゲームシステムの実施の形態について説明する。

【0014】実施の形態1. 図面を参照しつつ、本発明の通信式ゲームシステムの実施の形態1について説明する。図1は、本発明の通信式ゲームシステムの実施の形態1を示す説明図である。図1において、1は第1のゲーム機、2は第2のゲーム機、3は通信網を示す。第1のゲーム機1および第2のゲーム機2は通信網3を介して相互接続される。

【0015】第1のゲーム機1および第2のゲーム機2はそれぞれ通信回線確立手段と、データ表示手段と、データ入力手段と、対戦型ゲーム用データ処理手段とを含む。前記通信回線確立手段が、たとえば、日本電信電話(株)通信網(以下、「NTT通信網」という)におけるパーソナルハンディホンシステム端末機(以下、「PHS端末機」という)などの簡易型携帯電話システム端末機により実現されるばあい、データ表示手段はPHS端末機に内蔵された表示装置であり、データ入力手段はPHS端末機に内蔵されたキーボードである。さらに、通信網3は簡易型携帯電話システム通信網であるPHS通信網である。

【0016】さらに、第1のゲーム機1および第2のゲーム機2は、それぞれ対戦型ゲーム用データ処理手段たる対戦型ゲーム用データ処理装置を備えている。該対戦型ゲーム用データ処理装置(以下、単に「ゲーム用データ処理装置」という)は、たとえば、中央演算処理手段たるCPUと、対戦型ゲーム用ソフトウェア記憶手段たるROMと、基本データ記憶手段たる第1のRAMと、ゲーム履歴記憶手段たる第2のRAMとからなる。図2は、図1の第1のゲーム機の一例を示す説明図である。図2において、1aはPHS端末機、1bはゲーム用データ処理装置、11aはCPU、11bはROM、11cは第1のRAM、11dは第2のRAMを示す。なお、ROM11bを対戦型ゲーム用ソフトウェア記憶手段および基本データ記憶手段として用いてもよい。このばあい、第1のRAM11cを設ける必要はない。

【0017】PHS端末機1aは、通信網を介してゲーム機間の通信回線を確立し、データを送受信を行う。CPU11aはPHS端末機1aに接続される。CPU11aは、PHS端末機1aからのデータを受信したり、ROM11b、第1のRAM11cおよび第2のRAM11dから必要なデータを読み出して所定の処理を行ったのちPHS端末機1aに処理後のデータを送信したり、第1のRAM11cおよび第2のRAM11dにデータを書き込んだりする。また、第1のRAM11cに記憶された基本データは、たとえば操作者の氏名、年齢および性別ならびに操作者から対戦者へのメッセージなどを含む。なお、基本データは、操作者がゲーム機にあらかじめ入力したものであり常に変更可能である。

【0018】つぎに、本発明の通信式ゲームシステムを用いて対戦型ゲームを行う方法を、数字当てゲームを対戦型ゲームの一例として説明する。

【0019】まず、2つのゲーム機のうちたとえば第1のゲーム機の操作者(以下、単に「第1の操作者」ともいう)が、2つのPHS端末機間で通信回線を確立するために通常行われる操作を行い、2つのゲーム機間の通信回線を確立する。前記通常行われる操作の一例としては、第2のゲーム機の呼出し番号をキーボードなどを用いてPHS端末機に入力し、通信網に向けて送信するという操作がある。ついで、第1の操作者および第2のゲーム機の操作者(以下、単に「第2の操作者」ともいう)は、キーボードに含まれるファンクションキーを用いて、ゲーム用データ処理装置を起動させる。

【0020】本明細書においては、ゲーム機がPHS端末機を用いて通常行われる音声の送受信のみを行っている状態を「通信モード」といい、ゲーム機のゲーム用データ処理装置を起動させた状態を「ゲームモード」という。両操作者がゲーム機を通信モードからゲームモードに切り替えるとき、第1の操作者が第2の操作者に対戦型ゲームを行いたいという意思を画面表示または音声の送受信により伝え、第2の操作者から同意がえられた時

点で、ゲーム用データ処理装置を起動させてもよい。また、2つのゲーム機間の通信回線が確立した時点で第1の操作者が第1のゲーム機をゲームモードに切り替え、第1のゲーム機がゲームモードに切り替えられていることを示すデータを第2のゲーム機が受信することにより、第2の操作者が第1のゲーム機がゲームモードに切り替えられていること知り、第2のゲーム機をゲームモードに切り替えてもよい。

【0021】前記第1のゲーム機および第2のゲーム機がゲームモードに切り替えられたとき、ゲームを進める際に親装置となるゲーム機が第1のゲーム機および第2のゲーム機から自動的に選択される。たとえば、2つのゲーム機間で通信回線を確立するために必要とされる操作を行ったゲーム機が親装置となるように設定できる。かかる設定にしたがったばあい、本実施の形態では第1のゲーム機が親装置となる。さらに、第1のゲーム機および第2のゲーム機がゲームモードに切り替えられたとき、自動的に第1のゲーム機に入力された基本データが第2のゲーム機に送信され、第2のゲーム機に入力された基本データが第1のゲーム機に送信される。

【0022】第1の操作者は、PHS端末機に内蔵されたキーボードを用いて、親装置である第1のゲーム機のROMに記憶されている複数のゲームから所望のゲームを選択したり、必要に応じてゲームに関する条件設定を行う。このとき、PHS端末機に内蔵された液晶表示装置などの表示装置がゲーム用データ処理装置の表示装置の役割を果たす。前記条件設定の例としては、当てる数字の個数および数字の桁数がある。また、第1のゲーム機は、ゲームの選択や条件設定などゲーム開始までの過程を示すデータを第2のゲーム機に常に送る。第2の操作者は第2のゲーム機の表示装置によって、ゲーム開始までの過程を確認できる。

【0023】ゲーム開始とともに、表示装置の表示にしたがって、第1の操作者および第2の操作者はキーボードを利用して所望の数字を入力する。第2の操作者が所望の数字を入力すると、ただちに第2の操作者が入力した数字を示すデータが第1のゲーム機に送られる。第1のゲーム機のゲーム用データ処理装置は、該ゲーム用データ処理装置内でランダムに選択された数字と、第1の操作者および第2の操作者が入力した数字とをそれぞれ比較する。前記ランダムに選択された数字と同じ数字を入力した操作者の表示装置には勝ちを示す画像またはメッセージが表示され、前記ランダムに選択された数字と異なる数字を入力した操作者の表示装置には負けを示す画像またはメッセージが表示される。同時に、第1のゲーム機および第2のゲーム機の各ゲーム用データ処理装置の第2のRAMに、ゲームを行った日時、対戦相手の基本データおよび勝敗などのゲーム履歴が記憶される。

【0024】たとえば、第1のゲーム機のゲーム用データ処理装置内でランダムに選択された数字が「7」であ

り、第1の操作者の入力した数字が「7」であり、第2の操作者の入力した数字が「1」であればあい、第1の操作者が勝者となり、第2の操作者が敗者となる。また、ゲーム中、対戦相手の入力した数字および勝敗も同時に表示装置に表示してもよい。

【0025】ゲームが一回戦終了するごとに、ゲームを継続するか否かを第1の操作者および第2の操作者に確認する。また、親装置を操作する第1の操作者のみに確認してもよい。ゲームを終了するばあい、第1の操作者および第2の操作者がそれぞれのゲーム機をゲームモードから通信モードに切り替えればよい。該切り替えは、キーボードに含まれるファンクションキーを用いて行われる。

【0026】最後に、ゲーム機間の通信回線を切るために、通常のPHS端末機と同様にキーボードに含まれる通信回線を切るための所定の操作キーを押す。なお、ゲーム機をゲームモードから通信モードに切り替えた後、PHS端末機を用いて第1の操作者および第2の操作者間で音声による通信を行ってもよい。このばあい、音声による通信を行いたいという意思を、画面表示または音声の送受信により、第1の操作者（または第2の操作者）が第2の操作者（または第1の操作者）に伝えればよい。

【0027】本実施の形態では、データ表示手段およびデータ入力手段としてPHS端末機に内蔵された表示装置およびキーボードを使用している。しかし、ゲーム機に所定の端子を設け、該端子に、データ表示手段として、たとえばカラー表示または白黒表示の液晶表示装置を接続し、該液晶表示装置に、データ入力手段として、操作ボタンを設けてもよい。ゲーム用に前記液晶表示装置を接続することによって、より円滑に操作ができ、また、より大きな画面でゲームの経過を確認することができる。

【0028】また、ゲーム用データ処理装置内のROMを交換することにより利用できるゲームの種類を変えることができる。さらに、ROMの容量が十分に確保できるばあいは、ROMを交換することなく、通信網およびPHS端末機を介して新たなゲーム用ソフトウェアをROMに記憶させることができ、既に記憶されているゲーム用ソフトウェアの一部を修正することもできる。

【0029】また、ゲーム中に2つのゲーム機間の通信回線がとぎれたばあい、所定の時間内に再び通信回線を確立できなければ、ゲームが中断されて該ゲームに関する情報は自動的に消去される。

【0030】本発明の通信式ゲームシステムは、PHS端末機をそれぞれ含む2つのゲーム機を用いて、PHSネットワークを介して対戦型ゲームを行うので、地理的要因により制約されることなく対戦型ゲームを行うことができる。

【0031】実施の形態2. つぎに、本発明の通信式ゲ

ームシステムの実施の形態2について説明する。

【0032】前述の実施の形態1では、通信回線確立手段がPHS端末機により実現されているが、携帯電話システム端末機（以下、単に「携帯端末機」ともいう）を用いてもよい。かかるばあい、通信網として移動通信網が利用される。さらに、2つのゲーム機のうち、一方のゲーム機の通信回線確立手段をPHS端末機により実現し、他方のゲーム機の通信回線確立手段を携帯端末機により実現してもよい。かかるばあい、通信網としてPHS通信網および移動通信網が利用される。

【0033】また、2つのゲーム機のうち、一方のゲーム機の通信回線確立手段を携帯端末機またはPHS端末機により実現し、他方のゲーム機の通信回線確立手段を、たとえばNTT通信網における一般加入電話機などの固定電話機により実現してもよい。図3は、本発明の通信式ゲームシステムの実施の形態2におけるゲーム機の一例を示す説明図である。図3において、4aは一般加入電話機、4bはゲーム用付属装置、4cは分配器、14aはCPU、14bはROM、14cは第1のRAM、14dは第2のRAM、14eはデータ表示手段たる表示装置、14fはデータ入力手段たる入力装置を示す。前記表示装置はたとえばカラー表示または黒白表示の液晶表示装置であり、前記入力装置はたとえば操作ボタンである。一般加入電話機4aを用いるばあい、ゲーム機は、分配器4cと、該分配器の一方の端子に接続された固定電話機である一般加入電話機4aと、前記分配器の他方の端子に接続された対戦型ゲーム用付属装置4bとからなる。

【0034】分配器4cは、受信したデータを一般加入電話機4aに転送すべきデータと対戦型ゲーム用付属装置4bに転送すべきデータとに分ける。また、対戦型ゲーム用付属装置4bから送信されたデータは分配器4cを介して一般加入電話機4a用の回線に入力される。分配器4cは、ゲーム中に第3者から電話がかかってきたときに、ゲームを一端中断し第3者と通話できる機能を備えていてもよい。かかるばあい、分配器4cは、第3者から電話がかかっていることを音または光などによって知らせる手段と、第3者との通信回線を確立するための切替えスイッチとを含む。

【0035】本実施の形態において、2つのゲーム機間の通信回線を確立するには、通常、携帯端末機と一般加入電話機とのあいだで通信回線を確立するために必要とされる操作、たとえば携帯端末機または一般加入電話機の呼出し番号をキーボードなどを用いて入力し通信網に向けて送信するという操作を行えばよい。

【0036】前記対戦型ゲーム用端末機4bは、さらに携帯端末機またはPHS端末機と同様の機能を備えていてもよい。かかるばあい、屋内では一般加入電話機用の回線を利用し、一般加入電話機が無い場所または屋外では、実施の形態1に示されるようにPHS端末機により

通信回線確立手段が実現されているゲーム機と同様に使用してもよい。

【0037】実施の形態3. つぎに、本発明の通信式ゲームシステムの実施の形態3について説明する。

【0038】前述の実施の形態1では、第1の操作者が、2つのPHS端末機間で通信回線を確立するために必要とされる操作を行い、特定の相手のゲーム機と通信回線を確立している。本実施の形態では、不特定の相手と対戦するばあいの通信式ゲームシステムについて説明する。

【0039】図4は、本発明の通信式ゲームシステムの実施の形態3を示す説明図である。図4において、図1と同一の箇所は同じ符号を用いて示す。また、3aは通信網3に含まれるプロバイダを示す。該プロバイダとは、あらかじめプロバイダに登録された複数の端末機のうちの1つの端末機と他の不特定の端末機とのあいだで通信回線を確立しうるものをいう。たとえば、インターネットなどでも、特定のプロバイダに接続することによりより速く、より安く（通信費）目的の情報をえるための中継点であるばあいを使用される。

【0040】第1の操作者が不特定の相手と対戦するばあいは、まず、プロバイダ3aに不特定の相手との対戦を望んでいることを示す信号を送る。該信号を受信するとプロバイダ3a中のすべての通信回線が検索され、他に不特定の相手との対戦を望んでいる操作者がいないかを調べる。もし、いないばあいは、他の操作者がプロバイダ3aに不特定の相手との対戦を望んでいることを示す信号を送るまで第1のゲーム機は待機状態になる。このとき、プロバイダ3a中の1つの通信回線が待機状態になる。もし、いるばあいは、プロバイダ3aを介して第1のゲーム機と、他の操作者のゲーム機、すなわち第2のゲーム機とのあいだで通信回線が確立される。

【0041】通信回線が確立されたとき、ゲームを進める際に親装置となるゲーム機が第1のゲーム機1および第2のゲーム機2から自動的に選択される。本実施の形態においては、たとえば、2つのゲーム機間に通信回線が確立された時点でデータの送受信の感度が良い方を親機とする。

【0042】さらに、プロバイダ3aに信号を送るときに、操作者が選択したゲームを示す信号も同時に送り、互いに異なるゲームを選択した操作者のゲーム機間では通信回線を確立できないようにしてもよい。

【0043】本実施の形態においては、1つの端末機と他の不特定の端末機とのあいだで通信回線を確立するものとしてプロバイダを用いている。しかし、プロバイダに対戦型ゲーム用ソフトウェア記憶手段をさらに設けてもよい。このばあい、端末機に対戦型ゲーム用ソフトウェア記憶手段を設ける必要はなく、端末機がプロバイダに登録されていればよい。プロバイダは1つの端末機と他の不特定の端末機とのあいだで通信回線を確立するも

のとして機能するとともに、親装置としての役割も果たす。ゲームモードのとき、すべての端末機は単にゲームを進行するためのデータ表示手段、ゲーム入力手段、基本データ記憶手段およびゲーム履歴記憶手段として機能する。

【0044】本実施の形態においては、通信網中にプロバイダを設けることにより、不特定の相手との対戦を実現している。しかし、通信網を介さずに、本発明の通信式ゲームシステム専用の中継所を設け、該中継所を介して2つのゲーム機間の通信回線を確立してもよい。かかるばあい、操作者は中継所にゲーム機を登録しておく必要がある。

【0045】本実施の形態によれば、地理的要因により制約されることなく不特定の相手と対戦型ゲームを行うことができる。

【0046】実施の形態4. つぎに、本発明の通信式ゲームシステムの実施の形態4について説明する。図5は、図5において、図2と同一の箇所は同じ符号を用いて示す。また、5はキャラクター作成手段、15aはキャラクター作成用ソフトウェア記憶手段であるROM（以下、単に「キャラクターROM」という）、15bは作成されたキャラクターを記憶する手段であるRAM（以下、単に「キャラクターRAM」という）を示す。また、キャラクター作成手段5は中央演算処理手段も含んでおり、本実施の形態においては、ゲーム用データ処理装置1bのCPU11aが、キャラクター作成手段5の中央演算処理手段としての機能も備えているものとする。前記キャラクターとは、ゲームを行う際にゲームの進行状態または勝敗を示すゲームの登場人物（たとえば、概略的に示されたヒト、動物または物品）をいう。本実施の形態において、ゲーム機はキャラクター作成手段を備えている。該キャラクター作成手段により、操作者は所望の容姿のキャラクターを作成することができる。また、キャラクターROMにあらかじめ記憶されたキャラクターに関するデータに対して、操作者がさまざまな条件を付加してキャラクターの容姿などを変化させて所望の容姿のキャラクターを作成することもできる。キャラクターに付加される条件の例としては、キャラクターの性別、年齢、形状的特徴および色などがある。作成されたキャラクターは、キャラクターRAMに記憶される。

【0047】ゲーム機がキャラクター作成機能を備えているばあい、操作者がゲームに負けたとき、キャラクターに関するデータが自動的に対戦者に送信され対戦者のゲーム機内のキャラクターRAMに記憶され、ゲームに負けた操作者のキャラクターRAMから該キャラクターに関するデータが自動的に消去される。もし、キャラクターRAMに複数のキャラクターが記憶されているばあいは、負けたときに対戦者に送信されるキャラクターをあらかじめ選定しておくことができる。

【0048】また、操作者が作成したキャラクターをゲームに登場させることもできる。かかるばあい、キャラクターに対して操作者がさまざまな条件を付加するとき、対戦時に有利となる特徴をキャラクターにもたせることができる。たとえば、画面上でキャラクターに走るという動作をさせることにより、走ることの得意なキャラクターを作成することができる。また、画面上でキャラクターに物を運ぶという動作をさせることにより、力の強いキャラクターを作成することができる。

【0049】前述のようにして作成したキャラクターを対戦型ゲームに登場させることができる。該対戦型ゲームの例としては、たとえば画面上でキャラクターにスポーツ競技を行わせ、獲得点数により勝敗を決定するようなゲームがある。さらに、勝敗が決定した時点で、敗者側のキャラクターが勝者に景品として転送されてもよい。すなわち、敗者側のキャラクターに関するデータが自動的に勝者のゲーム機に転送され、勝者側のキャラクターRAMに記憶され、敗者側のキャラクターRAMからキャラクターに関するデータが自動的に消去される。

【0050】前述の実施の形態1～4では、2つのゲーム機間で通信回線を確立しているが、ゲーム機の数はず2つに限定されるものではなく、3つ以上のゲーム機間で通信回線を確立し、3人以上の操作者で1つのゲームを行ってもよい。

【0051】

【発明の効果】本発明によれば、通信網を介して対戦型ゲームを行うことができる。したがって、地理的要因により制約されることなく複数の操作者で1つの対戦型ゲームを行うことができる。

【図面の簡単な説明】

【図1】本発明の通信式ゲームシステムの実施の形態1を示す説明図である。

【図2】図1の第1のゲーム機の一例を示す説明図である。

【図3】本発明の通信式ゲームシステムの実施の形態2におけるゲーム機の一例を示す説明図である。

【図4】本発明の通信式ゲームシステムの実施の形態3を示す説明図である。

【図5】本発明の通信式ゲームシステムの実施の形態4におけるゲーム機の一例を示す説明図である。

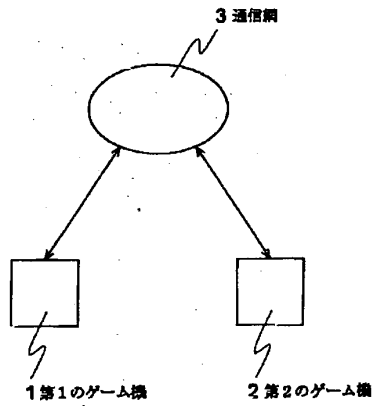
【符号の説明】

- 1 第1のゲーム機
- 1a PHS端末機
- 1b ゲーム用データ処理装置
- 2 第2のゲーム機
- 3 通信網
- 3a プロバイダ
- 4a 一般加入電話機
- 4b ゲーム用付属装置
- 4c 分配器

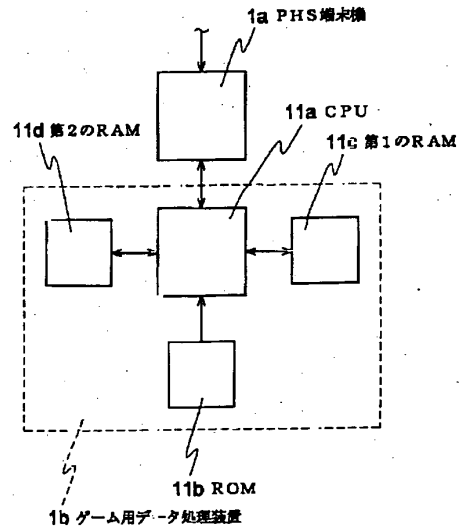
- 5 キャラクター作成手段
- 11a、14a CPU
- 11b、14b ROM
- 11c、14c 第1のRAM
- 11d、14d 第2のRAM

- 14e 表示装置
- 14f 入力装置
- 15a キャラクターROM
- 15b キャラクターRAM

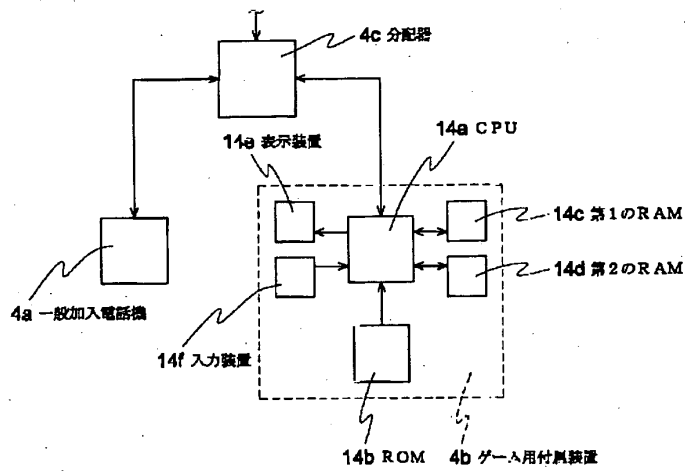
【図1】



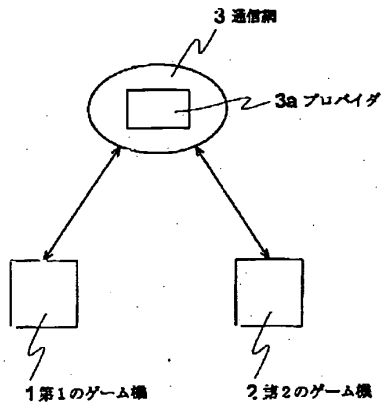
【図2】



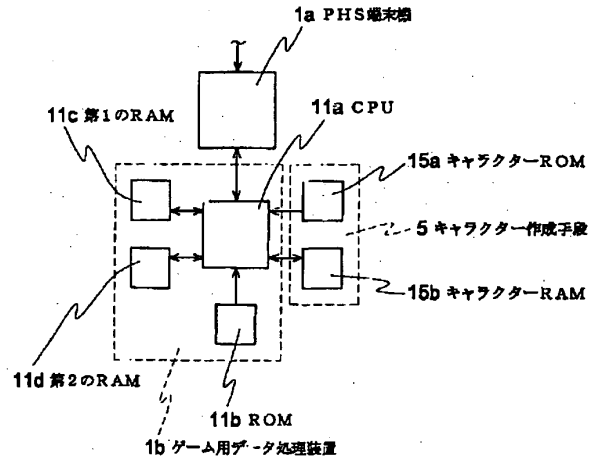
【図3】



【図4】



【図5】



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(54) METHOD TO PLAY GAME OPPOSING AND COOPERATING THROUGH MOBILE COMMUNICATION DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To enable to utilize a mobile telephone and PHS, by composing a mobile telephone and PHS to play a game by two or more persons.

SOLUTION: A game mechanism is composed into a mobile telephone such as a 1.56GHz portable phone and PHS to enable two or more persons to oppose and to cooperate to play a game such as soccer, base ball, Tetris, Go, Shogi (Japanese chess), Othello, etc. When the transceiver function of a PHS is used, a game can be played free of charge if the distance is short. If a service center is provided and a method to introduce an opposing person of cooperating person is established, one can enjoy a game with a person in a wide range. Further, if each telephone number is enabled to be exchanged by judgement of the person concerned, one can make friends with an opposing person.

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H 0 4 B	7/26	H 0 4 B	7/26 E

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(54)【発明の名称】 移動体通信装置を通して、対戦・協力してゲームをする方法

(57)【要約】

【課題】これまでの不便を解決する課題ではなく、この方法によってもっとよりよい娯楽ができるという意味で課題は移動体にて、ゲームを、二人以上の人数で、対戦、協力、もしくは、点数をかけることである。

【解決手段】移動体電話、PHSなどを利用して、無線にて、ゲームの対戦、協力等を行う。

【特許請求の範囲】

【請求項1】 二人以上の人が、移動体電話、PHSを利用して、対戦、協力してゲームをする方法

【請求項2】 移動体電話、PHSにゲーム機を接続してゲームをする請求項1の方法

【請求項3】 移動体電話、PHSの製造時に、上記機能を組み込んだ請求項1の方法

【請求項4】 ゲームの参加相手をつのり、応答連絡して、参加できるようにする請求項1の方法

【発明の詳細な説明】

今、みしらぬ人と、ゲームで対戦し腕くらべをすることが続行している。そこで、普及している移動体電話を用い、2人以上の人が、対戦、協力してゲームをするのが

本発明である。せっかく、1.56Hzの携帯電話、PHSが出ているのだから、それに利用しないとったいない。一人で、時間があいているとき、いっしょに、サッカー、野球、テトリス、囲碁、将棋、オセロなどのゲームを、移動体電話、PHSを通して、対戦するのである。PHSのトランシーバー機能を使えば近距離なら無料でできる。それにPHSは電池の持続時間が長い。さらに、対戦相手、協力相手のサービスセンターを作り、少し持っていれば、紹介できる方法をつくれればおもしろい。しかも、ゲーム後、当時者の判断により電話番号通知ができれば、友達になれる。また、競馬、ブラックジャック、ポーカーなど、メダルゲームにされているものも、点数によってかけるようにすることもできる。

PATENT ABSTRACTS OF JAPAN

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A63F 9/22

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(71)Applicant : TAITO CORP

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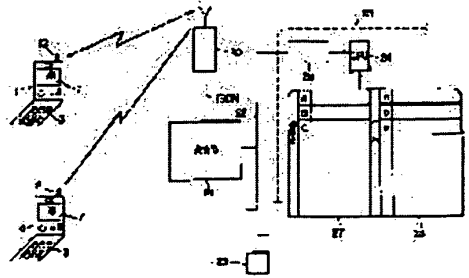
(72)Inventor : IZUTA SHINGO

(54) MOBILE COMMUNICATION TERMINAL CAPABLE OF PLAYING GAME

(57)Abstract:

PROBLEM TO BE SOLVED: To allow the portable terminal to utilize lots of kinds of games by down-loading game software by communication without carrying the software at all times.

SOLUTION: A database station 25 is provided with a database corresponding to mobile communication terminals and a mobile communication network. The mobile communication terminal 1 provided with an operation key 3, a read/write memory and a display section 7 is connected to a telephone exchange station 21 via a radio base station 20 and makes communication with a subscriber telephone set 23 by means of radio communication and makes data communication with the database station 25. The database station 25 stores pluralities of game software sets and the mobile communication terminal 1 is provided with a read only memory in which a program to control the operation key 3 corresponding to each game is stored, in advance. The mobile communication terminal 1 accesses the database station 25 by way of the base station 20 by means of a radio wave and down-loads a specific game software and stores it in the read/write memory. The user of the mobile communication terminal 1 plays the game by operating the operation key 3 and observing the game display on the display section 7.



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			H

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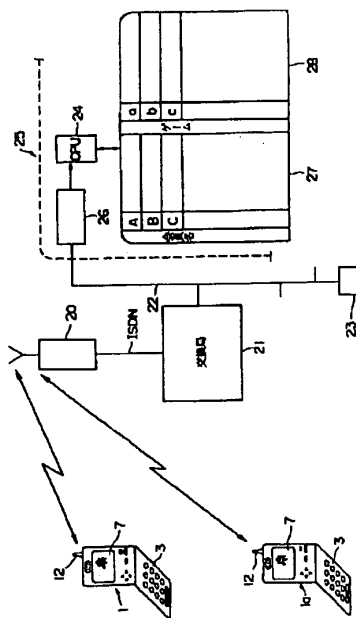
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 式会社タイトー内
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(54) 【発明の名称】 ゲーム動作が可能な移動体通信端末

(57) 【要約】

【課題】 ゲームソフトを常時携帯しなくても、通信によりダウンロードすれば多種類のゲームを携帯用端末上で利用できるようにする。

【解決手段】 移動体通信端末及び移動体通信ネットワークに対応したデータベースを発展させる。無線通信により無線基地局を介して電話交換局に接続し、加入電話機と通話するとともにデータベース局との間で通信可能であって、操作キーと読み書きメモリと表示部とを備えた移動体通信端末を利用する。前記データベース局に複数のゲームソフトを蓄積して、移動体通信端末にはゲームに対応して操作キーを制御するプログラムを予め記憶する読み出し専用メモリを備える。移動体通信端末から電波により基地局を介してデータベース局をアクセスし、そこから特定のゲームソフトを受信して読み書きメモリに格納する。操作キーを操作してゲームソフトを表示部上に展開してゲームを実行する。



【特許請求の範囲】

【請求項1】 無線通信により無線基地局を介して電話交換局に接続し、加入電話機と通話するとともにデータベース局との間で通信可能であって、操作キーと読み書きメモリと表示部とを備えた移動体通信端末において、前記データベース局に複数のゲームソフトを蓄積し、前記移動体通信端末にはゲームに対応して前記操作キーを制御するプログラムを予め記憶する読み出し専用メモリを備え、前記データベース局を無線基地局を介してアクセスして特定のゲームソフトを受信して前記読み書きメモリに格納し、前記操作キーを操作してゲームソフトを前記表示部上に展開してゲームを実行することを特徴とするゲーム動作が可能な移動体通信端末。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、ゲーム動作が可能な移動体通信端末に関し、特に通信ネットからダウンロードしたゲームプログラムによりゲームを実行する携帯用通信端末に関する。

【0002】

【従来の技術】従来の携帯機器には本体にゲームROM内蔵で、予め準備したゲームソフトを使用する固定型ゲーム機器、“たまごっち”等のようなものしかなかった。また、携帯用の小型ゲーム機器（任天堂：ゲームボーイ、セガ：ゲームギア等）は、パッケージ（ROMカード）によりゲームソフトが供給されている。従って、多くのゲームを楽しむには、パッケージを購入しておいて、行き先々に多数のゲームソフトを常に携帯する必要がある。従来では、新作ソフトの入手には発売日に長蛇の列に並ぶなど時間がかかっている。

【0003】

【発明が解決しようとする課題】移動体通信端末は1997年現在、200万台以上に普及したとはいえ、移動体通信端末を利用して何時何処でもゲームが実行できるものはなかった。またゲームソフトを常時携帯しなくても、通信によりダウンロードすれば多種類のゲームが利用できる移動体通信端末はなかった。この発明は、ゲームソフトを常時携帯しなくても、通信によりダウンロードすれば多種類のゲームが利用できるようにするものである。

【0004】

【課題を解決するための手段】この発明は、移動体通信端末及び移動体通信ネットワークに対応したデータベースを発展させたもので、無線通信により無線基地局を介して電話交換局に接続し、加入電話機と通話するとともにデータベース局との間で通信可能であって、操作キーと読み書きメモリと表示部とを備えた移動体通信端末を利用する。前記データベース局に複数のゲームソフトを蓄積しておいて、移動体通信端末にはゲームに対応して操作キーを制御するプログラムを予め記憶する読み出し

専用メモリを備える。移動体通信端末からデータベース局をアクセスして特定のゲームソフトを受信して読み書きメモリに格納する。操作キーを操作してゲームソフトを表示部上に展開してゲームを実行する。

【0005】

【発明の実施の形態】

実施の形態1

以下この発明を図面に従って説明する。まず、図1において、本発明のゲーム動作が可能な移動体通信端末を含む全体システムについて説明する。ここでは、移動体通信端末がPHS（パーソナル・ハンディホン・システム）である場合について説明する。移動体通信端末は各PHS1、1a・・・はアンテナ12をそれぞれ備え、基地局20に対して通信可能となっている。

【0006】基地局20は駅ビル、コンビニエンスストア、公衆電話ボックス、市街地のビルに設けた小型の電波基地であり、基地局20と各PHS1、1a、とは1.9GHzの周波数で交信する。基地局20はISDN等のデジタル網を利用したインターフェースで交換局21に接続され、交換局21はアナログの電話網22に接続可能である。

【0007】アナログの電話網22には家庭、事業所等の電話機23やデータベース局25が接続され、PHS1、1a等から家庭の電話機23へと同様に、データベース局25へのアクセスが可能である。基地局20は市街地や建造物のある所に例えば300Mおきにそれぞれ設けられ、移動中の人物のPHS1、1a等から発射した電波を各受信ゾーンで切り替えながら受信できる。

【0008】データベース局25はモデム機能を備えた通信制御部26、顧客名簿ファイル27とゲームデータベース28と、これらを管理するCPU24を備えている。顧客名簿ファイル27にはPHS1、1a等の所有者の名前、住所、クレジット番号とその電話番号が格納されている。ゲームデータベース28には各種のゲームソフトが識別番号を付けて多数格納されている。これらゲームソフトは必要に応じて更新したり、追加したり、削除できる。

【0009】ゲームソフトのサービスを受けたいと希望した顧客は予めゲームデータベース27を管理する企業等に、自己が所有するPHS1、1a等の電話番号と名前、住所、クレジット番号を書面や電話で申告する。管理する企業は、顧客名簿ファイル27に、顧客から受けたこれらの情報を登録する。顧客名簿ファイル27には書き込み可能なアクセス欄があり、登録済顧客の利用状況、日時、利用したゲームソフト名等が記録できる。

【0010】移動体通信端末のPHS1、1a、1b・・・はその固有番号（電話番号）が異なるだけでその構成はほぼ同じであるので、1個のPHS1を例にその内部構成を図2で説明する。移動体通信端末のPHS1は、中央演算装置（CPU）2と、操作キー3と、モデ

ム4と、読み出し専用メモリの第1ROM5および第2ROM6と表示部7と、送話器8および受話器9と、ゲームソフト用のメモリ10と、送信部11と、アンテナ12と、受信部13とから構成される。

【0011】図3に示すように、アンテナ12はPHS1の箱体から露出して電波が効率良く発射されるようになっている。また操作キー3と表示部7と送話器8および受話器9も、操作部や人間が対応する部分はPHS1の箱体から露出している。さて、第1ROM5には、登録時に設定した自機の固有番号例えば111（電話番号対応）等と操作キー3の一般的なPHSとしての操作に対応したプログラムが格納されている。

【0012】ゲームソフト用のメモリ10はRAMから構成され、CPU2から受信したゲームソフトのプログラム等が記憶される。メモリ10はPHSの本来の動作用のメモリの容量に余裕があれば、そのまま使用できるので、特に設けなくてもよい。第2ROM6には、ゲーム時の操作キー3の操作に対応した動作プログラムが格納されている。

【0013】第1ROM5にゲーム対応の動作プログラムを予め追加して書き込んでおけば、第2ROM6も不要となる。表示部7はキーボード等の操作キー3から入力された電話番号等一般的なPHS1機能時の必要データを表示するとともに、ゲーム時には時々変化するゲーム画面を表示する。

【0014】モデム5はCPU2からのデジタル信号を電話回線のアナログ信号に変換し、送信部11はモデム5からのデジタル信号を1.5GHzの高周波信号で変調してアンテナ12から電波を送信する。受信部13はアンテナ12で受信した1.5GHzの高周波電波を検波し、モデム5に伝える。

【0015】PHS1を携帯した人間が予め知られているデータベース局25の電話番号を操作キー3から入力する。PHS1のID信号（自機番号）と呼び出し相手の電話番号が1.5GHzの高周波電波となってアンテナ12からいずれかの基地局20に到着する。基地局20ではISDNを介し交換局21にID信号と電話番号を送る、交換局21では従来の方法に従って、このPHS1のID信号を検査してシステムに登録済であることを確認する。

【0016】その後交換局21は電話番号によりPHS1を呼び出し相手のデータベース局25に接続する。データベース局25では通信制御部26からPHS1のID信号を受けたCPU24は、このID信号が顧客名簿ファイル27に登録済か確認する。登録済であるので、CPU24はPHS1に対し、希望するゲーム番号を入力するように催促する文字を基地局20を介しPHS1に送る。

【0017】PHS1を携帯する者は表示部7上の問い合わせ文字を見て、希望するゲーム番号を操作キー3の

数字キー30を使用して入力する。PHS1を携帯する者はゲーム番号ブック等を前もって準備してから、ゲームのリクエストを行うようにすると、手早く入力できる。

【0018】または、データベース局25のCPU24はPHS1に対し、ゲーム番号リストを提示できる旨の文字と指示番号を基地局20を介し送る。PHS1を携帯する者は表示部7上のリスト問い合わせ文字を見て、数字と#記号等を数字キー30を使用して入力することにより、リスト一覧を受信し、表示部7上でスクロールして見ることができる。この場合PHS1の通信時間がその分長くなるので通信料金が高くなる。

【0019】PHS1からリクエストされたゲーム番号を受信したデータベース局25のCPU24はゲームデータベース28から当該ゲームソフトのデータを読み出しPHS1に送る。そしてCPU24は顧客名簿ファイル27の当該ID番号の記入欄に日時と送り出したゲーム番号を記録する。

【0020】データベース局25のCPU24は、この記録を月毎に集計して請求事務等を行う。さてゲームソフトを受信したPHS1では、ゲームソフトのデータをまずメモリ10に格納し、基地局20との交信を切断する。PHS1のメモリ10からゲームソフトのデータを順番に読み出し、初期画面を表示部7に表示する。

【0021】その後、操作キー3の数字キー30や上下左右キー31を操作して、図3に示す表示部7上のゲームGを実行する。ゲームの効果音は受話器9をスピーカ一代わりに使用して鳴らすことができるので、専用のゲーム機と同様にゲームが楽しむことができる。移動体通信端末を携帯して、街角や公園で待ち合わせをしている時には、ゲームプログラムをダウンロードして、ゲームを楽しむことができる。

【0022】この発明は、移動体ネットワークの移動体通信端末に、上下左右の操作キーと、ゲームプログラムをダウンロードする機能と、ゲームプログラムを処理可能なCPUおよびRAM容量とディスプレイコントローラ等を追加すれば、下記の各種移動体通信端末に容易に適用できる。例えば、携帯電話、セラーフォン、ザウルス、ニュートン、電子ブック、電子手帳、ポケベル、PDA（パーソナル・デジタル・アシスタント）等である。

【0023】ゲームは通信により移動体通信端末にダウンロードされるため、最新作がすぐに利用できる。移動体通信端末で利用できるため、専用のゲーム機器本体を携帯する必要がない。非音声データ通信のため、通話チャンネルの占有時間が一定で、移動体キャリアーの設備拡張の負担も少なくすむ。通信を利用することにより、双方向にユーザーの得点を集計するなどのサービスが可能となる。

【図面の簡単な説明】

【図1】この発明のゲーム動作が可能な移動体通信端末をPHSとした例の全体システム構成図である。

【図2】この発明のゲーム動作が可能な移動体通信端末をPHSとした例のブロック構成図である。

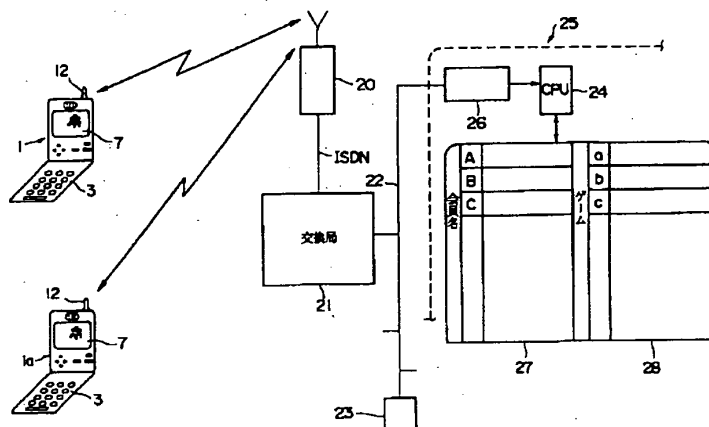
【図3】この発明のゲーム動作が可能な移動体通信端末をPHSとした例の斜視図である。

【符号の説明】

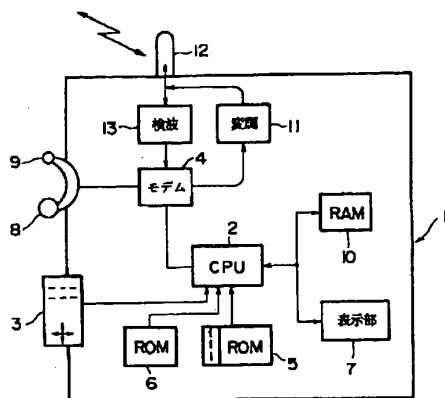
- 1 1a PHS
- 2、24 CPU
- 3 操作キー
- 4 モデム
- 5 第1AROM
- 6 第2ROM
- 7 表示部
- 8 送話器
- 9 受話器

- 10 ゲームソフトのメモリ
- 11 送信部
- 12 アンテナ
- 13 受信部
- 20 基地局
- 21 交換局
- 22 電話網
- 23 電話機
- 25 データベース局
- 26 通信制御部
- 27 顧客名簿ファイル
- 28 ゲームデータベース
- 30 数字キー
- 31 上下左右キー
- G ゲーム

【図1】



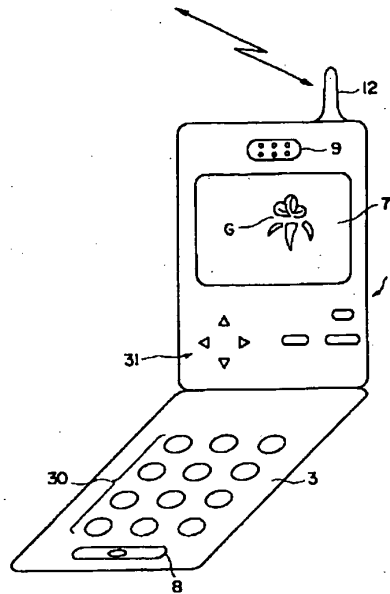
【図2】



(5)

特開平10-271562



【図3】



Method of implementing network game function in mobile telephone by transmitting game data corresponding to key signals to opposing mobile telephone

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Inventor: KIM JONG-KWANG (KR)
Applicant: SAMSUNG ELECTRONICS CO LTD (KR)
Classification:
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Application number: DE20001038142 20000804
Priority number(s): KR19990032178 19990805

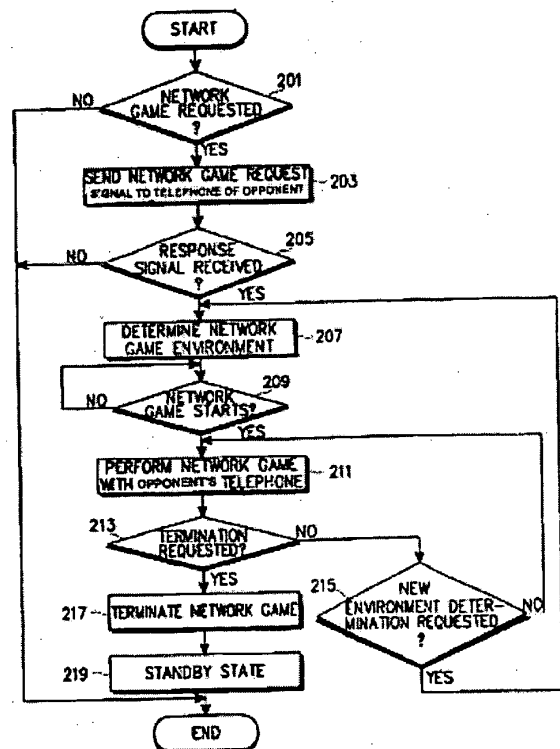
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Abstract of DE10038142

The method involves nominating the mobile telephone to play a network game. When a game starts, the network game program is executed in correspondence with key signals input by a user. Game data corresponding to the key signals input for the network game, are transmitted to the opposing mobile telephone and the network game program is executed in accordance with the changed data. The same game image is displayed on each mobile telephone, which performs the network game in real-time in accordance with the changed game data.



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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

Prüfungsantrag gem. § 44 PatG ist gestellt

- 54 Verfahren für die Verwirklichung einer Netzwerkspielfunktion unter Verwendung von tragbaren Telefonen
- 57 Offengelegt wird ein Verfahren für die Verwirklichung einer Netzwerkspielfunktion unter Verwendung eines tragbaren Telefons, das einer Vielzahl von Benutzern mit tragbaren Telefonen ermöglicht, sich gleichzeitig an dem Spiel zu erfreuen. Nach dem Verfahren werden die tragbaren Telefone zuerst bezeichnet, um das Netzwerkspiel durchzuführen. Falls das Netzwerkspiel beginnt, führt das tragbare Telefon das Netzwerkspielprogramm entsprechend den von einem Benutzer eingegebenen Tasterursignalen für das Netzwerkspiel durch und überträgt die Spieldaten, die mit den für das Netzwerkspiel eingegebenen Tasterursignalen korrespondieren, an das gegenüberstehende tragbare Telefon. Das tragbare Telefon empfängt die Spieldaten von dem gegenüberstehenden tragbaren Telefon und führt das Netzwerkspielprogramm in Übereinstimmung mit den veränderten Daten durch. Dabei wird dasselbe Spielbild auf einem Anzeigeabschnitt des jeweiligen tragbaren Telefons angezeigt, welches das Netzwerkspiel in Übereinstimmung mit den veränderten Spieldaten in Echtzeit durchführt.

DE 100 38 142 A 1

Beschreibung

1. Feld der Erfindung

Die vorliegende Erfindung bezieht sich auf eine Zusatzfunktion eines tragbaren Telefons, und besonders auf ein Verfahren für die Verwirklichung einer Netzwerkspielfunktion unter Verwendung eines tragbaren Telefons, das einer Vielzahl von Benutzern mit tragbaren Telefonen ermöglicht, sich gleichzeitig an einem Spiel zu erfreuen.

2. Beschreibung des Stands der Technik

Nach der jüngsten Tendenz ist ein tragbares Telefon nicht begrenzt auf seine primäre Funktion des Herstellens von Telefonverbindungen, wenn es ohne Beachtung seines jeweiligen Orts bewegt wird, sondern es sichert sich einen Platz als ein integriertes Informationskommunikationsgerät wie auch als ein vielseitiges Gerät.

Unter den verschiedenen, zum tragbaren Telefon hinzugefügten Funktionen wird eine Spielfunktion verwirklicht, wodurch ein Benutzer sich an einem Spiel unter Verwendung des tragbaren Telefons erfreuen kann. Die in dem tragbaren Telefon verwirklichte Spielfunktion hat keine Beziehung zu anderen tragbaren Telefonen, und so kann der Benutzer sich unter Verwendung eines eingebauten Spielprogramms nur allein an dem Spiel erfreuen.

Jedoch neigt der Benutzer dazu, sich bei solch einem Spiel zu langweilen, das er oder sie allein spielt, und die in dem tragbaren Telefon implementierte Spielfunktion kann dadurch nutzlos werden. Um den Nutzen der zu dem tragbaren Telefon hinzugefügten Spielfunktion für den Benutzer wiederzubringen, ist eine Spielfunktion mit vielen Spielern erforderlich, wodurch der Benutzer sich gleichzeitig mit anderen Benutzern an dem Spiel erfreuen kann.

Inzwischen sind Netzwerkspiele vorgeschlagen worden, die eine Spielfunktion für mehrere Spieler hat, welche einer Vielzahl von Benutzern über ein mit PC verbundenes Netzwerk gleichzeitig ermöglicht, sich an dem Spiel zu erfreuen. Jedoch ist solch ein mit PC verbundenes Netzwerkspiel nur über drahtgebundene Kommunikation ablauffähig, und ist nur an einer begrenzten Anzahl von Orten verfügbar.

Zusammenfassung der Erfindung

Dementsprechend wurde die vorliegende Erfindung mit einem Ansatz gemacht, die Probleme nach dem Stand der Technik zu lösen, und ein Ziel der vorliegenden Erfindung ist es, ein Verwirklichungsverfahren für eine Netzwerkspielfunktion in einem tragbaren Telefon vorzusehen, das es einer Vielzahl von Benutzern ermöglicht, sich gleichzeitig über tragbare Telefone an dem Spiel zu erfreuen.

Um das obige Ziel zu erreichen, wird nach der vorliegenden Erfindung ein Verwirklichungsverfahren für eine Netzwerkspielfunktion in einem tragbaren Telefon vorgesehen, wodurch ein Netzwerkspiel gleichzeitig mit anderen tragbaren Telefonen mit demselben Netzwerkspielprogramm durchgeführt wird, und das Verfahren enthält die Schritte: Bezeichnen der tragbaren Telefone, um das Netzwerkspiel durchzuführen; falls das Netzwerkspiel beginnt, Durchführen des Netzwerkspielprogramms entsprechend den von einem Benutzer eingegebenen Tastatursignalen für das Netzwerkspiel, Übertragen der Spieldaten, die mit den für das Netzwerkspiel eingegebenen Tastatursignalen korrespondieren, an das gegenüberstehende tragbare Telefon, Empfangen der Spieldaten, die von dem gegenüberstehenden tragbaren Telefon empfangen wurden, und Durchführen des Netzwerkspielprogramms in Übereinstimmung mit den ver-

änderten Daten; und Anzeigen desselben Spielbildes auf einem Anzeigeabschnitt des jeweiligen tragbaren Telefons, welches das Netzwerkspiel in Übereinstimmung mit den veränderten Spieldaten in Echtzeit durchführt.

Kurze Beschreibung der Zeichnungen

Die obigen Ziele und Vorteile der vorliegenden Erfindung werden deutlicher werden durch detailliertes Beschreiben ihrer bevorzugten Ausführungsformen mit Bezug auf die angefügten Zeichnungen, in denen:

Fig. 1 ein Blockdiagramm eines tragbaren Telefons für die Durchführung einer Netzwerkspielfunktion nach einer Ausführungsform der vorliegenden Erfindung ist;

Fig. 2 eine Darstellung ist, welche die Netzwerkspielfunktion erläutert, die drahtlos über eine Basisstation nach einer Ausführungsform der vorliegenden Erfindung durchgeführt wird;

Fig. 3 eine Darstellung ist, welche die Netzwerkspielfunktion erläutert, die drahtgebunden nach einer Ausführungsform der vorliegenden Erfindung durchgeführt wird;

Fig. 4 eine Darstellung ist, welche die Netzwerkspielfunktion erläutert, die unter Verwendung eines Funkfrequenzsignals nach der IrDA-(Infrared Data Association) oder "Bluetooth"-Spezifikation nach einer Ausführungsform der vorliegenden Erfindung durchgeführt wird;

Fig. 5 ein Flußdiagramm ist, das den Prozeß der Durchführung der Netzwerkspielfunktion nach der bevorzugten Ausführungsform der vorliegenden Erfindung veranschaulicht.

Genauere Beschreibung der bevorzugten Ausführungsformen

Die bevorzugten Ausführungsformen der vorliegenden Erfindung werden nun im Detail und mit Bezug auf die begleitenden Zeichnungen beschrieben. In den Zeichnungen werden dieselben Elemente mit denselben Bezugszeichen bezeichnet, selbst wenn sie in unterschiedlichen Zeichnungen dargestellt sind. In der folgenden Beschreibung der vorliegenden Erfindung werden viele spezifische Einzelheiten wie etwa genaue Verarbeitungsflußdiagramme angezeigt, aber sie werden allein zum besseren Verständnis der vorliegenden Erfindung wiedergegeben und deshalb wird von den in der Technik Bewanderten verstanden, daß die vorliegende Erfindung auch ohne solche spezifischen Einzelheiten ausgeführt werden kann. Bei der Erläuterung der vorliegenden Erfindung wird hier eine detaillierte Beschreibung bekannter Funktionen und Konfigurationen weggelassen, wenn sie den Gegenstand der vorliegenden Erfindung eher verschleiern würde.

Fig. 1 ist ein Blockdiagramm eines tragbaren Telefons für die Durchführung einer Netzwerkspielfunktion nach einer Ausführungsform der vorliegenden Erfindung.

Mit Bezug auf Fig. 1 steuert ein Steuerungsabschnitt 10 den Gesamtbetrieb des tragbaren Telefons. Der Steuerungsabschnitt 10 empfängt Spieldaten und verschiedene andere Arten von Daten, die von einer Basisstation stammen, über einen Funkfrequenzsende- und -empfangsabschnitt 60 und einen Verstärkerabschnitt 70, und steuert den Betrieb, um die Daten den zugeordneten Schaltkreisabschnitten zukommen zu lassen. Der Steuerungsabschnitt 10 erzeugt auch die Spieldaten und verschiedene andere Arten von Daten, und steuert den Betrieb, um die Daten über den Verstärkerabschnitt 70 und den Funkfrequenzsende- und -empfangsabschnitt zur Basisstation zu übertragen. Der Steuerungsabschnitt 10 steuert auch die Durchführung der Netzwerkspielfunktion, wenn die Netzwerkspielfunktion angewählt ist.

Ein erster Verstärkerabschnitt 80 verstärkt ein an den

Lautsprecher SPK ausgegebenes Audiosignal.

Ein zweiter Verstärkerabschnitt 90 verstärkt ein über das Mikrofon MIC eingegebenes Audiosignal.

Ein Tastaturabschnitt 50 ist mit Steuerungstasten, numerischen Tasten und Kommandotasten für die Erzeugung verschiedener Arten von Steuerungssignalen ausgerüstet, die für die Durchführung der Netzwerkspielfunktion erforderlich sind.

Ein EEPROM 30 speichert Parameter des Nummernzuordnungsmoduls (NAM), Telefonnummern, Namen und Nachrichten des Kurznachrichtendienstes (SMS).

Ein Flash-Speicher 40 speichert verschiedene Arten von Programmdateien und Erkennungsdaten und speichert ein eingebautes Betriebsprogramm, das für die Durchführung der Spielfunktion nach der vorliegenden Erfindung erforderlich ist.

Ein Funkfrequenzabschnitt 60 empfängt verschiedene Arten von Daten und Audiosignalen, die über eine Antenne empfangen werden, und übergibt sie an den Verstärkerabschnitt 70. Der Funkfrequenzabschnitt 60 überträgt auch verschiedene Arten von Daten und Audiosignalen, die von dem Verstärkerabschnitt 70 übergeben wurden, über die Antenne an die Basisstation.

Der Verstärkerabschnitt 70 verstärkt die Audiosignale und gesendeten/emfangenen Daten.

Ein Anzeigeabschnitt 20 empfängt verschiedene Arten von Anzeigedaten von dem Steuerungsabschnitt 10 und zeigt die Daten auf seinem Schirm (z. B. einer LCD-Anzeige) an. Der Anzeigeabschnitt 20 zeigt auch ein Spielbild unter Steuerung des Steuerungsabschnitts 10 an, während die Netzwerkspielfunktion nach der vorliegenden Erfindung durchgeführt wird.

Fig. 2 ist eine Darstellung, welche die Netzwerkspielfunktion erläutert, die drahtlos über eine Basisstation nach einer Ausführungsform der vorliegenden Erfindung durchgeführt wird.

Mit Bezug auf Fig. 2 wird die Spielfunktion zwischen einem ersten tragbaren Telefon 110 und einem zweiten tragbaren Telefon 120 über eine Basisstation 200 durchgeführt. In diesem Fall ist das Netzwerkspielprogramm in jedem tragbaren Telefon gespeichert, und eine Vielzahl von anderen tragbaren Telefonen, die die Netzwerkspielfunktion durchführen können, sind registriert. Die Registrierung der anderen Telefone kann dadurch bewirkt werden, daß die Identifikationsnummern (ID-Nummern) der tragbaren Telefone übergeben und registriert werden. Jedes tragbare Telefon ist programmiert, um irgendein tragbares Telefon aus der Vielzahl anderer tragbarer Telefone zu bezeichnen, die als ein Netzwerkmitspieler registriert sind, und spielt das Netzwerkspiel mit den bezeichneten tragbaren Telefonen.

Falls das erste tragbare Telefon 110 das zweite tragbare Telefon 120 bezeichnet und das Netzwerkspiel von der Basisstation 200 anfordert, verbindet die Basisstation 200 das erste tragbare Telefon 110 und das zweite tragbare Telefon 120. Danach bestimmen das erste und das zweite tragbare Telefon 110 bzw. 120 die gemeinsame Netzwerkspielumgebung und führen das Netzwerkspiel durch. Da dasselbe Netzwerkspielprogramm in dem ersten und in dem zweiten Telefon 110 bzw. 120 registriert ist, steuert das tragbare Telefon 110 die Spielvariablen in Übereinstimmung mit den variablen Spieldaten, die es von dem zweiten tragbaren Telefon 120 über die Basisstation 200 empfangen hat, und mit variablen Spieldaten, die über seinen eigenen Tastatureingabeabschnitt eingegeben wurden. Dementsprechend ist die Situation des Netzwerkspielfortschritts gleich sowohl für das erste tragbare Telefon 110 als auch das zweite tragbare Telefon 120, und so wird dasselbe Netzwerkspielbild auf den Anzeigeabschnitten des ersten und des zweiten tragba-

ren Telefons angezeigt.

Falls zwei oder mehr tragbare Telefone bezeichnet sind, um gleichzeitig das Netzwerkspiel zu spielen, werden spezifizierte tragbare Telefone aus der Vielzahl der anderen tragbaren Telefone bestimmt, die als Netzwerkspielgefährten registriert sind, und die bezeichneten tragbaren Telefone werden mit dem spezifizierten Telefon verbunden, um das Netzwerkspiel über die Basis-Station durchzuführen. Dazu werden Daten ausgesendet und empfangen unter Verwendung einer Vielzahl von Kanälen, die den tragbaren Telefonen zugewiesen sind.

Fig. 3 ist eine Darstellung, welche die Netzwerkspielfunktion erläutert, die drahtgebunden nach einer Ausführungsform der vorliegenden Erfindung durchgeführt wird. In der Ausführungsform von Fig. 3 werden die variablen Netzwerkspieldaten zwischen dem ersten tragbaren Telefon 110 und dem zweiten tragbaren Telefon 120 gesendet und empfangen unter Verwendung eines physikalischen Kabels, das zwischen ihnen angeschlossen ist, um dieselbe Netzwerkspielfunktion durchzuführen, wobei dasselbe Netzwerkspielprogramm gespeichert ist.

Fig. 4 ist eine Darstellung, welche die Netzwerkspielfunktion erläutert, die unter Verwendung eines Funkfrequenzsignals nach der IrDA-(Infrared Data Association) oder "Bluetooth"-Spezifikation nach einer Ausführungsform der vorliegenden Erfindung durchgeführt wird. In der Ausführungsform von Fig. 4 wird das Netzwerkspiel in einer drahtlosen Form zwischen den tragbaren Telefonen unter Verwendung einer Infrarot-Kommunikation, d. h. IrDA, durchgeführt, oder die variablen Spieldaten, die für den gegenseitigen Spielfortschritt benötigt werden, werden in einer drahtlosen Form zwischen den tragbaren Telefonen unter Verwendung eines Funksignals nach der "Bluetooth"-Spezifikation gesendet und empfangen. Dazu ist das jeweilige tragbare Telefon ausgerüstet mit Infrarot-Strahlungsverarbeitungseinheit oder einem Funktionsabschnitt nach der "Bluetooth"-Spezifikation, um das Netzwerkspiel durchzuführen.

Fig. 5 ist ein Flußdiagramm, das den Prozeß der Durchführung der Netzwerkspielfunktion nach der bevorzugten Ausführungsform der vorliegenden Erfindung veranschaulicht.

Nun wird die bevorzugte Ausführungsform der vorliegenden Erfindung im Detail und mit Bezug auf Fig. 1 bis 5 erläutert.

Mit Bezug auf Fig. 1 erkennt zuerst der Steuerungsabschnitt 10 in Schritt 201, ob das Netzwerkspiel angefordert wurde. Diese Anforderung des Netzwerkspiels wird bewirkt durch Eingabe einer Netzwerkspielanforderungstaste über den Tastaturabschnitt und Bezeichnung des gegenüberstehenden tragbaren Telefons. Falls die Netzwerkspielanforderung erkannt wird, verzweigt der Steuerungsabschnitt 10 zu Schritt 203 und sendet das Netzwerkspielanforderungssignal über die Basisstation 200 an das gegenüberstehende tragbare Telefon. Falls dazu eine Vielzahl von gegenüberstehenden tragbaren Telefonen bezeichnet ist, überträgt der Steuerungsabschnitt 10 die ID-Nummern der jeweiligen tragbaren Telefone an die Basisstation 200, so dass die Basisstation 200 das Netzwerkspielanforderungssignal an die korrespondierenden tragbaren Telefone sendet.

Falls danach in Schritt 205 ein Antwortsignal von dem gegenüberstehenden tragbaren Telefon über die Basisstation 200 empfangen wird, verzweigt der Steuerungsabschnitt 10 zu Schritt 207 und bestimmt die Netzwerkspielumgebung durch Ausführen des Netzwerkspielprogramms. Dazu bestimmt das gegenüberstehende tragbare Telefon ebenfalls die Netzwerkspielumgebung. Falls das Netzwerkspiel, wie oben beschrieben, bestimmt worden ist, verzweigt der

Steuerungsabschnitt 10 zu Schritt 209 und prüft, ob der Netzwerkspielbeginn gewählt worden ist. Falls der Netzwerkspielbeginn gewählt worden ist, verzweigt der Steuerungsabschnitt 10 zu Schritt 211 und führt das Netzwerkspiel zusammen mit dem gegenüberstehenden Telefon durch. Wie oben beschrieben wird das Netzwerkspiel durchgeführt unter Senden und Empfangen der variablen Daten, die für das Netzwerkspiel benötigt werden. Falls danach in Schritt 213 die Beendigung des Netzwerkspiels verlangt wird, verzweigt der Steuerungsabschnitt 10 zu Schritt 217, um das Netzwerkspiel zu beenden, während der Steuerungsabschnitt 10 anderenfalls zu Schritt 215 verzweigt und prüft, ob eine neue Umgebung für das Netzwerkspiel verlangt wird. Falls eine neue Umgebung für das Netzwerkspiel verlangt wird, kehrt der Steuerungsabschnitt 10 zu Schritt 207 zurück, während er anderenfalls zu Schritt 211 zurückkehrt, um die Netzwerkspielfunktion weiterzuführen.

In Schritt 217 beendet der Steuerungsabschnitt 10 das Netzwerkspiel und verzweigt zu Schritt 219, um den Bereitschaftszustand anzunehmen.

Wie oben beschrieben bezeichnet ein tragbares Telefon mit einer Netzwerkspielfunktion nach der vorliegenden Erfindung andere tragbare Telefone für die gemeinsame Durchführung des Netzwerkspiels, und die jeweiligen tragbaren Telefone bestimmen die Umgebung, die für die Durchführung des Spiels erforderlich ist. Die Spielumgebung bedeutet eine Umgebung, die von dem Benutzer vor dem Start des Spiels in einem allgemeinen Spielprogramm bestimmt wird. Wenn das Spiel beginnt, nachdem die Netzwerkspielumgebung für die jeweiligen tragbaren Telefone wie oben beschrieben bestimmt worden ist, führt das tragbare Telefon das Netzwerkspielprogramm entsprechend den durch den Benutzer eingegebenen Tastatursignalen für das Spiel durch, und sendet die den eingegebenen Tastatursignalen für das Spiel entsprechenden Spieldaten an das gegenüberstehende Telefon. Das tragbare Telefon empfängt auch die Spieldaten von dem gegenüberstehenden Telefon und führt sein eigenes Netzwerkspielprogramm in Übereinstimmung mit den veränderten Daten durch. Das Senden und Empfangen der Spieldaten wird über die Basisstation 200 durchgeführt. Auf dem Anzeigeabschnitt eines jeden tragbaren Telefons, welches das Netzwerkspiel durchführt, wird entsprechend den variablen Spieldaten dasselbe Spielbild in Echtzeit kontinuierlich angezeigt.

In dem Fall, in dem zwei oder mehrere tragbare Telefone gleichzeitig das Netzwerkspiel durchführen, weist die Basisstation 200 die für die Durchführung des Mehrteilnehmerspiels erforderlichen Kanäle zu, und steuert das Senden und Empfangen der Spieldaten der jeweiligen tragbaren Telefone.

Auch empfangen die jeweiligen tragbaren Telefone, die von dem Netzwerkspiel unterstützt werden, ein neues Netzwerkspiel, das von der Basisstation 200 heruntergeladen wird, und registrieren es. Falls eine Vielzahl von Netzwerkspielprogrammen in jedem tragbaren Telefon registriert ist, wird eines der Netzwerkspielprogramme ausgewählt, um passend zu sein für dasjenige des gegenüberstehenden Telefons, wenn ein zugeordnetes Netzwerkspiel verlangt wird.

Das Netzwerkspielverwirklichungsverfahren nach der bevorzugten Ausführungsform der vorliegenden Erfindung wurde vorstehend unter Verwendung der Basisstation 200 erläutert. Jedoch kann das Netzwerkspiel auch unter Verwendung eines physikalischen Kabels verwirklicht werden, wie in Fig. 3 und Fig. 4 gezeigt, unter Verwendung eines Signals nach IrDA oder der "Bluetooth"-Spezifikation oder unter Durchführung direkter Kommunikation zwischen den tragbaren Telefonen. Ihre Ausführungsformen sind Personen mit gewöhnlichen Kenntnissen der Technik bei Bezug

auf das in Fig. 2 gezeigte Netzwerkspielverwirklichungsverfahren offensichtlich, und ihre detaillierte Erläuterung wird weggelassen. Wie oben beschrieben, ist es offenkundig, dass die vorliegende Erfindung die Vorteile vorsieht, dass die Mehrteilnehmerspielnetzwerkspielfunktion mittels einer Vielzahl von tragbaren Telefonen verwirklicht werden kann, und so eine Vielzahl von Benutzern sich an demselben Spiel gleichzeitig über tragbare Telefone unabhängig von ihren jeweiligen Orten erfreuen kann.

Während die vorliegende Erfindung beschrieben wurde in Verbindung mit dem, was als die praktischen und bevorzugten Ausführungsformen angesehen wird, ist zu verstehen, dass andere Modifikationen gemacht werden können ohne vom Geist der Erfindung abzuweichen. Deshalb sollte die Erfindung nicht auf die offengelegte Ausführungsform begrenzt werden, sondern sollte definiert werden durch den Umfang der angefügten Ansprüche und ihre Äquivalente.

Patentansprüche

1. Verwirklichungsverfahren für eine Netzwerkspielfunktion in einem tragbaren Telefon, wodurch ein Netzwerkspiel gleichzeitig mit anderen tragbaren Telefonen mit demselben Netzwerkspielprogramm durchgeführt wird, und das Verfahren enthält die Schritte: Bezeichnen der tragbaren Telefone, um das Netzwerkspiel durchzuführen; falls das Netzwerkspiel beginnt, Durchführen des Netzwerkspielprogramms entsprechend den von einem Benutzer eingegebenen Tastatursignalen für das Netzwerkspiel, Übertragen der Spieldaten, die mit den für das Netzwerkspiel eingegebenen Tastatursignalen korrespondieren, an das gegenüberstehende tragbare Telefon, Empfangen der Spieldaten von dem gegenüberstehenden tragbaren Telefon, und Durchführen des Netzwerkspielprogramms in Übereinstimmung mit den veränderten Daten; und Anzeigen desselben Spielbildes auf einem Anzeigeabschnitt des jeweiligen tragbaren Telefons, welches das Netzwerkspiel in Übereinstimmung mit den veränderten Spieldaten in Echtzeit durchführt.
2. Verfahren nach Anspruch 1, wobei das Aussenden und Empfangen der Spieldaten über eine Basisstation durchgeführt wird.
3. Verfahren nach Anspruch 1, wobei das Aussenden und Empfangen der Spieldaten zwischen den tragbaren Telefonen über ein physikalisches Kabel durchgeführt wird.
4. Verfahren nach Anspruch 1, wobei das Aussenden und Empfangen der Spieldaten zwischen den tragbaren Telefonen unter Verwendung eines Infrarotsignals durchgeführt wird.
5. Verfahren nach Anspruch 1, wobei das Aussenden und Empfangen der Spieldaten zwischen den tragbaren Telefonen unter Verwendung eines Funksignals nach der "Bluetooth"-Spezifikation durchgeführt wird.

Hierzu 3 Seite(n) Zeichnungen

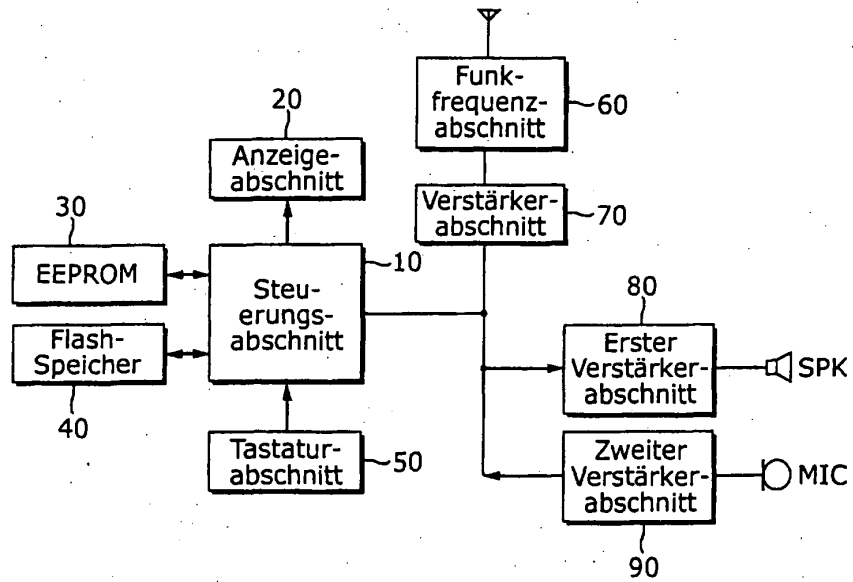


Fig. 1

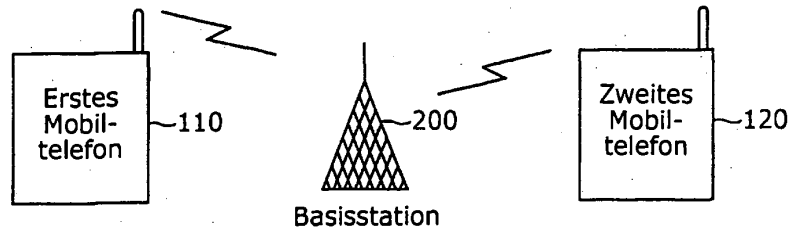


Fig. 2

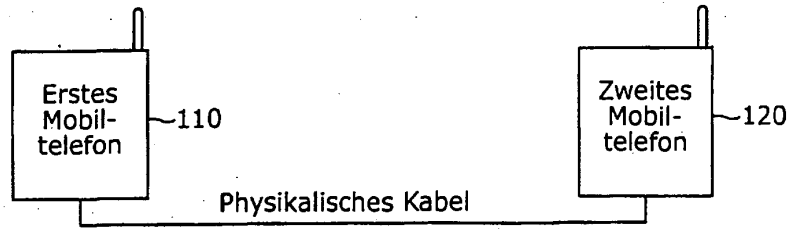


Fig. 3

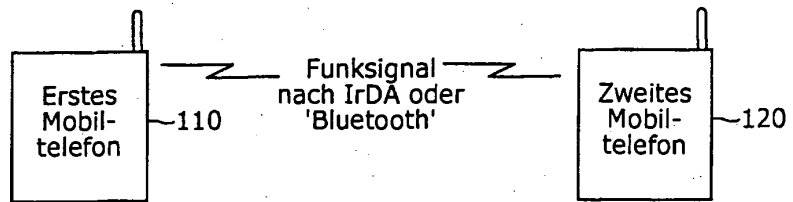


Fig. 4

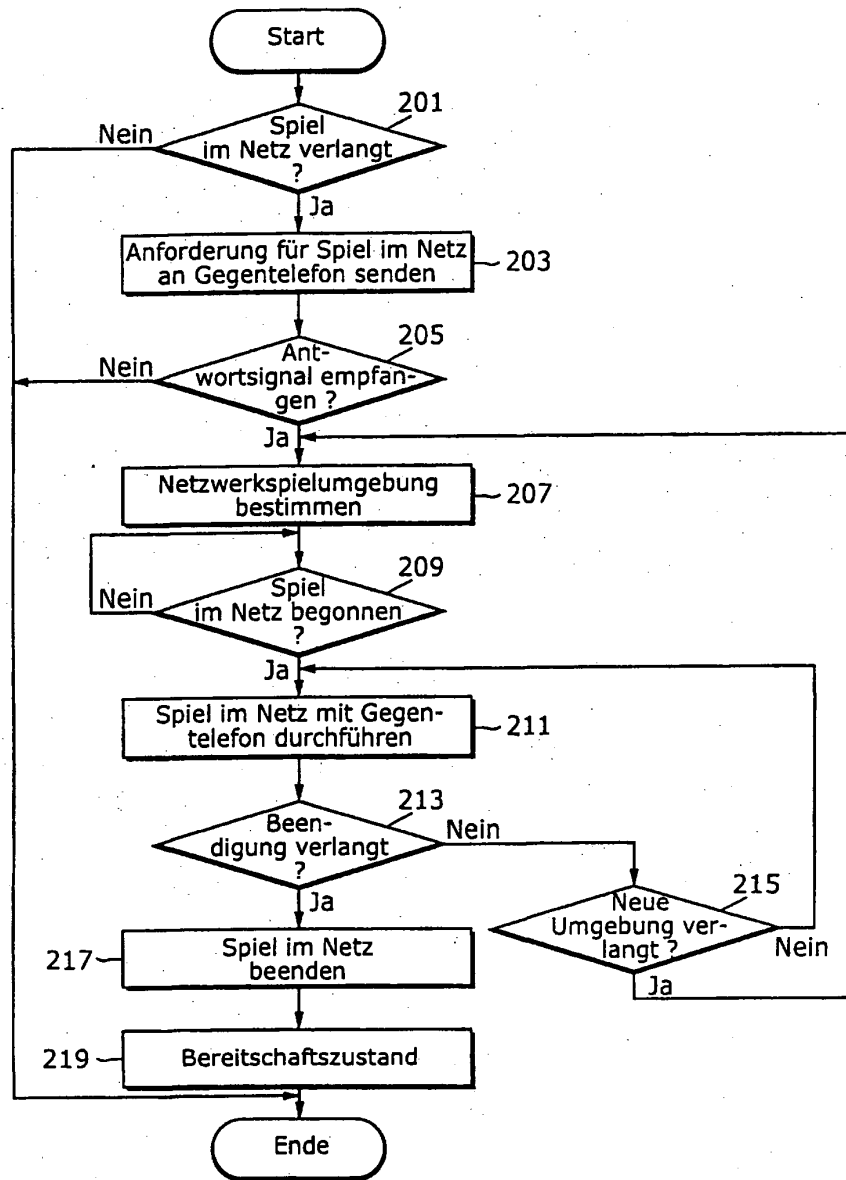


Fig. 5

Doc Code:

PTO/SB/30 (09-04)

Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL Address to: Mail Stop RCE Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450	Application Number	09/974,082
	Filing Date	October 9, 2001
	First Named Inventor	Han-gyoo Kim
	Art Unit	2155
	Examiner Name	Korobov, Vitali A.
	Attorney Docket Number	

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **Submission required under 37 CFR 1.114** Note: If the RCE is proper, any previously filed unentered and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

a. Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

i. Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

ii. Other _____

b. Enclosed

i. Amendment/Reply

ii. Affidavit(s)/Declaration(s)

iii. Information Disclosure Statement (IDS)

iv. Other _____

2. **Miscellaneous**

a. Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

b. Other _____

3. **Fees** The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

a. The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No. 04-1415. I have enclosed a duplicate copy of this sheet.

i. RCE fee required under 37 CFR 1.17(e)

ii. Extension of time fee (37 CFR 1.136 and 1.17)

iii. Other _____

b. Check in the amount of \$ _____ enclosed

c. Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature		Date	June 21, 2006
Name (Print / Type)	S. Craig Hemenway	Registration No.	44,759

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature		Date	
Name (Print / Type)		Date	

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing the burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

**COMBINED AMENDMENT & PETITION FOR EXTENSION OF
TIME UNDER 37 CFR 1.136(a) (Small Entity)**

Docket No.
34253/US/2

In Re Application Of: **Han-gyoo Kim**

Application No. 09/974,082	Filing Date October 9, 2001	Examiner Korobov, Vitali A.	Customer No. 20686	Group Art Unit 2155	Confirmation No. 6653
--------------------------------------	---------------------------------------	---------------------------------------	------------------------------	-------------------------------	---------------------------------

Invention: **DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK**

COMMISSIONER FOR PATENTS:

This is a combined amendment and petition under the provisions of 37 CFR 1.136(a) to extend the period for filing a response to the Office Action of February 21, 2006 in the above-identified application.
Date

The requested extension is as follows (check time period desired):

One month Two months Three months Four months Five months

from: May 21, 2006 until: June 21, 2006
Date *Date*

Applicant claims small entity status. See 37 CFR 1.27.

The fee for the amendment and extension of time has been calculated as shown below:

CLAIMS AS AMENDED

	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST # PREV. PAID FOR	NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE
TOTAL CLAIMS	28 -	111 =	0	x \$25.00	\$0.00
INDEP. CLAIMS	3 -	14 =	0	x \$100.00	\$0.00
FEE FOR AMENDMENT					\$0.00
FEE FOR EXTENSION OF TIME					\$60.00
TOTAL FEE FOR AMENDMENT AND EXTENSION OF TIME					\$60.00

P28SMALL/REV05

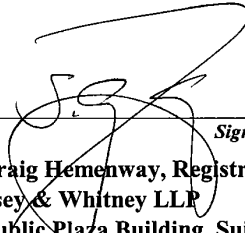
**COMBINED AMENDMENT & PETITION FOR EXTENSION OF
TIME UNDER 37 CFR 1.136(a) (Small Entity)**

Docket No.
34253/US/2

The fee for the amendment and extension of time is to be paid as follows:

- A check in the amount of _____ for the amendment and extension of time is enclosed.
- Please charge Deposit Account No. **04-1415** in the amount of **\$455.00**
- The Director is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. **04-1415**
 - Any additional filing fees required under 37 C.F.R. 1.16.
 - Any patent application processing fees under 37 CFR 1.17.
- If an additional extension of time is required, please consider this a petition therefor and charge any additional fees which may be required to Deposit Account No. **04-1415**
- Payment by credit card. Form PTO-2038 is attached.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.



Signature

S. Craig Hemenway, Registration No. 44,759
Dorsey & Whitney LLP
Republic Plaza Building, Suite 4700
370 Seventeenth Street
Denver, CO 80202-5647
Phone: (303) 629-3400
Fax: (303) 629-3450
USPTO Customer No. 20686

CC:

Dated: June 21, 2006

~~I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to the "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" (37 C.F.R. 1.8(a)) on _____ (Date) _____ (Signature of Person Mailing Correspondence) _____ (Typed or Printed Name of Person Mailing Correspondence)~~

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

Applicant	: Han-gyoo Kim	Confirmation No: 6653
Appln. No.	: 09/974,082	Group Art Unit: 2155
Filed	: October 9, 2001	Examiner: Korobov, Vitali A.
Title	: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK	

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the final Office action dated February 21, 2006, please consider the following remarks and amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Claims

1-33. (Cancelled)

34. (Currently Amended) A network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising:

a network adapter for receiving disk access command in data link frames through the network;

a disk controller, connected to the LAN adapter, for executing disk access commands;

a disk for storing data; and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device;

wherein access to the disk is operatively controlled by the disk controller; and no disk access command is required to be routed through a server associated with the NAD.

35. (Original) The NAD device of claim 34, wherein the network runs Ethernet.

36. (Original) The NAD device of claim 34, wherein said disk is formatted as a local disk.

37. (Original) The NAD device of claim 34, wherein said disk is partitioned as a local disk.

38. (Original) The NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller.

39. (Original) The NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device.

40. (Original) The NAD device of claim 34, wherein the controller has a filter for controlling access to the disk.

41. (Original) The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions.

42. (Original) The NAD device of claim 41, wherein each disk partition is controlled by a separate driver.

43-49. (Cancelled)

50. (Currently Amended) A network-attached storage device adapted to be connected through a network to host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the storage device comprising:

a storage device;

a network adapter for receiving a storage command through the network without requiring routing of any storage command through a server associated with the storage device; and

a storage controller for executing the storage command.

51. (Original) The network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device.

52. (Original) The network-attached storage device of claim 50, wherein the storage device is a disk.

53. (Original) The network-attached storage device of claim 50, wherein the storage device is a tape device.

54. (Original) The network-attached storage device of claim 50, wherein the storage device is a CD drive.

55. (Original) The network-attached storage device of claim 50, wherein the storage device is a memory device.

56-111. (Cancelled)

112. (Currently Amended) A network attached disk device, comprising:
a first disk device;

a network attached disk device controller operative to receive across a network an input/output command for the first disk device without routing of any input/output command through a server associated with the network attached disk device;

a disk controller operative to control the operation of the disk device in response to the input/output command;

a network adapter operative to receive the input/output command from the network attached disk device controller; wherein

the network attached disk device is operative to be recognized as a local device by a remote host.

113. (Previously Presented) The network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host.

114. (Previously Presented) The network attached disk device of claim 112, further comprising a second disk device.

115. (Previously Presented) The network attached disk device of claim 114, wherein the first and second disk devices are both operative to be recognized as unique local devices by the remote host.

116. (Previously Presented) The network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command.

117. (Previously Presented) The network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication.

118. (Previously Presented) The network attached disk device of claim 116, wherein a protocol stack comprises a TCP/IP connection.

119. (Previously Presented) The network attached disk device of claim 112, wherein the disk controller comprises:

a channel controller;

at least one disk channel operatively connected to the channel controller;

a buffer manager operatively connected to the channel controller; and

a bus interface operatively connected to the buffer manager and the network attached disk device controller.

120. (Previously Presented) The network attached disk device of claim 112, wherein the network attached disk device controller comprises:

a main controller operative to generally control the operation of the network attached disk device;

a buffer management module operative to cache data associated with the first disk device;

a disk controller driver for interfacing with the disk controller; and

a network adapter driver for interfacing with the network adapter.

121. (Previously Presented) The network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote host.

122. (Previously Presented) The network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk.

123. (Previously Presented) The network attached disk of claim 112, wherein the first disk device comprises a compact disk.

124. (Previously Presented) The network attached disk of claim 112, wherein the first disk device comprises a digital versatile disk.

REMARKS/ARGUMENTS

This Amendment and Response responds to the final Office action dated February 21, 2006, setting forth a shortened three month statutory period for reply expiring May 21, 2006. Insofar as the present paper is filed after May 21, 2006 but prior to June 21, 2006, a petition for a one-month extension of time is filed herewith. Further, because this paper is filed in reply to a final Office action, the Applicant submits concurrently a Request for Continued Examination.

I. Rejections Under 35 U.S.C. § 102 – Claims 34-42, 50-52, 55, 112-120 and 122

The Examiner rejected claims 34-35, 50 and 112-117 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,566,331 to Irwin, Jr., et al (hereinafter “Irwin”). For at least the following reasons, the Applicant respectfully disagrees.

Independent claims 34, 50 and 112 have each been amended. Claim 34 now recites that no “disk access command is required to be routed through a server associated with the NAD.” Claim 50 recites as an element “a network adapter for receiving a storage command through the network without requiring routing of any storage command through a server associated with the storage device.” Similarly, claim 112 requires an input/output command be received “without routing of any input/output command through a server associated with the network attached disk device.” The Applicant respectfully submits Irwin fails to teach or suggest such limitations.

Irwin explicitly requires any connection between a host and storage device be routed through a server associated with the storage device. Fig. 1, for example, clearly shows each storage system is associated with a server to create a “plurality of data storage devices 40-1 to 40-m” (col. 5, lines 15-18). Every such “data storage device” taught by Irwin consists of a server and a storage system such as a disk or tape drive:

In particular, a subset of possible devices are illustrated in Fig. 1 and for illustrative purposes comprise a RAID-3 disk array data storage subsystem which consists of 1) a **data storage server 60-1** and a plurality of disk drives 40-1; 2) a RAID-5 disk array direct access data storage subsystem, which consists of a **data storage server 60-2** equipped with a plurality of disk drives 40-2; and 3) a tape drive sequential access data storage subsystem, which consists of a **data storage server 60-m** as well as physical volume repository 40-m... (emphasis added.)

These servers are essential in passing commands to the associated storage systems: commands are sent from a client “to the associated storage server 60-2 via the appropriate I/O channel. The storage server 60-2 handles the actual transaction with the storage device 40-2” (col. 6, lines 23-30). Accordingly, Irwin explicitly teaches that a server associated with a storage device is required to access the storage device. In Irwin’s

teachings no I/O command can reach a storage device without being routed through an associated server.

Likewise, a "bitfile server" is necessary to mount or dismount a storage device to a client (col. 9, lines 21-51; col. 11, lines 26-31). Until the storage device is mounted, it cannot be accessed by Irwin's client. Accordingly, at least the mount command must pass through this bitfile server.

Indeed, Irwin not only fails to teach that input/output commands, disk access commands, and storage commands need not be routed through an associated server, it explicitly requires such routing. Accordingly, Irwin cannot anticipate or render obvious amended independent claims 34, 50 and 112.

The remaining rejected claims each depend, directly or indirectly, from one of independent claims 34, 50 and 112. These independent claims have been shown to be patentable. Accordingly, these dependent claims are likewise patentable. The Applicant makes this statement without reference to, or waiving, the independent bases of patentability within each dependent claim.

For at least the foregoing reasons, the Applicant respectfully requests the Examiner withdraw his rejections and allow the rejected claims over the cited reference.

II. Rejections Under 35 U.S.C. § 103- Irwin and Starr

The Examiner rejected claims 36-42, 51-52, 55, 118-120 and 122 under 35 U.S.C. § 103(a) as unpatentable over Irwin in view of United States Patent No. 6,807,581 to Starr et al. (hereinafter "Starr"). For at least the following reason, the Applicant respectfully disagrees.

Each of the rejected claims each depend, directly or indirectly, from one of independent claims 34, 50 and 112. These independent claims have been shown to be patentable. Accordingly, these dependent claims are likewise patentable. The Applicant makes this statement without reference to, or waiving, the independent bases of patentability within each dependent claim.

For at least the foregoing reasons, the Applicant respectfully requests the Examiner withdraw his rejections and allow the rejected claims over the cited references.

III. Rejections Under 35 U.S.C. § 103- Irwin and Prothapragada

The Examiner rejected claims 53-54, 121, 123 and 124 under 35 U.S.C. § 103(a) as unpatentable over Irwin in view of United States Patent No. 6,389,432 to Prothapragada et al. (hereinafter "Prothapragada"). For at least the following reason, the Applicant respectfully disagrees.

Each of the rejected claims each depend, directly or indirectly, from one of independent claims 34, 50 and 112. These independent claims have been shown to be patentable. Accordingly, these dependent claims are likewise patentable. The Applicant makes this statement without reference to, or waiving, the independent bases of patentability within each dependent claim.

For at least the foregoing reasons, the Applicant respectfully requests the Examiner withdraw his rejections and allow the rejected claims over the cited references.

IV. Conclusion

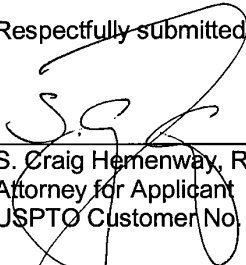
The Applicant thanks the Examiner for his careful review of the present application and pending claims. Further, the Applicant respectfully submits the present application is now in condition for allowance. Therefore, the Applicant respectfully requests the issuance of a Notice of Allowability at the Examiner's earliest convenience.

This Amendment is submitted contemporaneously with a petition for a one-month extension of time in accordance with 37 CFR § 1.136(a) and a Request for Continued Examination. Accordingly, please charge Deposit Account No. 04-1415 in the amount of \$455.00 (\$60.00 for one-month extension of time fee and \$455.00 Request for Continued Examination fee. The Applicant believes no further fees or petitions are required. However, if any such petitions or fees are necessary, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 accordingly.

If the Examiner should require any additional information or amendment, please contact the undersigned attorney.

Dated: June 21, 2006

Respectfully submitted,


S. Craig Hemenway, Registration No. 44,759
Attorney for Applicant
USPTO Customer No. 20686

DORSEY & WHITNEY LLP
370 Seventeenth Street, Suite 4700
Denver, Colorado 80202-5647
Tel: 303-629-3400
Fax: 303-629-3450

Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	Disk system adapted to be directly attached to network			
First Named Inventor:	Han-Gyoo Kim			
Filer:	Stephen C. Hemenway/Elissa Ferguson			
Attorney Docket Number:	1203			
Filed as Small Entity				
Utility Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with \$0 paid	2251	1	60	60

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for continued examination	2801	1	395	395
Total in USD (\$)				455

Electronic Acknowledgement Receipt

EFS ID:	1087367
Application Number:	09974082
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor:	Han-Gyoo Kim
Customer Number:	32940
Filer:	Stephen C. Hemenway/Elissa Ferguson
Filer Authorized By:	Stephen C. Hemenway
Attorney Docket Number:	1203
Receipt Date:	21-JUN-2006
Filing Date:	09-OCT-2001
Time Stamp:	17:30:27
Application Type:	Utility
International Application Number:	

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 455
RAM confirmation Number	308
Deposit Account	041415

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part	Pages
1	Request for Continued Examination (RCE)	RCE34253US2.pdf	75678	no	1
Warnings:					
Information:					
2	Extension of Time	CombinedAmendmentandPetitionforExtensionofTime34253US2.pdf	72308	no	2
Warnings:					
Information:					
3	Amendment After Final	AmendmentandResponsetoOA34253US2.pdf	293408	no	8
Warnings:					
Information:					
4	Fee Worksheet (PTO-875)	fee-info.pdf	8307	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			449701		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p>					

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number

09/1974,082
1203

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	85	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	85 minus 20 =	65
INDEPENDENT CLAIMS	12 minus 3 =	9
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

(Column 1) 06-02-05 (Column 2) (Column 3)

AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	29 Minus	111	
Independent	3 Minus	14	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

11/15/05

(Column 1) (Column 2) (Column 3)

AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	28 Minus	111	
Independent	3 Minus	14	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

6-21-06

(Column 1) (Column 2) (Column 3)

AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	28 Minus	111	
Independent	3 Minus	14	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

SMALL ENTITY TYPE OR OTHER THAN SMALL ENTITY

RATE	FEE	OR	RATE	FEE
BASIC FEE	370.00	OR	BASIC FEE	740.00
X\$ 9=	588	OR	X\$18=	
X42=	378	OR	X84=	
+140=		OR	+280=	
TOTAL	1333	OR	TOTAL	

SMALL ENTITY OR OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L2	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L3	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L4	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L5	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L6	58	L5 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L7	115	L5 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L8	231	L5 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

L9	8949	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L10	272	L9 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L11	693	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L12	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L13	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L14	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L15	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L16	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23

EAST Search History

L17	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L18	58	L17 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L19	115	L17 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L20	231	L17 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L21	8949	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L22	272	L21 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L23	693	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L24	1746	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

L25	2	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L26	4057	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L27	1938	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L28	1000	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L29	340	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L30	320	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L31	364	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L32	92	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

L33	34	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L34	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L35	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L36	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
L37	222	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2006/08/27 20:23
L38	134	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2006/08/27 20:23
L39	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2006/08/27 20:23
L40	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L41	92	L40 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L42	276	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2006/08/27 20:23
L43	13	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2006/08/27 20:23

EAST Search History

L44	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/08/27 20:23
L45	22	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/08/27 20:23
L46	1	"6389432".pn.	USPAT	AND	ON	2006/08/27 20:23
L47	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L48	92	L47 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L49	1	"6216202".pn.	USPAT	AND	ON	2006/08/27 20:23
L50	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2006/08/27 20:23
L51	18	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2006/08/27 20:23
L52	4	L45 not L51	USPAT	AND	ON	2006/08/27 20:23
L53	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2006/08/27 20:23
L54	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
L55	25	"Network Attached Storage" "as local"	USPAT	AND	ON	2006/08/27 20:23
L56	528	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2006/08/27 20:23
L57	261	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2006/08/27 20:23
L58	89	"Network Attached Storage" (dvd)	USPAT	AND	ON	2006/08/27 20:23
L59	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2006/08/27 20:23
L60	5612	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2006/08/27 20:23

EAST Search History

L61	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
L62	11	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2006/08/27 20:23
L63	831	(channel with attach\$4 with storage)	USPAT	AND	ON	2006/08/27 20:23
L64	46	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2006/08/27 20:23
L65	32	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2006/08/27 20:23
L66	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2006/08/27 20:23
L67	11	(virtual adj local adj storage)	USPAT	AND	ON	2006/08/27 20:23
L68	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L69	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L70	8949	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L71	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L72	8949	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

L73	340	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L74	320	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L75	222	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2006/08/27 20:23
L76	134	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2006/08/27 20:23
L77	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L78	276	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2006/08/27 20:23
L79	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L80	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2006/08/27 20:23
L81	528	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2006/08/27 20:23
L82	5612	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2006/08/27 20:23
L83	831	(channel with attach\$4 with storage)	USPAT	AND	ON	2006/08/27 20:23
L84	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
L85	1	"6389432".pn.	USPAT	AND	ON	2006/08/27 20:23
L86	1	"6216202".pn.	USPAT	AND	ON	2006/08/27 20:23
L87	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2006/08/27 20:23
L88	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23

EAST Search History

L89	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2006/08/27 20:23
L90	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L91	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L92	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L93	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L94	58	L69 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L95	115	L69 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L96	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L97	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23

EAST Search History

L98	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L99	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L100	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L101	58	L71 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L102	115	L71 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L103	2	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L104	92	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L105	34	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

L106	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L107	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L108	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2006/08/27 20:23
L109	92	L77 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L110	13	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2006/08/27 20:23
L111	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/08/27 20:23
L112	22	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/08/27 20:23
L113	92	L79 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L114	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2006/08/27 20:23
L115	18	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2006/08/27 20:23
L116	4	L112 not L115	USPAT	AND	ON	2006/08/27 20:23

EAST Search History

L117	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
L118	25	"Network Attached Storage" "as local"	USPAT	AND	ON	2006/08/27 20:23
L119	89	"Network Attached Storage" (dvd)	USPAT	AND	ON	2006/08/27 20:23
L120	11	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2006/08/27 20:23
L121	46	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2006/08/27 20:23
L122	32	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2006/08/27 20:23
L123	11	(virtual adj local adj storage)	USPAT	AND	ON	2006/08/27 20:23
L124	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
L125	231	L69 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L126	231	L71 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L127	261	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2006/08/27 20:23
L128	272	L70 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L129	272	L72 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

L130	364	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L131	693	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L132	693	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L133	1000	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L134	1746	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L135	1938	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L136	4057	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L137	31	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; IBM_TDB	AND	ON	2006/08/27 20:23
L138	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. (controller with access)	USPAT	AND	ON	2006/08/27 20:23

EAST Search History

L139	0	(John "L." Sloan).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
L140	72	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual with local with (storage or disk))	USPAT	AND	ON	2006/08/27 20:23
L141	8078	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2006/08/27 20:23
L142	16	(virtual adj local adj (storage or disk))	USPAT	AND	ON	2006/08/27 20:23
L143	387	(virtual with local with (storage or disk))	USPAT	AND	ON	2006/08/27 20:23
L144	11	(virtual adj disk) dell.as.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
L145	14	("5329619" "6404766" "5513314" "5774660" "6128644" "6175869" "6314465" "6345300" "6317775" "6360265" "6449647" "6470389" "6510164" "5999808").pn.	USPAT	OR	ON	2006/08/27 20:23
L146	4	blood.in. and dell.as.	USPAT	AND	ON	2006/08/27 20:23
L147	5	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual adj local adj (storage or disk))	USPAT	AND	ON	2006/08/27 20:23
L148	2	("6421753" or "5941972").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	AND	ON	2006/08/27 20:23
L149	1	"20030061401".pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:45

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicant: Han-gyoo Kim	
App. No.: 09/974,082	Con. No.: 6653
Filed: October 9, 2001	Art Unit: 2155
Title: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK	Examiner: Korobov, Vitali A.

**INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§1.97(b)(4) and 1.98 and
STATEMENT OF RELATEDNESS UNDER M.P.E.P. § 2001.06(b)**

MAIL STOP RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Examiner is requested to consider the references noted on the enclosed Form PTO/SB/08a during examination of the above-identified patent application. These references are submitted for the Examiner's consideration and are submitted pursuant to the duty of disclosure under 37 C.F.R. § 1.56. In submitting these references, no representation is made or implied that the references are or are not material to the examination of the application. The Examiner is encouraged to make his or her own determination of materiality. Pursuant to the U.S. Patent and Trademark Office's Consolidated Patent Rules of February 1, 2005, waiver of the requirements of 37 C.F.R. § 1.98(a)(2)(ii), copies of the U.S. patent application publication references are not provided, unless required by the Office.

In satisfaction of the duty of disclosure under 37 C.F.R. § 1.56, and as required by M.P.E.P. § 2001.06(b), the Examiner is requested to consider the following applications commonly owned by the Assignee of the present application and that may include subject matter similar to that of the present application:

- (1) U.S. patent application no. 10/195,817, filed July 15, 2002, pending;
- (2) U.S. patent application no. 10/829,399, filed April 22, 2004, pending;
- (3) U.S. patent application no. 10/951,474, filed September 27, 2004, pending;
- (4) U.S. patent application no. 10/963,200, filed October 12, 2004, pending;

- (5) U.S. patent application no. 11/029,775, filed January 5, 2005, pending;
- (6) U.S. patent application no. 11/061,760, filed February 17, 2005, pending;
- (7) U.S. patent application no. 11/062,104, filed February 18, 2005, pending;
- (8) U.S. patent application no. 11/068,519, filed February 27, 2005, pending;
- (9) U.S. patent application no. 11/153,985, filed June 16, 2005, pending;
- (10) U.S. patent application no. 11/187,762, filed July 22, 2005, pending;
- (11) U.S. patent application no. 11/210,521, filed August 23, 2005, pending;
- (12) U.S. patent application no. 11/326,810, filed January 6, 2006, pending; and
- (13) U.S. patent application no. 11/360,331, filed February 23, 2006, pending.

This Information Disclosure Statement is being filed before the first Office action, after the filing of a Request for Continued Examination. Accordingly, pursuant to 37 C.F.R. § 1.97(b)(4), no fees are due with respect to this filing. However, should any such fees or petitions be required, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 as necessary.

If the Examiner has any questions, please contact the undersigned attorney.

Dated: 30 August 2006

Respectfully submitted,



S. Craig Hemenway, Registration No. 44,759
Attorney for Applicant
USPTO Customer No. 20686

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PTO/SB/08A (08-03) U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE Substitute for Form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	APPLICATION NO.: 09/974,082	FILING DATE: October 9, 2001
	INVENTOR(S): Han-gyoo Kim	ART UNIT: 2155
	EXAMINER NAME: Korobov, Vitali A.	ATTY. DOCKET NO.: 34253/US/2

U.S. PATENT DOCUMENTS					
EXAMINER INITIALS*	Cite No. ¹	PATENT NUMBER	ISSUE DATE	Name of Patentee of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		

U.S. PUBLICATION DOCUMENTS					
EXAMINER INITIALS*	Cite No. ¹	PUBLICATION NUMBER	PUBLICATION DATE	Name of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		
	1.	2003/0014569	01/2003	Kim	
	2.	2005/0149682	07/2005	Kim	
	3.	2005/0193017	09/2005	Kim	
	4.	2005/0193189	09/2005	Kim	
	5.	2006/0010287	01/2006	Kim	
	6.	2006/0045130	03/2006	Kim	
	7.	2006/0067356	03/2006	Kim	
	8.	2006/0069884	03/2006	Kim	
	9.	2006/0155805	07/2006	Kim	

FOREIGN PATENT DOCUMENTS						
EXAMINER INITIALS*	Cite No. ¹	DOCUMENT NUMBER	PUBLICATION DATE	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
		Country Code ² - Number ³ - Kind Code ⁵ (if known)	MM-DD-YYYY			

* EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPBP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS			
EXAMINER INITIALS ¹	Cite No. ¹	Include name of Author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁶
EXAMINER		DATE CONSIDERED	
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

Electronic Acknowledgement Receipt

EFS ID:	1177732
Application Number:	09974082
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor:	Han-Gyoo Kim
Customer Number:	32940
Filer:	Stephen C. Hemenway/Elissa Ferguson
Filer Authorized By:	Stephen C. Hemenway
Attorney Docket Number:	1203
Receipt Date:	30-AUG-2006
Filing Date:	09-OCT-2001
Time Stamp:	11:10:12
Application Type:	Utility
International Application Number:	

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part	Pages
1	Information Disclosure Statement (IDS) Filed	IDS34253US2.pdf	127404	no	4

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	127404
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p>	



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/974,082	10/09/2001	Han-Gyoo Kim	1203	6653
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32940 7590 08/30/2006
DORSEY & WHITNEY LLP
 555 CALIFORNIA STREET, SUITE 1000
 SUITE 1000
 SAN FRANCISCO, CA 94104

EXAMINER

KOROBV, VITALI A

ART UNIT	PAPER NUMBER
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2155

DATE MAILED: 08/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/974,082	KIM, HAN-GYOO	
	Examiner	Art Unit	
	Vitali Korobov	2155	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 21 June 2006.
- 2a) This action is **FINAL**.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 34-42, 50-55 and 112-124 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) none is/are allowed.
- 6) Claim(s) 34-42, 50-55 and 112-124 is/are rejected.
- 7) Claim(s) none is/are objected to.
- 8) Claim(s) none are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 03/03/06
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____

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RESPONSE TO RCE

1. This Office Action is in response to an RCE filed on 06/21/2006. Claims 34, 50 and 112 have been amended. Claims 34-42, 50-55 and 112-124 are currently pending.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. The Applicant's submission filed on 06/21/2006 has been entered.

Paper Submitted

3. It is hereby acknowledged that the following papers have been received and placed of record in the file: **Information Disclosure Statement** as received on 03/03/2006 was partially considered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be

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patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 34-35, 50 and 112-117 are rejected under 35 U.S.C. 103(a) as being unpatentable over the U. S. Patent No. 5,566,331, issued to Irwin, Jr. et al., hereinafter Irwin, in view of the U. S. Patent No. 6,421,753 issued to Hoese et al., hereinafter Hoese.

Regarding claim 34, Irwin teaches a network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host (Col. 2, lines 54-61), the NAD device comprising: a network adapter for receiving disk access command in data link frames through the network (Encapsulating data in the form required by the channel-switching fabric (col. 10, lines 58-63) transmitted using lower levels of protocol (col. 12, lines 30-35). Implementation of Ethernet that Irwin teaches in col. 13, lines 59-64 inherently requires a storage device connected to the Ethernet to have a network adapter); a disk controller, connected to the LAN adapter (col. 15, line 67 and col. 16, lines 1-7 - controller of the direct access storage device), for executing disk access commands (col. 16, lines 1-7 - controller of the direct access storage device decapsulates and executes access commands); and a disk for storing data (Fig. 1, direct access storage devices 40-1 to 40-m); and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device (Fig. 1, control path 13);

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wherein access to the disk is operatively controlled by the disk controller (col. 15, lines 59-67 and col. 16, lines 1-7).

Irwin does not explicitly teach the NAD device wherein no disk access command is required to be routed through a server associated with the NAD.

However, Hoese in analogous art, directed to a method for providing virtual local storage on remote SCSI storage devices, teaches the NAD device wherein no disk access command is required to be routed through a server associated with the NAD (Hoese, col. 3, lines 30-37). Hoese essentially takes the invention of Irwin (See Fig. 1 of Hoese, data access server 14), and proposes to eliminate the data storage server in order to speed up the data access (Hoese, col. 1, lines 50-55), and to implement other technical advantages (Hoese, col. 2, lines 25-44).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Hoese into the teachings of Irwin in order to speed up the data access (Hoese, col. 1, lines 50-55) and to implement other technical advantages (Hoese, col. 2, lines 25-44). Modified in this manner Irwin is hereinafter referred to as "modified Irwin".

Regarding claim 35, modified Irwin teaches the NAD device of claim 34, wherein the network runs Ethernet (col. 13, lines 59-64).

Claim 50 does not teach or define any new limitations above claim 34 and therefore is rejected under the same rationale as claim 34.

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Regarding claim 112, modified Irwin teaches a network attached disk device, comprising: a first disk device (Fig. 1, 40-2); a network attached disk device controller operative to receive across a network an input/output command for the first disk device (col. 15, line 67 and col. 16, lines 1-7 - controller of the direct access storage device) without routing of any input/output command through a server associated with the network attached disk device (Hoese, col. 3, lines 30-37); a disk controller operative to control the operation of the disk device in response to the input/output command (col. 16, lines 1-7 - controller of the direct access storage device decapsulates and executes access commands); a network adapter operative to receive the input/output command from the network attached disk device controller (Implementation of Ethernet that Irwin teaches in col. 13, lines 59-64 inherently requires a storage device, connected to the Ethernet to have a network adapter); wherein the network attached disk device is operative to be recognized as a local device by the remote host (col. 2, lines 54-61).

Regarding claim 113, modified Irwin teaches the network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host (col. 2, lines 54-61).

Regarding claim 114, modified Irwin teaches the network attached disk device of claim 112, further comprising a second disk device (Fig. 1, any of the devices 40-1, or 40-3 to 40-m).

Regarding claim 115, modified Irwin teaches the network attached disk device of claim 114, wherein the first and second disk devices are both operative to be

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recognized as unique local devices by the remote host (Col. 8, lines 49-60 - mass storage system 10 allows each client data processor the possible use of many file-systems located on many different direct access storage devices).

Regarding claim 116, modified Irwin teaches the network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command (Col. 10, lines 46-52).

Regarding claim 117, modified Irwin teaches the network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication (Fig. 3, protocol stack 209).

5. Claims 36-42, 51-52, 55, 118-120 and 122 are rejected under 35 U.S.C. 103(a) as being unpatentable over modified Irwin in view of the U. S. Patent No. 6,807,581 to Starr et al., hereinafter Starr.

Regarding claim 36, modified Irwin teaches the NAD device of claim 34.

Modified Irwin does not explicitly teach such device wherein said disk is formatted as a local disk.

However, Starr in analogous art, related to a network attached storage unit, teaches such device wherein said disk is formatted as a local disk (As per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Starr into the teachings

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of Irwin in order to reduce overhead associated with accessing data stored in different file formats. (Modified Irwin with incorporated teachings of Starr is hereinafter referred to as I/H/S).

Regarding claim 37, I/H/S teaches the NAD device of claim 34, wherein said disk is partitioned as a local disk (Starr, as per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23. Also, as per col. 6, lines 30-35, the file system 23 supports logical file format, and therefore is inherently capable of supporting partitions, partitions being nothing more than logical subdivisions of a physical disk space).

Regarding claim 38, I/H/S teaches the NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller (Starr, col. 5, lines 35-39 and Fig. 1 – Media Access Control 60).

Regarding claim 39, I/H/S teaches the NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device (Starr, Fig. 1, I/O controller 72).

Regarding claim 40, I/H/S teaches the NAD device of claim 34, wherein the controller has a filter for controlling access to the disk (Starr, col. 7, lines 23-26 – filtering based on authentication and other connection initialization procedures).

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Regarding claim 41, I/H/S teaches the NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions (Starr, col. 5, line 67, col. 6, lines 1-4 – optional boot partition).

Regarding claim 42, I/H/S teaches the NAD device of claim 41, wherein each disk partition is controlled by a separate driver (Col. 5, lines 59-64 – RAID. The disks (partitions) in RAID are independent by definition, since RAID stands for “redundant array of independent disks”).

Regarding claim 51, I/H/S teaches the network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device (Starr, Fig. 1, INIC I/O controller 72).

Regarding claim 52, I/H/S teaches the network-attached storage device of claim 50, wherein the storage device is a disk (Starr, col. 5, lines 59-60).

Regarding claim 55, I/H/S teaches the network-attached storage device of claim 50, wherein the storage device is a memory device (Starr, col. 6, lines 9-14).

Regarding claim 118, I/H/S teaches the network attached disk device of claim 116, wherein the protocol stack comprises a TCP/IP connection (Starr, col. 7, lines 26-29).

Regarding claim 119, I/H/S teaches the network attached disk device of claim 112, wherein the disk controller comprises: a channel controller (Starr, col. 5, lines 53-57 – controller 72); at least one disk channel operatively connected to the channel controller (Starr, col. 5, lines 53-57 – INIC storage unit 70 connected to INIC controller

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72 via parallel channel 75); a buffer manager operatively connected to the channel controller (Starr, Fig. 1, buffers 77 are connected to controller 72 via bus 48); and a bus interface operatively connected to the buffer manager and the network attached disk device controller (Starr, Fig. 1, buffers 77 are connected to controller 72 via bus 48).

Regarding claim 120, I/H/S teaches the network attached disk device of claim 112, wherein the network attached disk device controller comprises: a main controller operative to generally control the operation of the network attached disk device (Starr, Fig. 1, controller 72); a buffer management module operative to cache data associated with the first disk device (Starr, Fig. 1, INIC memory manager 46, buffers 77, cache 74 of the Communication Control Block (CCB)); a disk controller driver for interfacing with the disk controller (Starr, Fig. 1, INIC driver 39); and a network adapter driver for interfacing with the network adapter (Starr, Fig. 13 is a diagram of a Microsoft.RTM. TCP/IP stack and Alacritech command driver configured for NetBios communications).

Regarding claim 122, I/H/S teaches the network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk (Starr, Col. 7, lines 23-26 – authentication).

6. Claims 53-54, 121, 123 and 124 are rejected under 35 U.S.C. 103(a) as being unpatentable over I/H/S in view of the U. S. Patent No. 6,389,432 to Pothapragada et al. (hereinafter Pothapragada).

Regarding claim 53, modified Irwin teaches the network-attached storage device of claim 50.

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I/H/S Irwin further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support tape drives, but does not explicitly teach the network-attached storage device of claim 50, wherein the storage device is a tape device.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, where one of the virtual volumes is a tape farm (Fig. 2, tape farm 204), which may be controlled by a SCSI controller (Pothapragada, col. 4, lines 19-24).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach the SCSI-controlled tape farm of Pothapragada to remote storage SCSI controller of I/H/S in order to meet the increasing demand for storage and take advantage of dropping prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 54, modified Irwin teaches the network-attached storage device of claim 50.

I/H/S further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support CD-ROM drives, but does not explicitly teach the network-attached storage device of claim 50, wherein the storage device is a CD drive.

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However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, where one of the virtual volumes is a CD drive (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of modified Irwin in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 121, I/H/S teaches the network attached disk device of claim 120.

I/H/S does not explicitly teach the network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote host.

However, Pothapragada a network attached disk device that is operative to provide back-up functionality to the remote host (Pothapragada, col. 13, lines 8-12).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made combine the teaching of modified Irwin with the teachings of Pothapragada in order to enhance the functionality of the network attached disk with additional function of performing backups for the host.

Regarding claim 123, modified Irwin teaches the network attached disk of claim 112.

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I/H/S teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support CD-ROM drives, but does not explicitly teach the network attached storage device of claim 112, wherein the first disk device comprises a compact disk.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of modified Irwin in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 124, modified Irwin teaches the network attached disk of claim 112.

I/H/S further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support DVD-ROM drives. Starr, in combination with Pothapragada further teaches the network-attached storage devices of claim 112, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16). Modified Irwin does not explicitly teach the network attached storage device of claim 112, wherein the first disk device comprises a digital versatile disk.

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"Official Notice" is taken that the concept and the advantages of substituting a digital versatile disk for compact disk is old and well known in the art.

Therefore, it would have been obvious to one of ordinary skills in the art at the time the invention was made to enhance the functionality of modified Irwin by replacing a compact disk with a digital versatile disk. One of ordinary skills in the art would be motivated to do so in order to provide a higher storage capacity per disk.

7. **Examiner's note:** Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

Response to Arguments

8. Applicant's arguments with respect to claims 34-42, 50-55 and 112-124 have been considered but are moot in view of the new ground(s) of rejection, necessitated by the Applicant's amendment.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant is reminded that in amending in response to a rejection of claims, the patentable novelty must be clearly shown in view of the state of the art

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disclosed by the references cited and the objection made. Applicant must show how the amendments avoid such references and objections. See 37 CFR § 1.111(c).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vitali Korobov whose telephone number is 571-272-7506. The examiner can normally be reached on Mon-Friday 8a.m. - 4:30p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached on (571)272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Vitali Korobov
Examiner
Art Unit 2155

08/27/2006
VAK


SALEH NAJJAR
SUPERVISORY PATENT EXAMINER

Notice of References Cited	Application/Control No. 09/974,082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO	
	Examiner Vitali Korobov	Art Unit 2155	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification	
*	A	US-6,807,581	10-2004	Starr et al.	709/250
*	B	US-6,389,432	05-2002	Pothapragada et al.	707/205
*	C	US-6,356,915	03-2002	Chtchetkine et al.	707/200
*	D	US-6,594,677	07-2003	Davis et al.	707/204
*	E	US-6,216,202	04-2001	D'Errico, Matthew J.	711/112
*	F	US-5,566,331	10-1996	Irwin et al.	707/10
*	G	US-6,529,996	03-2003	Nguyen et al.	711/114
*	H	US-5,987,627	11-1999	Rawlings, III, Joseph H.	714/48
*	I	US-6,366,988	04-2002	Skiba et al.	711/165
*	J	US-5,463,772	10-1995	Thompson et al.	707/101
*	K	US-6,834,326	12-2004	Wang et al.	711/114
*	L	US-6,732,104	05-2004	Weber, Bret S.	707/10
*	M	US-6,421,753	07-2002	Hoese et al.	710/305

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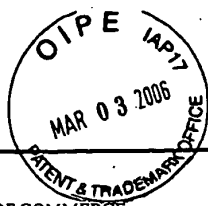
*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N				
	O				
	P				
	Q				
	R				
	S				
	T				

NON-PATENT DOCUMENTS

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
U	
V	
W	
X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

PATENT



Attorney Docket No. 34253/US/2 (473628-9)

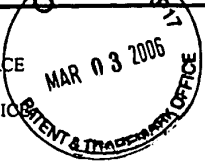
PTO/SB/08A U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)			ATTY. DOCKET NO.: 34253/US/2	APPLICATION NO.: 09/974,082	
			FIRST NAMED INVENTOR: Han-gyoo KIM		
			FILING DATE: October 9, 2001	ART UNIT: 2155	
Sheet	1	of	3	EXAMINER NAME: Korobov, Vitali A.	

U.S. PATENT OR PUBLISHED PATENT APPLICATION DOCUMENTS

EXAMINER INITIALS*	Cite No. ¹	DOCUMENT NUMBER	PUBLICATION DATE MM-DD-YYYY	Name of PATENTEE or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)			
VAK		5,329,619	07-12-1994	Page et al.	
VAK		6,404,766	06-11-2002	Kitai et al.	
VAK		5,513,314	04-30-1996	Kandasamy et al.	
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PATENT

Attorney Docket No. 34253/US/2 (473628-9)

PTO/SB/08A				ATTY. DOCKET NO.:		APPLICATION NO.:	
U.S. DEPARTMENT OF COMMERCE				34253/US/2		09/974,082	
PATENT AND TRADEMARK OFFICE		FIRST NAMED INVENTOR: Han-gyoo KIM					
Substitute for form 1449A/PTO		FILING DATE:		ART UNIT:			
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)		October 9, 2001		2155			
FOREIGN PATENT DOCUMENTS							
EXAMINER INITIALS*	Cite No. ¹	FOREIGN PATENT DOCUMENT	PUBLICATION DATE	Name of PATENTEE or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶	
		Country Code ³ - Number ⁴ - Kind Code ⁵ (if known)	MM-DD-YYYY				
		KR 10-2001-008852R	09-28-2001	Necster Co.			
		KR 10-2000-72493	12-05-2000	Leem Dong Hoo			
		DE 19610840	09-25-1997	Siemens AG			
		JP 11-114324	04-27-1999	Takachi			
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		JP 10-271563	10-06-1998	Taito Corp			
		DE 10038142	02-15-2001	Samsung Elec. Co.			
EXAMINER				DATE CONSIDERED			
/Vitali Korobov/				08/17/2006			
				Lined-through references were not considered			

No English language translation was provided. English language abstracts that were provided are too brief to regard the cited documents as considered based on the review of the respective abstracts.

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3) ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

Index of Claims



Application/Control No.

09/974,082

Examiner

Vitali Korobov

Applicant(s)/Patent under Reexamination

KIM, HAN-GYOO

Art Unit

2155

✓	Rejected
=	Allowed

-	(Through numeral) Cancelled
+	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim	Date			
	Final	Original	8/10/05	2/12/06
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
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Claim	Date			
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Search Notes



Application/Control No.

09/974,082

Examiner

Vitali Korobov

Applicant(s)/Patent under Reexamination

KIM, HAN-GYOO

Art Unit

2155

SEARCHED

Class	Subclass	Date	Examiner
Updated	class. search	8/27/2006	VAK

SEARCH NOTES (INCLUDING SEARCH STRATEGY)

	DATE	EXMR
Updated text search	8/27/2006	VAK

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

Applicant	: Han-Gyoo Kim	Confirmation No: 6653
Appln. No.	: 09/974,082	Group Art Unit: 2155
Filed	: October 9, 2001	Examiner: Korobov, Vitali A.
Title	: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK	

AMENDMENT AND RESPONSE TO OFFICE ACTION

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office action dated August 30, 2006, please consider the following remarks and amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Claims

1-33. (Cancelled)

34. (Currently Amended) A network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising:

a network adapter for receiving a disk access command in data link frames through the network;

a disk controller, connected to the LAN adapter, for executing the disk access command[[s]];

a disk for storing data; and

a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device;

wherein access to the disk is operatively controlled by the disk controller; and

no disk access command is required to be routed through a server associated with the NAD.

35. (Original) The NAD device of claim 34, wherein the network runs Ethernet.

36. (Original) The NAD device of claim 34, wherein said disk is formatted as a local disk.

37. (Original) The NAD device of claim 34, wherein said disk is partitioned as a local disk.

38. (Original) The NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller.

39. (Original) The NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device.

40. (Original) The NAD device of claim 34, wherein the controller has a filter for controlling access to the disk.

41. (Original) The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions.

42. (Original) The NAD device of claim 41, wherein each disk partition is controlled by a separate driver.

43-49. (Cancelled)

50. (Previously Amended) A network-attached storage device adapted to be connected through a network to host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the storage device comprising:

a storage device;

a network adapter for receiving a storage command through the network without requiring routing of any storage command through a server associated with the storage device; and

a storage controller for executing the storage command.

51. (Original) The network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device.

52. (Original) The network-attached storage device of claim 50, wherein the storage device is a disk.

53. (Original) The network-attached storage device of claim 50, wherein the storage device is a tape device.

54. (Original) The network-attached storage device of claim 50, wherein the storage device is a CD drive.

55. (Original) The network-attached storage device of claim 50, wherein the storage device is a memory device.

56-111. (Cancelled)

112. (Previously Presented) A network attached disk device, comprising:
a first disk device;

a network attached disk device controller operative to receive across a network an input/output command for the first disk device without routing of any input/output command through a server associated with the network attached disk device;

a disk controller operative to control the operation of the disk device in response to the input/output command;

a network adapter operative to receive the input/output command from the network attached disk device controller; wherein

the network attached disk device is operative to be recognized as a local device by a remote host.

113. (Previously Presented) The network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host.

114. (Previously Presented) The network attached disk device of claim 112, further comprising a second disk device.

115. (Previously Presented) The network attached disk device of claim 114, wherein the first and second disk devices are both operative to be recognized as unique local devices by the remote host.

116. (Previously Presented) The network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command.

117. (Previously Presented) The network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication.

118. (Previously Presented) The network attached disk device of claim 116, wherein a protocol stack comprises a TCP/IP connection.

119. (Previously Presented) The network attached disk device of claim 112, wherein the disk controller comprises:

a channel controller;

at least one disk channel operatively connected to the channel controller;

a buffer manager operatively connected to the channel controller; and

a bus interface operatively connected to the buffer manager and the network attached disk device controller.

120. (Previously Presented) The network attached disk device of claim 112, wherein the network attached disk device controller comprises:

a main controller operative to generally control the operation of the network attached disk device;

a buffer management module operative to cache data associated with the first disk device;

a disk controller driver for interfacing with the disk controller; and

a network adapter driver for interfacing with the network adapter.

121. (Previously Presented) The network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote host.

122. (Previously Presented) The network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk.

123. (Previously Presented) The network attached disk of claim 112, wherein the first disk device comprises a compact disk.

124. (Previously Presented) The network attached disk of claim 112, wherein the first disk device comprises a digital versatile disk.

REMARKS/ARGUMENTS

This Amendment and Response responds to the Office action dated August 30, 2006, setting forth a shortened three month statutory period for reply expiring on November 30, 2006. Claim 34 is amended to fix typographical errors and no claims are canceled. Accordingly, after entry of this Amendment and Response, claims 34-42, 50-55 and 112-124 remain pending.

I. Rejection of Claims 34-35, 50 and 112-117 Under 35 U.S.C. § 103

The Examiner rejects claims 34-35, 50 and 112-117 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,566,331 to Irwin, Jr. et al. (hereinafter "Irwin"), in view of U.S. Patent No. 6,421,753 to Hoese et al. (hereinafter "Hoese"). The Applicant respectfully traverses this rejection. Initially the Applicant addresses the rejection of independent claims 34, 50 and 112.

A proper prima facie case of obviousness rejection must 1) provide a suggestion or motivation to modify the prior art reference or combine the reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. See MPEP § 2143. The Applicant respectfully submits that the combined references do not teach or suggest all the limitations of independent claims 34, 50 and 112.

Independent claim 34 includes the limitation "a network adaptor for receiving disk access command in data link frames through the network." Claim 50 includes a similar limitation. The Examiner alleges Irwin teaches this limitation by encapsulating data in the form required by the channel-switching fabric transmitted using lower levels of protocol. The Applicant respectfully disagrees. The client in Irwin is connected to a direct attached storage system via a high speed data channel that is connected to the channel-switching fabric of the storage system (see column 5, lines 4-10). A channel is a special purpose communications path designed to connect a client to a storage device at very high data transfer rates (see column 12, lines 30-32). Further, Irwin states that there is an important distinction between a network and a channel. A network is a general purpose data communications path and data that moves through the network is usually processed through many layers of software. As such, the network is incapable of connecting the client to the storage system at data communication transfer rates capable of driving storage devices at the full data transfer rates (see column 12, lines 17-29). That is, a direct attached storage device connected to a host via a channel does not teach a storage device connected to a host via a network as required by independent claims 34 and 50.

Independent claim 112 includes the limitation "a network attached disk controller operative to receive across a network an input/output command for the first disk device."

The Examiner alleges Irwin teaches this limitation through the use of a channel-switching fabric switching encapsulated commands onto an I/O channel where they are read by the controller of the direct access device (see column 15, line 67 to column 16, line 7). That is, the commands are transmitted across a channel, not a general purpose network. For the reasons previously discussed above, the Applicant respectfully submits that Irwin does not teach a network attached controller receiving commands across a network as required by independent claim 112.

Further, the Applicant respectfully submits that the combination of Irwin and Hoese does not teach all the limitations of the independent claims. The storage devices in Hoese are connected to a SCSI bus (see column 2, lines 3-6 and figure 3). That is, the devices are connected to a SCSI bus transport medium and not directly to the network as required by the present invention. Therefore, the Applicant respectfully submits that independent claims 34, 50 and 112 are patentable over Irwin in view of Hoese and respectfully requests such indication by the Examiner.

Rejected claims 35 and 113-117 all depend, either directly or indirectly, from one of independent claims 34 and 112. Accordingly, these dependent claims are themselves patentable over Irwin in view of Hoese for at least the reasons set forth above for the independent claims. This statement is made without reference to or waiving the independent bases of patentability within each dependent claims. The Applicant therefore respectfully requests the Examiner allow the dependent claims over Irwin in view of Hoese.

II. Rejection of Claims 36-42, 51-52, 118-120 and 122 Under 35 U.S.C. § 103

The Examiner rejects claims 36-42, 51-52, 118-120 and 122 under 35 U.S.C. § 103(a) as being unpatentable over Irwin and Hoese in view of U.S. Patent No. 6,807,581 to Starr et al. (hereinafter "Starr"). For at least the following reason, the Applicant respectfully disagrees.

Each of the rejected claims 36-42, 51-52, 118-120 and 122 depend, either directly or indirectly, from one of independent claims 34, 50 and 112. These independent claims have been shown to be patentable. Accordingly, these dependent claims are likewise patentable. The Applicant makes this statement without reference to, or waiving, the independent bases of patentability within each dependent claim.

For at least the foregoing reason, the Applicant respectfully requests the Examiner withdraw his rejections and allow the rejected claims over the cited references.

III. Rejection of Claims 53-54, 121 and 123-124 Under 35 U.S.C. § 103

The Examiner rejects claims 53-54, 121 and 123-124 under 35 U.S.C. § 103(a) as being unpatentable over Irwin, Hoese and Starr in view of U.S. Patent No. 6,389,432 to Pothapragada et al. (hereinafter "Pothapragada").

Each of the rejected claims 53-54, 121 and 123-124 depend, either directly or indirectly, from one of independent claims 50 and 112. These independent claims have been shown to be patentable. Accordingly, these dependent claims are likewise patentable. The Applicant makes this statement without reference to, or waiving, the independent bases of patentability within each dependent claim.

For at least the foregoing reason, the Applicant respectfully requests the Examiner withdraw his rejections and allow the rejected claims over the cited references.

IV. Conclusion


The Applicant thanks the Examiner for his thorough review of the application and pending claims. Further, the Applicant respectfully submits the present application, as amended, is in condition for allowance. Therefore, the Applicant respectfully requests the issuance of a Notice of Allowability at the Examiner's earliest convenience.

This Amendment is submitted contemporaneously with a petition for a one-month extension of time in accordance with 37 CFR § 1.136(a). Accordingly, please charge Deposit Account No. 04-1415 in the amount of \$60.00, for a one-month extension of time fee. The Applicant believes no further fees or petitions are required. However, if any such petitions or fees are necessary, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 accordingly.

If the Examiner should require any additional information or amendment, please contact the undersigned attorney.

Dated: 3 January 2007

Respectfully submitted,


S. Craig Hemenway, Registration No. 44,759
Attorney for Applicant
USPTO Customer No. 20686

DORSEY & WHITNEY LLP
370 Seventeenth Street, Suite 4700
Denver, Colorado 80202-5647
Tel: 303-629-3400
Fax: 303-629-3450

Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	Disk system adapted to be directly attached to network			
First Named Inventor/Applicant Name:	Han-Gyoo Kim			
Filer:	Stephen C. Hemenway/Elissa Ferguson			
Attorney Docket Number:	1203			
Filed as Small Entity				
Utility Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with \$0 paid	2251	1	60	60

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				60

Electronic Acknowledgement Receipt

EFS ID:	1414548
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	32940
Filer:	Stephen C. Hemenway/Elissa Ferguson
Filer Authorized By:	Stephen C. Hemenway
Attorney Docket Number:	1203
Receipt Date:	03-JAN-2007
Filing Date:	09-OCT-2001
Time Stamp:	18:35:14
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 60
RAM confirmation Number	858
Deposit Account	041415

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	CombinedAmendmentandPetitionforExtensionofTime34253US2.pdf	70205	no	2
Warnings:					
Information:					
2	Amendment - After Non-Final Rejection	AmendmentandResponsetoOA34253US2.pdf	298691	no	8
Warnings:					
Information:					
3	Fee Worksheet (PTO-06)	fee-info.pdf	8153	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			377049		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p>					

**COMBINED AMENDMENT & PETITION FOR EXTENSION OF
TIME UNDER 37 CFR 1.136(a) (Small Entity)**

Docket No.
34253/US/2

In Re Application Of: **Han-gyoo Kim**

Application No. 09/974,082	Filing Date October 9, 2001	Examiner Korobov, Vitali A.	Customer No. 20686	Group Art Unit 2155	Confirmation No. 6653
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Invention: **DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK**

COMMISSIONER FOR PATENTS:

This is a combined amendment and petition under the provisions of 37 CFR 1.136(a) to extend the period for filing a response to the Office Action of August 30, 2006 in the above-identified application.
Date

The requested extension is as follows (check time period desired):

- One month Two months Three months Four months Five months

from: November 30, 2006 until: January 3, 2007
Date *Date*

Applicant claims small entity status. See 37 CFR 1.27.

The fee for the amendment and extension of time has been calculated as shown below:

CLAIMS AS AMENDED

	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST # PREV. PAID FOR	NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE
TOTAL CLAIMS	28 -	111 =	0	x \$25.00	\$0.00
INDEP. CLAIMS	3 -	14 =	0	x \$100.00	\$0.00
FEE FOR AMENDMENT					\$0.00
FEE FOR EXTENSION OF TIME					\$60.00
TOTAL FEE FOR AMENDMENT AND EXTENSION OF TIME					\$60.00

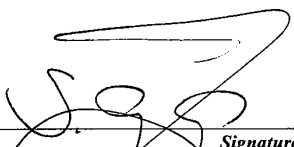
**COMBINED AMENDMENT & PETITION FOR EXTENSION OF
TIME UNDER 37 CFR 1.136(a) (Small Entity)**

Docket No.
34253/US/2

The fee for the amendment and extension of time is to be paid as follows:

- A check in the amount of _____ for the amendment and extension of time is enclosed.
- Please charge Deposit Account No. **04-1415** in the amount of **\$60.00**
- The Director is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. **04-1415**
 - Any additional filing fees required under 37 C.F.R. 1.16.
 - Any patent application processing fees under 37 CFR 1.17.
- If an additional extension of time is required, please consider this a petition therefor and charge any additional fees which may be required to Deposit Account No. **04-1415**
- Payment by credit card. Form PTO-2038 is attached.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.



Signature

S. Craig Hemenway, Registration No. 44,759
Dorsey & Whitney LLP
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370 Seventeenth Street
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USPTO Customer No. 20686

cc:

Dated: 3 January 2007

~~I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to the "Commissioner for Patents, P.O. Box 4150, Alexandria, VA 22310-4150" (37 CFR 1.8(a)) on _____ (Date) _____ Signature of Person Mailing Correspondence _____ Printed or Printed Name of Person Mailing Correspondence _____~~

P28SMALL/REV05

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 00:52
S2	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/02 21:18
S3	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 00:51
S4	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/10 20:08
S5	8535	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/02 22:10
S7	38	S5 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/02 22:37
S8	63	S5 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/02 22:20
S10	116	S5 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 12:10

EAST Search History

S11	4235	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/09 18:03
S12	132	S11 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 13:54
S13	421	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 13:54
S14	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 02:59
S15	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:44
S16	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:44
S17	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:44
S18	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/03 14:44

EAST Search History

S19	8535	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:45
S20	38	S19 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:45
S21	63	S19 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:46
S23	116	S19 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:46
S24	4235	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:47
S25	132	S24 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:47
S26	421	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 14:48
S27	1146	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 15:01

EAST Search History

S28	1	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 15:02
S29	2826	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 18:38
S30	1148	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:31
S31	611	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 18:57
S32	195	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:31
S33	198	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:32
S34	225	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:36
S35	58	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:42

EAST Search History

S37	26	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:55
S38	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 19:55
S39	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/01/03 20:00
S40	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2005/08/04 18:20
S42	190	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2005/08/04 21:14
S43	111	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2005/08/04 21:14
S44	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2005/08/04 21:14
S45	11146	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 14:27
S46	76	S45 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 14:27
S47	189	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2005/08/08 15:28
S48	11	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2005/08/08 15:20

EAST Search History

S49	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2005/08/08 15:29
S50	17	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2005/08/08 18:16
S51	1	"6389432".pn.	USPAT	AND	ON	2005/08/08 15:34
S52	11146	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 15:37
S53	76	S52 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2005/08/08 15:37
S54	1	"6216202".pn.	USPAT	AND	ON	2005/08/08 16:38
S55	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2005/08/08 16:39
S56	14	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2005/08/08 19:15
S57	3	S50 not S56	USPAT	AND	ON	2005/08/08 19:16
S58	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2005/08/09 17:11
S59	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2005/08/09 17:11
S60	21	"Network Attached Storage" "as local"	USPAT	AND	ON	2005/08/09 18:05
S61	268	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2005/08/09 18:06
S62	138	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2005/08/09 18:08
S63	45	"Network Attached Storage" (dvd)	USPAT	AND	ON	2005/08/09 19:51
S64	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2005/08/09 19:51
S65	4741	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2005/08/10 20:07

EAST Search History

S66	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2006/02/11 23:13
S68	9	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2006/02/12 00:56
S69	792	(channel with attach\$4 with storage)	USPAT	AND	ON	2006/02/12 01:17
S70	43	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2006/02/12 01:18
S71	29	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2006/02/12 02:32
S72	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2006/02/12 02:32
S73	9	(virtual adj local adj storage)	USPAT	AND	ON	2006/02/12 02:49
S74	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 02:59
S75	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S76	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S77	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S78	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15

EAST Search History

S79	13573	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S80	55	S79 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S81	95	S79 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S82	194	S79 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S83	7242	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S84	224	S83 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S85	597	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S86	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15

EAST Search History

S87	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S88	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S89	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S90	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15
S91	13573	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S92	55	S91 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S93	95	S91 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S94	194	S91 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15

EAST Search History

S95	7242	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S96	224	S95 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S97	597	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S98	1506	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S99	2	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 0	3562	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 1	1646	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 2	853	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15

EAST Search History

S10 3	295	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 4	276	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 5	309	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 6	78	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 7	29	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 21:36
S10 8	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S10 9	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S11 0	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2006/02/12 16:15
S11 1	203	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2006/02/12 16:15
S11 2	121	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2006/02/12 16:15

EAST Search History

S11 3	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2006/02/12 16:15
S11 4	13573	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S11 5	85	S114 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S11 6	214	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2006/02/12 16:15
S11 7	11	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2006/02/12 16:15
S11 8	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/02/12 16:15
S11 9	19	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/02/12 16:15
S12 0	1	"6389432".pn.	USPAT	AND	ON	2006/02/12 16:15
S12 1	13573	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S12 2	85	S121 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 16:15
S12 3	1	"6216202".pn.	USPAT	AND	ON	2006/02/12 16:15

EAST Search History

S12 4	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2006/02/12 16:15
S12 5	16	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2006/02/12 16:15
S12 6	3	S119 not S125	USPAT	AND	ON	2006/02/12 16:15
S12 7	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2006/02/12 16:15
S12 8	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2006/02/12 16:15
S12 9	22	"Network Attached Storage" "as local"	USPAT	AND	ON	2006/02/12 16:15
S13 0	362	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2006/02/12 16:15
S13 1	181	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2006/02/12 16:15
S13 2	60	"Network Attached Storage" (dvd)	USPAT	AND	ON	2006/02/12 16:15
S13 3	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2006/02/12 16:15
S13 4	5121	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccs.	USPAT	AND	ON	2006/02/13 02:46
S13 5	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2006/02/12 16:15
S13 6	9	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2006/02/12 16:15
S13 7	792	(channel with attach\$4 with storage)	USPAT	AND	ON	2006/02/12 16:15
S13 8	43	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2006/02/12 16:15
S13 9	29	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2006/02/12 16:15
S14 0	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2006/02/12 16:55
S14 1	9	(virtual adj local adj storage)	USPAT	AND	ON	2006/02/12 16:15
S14 2	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/02/12 16:15

EAST Search History

S14 3	26	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; IBM_TDB	AND	ON	2006/02/12 16:49
S14 4	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. (controller with access)	USPAT	AND	ON	2006/02/12 18:39
S14 7	0	(John "L." Sloan).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/02/12 21:37
S15 1	7296	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2006/02/13 02:47
S15 2	56	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual with local with (storage or disk))	USPAT	AND	ON	2006/08/27 00:47
S15 3	327	(virtual with local with (storage or disk))	USPAT	AND	ON	2006/02/13 02:53
S15 4	13	(virtual adj local adj (storage or disk))	USPAT	AND	ON	2006/02/13 02:57
S15 5	7	(virtual adj disk) dell.as.	US-PGPUB; USPAT	AND	ON	2006/02/13 02:58
S15 6	14	("5329619" "6404766" "5513314" "5774660" "6128644" "6175869" "6314465" "6345300" "6317775" "6360265" "6449647" "6470389" "6510164" "5999808").pn.	USPAT	OR	ON	2006/08/17 21:37
S15 7	4	blood.in. and dell.as.	USPAT	AND	ON	2006/08/27 00:33
S15 8	5	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual adj local adj (storage or disk))	USPAT	AND	ON	2006/08/27 00:47
S16 0	2	("6421753" or "5941972").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	AND	ON	2006/08/27 00:53
S16 1	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23

EAST Search History

S16 2	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S16 3	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S16 4	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S16 5	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S16 6	58	S165 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S16 7	115	S165 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S16 8	231	S165 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S16 9	8949	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

S17 0	272	S169 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S17 1	693	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S17 2	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S17 3	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S17 4	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S17 5	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S17 6	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S17 7	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

S17 8	58	S177 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S17 9	115	S177 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S18 0	231	S177 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S18 1	8949	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S18 2	272	S181 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S18 3	693	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S18 4	1746	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S18 5	2	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

S18 6	4057	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S18 7	1938	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S18 8	1000	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S18 9	340	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S19 0	320	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S19 1	364	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S19 2	92	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S19 3	34	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

S19 4	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S19 5	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S19 6	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
S19 7	222	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2006/08/27 20:23
S19 8	134	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2006/08/27 20:23
S19 9	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2006/08/27 20:23
S20 0	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S20 1	92	S200 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S20 2	276	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2006/08/27 20:23
S20 3	13	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2006/08/27 20:23
S20 4	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/08/27 20:23

EAST Search History

S20 5	22	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/08/27 20:23
S20 6	1	"6389432".pn.	USPAT	AND	ON	2006/08/27 20:23
S20 7	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S20 8	92	S207 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S20 9	1	"6216202".pn.	USPAT	AND	ON	2006/08/27 20:23
S21 0	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2006/08/27 20:23
S21 1	18	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2006/08/27 20:23
S21 2	4	S205 not S211	USPAT	AND	ON	2006/08/27 20:23
S21 3	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2006/08/27 20:23
S21 4	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
S21 5	25	"Network Attached Storage" "as local"	USPAT	AND	ON	2006/08/27 20:23
S21 6	528	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2006/08/27 20:23
S21 7	261	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2006/08/27 20:23
S21 8	89	"Network Attached Storage" (dvd)	USPAT	AND	ON	2006/08/27 20:23
S21 9	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2006/08/27 20:23
S22 0	5612	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2006/08/27 20:23

EAST Search History

S22 1	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
S22 2	11	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2006/08/27 20:23
S22 3	831	(channel with attach\$4 with storage)	USPAT	AND	ON	2006/08/27 20:23
S22 4	46	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2006/08/27 20:23
S22 5	32	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2006/08/27 20:23
S22 6	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2006/08/27 20:23
S22 7	11	(virtual adj local adj storage)	USPAT	AND	ON	2006/08/27 20:23
S22 8	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S22 9	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S23 0	8949	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S23 1	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S23 2	8949	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

S23 3	340	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S23 4	320	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S23 5	222	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2006/08/27 20:23
S23 6	134	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2006/08/27 20:23
S23 7	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S23 8	276	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2006/08/27 20:23
S23 9	16349	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S24 0	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2006/08/27 20:23
S24 1	528	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2006/08/27 20:23
S24 2	5612	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2006/08/27 20:23
S24 3	831	(channel with attach\$4 with storage)	USPAT	AND	ON	2006/08/27 20:23
S24 4	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
S24 5	1	"6389432".pn.	USPAT	AND	ON	2006/08/27 20:23
S24 6	1	"6216202".pn.	USPAT	AND	ON	2006/08/27 20:23
S24 7	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2006/08/27 20:23

EAST Search History

S24 8	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
S24 9	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2006/08/27 20:23
S25 0	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S25 1	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S25 2	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S25 3	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S25 4	58	S229 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S25 5	115	S229 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S25 6	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23

EAST Search History

S25 7	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S25 8	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S25 9	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S26 0	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S26 1	58	S231 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S26 2	115	S231 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S26 3	2	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S26 4	92	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

S26 5	34	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S26 6	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S26 7	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S26 8	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2006/08/27 20:23
S26 9	92	S237 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S27 0	13	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2006/08/27 20:23
S27 1	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/08/27 20:23
S27 2	22	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2006/08/27 20:23
S27 3	92	S239 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S27 4	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2006/08/27 20:23

EAST Search History

S27 5	18	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2006/08/27 20:23
S27 6	4	S272 not S275	USPAT	AND	ON	2006/08/27 20:23
S27 7	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
S27 8	25	"Network Attached Storage" "as local"	USPAT	AND	ON	2006/08/27 20:23
S27 9	89	"Network Attached Storage" (dvd)	USPAT	AND	ON	2006/08/27 20:23
S28 0	11	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2006/08/27 20:23
S28 1	46	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2006/08/27 20:23
S28 2	32	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2006/08/27 20:23
S28 3	11	(virtual adj local adj storage)	USPAT	AND	ON	2006/08/27 20:23
S28 4	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/08/27 20:23
S28 5	231	S229 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S28 6	231	S231 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S28 7	261	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2006/08/27 20:23
S28 8	272	S230 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

S28 9	272	S232 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S29 0	364	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S29 1	693	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S29 2	693	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S29 3	1000	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S29 4	1746	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S29 5	1938	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S29 6	4057	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23

EAST Search History

S29 7	31	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; IBM_TDB	AND	ON	2006/08/27 20:23
S29 8	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. (controller with access)	USPAT	AND	ON	2006/08/27 20:23
S29 9	0	(John "L." Sloan).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2006/08/27 20:23
S30 0	72	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual with local with (storage or disk))	USPAT	AND	ON	2006/08/27 20:23
S30 1	8078	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2006/08/27 20:23
S30 2	16	(virtual adj local adj (storage or disk))	USPAT	AND	ON	2006/08/27 20:23
S30 3	387	(virtual with local with (storage or disk))	USPAT	AND	ON	2007/03/30 20:13
S30 4	11	(virtual adj disk) dell.as.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:23
S30 5	14	("5329619" "6404766" "5513314" "5774660" "6128644" "6175869" "6314465" "6345300" "6317775" "6360265" "6449647" "6470389" "6510164" "5999808").pn.	USPAT	OR	ON	2006/08/27 20:23
S30 6	4	blood.in. and dell.as.	USPAT	AND	ON	2006/08/27 20:23
S30 7	5	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual adj local adj (storage or disk))	USPAT	AND	ON	2006/08/27 20:23
S30 8	2	("6421753" or "5941972").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	AND	ON	2006/08/27 20:23
S30 9	1	"20030061401".pn.	US-PGPUB; USPAT	AND	ON	2006/08/27 20:45
S31 0	36	((virtual adj local) with (storage or disk))	USPAT	AND	ON	2007/03/30 20:14

EAST Search History

S31 1	9	("20030014569" or "20050149682" or "20050193017" or "20050193189" or "20060010287" or "20060045130" or "20060067356" or "20060069884" or "20060155805").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	AND	ON	2007/03/30 21:20
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/974,082	10/09/2001	Han-Gyoo Kim	1203	6653
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32940 7590 04/10/2007
DORSEY & WHITNEY LLP
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SAN FRANCISCO, CA 94104

EXAMINER

KOROBOV, VITALI A

ART UNIT	PAPER NUMBER
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2155

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS	04/10/2007	PAPER
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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RESPONSE TO AMENDMENT

1. This Office Action is in response to an amendment filed on 01/03/2007. Claim 34 has been amended. Claims 34-42, 50-55 and 112-124 are currently pending and have been examined in this Office Action.

Paper Submitted

2. It is hereby acknowledged that the following papers have been received and placed of record in the file: **Information Disclosure Statement** as received on 08/30/2006 was considered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 34-35, 50 and 112-117 are rejected under 35 U.S.C. 103(a) as being unpatentable over the U. S. Patent No. 5,566,331, issued to Irwin, Jr. et al., hereinafter Irwin, in view of the U. S. Patent No. 6,421,753 issued to Hoese et al., hereinafter Hoese.

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Regarding claim 34, Irwin teaches a network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host (Col. 2, lines 54-61), the NAD device comprising: a network adapter for receiving a disk access command in data link frames through the network (Encapsulating data in the form required by the channel-switching fabric (col: 10, lines 58-63) transmitted using lower levels of protocol (col. 12, lines 30-35). Implementation of Ethernet that Irwin teaches in col. 13, lines 59-64 inherently requires a storage device connected to the Ethernet to have a network adapter); a disk controller, connected to the LAN adapter (col. 15, line 67 and col. 16, lines 1-7 - controller of the direct access storage device), for executing the disk access command (col. 16, lines 1-7 - controller of the direct access storage device decapsulates and executes access commands); a disk for storing data (Fig. 1, direct access storage devices 40-1 to 40-m); and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device (Fig. 1, control path 13); wherein access to the disk is operatively controlled by the disk controller (col. 15, lines 59-67 and col. 16, lines 1-7).

Irwin does not explicitly teach the NAD device wherein no disk access command is required to be routed through a server associated with the NAD.

However, Hoese in analogous art, directed to a method for providing virtual local storage on remote SCSI storage devices, teaches the NAD device wherein no disk

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access command is required to be routed through a server associated with the NAD (Hoese, col. 3, lines 30-37). Hoese essentially takes the invention of Irwin (See Fig. 1 of Hoese, data access server 14), and proposes to eliminate the data storage server in order to speed up the data access (Hoese, col. 1, lines 50-55), and to implement other technical advantages (Hoese, col. 2, lines 25-44).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Hoese into the teachings of Irwin in order to speed up the data access (Hoese, col. 1, lines 50-55) and to implement other technical advantages (Hoese, col. 2, lines 25-44). Modified in this manner Irwin is hereinafter referred to as "modified Irwin".

Regarding claim 35, modified Irwin teaches the NAD device of claim 34, wherein the network runs Ethernet (col. 13, lines 59-64).

Claim 50 does not teach or define any new limitations above claim 34 and therefore is rejected under the same rationale as claim 34.

Regarding claim 112, modified Irwin teaches a network attached disk device, comprising: a first disk device (Fig. 1, 40-2); a network attached disk device controller operative to receive across a network an input/output command for the first disk device (col. 15, line 67 and col. 16, lines 1-7 - controller of the direct access storage device) without routing of any input/output command through a server associated with the network attached disk device (Hoese, col. 3, lines 30-37); a disk controller operative to control the operation of the disk device in response to the input/output command (col.

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16, lines 1-7 - controller of the direct access storage device decapsulates and executes access commands); a network adapter operative to receive the input/output command from the network attached disk device controller (Implementation of Ethernet that Irwin teaches in col. 13, lines 59-64 inherently requires a storage device, connected to the Ethernet to have a network adapter); wherein the network attached disk device is operative to be recognized as a local device by the remote host (col. 2, lines 54-61).

Regarding claim 113, modified Irwin teaches the network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host (col. 2, lines 54-61).

Regarding claim 114, modified Irwin teaches the network attached disk device of claim 112, further comprising a second disk device (Fig. 1, any of the devices 40-1, or 40-3 to 40-m).

Regarding claim 115, modified Irwin teaches the network attached disk device of claim 114, wherein the first and second disk devices are both operative to be recognized as unique local devices by the remote host (Col. 8, lines 49-60 - mass storage system 10 allows each client data processor the possible use of many file-systems located on many different direct access storage devices).

Regarding claim 116, modified Irwin teaches the network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command (Col. 10, lines 46-52).

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Regarding claim 117, modified Irwin teaches the network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication (Fig. 3, protocol stack 209).

4. Claims 36-42, 51-52, 55, 118-120 and 122 are rejected under 35 U.S.C. 103(a) as being unpatentable over modified Irwin in view of the U. S. Patent No. 6,807,581 to Starr et al., hereinafter Starr.

Regarding claim 36, modified Irwin teaches the NAD device of claim 34.

Modified Irwin does not explicitly teach such device wherein said disk is formatted as a local disk.

However, Starr in analogous art, related to a network attached storage unit, teaches such device wherein said disk is formatted as a local disk (As per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Starr into the teachings of Irwin in order to reduce overhead associated with accessing data stored in different file formats. (Modified Irwin with incorporated teachings of Starr is hereinafter referred to as I/H/S).

Regarding claim 37, I/H/S teaches the NAD device of claim 34, wherein said disk is partitioned as a local disk (Starr, as per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23. Also, as per col. 6, lines 30-

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35, the file system 23 supports logical file format, and therefore is inherently capable of supporting partitions, partitions being nothing more than logical subdivisions of a physical disk space).

Regarding claim 38, I/H/S teaches the NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller (Starr, col. 5, lines 35-39 and Fig. 1 – Media Access Control 60).

Regarding claim 39, I/H/S teaches the NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device (Starr, Fig. 1, I/O controller 72).

Regarding claim 40, I/H/S teaches the NAD device of claim 34, wherein the controller has a filter for controlling access to the disk (Starr, col. 7, lines 23-26 – filtering based on authentication and other connection initialization procedures).

Regarding claim 41, I/H/S teaches the NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions (Starr, col. 5, line 67, col. 6, lines 1-4 – optional boot partition).

Regarding claim 42, I/H/S teaches the NAD device of claim 41, wherein each disk partition is controlled by a separate driver (Col. 5, lines 59-64 – RAID. The disks (partitions) in RAID are independent by definition, since RAID stands for “redundant array of independent disks”).

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Regarding claim 51, I/H/S teaches the network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device (Starr, Fig. 1, INIC I/O controller 72).

Regarding claim 52, I/H/S teaches the network-attached storage device of claim 50, wherein the storage device is a disk (Starr, col. 5, lines 59-60).

Regarding claim 55, I/H/S teaches the network-attached storage device of claim 50, wherein the storage device is a memory device (Starr, col. 6, lines 9-14).

Regarding claim 118, I/H/S teaches the network attached disk device of claim 116, wherein the protocol stack comprises a TCP/IP connection (Starr, col. 7, lines 26-29).

Regarding claim 119, I/H/S teaches the network attached disk device of claim 112, wherein the disk controller comprises: a channel controller (Starr, col. 5, lines 53-57 – controller 72); at least one disk channel operatively connected to the channel controller (Starr, col. 5, lines 53-57 – INIC storage unit 70 connected to INIC controller 72 via parallel channel 75); a buffer manager operatively connected to the channel controller (Starr, Fig. 1, buffers 77 are connected to controller 72 via bus 48); and a bus interface operatively connected to the buffer manager and the network attached disk device controller (Starr, Fig. 1, buffers 77 are connected to controller 72 via bus 48).

Regarding claim 120, I/H/S teaches the network attached disk device of claim 112, wherein the network attached disk device controller comprises: a main controller operative to generally control the operation of the network attached disk device (Starr,

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Fig. 1, controller 72); a buffer management module operative to cache data associated with the first disk device (Starr, Fig. 1, INIC memory manager 46, buffers 77, cache 74 of the Communication Control Block (CCB)); a disk controller driver for interfacing with the disk controller (Starr, Fig. 1, INIC driver 39); and a network adapter driver for interfacing with the network adapter (Starr, Fig. 13 is a diagram of a Microsoft.RTM. TCP/IP stack and Alacritech command driver configured for NetBios communications).

Regarding claim 122, I/H/S teaches the network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk (Starr, Col. 7, lines 23-26 – authentication).

5. Claims 53-54, 121, 123 and 124 are rejected under 35 U.S.C. 103(a) as being unpatentable over I/H/S in view of the U. S. Patent No. 6,389,432 to Pothapragada et al. (hereinafter Pothapragada).

Regarding claim 53, modified Irwin teaches the network-attached storage device of claim 50.

I/H/S Irwin further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support tape drives, but does not explicitly teach the network-attached storage device of claim 50, wherein the storage device is a tape device.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, where one of the virtual volumes is a

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tape farm (Fig. 2, tape farm 204), which may be controlled by a SCSI controller (Pothapragada, col. 4, lines 19-24).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach the SCSI-controlled tape farm of Pothapragada to remote storage SCSI controller of I/H/S in order to meet the increasing demand for storage and take advantage of dropping prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 54, modified Irwin teaches the network-attached storage device of claim 50.

I/H/S further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support CD-ROM drives, but does not explicitly teach the network-attached storage device of claim 50, wherein the storage device is a CD drive.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, where one of the virtual volumes is a CD drive (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of modified Irwin in order to meet the increasing demand for

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storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 121, I/H/S teaches the network attached disk device of claim 120.

I/H/S does not explicitly teach the network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote host.

However, Pothapragada a network attached disk device that is operative to provide back-up functionality to the remote host (Pothapragada, col. 13, lines 8-12).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made combine the teaching of modified Irwin with the teachings of Pothapragada in order to enhance the functionality of the network attached disk with additional function of performing backups for the host.

Regarding claim 123, modified Irwin teaches the network attached disk of claim 112.

I/H/S teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support CD-ROM drives, but does not explicitly teach the network attached storage device of claim 112, wherein the first disk device comprises a compact disk.

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However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of modified Irwin in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 124, modified Irwin teaches the network attached disk of claim 112.

I/H/S further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support DVD-ROM drives. Starr, in combination with Pothapragada further teaches the network-attached storage devices of claim 112, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16). Modified Irwin does not explicitly teach the network attached storage device of claim 112, wherein the first disk device comprises a digital versatile disk.

“Official Notice” is taken that the concept and the advantages of substituting a digital versatile disk for compact disk is old and well known in the art.

Therefore, it would have been obvious to one of ordinary skills in the art at the time the invention was made to enhance the functionality of modified Irwin by replacing

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a compact disk with a digital versatile disk. One of ordinary skills in the art would be motivated to do so in order to provide a higher storage capacity per disk.

6. **Examiner's note:** Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

Response to Arguments

7. Applicant's arguments filed 01/03/2007 have been fully considered but they are not persuasive.

The Applicant argues – ***“That is, a direct attached storage device connected to a host via a channel does not teach a storage device connected to a host via a network as required by independent claims 34 and 50.”***

The Examiner respectfully submits that a channel is simply a high bandwidth link between two points, or nodes, of a network, and as such is a part of a network. Therefore, it is the Examiner's opinion is that Irwin does teach a storage device connected to a network.

The Applicant argues – ***“That is, the commands are transmitted across a channel, not a general purpose network. For the reasons previously discussed above, the Applicant respectfully submits that Irwin does not teach a network***

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attached controller receiving commands across a network as required by independent claim 112."

The Examiner respectfully submits that a channel is simply a high bandwidth link between two points, or nodes, of a network, and as such is a part of a network. Therefore, it is the Examiner's opinion is that Irwin does teach a storage device connected to a network. Furthermore, there are no limitations in claim 112 directed to "general purpose" network.

The Applicants argue – ***"That is, the devices are connected to a SCSI bus transport medium and not directly to the network as required by the present invention. Therefore, the Applicant respectfully submits that independent claims 34, 50 and 112 are patentable over Irwin in view of Hoese and respectfully requests such indication by the Examiner."***

The Examiner respectfully refers the Applicant to Figs. 2 and 3, which shows that workstation 40 connected to disks 42 via a SCSI bus, but workstations 36 are connected to disks 38 without employing SCSI bus.

The Applicant argues allowability of dependent claims based on their dependency from independent claims, which the Applicant argues are allowable. The Examiner respectfully submits that based on the above Examiner's arguments the independent claims are not allowable over Irwin and Hoese. Therefore, the Office respectfully maintains the rejection of all pending claims and makes the rejection final.

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Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vitali Korobov whose telephone number is 571-272-7506. The examiner can normally be reached on Mon-Friday 8a.m. - 4:30p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached on (571)272-4006. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

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For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Vitali Korobov
Examiner
Art Unit 2155

VAK
03/31/2007


SALEH NAJJAR
SUPERVISORY PATENT EXAMINER

PTO/SB/08A (08-03) U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE Substitute for Form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	APPLICATION NO.: 09/974,082	FILING DATE: October 9, 2001
	INVENTOR(S): Han-gyoo Kim	ART UNIT: 2155
	EXAMINER NAME: Korobov, Vitali A.	ATTY. DOCKET NO.: 34253/US/2

U.S. PATENT DOCUMENTS					
EXAMINER INITIALS*	Cite No. ¹	PATENT NUMBER	ISSUE DATE	Name of Patentee of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		

U.S. PUBLICATION DOCUMENTS					
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		Number - Kind Code ² (if known)	MM-DD-YYYY		
NAK/	1.	2003/0014569	01/2003	Kim	
NAK/	2.	2005/0149682	07/2005	Kim	
NAK/	3.	2005/0193017	09/2005	Kim	
NAK/	4.	2005/0193189	09/2005	Kim	
NAK/	5.	2006/0010287	01/2006	Kim	
NAK/	6.	2006/0045130	03/2006	Kim	
NAK/	7.	2006/0067356	03/2006	Kim	
NAK/	8.	2006/0069884	03/2006	Kim	
NAK/	9.	2006/0155805	07/2006	Kim	

FOREIGN PATENT DOCUMENTS						
EXAMINER INITIALS*	Cite No. ¹	DOCUMENT NUMBER	PUBLICATION DATE	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
		Country Code ³ - Number ² - Kind Code ⁴ (if known)	MM-DD-YYYY			

* EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS			
EXAMINER INITIALS ²	Cite No. ¹	Include name of Author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁶
EXAMINER /Vitali Korobov/		DATE CONSIDERED 03/30/2007	
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Notice of References Cited	Application/Control No. 09/974,082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO	
	Examiner Vitali Korobov	Art Unit 2155	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,807,581	10-2004	Starr et al.	709/250
*	B	US-6,389,432	05-2002	Pothapragada et al.	707/205
*	C	US-6,356,915	03-2002	Chtchetkine et al.	707/200
*	D	US-6,594,677	07-2003	Davis et al.	707/204
*	E	US-6,216,202	04-2001	D'Errico, Matthew J.	711/112
*	F	US-5,566,331	10-1996	Irwin et al.	707/10
*	G	US-6,529,996	03-2003	Nguyen et al.	711/114
*	H	US-5,987,627	11-1999	Rawlings, III, Joseph H.	714/48
*	I	US-6,366,988	04-2002	Skiba et al.	711/165
*	J	US-5,463,772	10-1995	Thompson et al.	707/101
*	K	US-6,834,326	12-2004	Wang et al.	711/114
*	L	US-6,732,104	05-2004	Weber, Bret S.	707/10
*	M	US-6,421,753	07-2002	Hoese et al.	710/305

FOREIGN PATENT DOCUMENTS

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	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims



Application/Control No.

09/974,082

Examiner

Vitali Korobov

Applicant(s)/Patent under Reexamination

KIM, HAN-GYOO

Art Unit

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√	Rejected
=	Allowed

-	(Through numeral) Cancelled
+	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim	Date					
	Final	Original	8/10/05	2/12/06	8/27/06	3/30/07
1	-	-	-	-	-	-
2	-	-	-	-	-	-
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4	-	-	-	-	-	-
5	-	-	-	-	-	-
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Claim	Date					
	Final	Original	8/10/05	2/12/06	8/27/06	3/30/07
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Claim	Date					
	Final	Original	8/10/05	2/12/06	8/27/06	3/30/07
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150	-	-	-	-	-	-

Search Notes



Application/Control No.	Applicant(s)/Patent under Reexamination	
09/974,082	KIM, HAN-GYOO	
Examiner	Art Unit	
Vitali Korobov	2155	

SEARCHED			
Class	Subclass	Date	Examiner
Updated	class. search	3/30/2007	VAK

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
Updated text search	3/30/2007	VAK

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicant: Han-gyoo Kim	
App. No.: 09/974,082	Con. No.: 6653
Filed: October 9, 2001	Art Unit: 2155
Title: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK	Examiner: Korobov, Vitali A.

**SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§1.97(c) and 1.98**

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Examiner is requested to consider the references noted on the enclosed Form PTO/SB/08a during examination of the above-identified patent application. These references are submitted for the Examiner's consideration and are submitted pursuant to the duty of disclosure under 37 C.F.R. § 1.56. In submitting these references, no representation is made or implied that the references are or are not material to the examination of the application. The Examiner is encouraged to make his or her own determination of materiality. Pursuant to the requirements of 37 C.F.R. § 1.98(a)(2)(ii), only copies of the foreign references and non-patent literature documents are provided. Copies of the U.S. patent and U.S. patent application publication references are not provided, unless required by the Office.

The Japanese patent reference cited on the attached PTO/SB/08a was cited in a Japanese Office action dated January 9, 2007, in possibly related Japanese Patent Application No. 555298/2002 and also in a Japanese Office action dated February 6, 2007, in possibly related Japanese Patent Application No. 513300/2003. Copies of these Office actions are enclosed herewith.

The official translation of the Japanese Office action for Japanese Patent Application No. 555298/2002, provided to us by our foreign associate, misdates the action as being issued on

January 9, 2006. A copy of the official Office action showing the proper date of January 9, 2007 is also enclosed.

Also cited in the Japanese Office Action for Japanese Application No. 555298/2002 was the WO99/03297 reference.

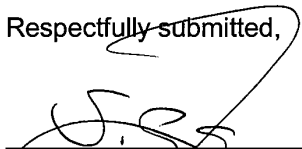
The following patent is not in the English language: JP11007404. An English translation of the abstract is attached to the patent, which is enclosed, to satisfy the requirement for a concise explanation of relevance.

This Supplemental Information Disclosure Statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of either (1) a final action under 37 C.F.R. § 1.113 or (2) a Notice of Allowance under 37 C.F.R. § 1.311. Pursuant to 37 C.F.R. § 1.17(p), please charge \$180.00 to Deposit Account no. 04-1415. If any additional fees are deemed necessary, such fees may also be charged to Deposit Account No. 04-1415.

If the Examiner has any questions, please contact the undersigned attorney.

Dated: 3 May 2007

Respectfully submitted,


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Attorney for Applicant
USPTO Customer No. 20686

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PTO/SB/08A (08-03) U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE Substitute for Form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>	APPLICATION NO.: 09/974,082	FILING DATE: October 9, 2001
	INVENTOR(S): Han-gyoo Kim	ART UNIT: 2155
	EXAMINER NAME: Korobov, Vitali A.	ATTY. DOCKET NO.: 34253/US/2

U.S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No. ¹	PATENT NUMBER	ISSUE DATE	Name of Patentee of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		
	1.	6,760,783	07/2004	Berry	

U.S. PUBLICATION DOCUMENTS

EXAMINER INITIALS*	Cite No. ¹	PUBLICATION NUMBER	PUBLICATION DATE	Name of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		
	2.	2007/0008988	01/2007	Kim	

FOREIGN PATENT DOCUMENTS

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		Country Code ³ - Number ² - Kind Code ⁵ (if known)	MM-DD-YYYY			
	3.	JP11007404	01/1999	Tokyo Shibaura Electric Co.		X
	4.	WO99/03297	07/1999	Crossroads Systems, Inc.		

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

EXAMINER INITIALS*	Cite No. ¹	Include name of Author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), volume-issue number(s), publisher, page(s) and date.	T ⁶
	5.	Japanese Office Action, App. No. 555298/2002, January 9, 2007.	
	6.	Japanese Office Action, App. No. 513300/2003, February 6, 2007.	
EXAMINER		DATE CONSIDERED	
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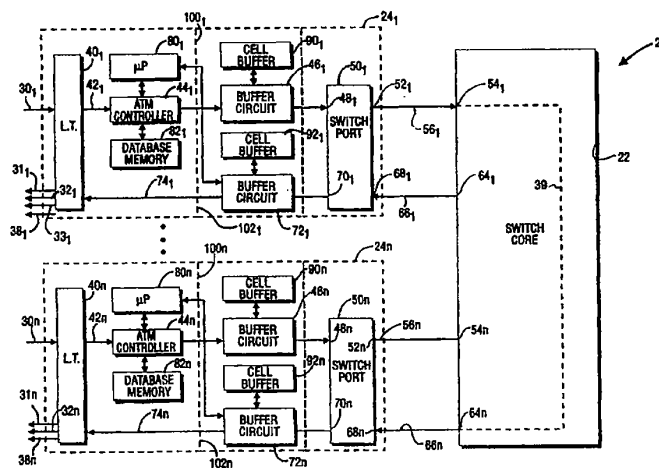
¹ Applicant's unique citation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : H04Q 11/04</p>	<p>A1</p>	<p>(11) International Publication Number: WO 99/03297 (43) International Publication Date: 21 January 1999 (21.01.99)</p>
<p>(21) International Application Number: PCT/SE98/01065 (22) International Filing Date: 4 June 1998 (04.06.98) (30) Priority Data: 08/893,677 11 July 1997 (11.07.97) US (71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE). (72) Inventors: BJENNE, Anders; Kritvägen 13, S-141 34 Huddinge (SE). FRANSSON, Clarence; Vårgårdavägen 35, S-125 51 Älvsjö (SE). LARSSON, Gunnar; Rådjursvägen 43, S-147 34 Tumba (SE). SISSONEN, Raimo; Taggsåmpsvägen 131, S-141 60 Huddinge (SE). (74) Agent: ERICSSON TELECOM AB; IPR Management & Patent Dept., S-126 25 Stockholm (SE).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>

(54) Title: BUFFERING OF POINT-TO-POINT AND/OR POINT-TO-MULTIPOINT ATM CELLS



(57) Abstract

An Asynchronous Transfer Mode (ATM) switching device (20) has ATM cells (both point-to-point and point-to-multipoint) routed therethrough to one or more physical output links (31 - 38). The switching device (20) includes a cell buffer memory (92) which is the sole storage area on an egress exchange terminal for all cells, including point-to-multipoint cells, regardless of to which physical output link the cell is destined. For point-to-multipoint cells, pointers to the location of the cell in the cell buffer memory (92) are stored in one or more pointer queues (114), the pointer queues (114) corresponding to physical output links over which the point-to-multipoint cells are expected to be propagated. As each physical output link is selected, the pointer in the corresponding pointer queue is used to obtain the cell from the cell buffer memory (92) for readout on the selected link.

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BUFFERING OF POINT-TO-POINT AND/OR POINT-TO-MULTIPOINT ATM CELLS

BACKGROUND

This application is related to simultaneously filed US Patent Application Serial No. 08/____,____ (attorney docket
5 1410-238) entitled "AUGMENTATION OF ATM CELL WITH BUFFERING DATA ", which is incorporated herein by reference.

1. Field of Invention

10 This invention pertains to telecommunications, and particularly to the handling of cells in a switching node of a telecommunications network operating in the asynchronous transfer mode.

2. Related Art and Other Considerations

15 The increasing interest for high band services such as multimedia applications, video on demand, video telephone, and teleconferencing has motivated development of the Broadband Integrated Service Digital Network (B-ISDN). B-ISDN is based on a technology know as Aynchronous
20 Transfer Mode (ATM), and offers considerable extension of telecommunications capabilities.

25 ATM is a packet-oriented transfer mode which uses asynchronous time division multiplexing techniques. Packets are called cells and have a fixed size. An ATM cell consists of 53 octets, five of which form a header and forty eight of which constitute a "payload" or information portion of the cell. The header of the ATM cell includes two quantities which are used to identify a connection in an ATM

-2-

network over which the cell is to travel, particularly the VPI (Virtual Path Identifier) and VCI (Virtual Channel Identifier). In general, the virtual path is a principal path defined between two switching nodes of the network; the virtual channel is one specific connection on the respective principal path.

At its termination points, an ATM network is connected to terminal equipment, e.g., ATM network users. Between ATM network termination points are a plurality of switching nodes having ports which are connected together by physical transmission paths or links. In traveling from an origin terminal equipment to a destination terminal equipment, ATM cells forming a message may travel through several switching nodes.

A switching node has a plurality of ports, each of which is connected by via a line termination circuit and a link to another node. The line termination circuit performs packaging of the cells according to the particular protocol in use on the link. A cell incoming to a switching node may enter the switching node at a first port and exit from a second port via a line termination circuit onto a link connected to another node. Each link can carry cells for a plurality of connections, a connection being a transmission between a calling subscriber or party and a called subscriber or party.

Many cells which are transmitted through an ATM network travel from an origination node to a single destination or target node, and accordingly are known as point-to-point cells. Some switching nodes are capable of handling cells, known as point-to-multipoint cells, which travel from an origination node to a plurality of destination nodes. Some of the point-to-multipoint cells, although being for differing connections, may travel on the

-3-

same link.

5 The switching nodes each typically have several functional parts, a primary of which is a switch core. The switch core essentially functions like a cross-connect between ports of the switch. Paths internal to the switch core are selectively controlled so that particular ports of the switch are connected together to allow a message ultimately to travel from the originating terminal equipment to the destination terminal equipment.

15 In a conventional switching technique, queues or buffers are provided for each port for e.g., storing cells prior to readout. In situations in which cells may have one of a plurality of priority classes, each port may have a number of queues or buffers corresponding to the number of priority classes. Cells are fed into an appropriate buffer by an input queue selector, and are readout of the buffer at an appropriate time by an output queue selector. In contrast to point-to-point cells, a common queue or buffer is provided (e.g., one queue for each priority class) for point-to-multipoint cells. When a point-to-multipoint cell is to be readout, the common queue for the point-to-multipoint cells is selected. How often the common queue for the point-to-multipoint cells is selected for a given cell payload depends on the number of point-to-multipoint leaves for which the cell is to be utilized. Thus, in essence, the cell is copied from the common queue in accordance with the number of nodes or multipoint leaves to which it is to be transmitted. A point-to-multipoint cell belongs to one connection; the cell is copied to all leaves.

35 At times a particular one of the line termination circuits (through which the switch port is connected to a corresponding outgoing link) can indicate that it is temporarily busy or saturated. In such cases, that

-4-

particular line termination circuit may generate a signal indicating that no more data should be sent to its link. Such a busy signal is particularly prone to occur when the cell in the common queue for point-to-multipoint cells is repeatedly replicated to one link. When such a busy signal occurs, other cells cannot be readout of the common queue for point-to-multipoint cells and cannot be forwarded to other links. Thus, the particular link which stopped readout from the common queue for point-to-multipoint cells effectively blocks the common queue, and sets up what has been termed a 'head of queue blocking problem'. The head of queue blocking problem undesirably increases the delay for point-to-multipoint cell copies destined for other links. This problem may also result in discarding of point-to-multipoint cells in the queue. In some implementations, the problems can be propagated to ingress point-to-multipoint queues, and discarding may be necessary. Even point-to-point queues may in some implementations be affected. These problems may result in degradation of throughput.

20

Another problem with a common point-to-multipoint queue is that it causes long delays between readout of first cell and last cells in a large point-to-multipoint tree (e.g., many leaves).

25

An alternative to the foregoing technique is the copying of point-to-multipoint cells to all leaves before storing the cells in the different link queues. However, such copying requires cessation of cell input until all copies have been made, which may decrease throughput and increase delay. Such copying could conceivably be accomplished in background (e.g., while waiting to fill empty cell slots), but since the copying may take a long time the delay and delay variation for point-to-multipoint cells will be very poor.

30
35

What is needed therefore, and an object of the

-5-

present invention, is a technique for efficiently handling point-to-multipoint ATM cells in a switching node.

SUMMARY

5 An Asynchronous Transfer Mode (ATM) switching device has ATM cells (both point-to-point and point-to-multipoint) routed therethrough to one or more physical output links. The switching device includes a cell buffer memory which is the sole storage area for all cells on the
10 egress exchange terminal, including point-to-multipoint cells, regardless of to which physical output link the cell is destined. For point-to-multipoint cells, pointers to the location of the cell in the cell memory are stored in one or more pointer queues, the pointer queues corresponding to
15 physical output links over which the point-to-multipoint cells are expected to be propagated. As each physical output link is selected, the pointer in the corresponding pointer queue is used to obtain the cell from the cell buffer memory for readout on the selected link.

20 A connection data record memory has stored therein at least two connection data records for each point-to-multipoint cell. The first connection data record has stored therein a next leaf pointer for each of the physical output
25 links which are active for the cell as well as an indicator of which physical output links are active for the cell. The second connection data record, for an active one of the physical output links, is pointed to by the next leaf pointer of the first connection data record for the
30 respective physical output link. The second connection data record has at least one of a virtual path identifier (VPI) and a virtual circuit identifier (VCI) stored therein for inclusion in the output-destined ATM cell. The second connection data record also stores a last leaf flag which
35 indicates whether there is a further connection data record for the respective physical output link. The second connection data record further has a further next leaf

-6-

pointer in the case that the last leaf flag of the second
connection data record indicates there is a further
connection data record. The further next leaf pointer
points to the further connection data record. Thus, a
5 linked list of connection data records is established so
that copies of the point-to-multipoint cell can be sent over
the same physical output link.

BRIEF DESCRIPTION OF THE DRAWINGS

10 The foregoing and other objects, features, and
advantages of the invention will be apparent from the
following more particular description of preferred
embodiments as illustrated in the accompanying drawings in
which reference characters refer to the same parts
15 throughout the various views. The drawings are not
necessarily to scale, emphasis instead being placed upon
illustrating the principles of the invention.

20 Fig. 1 is a schematic view of an ATM switch
according to an embodiment of the invention.

Fig. 2 is a schematic view of a buffer circuit
included in the ATM switch of Fig. 1.

25 Fig. 3 is a schematic view of a memory structure
of a buffer circuit according to an embodiment of the
invention.

30 Fig. 4 is a schematic view of a connection data
record (CDR) data structure.

Fig. 5 is a flowchart showing basic steps involved
in processing a cell obtained from a switch core and stored
in a cell buffer memory.

35

Fig. 6 is a flowchart showing basic steps involved

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in processing a cell obtained from a cell buffer memory and applied to a physical link.

5 Fig. 7 is a diagrammatic view of a cell obtained from a switch core of the ATM switch of Fig. 1.

10 Fig. 8 is a diagrammatic view of a point-to-point cell stored in a cell buffer memory of the ATM switch of Fig. 1.

15 Fig. 9 is a diagrammatic view of a point-to-multipoint cell stored in a cell buffer memory of the ATM switch of Fig. 1.

20 Fig. 10 is a diagrammatic view of a point-to-point connection data record.

25 Fig. 11 is a diagrammatic view of a point-to-multipoint connection data record.

30 Fig. 12 is a diagrammatic view of a point-to-multipoint pointer connection data record.

35 Fig. 13 is a diagrammatic view of a set of queue pointers in relationship to a set of queues.

Fig. 14 is a diagrammatic view showing a relationship of free list pointers, a free list of cell pointers, and a cell buffer.

Fig. 15 is a diagrammatic view showing a relationship of start and stop cell queue pointers, a queue, and a cell buffer.

Fig. 16A - Fig. 16E are diagrammatic views showing selected contents of a cell buffer and memory of a buffer circuit in the course of handling an exemplary point-to-

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multipoint cell in accordance with a mode of the invention.

Fig. 17 is a diagrammatic view of a portion of the connection data record structure of Fig. 4, and further
5 showing utilization of next leaf pointers.

DETAILED DESCRIPTION OF THE DRAWINGS

In the following description, for purposes of explanation and not limitation, specific details are set
10 forth such as particular architectures, interfaces, techniques, etc. in order to provide a thorough understanding of the present invention. However, it will be apparent to those skilled in the art that the present invention may be practiced in other embodiments that depart
15 from these specific details. In other instances, detailed descriptions of well known devices, circuits, and methods are omitted so as not to obscure the description of the present invention with unnecessary detail.

20 Fig. 1 shows an ATM switch 20 which primarily includes a switch core 22 and a plurality of device boards or exchange terminals $24_1 - 24_n$. Each exchange terminal is connected to other portions of an ATM network, e.g., other nodes, by a set of ingress physical links 30 and a set of
25 egress physical links 31 - 38. For example, exchange terminal 24_1 is shown with ingress physical links 30_1 and egress physical links $31_1 - 38_1$.

30 Although only two exchange terminals 24 are shown in Fig. 1, it should be understood that many other such exchange terminals are provided and are connected to switch core 22 in the same manner shown with respect to the illustrated exchange terminals. Moreover, unsubscripted
35 reference to an exchange terminal or a constituent element of an exchange terminal is intended to refer to any such exchange terminal or element generically, and not to one specific exchange terminal or element. The egress physical

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links, such as links 31₁ - 38₁, are also generically referred to as links phy0 - phy7, respectively, which generic representations are also abbreviated as ph0 - ph7, respectively.

5

A primary function of switch core 22 is to perform space switching, e.g., to route ATM cells received at one input terminal thereof to an appropriate output terminal(s) of switch core 22, so that an ATM transmission (potentially comprising many ATM cells) can occur between origination terminal equipment (the sender) and destination terminal equipment (the intended receiver). For example, as illustrated by broken line 39, Fig. 1 shows switch core 22 connecting two ports so that cells on link 30₁ incoming to switch 20 are ultimately transmitted to one or more of egress links 31_n - 38_n. Switch core 22 also performs copying of ATM cells and distribution of ATM cells to appropriate output terminals thereof in the case of point-to-multipoint cells, also known as multicast cells. The structure and operation of switch core 22 is understood by the person skilled in the art and accordingly is not detailed further herein.

Exchange terminals 24 of switch 20 each include line termination equipment (L.T.) 40 for interfacing with ingress physical links 30 and egress physical links 31 - 38. On their incoming side, each exchange terminal 24 has links 42 which connect line termination equipment 40 with an ATM controller 44. In the illustrated embodiment, as many as thirty two physical links 30 can be connected to ATM controller 44. An output terminal of controller 44 is connected to first buffer circuit 46, which in turn is connected to a switch port ingress input terminal 48 of switch port 50. Switch port 50 has an ingress output terminal 52 which is connected to a suitable one of a plurality of switch core ingress input terminals 54 by a switch core ingress input interface 56.

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Switch core 22 has a plurality of egress output terminals 64 which are paired with its ingress input terminals 54 and which are connected by switch core egress output interface 66 to exchange terminals 24 in accordance with the corresponding pairing. On their outgoing side, each exchange terminal 24 has egress input terminal 68, the egress input terminal 68 being connected to interface 66. Output terminals 70 on the egress side of switch ports 50 are connected to second buffer circuit 72, which in turn is connected to line termination equipment 40 by link 74. Line termination 40 serves to interface link 74 with egress physical links 31 - 38.

In each exchange terminal 24, ATM controller 44 is connected both to microprocessor 80 and to database memory 82. Database memory is preferably a random access memory (RAM). Microprocessor 80 is employed, e.g., to construct a database which resides in database memory 82. The database is employed e.g., to augment a cell with connection data. In the illustrated embodiment, ATM controller 44 is a device marketed by PMC-Sierra, Inc. as part number PM7322 RCMP-800 for performing ATM layer routing control, monitoring, and policing. Microprocessor 80 is also connected to buffering circuit 72. Microprocessor 80 writes the connection data, i.e., CDR records.

In the illustrated embodiment, each exchange terminal 24 has a microprocessor 80. Switch 20 has one or more unillustrated central processors to which the plurality of microprocessors 80 of the various exchange terminals 24 are connected.

An output terminal of controller 44 is connected to first buffer circuit 46. First buffer circuit 46 is connected to store and access ATM cells in cell buffer 90. Similarly, second buffer circuit 72 on the outgoing side of

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exchange terminal 24 is connected to store and access ATM cells in cell buffer 92. It is primarily the processing of cells on the egress side of switch 20, including operation of second buffer circuit 72, which is pertinent to the present invention.

One example embodiment of second buffer circuit 72 is shown in Fig. 2. Second buffer circuit 72 has a buffer circuit controller 200 and a plurality of handlers. Buffer circuit controller 200 provides timing information to the various handlers shown in Fig. 2 according to timing information received on an ASI interface.

The handlers include ASIEH interface handler 202; input cell handler (ICH) 204; output cell handler (OCH) 206; ATM transmission convergence/ALM interface handler (AAIH) 208; cell buffer handler (CBH) 210; data processing interface handler (DPIH) 212; and, control memory handler (CMH) 214.

Two of the handlers in the example second buffer circuit 72 are memory handlers. Cell buffer handler (CBH) 210 handles the physical buffering of cells. In particular, cell buffer handler (CBH) 210 contains a DRAM controller for accessing cell buffer 92. Control memory handler (CMH) 214 handles the logical buffering of cells, which means that it stores the cell pointer reads and updates the connection data records (CDRs). Control memory handler (CMH) 214 also handles the free list pointers. Control memory handler (CMH) 214 includes a DRAM controller.

ASIEH interface handler 202 receives the cell from switch core 22. Input cell handler (ICH) 204 receives the cell from handler 202 and obtains the connection data record (CDR) from the memory managed by control memory handler

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(CMH) 214. Input cell handler (ICH) 204 further performs packet and cell discard and, if the cell is not discarded, asks control memory handler (CMH) 214 for a free cell buffer and to store the queue pointer(s). Input cell handler (ICH) 5 204 also requests the cell buffer handler (CBH) 210 to store the cell in cell buffer 92.

Output cell handler (OCH) 206 includes a scheduler which selects the cell to be transmitted to the line 10 termination circuit. Output cell handler (OCH) 206 performs address translation from the internal channel number to the outgoing VP/VC value (VPI/VCI from the CDR record). For charging purposes all outgoing cells are counted per VP/VC. Output cell handler (OCH) 206 supports EFCI marking of 15 outgoing cells. Output cell handler (OCH) 206 performs the steps of Fig. 6 in conjunction with ATM transmission convergence/ALM interface handler (AAIH) 208, cell buffer handler (CBH) 210, and control memory handler (CMH) 214.

Fig. 3 shows cell buffer 92 as well as memory 20 structure of buffer circuit 72. Buffer circuit 72 includes an internal RAM 100. Buffer circuit 72 also accesses a RAM 102, also known as the Cntr RAM. Cell buffer 92 has locations for 128K cells, such locations being labeled as 25 "cell 0", "cell 1", ... "cell 128k-1" in Fig. 2. Cntr RAM 102 includes a connection data record (CDR) data structure 110 (shown in more detail in Fig. 4); a free list 112; and a queue area 114 wherein are stored queues for each of eight physical links ph0 to ph7. Each column in queue area 114 30 corresponds to a physical link, for example the first column corresponding to physical link ph0 and the last column corresponding to physical link ph7. Each row of queue area 114 corresponds to a delay priority. In particular, the first row is for CBR; the second row is for rtVBR; the third 35 row is for nrtVBR; the fourth row is for ABR; the fifth row is for UBR.

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The foregoing notations are understood with reference to the following: "CBRph0" means Constant Bit Rate for phy 0 (link 0); "nVBRph0" means real-time Variable Bit Rate for phy 0 (link 0); "nrtVBRph0" means non real-time Variable Bit Rate for phy 0 (link 0); "ABR" means Available Bit Rate for phy 0 (link 0); "UBR" means Unspecified Bit Rate for phy 0 (link 0). In a simple implementation, the scheduler takes a cell from the queue with highest priority. CRB has the highest priority, followed by VBR, and so forth in the order discussed above. ABR and UBR, however, do not have any strict difference in priority and must take cells from both queues.

Internal RAM 100 has two pointers utilized for accessing free list 112. The two pointers are a start free list pointer 120 and a stop free list pointer 122. In addition, internal RAM 100 has a set 124 of queue pointers which are illustrated in more detail in Fig. 13.

Fig. 5 shows steps conducted by buffer circuit 72 in obtaining a cell from switch core 22 and storing the cell in cell buffer 92. The cell is acquired through switch port 50, and is particularly obtained from an output terminal 70 on the egress side of switch port 50. Step 500 of Fig. 5 shows acquisition of the cell from switch core 22.

The format of a cell obtained from switch core 22 is shown in Fig. 7. The cell obtained from switch core 22 includes a cell payload and various other fields. The other fields having information as obtained from switch core 22 include a routing information field RI (fourteen bits which were employed for routing purposes in switch core 22); an internal channel number (ICI) field (sixteen bits); a multicast identifier (MCI) field (one bit); and the VCI, PT, and CLP fields. The value of the MCI field indicates

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whether the cell is a point-to-point cell or a point-to-multipoint cell. In the present example, if MCI = 0 the cell is a point-to-point cell; if MCI = 1 the cell is a point-to-multipoint cell. The value of the ICI field is an internal channel number and, as explained below, is used as an index.

At step 502 buffer circuit 72 obtains a connection data record (CDR) for the cell acquired at step 500. The CDR is obtained from CDR data structure 102, seen generally in Fig. 3 and in more detail in Fig. 4. CDR data structure 102 is effectively partitioned into three regions, particularly a first region 110A for point-to-point connection data records; a second region 110B for point-to-multipoint connection data records; and a third region 110C for point-to-multipoint pointer data records. Whether a cell is a point-to-point cell or a point-to-multipoint cell depends on the MCI, as explained above. If MCI = 0 the cell is a point-to-point cell; if MCI = 1 the cell is a point-to-multipoint cell. If the cell is a point-to-point cell, the CDR for the cell resides in point-to-point region 100A. If the cell is a point-to-multipoint cell, the CDR for the cell resides in point-to-point region 100C. The value of the field ICI of the cell is used to located the particular record in the region which is applicable to the cell acquired at step 500.

The format of a CDR record for a point-to-point cell, i.e., a point-to-point connection data record, is shown in Fig. 10. The CDR record for a point-to-point cell has two twenty-four bit cell counters, particularly Cell Counter CLP 0 and Cell Counter CLP 1. These cell counters are read and written when sending a cell to an appropriate one of the physical links phy0 - phy7 (i.e., links 31 - 38 in Fig. 1). In addition, the CDR record for a point-to-point cell has a twelve bit virtual path identifier (VPI) field and the following fields: PA, DA, EC, AC, PC, DP, POL,

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CDT, and SCD/EMD/ET. The size and names of these fields are provided in TABLE 1.

TABLE 1

5

Field Abbreviation	Field Name	Field Size (bits)
PA	Packet Connection	1
DA	Discard Active	1
EC	EFCI-marking connection	1
AC	ABR connection	1
PC	Packet connection	1
DP	Delay priority	3
POL	Physical Output Link	4
CDT	Cell Discard Threshold	12
SCD/EPD/E T	Selective Cell Discard/Early Packet discard/EFCI Threshold	12

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When the connection is established, processor 80 writes the PA, DA, EC, AC, PC, DP, and POL fields into the point-to-point connection data record. These fields, as well as VPI, CDT, and SCD/EPD/E T (when the cell is received from switch core 22 (also written when the connection is established), are all read when receiving the cell from switch core 22.

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The format of a CDR record for a point-to-multipoint cell, i.e., a point-to-multipoint pointer connection data record, is shown in Fig. 12. The point-to-multipoint pointer connection data record has some of the same type of fields as does the point-to-point connection data record, although the fields are in different locations within the record. In addition, the point-to-multipoint connection data record has eight "start pointer" fields, shown in Fig. 12 as "Start pointer Phy0" through "Start pointer Phy7", which correspond to each of the eight physical output links phy0 through phy7. Further, the point-to-multipoint connection data record has an eight bit physical link pointer active field (PPA). The "start pointer" fields and PPA are written into the CDR when the cell is received from switch core 22.

The format of point-to-multipoint connection data record is shown in Fig. 11. In addition to having the Cell Counter CLP 0 and Cell Counter CLP 1, the point-to-multipoint connection data record has the VPI and VCI fields, the significance of which is understood from the foregoing. Further the point-to-multipoint connection data record has a thirteen bit next leaf pointer (NLP) field and a one bit last leaf (LL) field. As will be understood subsequently, if the last leaf (LL) field does not indicate that the leaf is the last leaf, the next leaf pointer (NLP) field stores the address of a point-to-multipoint connection data record in region 110C.

After obtaining the CDR record for the cell, at step 504 numerous threshold checks are performed. These threshold checks include evaluations and comparison to thresholds, such as buffer length evaluations, potentially leading to such operations as cell or packet discard and EFCI marking. These evaluations are not necessary for an understanding of the present invention, and accordingly are not discussed in detail herein.

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5 With the cell having been obtained at step 500,
and its CDR obtained at step 502, it is next necessary to
store the cell in cell buffer 92. Determination of the
address in cell buffer 92 in which to store the cell
involves steps 506 and 508. At step 506, the value of start
free list pointer 120 (see Fig. 3) is utilized to determine
which pointer in free list 112 is next available to be
utilized. For example, as shown in Fig. 14, start free list
10 pointer 120 has a value which points to address 1, i.e.,
cell pointer 2, in free list 112. Cell pointer 2 of free
list 112 in turn points to a specific address in cell buffer
92, particularly shown as "cell buffer 1" in Fig. 14. Thus,
as indicated by step 508, the next available pointer in free
list 112 is used to determine the storage location of the
cell in cell buffer 92. The start free list pointer is then
15 incremented.

20 Free list 112 is maintained in such a fashion that
when an address in cell buffer 92 becomes free, i.e., a cell
is extracted therefrom, such free address is loaded into a
location determined by stop free list pointer 122, and the
stop free list pointer 122 then is incremented.

25 Step 510 involves checking whether the value of
MCI, obtained from the cell is one. If the value of MCI is
not one, the cell is a point-to-point cell and step 512 is
next executed. Otherwise, the cell is a point-to-multipoint
cell and step 532 is next executed.

30 Step 512 involves writing the cell to the storage
location in cell buffer 92 which was determined at step 508
(e.g., cell buffer 1 in the foregoing example). As written
into cell buffer 92, the point-to-point cell has the
structure shown in Fig. 8. In cell buffer 92 the cell has
35 the standard ATM cell fields, and in addition the ICI and
MCI fields which are obtained in the internal cell format

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from switch core 22 (see Fig. 7).

5 At step 514, the values in fields POL and DP, having been obtained from the CDR (see Fig. 10), are utilized to determine to which physical link 31 - 38 the cell will be outputted, and accordingly which of the corresponding queues in queue area 114 (see Fig. 3) will be utilized.

10 As shown in Fig. 3 and Fig. 13, queue area 114 has many queues. In particular, queue area 114 has a plurality of queues for each of eight physical links ph0 to ph7. For example, for physical link ph0 there are queues 130C, 130r, 130n, 130A, and 130R; for physical link ph1 there are queues
15 131C, 131r, 131n, 131A, and 131R; and so forth. For these queue reference numerals, the suffix "C" indicates that the queue is for CBR cells; the suffix "r" indicates that the queue is for rtVBR cells; the suffix "n" indicates that the queue is for nrtVBR cells; the suffix "A" indicates that the
20 queue is for ABR cells; and, the suffix "U" indicates that the queue is for UBR cells.

Thus, step 516 involves determining which of the queues in queue area 114 is to be associated with the cell
25 stored in cell buffer 92 at step 512. At step 516, a pointer is obtained from the set 124 of queue pointers to the next available location in such queue. The set 124 of queue pointers is shown in detail in Fig. 13, wherein it is seen that each queue in queue area 114 has both a start cell
30 queue pointer and a stop cell queue pointer. At step 516, the stop cell queue pointer in set 124 for the appropriate queue (as determined at step 514) is incremented, and such incremented value utilized to point to the next available location in the queue. Then, at step 518, the address of
35 the cell written at step 512 is written into the location determined at step 516. For example, if it were determined at step 516 that the cell is a CBR cell and to be associated

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with physical link phy0 (and thus queue 130C), the stop cell queue pointer for queue 130C in set 124 would be incremented and utilized to discern the next location in queue 130C to which the address in buffer 92 of the cell should be written.

If, at step 510, the value of MCI is determined to be one, the cell is a point-to-multipoint cell and step 532 is next executed. Step 532 involves writing the cell to the storage location in cell buffer 92 which was determined at step 508. As written into cell buffer 92, the point-to-multipoint cell has the structure shown in Fig. 9. In cell buffer 92 the point-to-multipoint cell includes the standard ATM cell fields, and in addition the ICI, PAA (Phy Pointer Active) [obtained from point-to-multipoint pointer connection data record], and next leaf pointer phy0 - phy7 fields which are obtained from the corresponding fields Start pointer Phy0 - Start pointer Phy7 of point-to-multipoint pointer connection data record (see Fig. 12 and step 502).

At step 534, the values in fields PPA and DP, having been obtained from the CDR (see Fig. 12), are utilized to determine to which physical link(s) 31 - 38 the cell will be outputted, and accordingly which of the queues in queue area 114 (see Fig 3) will be utilized. In this regard, PPA has a bit corresponding to each of phy0 - phy7, which bit is set active (i.e., equal to one) if a copy of the cell is to be sent out over the respective physical link 31 - 38.

At step 536, pointers are obtained from the set 124 of queue pointers (Fig. 13) to the next available location each of the queues corresponding to physical links to which the cell will be outputted. At step 536, the stop cell queue pointer in set 124 for each appropriate queue (as determined at step 534) is incremented, and such incremented

-20-

value utilized to point to the next available location in the queue for the corresponding physical link. Then, at step 538, for each queue corresponding to a physical link to which the cell is to be translated, the address of the cell written at step 532 is written into the location determined at step 536.

Fig. 6 shows steps involved in reading out a cell from cell buffer 92 to a particular physical link. The queues in set 114 (see Fig. 3) each have pointers stored therein which point to cells in cell buffer 92. Preparatory to Fig. 6, a selector determines which of the physical links phy0 - phy7 (i.e., links 31 - 38) is next to receive a cell.

As indicated previously, one of the queues in set 114 corresponds to the selected physical link, and thus is the selected queue. For such selected queue, at step 600 the start cell queue pointer in set 124 (see Fig. 3 and Fig. 13) is utilized to obtain an oldest pointer from the corresponding queue in queue set 114. The pointer obtained from the queue in set 114 points to a cell in cell buffer 92. Thus, at step 600, the pointer obtained from the queue in set 114 is employed to fetch the oldest cell for the selected physical link.

At step 602, the obtains the connection data record (CDR) for the cell fetched at step 600. For a point-to-point cell, the CDR is obtained from area 110A of connection data record structure 110 (see Fig. 4) using the MCI and ICI fields of the cell header (see Fig. 8). As indicated previously, the MCI field indicates that the cell is point-to-point and thus that area 110A is to be accessed, and the ICI field serves as an index for obtaining the correct record in CDR area 110A. If the MCI field indicates that the cell is a point-to-multipoint cell, the value of the next leaf pointer for the selected physical output link (e.g., phy0 through phy7, see Fig. 9) is utilized to locate the CDR for the next leaf of the selected physical link.

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In accordance with whether the switch type is VPI or VCI, either step 606 or step 608 is performed. For a VPI switch type, the VPI field is updated for both point-to-point and point-to-multipoint cells. For a VCI switch type, the VPI field is updated for a point-to-point cell and both VPI and VCI are updated for a point-to-multipoint cell.

Step 610 involves updating the cell counter in the CDR for the CLP (cell loss priority) value given in the cell header. The CDR record and cell counter CLPs for a point-to-point cell are shown in Fig. 10; the CDR record and cell counter CLPs for a point-to-multipoint cell are shown in Fig. 11.

At step 612 the value of the MCI field is again consulted to determine whether the cell is a point-to-point cell or a point-to-multipoint cell. For a point-to-point cell, steps 614, 616, and 618 are performed. For a point-to-multipoint cell, other steps shown in Fig. 6, culminating in step 618, are performed.

For a point-to-point cell, the address is first read and then the start cell queue pointer for the selected queue is incremented at step 614 (see Fig. 13). This incrementation serves to remove the pointer from the queue for the selected physical link. Then, at step 616, the address in cell buffer 92 for the cell-to-be-outputted is added to free list 112 (see Fig. 3). Step 616 is implemented by incrementing the stop free list pointer 122 (see Fig. 3) and storing the pointer to the address in cell buffer 92 for the cell-to-be-outputted at the location in the free list pointed to by the stop free list pointer 122. Lastly, the cell is outputted at step 618 by writing the cell to the selected physical link, e.g., one of links 31 - 38 (see Fig. 1).

For a point-to-multipoint cell, at step 620 a determination is made whether the leaf encountered is the

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last leaf. Specifically, step 620 involves checking the last leaf flag LL in the CDR record obtained at step 602. If the last leaf flag is set, steps 622, 624, 626, and possibly step 628 are executed prior to actually writing the cell to the selected physical link at step 618.

For a last leaf, at step 622 the leaf is marked as inactive in the PPA field. As explained earlier, the PPA field has a bit for each possible physical output link. When the last leaf has been processed for the selected physical output link, the bit for that selected link in the PPA field is changed from active to inactive (e.g., from a one to a zero). Then, at step 624, the pointer for the selected queue is removed from the queue by incrementing the start cell queue pointer for that queue (see Fig. 13).

In step 626, the PPA field is checked to determine whether all physical links have been marked as inactive, e.g., whether the PPA field has been changed to all zeros. If all physical links have been marked as inactive, at step 628 the cell buffer address is added to free list 112 (in like manner as described with respect to step 616) prior to executing step 618. Step 618 involves writing the cell to the selected physical link.

If the leaf currently processed does not have the last leaf flag LL set in its CDR, step 630 is executed prior to writing the cell to the selected physical link. At step 630, the value of the next leaf pointer field from the CDR (see Fig. 11) is stored in the field of the next leaf pointer for the selected physical link (e.g., Phy0 through Phy7) in the cell header (see Fig. 9). By virtue of step 630, the next time the same physical link is selected, the next leaf pointer in the cell header for the selected link will enable the fetching at step 602 for the proper CDR record for the next outgoing leaf on the selected link.

Fig. 16A - Fig. 16E and Fig. 17 are employed to illustrate exemplary handling of point-to-multipoint cells in accordance with the present invention. Fig. 16A shows

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the arrival of a cell containing ICI=1024 and an MCI=1 (indicative of point-to-multipoint) at buffer circuit 72 from switch core 22. In accordance with step 502, the values of MCI and ICI are utilized to obtain the connection data record (CDR) from area 110C of the connection data record structure 110 (see Fig. 4). The PPA and start pointers of the CDR record (shown in Fig. 12) are copied into the cell buffer along with the rest of the cell (Fig. 9). Fig. 16B shows the cell as being stored in cell buffer at an address 1692 in accordance with step 532. The particular determination of the address 1692 is the cell buffer is in accordance with steps 506 and 508 of Fig. 5.

In this example, the PPA field of the CDR indicates that only two physical links, particularly phy0 and phy3, are active. The next leaf pointer for Phy0 is the address A; the next leaf pointer for Phy3 is the address B. As mentioned, these addresses are loaded into the corresponding next leaf pointers in address 1692 of the cell buffer (see also Fig. 9 for the format of the cell buffer).

The queues for phy0 and phy3 are updated with a pointer to the address 1692 in the cell buffer. The process of updating the queues with pointers is understood from steps 534, 536, and 538 of Fig. 5.

As the example continues, eventually the cell obtained in Fig. 16A and stored at address 1692 in cell buffer 92 becomes the oldest cell awaiting output on link phy0 and phy3. At this point, the example continues with the selector of buffer circuit 72 selecting the first physical link, i.e. phy0, and thereby invoking execution of the steps of Fig. 6 for a first time in this example. In accordance with step 602, the cell is read from address 1692 in cell buffer 92. Then, in accordance with step 602, the CDR record for the first leaf for link phy0, illustrated in Fig. 16C, is fetched from address A from the CDR area 110B.

It will be recalled in connection with Fig. 16B that the address A was obtained from the next leaf pointer for phy0 in the cell header. The CDR obtained at step 602 for this

-24-

first leaf of physical link phy0 has a VPI of 18 and a VCI of 269, which values are written into the outgoing cell as shown in Fig. 16C and in accordance with steps 606 and 608.

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At step 620 it is determined from the last leaf flag LL of CDR record shown in Fig. 16C that the first leaf for physical link phy0 is the last leaf for physical link phy0. Therefore, in accordance with step 620 of Fig. 6, the first physical link phy0 is marked in the cell header at address 1692 as inactive (e.g., in Fig. 16C, PPA now has only the value three for phy3 in contrast to its former values of zero and three for phy0 and phy3, respectively). In accordance with step 624, the pointer to address 1692 is removed from the queue for phy0 prior to the cell being sent out on phy0.

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When the selector/scheduler of buffer circuit 72 selects phy3 as the next physical link, the example continues with a second pass of the steps of Fig. 6. Upon obtaining the cell from address 1692, the next leaf pointer for physical link phy3 is utilized at step 602 to locate the CDR record shown in Fig. 16D. The CDR obtained at step 602 for the first leaf of phy3 has a VPI have of 28 and a VCI value of 369, which values are stored in the outgoing cell in accordance with steps 606 and 608 and as shown in Fig. 16D. The check of the last leaf flag LL at step 620 shows the LL flag to have a zero content, meaning that physical link phy3 has other leaves corresponding to this cell. Such being the case, step 630 is executed for storing the next leaf pointer of the CDR into the cell header in address 1692. In particular, Fig. 16D shows that the next leaf pointer of the CDR has the address C, and the storage of address C into the next leaf pointer for phy3 in the cell header. At this point, the cell is written to physical link phy3 as the first leaf for physical link phy3.

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When the selector/scheduler again selects physical link phy3, the next leaf pointer for physical link phy3 is read from the cell at address C in cell buffer 92. In link

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ph3, the next leaf pointer for physical link phy3 is read from the cell at address C in cell buffer 92. In particular, as shown in Fig. 16D, the next leaf pointer has the address C. The particular CDR fetched from address C is shown in Fig. 16E as including the VPI value 38 and the VCI value 379. In accordance with step 606 and 608, these new VPI and VCI values are written into the outgoing cell (see Fig. 16E). The check at step 620 indicates that the CDR at address C has its last leaf flag set (i.e., equal to one). Accordingly, as step 622 the PPA value is adjusted to mark phy3 as inactive and (as step 624) the pointer to address 1692 is removed from the queue for physical link phy3 (see Fig. 16E). Moreover, since all physical links are now marked inactive in the PPA for this cell, address 1692 of cell buffer 92 is placed in the free list 112 in accordance with step 628. Then, the second and last leaf of this cell for physical link phy3 is written to physical link phy3 (step 618).

The present invention thus saves memory space, since only a pointer and flag need to be added when copying a point-to-multipoint cell (as opposed to copying the entire cell). Moreover, the number of logical leaves will not be limited by the memory access time. Further, with the same memory access time, there can be more physical leaves than if the whole cell would be copied. There is no need to chose between point-to-point and point-to-multipoint queues to keep a right proportion. Still further, point-to-multipoint cells can be handled for all and same priority classes (there being no limit of priority classes for point-to-multipoint cells as compared to point-to-point cells).

While the invention has been particularly shown and described with reference to the preferred embodiments thereof, it will be understood by those skilled in the art that various alterations in form and detail may be made therein without departing from the spirit and scope of the invention. For example, it should readily be understood

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that the term switch ports can include such devices as trunk adapters.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

- 5 1. An Asynchronous Transfer Mode (ATM) switching device through which ATM cells are routed to one or more of a plurality of physical output links, the switching device comprising:
- 10 a plurality of pointer queues respectively corresponding to the plurality of physical output links;
- a cell memory wherein ATM cells destined are stored, the cell memory having stored therein ATM cells destined for output on differing ones of the physical output links;
- 15 wherein pointers are stored in a selected pointer queue corresponding to a selected physical output queue, the pointer serving to locate in the cell memory an output-destined ATM cell for the selected physical output queue.
- 20 2. The apparatus of claim 1, further comprising:
- a connection data record memory wherein is stored:
- a first connection data record for each cell, the first connection data record having stored therein a next leaf pointer for each of the physical output links
- 25 which are active for the cell as well as an indicator of which physical output links are active for the cell; and
- a second connection data record which, for an active one of the physical output links, is pointed to by the next leaf pointer of the first connection data record
- 30 for the respective physical output link, the second connection data record having stored therein a last leaf flag which indicates whether there is a further connection data record for the respective physical output link, the second connection data record further having a further next leaf pointer stored therein in the case that the last leaf flag of the second connection data record indicates there is
- 35 a further connection data record, the further next leaf

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pointer pointing to the further connection data record.

3. The apparatus of claim 2, wherein the second connection data record has at least one of a virtual path identifier (VPI) and a virtual circuit identifier (VCI) stored therein for inclusion in the output-destined ATM cell.

4. A method of handling Asynchronous Transfer Mode (ATM) in an ATM switching device through which ATM cells are routed to one or more of a plurality of physical output links, the method comprising:

storing ATM cells destined for output to one or more of the plurality of physical output links in a common cell buffer;

for each of the physical output links to which a specific cell is to be outputted, storing a pointer in a queue corresponding to the physical output links to which the specific cell is to be outputted, the pointer specifying a location of the specific cell in the common cell buffer;

selecting a first physical output link included in the plurality of links as a selected physical output link to which the specific cell is to be outputted;

for the first physical output link, obtaining the pointer from the queue corresponding to the first physical output link and using the pointer to obtain the ATM cell from the common cell buffer.

5. The method of claim 4, further comprising:

obtaining a first connection data record for the specific cell, the first connection data record having stored therein a next leaf pointer for each of the physical output links which are active for the specific cell as well as an indicator of which physical output links are active for the specific cell; and

obtaining a second connection data record

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which, for an active one of the physical output links, is pointed to by the next leaf pointer of the first connection data record for the respective physical output link, the second connection data record having stored therein a last leaf flag which indicates whether there is a further connection data record for the respective physical output link, the second connection data record further having a further next leaf pointer stored therein in the case that the last leaf flag of the second connection data record indicates there is a further connection data record, the further next leaf pointer pointing to the further connection data record.

6. The method of claim 5, further comprising obtaining from the second connection data record at least one of a virtual path identifier (VPI) and a virtual circuit identifier (VCI) stored therein for inclusion in the output-destined ATM cell.

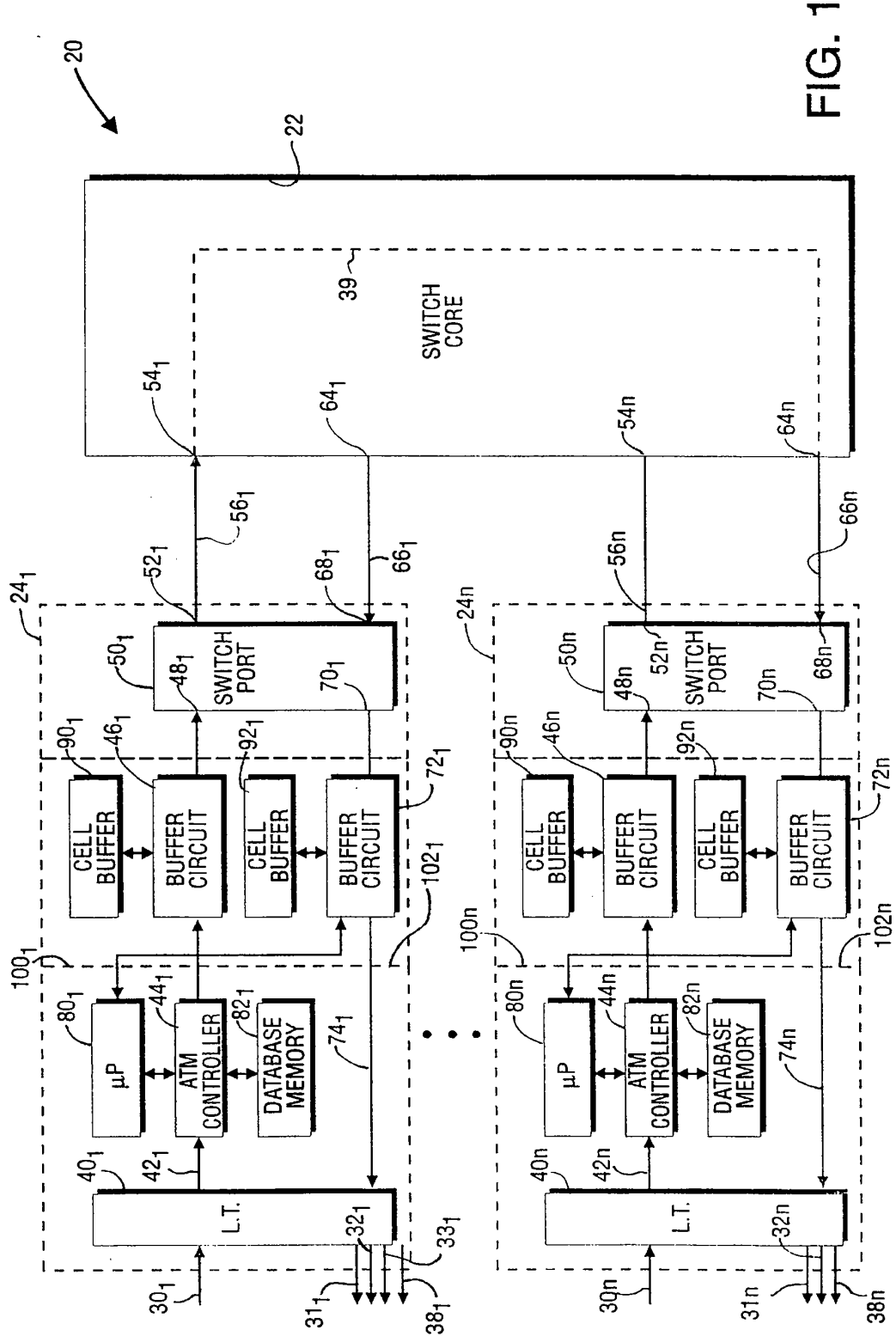


FIG. 1

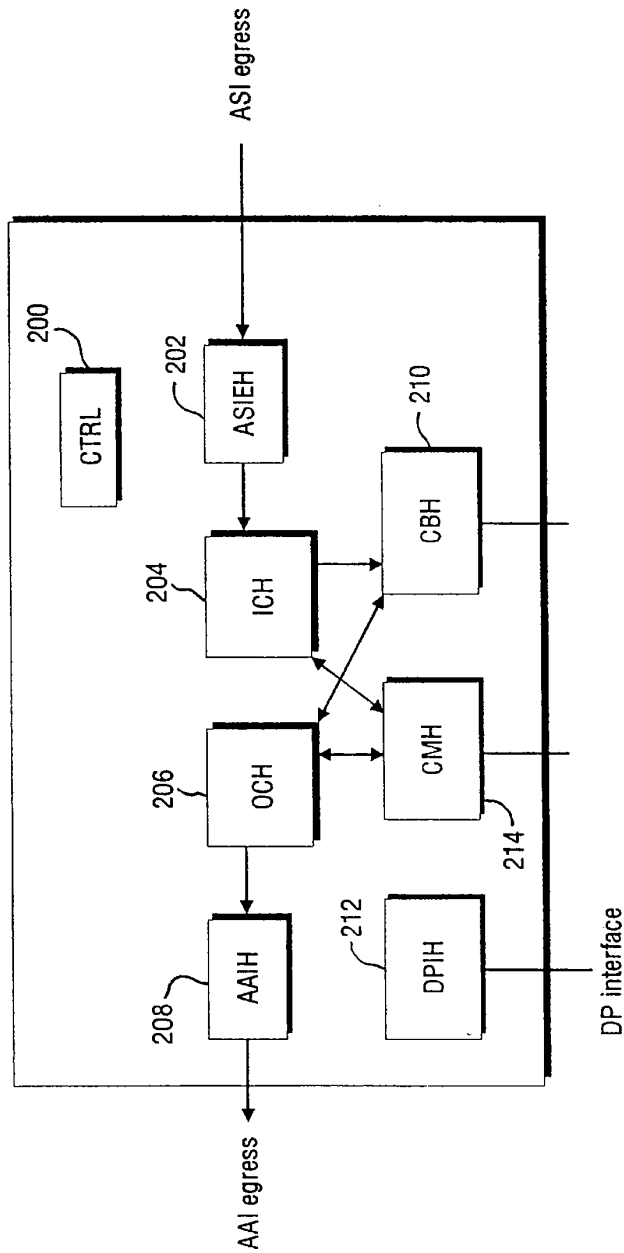


FIG. 2

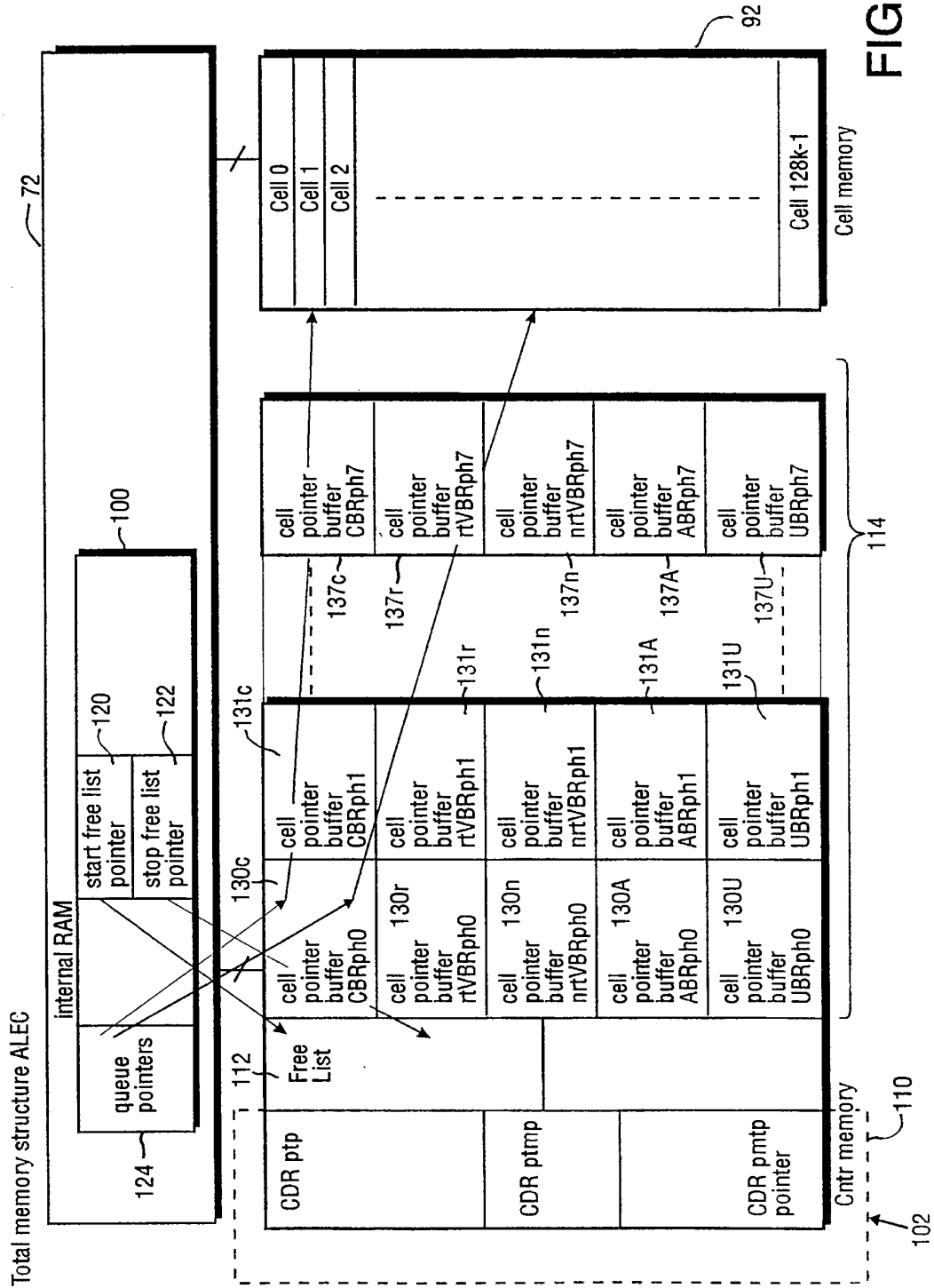


FIG. 3

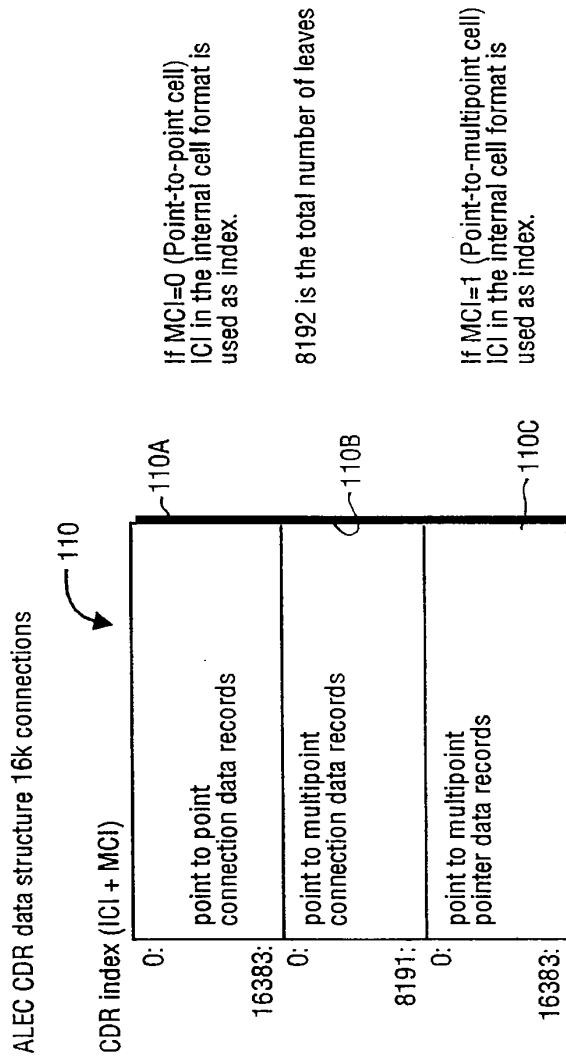


FIG. 4

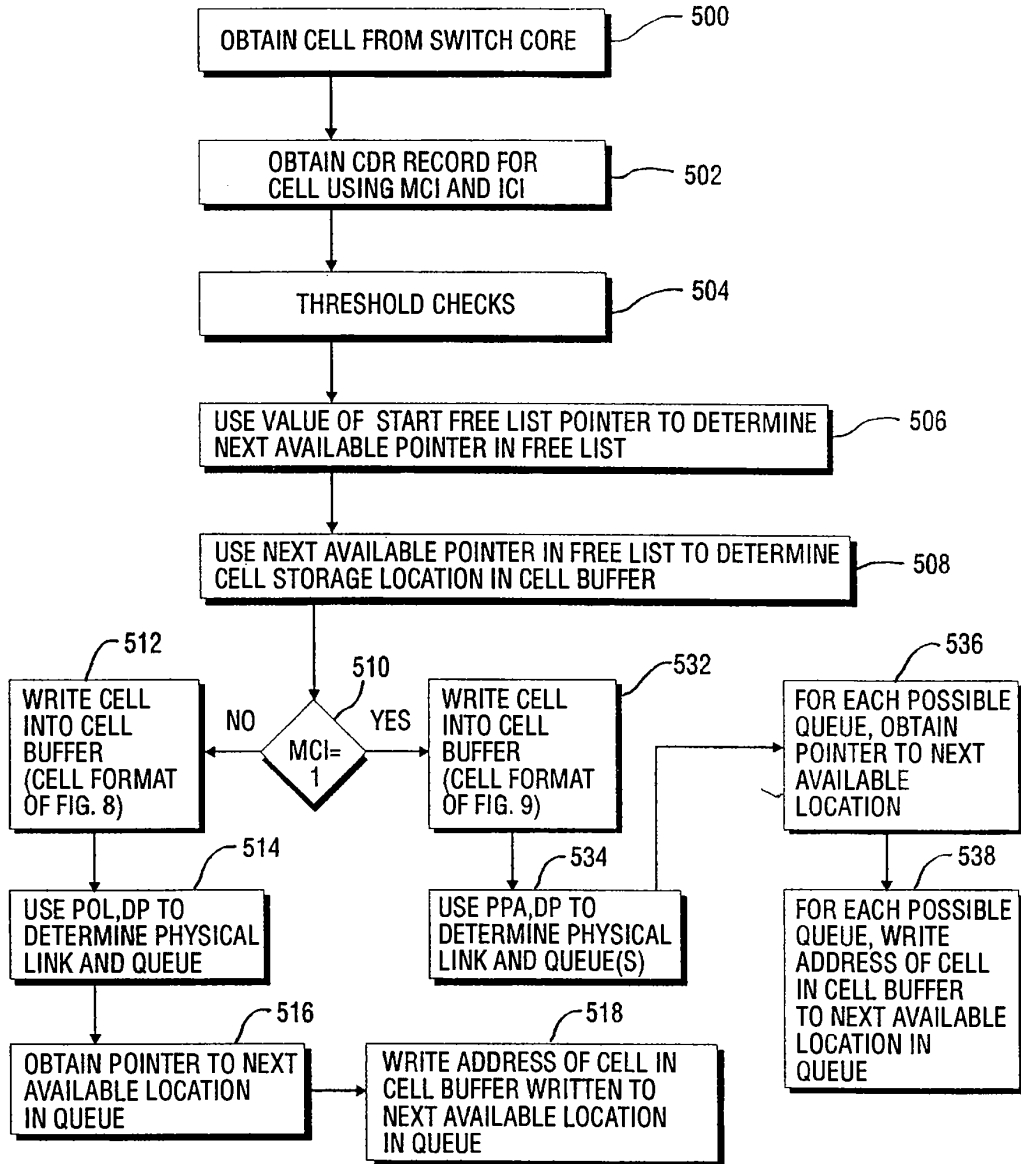


FIG. 5

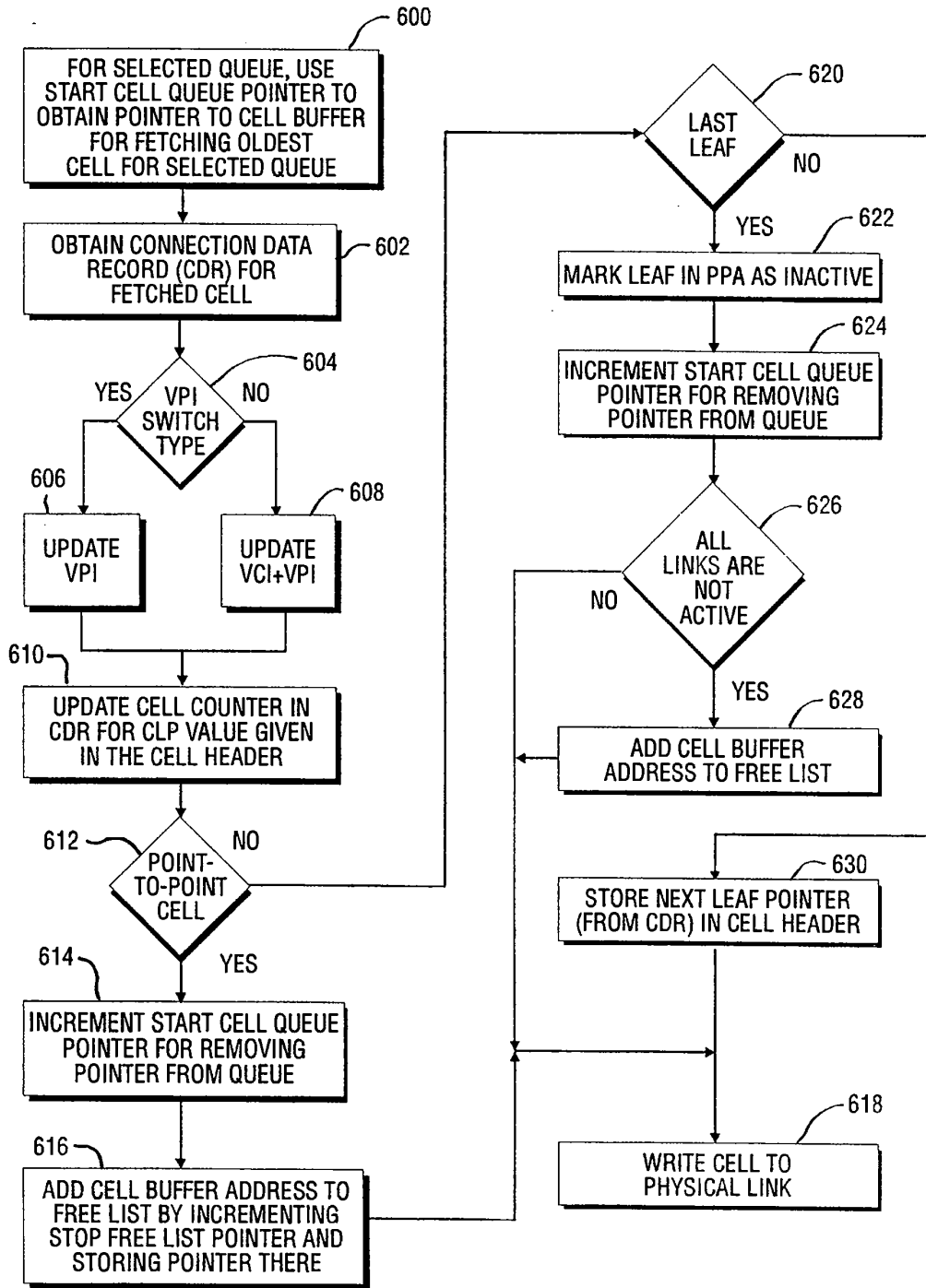


FIG. 6

FIG. 7

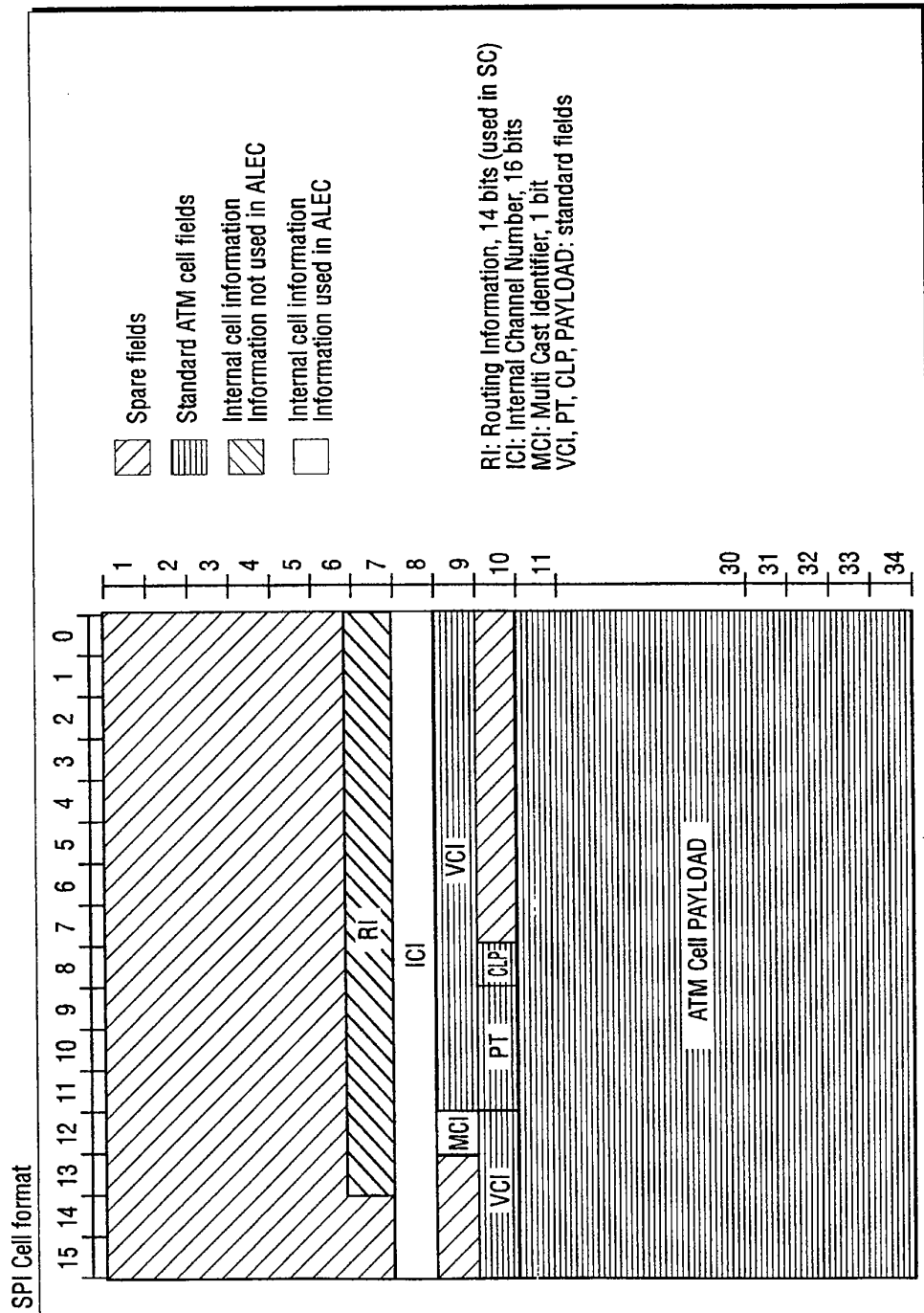
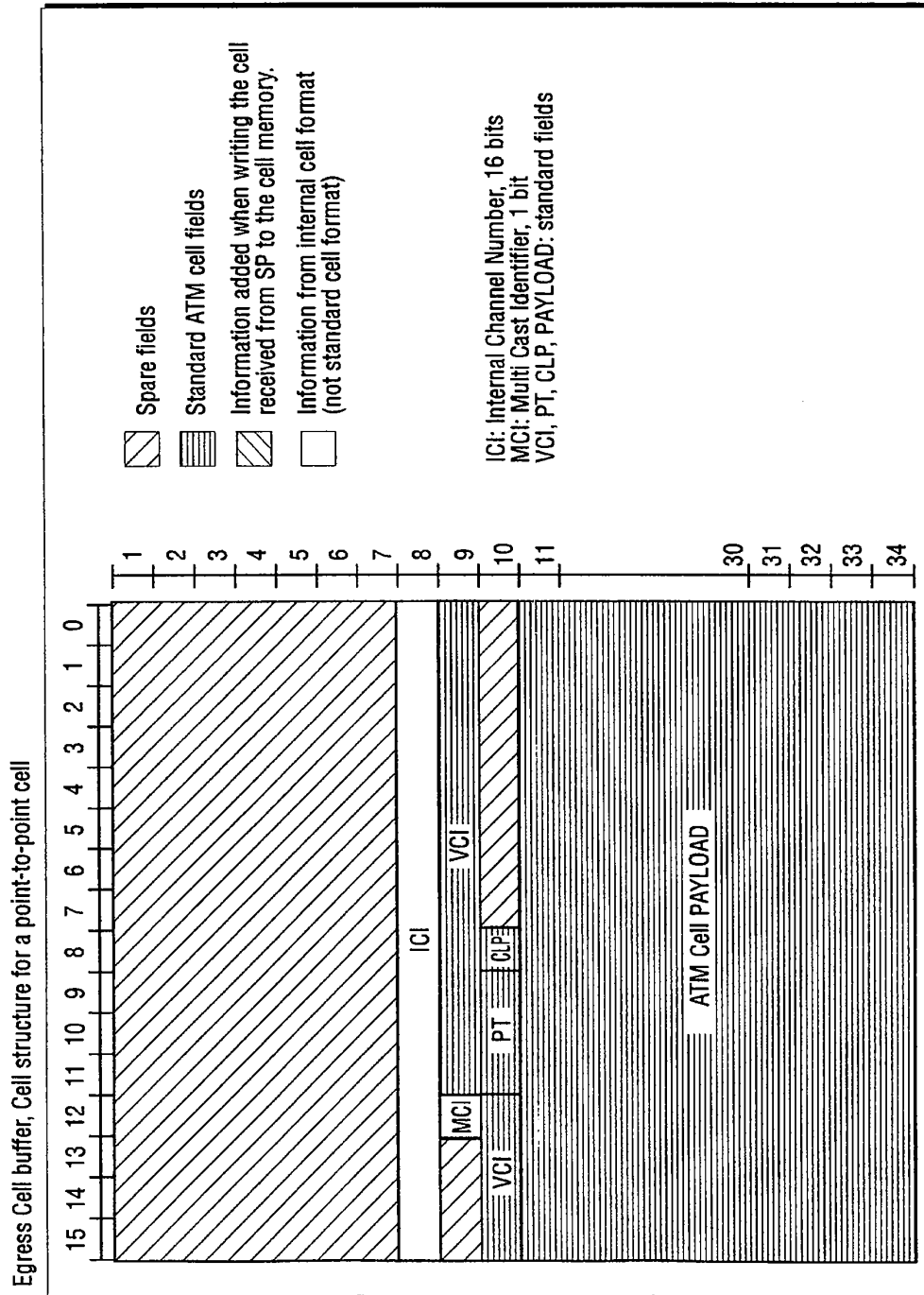


FIG. 8



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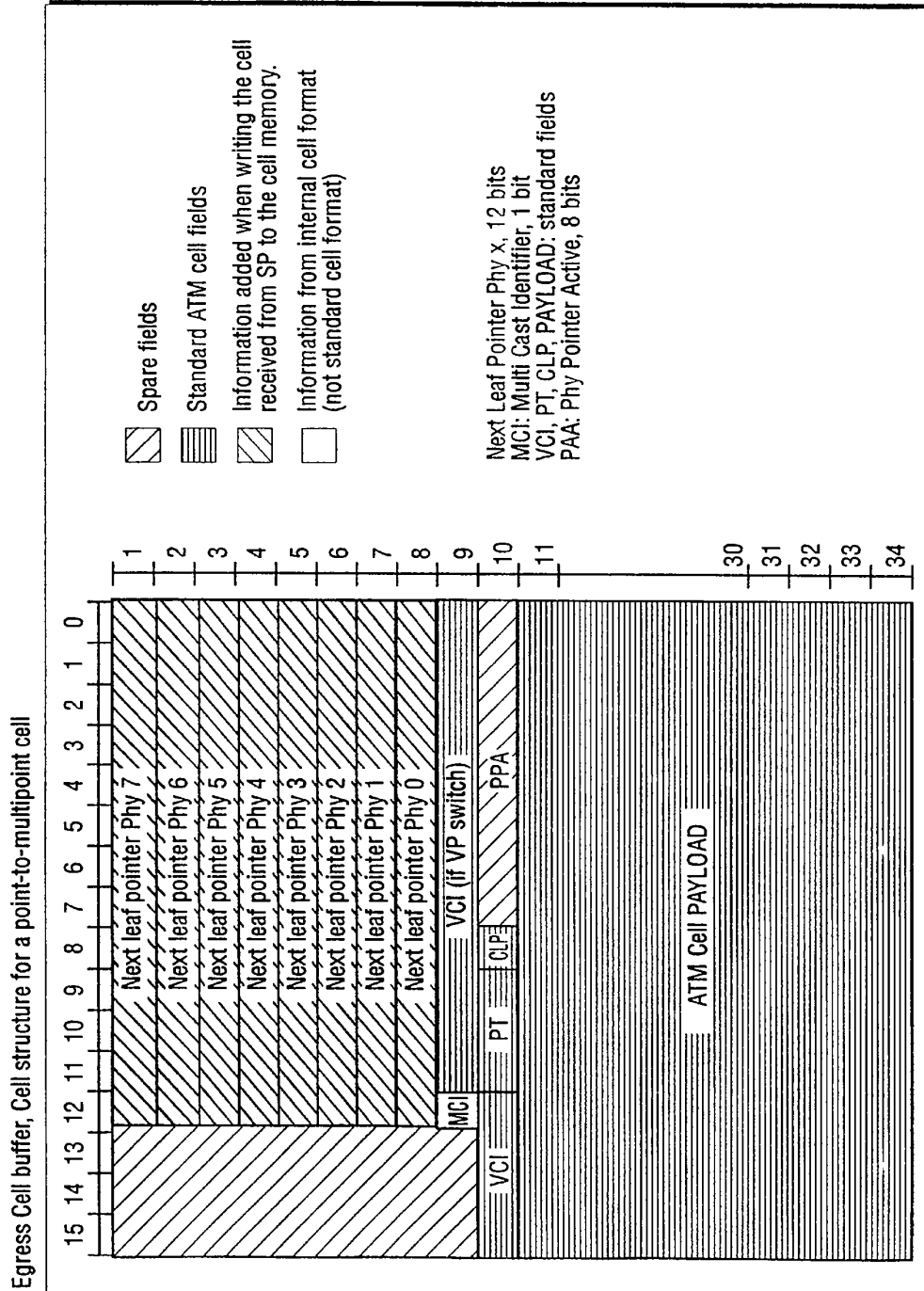


FIG. 9

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ALEC CDR record data structure for point to point connections, Point to point connection data records

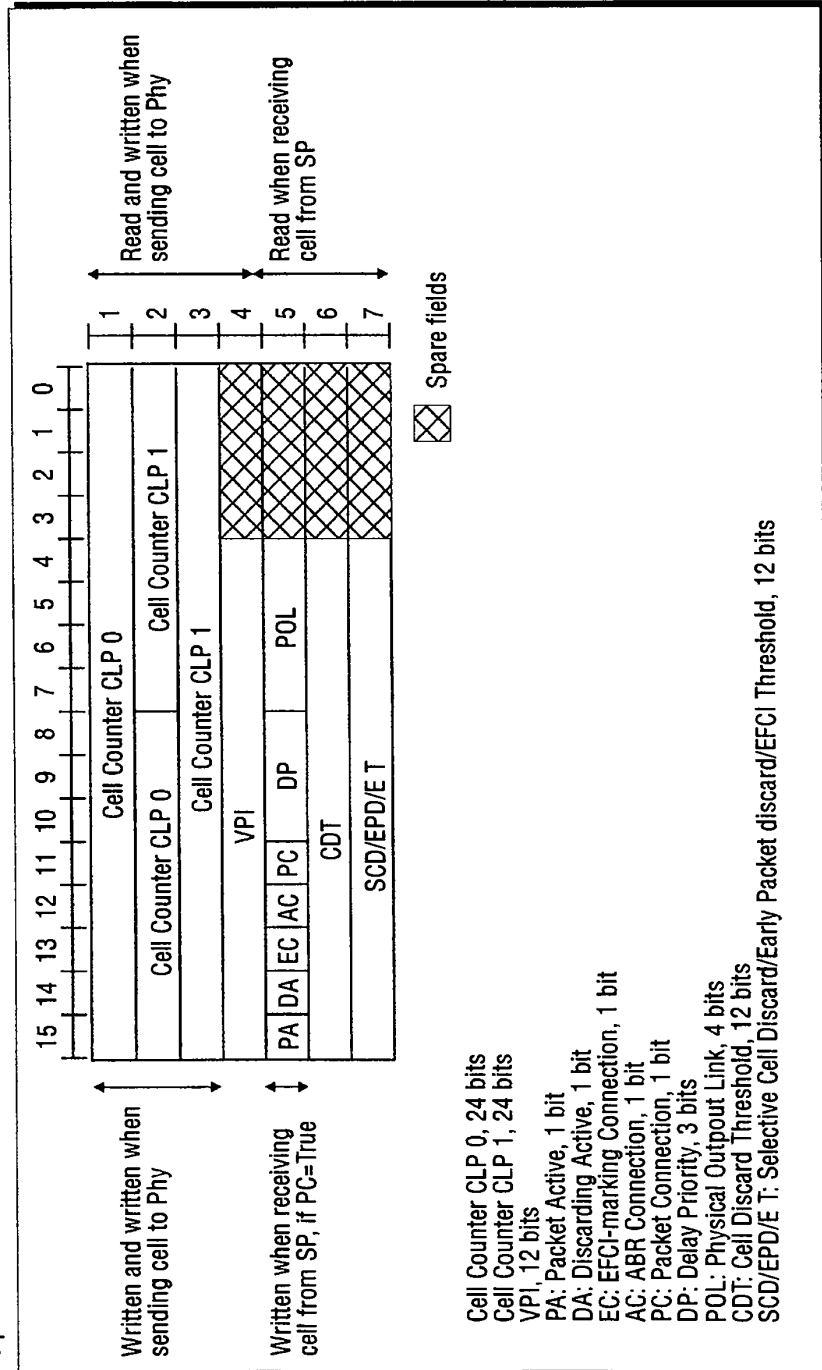


FIG. 10

ALEC CDR record data structure for point to multipoint leaf, Record Point to point connection data records

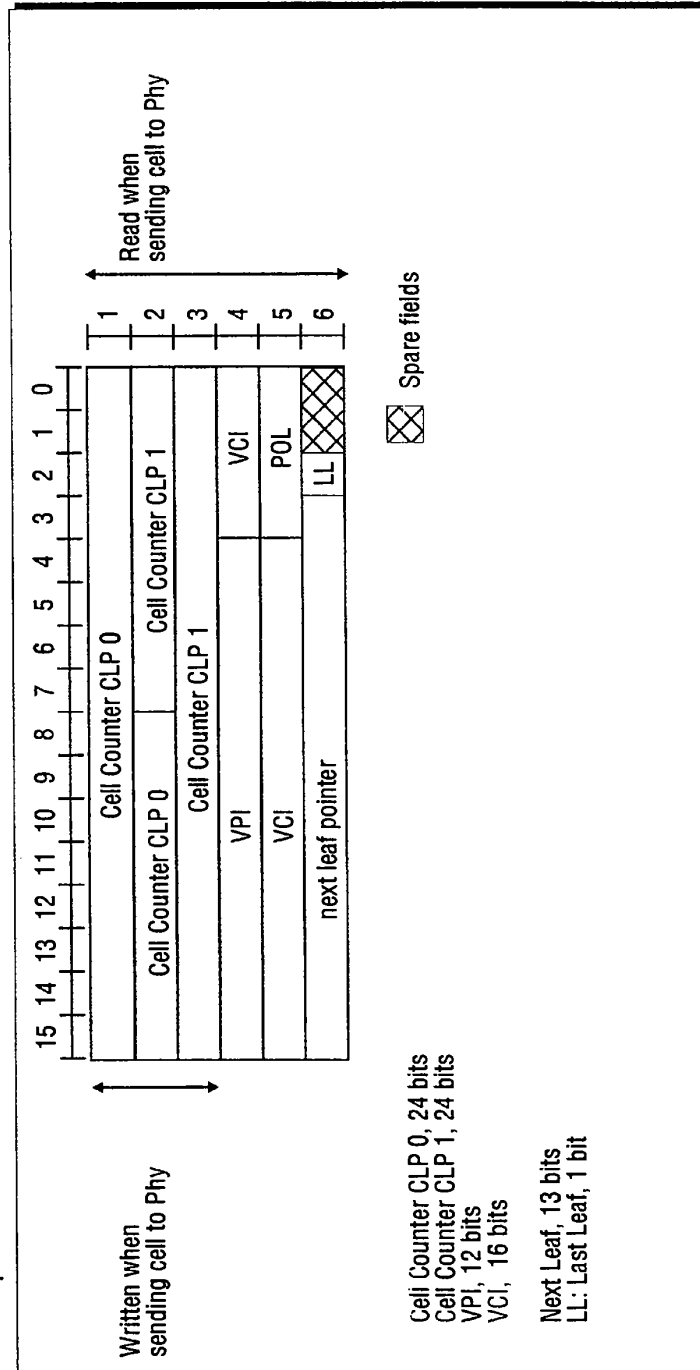
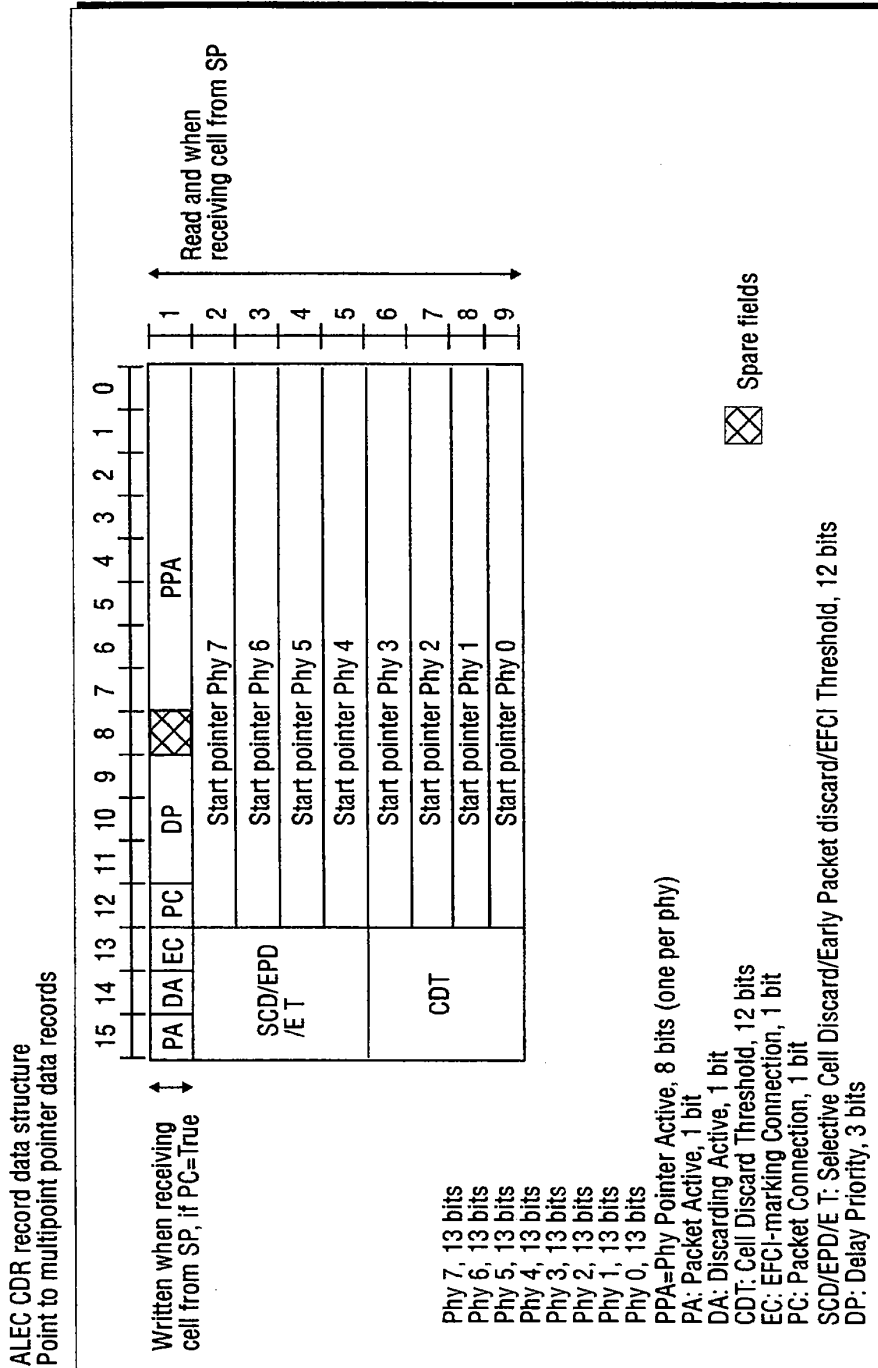


FIG. 11

FIG. 12



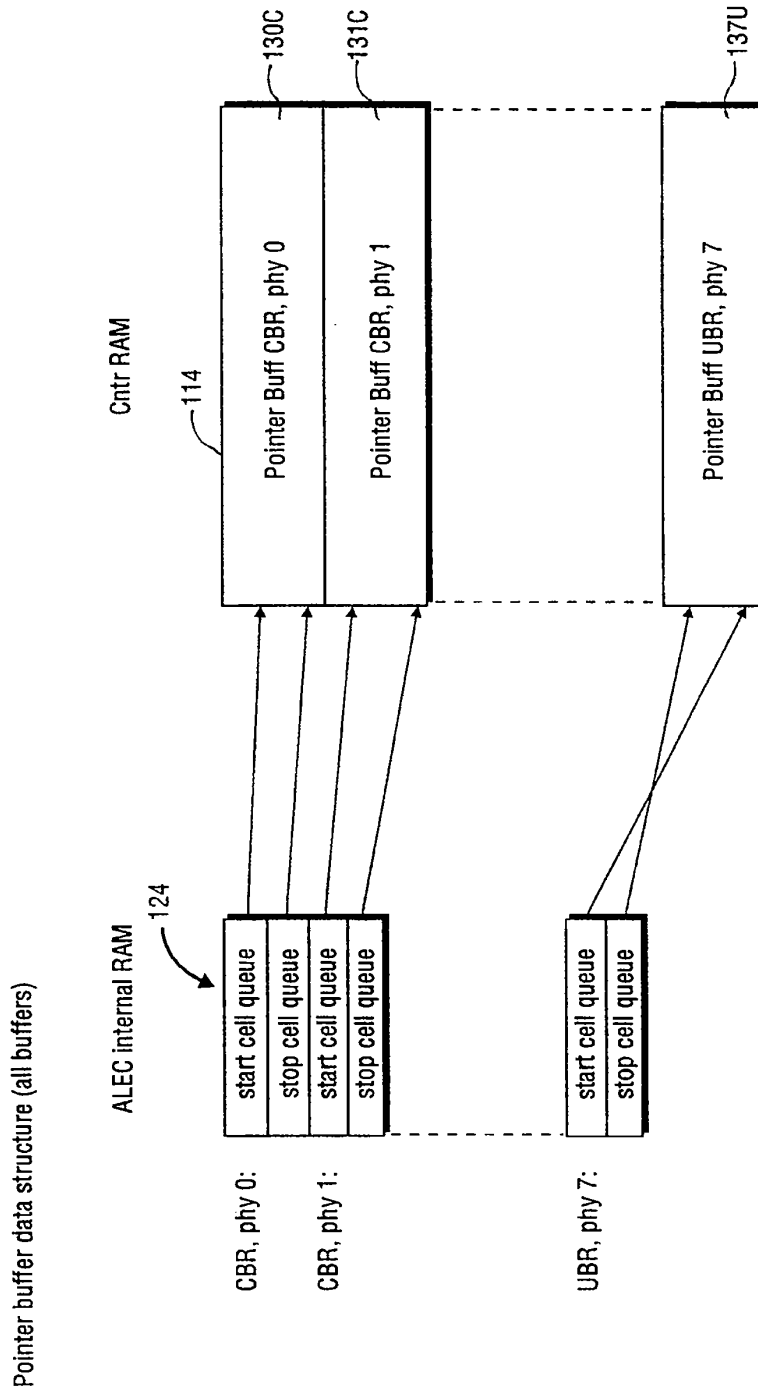


FIG. 13

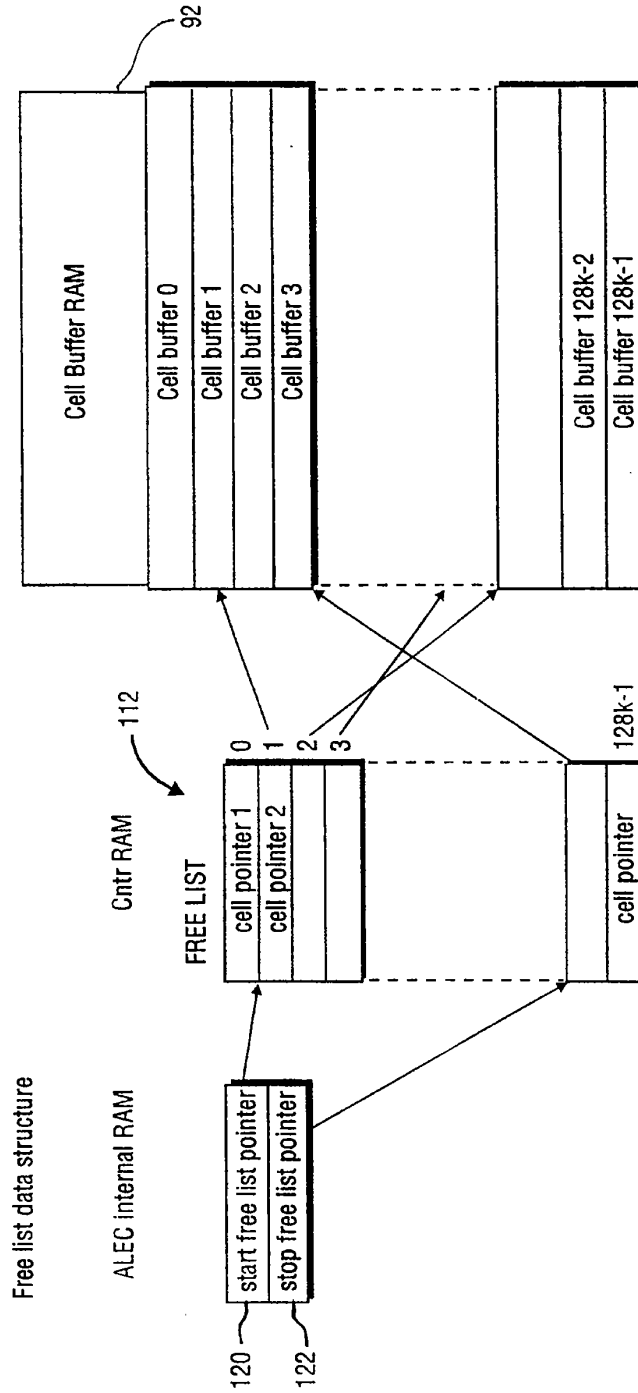


FIG. 14

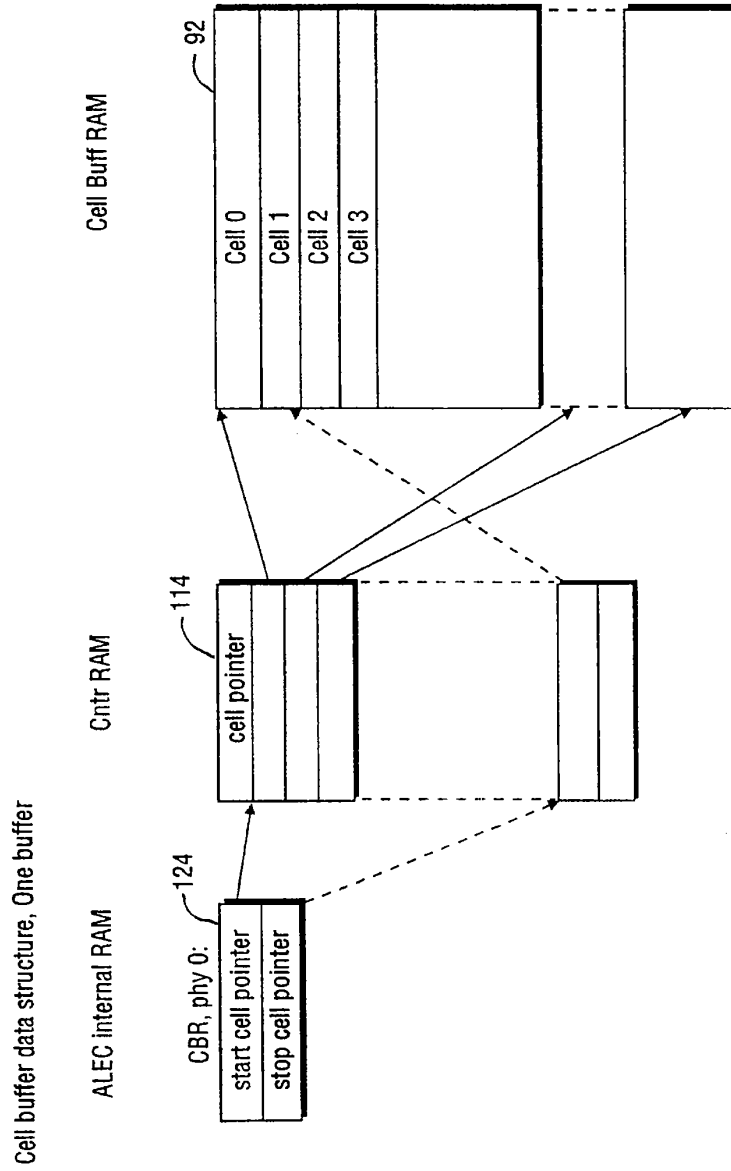


FIG. 15

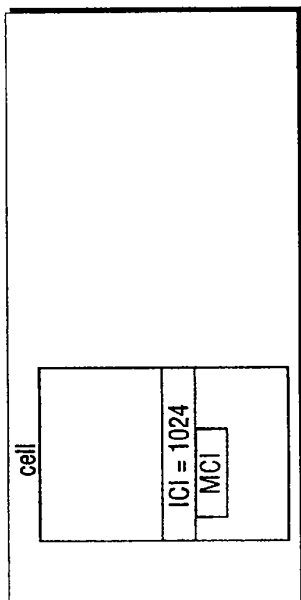


FIG. 16A

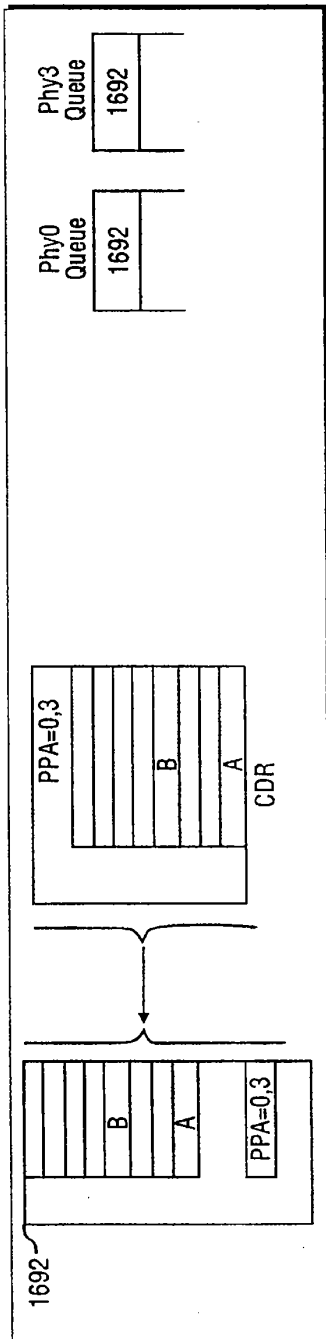


FIG. 16B

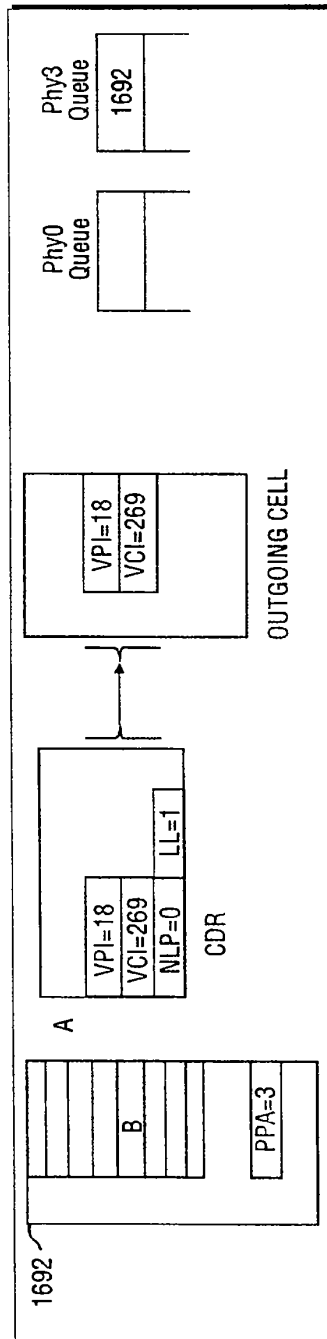


FIG. 16C

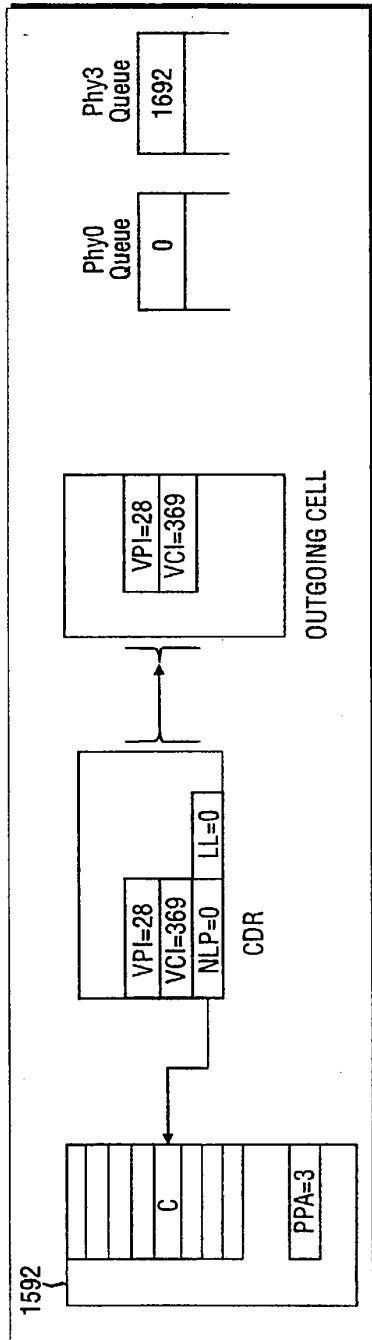


FIG. 16D

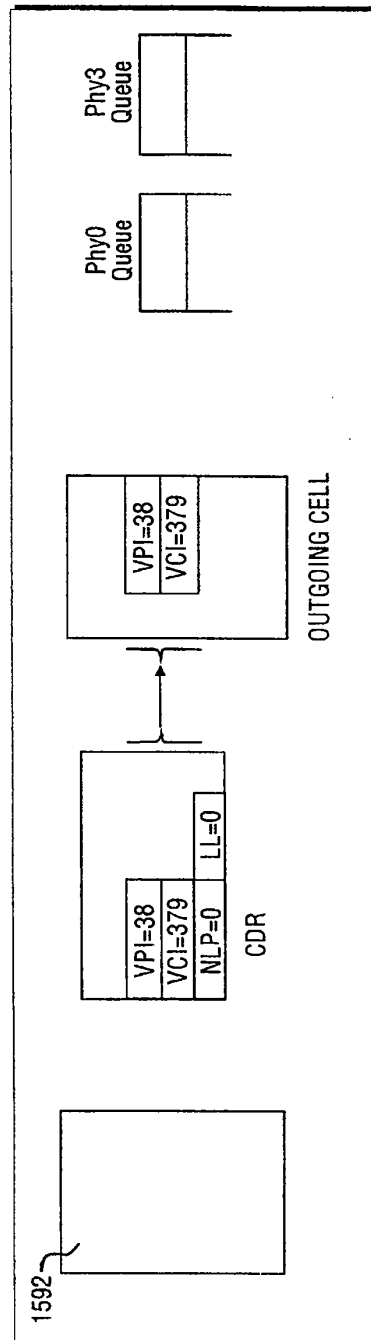


FIG. 16E

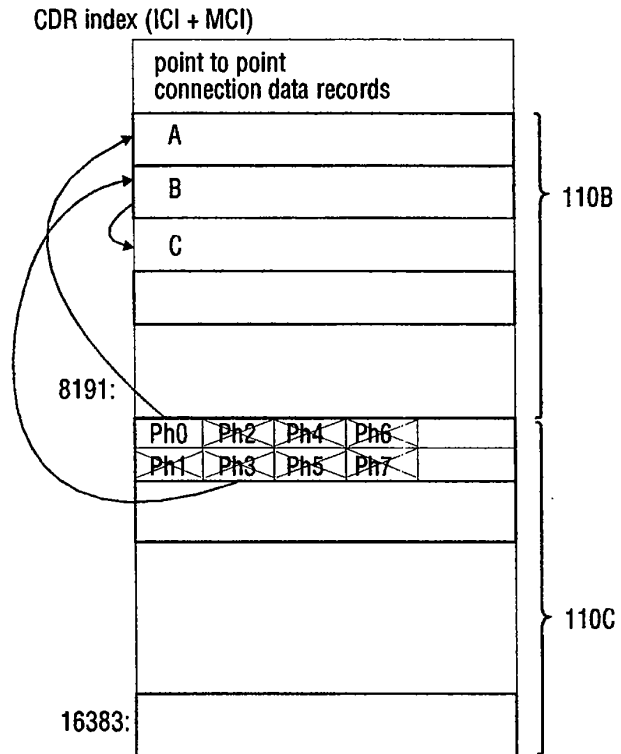


FIG. 17

INTERNATIONAL SEARCH REPORT

Intern al Application No PCT/SE 98/01065

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 H04Q11/04				
According to International Patent Classification(IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) IPC 6 H04Q H04L				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	EP 0 778 686 A (NIPPON ELECTRIC CO) 11 June 1997 see column 3, line 16 - line 31 see column 4, line 56 - column 5, line 51	1,4		
A	see column 7, line 54 - column 8, line 55 ----	2,3,5,6		
X	GB 2 308 959 A (ERICSSON TELEFON AB L M) 9 July 1997 see page 2, line 29 - page 3, line 6	1,4		
A	see claims 1,6 ----	2,3,5,6		
A	EP 0 680 179 A (HEWLETT PACKARD CO) 2 November 1995 see column 4, line 41 - column 6, line 18 -----	1-6		
<input type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.				
* Special categories of cited documents : <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 50%; border: none; vertical-align: top;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </td> </tr> </table>			<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>
<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>			
Date of the actual completion of the international search	Date of mailing of the international search report			
9 October 1998	16/10/1998			
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Gregori, S		

1

Form PCT/ISA210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/SE 98/01065

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0778686	A	11-06-1997	JP 9162879 A	20-06-1997
GB 2308959	A	09-07-1997	AU 1307397 A WO 9724904 A	28-07-1997 10-07-1997
EP 0680179	A	02-11-1995	JP 7321823 A US 5572522 A	08-12-1995 05-11-1996

Form PCT/ISA/210 (patent family annex) (July 1992)

Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	Disk system adapted to be directly attached to network			
First Named Inventor/Applicant Name:	Han-Gyoo Kim			
Filer:	Stephen C. Hemenway/Latisha Fernandez			
Attorney Docket Number:	1203			
Filed as Large Entity				
Utility Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	1742654
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	32940
Filer:	Stephen C. Hemenway/Latisha Fernandez
Filer Authorized By:	Stephen C. Hemenway
Attorney Docket Number:	1203
Receipt Date:	03-MAY-2007
Filing Date:	09-OCT-2001
Time Stamp:	17:23:28
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	806
Deposit Account	041415

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed	SupplementalIDS34253US2.pdf	116995	no	3
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
2	NPL Documents	XiMetaJapaneseOfficeAction for513300203.pdf	181793	no	6
Warnings:					
Information:					
3	NPL Documents	XiMetaJapaneseOfficeAction for555298202.pdf	86693	no	3
Warnings:					
Information:					
4	Foreign Reference	XiMetaWO9903297.pdf	1636486	no	51
Warnings:					
Information:					
5	Fee Worksheet (PTO-06)	fee-info.pdf	8178	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			2030145		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

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REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL Address to: Mail Stop RCE Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450	Application Number	09/974,082
	Filing Date	October 9, 2001
	First Named Inventor	Han-Gyoo Kim
	Art Unit	2155
	Examiner Name	Korobov, Vitali A.
	Attorney Docket Number	34253/US/2

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **Submission required under 37 CFR 1.114** Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

a. Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

i. Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

ii. Other _____

b. Enclosed

i. Amendment/Reply iii. Information Disclosure Statement (IDS)

ii. Affidavit(s)/Declaration(s) iv. Other **Combined Amendment & Petition for Extension of Time Under 37 C.F.R. 1.136(a) (Small Entity)**

2. **Miscellaneous**

a. Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

b. Other _____

3. **Fees** The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

a. The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments to Deposit Account No. **04-1415**. I have enclosed a duplicate copy of this sheet.

i. RCE fee required under 37 CFR 1.17(e)

ii. Extension of time fee (37 CFR 1.136 and 1.17)


iii. Other _____

b. Check in the amount of \$ _____ enclosed

c. Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature		Date	October 10, 2007
Name (Print / Type)	Robert D. Hoge	Registration No.	55,273

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature			
Name (Print / Type)	Date		

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing the burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

Applicant	: Han-Gyoo Kim	
Appln. No.	: 09/974,082	Confirmation No: 6653
Filed	: October 9, 2001	Group Art Unit: 2155
Title	: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK	Examiner: Korobov, Vitali A.

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

MAIL STOP AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the final Office action dated April 10, 2007, please consider the following remarks and amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Claims

1-33. (Cancelled)

34. (Currently Amended) A network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising:

a network adapter for receiving a disk access command in data link frames through the network;

a disk controller, connected to the [[LAN]] network adapter, for executing the disk access command;

a disk for storing data; and

a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device;

wherein access to the disk is operatively controlled by the disk controller; [[and]]

no disk access command is required to be routed through a server associated with the NAD; and automatic discovery of the NAD device occurs when it is connected to the network.

35. (Original) The NAD device of claim 34, wherein the network runs Ethernet.

36. (Original) The NAD device of claim 34, wherein said disk is formatted as a local disk.

37. (Original) The NAD device of claim 34, wherein said disk is partitioned as a local disk.

38. (Original) The NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller.

39. (Original) The NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device.

40. (Original) The NAD device of claim 34, wherein the controller has a filter for controlling access to the disk.

41. (Original) The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions.

42. (Original) The NAD device of claim 41, wherein each disk partition is controlled by a separate driver.

43-49. (Cancelled)

50. (Currently Amended) A network-attached storage device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the network-attached storage device comprising:

a storage device;

a network adapter for receiving a storage command through the network without requiring routing of any storage command through a server associated with the storage device; [[and]]

a storage controller for executing the storage command; and

wherein the virtual host bus adaptor comprises:

a bus driver configured to implement the virtual host bus adaptor through which I/O operations to the network-attached storage device are sent;

a port driver configured to redirect I/O requests to the network-attached storage device through the network; and

wherein the virtual host bus adaptor enumerates the network-attached storage device to the host when the network-attached storage device is connected to the network.

51. (Original) The network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device.

52. (Original) The network-attached storage device of claim 50, wherein the storage device is a disk.

53. (Original) The network-attached storage device of claim 50, wherein the storage device is a tape device.

54. (Original) The network-attached storage device of claim 50, wherein the storage device is a CD drive.

55. (Original) The network-attached storage device of claim 50, wherein the storage device is a memory device.

56-111. (Cancelled)

112. (Currently Amended) A network attached disk device, comprising:
a first disk device;
a network attached disk device controller operative to receive across a network an input/output command for the first disk device without routing of any input/output command through a server associated with the network attached disk device;
a disk controller operative to control the operation of the disk device in response to the input/output command;
a network adapter operative to receive the input/output command from the network attached disk device controller; wherein
the network attached disk device is operative to be recognized as a local device by a remote host; and the network is selected from the group consisting of a Local Area Network, a Wide Area Network, an Ethernet, and an Internet.

113. (Previously Presented) The network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host.

114. (Previously Presented) The network attached disk device of claim 112, further comprising a second disk device.

115. (Previously Presented) The network attached disk device of claim 114, wherein the first and second disk devices are both operative to be recognized as unique local devices by the remote host.

116. (Previously Presented) The network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command.

117. (Previously Presented) The network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication.

118. (Previously Presented) The network attached disk device of claim 116, wherein a protocol stack comprises a TCP/IP connection.
119. (Previously Presented) The network attached disk device of claim 112, wherein the disk controller comprises:
- a channel controller;
 - at least one disk channel operatively connected to the channel controller;
 - a buffer manager operatively connected to the channel controller; and
 - a bus interface operatively connected to the buffer manager and the network attached disk device controller.
120. (Previously Presented) The network attached disk device of claim 112, wherein the network attached disk device controller comprises:
- a main controller operative to generally control the operation of the network attached disk device;
 - a buffer management module operative to cache data associated with the first disk device;
 - a disk controller driver for interfacing with the disk controller; and
 - a network adapter driver for interfacing with the network adapter.
121. (Previously Presented) The network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote host.
122. (Previously Presented) The network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk.
123. (Previously Presented) The network attached disk of claim 112, wherein the first disk device comprises a compact disk.
124. (Previously Presented) The network attached disk of claim 112, wherein the first disk device comprises a digital versatile disk.

REMARKS/ARGUMENTS

This Amendment and Response responds to the final Office action dated April 10, 2007. Claims 34, 50 and 112 are amended and claims 1-33, 43-49 and 56-111 were previously canceled. Accordingly, after entry of this Amendment and Response, claims 34-42, 50-55 and 112-124 remain pending.

I. Rejection of Claims 34-35, 50 and 112-117 Under 35 U.S.C. § 103

The Examiner rejects claims 34-35, 50 and 112-117 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,566,331 to Irwin, Jr. et al., (hereinafter "Irwin") in view of U.S. Patent No. 6,421,753 to Hoese et al. (hereinafter "Hoese"). For at least the following reasons, the Applicant respectfully disagrees with the Examiner's rejections. Initially, the Applicant addresses the rejection of independent claims 34, 50 and 112.

The Applicant notes that independent claim 34, as amended, requires that "automatic discovery of [a] NAD device occurs when it is connected to the network." Support for this amendment may be found at least at paragraph 46 of the specification. The Applicant respectfully submits that neither Irwin nor Hoese teaches or suggests such a limitation.

Instead, Irwin discloses a mass storage system to archive, store, retrieve and manage data files that comprise a typical file system as a single uninterpreted bitfile. See *Irwin, Abstract*. Further, Irwin discloses that a data storage device is associated with the file system when the device is mounted and that the mount occurs once because the operating system remembers where the file system is mounted. See *Irwin, column 6, lines 3-8*. Accordingly, Irwin requires a static configuration of storage devices. Hoese discloses a storage router that interconnects workstations and storage devices without the use of a network server. See *Hoese, column 3, lines 30-40*. Further, the storage router must be configured to make the storage devices available on the network. See *Hoese, column 5, lines 48-52*. Accordingly, Hoese cannot automatically discover a storage device.

For at least the foregoing reasons, the Applicant respectfully submits that neither Irwin nor Hoese teach or suggest the automatic discovery of the NAD device occurs when it is connected to the network as required by independent claim 34. Accordingly, the Applicant submits that independent claim 34 is patentable over Irwin in view of Hoese.

The Applicant now turns to independent claim 50. This claim, as amended, requires "a virtual host bus adaptor comprising: a bus driver configured to implement the virtual host bus adaptor through which I/O operations to the network-attached storage device are sent; a port driver configured to redirect I/O requests to the network-attached storage device through the network; and wherein the virtual host bus adaptor enumerates the network-attached storage device to the host when the network-attached storage device is connected to the network." Support for this amendment may be found at least at paragraph 110 of the

specification. The Applicant respectfully submits that neither Irwin nor Hoese discloses wherein the virtual host bus adaptor enumerates the network attached storage device to the host when the network-attached storage device is connected to the network as required by independent claim 50.

Instead, Irwin discloses that the data storage device is associated with the file system when the device is mounted and that the mount occurs once because the operating system remembers where the file system is mounted. See *Irwin*, column 6, lines 3-8. Likewise, Hoese discloses a storage router that must be configured to make the storage devices available on the network. See *Hoese*, column 5, lines 48-52. The Applicant respectfully submits that Irwin in view of Hoese does not teach a virtual host bus adaptor that enumerates the network attached storage device to the host when the network-attached storage device is connected to the network as required by independent claim 50.

Further, the NAD device driver is a virtual host bus adaptor rather than a conventional bus driver built on top of a device physically connected to the I/O bus. Neither Irwin nor Hoese disclose a virtual host bus adaptor as required by independent claim 50.

For at least the foregoing reasons, the Applicant respectfully submits that independent claim 50, as amended, is patentable over Irwin in view of Hoese.

The Applicant now turns to independent claim 112. This claim, as amended, requires that “the network is selected from the group consisting of a Local Area Network, a Wide Area Network, an Ethernet, and an Internet.” The Applicant respectfully submits neither cited reference teaches or suggests the claimed NAD device used on a LAN, WAN, Ethernet or Internet. Instead, Irwin discloses the use of a special purpose communications path called a “channel” and having very high data transfer rates. Irwin requires this channel to operate; the channel is an integral part of its network. See *Irwin*, column 12, lines 17-35. Accordingly, Irwin cannot operate solely on a LAN, WAN, Ethernet or Internet. Instead, it needs an extremely specialized data channel to function.

Likewise, Hoese discloses the use of a fiber channel network having a protocol layer encapsulating SCSI protocols to allow workstations connected to the fiber channel network to communicate with storage devices through native, low level block protocols. See *Hoese*, Figure 3 and column 3, line 64 to column 4, line 6. As with Irwin, Hoese requires this specialized fiber channel network to operate in the manner disclosed. Accordingly, Hoese Likewise cannot operate across a network such as a LAN, WAN, Ethernet or Internet alone.

For at least the foregoing reasons, the Applicant respectfully submits that neither Irwin nor Hoese teach or suggest that the network is a Local Area Network, a Wide Area Network, an Ethernet, and an Internet as required by independent claim 112. Accordingly, the Applicant submits that independent claim 112 is patentable over Irwin in view of Hoese.

For at least the reasons set forth above, the Applicant respectfully submits that the independent claims 34, 50 and 112 are patentable over Irwin in view of Hoese and respectfully requests such indication from the Examiner.

Rejected claims 35 and 113-117 all depend, either directly or indirectly, from one of independent claims 34 and 112. Accordingly, these dependent claims are themselves patentable over Irwin in view of Hoese for at least the reasons set forth above for the independent claims. This statement is made without reference to, or waiving, the independent bases of patentability within each dependent claim.

II. Rejection of Claims 36-42, 51-52, 55, 118-120 and 122 Under 35 U.S.C. §103

The Examiner rejects claims 36-42, 51-52, 55, 118-120 and 122 under 35 U.S.C. § 103(a) as being unpatentable over Irwin in view of Hoese in further view of U.S. Patent No. 6,807,581 to Starr et al. (hereinafter "Starr").

Each of the rejected claims 36-42, 51-52, 55, 118-120 and 122 depend, either directly or indirectly, from one of independent claims 34, 50 and 112. For at least the reasons set forth above, these independent claims are patentable over Irwin in view of Hoese. Accordingly, dependent claims 36-42, 51-52, 55, 118-120 and 122 are patentable for at least the reasons set forth for the independent claims above. This statement is made without reference to, or waiving, the independent bases of patentability within each dependent claim. The Applicant, therefore, respectfully requests the Examiner allow the dependent claims over Irwin in view of Hoese.

III. Rejection of Claims 53-54, 121, 123 and 124 Under 35 U.S.C. § 103

The Examiner rejects claims 53-54, 121, 123 and 124 under 35 U.S.C. § 103(a) as being unpatentable over Irwin in view of Hoese in view of Starr in view of U.S. Patent No. 6,389,432 to Pothapragada et al. (hereinafter "Pothapragada").

Each of the rejected claims 53-54, 121, 123 and 124 depend, either directly or indirectly, from one of independent claims 50 and 112. For at least the reasons set forth above, these independent claims are patentable over Irwin in view of Hoese in further view of Starr. Accordingly, dependent claims 53-54, 121, 123 and 124 are patentable over the cited references for at least the reasons set forth for the independent claims above. This statement is made without reference to, or waiving, the independent bases of patentability within each dependent claim. The Applicant, therefore, respectfully requests the Examiner allow the dependent claims over Irwin in view of Hoese.

II. Conclusion

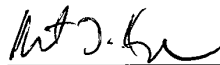
The Applicant thanks the Examiner for his thorough review of the application. The Applicant respectfully submits the present application, as amended, is in condition for allowance and respectfully requests the issuance of a Notice of Allowability as soon as practicable.

This Amendment is submitted contemporaneously with a Request for Continued Examination and a petition for a three-month extension of time in accordance with 37 C.F.R. § 1.136(a). Accordingly, please charge Deposit Account No. 04-1415 in the amount of \$930.00 (\$405.00 for Request for Continued Examination fee and \$525.00 for three-month extension of time fee). The Applicant believes no further fees or petitions are required. However, if any such petitions or fees are necessary, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 accordingly.

If the Examiner should require any additional information or amendment, please contact the undersigned attorney.

Dated: October 10, 2007

Respectfully submitted,



Robert D. Hoge, Registration No. 55,273
Attorney for Applicant
USPTO Customer No. 20686

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Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	Disk system adapted to be directly attached to network			
First Named Inventor/Applicant Name:	Han-Gyoo Kim			
Filer:	Robert D. Hoge./Ginny Sawatzke			
Attorney Docket Number:	34253/US/2			
Filed as Small Entity				
Utility Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 3 months with \$0 paid	2253	1	525	525

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for continued examination	2801	1	405	405
Total in USD (\$)				930

Electronic Acknowledgement Receipt

EFS ID:	2303498
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	32940
Filer:	Robert D. Hoge./Ginny Sawatzke
Filer Authorized By:	Robert D. Hoge.
Attorney Docket Number:	34253/US/2
Receipt Date:	10-OCT-2007
Filing Date:	09-OCT-2001
Time Stamp:	16:51:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 930
RAM confirmation Number	1894
Deposit Account	041415

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	CombinedAmendmentandPetitionForExtensionofTime_34253US2.pdf	66268 ff170686437d04285e8ea5ddea4a23ec3ef6307e	no	2
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	RequestForContinuedExaminationTransmittal_34253US2.pdf	72740 db067ae51929302e1ac9c11541971d7cb7abcbcc	no	1
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
3		AmendmentandResponsetoFinalOffice_34253US2.pdf	357372 8931a09f71e25472d3737e6cea8d8fab677dada	yes	9
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Amendment After Final		1	1	
	Claims		2	5	
	Applicant Arguments/Remarks Made in an Amendment		6	9	
Warnings:					
Information:					
4	Fee Worksheet (PTO-06)	fee-info.pdf	8320 0f2dc341b5f11285463ead50c7e5cc31765a2840	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			504700		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

**COMBINED AMENDMENT & PETITION FOR EXTENSION OF
TIME UNDER 37 CFR 1.136(a) (Small Entity)**

Docket No.
34253/US/2

In Re Application Of: **Han-Gyoo Kim**

Application No. 09/974,082	Filing Date October 9, 2001	Examiner Korobov, Vitali A.	Customer No. 20686	Group Art Unit 2155	Confirmation No. 6653
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Invention: **DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK**

COMMISSIONER FOR PATENTS:

This is a combined amendment and petition under the provisions of 37 CFR 1.136(a) to extend the period for filing a response to the Office Action of April 10, 2007 in the above-identified application.
Date

The requested extension is as follows (check time period desired):

One month Two months Three months Four months Five months

from: July 10, 2007 until: October 10, 2007
Date *Date*

Applicant claims small entity status. See 37 CFR 1.27.

The fee for the amendment and extension of time has been calculated as shown below:

CLAIMS AS AMENDED

	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST # PREV. PAID FOR	NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE
TOTAL CLAIMS	28 -	111 =	0	x \$25.00	\$0.00
INDEP. CLAIMS	3 -	14 =	0	x \$105.00	\$0.00
FEE FOR AMENDMENT					\$0.00
FEE FOR EXTENSION OF TIME					\$525.00
TOTAL FEE FOR AMENDMENT AND EXTENSION OF TIME					\$525.00

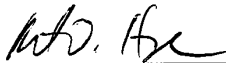
**COMBINED AMENDMENT & PETITION FOR EXTENSION OF
TIME UNDER 37 CFR 1.136(a) (Small Entity)**

Docket No.
34253/US/2

The fee for the amendment and extension of time is to be paid as follows:

- A check in the amount of _____ for the amendment and extension of time is enclosed.
- Please charge Deposit Account No. **04-1415** in the amount of **\$525.00**
- The Director is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. **04-1415**
 - Any additional filing fees required under 37 C.F.R. 1.16.
 - Any patent application processing fees under 37 CFR 1.17.
- If an additional extension of time is required, please consider this a petition therefor and charge any additional fees which may be required to Deposit Account No. **04-1415**
- Payment by credit card. Form PTO-2038 is attached.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.



Signature

**Robert D. Hoge, Reg. No. 55,273
DORSEY & WHITNEY LLP
370 Seventeenth Street, Suite 4700
Denver, Colorado 80202-5647
Tel.: (303) 629-3400
Fax: (303) 629-3450**

USPTO Customer No.: 20686

CC:

Dated: **October 10, 2007**

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to the "Commissioner for Patents, P.O. Box 1450, Alexandria, VA, 22313-1450" [37 CFR 1.8(a)] on

(Date)

Signature of Person Mailing Correspondence

Typed or Printed Name of Person Mailing Correspondence

P28SMALL/REV06

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L7	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L8	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L9	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L10	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L11	63	L10 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L12	177	L10 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L13	351	L10 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03

EAST Search History

L14	13881	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L15	419	L14 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L16	935	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L17	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
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L19	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L20	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L21	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03

EAST Search History

L22	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L23	63	L22 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L24	177	L22 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L25	351	L22 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L26	13881	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L27	419	L26 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L28	935	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L29	2242	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03

EAST Search History

L30	3	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L31	5287	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L32	2851	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L33	1434	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L34	498	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L35	455	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L36	518	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L37	127	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03

EAST Search History

L38	42	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L39	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L40	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L41	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:03
L42	262	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2008/01/07 09:03
L43	164	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2008/01/07 09:03
L44	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2008/01/07 09:03
L45	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L46	118	L45 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L47	393	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2008/01/07 09:03
L48	16	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2008/01/07 09:03

EAST Search History

L49	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2008/01/07 09:03
L50	29	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2008/01/07 09:03
L51	1	"6389432".pn.	USPAT	AND	ON	2008/01/07 09:03
L52	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L53	118	L52 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L54	1	"6216202".pn.	USPAT	AND	ON	2008/01/07 09:03
L55	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2008/01/07 09:03
L56	21	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2008/01/07 09:03
L57	8	L50 not L56	USPAT	AND	ON	2008/01/07 09:03
L58	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2008/01/07 09:03
L59	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:03
L60	41	"Network Attached Storage" "as local"	USPAT	AND	ON	2008/01/07 09:03
L61	1070	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2008/01/07 09:03
L62	535	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2008/01/07 09:03
L63	180	"Network Attached Storage" (dvd)	USPAT	AND	ON	2008/01/07 09:03
L64	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2008/01/07 09:03
L65	6840	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2008/01/07 09:03

EAST Search History

L66	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:03
L67	14	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2008/01/07 09:03
L68	989	(channel with attach\$4 with storage)	USPAT	AND	ON	2008/01/07 09:03
L69	54	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2008/01/07 09:03
L70	49	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2008/01/07 09:03
L71	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2008/01/07 09:03
L72	13	(virtual adj local adj storage)	USPAT	AND	ON	2008/01/07 09:03
L73	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L74	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L75	13881	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L76	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L77	13881	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03

EAST Search History

L78	498	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L79	455	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L80	262	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2008/01/07 09:03
L81	164	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2008/01/07 09:03
L82	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L83	393	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2008/01/07 09:03
L84	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L85	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2008/01/07 09:03
L86	1070	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2008/01/07 09:03
L87	6840	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2008/01/07 09:03
L88	989	(channel with attach\$4 with storage)	USPAT	AND	ON	2008/01/07 09:03
L89	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:03
L90	1	"6389432".pn.	USPAT	AND	ON	2008/01/07 09:03
L91	1	"6216202".pn.	USPAT	AND	ON	2008/01/07 09:03
L92	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2008/01/07 09:03
L93	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:03

EAST Search History

L94	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2008/01/07 09:03
L95	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L96	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L97	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L98	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L99	63	L74 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L100	177	L74 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L101	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L102	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03

EAST Search History

L103	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L104	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L105	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L106	63	L76 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L107	177	L76 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L108	3	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L109	127	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L110	42	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03

EAST Search History

L111	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L112	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L113	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2008/01/07 09:03
L114	118	L82 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L115	16	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2008/01/07 09:03
L116	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2008/01/07 09:03
L117	29	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2008/01/07 09:03
L118	118	L84 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L119	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2008/01/07 09:03
L120	21	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2008/01/07 09:03
L121	8	L117 not L120	USPAT	AND	ON	2008/01/07 09:03

EAST Search History

L122	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:03
L123	41	"Network Attached Storage" "as local"	USPAT	AND	ON	2008/01/07 09:03
L124	180	"Network Attached Storage" (dvd)	USPAT	AND	ON	2008/01/07 09:03
L125	14	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2008/01/07 09:03
L126	54	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2008/01/07 09:03
L127	49	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2008/01/07 09:03
L128	13	(virtual adj local adj storage)	USPAT	AND	ON	2008/01/07 09:03
L129	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L130	351	L74 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L131	351	L76 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L132	535	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2008/01/07 09:03
L133	419	L75 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L134	419	L77 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03

EAST Search History

L135	518	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L136	935	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L137	935	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L138	1434	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L139	2242	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L140	2851	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L141	5287	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L142	39	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; IBM_TDB	AND	ON	2008/01/07 09:03
L143	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. (controller with access)	USPAT	AND	ON	2008/01/07 09:03

EAST Search History

L144	0	(John "L." Sloan).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L145	93	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual with local with (storage or disk))	USPAT	AND	ON	2008/01/07 09:03
L146	9998	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2008/01/07 09:03
L147	18	(virtual adj local adj (storage or disk))	USPAT	AND	ON	2008/01/07 09:03
L148	506	(virtual with local with (storage or disk))	USPAT	AND	ON	2008/01/07 09:03
L149	15	(virtual adj disk) dell.as.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:03
L150	14	("5329619" "6404766" "5513314" "5774660" "6128644" "6175869" "6314465" "6345300" "6317775" "6360265" "6449647" "6470389" "6510164" "5999808").pn.	USPAT	OR	ON	2008/01/07 09:03
L151	5	blood.in. and dell.as.	USPAT	AND	ON	2008/01/07 09:03
L152	6	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual adj local adj (storage or disk))	USPAT	AND	ON	2008/01/07 09:03
L153	2	("6421753" or "5941972").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	AND	ON	2008/01/07 09:03
L154	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L155	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03

EAST Search History

L156	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L157	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L158	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L159	63	L158 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L160	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L161	13881	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L162	419	L161 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L163	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03

EAST Search History

L164	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L165	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L166	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L167	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:03
L168	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L169	262	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2008/01/07 09:03
L170	164	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2008/01/07 09:03
L171	3	network and storage and (housing adj (chamber or storage)) (disk adj controller)	USPAT	AND	ON	2008/01/07 09:03
L172	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L173	118	L172 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L174	393	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2008/01/07 09:03

EAST Search History

L175	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L176	118	L175 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L177	16	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2008/01/07 09:03
L178	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2008/01/07 09:03
L179	29	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2008/01/07 09:03
L180	21	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2008/01/07 09:03
L181	8	L179 not L180	USPAT	AND	ON	2008/01/07 09:03
L182	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:03
L183	127	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L184	42	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03

EAST Search History

L185	455	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L186	518	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L187	1	"6389432".pn.	USPAT	AND	ON	2008/01/07 09:03
L188	1	"6216202".pn.	USPAT	AND	ON	2008/01/07 09:03
L189	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2008/01/07 09:03
L190	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2008/01/07 09:03
L191	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:03
L192	41	"Network Attached Storage" "as local"	USPAT	AND	ON	2008/01/07 09:03
L193	1070	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2008/01/07 09:03
L194	535	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2008/01/07 09:03
L195	180	"Network Attached Storage" (dvd)	USPAT	AND	ON	2008/01/07 09:03
L196	498	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:03
L197	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2008/01/07 09:04
L198	6840	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2008/01/07 09:04
L199	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:04
L200	14	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2008/01/07 09:04
L201	989	(channel with attach\$4 with storage)	USPAT	AND	ON	2008/01/07 09:04
L202	54	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2008/01/07 09:04

EAST Search History

L203	49	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2008/01/07 09:04
L204	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2008/01/07 09:04
L205	13	(virtual adj local adj storage)	USPAT	AND	ON	2008/01/07 09:04
L206	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L207	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L208	13881	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L209	2851	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L210	1434	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L211	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L212	13881	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04

EAST Search History

L213	498	"virtual disk" same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L214	455	(virtual near4 storage) same network same local	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L215	3	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L216	5287	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L217	262	network and storage and (housing adj (chamber or storage))	USPAT	AND	ON	2008/01/07 09:04
L218	164	network and storage and (housing adj (chamber or storage)) disk	USPAT	AND	ON	2008/01/07 09:04
L219	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L220	393	(network with attached with storage) not channel (local\$ with (disk or stor\$))	USPAT	AND	ON	2008/01/07 09:04
L221	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L222	13881	"Network Attached Storage" or "Storage Area Network"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04

EAST Search History

L223	419	L222 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L224	935	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L225	2242	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L226	3	("20030028614" or "6167490" or "5838916" or "6128690").pn.	USPAT	AND	ON	2008/01/07 09:04
L227	1070	"Network Attached Storage" (cd or dvd or memory)	USPAT	AND	ON	2008/01/07 09:04
L228	6840	("709/250,236,246" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2008/01/07 09:04
L229	989	(channel with attach\$4 with storage)	USPAT	AND	ON	2008/01/07 09:04
L230	63	L207 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L231	1	"20040010654".pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:04
L232	24903	((remote near3 storage) or (auxiliary near3 storage)) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L233	351	L232 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L234	1	"6389432".pn.	USPAT	AND	ON	2008/01/07 09:04
L235	1	"6216202".pn.	USPAT	AND	ON	2008/01/07 09:04

EAST Search History

L236	63	L232 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L237	177	L232 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L238	1	"Network Attached Storage" (virtual with host with bus with adapter)	USPAT	AND	ON	2008/01/07 09:04
L239	1	"20050193189".pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:04
L240	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. controller	USPAT	AND	ON	2008/01/07 09:04
L241	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L242	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L243	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L244	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L245	42	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04

EAST Search History

L246	177	L207 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L247	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L248	2	("5838916").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L249	2	("20030028614").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L250	2	("6167490").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L251	2	("6128690").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L252	63	L211 and (device adj driver) and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L253	177	L211 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04

EAST Search History

L254	3	Network and juke\$1box and 369/24.01.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L255	127	(virtual near4 storage) near6 (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L256	4	("20030028614" or "6167490" or "5838916" or "6128690").pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:04
L257	2	"6421753".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L258	2	"5941972".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L259	3	network and storage and (housing adj.(chamber or storage)) (disk adj controller)	USPAT	AND	ON	2008/01/07 09:04
L260	118	L219 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L261	16	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter))	USPAT	AND	ON	2008/01/07 09:04
L262	7	(network with attached with storage) not channel (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2008/01/07 09:04
L263	29	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$)	USPAT	AND	ON	2008/01/07 09:04

EAST Search History

L264	118	L221 and (device adj driver) and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L265	3	("6366988" or "6356915" or "6363400").pn.	USPAT	AND	ON	2008/01/07 09:04
L266	21	(network with attached with storage) (local\$ with (disk or stor\$)) (disk with controller) (network with (adapter)) (direct\$ with attach\$) (bus with adapter)	USPAT	AND	ON	2008/01/07 09:04
L267	8	L263 not L266	USPAT	AND	ON	2008/01/07 09:04
L268	41	"Network Attached Storage" "as local"	USPAT	AND	ON	2008/01/07 09:04
L269	180	"Network Attached Storage" (dvd)	USPAT	AND	ON	2008/01/07 09:04
L270	14	(Internet with storage) (x\$disk or x\$drive)	USPAT	AND	ON	2008/01/07 09:04
L271	54	(channel with attach\$4 with storage) DAS	USPAT	AND	ON	2008/01/07 09:04
L272	49	(remote adj storage) (channel with attach\$4 with storage)	USPAT	AND	ON	2008/01/07 09:04
L273	13	(virtual adj local adj storage)	USPAT	AND	ON	2008/01/07 09:04
L274	2	("20020069245").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/01/07 09:04
L275	351	L207 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L276	351	L211 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L277	535	"Network Attached Storage" (cd or dvd)	USPAT	AND	ON	2008/01/07 09:04

EAST Search History

L278	419	L208 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L279	419	L212 and "Direct Attached Storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L280	518	(virtual near4 storage) same (network and local)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L281	6	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual adj local adj (storage or disk))	USPAT	AND	ON	2008/01/07 09:04
L282	935	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L283	1434	"virtual disk" and network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L284	2242	Network and juke\$1box	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L285	2851	(virtual near4 storage) same network	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04

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L286	5287	virtual near4 disk	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L287	39	"virtual local storage"	US-PGPUB; USPAT; USOCR; EPO; JPO; IBM_TDB	AND	ON	2008/01/07 09:04
L288	1	(remote adj storage) (channel with attach\$4 with storage) irwin.in. (controller with access)	USPAT	AND	ON	2008/01/07 09:04
L289	0	(John "L." Sloan).in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L290	93	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls. (virtual with local with (storage or disk))	USPAT	AND	ON	2008/01/07 09:04
L291	9998	("709/250,236,246,217" or 711/111 or 710/5 or 707/204,205).ccls.	USPAT	AND	ON	2008/01/07 09:04
L292	18	(virtual adj local adj (storage or disk))	USPAT	AND	ON	2008/01/07 09:04
L293	506	(virtual with local with (storage or disk))	USPAT	AND	ON	2008/01/07 09:04
L294	15	(virtual adj disk) dell.as.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:04
L295	14	("5329619" "6404766" "5513314" "5774660" "6128644" "6175869" "6314465" "6345300" "6317775" "6360265" "6449647" "6470389" "6510164" "5999808").pn.	USPAT	OR	ON	2008/01/07 09:04
L296	5	blood.in. and dell.as.	USPAT	AND	ON	2008/01/07 09:04
L297	2	("6421753" or "5941972").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	AND	ON	2008/01/07 09:04
L298	1	"20030061401".pn.	US-PGPUB; USPAT	AND	ON	2008/01/07 09:04

EAST Search History

L299	351	L158 and (directly near6 attach\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L300	177	L158 and ("directly attached")	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L301	935	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L302	935	Network near4 RAID	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2008/01/07 09:04
L303	42	((virtual adj local) with (storage or disk))	USPAT	AND	ON	2008/01/07 09:04
L304	9	("20030014569" or "20050149682" or "20050193017" or "20050193189" or "20060010287" or "20060045130" or "20060067356" or "20060069884" or "20060155805").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	AND	ON	2008/01/07 09:04



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,082	10/09/2001	Han-Gyoo Kim	34253/US/2	6653
32940	7590	01/09/2008	EXAMINER	
DORSEY & WHITNEY LLP 555 CALIFORNIA STREET, SUITE 1000 SUITE 1000 SAN FRANCISCO, CA 94104			KOROBOV, VITALI A	
			ART UNIT	PAPER NUMBER
			2155	
			MAIL DATE	DELIVERY MODE
			01/09/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

mn

Office Action Summary	Application No.	Applicant(s)	
	09/974,082	KIM, HAN-GYOO	
	Examiner	Art Unit	
	Vitali Korobov	2155	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 10 October 2007.
- 2a) This action is **FINAL**.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 34-42, 50-55 and 112-124 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 34-42, 50-55 and 112-124 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 - Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 - Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 05/03/07
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application
- 6) Other: _____

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RESPONSE TO RCE

1. This Office Action is in response to an amendment filed on 10/15/2007. Claims 34, 50 and 112 have been amended. Claims 34-42, 50-55 and 112-124 are currently pending and have been examined in this Office Action.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. The Applicant's submission filed on 10/15/2007 has been entered.

Paper Submitted

3. It is hereby acknowledged that the following papers have been received and placed of record in the file: **Information Disclosure Statement** as received on 05/03/2007 was been partially considered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person

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skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 112-124 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In particular, claim 112 contains limitation directed to the network that is selected from the group consisting of a Local Area Network, a Wide Area Network, an Ethernet, and an Internet. There is no support for implementation of the instant invention over WAN or the Internet in the specifications.

The dependent claims 113-124 suffer from the same deficiency as the claim they depend from.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 34-35, 50 and 112-117 are rejected under 35 U.S.C. 103(a) as being unpatentable over the U. S. Patent No. 5,566,331, issued to Irwin, Jr. et al.,

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hereinafter Irwin, in view of the U. S. Patent No. 6,421,753 issued to Hoese et al., hereinafter Hoese, and further in view of the U. S. Patent No. 6,389,432 to Pothapragada et al., hereinafter Pothapragada.

Regarding claim 34, Irwin teaches a network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host (Col. 2, lines 54-61), the NAD device comprising: a network adapter for receiving a disk access command in data link frames through the network (Encapsulating data in the form required by the channel-switching fabric (col. 10, lines 58-63) transmitted using lower levels of protocol (col. 12, lines 30-35). Implementation of Ethernet that Irwin teaches in col. 13, lines 59-64 inherently requires a storage device connected to the Ethernet to have a network adapter); a disk controller, connected to the network adapter (col. 15, line 67 and col. 16, lines 1-7 - controller of the direct access storage device), for executing the disk access command (col. 16, lines 1-7 - controller of the direct access storage device decapsulates and executes access commands); a disk for storing data (Fig. 1, direct access storage devices 40-1 to 40-m); and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device (Fig. 1, control path 13); wherein access to the disk is operatively controlled by the disk controller (col. 15, lines 59-67 and col. 16, lines 1-7).

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Irwin does not explicitly teach the NAD device wherein no disk access command is required to be routed through a server associated with the NAD.

However, Hoese in analogous art, directed to a method for providing virtual local storage on remote SCSI storage devices, teaches the NAD device wherein no disk access command is required to be routed through a server associated with the NAD (Hoese, col. 3, lines 30-37). Hoese essentially takes the invention of Irwin (See Fig. 1 of Hoese, data access server 14), and proposes to eliminate the data storage server in order to speed up the data access (Hoese, col. 1, lines 50-55), and to implement other technical advantages (Hoese, col. 2, lines 25-44).

Irwin and Hoese do not explicitly teach an automatic discovery of the NAD device that occurs when it is connected to the network.

However, Pothapragada, in analogous art, directed to a system with virtual volume access and management, teaches a system wherein discovery of the NAD device occurs when it is connected to the network (6:54-60).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Hoese and Pothapragada into the teachings of Irwin in order to speed up the data access (Hoese, col. 1, lines 50-55) and to implement other technical advantages (Hoese, col. 2, lines 25-44), and in order to increase storage volume utilization. Modified in this manner Irwin is hereinafter referred to as "modified Irwin".

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Regarding claim 35, modified Irwin teaches the NAD device of claim 34, wherein the network runs Ethernet (col. 13, lines 59-64).

Regarding claim 50, modified Irwin teaches a network-attached storage device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system (Irwin, 2:54-61), bus of the host, the network-attached storage device comprising: a storage device; a network adapter for receiving a storage command through the network without requiring routing of any storage command through a server associated with the storage device (Hoese, 1:58-64 - virtual local storage implemented over a SCSI bus); a storage controller for executing the storage command (Irwin, 15:67 and 16:1-7 - controller of the direct access storage device); and wherein the virtual host bus adaptor comprises: a bus driver configured to implement the virtual host bus adaptor through which I/O operations to the network-attached storage device are sent; a port driver configured to redirect I/O requests to the network-attached storage device through the network (Hoese, 1:58-64 - since the implemented storage is virtual, the communication attributes associated with this storage must inherently be virtual as well); and wherein the virtual host bus adaptor enumerates the network-attached storage device to the host when the network-attached storage device is connected to the network (Hoese, 8:15-27).

Regarding claim 112, modified Irwin teaches a network attached disk device, comprising: a first disk device (Fig. 1, 40-2); a network attached disk device controller

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operative to receive across a network an input/output command for the first disk device (col. 15, line 67 and col. 16, lines 1-7 - controller of the direct access storage device) without routing of any input/output command through a server associated with the network attached disk device (Hoese, col. 3, lines 30-37); a disk controller operative to control the operation of the disk device in response to the input/output command (col. 16, lines 1-7 - controller of the direct access storage device decapsulates and executes access commands); a network adapter operative to receive the input/output command from the network attached disk device controller (Implementation of Ethernet that Irwin teaches in col. 13, lines 59-64 inherently requires a storage device, connected to the Ethernet to have a network adapter); wherein the network attached disk device is operative to be recognized as a local device by the remote host (col. 2, lines 54-61); and the network is selected from the group consisting of a Local Area Network, a Wide Area Network, an Ethernet, and an Internet (Hoese, 6:52-64 - Ethernet support).

Regarding claim 113, modified Irwin teaches the network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host (col. 2, lines 54-61).

Regarding claim 114, modified Irwin teaches the network attached disk device of claim 112, further comprising a second disk device (Fig. 1, any of the devices 40-1, or 40-3 to 40-m).

Regarding claim 115, modified Irwin teaches the network attached disk device of claim 114, wherein the first and second disk devices are both operative to be

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recognized as unique local devices by the remote host (Col. 8, lines 49-60 - mass storage system 10 allows each client data processor the possible use of many file-systems located on many different direct access storage devices).

Regarding claim 116, modified Irwin teaches the network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command (Col. 10, lines 46-52).

Regarding claim 117, modified Irwin teaches the network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication (Fig. 3, protocol stack 209).

6. Claims 36-42, 51-52, 55, 118-120 and 122 are rejected under 35 U.S.C. 103(a) as being unpatentable over modified Irwin in view of the U. S. Patent No. 6,807,581 to Starr et al., hereinafter Starr.

Regarding claim 36, modified Irwin teaches the NAD device of claim 34.

Modified Irwin does not explicitly teach such device wherein said disk is formatted as a local disk.

However, Starr in analogous art, related to a network attached storage unit, teaches such device wherein said disk is formatted as a local disk (As per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Starr into the teachings

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of Irwin in order to reduce overhead associated with accessing data stored in different file formats. (Modified Irwin with incorporated teachings of Starr is hereinafter referred to as I/H/S).

Regarding claim 37, I/H/S teaches the NAD device of claim 34, wherein said disk is partitioned as a local disk (Starr, as per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23. Also, as per col. 6, lines 30-35, the file system 23 supports logical file format, and therefore is inherently capable of supporting partitions, partitions being nothing more than logical subdivisions of a physical disk space).

Regarding claim 38, I/H/S teaches the NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller (Starr, col. 5, lines 35-39 and Fig. 1 – Media Access Control 60).

Regarding claim 39, I/H/S teaches the NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device (Starr, Fig. 1, I/O controller 72).

Regarding claim 40, I/H/S teaches the NAD device of claim 34, wherein the controller has a filter for controlling access to the disk (Starr, col. 7, lines 23-26 – filtering based on authentication and other connection initialization procedures).

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Regarding claim 41, I/H/S teaches the NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions (Starr, col. 5, line 67, col. 6, lines 1-4 – optional boot partition).

Regarding claim 42, I/H/S teaches the NAD device of claim 41, wherein each disk partition is controlled by a separate driver (Col. 5, lines 59-64 – RAID. The disks (partitions) in RAID are independent by definition, since RAID stands for “redundant array of independent disks”).

Regarding claim 51, I/H/S teaches the network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device (Starr, Fig. 1, INIC I/O controller 72).

Regarding claim 52, I/H/S teaches the network-attached storage device of claim 50, wherein the storage device is a disk (Starr, col. 5, lines 59-60).

Regarding claim 55, I/H/S teaches the network-attached storage device of claim 50, wherein the storage device is a memory device (Starr, col. 6, lines 9-14).

Regarding claim 118, I/H/S teaches the network attached disk device of claim 116, wherein the protocol stack comprises a TCP/IP connection (Starr, col. 7, lines 26-29).

Regarding claim 119, I/H/S teaches the network attached disk device of claim 112, wherein the disk controller comprises: a channel controller (Starr, col. 5, lines 53-57 – controller 72); at least one disk channel operatively connected to the channel controller (Starr, col. 5, lines 53-57 – INIC storage unit 70 connected to INIC controller

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72 via parallel channel 75); a buffer manager operatively connected to the channel controller (Starr, Fig. 1, buffers 77 are connected to controller 72 via bus 48); and a bus interface operatively connected to the buffer manager and the network attached disk device controller (Starr, Fig. 1, buffers 77 are connected to controller 72 via bus 48).

Regarding claim 120, I/H/S teaches the network attached disk device of claim 112, wherein the network attached disk device controller comprises: a main controller operative to generally control the operation of the network attached disk device (Starr, Fig. 1, controller 72); a buffer management module operative to cache data associated with the first disk device (Starr, Fig. 1, INIC memory manager 46, buffers 77, cache 74 of the Communication Control Block (CCB)); a disk controller driver for interfacing with the disk controller (Starr, Fig. 1, INIC driver 39); and a network adapter driver for interfacing with the network adapter (Starr, Fig. 13 is a diagram of a Microsoft.RTM. TCP/IP stack and Alacritech command driver configured for NetBios communications).

Regarding claim 122, I/H/S teaches the network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk (Starr, Col. 7, lines 23-26 – authentication).

7. Claims 53-54, 121, 123 and 124 are rejected under 35 U.S.C. 103(a) as being unpatentable over I/H/S in view of the U. S. Patent No. 6,389,432 to Pothapragada et al. (hereinafter Pothapragada).

Regarding claim 53, modified Irwin teaches the network-attached storage device of claim 50.

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I/H/S Irwin further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support tape drives, but does not explicitly teach the network-attached storage device of claim 50, wherein the storage device is a tape device.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, where one of the virtual volumes is a tape farm (Fig. 2, tape farm 204), which may be controlled by a SCSI controller (Pothapragada, col. 4, lines 19-24).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach the SCSI-controlled tape farm of Pothapragada to remote storage SCSI controller of I/H/S in order to meet the increasing demand for storage and take advantage of dropping prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 54, modified Irwin teaches the network-attached storage device of claim 50.

I/H/S further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support CD-ROM drives, but does not explicitly teach the network-attached storage device of claim 50, wherein the storage device is a CD drive.

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However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, where one of the virtual volumes is a CD drive (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of modified Irwin in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 121, I/H/S teaches the network attached disk device of claim 120.

I/H/S does not explicitly teach the network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote host.

However, Pothapragada a network attached disk device that is operative to provide back-up functionality to the remote host (Pothapragada, col. 13, lines 8-12).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made combine the teaching of modified Irwin with the teachings of Pothapragada in order to enhance the functionality of the network attached disk with additional function of performing backups for the host.

Regarding claim 123, modified Irwin teaches the network attached disk of claim 112.

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I/H/S teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support CD-ROM drives, but does not explicitly teach the network attached storage device of claim 112, wherein the first disk device comprises a compact disk.

However, Pothapragada teaches a system with virtual volume access and management of network-attached storage devices, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to attach a CD drive of Pothapragada to remote storage SCSI controller of modified Irwin in order to meet the increasing demand for storage and continually lower prices of storage, along with providing seamless expansion of online storage capacity (Pothapragada, col.1, lines 49-57).

Regarding claim 124, modified Irwin teaches the network attached disk of claim 112.

I/H/S further teaches that the INIV I/O controller 72 may be a SCSI controller (Starr, col. 5, lines 62-64), known in the art to support DVD-ROM drives. Starr, in combination with Pothapragada further teaches the network-attached storage devices of claim 112, wherein the first disk device comprises a compact disk (Pothapragada, col. 15, lines 14-16). Modified Irwin does not explicitly teach the network attached storage device of claim 112, wherein the first disk device comprises a digital versatile disk.

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“Official Notice” is taken that the concept and the advantages of substituting a digital versatile disk for compact disk is old and well known in the art.

Therefore, it would have been obvious to one of ordinary skills in the art at the time the invention was made to enhance the functionality of modified Irwin by replacing a compact disk with a digital versatile disk. One of ordinary skills in the art would be motivated to do so in order to provide a higher storage capacity per disk.

8. **Examiner’s note:** Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

Response to Arguments

9. Applicant’s arguments with respect to the pending claims have been considered but are moot in view of the new ground(s) of rejection, necessitated by the Applicant’s amendment.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant’s disclosure. Applicant is reminded that in amending in response to a rejection of claims, the patentable novelty must be clearly shown in view of the state of the art

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disclosed by the references cited and the objection made. Applicant must show how the amendments avoid such references and objections. See 37 CFR § 1.111(c).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vitali Korobov whose telephone number is 571-272-7506. The examiner can normally be reached on Mon-Friday 8a.m. - 4:30p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached on (571)272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Vitali Korobov
Examiner
Art Unit 2155

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SALEH NAJJAR
SUPERVISORY PATENT EXAMINER

PTO/SB/08A (08-03) U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE Substitute for Form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	APPLICATION NO.: 09/974,082	FILING DATE: October 9, 2001
	INVENTOR(S): Han-gyoo Kim	ART UNIT: 2155
	EXAMINER NAME: Korobov, Vitali A.	ATTY. DOCKET NO.: 34253/US/2

U.S. PATENT DOCUMENTS					
EXAMINER INITIALS*	Cite No. ¹	PATENT NUMBER	ISSUE DATE	Name of Patentee of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		
N.K./	1.	6,760,783	07/2004	Berry	

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EXAMINER INITIALS*	Cite No. ¹	PUBLICATION NUMBER	PUBLICATION DATE	Name of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		
N.K./	2.	2007/0008988	01/2007	Kim	

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EXAMINER INITIALS*	Cite No. ¹	DOCUMENT NUMBER	PUBLICATION DATE	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
		Country Code ³ - Number ⁴ - Kind Code ⁵ (if known)	MM-DD-YYYY			
N.K./	3.	JP11007404	01/1990	Tokyo Shibaura Electric Co.	No ref. or trans. provided	X
N.K./	4.	WO99/03297	07/1999	Crossroads Systems, Inc.		

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS					
EXAMINER INITIALS*	Cite No. ¹	Include name of Author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), volume-issue number(s), publisher, page(s) and date.			T ⁶
N.K./	5.	Japanese Office Action, App. No. 55298/2002, January 9, 2007.			
N.K./	6.	Japanese Office Action, App. No. 513300/2003, February 6, 2007.			
EXAMINER /Vitali Korobov/				DATE CONSIDERED 01/07/2008	
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.					

* EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

Notice of References Cited	Application/Control No. 09/974,082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO	
	Examiner Vitali Korobov	Art Unit 2155	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,807,581	10-2004	Starr et al.	709/250
*	B	US-6,389,432	05-2002	Pothapragada et al.	707/205
*	C	US-6,356,915	03-2002	Chetkine et al.	707/200
*	D	US-6,594,677	07-2003	Davis et al.	707/204
*	E	US-6,216,202	04-2001	D'Errico, Matthew J.	711/112
*	F	US-5,566,331	10-1996	Irwin et al.	707/10
*	G	US-6,529,996	03-2003	Nguyen et al.	711/114
*	H	US-5,987,627	11-1999	Rawlings, III, Joseph H.	714/48
*	I	US-6,366,988	04-2002	Skiba et al.	711/165
*	J	US-5,463,772	10-1995	Thompson et al.	707/101
*	K	US-6,834,326	12-2004	Wang et al.	711/114
*	L	US-6,732,104	05-2004	Weber, Bret S.	707/10
*	M	US-6,421,753	07-2002	Hoese et al.	710/305

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims



Application/Control No.

09/974,082

Examiner

Vitali Korobov

Applicant(s)/Patent under Reexamination

KIM, HAN-GYOO

Art Unit

2155

√	Rejected
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-	(Through numeral) Cancelled
+	Restricted

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Claim	Date						
	Final	Original	8/10/05	2/12/06	8/27/06	3/30/07	1/7/08
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicant: Han-gyoo Kim	
App. No.: 09/974,082	Con. No.: 6653
Filed: October 9, 2001	Art Unit: 2155
Title: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK	Examiner: Korobov, Vitali A.

**SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§ 1.97(c) and 1.98 and
STATEMENT OF RELATEDNESS UNDER M.P.E.P. § 2001.06(b)**

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Examiner is requested to consider the references noted on the enclosed Form PTO/SB/08a during examination of the above-identified patent application. These references are submitted for the Examiner's consideration and are submitted pursuant to the duty of disclosure under 37 C.F.R. § 1.56. In submitting these references, no representation is made or implied that the references are or are not material to the examination of the application. The Examiner is encouraged to make his or her own determination of materiality. Pursuant to the requirements of 37 C.F.R. § 1.98(a)(2)(ii), only copies of the foreign references and non-patent literature documents are provided. Copies of the U.S. patent and U.S. patent application publication references are not provided, unless required by the Office.

In satisfaction of the duty of disclosure under 37 C.F.R. § 1.56, and as required by M.P.E.P. § 2001.06(b), the Examiner is requested to consider the following application commonly owned by the Assignee of the present application and that may include subject matter similar to that of the present application:

- (1) U.S. patent application no. 09/650,644, filed August 3, 2000, abandoned.

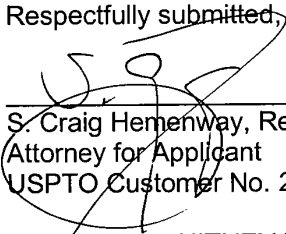
The references denoted with an asterisk (*) and cited on the attached PTO/SB/08a were cited in Supplementary European search report dated November 5, 2007, in corresponding European Patent Application No. 01272932.3. A copy of the Supplementary European search report is enclosed herewith.

This Supplemental Information Disclosure Statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of either (1) a final Office action or (2) a Notice of Allowance. Pursuant to 37 C.F.R. § 1.17(p), please charge \$180.00 to Deposit Account no. 04-1415. If any additional fees are deemed necessary, such fees may also be charged to Deposit Account No. 04-1415.

If the Examiner has any questions, please contact the undersigned attorney.

Dated: 22 January 2008

Respectfully submitted,


S. Craig Hemenway, Registration No. 44,759
Attorney for Applicant
USPTO Customer No. 20686

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PTO/SB/08A (08-03) U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE Substitute for Form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	APPLICATION NO.: 09/974,082	FILING DATE: October 9, 2001
	INVENTOR(S): Han-gyoo Kim	ART UNIT: 2155
	EXAMINER NAME: Korobov, Vitali A.	ATTY. DOCKET NO.: 34253/US/2

U.S. PATENT DOCUMENTS					
EXAMINER INITIALS*	Cite No. ¹	PATENT NUMBER	ISSUE DATE	Name of Patentee of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		
	1.	5,426,427	06/1995	Chinnock et al.	
	2.	5,524,247	06/1996	Mizuno	
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	4.	6,047,307	04/2000	Radko	
	5.	6,085,234	07/2000	Pitts et al.	
	6.	6,523,066	02/2003	Montroy et al.	
	7.	6,539,446	03/2003	Chan	
	8.	6,598,068	07/2003	Clark	
	9.	6,823,458	11/2004	Lee et al.	
	10.	6,894,981	05/2005	Coile et al.	
	11.	7,010,303	03/2006	Lewis et al.	
	12.	7,124,128	10/2006	Springer et al.	
	13.	7,254,578	08/2007	Devarakonda et al.	

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EXAMINER INITIALS*	Cite No. ¹	PUBLICATION NUMBER	PUBLICATION DATE	Name of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		
	14.	2003/0172149	09/2003	Edsall et al.	
	15.	2004/0068563	04/2004	Ahuja et al.	
	16.	2004/0220933	11/2004	Walker	

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EXAMINER INITIALS*	Cite No. ¹	DOCUMENT NUMBER	PUBLICATION DATE	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
		Country Code ³ - Number ⁴ - Kind Code ⁵ (if known)	MM-DD-YYYY			
	17.	WO00/29529	05/2000	Qlogic Corporation		

* communication to applicant.

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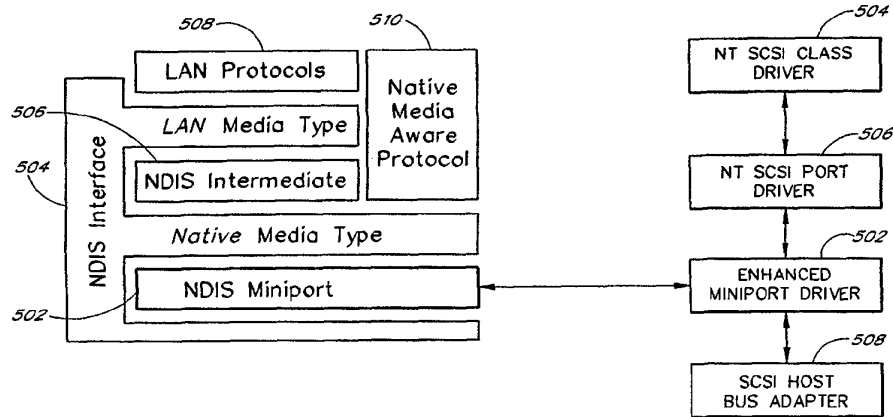
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(54) Title: SYSTEMS AND METHODS FOR NETWORK AND I/O DEVICE DRIVERS



(57) Abstract

The present invention is directed to systems and methods for transferring storage data and network data using the same interface circuit. Storage data is transferred from an upper layer storage driver to a lower layer storage driver. Network data is transferred from a network driver to the lower layer storage drive. The storage data and the network data are transferred to a communications link interface circuit, wherein the storage data is transferred using a storage protocol and the network data is transferred using a network protocol.

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SYSTEMS AND METHODS FOR NETWORK AND I/O DEVICE DRIVERSBackground of the Invention5 Field of the Invention

The present invention relates to methods and systems for handling network and I/O communications, and in particular, to network and I/O device drivers.

Description of the Related Art

10 Computer systems typically utilize an operating system that provides an interface between application programs and the hardware. For example, operating systems are used to schedule tasks, allocate storage, and handle the interface to peripheral hardware, such as hard drives, optical disk drives, tape drives, network devices and the like. The operating system may be split into a kernel and various system programs. The system programs use facilities
15 provided by the kernel to perform higher-level housekeeping task, often acting as servers in a client-server relationship.

As previously discussed, an operating system interfaces application programs to hardware. For example, an application program may transmit a request to access peripheral hardware. This request is received by the operating system, which in turn translates the
20 request to a format useable by the device. The operating system then transmits the translated request to the appropriate device and handles communications with the device.

The software used to control a peripheral device is typically called a device driver. A driver is usually a routine or set of routines that implements device-specific aspects of generic I/O operations. The device driver may be responsible for accessing the hardware registers of
25 the device, starting and completing I/O operations, performing error processing, and often includes an interrupt handler to service interrupts generated by the device. Device drivers are typically kernel mode drivers and often form part of the lowest level of the operating system kernel, with which they are linked when the kernel is built. Some operating systems, such as Windows NT, have loadable device drivers that can be installed from files after the operating
30 system is running.

In Windows NT, an I/O manager handles communication between a driver and an application program or kernel component. The I/O manager responds to an I/O request by issuing an I/O request packet to the appropriate device driver. The driver translates the request into an appropriate form for the targeted device and causes the device to begin the
35 requested I/O operation. Once the device completes the I/O operation, the device generates

an interrupt which is serviced by the device driver. The I/O manager then completes the I/O request by performing a variety of operations, including, for example, recording the outcome of the I/O operation.

5 Some operating systems, such as Windows NT, or UNIX, use a layered approach in implementing device drivers. These operating systems allow several driver layers to exist between an application program and a device. For example, one or more intermediate drivers may be layered on top of a physical device driver. These intermediate driver layers allow hardware-specific operations to be separated from more general management issues. In Windows NT parlance, one such intermediate driver type is referred to as a “class driver,”
10 while the hardware driver is called a “port driver.”

One example of a device driver is a SCSI drive device driver. The SCSI device driver typically consists of several layers. For example, the SCSI device driver may include a class driver, a SCSI port driver, and a SCSI miniport driver. When an application program issues a read request for a file located on the disk, the operating system invokes the appropriate SCSI
15 class driver and passes the read request to the class driver. The class driver translates the received I/O request packets into I/O request packets with system defined SCSI request blocks (SRBs) containing SCSI command descriptor blocks. The translated I/O request packets are then sent to the next lower driver, which may be, for example, a SCSI port driver. The SCSI port driver translates the SCSI request blocks from the class driver and passes the SCSI
20 request blocks and the command descriptor blocks to the SCSI miniport. The SCSI miniport driver is dynamically linked with the SCSI port driver and provides hardware-specific support for a particular SCSI host bus adapter (HBA). The SCSI drive performs the read operation and generates an interrupt to the SCSI miniport that then services the interrupt.

Another example of a device driver is a network driver. The network driver handles
25 communication with networking hardware, such as a NIC (Network Interface Card). Many operating systems, such as Windows NT, use driver layering to disengage network protocol management from actual data transfers. Thus, a network driver may include a Windows NT LAN (Large Area Network) driver followed by an NDIS or NIC miniport driver. The network driver layers may be interconnected using a Windows NT NDIS (Network Device
30 Interface Specification) interface. In conventional systems, the NDIS miniport driver interfaces to the NIC. Thus, in conventional systems, the NDIS miniport performs the hardware-specific operations needed to manage the NIC.

Many conventional computer systems include at least two interface cards, an I/O HBA and a network interface card, to respectively handle I/O and network protocols. As described

above, these cards are managed respectively by a SCSI miniport and an NDIS miniport. Each card is typically connected to separate communication media. For example, the I/O HBA might be connected to a high speed Fibre Channel communication link, which in turn might be connected to one or more server systems or other computer systems. The Fibre Channel link would then handle storage related communications. The NDIS miniport might be connected via a NIC to an Ethernet link, which in turn may be connected to other computer systems. The Ethernet link would then handle the network related communications, such as, in the case of a clustered server system, "heartbeat" information. The network heartbeat traffic is typically much less than the storage related traffic, and therefore the lower bandwidth, lower cost, Ethernet link is considered well suited to handle such lower bandwidth communication. Thus, for example, in a typical clustered server system having host systems and storage subsystems, each host system would have at least one I/O HBA and one Ethernet interface card. In addition, each storage subsystem would have at least one I/O HBA. The host systems communicate heartbeat information to each other over the Ethernet link. Both the host systems and the storage subsystems communicate storage information over the Fibre Channel.

However, the conventional approach described above disadvantageously requires at least two slots in each host system computer, one for the storage or I/O HBA and one for the NIC, and two communication links, in order to handle both storage related communication and network related communication. This situation is further exacerbated in systems incorporating redundant channels for both the storage and communication links. In conventional systems, such redundancy requires four host bus adapters, which in turn require four card slots in each host computer system. However, many standard computers have a very limited number of slots available. Hence, in order to accommodate four HBAs, either a non-standard, larger chassis is required, or an additional chassis having additional slot positions must be connected to the host computer system. Either alternative results in an expensive, large system.

Summary of the Invention

One embodiment of the present invention advantageously enables both network protocol and an I/O protocol to be transferred to a communication link using the same interface circuit. For example, in one embodiment two or more computer systems are interconnected using a communication link, such as a Fibre Channel link. Both an I/O protocol, such as a SCSI protocol, and a network protocol, such as an Internet protocol (IP),

are used to transmit data over the same Fibre Channel link using the same host bus adapter. Thus, in comparison with conventional systems, one embodiment of the present requires half as many communication links and half as many host bus adapters to carry data using both SCSI and IP protocols.

5 The reduction in the number of communication links and the number of host bus adapters is even greater in networked systems having redundant links. For example, in one embodiment of the present invention, two or more computer systems are interconnected using two communication links. During normal operation, one link is used to carry data using an I/O protocol, such as SCSI, while the other link is used to carry data using a network protocol,
10 such as IP. In the event of failure of either one of the two links, one embodiment of the present invention detects the failure and uses the remaining link to carry data using both the I/O and network protocols. Thus, one embodiment of the present invention provides redundant links for both network and I/O protocol data using two links and two host bus adapters. This contrasts with conventional systems, which typically use two redundant
15 communication links and two host bus adapters for I/O protocol data, and two additional redundant links and two additional host bus adapters for network protocol data.

Brief Description of the Drawings

Figure 1 illustrates one embodiment of the present invention;
20 Figure 2 illustrates one embodiment of the present invention with redundant communication links;
Figure 3 illustrates a conventional network driver architecture;
Figure 4 illustrates a conventional I/O driver architecture; and
Figure 5 illustrates one embodiment of the driver architecture of the present invention.

25

Detailed Description of the Preferred Embodiment

The present invention provides methods and systems for running network and storage protocols over the same communication link. Thus, by way of example, one embodiment of the present invention advantageously reduces the number of interface cards, interface circuits,
30 and communication links, required to network clustered server systems together. The reduction in the number of interface cards, interface circuits, and communication links provides for reduced costs and smaller systems as compared with conventional systems.

Figure 1 provides an overview of the hardware of an exemplary system incorporating one embodiment of the present invention. The illustrated system is a clustered server system.

A clustered server system typically includes two or more independent servers that can access a common body of data storage and provide services to a common set of clients. However, the present invention is not limited to clustered server systems. For example, the present invention can be incorporated into other systems that utilize both network and storage protocols.

As illustrated in Figure 1, the exemplary system 100 includes two storage subsystems 106, 108 and two host systems 102, 104, though the clustered server system 100 can have more or fewer host systems and storage subsystems. Each storage subsystem 106, 108 and host system 102, 104 may include one or more processors, such as, by way of example, a Pentium® II processor or an Alpha® processor. In one embodiment, each host system 102, 104 is running an operating system, such as Microsoft Windows® NT versions 4 or 5, or Unix. For the purposes of illustrating exemplary embodiments of the present invention, it will be assumed that the systems are running a version of Microsoft Windows® NT. Each storage subsystem 106, 108 and host system 102, 104 typically includes random access memory, as well as hard drives and optical drives, such as a CD-ROM drive or a DVD drive (not shown). In addition, each host system typically includes an interface card, such as a host bus adapter (not shown) from one of the QLogic ISP21xx or ISP22xx families. In one embodiment, the host adapter has a processor, such as CISC (complex instruction set computer) or a RISC (reduced instruction set computer) processor, and memory, such as RAM or EEPROM. In one embodiment, at least a portion of the memory is used to hold adapter code downloaded from the host computer system. In one embodiment, each host adapter is located on a separate circuit card. In another embodiment, more than one host adapter is located on a circuit card. Each host bus adapter card is typically connected to a local computer bus slot, such as a PCI bus slot.

In contrast to conventional systems, the system 100 illustrated in Figure 1 runs both storage and network communications using the same host bus adapter interface circuit on a common communication link 110. Thus, in contrast to conventional systems, which use two interface cards and two corresponding communication links and per host system, the embodiment illustrated in Figure 1 only needs one interface card or circuit and one communication link per host system. Furthermore, as discussed below, in one embodiment, use of the present invention is transparent to the operating system. Additionally, in one embodiment of the present invention, Windows NT standard class drivers may be used without modification.

In one embodiment of the present invention, the cluster storage protocol is a SCSI protocol, such as SCSI II, while the network protocol is the Internet Protocol (IP). In one embodiment, the communication link 110 connecting the various cluster systems or "nodes" is a

Fibre Channel Loop (FCL). Fibre Channel is a high-speed data transfer interface technology that advantageously maps common transport protocols, such as SCSI and IP. Thus, using Fibre Channel technology, it is possible to merge high-speed I/O, such as SCSI, and networking functionality in a single connectivity technology. However, alternative embodiments can use
5 other bus technologies, such as a SCSI bus, to run both I/O and networking protocols on a common link. Thus, in one embodiment, the network and storage packets are transferred between computer systems using standard network and I/O protocols, such as the IP and SCSI protocols. This embodiment may be used when the HBA, such as one based on the QLogic ISP2200, supports both IP and SCSI protocols. In another embodiment, if the HBA supports the
10 SCSI protocol, but not the IP protocol, the network packets are encapsulated in SCSI packets or commands. In the "encapsulation" embodiment, the HBA may support the SCSI target mode, as well as the more typical initiator mode, thereby allowing the HBA to receive SCSI packets encapsulating IP packets.

The Fibre Channel Loop 110 is connected to the host bus adapter of the host systems
15 102, 104 and the storage subsystems 106, 108. Thus, storage and network packets can be routed between the host systems 102, 104 and the storage subsystems 106, 108. The data transferred using the IP protocol may include "heartbeat" related information. "Heartbeats" are transferred across the clustered nodes to ensure that everything is properly synchronized, and so that each node can ensure that the other nodes are functioning.

The Fibre Channel Loop 110 is connected to the host bus adapters residing in each node
20 102-108. Thus, data is transferred from and to the Fibre Channel Loop 110 via respective host bus adapters. The operating systems running each node communicate with their respective host bus adapters using device drivers. In one embodiment, the device driver is responsible for accessing the host bus adapter's internal registers, starting and completing I/O operations,
25 performing error processing, and servicing interrupts generated by the device.

In one embodiment, a fail-over path is provided to ensure high reliability and to avoid a shutdown of the clustered server system in the event of a communication link failure. By way of example, Figure 2 illustrates a clustered server system 200 which has two Fibre Channel Loops
30 210, 212. In normal operation, Loop 1 210 handles the I/O traffic, while Loop 2 212 handles the network traffic. Thus, both communication loops 210, 212 are efficiently utilized in normal operation, with the bandwidth of Loop 1 allocated to I/O traffic, and the bandwidth of Loop 2 allocated to network traffic. However, in the event of a Fibre Channel Loop failure, such as the failure of Loop 1 210, one embodiment of the present invention detects the failure. Upon detecting the failure, the remaining operating Fibre Channel Loop, such as Loop 2 212, is used as

a fail-over path to carry both network traffic and I/O traffic. Thus, in contrast to conventional systems, which would utilize four communication links to provide redundancy for both network and I/O traffic, the illustrated embodiment 200 of the present invention utilizes two communication links 210, 212. Furthermore, in contrast to conventional systems, which would
5 utilize at least two HBAs and two NICs to provide such redundancy, the illustrated embodiment 200 uses two HBAs per host system 202, 204 to provide the desired fail-over path.

In one embodiment, the fail-over technique operates as follows. Typically, a Windows NT Cluster Administrator is used to manage and configure network paths and storage devices. In conventional systems, if multiple network paths, with corresponding multiple communication
10 links, have been configured, one path is designated as the primary network path. If the Cluster Administrator determines, via a loss of signal indication or the like, that it is unable to communicate over the primary path, the Windows NT Cluster Administrator can switch to a secondary network path and a corresponding secondary communication link. In contrast to conventional systems, one embodiment of the present invention permits the I/O bus, such as the
15 SCSI bus or the Fibre Channel loop, to be configured as a secondary or primary network path in addition to acting as a I/O or storage path. Thus, upon detection of a network path failure, the Windows NT Cluster Administrator can fail-over to the I/O bus.

To better illustrate the software architecture of one embodiment of the present invention, a description of conventional NIC and SCSI drivers will now be discussed. Figure 3 illustrates a
20 conventional Windows NT NDIS (Network Device Interface Specification) driver architecture 300. An NDIS interface 304 forms a wrapper about an NDIS NIC miniport driver 302, thus providing an interface between the NDIS NIC miniport driver 302, one or more NDIS intermediate drivers 306, LAN protocol drivers 308, and native-media-aware protocol drivers 310. Additionally, the NDIS interface 304 provides common, pre-defined functions to the
25 interface between the NDIS NIC miniport driver 302 and the NIC 312. The NDIS NIC miniport driver 302 uses these pre-defined functions, which in turn call other components, to manage the NIC 312 hardware.

Figure 4 illustrates a conventional Windows SCSI driver architecture 400. At the upper level is a SCSI class driver 404. The SCSI class driver 404 translates I/O requests received from
30 application programs and the like via I/O system services. The translated I/O requests are in the form of packets with system defined SCSI request blocks containing SCSI command descriptor blocks. The translated I/O request packets are then sent to the next lower driver, for example, a SCSI port driver 406. The SCSI port driver 406 translates the SCSI request blocks from the class driver 404 and passes the SCSI request blocks and the command descriptor blocks to the SCSI

miniport driver 402. The SCSI miniport driver 402 is dynamically linked with the SCSI port driver 406 and provides hardware-specific support for a particular SCSI host bus adapter 408. The SCSI driver 400 may include other optional driver layers as well, such as encryption drivers or filter drivers. Thus, as illustrated in Figures 3 and 4, in conventional systems the NIC driver
5 300 and SCSI driver 400 independently interface to their respective interface cards 312, 408.

The software architecture and operation of the embodiment 100 illustrated in Figure 1 will now be discussed in detail. Figure 5 illustrates one embodiment of a driver architecture 500 of the present invention. For example, the illustrated embodiment 500 could be used in one of the host systems illustrated in Figures 1 or 2. The upper layers of the NIC driver and the SCSI
10 driver are similar to those found in the conventional driver architectures 300, 400 illustrated in Figures 3 and 4. However, in contrast to the NIC miniport 302 illustrated in Figure 3, which interfaces to its own network interface card 312, the NDIS miniport 502 illustrated in Figure 5 redirects communication to an enhanced SCSI miniport driver 508 via an interface 504. The enhanced SCSI miniport driver 508, in turn, routes network traffic from the NDIS miniport 502
15 onto the common Fibre Channel Loop 110 illustrated in Figure 1. Therefore, in one embodiment, the network miniport driver 502 and the SCSI miniport driver 508 allow host-to-host network traffic to be overlaid onto a Fibre Channel bus, or, in an alternative embodiment, onto a SCSI bus. This permits the host-to-host traffic to operate in parallel with normal disk storage related traffic on the same bus. Thus, the enhanced driver 502, 508, in combination with
20 the HBA, emulate the network interface card (NIC).

Thus, in one embodiment, the NDIS miniport driver 502 emulates an Ethernet connection between multiple systems sharing a common Fibre Channel or SCSI bus. This Ethernet emulation is overlaid by the enhanced SCSI miniport onto the same data channels used to access disk devices shared between the clustered systems. As previously described
25 with reference to Figure 1, this approach particularly benefits clustered systems that are running short on card slots, such as PCI slots. In addition, as previously described with reference to Figure 2, in one embodiment, the present invention can provide additional fail-over paths to backup NIC adapters used for local host-to-host communications. In one embodiment, the network driver is adapter-type independent and supports multiple Ethernet
30 emulations through multiple enhanced miniport drivers simultaneously.

In one embodiment, several features are incorporated into the driver architecture 500 to enable the enhanced SCSI miniport 508 to handle both the NDIS miniport communications and the standard SCSI miniport communications. For example, the SCSI miniport 508 is enhanced with additional entry points to accommodate the connection to the NDIS miniport 502. These

additional entry points are termed “backdoor” entry points. Similarly, the NDIS miniport 502 addresses communications to the additional SCSI miniport entry points, rather than to the network interface card.

In addition, because the SCSI miniport 508 is not aware of physical addresses of the NIC command data stored in the host system memory, the SCSI miniport 508 cannot build the scatter/gather list for the network related command data and data buffers. As is understood by one of ordinary skill in the art, scatter/gather lists are used to track logically contiguous data that have non-contiguous physical addresses. Thus, in one embodiment, one or more upper layer drivers generate the scatter/gather list for the network data. For example, a SCSI filter driver, the SCSI port driver 406, and/or the NDIS driver 502 may complete the scatter/gather list. The scatter/gather list is then passed to the SCSI miniport 508 via a SCSI Request Block (SRB) extension, as discussed below.

In addition, the SRB extension is used to pass pointer and context parameter information for a Command Callback routine. The Command Callback routine is called by the miniport driver 508 as each command is completed. The Command Callback routine places a pointer to the completed command into a queue of completed command pointers, schedules a DPC (Deferred Procedure Call) service routine, and then returns.

An exemplary backdoor (BD) SRB extension shown below contains link pointers, a completion routine pointer and context, a scatter/gather count, and a list of scatter/gather elements. The exemplary SRB extension may be used when network packets are to be encapsulated in SCSI packets before the packets are transferred over the communications link.

```
typedef struct _BD_SRB_EXTENSION
{
25   SRB_EXTENSION                stdExt;

   PSCSI_REQUEST_BLOCK          nextSrb;
   PSCSI_REQUEST_BLOCK          previousSrb;
   PCOMPLETION_CALLBACK         completionRoutine;
30   PVOID                        completionContext;
   PVOID                        driverContext;
   LONG                          sgEntryCnt;
   BD_SG_ELEMENT                sgList[MAX_SG_ENTRIES];
   } BD_SRB_EXTENSION, *PBD_SRB_EXTENSION;
```

35

The PSCSI_REQUEST_BLOCK is a standard NT type, as is PVOID, indicating that the associated parameter is untyped, and LONG, indicating that the associated parameter is 32 bits. The nextSrb and the previousSrb parameters are SRB pointers associated with,

respectively, the previous and the next SRB. These pointers are used to chain or queue SRBs. When the enhanced SCSI miniport 508 is finished with a given SRB, the SCSI miniport 508 calls the Completion Callback routine identified by the completionRoutine parameter, and passes the completion context parameter completionContext. The driverContext parameter is used as a scratchpad to store context related information needed to return to a previous context upon a command completion. The sgEntryCnt and sgList parameters are used to pass the number of scatter/gather entries and the entries themselves.

In addition, several items are added to the SCSI driver object extension structure for supporting the enhanced miniport 508. This structure is allocated for each adapter managed by the SCSI miniport 508 for keeping HBA context. The structure includes the following:

- A spinlock used to synchronize access to a request queue for the HBA processor and to a SRB request queue.
- A port database array containing a list of the SCSI, network, and other devices, currently connected. The port database array is typically built during driver initialization using data received from corresponding HBAs.
- Pointer and context parameter information, including information for imported Notification Callback routines and imported Get Buffer routines described below.

In one embodiment, a host or storage system may be multiprocessor-based. The host or storage system may further include an operating system configured to run on either a uniprocessor system or a multiprocessor system, such as a Symmetric Multiprocessor System (SMP). One problem that arises in multiprocessor systems is synchronizing two threads of execution that share resources that can be accessed at the same time on a multiprocessor computer. For example, two threads could be running simultaneously on different processors and attempting to modify the same data. Such accesses need to be synchronized. Windows NT utilizes locks, such as spinlocks, to provide a synchronization mechanism for protecting resources shared by kernel-mode threads running at interrupt level. A spinlock handles synchronization among various threads of execution running concurrently on a multiprocessor computer. A thread acquires a spinlock before accessing protected resources, such as data structures. The spinlock keeps any thread except the one holding the spinlock, from using the resource. A thread that is waiting on the spinlock loops, or “spins” attempting to acquire the spinlock until it is released by the thread holding the spinlock. Since only one processor at a time can own a spinlock, the resource is safe from collisions.

A typical use for a spinlock is to protect a queue used by more than one layer of a driver. For example, a miniport function might queue packets passed to it by a protocol

driver. Because other driver functions also use this queue, the miniport function needs to protect the queue with a spinlock, so that only one thread at a time can manipulate the links or contents. The miniport function acquires the spinlock, adds the packet to the queue, and then releases the spinlock. Using a spinlock ensures that the thread holding the spinlock is the only
5 thread modifying the queue links while the packet is safely added to the queue.

In one embodiment of the present invention, the enhanced SCSI miniport 508 uses a spinlock to synchronize access to a host bus adapter processor request queue, used to pass SCSI and IP packets to the HBA processor, and the SCSI Request Block (SRB) queue.

In addition, the device extension structure is used to store pointer and context
10 parameter information for the Notification Callback routine and the Get Buffer routine. The Notification Callback routine may be used to pass error types, such as a loop down error, for communication to other drivers needing the information.

The driver architecture is further supported by a variety of routines. Some of these routines are standard or modified Windows NT-type routines, such as a Driver Entry routine,
15 a Find Adapter routine, an Initialize Adapter routine, a Start IO routine, an Interrupt Service routine, an interrupt DPC routine, as well as other routines discussed below.

One embodiment of a procedure for initializing and utilizing the SCSI miniport 508 will now be described. Initially, a Driver Entry routine is executed when the miniport driver is loaded. The Driver Entry routine builds and returns a hardware initialization data structure
20 to the SCSI port driver. The hardware initialization data structure includes information which identifies the HBA type supported by the SCSI miniport driver 508, as well as other SCSI miniport driver entry points which may be called by the SCSI port driver. In one embodiment, no modifications of the Driver Entry routine are required for the enhanced miniport driver.

25 Next, a Find Adapter routine is called for each instance of the SCSI miniport driver adapter-type found in the computer system. The Find Adapter routine builds and returns a port configuration information data structure to the SCSI miniport driver 508. The port configuration information data structure includes information related to the characteristics of the SCSI miniport driver 508 and the HBA. In addition, in one embodiment, the Find
30 Adapter routine sets the initial state of the spinlock used to control access to the HBA processor request queue. The Find Adapter routine may also set the initial synchronization interrupt request (IRQ) level to dispatch level to ensure that other processes can be run in parallel. Furthermore, in the embodiment where the IP packets are encapsulated in a SCSI packet, the Find Adapter routine will initialize the "initialize inquiry" data used for target

mode response to inquiry commands received from other connected systems. This last step is used to ensure that the other connected systems are aware that the present system is capable of encapsulating IP packets in SCSI packets.

5 During system initialization, an Initialize Adapter routine is called once for each host adapter found in the system. The Initialize Adapter routine is responsible for initializing the host adapter, which, in one embodiment, includes resetting the host adapter processor, downloading code to the host adapter, and starting and initializing the host adapter code. For the enhanced SCSI miniport driver 508, the Initialize Adapter routine will also initialize the port database, and, if IP packets are to be embedded in SCSI packets, enable the host adapter
10 target mode so that the HBA can receive as well as transmit SCSI commands.

A StartIO routine is called by the SCSI port driver to pass an SRB, containing a command, to the enhanced SCSI miniport 508 for execution. In a Windows NT driver, the StartIo routine is responsible for starting an I/O operation on the physical device. In one embodiment, the StartIO routine is enhanced to reserve and release the spinlock when
15 accessing the host bus adapter processor queue and the SRB queue.

In one embodiment, the StartIO routine is further enhanced to support two additional commands. The first command, termed the "IOCTL_BD_INQUIRY" command, is used to locate host bus adapters being managed by the enhanced SCSI miniport 508. This command gets the StartIO IRQ level that is used for synchronized access to the spinlock-controlled
20 resources, and saves the IRQ level in the device extension. This command also exports the backdoor StartIO entry point and the entry point for the Reset routine as discussed below.

One embodiment of a data structure associated with the IOCTL_BD_INQUIRY command, which may be used when the network packets are encapsulated in storage or I/O packets, is as follows:

```

typedef struct    _BD_INQUIRY_DATA
{
    ULONG          options;                // Export miniport supported options
    PSTARTIO_BACKDOOR startIoRoutine;     // Export backdoor StartIo entry
5   PVOID          startIoContext;        // Export miniport pDevExt pointer
    PRESET_BACKDOOR resetRoutine;        // Export backdoor Reset entry
    PVOID          resetContext;         // Export miniport pDevExt pointer
    USHORT        numberBuses;          // Export adapter bus count
10   USHORT        idsPerBus;            // Export number of IDs per bus
    USHORT        adapterBusId[MAX_BUS_COUNT]; // Export adapter bus IDs
    USHORT        maxDataSegments;     // Export max data segment count
} BD_INQUIRY_DATA, *PBD_INQUIRY_DATA;

```

15 Thus, the above data structure is used to export the enhanced SCSI miniport options. The inquiry data structure also exports the startIoRoutine backdoor StartIo entry address with the associated startIoContext pointer, used for passing StartIo context information. In addition, the inquiry data structure exports a backdoor resetRoutine entry address and associated resetContext, used by the NDIS miniport 502 to cause the SCSI miniport 508 to initiate an

20 HBA reset. Furthermore, the inquiry data structure is used to export the numberBuses, IdsPerBus, and BusIds parameters, to thereby pass the adapter bus count, the number of IDs per bus, and the bus adapter IDs.

In one embodiment, the enhanced SCSI miniport supported options include support for a filter driver, support for the enhanced NDIS NIC miniport driver, and support for a port

25 database. The options are defined as follows:

```

// IOCTL_BD_INQUIRY options
#define BDI_FILTER_SUPPORT    0x00000001 // Filter driver supported
30 #define BDI_LAN_SUPPORT     0x00000002 // LAN driver supported
#define BDI_PORT_DATABASE    0x00000004 // Port database supported

```

The second command used to enhance the StartIO routine is termed the IOCTL Backdoor Enable command, or the "IOCTL_BD_ENABLE" command. The IOCTL_BD_ENABLE backdoor enable command is issued by the network driver to enable

35 backdoor operation with the enhanced SCSI miniport driver 508. After locating host adapters associated with enhanced miniport drivers using the inquiry command, and after completing initialization of the host adapters, the network driver issues the enable command to enable the link to the enhanced SCSI miniport driver 508. For the embodiment where network packets are encapsulated in storage or I/O packets, the following data structure is used with the

40 IOCTL_BD_ENABLE command to import to corresponding data to the enhanced SCSI miniport 508:

```

typedef struct    _BD_ENABLE_DATA
{

```

```

        ULONG          options;           // Import driver supported options
        PNOTIFY_CALLBACK notifyRoutine;    // Import notification routine
        PVOID          notifyContext;      // Import notification parameter
        PPORT_DATA_CALLBACK portDataUpdateRoutine; // Import port database routine
5      PVOID          portDataUpdateContext; // Import port database parameter
        PGET_BUFFER_CALLBACK getBufferRoutine; // Import get buffer routine
        PVOID          getBufferContext;   // Import get buffer parameter
        USHORT        receiveBufferCount; // Import buffer count
10     } BD_ENABLE_DATA, *PBD_ENABLE_DATA;

```

The backdoor enable options include the following:

```

// IOCTL_BD_ENABLE options
15 #define BDE_NOTIFY_ROUTINE      0x00000001 // Notify routine imported
   #define BDE_DATABASE_ROUTINE  0x00000002 // Port database routine imported
   #define BDE_BUFFER_ROUTINE    0x00000004 // Get buffer routine imported

```

For the embodiment where network packets are embedded in SCSI commands, a backdoor StartIO routine is called by the network miniport driver for sending the network packets that are to be embedded in SCSI commands. The backdoor StartIO routine is similar to the StartIO routine described above. For the embodiment which encapsulates network packets in storage or I/O packets, this routine builds an I/O command block (IOCB) in the command request queue and passes the SCSI command to the host bus adapter processor for execution. SRBs use the SRB extension described above to pass in the scatter/gather list for the command. The standard StartIO routine runs at the same IRQ level as the Interrupt Service routine (ISR), while this routine is called at DISPATCH_LEVEL or lower. Therefore, the backdoor StartIO routine uses the saved IRQ level from the device extension and raises its IRQ level to the same level as the standard start IO routine before acquiring the spinlock to access the request queue or the SRB queue.

The Interrupt Service routine (ISR) is called by the SCSI port driver when an adapter is requesting service from the host system. This routine will normally be called for fast posting command completion through mailbox registers. A flag in the SRB extension is used to identify the backdoor SRBs. For those commands, the SRB extension also contains the pointer and parameter for the Command Completion callback routine. This callback routine is part of an upper SCSI layer driver or the network driver and is called by the ISR to return the completed command to the appropriate driver.

In addition, the ISR also handles other various asynchronous events posted by the adapter. In one embodiment, for most of these events, the ISR will set a flag representing the event in the device extension and schedule the execution of the interrupt DPC routine to further process the event. The interrupt DPC routine is also scheduled to process commands

that are completed through the adapter response queue and incoming target mode requests from the host adapter.

Thus, for example, the interrupt DPC routine is scheduled by the Interrupt Service routine to handle more time consuming tasks, such as error handling. The IRQ level is set to DISPATCH_LEVEL for the DPC routine. When accessing the adapter request queue and the SRB queue, this routine raises the IRQL to the saved start IO level and acquires the spinlock. The following is an exemplary list of tasks which may be performed by the interrupt DPC routine:

- 10 • Upon detection of fatal error, the DPC routine returns all commands and reinitializes adapter.
- Upon detection of a bus reset, the DPC routine cleans up queued commands, restarts the host adapter queue, and notifies other connected drivers. If an upper layer SCSI driver and/or network drivers imported a Notify routine, the Notify routine is called with a ResetDetected event code.
- 15 • Upon receipt of a port database updated event from the host adapter, the DPC routine obtains updates from the host adapter and updates data in the SCSI miniport device extension. If an upper layer SCSI driver and/or network drivers imported a Port Database callback routine, the Port Database callback routine is called with a pointer to the updated port database in the SCSI miniport device extension.
- 20 • The DPC routine handles host adapter response queue entries. Commands with an error status are returned through the response queue. The response queue is also used for supporting target mode operation. To support the network driver, the enhanced SCSI miniport driver 508 includes support for I/O command block-types needed for target mode.
- 25 • For incoming network data packets, the host adapter sends the SCSI miniport driver 508 an ATIO (accept target I/O) entry in the response queue. The SCSI miniport driver 508, in-turn, calls the Get Buffer routine imported from the network miniport driver to get an address of a free buffer which can be used as a destination buffer. The SCSI miniport driver 508 then sends a CTIO (continue target I/O) entry to the host adapter, passing the destination buffer address for the incoming data packet. When the data transfer is complete, the host adapter fast posts the completion through the mailbox registers, and the ISR will call the network driver Command Completion callback routine, passing the received packet to the NDIS miniport driver 502.
- 30 • The DPC routine is used to start commands waiting in the SRB queue.

The Reset routine resets the bus and cleans up outstanding commands. The Reset routine is typically called when a command timeout, or the like, occurs. A Reset routine entry point is exported to one or more upper layer SCSI drivers and the network drivers. When the Reset routine is called from the SCSI port, the IRQ level is set to the same level as the ISR.
5 When called from the backdoor drivers, the IRQ level is set to DISPATCH_LEVEL. When accessing the SRB queue from this routine, the current IRQ level is checked and, if not at ISR level, raised, before acquiring the spinlock.

The SCSI miniport Database routine is called from the interrupt DPC routine when a port database updated asynchronous event is received from the bus adapter. The asynchronous event may be the "hot" insertion or removal of a "hot plug" device, necessitating the update of the port database. The Database routine issues mailbox commands to the bus adapter to get the port data and to update the port database in the device extension.
10 If the upper SCSI driver layers and/or network drivers imported a Port Database callback routine, the routine is called with a pointer to the updated port database in the SCSI device extension.
15

The enhanced NDIS miniport routines and data structures will now be described. As previously discussed, in one embodiment the NDIS miniport 502 is enhanced to permit network and I/O protocols to be transferred using the same host adapter over the same communications link. For example, in the embodiment where the NDIS miniport 502 performs an Ethernet emulation, an adapter control block structure is allocated for each Ethernet emulation driver initialization. This adapter control block structure includes the following data:
20

- A current network address created from a host adapter IEEE ID and an adapter bus ID, where the physical address is encapsulated in the network address. The encapsulation of the physical SCSI address within the network address allows the encapsulation of IP packets in SCSI packets to be accomplished quickly, with little overhead.
25
- Current packet filter flags passed down from higher-level network driver.
- The backdoor start IO entry point and parameter exported from the SCSI enhanced miniport driver.
- 30
- A queue of free send buffers.
- A queue of free receive buffers.
- A queue of received data packets.
- A multicast list passed down from higher-level network driver.
- A broadcast list of other adapters on the bus, built from the port database.

- Statistical counters.

The following is a description of various routines used in conjunction with the enhanced NDIS miniport 502.

Typically, an NDIS Driver Entry routine is the first routine executed when the NDIS miniport driver is loaded. The NDIS Driver Entry routine is responsible for registering the NDIS miniport driver 502 with the NDIS layer and exporting other driver entry points and driver characteristics.

An NDIS miniport Initialization routine is then executed once for each Ethernet emulation installed. This NDIS miniport Initialization routine performs one or more of the following tasks:

- The Initialization routine scans for the next available bus adapter being managed by an enhanced SCSI miniport driver 508 using the Backdoor Inquiry IOCTL command.
- The Initialization routine allocates and initializes the adapter control block described above.
- The Initialization routine allocates and initializes a queue of send buffers. An SRB and SRB extension is allocated and initialized for each buffer.
- The Initialization routine allocates and initializes a queue of receive buffers. An SRB and SRB extension is allocated and initialized for each buffer.
- The Initialization routine initializes DPC routines.
- The Initialization routine sends the Backdoor Enable IOCTL described above to the enhanced SCSI miniport driver and exports the Get Buffer routine and the Port Database callback routine.

A Send routine is called by a higher-level network driver to transmit a data packet on the communication link. In one embodiment, the Send routine allocates the next available send buffer and moves the discontinuous data packet into the contiguous send buffer. In another embodiment, a discontinuous scatter/gather list is built within the SRB extension. Small segments, 256 bytes or less in size, may be loaded into a small buffer and passed as one segment. Larger packets may then be sent with the corresponding scatter/gather list.

The SRB associated with the send buffer is initialized with a SCSI Send CDB (command data block) and sent to the enhanced SCSI miniport driver 508 through the backdoor Start IO routine. The destination address at the front of the data packet is checked for the unique broadcast address (for example, all Fs). If the packet is a broadcast message, the Send routine will send it to the addresses in the broadcast list. Thus, an IP broadcast may be simulated by sending the same packet to every node in the driver's broadcast list. If no

send buffer is available, the Send routine will set a flag indicating the send queue is stopped and return an NDIS_STATUS_RESOURCES error status. As discussed below, in another embodiment, the broadcasting may be handled by an IP-capable host bus adapter. Hence, the broadcast list is not included in the adapter control block structure.

5 A Send Callback routine is exported to the enhanced miniport driver in the SRB extension. After transmitting the network data packet, the enhanced SCSI miniport driver 508 calls the Send Callback routine from its interrupt service routine. The Send Callback routine returns the send buffer to the queue of free send buffers and checks the queue stopped flag to see if the send queue is stopped. If stopped, this routine will schedule the execution of a send
10 DPC routine.

 The send DPC routine is scheduled by the Send Callback routine upon the stoppage of the send queue resulting from a shortage of send buffers. The send DPC routine is responsible for notifying the appropriate higher level network driver that resources are now available to receive additional packets. This notification is performed by a standard
15 NdisMSendResourcesAvailable call. However, prior to issuing this call, the send DPC routine needs to synchronize with other network miniport functions by acquiring a network miniport spinlock using the standard NdisIMSwitchToMiniport call. The spinlock is returned with a call to NdisIMRevertBack.

 A Receive Buffer routine is exported to the enhanced SCSI miniport driver 508 via the
20 Backdoor Enable IOCTL function. When the enhanced SCSI miniport 508 receives a SCSI Send CDB from a second host adapter on a shared bus, the enhanced SCSI miniport 508 calls the Receive Buffer routine to obtain a free receive buffer for an incoming data packet.

 A Receive Callback routine is used to insert the receive buffer into the queue of received packets and to schedule the execution of a receive DPC routine. After receiving the
25 incoming data packet, the enhanced SCSI miniport driver 508 calls this routine from its interrupt service routine. The Receive Callback routine is exported to the enhanced miniport driver in the SRB extension.

 The receive DPC routine is scheduled by the Receive Callback routine after queuing an incoming data packet. The receive DPC routine is responsible for passing the received
30 packets up to the protocol driver using standard NdisMEthIndicateReceive and NdisMEthIndicateReceiveComplete calls. This backdoor routine also needs to synchronize with other network miniport functions by acquiring and releasing the network miniport spinlock using NdisIMSwitchToMiniport and NdisIMRevertBack calls.

The receive DPC routine also includes support for packet filtering and multicast lists. The packet filtering flags and the multicast list are passed down to the network miniport via NDIS_OID functions described below. The destination address at the front of the data packet indicates the type of message, for example, direct address, broadcast, or multicast message types. The receive DPC routine enforces the filter flags, discarding the types of messages that the higher level driver is not interested in receiving. If multicast messages are enabled and a multicast message is received, the receive DPC routine verifies that the packet destination address is in the multicast list prior to passing the packet up to the protocol driver. The receive buffers are returned to the queue of free receive buffers after the data packet has either been passed up to the protocol driver or discarded.

In another embodiment, a single DPC routine handles both the task of notifying the higher level driver that resources are available to send packets, and the task of passing packets to the protocol driver.

The Port Database callback routine is exported to the enhanced miniport driver via the Backdoor Enable IOCTL function. As previously described, this routine is called by the SCSI miniport driver 508 initially from the IOCTL function and later whenever the port database is updated. This routine scans the port database looking for host adapters on the bus. Each adapter found is added to the broadcast list maintained in the adapter control block so that the driver has a current broadcast list.

A Query Information routine handles NDIS_OID (NDIS Object Identifier) query requests from higher-level network drivers. Each NDIS driver contains an information block in which the driver stores dynamic configuration information, such as a multicast address list, and statistical information that a management entity can query or set. Each information element within the information block is typically referred to as an object. An Object identifier (OID) is used to refer to the object. Thus, a management entity needs to provide an appropriate OID when querying or setting a given object.

A Set Information routine handles NDIS_OID requests from higher-level network drivers to pass information to the network miniport driver. The Set Information routine is used to pass down the filter flags and the multicast list to the network miniport driver.

The embodiment where network and storage packets are transferred between computer systems using standard IP and SCSI protocols, rather than by encapsulating IP packets in SCSI packets, will now be described. The data structures and routines for this embodiment are similar to the data structures and routines for the "encapsulation" embodiment described above, with the following modifications. In general, the modifications enable the NDIS

miniport driver 502 and the HBA processor to send network unencapsulated IP packets and the associated scatter/gather lists to be sent to the HBA processor. Furthermore, the modifications allow the receive buffers to be immediately pushed onto the HBA processor receive buffer queue, rather than having the enhanced SCSI miniport 508 get the receive
5 buffers from the enhanced NDIS miniport 502 when requested. The modifications help take advantage of HBAs that support both network and I/O protocols.

Several routines and data structures are substantially the same as for the “encapsulation” embodiment. For example, the enhanced SCSI miniport Driver Entry routine and Reset routine are substantially the same for both the present embodiment and the
10 “encapsulation” embodiment. Similarly, the enhanced NDIS miniport Send Callback routine, Query Information routine and Set Information Routine are substantially unaltered.

First, modifications to the SCSI miniport driver routines and structures will be discussed. The SCSI driver object extension structure previously described is modified to provide storage for additional data imported from the enhanced NDIS miniport 502. In
15 addition, the SCSI driver object extension structure is modified to include a queue for passing receive buffers to the HBA processor for incoming IP packets, and to support a separate port database used to contain a list of connected IP devices. The additional data imported from the enhanced NDIS miniport 502 includes information relating to the receive buffers and the ReturnReceive routine, as illustrated below in the backdoor enable data structure
20 BD_ENABLE_DATA.

As the HBA supports both I/O and network protocols, and can therefore receive IP packets directly, the HBA does not need to support SCSI target mode. The SCSI miniport Find Adapter routine may therefore be modified to eliminate support for the SCSI target
25 mode. Thus, the Find Adapter routine no longer needs to initialize data for the SCSI target mode. The Find Adapter routine may be further modified to initialize the IP receive buffer queue. Support for the SCSI target mode may also be eliminated from the Interrupt DPC Routine.

The SCSI miniport Initialize Adapter routine may be similarly modified to remove support for the SCSI target mode. For example, the Initialize Adapter routine no longer needs
30 to enable target mode in the HBA. The Initialize Adapter routine may be further modified to enable the IP mode in the HBA and to pass the receive buffer queue address to the HBA.

As illustrated below, the BD_INQUIRY_DATA data structure is modified to export additional information from the enhanced SCSI miniport driver 508 to the NDIS miniport driver 502. For example, the data structure includes a pointer to the receive buffer queue, as

well as the size of the receive buffer queue, which can be passed to the NDIS miniport driver 502. This allows the NDIS miniport driver 502 to directly pass the free receive buffers to the HBA processor. Furthermore, an Add Buffers backdoor routine entry is also passed to the NDIS miniport driver 502. The Add Buffers backdoor routine permits the NDIS miniport driver 502 to inform the SCSI miniport driver 508 if free buffers have been added to the receive buffer queue. In addition, the data structure also includes an entry for passing a Fibre Channel adapter world wide node name. Thus, rather than encapsulating the physical address in the network address, as described above, the node name may be used.

```

10 typedef struct _BD_INQUIRY_DATA
    {
        ULONG Options; // Export miniport supported options
        PSTARTIO_BACKDOOR StartIoRoutine; // Export backdoor StartIo entry
        PVOID StartIoContext; // Export miniport DevExt pointer
15 PRESET_BACKDOOR ResetRoutine; // Export backdoor Reset entry
        PVOID ResetContext; // Export miniport DevExt pointer
        USHORT ReceiveBufferQueueSize; // Export receive buffer queue size
        PVOID ReceiveBufferQueue; // Export receive buffer queue pointer
        PBUFFERS_BACKDOOR AddBuffersRoutine; // Export backdoor Add Buffers entry
20 PVOID AddBuffersContext; // Export miniport DevExt pointer
        UCHAR acNodeName[8]; // Export adapter node name
    } BD_INQUIRY_DATA, *PBD_INQUIRY_DATA;

```

The `_BD_ENABLE_DATA` data structure is correspondingly modified to import additional information from the enhanced NDIS miniport driver 502 to the enhanced SCSI miniport driver 508. For example, the data structure is used to import the size of each receive buffer and the maximum size of IP packets supported. The data structure is also used to import pointer and context parameters for the ReturnReceive routine, which is used to pass received packets from the SCSI miniport driver 508 to the NDIS miniport driver 502. The data structure also is used to import the IP address for NIC emulation. Note that the NDIS miniport 502 no longer imports the Port Database routine, the Get Buffer routine, or the Notification Routine. The NDIS miniport driver 5902 does not need the port database, because all addressing is handled by the SCSI miniport driver 508. In the present embodiment, the SCSI miniport driver 508 takes the network node name in the IP packet header, searches for a corresponding Loop ID in the IP port database, and provides the Loop ID to the HBA.

```

typedef struct _BD_ENABLE_DATA
    {
40     ULONG Options; // Import driver supported options
        USHORT ReceiveBufferCount; // Import buffer count
    }

```

```

    ULONG          ReceiveBufferSize; // Import buffer size
    ULONG          MaximumTransferSize; // Import maximum transfer size
    PRETURN_PACKETS_CALLBACK ReturnReceivePacketsRoutine; // Import return
                                                           packets routine
5   PVOID          ReturnReceivePacketsContext; // Import return packets parameter
    PVOID          ReceiveBufferCBs; // Import receive buffer control blocks
    ULONG          IpAddress; // Import IP address
} BD_ENABLE_DATA, *PBD_ENABLE_DATA;

```

10

The Backdoor Start IO routine is also modified, as it no longer needs to build an IOCB that passes SCSI commands with encapsulated IP packets to the HBA processor. Instead, in the present embodiment, the Backdoor Start IO routine builds and sends an IOCB for sending unencapsulated IP packets, along with the associated scatter/gather lists, to the HBA. In another embodiment, the Backdoor Start IO routine is modified to handle multiple send packets on a single call from the NDIS miniport driver 502.

15

The Interrupt Service routine (ISR) operates substantially the same as in the “encapsulation” embodiment when sending IP packets. The SRB extension contains the pointer to the NDIS miniport Callback routine, which is used for returning the send buffer to the NDIS miniport 502. For incoming receive IP packets, the HBA processor takes empty receive buffers from the receive buffer queue as needed. When an entire packet has been received into one or more receive buffers, the HBA interrupts the host. The ISR routine then passes the received packet to the NDIS miniport 502 using the ReturnReceivePackets callback routine.

20

25

The Port Database routine may be modified to keep a separate list of all IP type devices, such as other HBAs attached on the same Fibre loop. This list is used by the enhanced SCSI miniport 508 to get the Fibre Channel address when sending a packet. Because all Fibre Channel addressing is resolved by the SCSI miniport 508, the NDIS miniport 502 no longer uses the port database.

30

Modifications to the NDIS miniport driver routines and structures will be now be discussed. In one embodiment, the IP-capable HBA now handles IP broadcasting operations. Hence, the broadcast list of other loop-connected devices may be deleted from the adapter control block structure. The adapter control block structure may be further modified to provide storage for the additional information exported from the SCSI miniport driver 508, as previously discussed.

35

Because the NDIS miniport 502 no longer uses the port database, the Port Database Callback routine may be eliminated.

The Initialization routine may be modified to import/export additional information to and from the SCSI miniport driver 508, as described above. In the present embodiment, SRBs and SRB extensions are no longer used to allocate or initialize receive buffer queues. Instead, the receive buffer queue is initialized by the SCSI miniport driver 508, as discussed
5 above. The receive buffers are then directly added to the HBA processor receive buffer queue. The Initialization routine may therefore be modified to call the SCSI miniport backdoor routine, AddBuffersRoutine, which informs the SCSI miniport 508 and the HBA processor how many buffers were added to the queue.

As network data is no longer encapsulated in a SCSI command, the Send routine may
10 be modified to no longer build the SCSI Send CDB in the SRB. Furthermore, because the IP-capable HBA now handles broadcast messages, the Send routine code that simulated an IP broadcast may be eliminated. In addition, in one embodiment, the Send routine may be modified to support NDIS calls to send multiple packets at a time. Thus, multiple send packets can be sent to the SCSI miniport backdoor Start IO routine in a single call.

15 In one embodiment, the Send DPC routine and the Receive DPC routine may be combined into a single DPC routine to handle both functions. After the received packets have been indicated up the driver layer stack to higher level network drivers, the free receive buffers are returned directly to the HBA processor receive buffer queue. The SCSI miniport backdoor routine, AddBuffersRoutine, is called to notify the SCSI miniport and the HBA
20 processor of the additional free buffers.

In the present embodiment, all free receive buffers are immediately pushed onto the HBA processor receive buffer queue. Therefore, the Receive Buffer routine may be completely removed.

No changes to the Receive Callback routine are needed. However, the Receive
25 Callback routine pointer is now imported to the SCSI miniport driver 508 via the IOCTL command, instead of by the SRB extension.

While certain preferred embodiments of the invention have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the present invention. Accordingly, the breadth and scope of the present invention
30 should be defined only in accordance with the following claims and their equivalents.

WHAT IS CLAIMED IS:

1. A system for sending both network and storage protocols over the same host adapter, said system comprising:
 - a network driver, including at least one network miniport;
 - 5 a SCSI miniport driver layer coupled to said network driver to receive network related information from said network miniport;
 - a SCSI driver layer higher than said SCSI miniport driver layer, said higher SCSI layer passing storage related information to said SCSI miniport driver layer;
 - a bus adapter coupled to said SCSI miniport driver layer, wherein said SCSI
 - 10 miniport driver layer transfers both network and storage related information to said bus adapter; and
 - a communication medium link coupled to said bus adapter, wherein said communication link is configured to receive both said network related information and said storage related information, and said communication medium link is configured
 - 15 to couple a first computer system to a second computer system.
2. The system for sending both network and storage protocols over the same host adapter as defined in Claim 1, wherein said network driver includes at least a intermediate driver.
3. The system for sending both network and storage protocols over the same host
- 20 adapter as defined in Claim 1, wherein said communication medium link is fibre channel-compatible.
4. The system for sending both network and storage protocols over the same host adapter as defined in Claim 1, wherein said communication medium link is SCSI-compatible.
5. The system for sending both network and storage protocols over the same host
- 25 adapter as defined in Claim 1, wherein said network related information is transferred using an Ethernet protocol.
6. The system for sending both network and storage protocols over the same host adapter as defined in Claim 1, wherein said storage related data is transferred using a SCSI protocol.
- 30 7. The system for sending both network and storage protocols over the same host adapter as defined in Claim 1, wherein said storage related data is transferred using a fibre channel protocol.
8. A method of transferring data using a storage protocol and a network protocol over the same host adapter, said method comprising the acts of:

transferring storage data from an upper layer storage driver layer to a lower layer storage driver;

transferring network data from a network driver to said lower layer storage driver; and

5 transferring said storage data and said network data to a communication link interface circuit.

9. The method of transferring data as defined in Claim 8, wherein said lower layer storage driver is a miniport driver.

10 10. The method of transferring data as defined in Claim 8, wherein said upper layer storage driver is a port driver.

11. The method of transferring data as defined in Claim 8, wherein said network driver includes at least a network miniport driver.

12. The method of transferring data as defined in Claim 8, further comprising the act of encapsulating said network data in a storage command.

15 13. The method of transferring data as defined in Claim 8, further comprising the act of passing a network scatter/gather list to said lower layer storage driver.

14. The method of transferring data as defined in Claim 8, further comprising the act of determining if said lower layer storage driver supports an interface to said network driver.

20 15. A system for sending both network and storage data using the same driver, said system comprising:

 a network driver; and

25 a storage driver coupled to said network driver to receive network related information, said storage driver configured to receive storage related information from an operating system, and said storage driver configured to transfer both said network and said storage related data to an interface card.

16. The system for sending both network and storage data as defined in Claim 15, wherein said storage driver further comprises at least one entry point for communication with said network driver.

30 17. The system for sending both network and storage data as defined in Claim 15, further comprising a spinlock managed by said storage driver, said spinlock used to control access to at least a first resource.

18. The system for sending both network and storage data as defined in Claim 15, wherein said interface card is configured to be coupled to a fibre channel network.

19. The system for sending both network and storage data as defined in Claim 15, wherein said interface card is configured to be coupled to a SCSI bus.

20. A device driver for communicating both network and storage information over the same interface circuit, said device driver comprising:

5 a first entry point used to receive storage data intended for transfer to at least one communication link; and

a second entry point used to receive network data intended for transfer to said at least one communication link; and

10 an interface used to communicate said storage data using a storage protocol and said network data using a network protocol to a communication link interface circuit.

21. The device driver as defined in Claim 20, further comprising at least a standard Windows NT class layer.

15 22. The device driver as defined in Claim 20, further comprising at least a class layer, a port layer, and a miniport layer, wherein said second entry point is associated with said miniport layer.

23. A networked system, including at least two computer systems coupled by a communication link which transfers data between said computer systems using both network and storage protocols, said system comprising:

20 at least a first processor located in at least a first of said at least two computer systems;

a first operating system configured to be executed by said first processor;

25 a first network driver configured to be executed by said first computer system, said first network driver having an interface used to receive network related information from said operating system; and

a first storage driver, configured to be executed by said first computer system, said first storage driver having at least a first interface used to receive said network related information from said network driver, and said first storage driver having at least a second interface used to receive storage related information from said operating system;

30 a first bus adapter in communication with said first storage driver, said first bus adapter used to receive both said network related information and said storage related information; and

a communication medium in communication with said first adapter, said communication medium used to transfer both said network and said storage related data, using respectively, a network protocol and a storage protocol, to at least a second of said at least two computer systems.

5 24. The networked system as defined by Claim 23, further comprising:

a second host adapter coupled to at least a second processor in a second of said at least two computers, said second host adapter coupled to said communication medium; and

10 a second storage driver, configured to be executed by said second computer system, said second storage driver having at least a first interface used to receive said network related information and storage related information from said second host adapter;

15 a second network driver configured to be executed by said second computer system, said second network driver having at least a first interface for receiving network related information from said storage driver; and

a second operating system configured to be executed by at least a first processor of said second computer system, said second operating system having at least one interface for receiving information from said storage driver and said network driver.

20 25. The networked system as defined by Claim 23, wherein said communication medium is a fibre channel.

26. The networked system as defined by Claim 23, wherein said communication medium is SCSI-compatible.

25 27. The networked system as defined by Claim 23, wherein said first operating system is Windows NT.

28. The networked system as defined by Claim 23, wherein said first computer system further comprises at least a second processor configured to execute said first operating system.

30 29. A networked system, including at least two computer systems coupled by at least two communication links, said networked system comprising:

a first computer system;

a second computer system;

a first communication link coupling said first computer system and said second computer system, said first communication link configured to transfer data using an I/O protocol;

5 a second communication link coupling said first computer system and said second computer system, said second communication link configured to transfer data using a network protocol;

a failure detection routine configured to detect the failure of said first communication link and said second communication link, wherein upon detecting the failure of either of said first and said second communication links, said failure
10 detection routine causes both I/O and network protocols to be used to transfer, respectively, storage and network data, on the non-failed communication link.

30. The networked system as defined by claim 29, wherein said I/O protocol is a SCSI protocol.

31. A method of providing redundant communication between at least two
15 computer systems, said method comprising the acts of:

transferring data over a first communication link using an I/O protocol;

transferring data over a second communication link using a network protocol;

detecting when either said first communication link or said second communication link have experienced at least a first mode of failure;

20 transferring data using said network protocol over said first communication link in response to detecting said failure in said second communication link; and

transferring data using said I/O protocol over said second communication link in response to detecting said failure in said first communication link.

32. A device driver for communicating both network and storage information
25 using the same interface circuit, said device driver comprising:

a first interface used to receive storage data intended for transfer to at least one communication link; and

a second interface used to receive network data intended for transfer to at least one communication link; and

30 a third interface used to communicate said storage data using said storage protocol and said network data, where said network data is encapsulated using said storage protocol, to a communication link interface circuit.

33. A device driver for communicating both network and I/O information using the same interface circuit using respectively network and I/O protocols, said device driver comprising:

5 a means for receiving I/O data intended for transfer to at least one communication link; and

a means for receiving network data intended for transfer to at least one communication link; and

10 a means for communicating said I/O data using an I/O protocol and said network data using said network protocol to a means for interfacing to a communication medium.

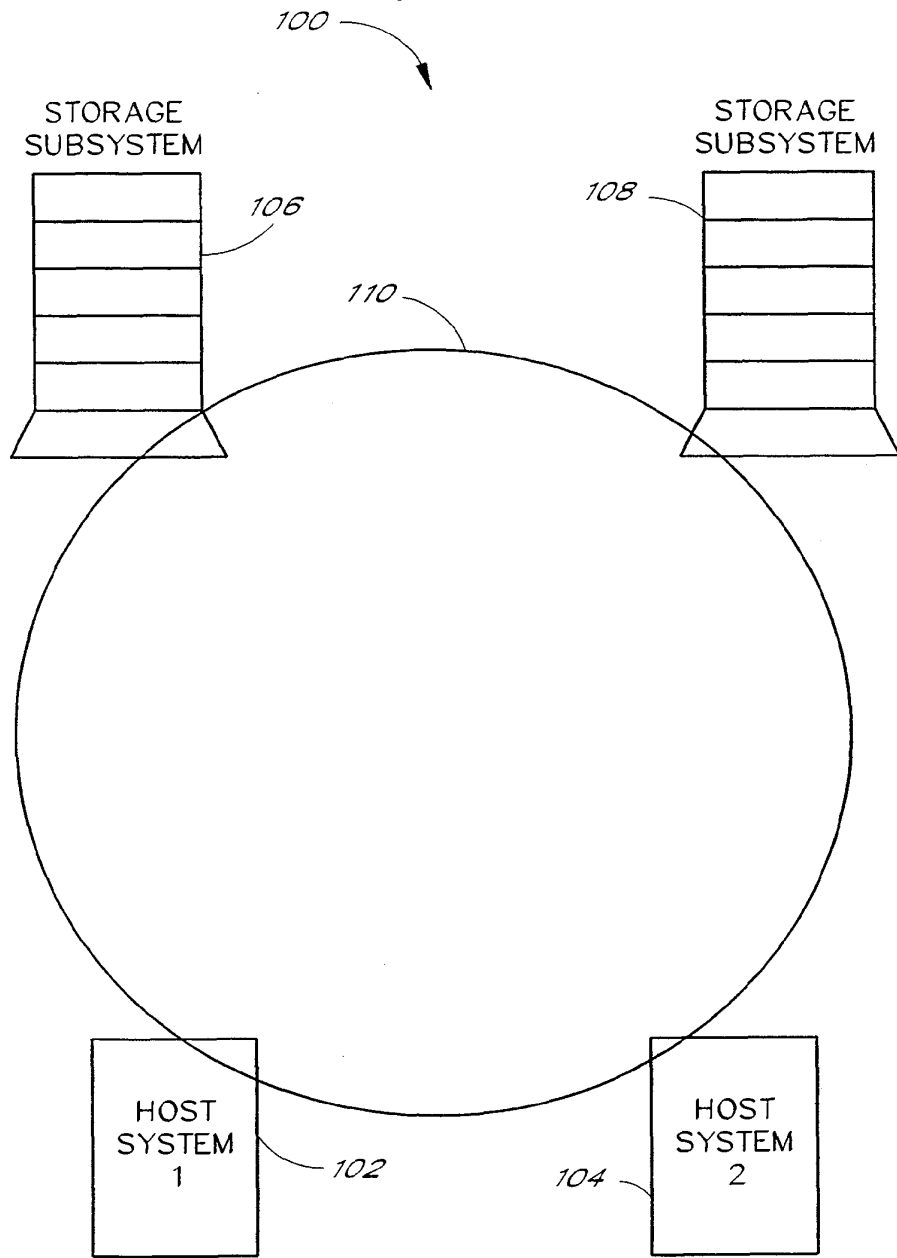


FIG. 1

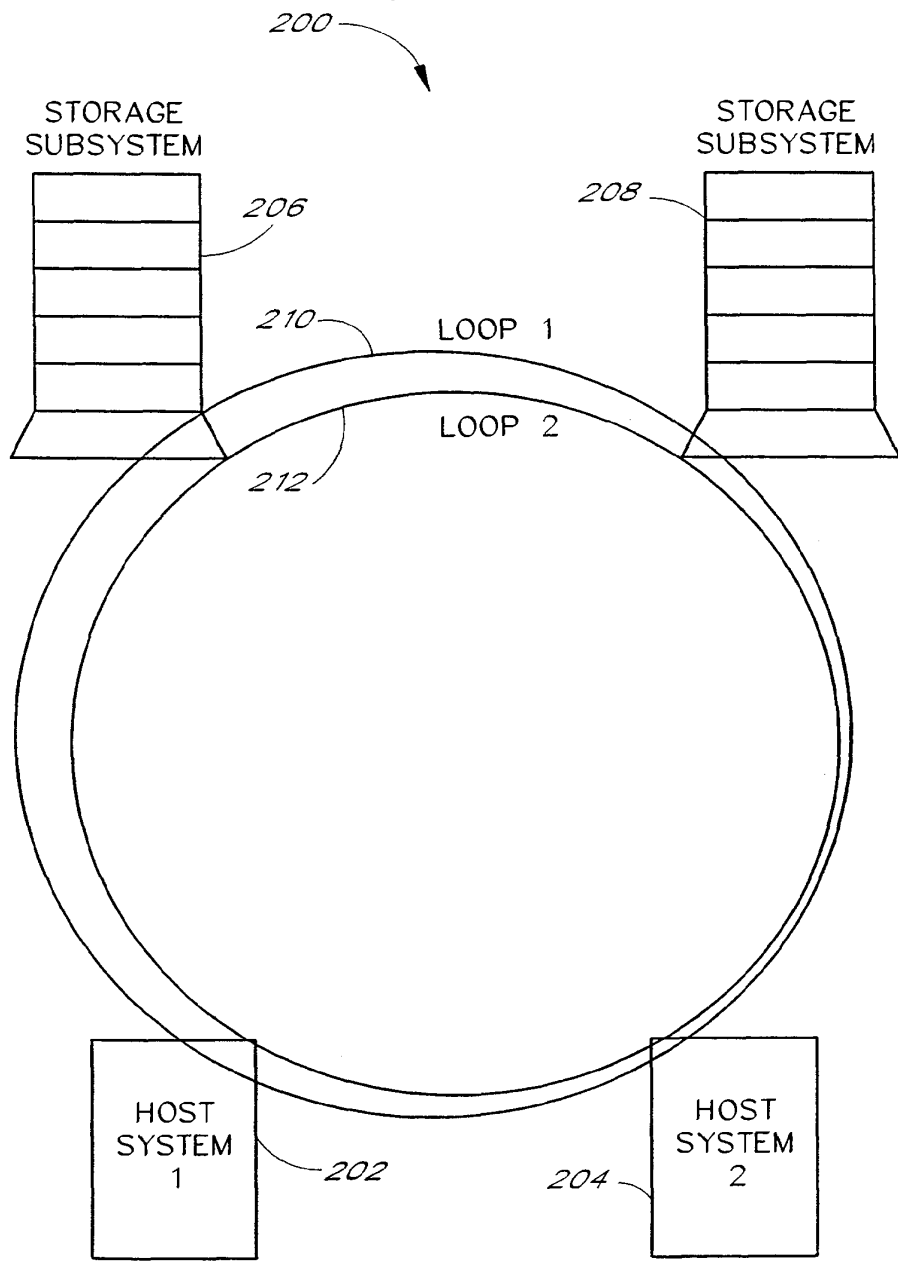


FIG. 2

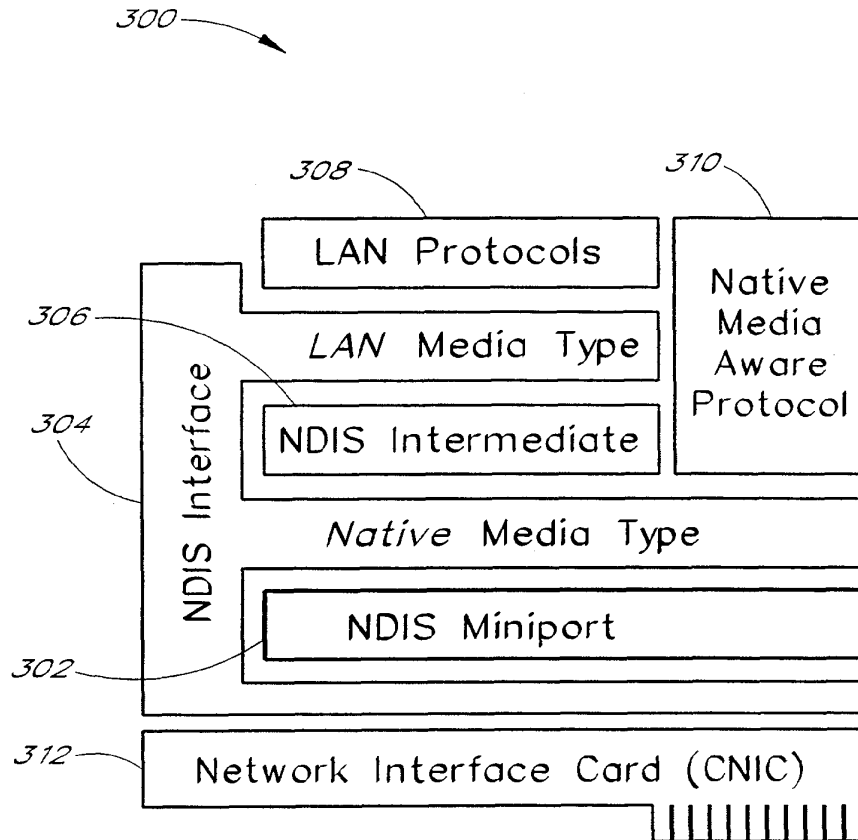


FIG. 3

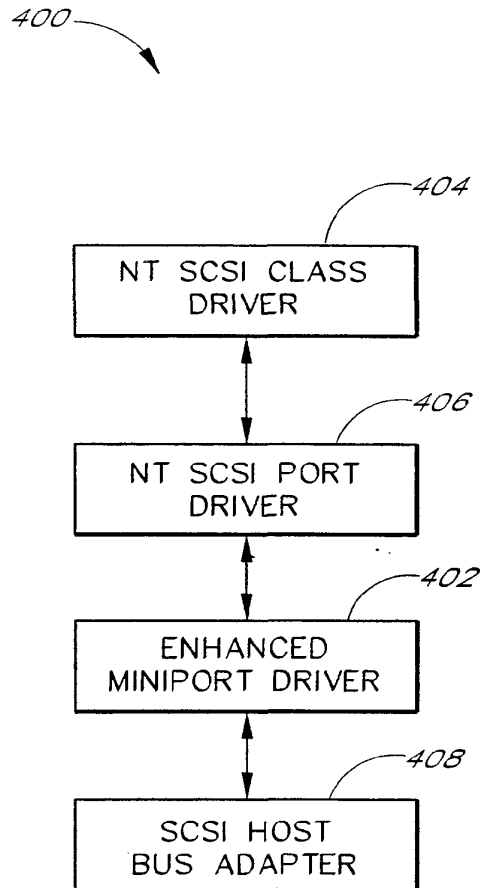


FIG. 4

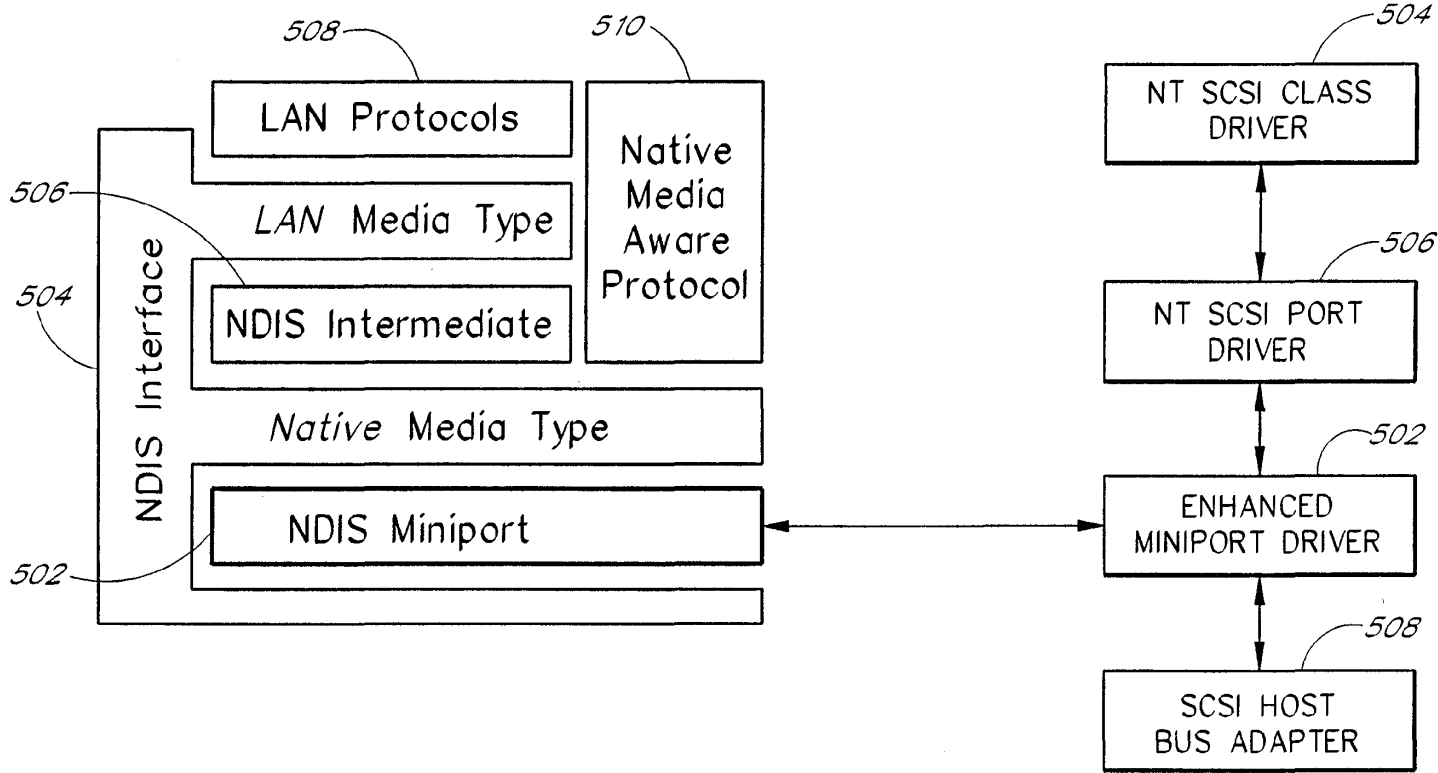


FIG. 5

Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	Disk system adapted to be directly attached to network			
First Named Inventor/Applicant Name:	Han-Gyoo Kim			
Filer:	Stephen C. Hemenway/Elissa Asaro			
Attorney Docket Number:	34253/US/2			
Filed as Large Entity				
Utility Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	2750503
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	32940
Filer:	Stephen C. Hemenway/Elissa Asaro
Filer Authorized By:	Stephen C. Hemenway
Attorney Docket Number:	34253/US/2
Receipt Date:	22-JAN-2008
Filing Date:	09-OCT-2001
Time Stamp:	17:13:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	2772
Deposit Account	041415
Authorized User	

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Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed	SupplementalIDS34253US2.pdf	131134	no	4
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Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
2	Foreign Reference	WO0029529.pdf	1833043	no	36
			70ccf13f0d7025a7c7fd8c343fd538c5b8634ae		
Warnings:					
Information:					
3	NPL Documents	BlundenStorageNetworkingVirtualization.pdf	4499147	no	124
			f2ea69cf2eb8e507bca2117702bf3ea4039c3f77		
Warnings:					
Information:					
4	NPL Documents	KleinStorageVirtualization.pdf	432376	no	15
			fb6c25c78738a535536ff2eeb32a06c39bc57741		
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5	NPL Documents	SchulzSANandNAS.pdf	452649	no	11
			9123712f4bf3aca668094339da733dfe92013b5		
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6	NPL Documents	SuppSearchReport34253EP.pdf	129372	no	4
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Warnings:					
Information:					
Total Files Size (in bytes):			7485900		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

Applicant	: Han-Gyoo Kim	
Appln. No.	: 09/974,082	Confirmation No: 6653
Filed	: October 9, 2001	Group Art Unit: 2155
Title	: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK	Examiner: Korobov, Vitali A.

AMENDMENT AND RESPONSE TO OFFICE ACTION

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the final Office action dated January 9, 2008, please consider the following remarks and amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

CLAIMS:

1-33. (Cancelled)

34. (Currently Amended) A network-attached disk (NAD) device adapted to be connected through a general purpose front-end network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising:

- a network adapter for receiving a disk access command in data link frames through the general purpose front-end network;
- a disk controller, connected to the network adapter, for executing the disk access command;
- a disk for storing data; and
- a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device;

wherein access to the disk is operatively controlled by the disk controller;

no disk access command is required to be routed through a server associated with the NAD; and automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network.

35. (Original) The NAD device of claim 34, wherein the network runs Ethernet.

36. (Original) The NAD device of claim 34, wherein said disk is formatted as a local disk.

37. (Original) The NAD device of claim 34, wherein said disk is partitioned as a local disk.

38. (Original) The NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller.

39. (Original) The NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device.

40. (Original) The NAD device of claim 34, wherein the controller has a filter for controlling access to the disk.

41. (Original) The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions.
42. (Original) The NAD device of claim 41, wherein each disk partition is controlled by a separate driver.
- 43-49. (Cancelled)
50. (Currently Amended) A network-attached storage device adapted to be connected through a front-end network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the network-attached storage device comprising:
- a storage device;
 - a network adapter for receiving a storage command through the front-end network without requiring routing of any storage command through a server associated with the storage device;
 - a storage controller for executing the storage command; and
- wherein the virtual host bus adaptor comprises:
- a bus driver configured to implement the virtual host bus adaptor through which I/O operations to the network-attached storage device are sent;
 - a port driver configured to redirect I/O requests to the network-attached storage device through the network; and
- wherein the virtual host bus adaptor enumerates the network-attached storage device to the host when the network-attached storage device is connected to the front-end network.
51. (Original) The network-attached storage device of claim 50, further comprising a state machine controlling the operation of the storage device.
52. (Original) The network-attached storage device of claim 50, wherein the storage device is a disk.
53. (Original) The network-attached storage device of claim 50, wherein the storage device is a tape device.
54. (Original) The network-attached storage device of claim 50, wherein the storage device is a CD drive.

55. (Original) The network-attached storage device of claim 50, wherein the storage device is a memory device.

56-111. (Cancelled)

112. (Previously Presented) A network attached disk device, comprising:
a first disk device;
a network attached disk device controller operative to receive, across a front-end network, an input/output command for the first disk device without routing of any input/output command through a server associated with the network attached disk device;
a disk controller operative to control the operation of the disk device in response to the input/output command;
a network adapter operative to receive the input/output command from the front-end network attached disk device controller; wherein
the network attached disk device is operative to be recognized as a local device by a remote host; and the front-end network is selected from the group consisting of a Local Area Network, a Wide Area Network, an Ethernet, and an Internet.

113. (Previously Presented) The network attached disk device of claim 112, further operative to be recognized by the host as a local device attached to a system bus of the remote host.

114. (Previously Presented) The network attached disk device of claim 112, further comprising a second disk device.

115. (Previously Presented) The network attached disk device of claim 114, wherein the first and second disk devices are both operative to be recognized as unique local devices by the remote host.

116. (Previously Presented) The network attached disk device of claim 112, wherein the input/output command comprises a local bus input/output command.

117. (Previously Presented) The network attached disk device of claim 116, wherein the input/output command further comprising a protocol stack for network communication.

118. (Previously Presented) The network attached disk device of claim 116, wherein a protocol stack comprises a TCP/IP connection.

119. (Previously Presented) The network attached disk device of claim 112, wherein the disk controller comprises:

a channel controller;

at least one disk channel operatively connected to the channel controller;

a buffer manager operatively connected to the channel controller; and

a bus interface operatively connected to the buffer manager and the network attached disk device controller.

120. (Previously Presented) The network attached disk device of claim 112, wherein the network attached disk device controller comprises:

a main controller operative to generally control the operation of the network attached disk device;

a buffer management module operative to cache data associated with the first disk device;

a disk controller driver for interfacing with the disk controller; and

a network adapter driver for interfacing with the network adapter.

121. (Previously Presented) The network attached disk device of claim 120, wherein the network attached disk device is further operative to provide back-up functionality to the remote host.

122. (Previously Presented) The network attached disk of claim 120, wherein the network attached disk device is further operative to control access rights to the first disk.

123. (Previously Presented) The network attached disk of claim 112, wherein the first disk device comprises a compact disk.

124. (Previously Presented) The network attached disk of claim 112, wherein the first disk device comprises a digital versatile disk.

REMARKS/ARGUMENTS

This paper is submitted in response to the Office action mailed on January 9, 2008. This paper neither adds nor cancels any claims. Accordingly, after entry of this Amendment and Response, claims 34-42- 50-55 and 112-124 remain pending.

I. Claim Rejections Under 35 U.S.C. § 112

The Examiner rejected claims 112-124 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In particular, the Examiner alleges that the instant application does not contain support for implementing the claimed invention over a wide-area network (WAN) or the Internet. The Assignee respectfully disagrees.

First, the Assignee notes that the background of the invention, as set forth in paragraphs [0005] to [0010], generally describes issues with operating a disk system or network attached storage in light of the increase in popularity of the Internet. The background likewise indicates that such devices may use a Common Internet File System and/or “the IP protocol used on the Internet.” Thus, in setting the stage for the description of various embodiments of the invention, the application clearly contemplates issues with (and solutions to) problems arising from networked storage devices attached to hosts via the Internet.

Next, the Assignee notes the specification explicitly states in paragraph [0155] that the embodiments of the invention may employ “a standard protocol or a non-standard protocol,” including an Internet protocol (IP). The Assignee respectfully submits that the explicit recitation that embodiment may employ an IP for communication with a network-attached disk inherently indicates that the use of the invention can occur over the Internet and thus that claim 112 is fully supported by the specification.

The Assignee further notes that a WAN is generally defined as a network extending across a large geographic area. See, e.g., the Wikipedia definition of a WAN at http://en.wikipedia.org/wiki/Wide_area_network and the Webopedia definition located at http://www.webopedia.com/TERM/w/wide_area_network_WAN.htm. The Internet is the largest WAN in existence, as stated by both sources. Accordingly, the Assignee respectfully submits that one of ordinary skill in the art would appreciate that the explicit reference in the specification to embodiments of the invention operating over the Internet would likewise encompass operation over a WAN.

For at least the foregoing reasons, the Assignee respectfully submits claims 112-124 are fully supported by the specification in their present state. The Assignee therefore respectfully requests the Examiner withdraw his rejection.

II. Claim Rejections Under 35 U.S.C. § 103

The Examiner rejected claims 34-35, 50 and 112-117 under 35 U.S.C. § 103(a) as rendered obvious by the combination of U.S. Patent No. 5,566,331 to Irwin, Jr. et al (hereinafter "Irwin"), U.S. Patent No. 6,421,753 to Hoese et al. (hereinafter "Hoese") and U.S. Patent No. 6,389,432 to Pothapragada et al. (hereinafter "Pothapragada"). For at least the following reasons, the Assignee respectfully disagrees with the Examiner's rejection.

The Assignee notes independent claim 34, as amended, requires receipt of "a disk access command in data link frames through [a] general purpose front-end network." Independent claims 50 and 112 require similar limitations; all three require interaction with a "front-end network." A front-end network, as defined in paragraph [0043] of the specification, carries "general-purpose network traffic" and is distinguished "from a 'back-end' network dedicated to storage such as that used in the conventional Storage Area Network (SAN) scheme."

By contrast, Irwin explicitly requires a dedicated storage network to function. As shown in Figs. 1 and 2 of Irwin, data and disk access commands must pass from and to a storage device (such as elements 40-4 and 40-m of Fig. 2) via a dedicated "data fabric 11." The data fabric 11 is a channel switching fabric that "functions to controllably interconnect the data channels... of the associated data processors with selected high-speed interface channels, each of which is connected to a corresponding data storage device" (Irwin, col. 5, lines 8-14). Likewise, Irwin explicitly states that access to a storage device by its client occurs across the channel-switching fabric 11 (see col. 10, lines 40-45). Indeed, I/O commands (e.g., data access commands) are carried across the specialized back-end network of the channel-switching fabric to a storage device as well: "Such encapsulated [input/output] commands are switched by the channel-switching fabric 11 onto I/O channel 30-4 where they are read by the controller (not shown) of storage device..." (col. 10, lines 58-66). The Assignee respectfully states that channel 30-4 is a "high speed interface channel" of the switching fabric and not a "general purpose" or "front-end" network as required by the independent claims (see col. 5, lines 10-14).

In short, the Assignee respectfully submits that Irwin requires a specialized back-end, storage-specific network. Indeed, the "data fabric" disclosed by Irwin is nothing more than an example of a switched fabric implemented by a Fibre Channel network, as known to those skilled in the art. A Fibre Channel network is the very definition of a back-end network as used in the present specification, since it is a "network technology primarily used for storage networking" (see http://en.wikipedia.org/wiki/Fibre_channel). Irwin cannot operate without its specialized back-end network.

Similarly, Hoese requires storage commands to be routed between a storage device and a Fibre Channel via a specialized storage router (see Abstract, Fig. 3, col. 5, lines 33-37

and col. 5, lines 46-50). Accordingly, Hoese likewise cannot operate without its specialized back-end network.

Pothapragada also requires a Fibre Channel or SAN network for its operation, as shown in both Figs. 1 and 2 and discussed in more detail at col. 4, lines 1-6 and col. 4, lines 17-39. Again, without such storage-specialized back-end networks, Pothapragada ceases to function.

Insofar as no cited reference discloses receiving “a disk access command in data link frames through [a] general purpose front-end network,” the references cannot anticipate or render obvious the inventions recited in claims 34, 50 and 112. Indeed, the Assignee respectfully submits that no cited reference can operate (either singly or in combination) without its specialized back-end network, which is explicitly outside the scope of each pending independent claim. Thus, the Assignee respectfully submits that claims 34, 50 and 112 are all patentable over Irwin, Hoese and Pothapragada, whether taken singly or in combination.

All remaining claims depend from one of independent claims 34, 50 and 112 and are thus likewise patentable. The Assignee makes this statement without reference to or waiving the independent bases of patentability in each such claim. The Assignee reserves the right to later argue such bases of patentability if necessary.

For at least the foregoing reasons, the Assignee respectfully requests the Examiner withdraw his rejection and allow all pending claims.

III. Conclusion

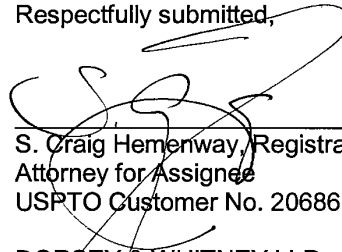
The Assignee thanks the Examiner for his thorough review of the application. The Assignee respectfully submits the present application, as amended, is in condition for allowance and respectfully requests the issuance of a Notice of Allowability as soon as practicable.

This Amendment is submitted contemporaneously with a petition for a three-month extension of time in accordance with 37 CFR § 1.136(a). Accordingly, please charge Deposit Account No. 04-1415 in the amount of \$525, for a three-month extension of time fee for a small entity. The Assignee believes no further fees or petitions are required. However, if any such petitions or fees are necessary, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 accordingly.

If the Examiner should require any additional information or amendment, please contact the undersigned attorney.

Dated: 9 July 2008

Respectfully submitted,



S. Craig Hemenway, Registration No. 44,759
Attorney for Assignee
USPTO Customer No. 20686

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Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	Disk system adapted to be directly attached to network			
First Named Inventor/Applicant Name:	Han-Gyoo Kim			
Filer:	Stephen C. Hemenway/Elissa Asaro			
Attorney Docket Number:	34253/US/2			
Filed as Large Entity				
Utility Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 3 months with \$0 paid	1253	1	1050	1050

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
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Total in USD (\$)				1050

Electronic Acknowledgement Receipt

EFS ID:	3591606
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	32940
Filer:	Stephen C. Hemenway/Elissa Asaro
Filer Authorized By:	Stephen C. Hemenway
Attorney Docket Number:	34253/US/2
Receipt Date:	09-JUL-2008
Filing Date:	09-OCT-2001
Time Stamp:	18:49:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 1050
RAM confirmation Number	3541
Deposit Account	041415
Authorized User	

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	CombinedAmendmentandPetitionforExtensionofTime34253US2.pdf	68889 8d861f03d98ab864935720ba3ffd3265a43e4a5e	no	2

Warnings:

Information:

2	Amendment - After Non-Final Rejection	AmendmentandResponsetoOA34253US2.pdf	332944 baf44c171666e20874182eded352575dd0ada917	no	9
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Warnings:

Information:

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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

**COMBINED AMENDMENT & PETITION FOR EXTENSION OF
TIME UNDER 37 CFR 1.136(a) (Large Entity)**

Docket No.
34253/US/2

In Re Application Of: **Han-Gyoo Kim**

Application No. 09/974,082	Filing Date October 9, 2001	Examiner Korobov, Vitali A.	Customer No. 20686	Group Art Unit 2155	Confirmation No. 6653
--------------------------------------	---------------------------------------	---------------------------------------	------------------------------	-------------------------------	---------------------------------

Invention: **DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK**

COMMISSIONER FOR PATENTS:

This is a combined amendment and petition under the provisions of 37 CFR 1.136(a) to extend the period for filing a response to the Office Action of January 9, 2008 in the above-identified application.
Date

The requested extension is as follows (check time period desired):

One month Two months Three months Four months Five months

from: April 9, 2008 until: July 9, 2008
Date *Date*

The fee for the amendment and extension of time has been calculated as shown below:

CLAIMS AS AMENDED

	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST # PREV. PAID FOR	NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE
TOTAL CLAIMS	28 -	111 =	0	x \$50.00	\$0.00
INDEP. CLAIMS	3 -	14 =	0	x \$210.00	\$0.00
FEE FOR AMENDMENT					\$0.00
FEE FOR EXTENSION OF TIME					\$1,050.00
TOTAL FEE FOR AMENDMENT AND EXTENSION OF TIME					\$1,050.00

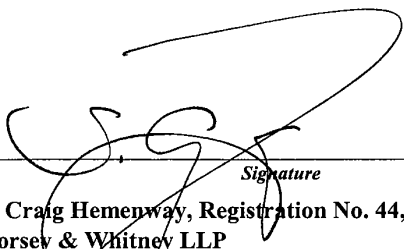
**COMBINED AMENDMENT & PETITION FOR EXTENSION OF
TIME UNDER 37 CFR 1.136(a) (Large Entity)**

Docket No.
34253/US/2

The fee for the amendment and extension of time is to be paid as follows:

- A check in the amount of _____ for the amendment and extension of time is enclosed.
- Please charge Deposit Account No. **04-1415** in the amount of **\$1,050.00**
- The Director is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. **04-1415**
 - Any additional filing fees required under 37 C.F.R. 1.16.
 - Any patent application processing fees under 37 CFR 1.17.
- If an additional extension of time is required, please consider this a petition therefor and charge any additional fees which may be required to Deposit Account No. **04-1415**
- Payment by credit card. Form PTO-2038 is attached.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.



Signature

S. Craig Hemenway, Registration No. 44,759
Dorsey & Whitney LLP
Republic Plaza Building, Suite 4700
370 Seventeenth Street
Denver, CO 80202-5647
Phone: (303) 629-3400
Fax: (303) 629-3450
USPTO Customer No. 20686

CC:

Dated: 9 July 2008

Not to be used for correspondence that is to be transmitted with the United States Postal Service with common postage or first class mail. Envelope addressed to the Commissioner for Patents, P.O. Box 1400, Alexandria, VA 22304-1400 (37 CFR 1.8(c)).
Signature
Signature of Patenting Agent
Printed Name of Person Submitting Correspondence

P28LARGE/REV06

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 09/974,082	Filing Date 10/09/2001	<input type="checkbox"/> To be Mailed		
APPLICATION AS FILED – PART I									
(Column 1)			(Column 2)		SMALL ENTITY <input checked="" type="checkbox"/>	OR	OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)		
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A			N/A			
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A			N/A			
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A			
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	minus 20 =	*	X \$ =			X \$ =			
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =			X \$ =			
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>									
* If the difference in column 1 is less than zero, enter "0" in column 2.									
APPLICATION AS AMENDED – PART II									
(Column 1)			(Column 2)	(Column 3)	SMALL ENTITY	OR	OTHER THAN SMALL ENTITY		
AMENDMENT	07/09/2008	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)	
	<small>Total (37 CFR 1.16(i))</small>	* 28	Minus	** 111	= 0	X \$25 =	0	OR	X \$ =
	<small>Independent (37 CFR 1.16(h))</small>	* 3	Minus	*** 14	= 0	X \$105 =	0	OR	X \$ =
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>								
					TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE	
AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)		
	<small>Total (37 CFR 1.16(i))</small>	*	Minus	**	=	X \$ =	OR	X \$ =	
	<small>Independent (37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =	OR	X \$ =	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>								
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.									
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".									
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".									
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.									
Legal Instrument Examiner: /LAVINIA D. JOHNSON/									

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicant: Han-gyoo Kim	
App. No.: 09/974,082	Con. No.: 6653
Filed: October 9, 2001	Art Unit: 2155
Title: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO A NETWORK	Examiner: Korobov, Vitali A.

**SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§ 1.97(c)(1), 1.97(e)(2), and 1.98**

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Examiner is requested to consider the references noted on the enclosed Form PTO/SB/08a during examination of the above-identified patent application. These references are submitted for the Examiner's consideration and are submitted pursuant to the duty of disclosure under 37 C.F.R. § 1.56. In submitting these references, no representation is made or implied that the references are or are not material to the examination of the application. The Examiner is encouraged to make his or her own determination of materiality. Pursuant to the requirements of 37 C.F.R. § 1.98(a)(2)(ii), copies of the U.S. patent and U.S. patent application publication references are not provided, unless required by the Office.

This Supplemental Information Disclosure Statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of either (1) a final Office action or (2) a Notice of Allowance. Accordingly, this Information Disclosure Statement requires a statement according to 37 C.F.R. § 1.97(e).

Statement Under 37 C.F.R. § 1.97(e)(2)

No item of information contained in the Supplemental Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in the Supplemental Information Disclosure Statement was known to any individual designated in 37

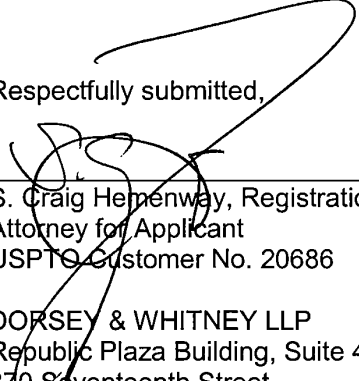
C.F.R. § 1.56(c) more than three months prior to the filing of the Supplemental Information Disclosure Statement.

The Applicant believes no fees or petitions are due with this filing. However, should any such fees or petitions be required, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 as necessary.

If the Examiner has any questions, please contact the undersigned attorney.

Dated: 5 August 2008

Respectfully submitted,



S. Craig Hemenway, Registration No. 44,759
Attorney for Applicant
USPTO Customer No. 20686

DORSEY & WHITNEY LLP
Republic Plaza Building, Suite 4700
370 Seventeenth Street
Denver, Colorado 80202-5647
Phone: (303) 629-3400
Fax: (303) 629-3450

PTO/SB/08A (08-03) U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE Substitute for Form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>	APPLICATION NO.: 09/974,082	FILING DATE: October 9, 2001
	INVENTOR(S): Han-gyoo Kim	ART UNIT: 2155
	EXAMINER NAME: Korobov, Vitali A.	ATTY. DOCKET NO.: 34253/US/2

U.S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No. ¹	PATENT NUMBER	ISSUE DATE	Name of Patentee of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code* (if known)	MM-DD-YYYY		
	1.	5,721,818	02/1998	Hanif et al.	
	2.	5,987,523	11/1999	Hind et al.	
	3.	6,347,095	02/2002	Tang et al.	
	4.	6,578,111	06/2003	Damron et al.	
	5.	6,609,167	08/2003	Bastiani et al.	
	6.	6,647,016	11/2003	Isoda et al.	
	7.	7,069,312	06/2006	Kostic et al.	
	8.	7,069,350	06/2006	Fujita et al.	
	9.	7,076,690	07/2006	Todd et al.	
	10.	7,251,704	07/2007	Solomon et al.	
	11.	7,277,955	10/2007	Elliott	
	12.	7,376,133	05/2008	Gettala et al.	
	13.	7,383,229	06/2008	Jacoby	

U.S. PUBLICATION DOCUMENTS

EXAMINER INITIALS*	Cite No. ¹	PUBLICATION NUMBER	PUBLICATION DATE	Name of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code* (if known)	MM-DD-YYYY		
	14.	2003/0018403	01/2003	Braun et al.	
	15.	2004/0117813	06/2004	Karaoguz et al.	
	16.	2003/0225834	12/2003	Lee et al.	
	17.	2005/0042591	02/2005	Bloom et al.	
	18.	2005/0110768	05/2005	Marriott et al.	
	19.	2006/0004935	01/2006	Seto et al.	

FOREIGN PATENT DOCUMENTS						
EXAMINER INITIALS ¹	Cite No. ¹	DOCUMENT NUMBER	PUBLICATION DATE	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
		Country Code ² - Number ⁴ - Kind Code ⁵ (if known)	MM-DD-YYYY			

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS			
EXAMINER INITIALS ¹	Cite No. ¹	Include name of Author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), volume-issue number(s), publisher, page(s) and date.	T ⁶
EXAMINER		DATE CONSIDERED	
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

*
communication to applicant.

¹ Applicant's unique citation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

Electronic Acknowledgement Receipt

EFS ID:	3731143
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	32940
Filer:	Stephen C. Hemenway/Elissa Asaro
Filer Authorized By:	Stephen C. Hemenway
Attorney Docket Number:	34253/US/2
Receipt Date:	05-AUG-2008
Filing Date:	09-OCT-2001
Time Stamp:	14:52:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed (SB/08)	SupplementalIDS34253US2.pdf	118938 15f3094cbc90d3f8eaac9e9e666b9662871c7e1	no	4

Warnings:

Information:

This is not an USPTO supplied IDS fillable form

Total Files Size (in bytes):

118938

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes details for application 09/974,082, inventor Han-Gyoo Kim, attorney Dorsey & Whitney LLP, examiner Hamza, Faruk, art unit 2155, and mail date 09/15/2008.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species of the claimed invention: Species 1 (A network-attached disk (NAD) device comprising: a network adapter for receiving a disk access command in data link frames through the general purpose front-end network; a disk controller for executing the disk access command; and automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network ; Fig. 14,15 P [0089-0094]); Species 2 (A network-attached disk (NAD) device comprising: a network adapter for receiving a storage command through the front-end network without requiring routing of any storage command; a storage controller for executing the storage command; a bus driver configured to implement virtual host bus; a port driver configured to redirect I/O requests to the network-attached storage and the virtual host bus adaptor enumerates the network-attached storage device to the host when the network-attached storage device is connected to the front-end network; Figure 20A, 20B; P [0105-0110]); Species 3 (A network-attached disk (NAD) device comprising: a network attached disk device controller operative to receive an I/O command for first disk device without routing I/O command; a disk controller operative to control the operation of the disk device in response to the I/O command; a network adaptor operative to receive the I/O command from the front-end network attached disk device controller; the network attached disk device is operative to be recognized as a local device by a remote host; Figure 17,18,19,P [0099-0102]).

Related inventions are distinct if the inventions as claimed are not connected in at least one of design, operation, or effect (e.g., can be made by, or used in, a materially different process) and wherein at least one invention is patentable (novel and non-obvious) over the other (though they may each be unpatentable over the prior art). See MPEP § 802.01(II).

In the instant case, the Species 1, 2 and 3 are not connected in at least mode of operation, which is clearly evidenced by Fig.14, Fig. 15, Fig. 20A, Fig. 20B, Fig. 17, Fig. 18 and Fig. 19 respectively, and relevant parts of the disclosure describing these figures.

The Examiner has determined that the additional attributes present in Species 2 and 3 would not be an obvious variation of attributes present in Species 1 to one of ordinary skills in the art. Therefore, Species 1 are patentably distinct from Species 2 and 3, though they may each be unpatentable over the prior art.

The Examiner has determined that the Species 1-3 differ in mode of operation from one another in ways that would not be obvious to one of ordinary skills in the art at the time the invention was made. Therefore, Species 1-3 are patentably distinct from one another, though they may each be unpatentable over the prior art.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no

generic claim is finally held to be allowable. Currently, no claim appears to be generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

A telephone call was made to the applicant's representative (Mr. Craig Hemenway, Reg. No. 44,759) on September 11th, 2008 to request an oral election to the above restriction requirement, but did not result in an election being made.

Applicant is given **ONE (1) MONTH, or THIRTY (30) DAYS** from the mailing date of this communication, whichever is longer, within which to respond to this election/restriction requirement in order to avoid abandonment (35 U.S.C. § 133). Extensions of this time period may be granted under 37 CFR 1.136(a).

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faruk Hamza whose telephone number is 571-272-7969. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached at 571-272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 886-217-9197 (toll –free).

Faruk Hamza

Patent Examiner

Group Art Unite 2155

/saleh najjar/

Supervisory Patent Examiner, Art Unit 2155

Index of Claims



Application/Control No.

09/974,082

Examiner

FARUK HAMZA

Applicant(s)/Patent under Reexamination

KIM, HAN-GYOO

Art Unit

2155

√	Rejected
=	Allowed

-	(Through numeral) Cancelled
+	Restricted


N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim		Date									
Final	Original	9/11/08									
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Claim		Date									
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Claim		Date									
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<p style="text-align: center;">Application Number</p> 	<p>Application/Control No.</p> <p>09/974,082</p>	<p>Applicant(s)/Patent under Reexamination</p> <p>KIM, HAN-GYOO</p>	
	<p>Examiner</p> <p>FARUK HAMZA</p>	<p>Art Unit</p> <p>2155</p>	



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,082	10/09/2001	Han-Gyoo Kim	34253/US/2	6653

32940 7590 09/15/2008
DORSEY & WHITNEY LLP
555 CALIFORNIA STREET, SUITE 1000
SUITE 1000
SAN FRANCISCO, CA 94104

EXAMINER

HAMZA, FARUK

ART UNIT	PAPER NUMBER
2155	

MAIL DATE	DELIVERY MODE
09/15/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 09/974,082	Applicant(s) KIM, HAN-GYOO	
	Examiner FARUK HAMZA	Art Unit 2155	

- The MAILING DATE of this communication appears on the cover sheet with the correspondence address -

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 09 July 2008.
- 2a) This action is FINAL.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 34-42, 50-55 and 112-124 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) _____ is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) 34-42, 50-55 and 112-124 are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species of the claimed invention: Species 1 (A network-attached disk (NAD) device comprising: a network adapter for receiving a disk access command in data link frames through the general purpose front-end network; a disk controller for executing the disk access command; and automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network ; Fig. 14,15 P [0089-0094]); Species 2 (A network-attached disk (NAD) device comprising: a network adapter for receiving a storage command through the front-end network without requiring routing of any storage command; a storage controller for executing the storage command; a bus driver configured to implement virtual host bus; a port driver configured to redirect I/O requests to the network-attached storage and the virtual host bus adaptor enumerates the network-attached storage device to the host when the network-attached storage device is connected to the front-end network; Figure 20A, 20B; P [0105-0110]); Species 3 (A network-attached disk (NAD) device comprising: a network attached disk device controller operative to receive an I/O command for first disk device without routing I/O command; a disk controller operative to control the operation of the disk device in response to the I/O command; a network adaptor operative to receive the I/O command from the front-end network attached disk device controller; the network attached disk device is operative to be recognized as a local device by a remote host; Figure 17,18,19,P [0099-0102]).

Art Unit: 2155

Related inventions are distinct if the inventions as claimed are not connected in at least one of design, operation, or effect (e.g., can be made by, or used in, a materially different process) and wherein at least one invention is patentable (novel and non-obvious) over the other (though they may each be unpatentable over the prior art). See MPEP § 802.01(II).

In the instant case, the Species 1, 2 and 3 are not connected in at least one mode of operation, which is clearly evidenced by Fig. 14, Fig. 15, Fig. 20A, Fig. 20B, Fig. 17, Fig. 18 and Fig. 19 respectively, and relevant parts of the disclosure describing these figures.

The Examiner has determined that the additional attributes present in Species 2 and 3 would not be an obvious variation of attributes present in Species 1 to one of ordinary skills in the art. Therefore, Species 1 are patentably distinct from Species 2 and 3, though they may each be unpatentable over the prior art.

The Examiner has determined that the Species 1-3 differ in mode of operation from one another in ways that would not be obvious to one of ordinary skills in the art at the time the invention was made. Therefore, Species 1-3 are patentably distinct from one another, though they may each be unpatentable over the prior art.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no

Art Unit: 2155

generic claim is finally held to be allowable. Currently, no claim appears to be generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

A telephone call was made to the applicant's representative (Mr. Craig Hemenway, Reg. No. 44,759) on September 11th, 2008 to request an oral election to the above restriction requirement, but did not result in an election being made.

Applicant is given **ONE (1) MONTH, or THIRTY (30) DAYS** from the mailing date of this communication, whichever is longer, within which to respond to this election/restriction requirement in order to avoid abandonment (35 U.S.C. § 133). Extensions of this time period may be granted under 37 CFR 1.136(a).

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faruk Hamza whose telephone number is 571-272-7969. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached at 571-272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2155

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 886-217-9197 (toll -free).

Faruk Hamza

Patent Examiner

Group Art Unite 2155

/saleh najjar/

Supervisory Patent Examiner, Art Unit 2155

Organization TC2100 Bldg./Room RANDOLPH

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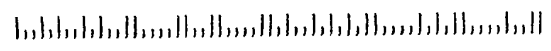
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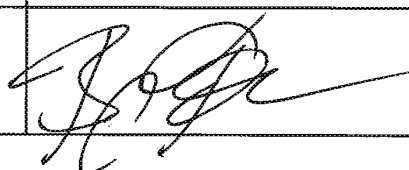
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Petitioners Microsoft Corporation and HP Inc. - Ex. 1009, p. 620

TRANSMITTAL FORM <i>(to be used for all correspondence after initial filing)</i>	<i>Complete if Known</i>	
	Application Number	09/974,082
	Filing Date	October 9, 2001
	First Named Inventor	Han-gyoo KIM.
	Examiner Name	Faruk Hamza
	Group Art Unit	2455
	Attorney Docket Number	3720-101
Total Number of Pages in This Submission <u>3</u>	Confirmation Number	6653
ENCLOSURES (check all that apply)		

- | | | |
|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| <input type="checkbox"/> Fee Transmittal Form | <input type="checkbox"/> Drawing(s) | <input type="checkbox"/> After Allowance Communication to TC |
| <input type="checkbox"/> Fee Attached | <input type="checkbox"/> Licensing-related Papers | <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences |
| <input type="checkbox"/> Amendment/Reply | <input type="checkbox"/> Petition | <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) |
| <input type="checkbox"/> After Final | <input type="checkbox"/> Petition to Convert to a Provisional Application | <input type="checkbox"/> Proprietary Information |
| <input type="checkbox"/> Affidavits/declaration(s) | <input checked="" type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address | <input type="checkbox"/> Status Letter |
| <input type="checkbox"/> Extension of Time Request | <input type="checkbox"/> Terminal Disclaimer | <input type="checkbox"/> Other Enclosure(s) (please identify below): |
| <input type="checkbox"/> Express Abandonment Request | <input type="checkbox"/> Request for Refund | |
| <input type="checkbox"/> Information Disclosure Statement | <input type="checkbox"/> CD, Number of CD(s) | |
| <input type="checkbox"/> Certified Copy of Priority Document(s) | <input type="checkbox"/> Landscape Table on CD | |
| <input type="checkbox"/> Response to Missing Parts/ Incomplete Application | | |
| <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53 | | |
- REMARKS:

SUBMITTED BY		Complete (if applicable)			
NAME AND REG. NUMBER	Brian A. Tollefson, Reg. No. 46,338				
SIGNATURE		DATE	12/19/08	DEPOSIT ACCOUNT USER ID	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/974,082
Applicant : Han-Gyoo Kim
Filed : October 9, 2001
TC/A.U. : 2455
Examiner : Faruk Hamza

Docket No. : 3720-101
Customer No. : 06449
Confirmation No. : 6653

REVOCATION OF PREVIOUS POWER OF ATTORNEY,
APPOINTMENT OF POWER OF ATTORNEY BY ASSIGNEE
CHANGE OF CORRESPONDENCE ADDRESS
AND STATEMENT UNDER 37 CFR 3.73(b)

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Revocation

I or we hereby revoke all previous powers of attorney given in the above-identified application.

Power of Attorney

The undersigned, on behalf of XIMETA TECHNOLOGY, INC., assignee of the above-referenced patent application, hereby appoints the practitioners associated with **Customer Number 06449** as attorneys to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.

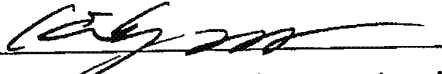
Change of Correspondence Address

Please change the correspondence address for the above-identified application to
Customer Number 06449.

Statement under 37 CFR 3.73(b)

I am an authorized representative of XIMETA TECHNOLOGY, INC., the assignee of record of 100% interest in the present application identified above by virtue of an assignment from the inventor(s) of the patent application identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 013024, Frame 0218.

Assignee: XIMETA TECHNOLOGY, INC.

Date Nov. 28, 2008 By 
Name: HAN GYOO KIM
Title: CEO

Electronic Acknowledgement Receipt

EFS ID:	4493283
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	32940
Filer:	Brian A. Tollefson/Jessica Fu
Filer Authorized By:	Brian A. Tollefson
Attorney Docket Number:	34253/US/2
Receipt Date:	19-DEC-2008
Filing Date:	09-OCT-2001
Time Stamp:	17:45:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		POA.pdf	161862 04c8562bf147177b04085ad41d1b836a77e9f0b5	yes	3

Multipart Description/PDF files in .zip description		
Document Description	Start	End
Miscellaneous Incoming Letter	1	1
Power of Attorney	2	3
Warnings:		
Information:		
Total Files Size (in bytes):		161862
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/974,082
Applicant : Han-Gyoo Kim
Filed : October 9, 2001
TC/A.U. : 2155
Examiner : Faruk HAMZA

Docket No. : 3720-101
Customer No. : 06449
Confirmation No. : 6653

Director of U.S. Patent and Trademark Office
P. O. Box 1450
Alexandria, Virginia 22313-1450

RESPONSE TO ELECTION REQUIREMENT

In reply to the Office Action mailed September 15, 2008, please amend the above-identified application as indicated below. A four-month extension of time is also submitted herewith extending the date of response from October 15, 2008 to February 15, 2009 (February 15 was a Sunday and February 16 was a holiday). Therefore, this response is timely.

Amendments to the **Claims** are reflected in the listing of claims which begins on **page 2** of this paper.

Remarks begin on **page 7** of this paper.

Amendments to the Claims:

The following listing of the claims replaces and supersedes all previous listings.

Listing of Claims:

1-33. (Cancelled)

34. (Previously Presented) A network-attached disk (NAD) device adapted to be connected through a general purpose front-end network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising:

a network adapter for receiving a disk access command in data link frames through the general purpose front-end network;

a disk controller, connected to the network adapter, for executing the disk access command;

a disk for storing data; and

a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device;

wherein access to the disk is operatively controlled by the disk controller;

no disk access command is required to be routed through a server associated with the NAD; and automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network.

35. (Original) The NAD device of claim 34, wherein the network runs Ethernet.

36. (Original) The NAD device of claim 34, wherein said disk is formatted as a local disk.

37. (Original) The NAD device of claim 34, wherein said disk is partitioned as a local disk.

38. (Original) The NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller.

39. (Original) The NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device.

40. (Original) The NAD device of claim 34, wherein the controller has a filter for controlling access to the disk.

41. (Original) The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions.

42. (Original) The NAD device of claim 41, wherein each disk partition is controlled by a separate driver.

43-124. (Cancelled)

125. (New) A network-attached disk (NAD) device adapted to be connected through a general purpose front-end network to a host computer having a system bus, the NAD device comprising:

a network adapter for receiving a disk access command through the general purpose front-end network, said network adapter including:

a physical network interface for interfacing with the general purpose front-end network to receive a disk I/O request packet from the host computer,

and

a media access control (MAC) controller connected to the physical network interface to extract necessary data from the disk I/O request packet;

a disk controller, connected to the network adapter, for executing the disk access command;

a disk for storing data; and

a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device.

126. (New) The NAD device of claim 125, wherein automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network.

127. (New) The NAD device of claim 125, wherein the general purpose front-end network runs Ethernet.

128. (New) The NAD device of claim 125, wherein said disk is formatted as a local disk.

129. (New) The NAD device of claim 125, wherein said disk is partitioned as a local disk.

130. (New) The NAD device of claim 125, wherein the controller has a state machine for controlling the operation of the NAD device.

131. (New) The NAD device of claim 125, wherein the controller has a filter for controlling access to the disk.

132. (New) The NAD device of claim 125, wherein the disk is partitioned into a plurality of disk partitions.

133. (New) The NAD device of claim 125, wherein each disk partition is controlled by a separate driver.

Remarks

The Election Requirement dated September 15, 2008, has been received and carefully reviewed. In response thereto, Applicant elects, with traverse, to prosecute Species I, which is defined by claims 34-42. Claims 50-55 and 112-124 were cancelled without prejudice or disclaimer. New claims 125-133 are added. Support for the claims can be found in, *inter alia*, paragraphs 0089-0094 and Figs. 14-15. Thus, claims 34-42 and 125-133 are currently pending and submitted for reconsideration.

By cancelling claims 50-55 and 112-124, the basis for the Election Requirement is removed. Applicant submits that new claims 125-133 cover Figs. 14-15 and therefore should be included in Species I and be prosecuted along with claims 34-42. Applicant respectfully request the Election Requirement be withdrawn and all claims be promptly examined.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the Applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

Respectfully submitted,

February 17, 2009
Date

/Brian A. Tollefson/
Attorney for the Applicant
Brian A. Tollefson
Reg. No. 46,338
ROTHWELL, FIGG, ERNST & MANBECK
1425 K Street, N.W.
Suite 800
Washington, D.C. 20005
(202) 783-6040

1580977

Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	Disk system adapted to be directly attached to network			
First Named Inventor/Applicant Name:	Han-Gyoo Kim			
Filer:	Brian A. Tollefson/Sheda Vasseghi			
Attorney Docket Number:	34253/US/2			
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 4 months with \$0 paid	2254	1	865	865

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				865

Electronic Acknowledgement Receipt

EFS ID:	4806905
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	32940
Filer:	Brian A. Tollefson/Sheda Vasseghi
Filer Authorized By:	Brian A. Tollefson
Attorney Docket Number:	34253/US/2
Receipt Date:	17-FEB-2009
Filing Date:	09-OCT-2001
Time Stamp:	17:22:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 865
RAM confirmation Number	3421
Deposit Account	022135
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)
 Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)
 Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		resp_RR.PDF	179028 bbe6197ad51a552906b51fce03af7c0e06354f4	yes	8

Multipart Description/PDF files in .zip description

Document Description	Start	End
Response to Election / Restriction Filed	1	1
Claims	2	6
Applicant Arguments/Remarks Made in an Amendment	7	8

Warnings:

Information:

2	Fee Worksheet (PTO-06)	fee-info.pdf	30431 2186c2d2de9d30c3aa3a9c6922b91e8daa77f990	no	2
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Warnings:

Information:

Total Files Size (in bytes): 209459

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 09/974,082		Filing Date 10/09/2001		<input type="checkbox"/> To be Mailed					
APPLICATION AS FILED – PART I														
(Column 1)			(Column 2)			SMALL ENTITY <input checked="" type="checkbox"/>		OR		OTHER THAN SMALL ENTITY				
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)	OR		RATE (\$)	FEE (\$)				
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>		N/A	N/A		N/A				N/A					
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>		N/A	N/A		N/A				N/A					
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>		N/A	N/A		N/A				N/A					
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>		minus 20 =	*		X \$ =				X \$ =					
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>		minus 3 =	*		X \$ =				X \$ =					
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).												
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>														
* If the difference in column 1 is less than zero, enter "0" in column 2.														
APPLICATION AS AMENDED – PART II														
(Column 1)			(Column 2)			(Column 3)			SMALL ENTITY		OR		OTHER THAN SMALL ENTITY	
AMENDMENT	02/17/2009		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR		RATE (\$)	ADDITIONAL FEE (\$)		
	Total <small>(37 CFR 1.16(i))</small>		* 18	Minus	** 111	= 0	X \$26 =	0			X \$ =			
	Independent <small>(37 CFR 1.16(h))</small>		* 2	Minus	***14	= 0	X \$110 =	0			X \$ =			
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>													
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>													
							TOTAL ADD'L FEE	0			TOTAL ADD'L FEE			
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR		RATE (\$)	ADDITIONAL FEE (\$)		
	Total <small>(37 CFR 1.16(i))</small>		*	Minus	**	=	X \$ =				X \$ =			
	Independent <small>(37 CFR 1.16(h))</small>		*	Minus	***	=	X \$ =				X \$ =			
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>													
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>													
							TOTAL ADD'L FEE				TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.														
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".														
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".														
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.														
Legal Instrument Examiner: /GAIL D. D. WOOTEN/														

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,082	10/09/2001	Han-Gyoo Kim	34253/US/2	6653
32940 7590 05/26/2009 DORSEY & WHITNEY LLP INTELLECTUAL PROPERTY DEPARTMENT 370 SEVENTEENTH STREET SUITE 4700 DENVER, CO 80202-5647			EXAMINER HAMZA, FARUK	
			ART UNIT 2455	PAPER NUMBER
			MAIL DATE 05/26/2009	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Response to Amendment

1. This action is response to the communication filed on February 17, 2009. Applicant's election of species I (claims 34-42) is acknowledged. Claims 50-55 and 112-124 have been canceled. Claims 125-133 have been newly added. Claims 34-42 and 125-133 are pending.

Examiner's Note

2. The use of intended use clauses have been noted in the claims (i.e. "adapted to"). Applicant is advised that such terminology may render some limitation optional.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over the U. S. Patent No. 5,566,331, issued to Irwin, Jr. et al., hereinafter Irwin, in view of the U. S. Patent No. 6,421,753 issued to Hoese et al., hereinafter Hoese, and further in view of the U. S. Patent No. 6,389,432 to Pothapragada et al., hereinafter Pothapragada.

Regarding claim 34, Irwin teaches a network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host (Col. 2, lines

54-61), the NAD device comprising: a network adapter for receiving a disk access command in data link frames through the general purpose front-end network (Encapsulating data in the form required by the channel-switching fabric (col. 10, lines 58-63) transmitted using lower levels of protocol (col. 12, lines 30-35). Implementation of Ethernet that Irwin teaches in col. 13, lines 59-64 inherently requires a storage device connected to the Ethernet to have a network adapter); a disk controller, connected to the network adapter (col. 15, line 67 and col. 16, lines 1-7 - controller of the direct access storage device), for executing the disk access command (col. 16, lines 1-7 - controller of the direct access storage device encapsulates and executes access commands); a disk for storing data (Fig. 1, direct access storage devices 40-1 to 40-m); and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device (Fig. 1, control path 13); wherein access to the disk is operatively controlled by the disk controller (col. 15, lines 59-67 and col. 16, lines 1-7).

Irwin does not explicitly teach the NAD device wherein no disk access command is required to be routed through a server associated with the NAD.

However, Hoese in analogous art, directed to a method for providing virtual local storage on remote SCSI storage devices, teaches the NAD device wherein no disk access command is required to be routed through a server associated with the NAD (Hoese, col. 3, lines 30-37). Hoese essentially takes the invention of Irwin (See Fig. 1 of Hoese, data access server 14), and proposes to

eliminate the data storage server in order to speed up the data access (Hoeser, col. 1, lines 50-55), and to implement other technical advantages (Hoeser, col. 2, lines 25-44).

Irwin and Hoeser do not explicitly teach an automatic discovery of the NAD device that occurs when it is connected to the network.

However, Pothapragada, in analogous art, directed to a system with virtual volume access and management, teaches a system wherein discovery of the NAD device occurs when it is connected to the network (6:54-60).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Hoeser and Pothapragada into the teachings of Irwin in order to speed up the data access (Hoeser, col. 1, lines 50-55) and to implement other technical advantages (Hoeser, col. 2, lines 25-44), and in order to increase storage volume utilization. Modified in this manner Irwin is hereinafter referred to as "modified Irwin".

Regarding claim 35, modified Irwin teaches the NAD device of claim 34, wherein the network runs Ethernet (col. 13, lines 59-64).

4. Claims 36-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over modified Irwin in view of the U. S. Patent No. 6,807,581 to Starr et al., hereinafter Starr.

Regarding claim 36, modified Irwin teaches the NAD device of claim 34. Modified Irwin does not explicitly teach such device wherein said disk is formatted as a local disk.

However, Starr in analogous art, related to a network attached storage unit, teaches such device wherein said disk is formatted as a local disk (As per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Starr into the teachings of Irwin in order to reduce overhead associated with accessing data stored in different file formats. (Modified Irwin with incorporated teachings of Starr is hereinafter referred to as I/H/S).

Regarding claim 37, I/H/S teaches the NAD device of claim 34, wherein said disk is partitioned as a local disk (Starr, as per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23. Also, as per col. 6, lines 30-35, the file system 23 supports logical file format, and therefore is inherently capable of supporting partitions, partitions being nothing more than logical subdivisions of a physical disk space).

Regarding claim 38, I/H/S teaches the NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller (Starr, col. 5, lines 35-39 and Fig. 1 – Media Access Control 60).

Regarding claim 39, I/H/S teaches the NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device (Starr, Fig. 1, I/O controller 72).

Regarding claim 40, I/H/S teaches the NAD device of claim 34, wherein the controller has a filter for controlling access to the disk (Starr, col. 7, lines 23-26 – filtering based on authentication and other connection initialization procedures).

Regarding claim 41, I/H/S teaches the NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions (Starr, col. 5, line 67, col. 6, lines 1-4 – optional boot partition).

Regarding claim 42, I/H/S teaches the NAD device of claim 41, wherein each disk partition is controlled by a separate driver (Col. 5, lines 59-64 – RAID. The disks (partitions) in RAID are independent by definition, since RAID stands for “redundant array of independent disks”).

Claims 125-133 do not teach or define any new limitation other than above claims 34-42. Therefore, claims 125-133 are rejected for similar reasons.

Response to Arguments

5. Applicant's arguments have been fully considered but they are not persuasive.

In the remarks the applicant argues in substance that; A) Irwin does not teach the claim limitation general purpose front-end network.

In response to A) The applicant is misinterpreting the Irwin reference. The applicant asserts that Irwin only teaches Fiber Channel Network. The examiner respectfully disagrees. Irwin teaches local area networks based on physical transport mechanisms such as Ethernet (Column 7, lines 48-62). The claim

language failed to define the limitation "general purpose front-end network". The applicant is reminded that claim limitation must be given their reasonable broadest interpretation. The claim limitation "general purpose front-end network" is broad. The examiner is broadly interpreting Ethernet to be the general purpose front-end network. Therefore, teaching of Irwin meets the claim limitation.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faruk Hamza whose telephone number is 571-272-7969. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached at 571-272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 886-217-9197 (toll –free).

Faruk Hamza

Patent Examiner

Group Art Unite 2455


Application/Control Number: 09/974,082

Page 8

Art Unit: 2455

/saleh najjar/

Supervisory Patent Examiner, Art Unit 2455

Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

CLAIM		DATE							
Final	Original	05/11/2009							
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	35	✓							
	36	✓							

<i>Index of Claims</i> 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

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Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
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CLAIM		DATE							
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	40	✓							
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	42	✓							
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Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
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O	Objected

Claims renumbered in the same order as presented by applicant
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CLAIM		DATE							
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Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

CLAIM		DATE								
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	123	-								
	124	-								
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	126	✓								
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	129	✓								
	130	✓								
	131	✓								
	132	✓								
	133	✓								

Search Notes 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

SEARCHED			
Class	Subclass	Date	Examiner
709	203,217-219,236,246,250	05/18/09	FH

SEARCH NOTES		
Search Notes	Date	Examiner
See East Search Notes	05/18/09	FH

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	25174	709/203,217-219,236,246,250.ccls.	US-PGPUB; USPAT	OR	ON	2009/05/18 14:49
L2	467955	san or storage adj access adj network	US-PGPUB; USPAT	OR	ON	2009/05/18 14:50
L3	5233	1 and 2	US-PGPUB; USPAT	OR	ON	2009/05/18 14:50
L4	52713	access\$ near3 disk	US-PGPUB; USPAT	OR	ON	2009/05/18 14:52
L5	476	3 and 4	US-PGPUB; USPAT	OR	ON	2009/05/18 14:52
L6	121568	(access\$ or control\$4) near3 disk	US-PGPUB; USPAT	OR	ON	2009/05/18 14:53
L7	656	3 and 6	US-PGPUB; USPAT	OR	ON	2009/05/18 14:53
L8	323	directly near5 attach\$ near3 network with disk	US-PGPUB; USPAT	OR	ON	2009/05/18 14:58
L9	15	1 and 8	US-PGPUB; USPAT	OR	ON	2009/05/18 14:58
S1	2	"09974082"	US-PGPUB; USPAT	OR	ON	2009/05/15 11:40
S2	6	"09/974082"	US-PGPUB; USPAT	OR	ON	2009/05/15 11:41
S3	1	("5566331").PN.	USPAT; USOCR	OR	OFF	2009/05/17 09:52

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PTO/SB/08A (08-03) U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE Substitute for Form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	APPLICATION NO.: 09/974,082	FILING DATE: October 9, 2001
	INVENTOR(S): Han-gyoo Kim	ART UNIT: 2155
	EXAMINER NAME: Korobov, Vitali A.	ATTY. DOCKET NO.: 34253/US/2

U.S. PATENT DOCUMENTS					
EXAMINER INITIALS*	Cite No. ¹	PATENT NUMBER	ISSUE DATE	Name of Patentee of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		
	1.	5,426,427	06/1995	Chinnock et al.	
	2.	5,524,247	06/1996	Mizuno	
	3.	5,781,550	07/1998	Templin et al.	
	4.	6,047,307	04/2000	Radko	
	5.	6,085,234	07/2000	Pitts et al.	
	6.	6,523,066	02/2003	Montroy et al.	
	7.	6,539,446	03/2003	Chan	
	8.	6,598,068	07/2003	Clark	
	9.	6,823,458	11/2004	Lee et al.	
	10.	6,894,981	05/2005	Coile et al.	
	11.	7,010,303	03/2006	Lewis et al.	
	12.	7,124,128	10/2006	Springer et al.	
	13.	7,254,578	08/2007	Devarakonda et al.	

U.S. PUBLICATION DOCUMENTS					
EXAMINER INITIALS*	Cite No. ¹	PUBLICATION NUMBER	PUBLICATION DATE	Name of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)	MM-DD-YYYY		
	14.	2003/0172149	09/2003	Edsall et al.	
	15.	2004/0068563	04/2004	Ahuja et al.	
	16.	2004/0220933	11/2004	Walker	

FOREIGN PATENT DOCUMENTS						
EXAMINER INITIALS*	Cite No. ¹	DOCUMENT NUMBER	PUBLICATION DATE	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
		Country Code ³ - Number ⁴ - Kind Code ⁵ (if known)	MM-DD-YYYY			
	17.	WO00/29529	05/2000	Qlogic Corporation		

communication to applicant.

¹ Applicant's unique citation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language translation is attached.

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OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS			
EXAMINER INITIALS ¹	Cite No. ¹	Include name of Author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), volume-issue number(s), publisher, page(s) and date.	T ⁶
	18.	Blunden et al., "Storage Network Virtualization: What's it all about?", ibm.com/redbooks, XP-002286341, pp. 1-110, December 2000.	
	19.	Klein, Yaron, "Storage Virtualization with iSCSI Protocol", Internet Draft, XP-015030964, pp. 1-15, November 2, 2000.	
	20.	Schulz, Greg, "SAN and NAS; Complementary Technologies", http://www.mti.com/white_papers/WP20002.pdf , XP-002201566, pp. 1-7, May 1, 2000.	
	21.	Supplementary European Search Report, Application No. 01272932.3, 4 pages, November 5, 2007.	
EXAMINER		/Faruk Hamza/	DATE CONSIDERED 05/18/2009
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

¹ ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /F.H./

PTO/SB/08A (08-03) U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE Substitute for Form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>	APPLICATION NO.: 09/974,082	FILING DATE: October 9, 2001
	INVENTOR(S): Han-gyoo Kim	ART UNIT: 2155
	EXAMINER NAME: Korobov, Vitali A.	ATTY. DOCKET NO.: 34253/US/2

U.S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No. ¹	PATENT NUMBER	ISSUE DATE	Name of Patentee of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code* (if known)	MM-DD-YYYY		
	1.	5,721,818	02/1998	Hanif et al.	
	2.	5,987,523	11/1999	Hind et al.	
	3.	6,347,095	02/2002	Tang et al.	
	4.	6,578,111	06/2003	Damron et al.	
	5.	6,609,167	08/2003	Bastiani et al.	
	6.	6,647,016	11/2003	Isoda et al.	
	7.	7,069,312	06/2006	Kostic et al.	
	8.	7,069,350	06/2006	Fujita et al.	
	9.	7,076,690	07/2006	Todd et al.	
	10.	7,251,704	07/2007	Solomon et al.	
	11.	7,277,955	10/2007	Elliott	
	12.	7,376,133	05/2008	Gettala et al.	
	13.	7,383,229	06/2008	Jacoby	

U.S. PUBLICATION DOCUMENTS

EXAMINER INITIALS*	Cite No. ¹	PUBLICATION NUMBER	PUBLICATION DATE	Name of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code* (if known)	MM-DD-YYYY		
	14.	2003/0018403	01/2003	Braun et al.	
	15.	2004/0117813	06/2004	Karaoguz et al.	
	16.	2003/0225834	12/2003	Lee et al.	
	17.	2005/0042591	02/2005	Bloom et al.	
	18.	2005/0110768	05/2005	Marriott et al.	
	19.	2006/0004935	01/2006	Seto et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /F.H./

FOREIGN PATENT DOCUMENTS						
EXAMINER INITIALS ¹	Cite No. ¹	DOCUMENT NUMBER	PUBLICATION DATE	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
		Country Code ³ - Number ⁴ - Kind Code ⁵ (if known)	MM-DD-YYYY			

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS			
EXAMINER INITIALS ¹	Cite No. ¹	Include name of Author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), volume-issue number(s), publisher, page(s) and date.	T ⁶
EXAMINER		/Faruk Hamza/	DATE CONSIDERED 05/18/2009
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

*
communication to applicant.

¹ Applicant's unique citation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /F.H./



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
09/974,082	10/09/2001	Han-Gyoo Kim	34253/US/2

CONFIRMATION NO. 6653

POWER OF ATTORNEY NOTICE

32940
DORSEY & WHITNEY LLP
INTELLECTUAL PROPERTY DEPARTMENT
370 SEVENTEENTH STREET
SUITE 4700
DENVER, CO 80202-5647



Date Mailed: 07/20/2009

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/19/2008.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/tvhargrove/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
09/974,082	10/09/2001	Han-Gyoo Kim	34253/US/2

CONFIRMATION NO. 6653

POA ACCEPTANCE LETTER

6449
ROTHWELL, FIGG, ERNST & MANBECK, P.C.
1425 K STREET, N.W.
SUITE 800
WASHINGTON, DC 20005



Date Mailed: 07/20/2009

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/19/2008.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/tvhargrove/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/974,082
Applicant : Han-Gyoo Kim
Filed : October 9, 2001
TC/A.U. : 2455
Examiner : Faruk HAMZA
Docket No. : 3720-101
Customer No. : 06449
Confirmation No. : 6653

AMENDMENT AND REPLY UNDER 37 C.F.R. § 1.116

Director of U.S. Patent and Trademark Office
P. O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In reply to the Office Action mailed May 26, 2009, please amend the above-identified application as indicated below. This reply is being filed Monday, July 27, 2009, and is therefore timely filed within two months of the Office Action mailing date.

Amendments to the **Claims** are reflected in the listing of claims which begins on **page 2** of this paper.

Remarks begin on **page 5** of this paper.

Amendments to the Claims

The following listing of the claims replaces and supersedes all previous listings.

Listing of Claims:

Claims 1-33. (Canceled)

34. (Currently Amended) A network-attached disk (NAD) device adapted to be connected through a general purpose front-end network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising:

a network adapter for receiving a disk access command in data link frames through the general purpose front-end network;

a disk controller, connected to the network adapter, for executing the disk access command;

a disk for storing data; and

a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device;

wherein access to the disk is operatively controlled by the disk controller;

no disk access command is required to be routed through a server associated with the NAD; and automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network, and

the disk access command is formatted in a format independent of a file system and issued by the host.

35. (Original) The NAD device of claim 34, wherein the network runs Ethernet.

36. (Original) The NAD device of claim 34, wherein said disk is formatted as a local disk.

37. (Original) The NAD device of claim 34, wherein said disk is partitioned as a local disk.

38. (Original) The NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller.

39. (Original) The NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device.

40. (Original) The NAD device of claim 34, wherein the controller has a filter for controlling access to the disk.

41. (Original) The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions.

42. (Original) The NAD device of claim 41, wherein each disk partition is controlled by a separate driver.

Claims 43-124. (Canceled)

125. (Currently Amended) A network-attached disk (NAD) device adapted to be connected through a general purpose front-end network to a host computer having a system bus, the NAD device comprising:

a network adapter for receiving a disk access command through the general purpose front-end network, said network adapter including:

a physical network interface for interfacing with the general purpose front-end network to receive a disk I/O request packet from the host computer, and

a media access control (MAC) controller connected to the physical network interface to extract necessary data from the disk I/O request packet;

a disk controller, connected to the network adapter, for executing the disk access command;

a disk for storing data; and

a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device;

wherein no disk access command is required to be routed through a server associated with the NAD, and the disk access command is formatted in a format independent of a file system and issued by the host computer.

126. (Previously Presented) The NAD device of claim 125, wherein automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network.

127. (Previously Presented) The NAD device of claim 125, wherein the general purpose front-end network runs Ethernet.

128. (Previously Presented) The NAD device of claim 125, wherein said disk is formatted as a local disk.

129. (Previously Presented) The NAD device of claim 125, wherein said disk is partitioned as a local disk.

130. (Previously Presented) The NAD device of claim 125, wherein the controller has a state machine for controlling the operation of the NAD device.

131. (Previously Presented) The NAD device of claim 125, wherein the controller has a filter for controlling access to the disk.

132. (Previously Presented) The NAD device of claim 125, wherein the disk is partitioned into a plurality of disk partitions.

133. (Currently Amended) The NAD device of claim ~~[[125]]~~ 132, wherein each disk partition is controlled by a separate driver.

Remarks

The Office Action dated May 26, 2009, has been carefully reviewed. The foregoing amendments and following remarks form a full and complete response thereto. Claims 34, 125, and 133 are amended. Support for the amendments may be found at least in paragraphs 0047 and 0062 and original claim 42. No new matter is added. Claims 34-42 and 125-133 are pending. Reconsideration and allowance are requested.

Date of Action

Applicant filed a change of correspondence address with the Office on December 19, 2008. Nevertheless, the present Office Action was erroneously mailed on May 26, 2009, to the previous correspondence address. The present correspondence address is that of practitioners associated with customer number 6449; those practitioners did not receive notification until June 18, 2009, that the recipient at the previous address had erroneously received the Office Action. Because the Office failed to mail the Office Action to the properly noticed correspondence address of record, Applicant respectfully requests that the mailing date of this action be set to no earlier than June 18, 2009.

Finality of Rejection

Applicant submits that the Office Action failed to set forth a basis for designating the Office Action final. Applicant's last reply was a Response to Election Requirement. Applicants respectfully request that the Office provide a basis for designating the Office Action final or withdrawn the finality of the Office Action.

Claim rejections under 35 U.S.C. § 103(a)

Claims 34 and 35 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable as obvious in view of Pats. 5,566,331 to Irwin, 6,421,753 to Hoese, and 6,389,432 to Pothapragada. Applicant submits that the combination of Irwin, Hoese and Pothapragada (altogether "Examiner's modified Irwin") fails to teach each element of amended claim 34, upon which claim 35 depends.

Irwin teaches a system in which client data processors access a file-system on a shared, channel-attached direct access storage device. Abstract of Irwin. Hoese discloses a storage router interfacing SCSI-based storage devices with a Fibre

Channel transport medium. Abstract of Hoese. Pothapragada discloses an intelligent virtual volume access scheme in which a data storage request specifies criteria for storage space and a data structure is searched for an entry specifying a data storage device whose attributes best match the criteria. See Abstract of Pothapragada.

In contrast, claim 34 defines a NAD device adapted to be connected through a general purpose front-end network to a host having a system bus, where the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host. The NAD device has a network adapter for receiving a disk access command in data link frames through the general purpose front-end network; a disk controller, connected to the network adapter, for executing the disk access command; a disk for storing data; and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device. The access to the disk is operatively controlled by the disk controller and no disk access command is required to be routed through a server associated with the NAD. Automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network. The disk access command is formatted in a format independent of a file system and issued by the host.

Irwin, Hoese, and Pothapragada, singly and in combination, fail to teach or suggest at least that the disk access command is formatted in a format independent of a file system and issued by the host as recited in amended claim 34. Thus, Applicant requests that the rejection of independent claim 34 and dependent claim 35 be withdrawn at least for this reason.

Claims 36-42 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable as obvious in view of Examiner's modified Irwin in further view of Pat. 6,807,581 to Starr. Applicant submits that the rejection of claims 36-42, which depend directly or through an intervening claim to independent claim 34, should be withdrawn for at least the same reasons as provided above regarding claim 34 because Starr fails to remedy the deficiencies of Examiner's modified Irwin. Starr discloses an interface device connected to a host for accelerating data transfers between a network and a storage unit. Abstract. The interface device can use a dedicated fast-path for data

transfer between the network and the storage unit. Id. The fast-path is set up by the host and allows the host CPU to avoid protocol processing for data transfer over the fast-path. Id. Starr fails to disclose or suggest, singly and in combination with Irwin, Hoese, and Pothapragada, at least that the disk access command is formatted in a format independent of a file system and issued by the host, as recited in claim 34. Thus, Applicant requests that the rejection of claims 36-42 be withdrawn for at least this reason.

The Office Action asserted that claims 125-133 “do not teach for [sic] define any new limitation other than above claims 34-42. Therefore, claims 125-133 are rejected for similar reasons.” Office Action at 6. No other explanation of the rejection is provided.

Applicant submits that the rejection of claims 125-133 is improper at least because the Office Action’s assertion that claims 125-133 define no new limitations is incorrect. For example, independent claim 125, upon which claims 126-133 depend, recites that a network adapter includes a physical network interface for interfacing with the general purpose front-end network to receive a disk I/O request packet from the host computer, and a media access control (MAC) controller connected to the physical network interface to extract necessary data from the disk I/O request packet. Contrary to the Office’s assertion, claims 34-42 do not recite these elements. Applicant therefore requests that the rejection of claims 125-133 be withdrawn for at least this reason. Applicant further requests that if the Office determines to maintain the rejection, that the basis for the rejection be properly communicated in a non-final Office Action so that Applicant has a fair opportunity to respond to the rejection. See MPEP 706.02(j).

Applicant further submits that the rejection of claims 125-133 is improper for the additional, independent reason that claims 125-133 define subject matter not disclosed or suggested by the cited references. As discussed above with regard to claims 36-42, Irwin, Hoese, Pothapragada, and Starr, singly and in combination, fail to disclose or suggest at least that the disk access command is formatted in a format independent of a file system and issued by the host computer as recited in independent claim 125,

upon which claims 126-134 depend directly or through an intervening claim. Applicants request that the rejection of claims 125-133 be withdrawn for this additional, independent reason.

In view of the above, all rejections have been sufficiently addressed. Applicant submits that the application is now in condition for allowance and request that claims 34-42 and 125-133 be allowed and this application be passed to issue.

In the event that this paper is not timely filed, the Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account No. 02 2135.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the Applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

Respectfully submitted,

July 27, 2009
Date

/Oliver L. Edwards/
Attorney for the Applicant
Oliver L. Edwards
Reg. No. 64,711
ROTHWELL, FIGG, ERNST & MANBECK
1425 K Street, N.W.
Suite 800
Washington, D.C. 20005
(202) 783-6040

Electronic Acknowledgement Receipt

EFS ID:	5774008
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	06449
Filer:	Richard Wydeven/marie lucier
Filer Authorized By:	Richard Wydeven
Attorney Docket Number:	3720-101
Receipt Date:	27-JUL-2009
Filing Date:	09-OCT-2001
Time Stamp:	15:37:19
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Amendment.pdf	97352 41e37de223d19bf5c16578f50e0dcaf931376908	yes	8

Multipart Description/PDF files in .zip description		
Document Description	Start	End
Amendment After Final	1	1
Claims	2	4
Applicant Arguments/Remarks Made in an Amendment	5	8
Warnings:		
Information:		
Total Files Size (in bytes):	97352	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>		

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 09/974,082		Filing Date 10/09/2001		<input type="checkbox"/> To be Mailed				
APPLICATION AS FILED – PART I													
(Column 1)			(Column 2)			SMALL ENTITY <input checked="" type="checkbox"/>		OR		OTHER THAN SMALL ENTITY			
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)	OR		RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>		N/A	N/A		N/A				N/A				
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>		N/A	N/A		N/A				N/A				
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>		N/A	N/A		N/A				N/A				
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>		minus 20 =	*		X \$ =				X \$ =				
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>		minus 3 =	*		X \$ =				X \$ =				
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).											
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>													
* If the difference in column 1 is less than zero, enter "0" in column 2.													
APPLICATION AS AMENDED – PART II													
(Column 1)			(Column 2)			SMALL ENTITY		OR		OTHER THAN SMALL ENTITY			
AMENDMENT	07/27/2009	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR		RATE (\$)	ADDITIONAL FEE (\$)		
	Total <small>(37 CFR 1.16(i))</small>	* 18	Minus	** 111	= 0	X \$26 =	0			X \$ =			
	Independent <small>(37 CFR 1.16(h))</small>	* 2	Minus	***14	= 0	X \$110 =	0			X \$ =			
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>												
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>												
						TOTAL ADD'L FEE	0			TOTAL ADD'L FEE			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR		RATE (\$)	ADDITIONAL FEE (\$)		
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	X \$ =				X \$ =			
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =				X \$ =			
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>												
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>												
						TOTAL ADD'L FEE				TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.													
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".													
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".													
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.													

Legal Instrument Examiner:
/DIANE WILLIAMS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/974,082
Applicant : Han-Gyoo Kim
Filed : October 9, 2001
TC/A.U. : 2455
Examiner : Faruk HAMZA DO NOT ENTER: /F.H./
Docket No. : 3720-101
Customer No. : 06449
Confirmation No. : 6653

AMENDMENT AND REPLY UNDER 37 C.F.R. § 1.116

Director of U.S. Patent and Trademark Office
P. O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In reply to the Office Action mailed May 26, 2009, please amend the above-identified application as indicated below. This reply is being filed Monday, July 27, 2009, and is therefore timely filed within two months of the Office Action mailing date.

Amendments to the **Claims** are reflected in the listing of claims which begins on **page 2** of this paper.

Remarks begin on **page 5** of this paper.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,082	10/09/2001	Han-Gyoo Kim	3720-101	6653
6449	7590	08/12/2009	EXAMINER	
ROTHWELL, FIGG, ERNST & MANBECK, P.C. 1425 K STREET, N.W. SUITE 800 WASHINGTON, DC 20005			HAMZA, FARUK	
			ART UNIT	PAPER NUMBER
			2455	
			NOTIFICATION DATE	DELIVERY MODE
			08/12/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO-PAT-Email@rfem.com

Advisory Action Before the Filing of an Appeal Brief	Application No. 09/974,082	Applicant(s) KIM, HAN-GYOO	
	Examiner FARUK HAMZA	Art Unit 2455	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 27 July 2009 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:

a) The period for reply expires _____ months from the mailing date of the final rejection.

b) The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because

(a) They raise new issues that would require further consideration and/or search (see NOTE below);

(b) They raise the issue of new matter (see NOTE below);

(c) They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or

(d) They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: See Continuation Sheet. (See 37 CFR 1.116 and 41.33(a)).

4. The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).

5. Applicant's reply has overcome the following rejection(s): _____.

6. Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).

7. For purposes of appeal, the proposed amendment(s): a) will not be entered, or b) will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.

The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: None.

Claim(s) objected to: None.

Claim(s) rejected: 34-42 and 125-133.

Claim(s) withdrawn from consideration: None.

AFFIDAVIT OR OTHER EVIDENCE

8. The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).

9. The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).

10. The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.

12. Note the attached Information *Disclosure Statement(s)*. (PTO/SB/08) Paper No(s). _____

13. Other: _____.

/saleh najjar/
Supervisory Patent Examiner, Art Unit 2455

Continuation of 3. NOTE: further search and/or consideration would be necessiated by the proposed changed in the scope of the claims (i.e. "the disk access command is formatted in a format independent of a file system and issued by the host").

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)							
Application Number	09974082	Filing Date	2001-10-09	Docket Number (if applicable)	3720-101	Art Unit	2455
First Named Inventor	Han-Gyoo KIM			Examiner Name	Faruk Hamza		
<p>This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application. Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV</p>							
SUBMISSION REQUIRED UNDER 37 CFR 1.114							
<p>Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).</p>							
<p><input checked="" type="checkbox"/> Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.</p> <p style="margin-left: 40px;"><input type="checkbox"/> Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____</p> <p style="margin-left: 40px;"><input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> Enclosed</p> <p style="margin-left: 40px;"><input type="checkbox"/> Amendment/Reply</p> <p style="margin-left: 40px;"><input type="checkbox"/> Information Disclosure Statement (IDS)</p> <p style="margin-left: 40px;"><input type="checkbox"/> Affidavit(s)/ Declaration(s)</p> <p style="margin-left: 40px;"><input type="checkbox"/> Other _____</p>							
MISCELLANEOUS							
<p><input type="checkbox"/> Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)</p> <p><input type="checkbox"/> Other _____</p>							
FEES							
<p>The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.</p> <p><input checked="" type="checkbox"/> The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No <u>022135</u></p>							
SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED							
<p><input checked="" type="checkbox"/> Patent Practitioner Signature</p> <p><input type="checkbox"/> Applicant Signature</p>							

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (01-09)

Approved for use through 02/28/2009. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Signature of Registered U.S. Patent Practitioner			
Signature	/Oliver L. Edwards/	Date (YYYY-MM-DD)	2009-08-20
Name	Oliver L. Edwards	Registration Number	64711

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	Disk system adapted to be directly attached to network			
First Named Inventor/Applicant Name:	Han-Gyoo Kim			
Filer:	Oliver Lee Edwards/Jessica Fu			
Attorney Docket Number:	3720-101			
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for continued examination	2801	1	405	405
Total in USD (\$)				405

Electronic Acknowledgement Receipt

EFS ID:	5923819
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	06449
Filer:	Oliver Lee Edwards/Jessica Fu
Filer Authorized By:	Oliver Lee Edwards
Attorney Docket Number:	3720-101
Receipt Date:	20-AUG-2009
Filing Date:	09-OCT-2001
Time Stamp:	15:11:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 405
RAM confirmation Number	1219
Deposit Account	022135
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)
 Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)
 Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	RCE.pdf	768748	no	3
			06e2317ecc2445df3ea9cd0ec275e4e986162e18		

Warnings:

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	29965	no	2
			1f31d35b36ad5899d9aad7cd896a1f70212ad1a		

Warnings:

Information:

Total Files Size (in bytes):	798713
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 09/974,082		Filing Date 10/09/2001		<input type="checkbox"/> To be Mailed				
APPLICATION AS FILED – PART I													
(Column 1)			(Column 2)			SMALL ENTITY <input checked="" type="checkbox"/>		OR		OTHER THAN SMALL ENTITY			
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)	OR		RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>		N/A	N/A		N/A				N/A				
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>		N/A	N/A		N/A				N/A				
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>		N/A	N/A		N/A				N/A				
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>		minus 20 =	*		X \$ =				X \$ =				
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>		minus 3 =	*		X \$ =				X \$ =				
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).											
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>													
* If the difference in column 1 is less than zero, enter "0" in column 2.													
APPLICATION AS AMENDED – PART II													
(Column 1)			(Column 2)			SMALL ENTITY		OR		OTHER THAN SMALL ENTITY			
AMENDMENT	08/20/2009	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR		RATE (\$)	ADDITIONAL FEE (\$)		
	Total <small>(37 CFR 1.16(i))</small>	* 18	Minus	** 111	= 0	X \$26 =	0			X \$ =			
	Independent <small>(37 CFR 1.16(h))</small>	* 2	Minus	***14	= 0	X \$110 =	0			X \$ =			
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>												
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>												
						TOTAL ADD'L FEE	0			TOTAL ADD'L FEE			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR		RATE (\$)	ADDITIONAL FEE (\$)		
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	X \$ =				X \$ =			
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =				X \$ =			
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>												
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>												
						TOTAL ADD'L FEE				TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.													
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".													
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".													
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.													
<p>Legal Instrument Examiner: /DONNA D. SMALLS LOGAN/</p>													

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/974,082
Applicant : Han-Gyoo Kim
Filed : October 9, 2001
TC/A.U. : 2455
Examiner : Faruk HAMZA
Docket No. : 3720-101
Customer No. : 06449
Confirmation No. : 6653

~~DO NOT ENTER: /F.H./~~

OK Wendy
RCE Filed

AMENDMENT AND REPLY UNDER 37 C.F.R. § 1.116

8/20/09

Director of U.S. Patent and Trademark Office
P. O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In reply to the Office Action mailed May 26, 2009, please amend the above-identified application as indicated below. This reply is being filed Monday, July 27, 2009, and is therefore timely filed within two months of the Office Action mailing date.

Amendments to the **Claims** are reflected in the listing of claims which begins on **page 2** of this paper.

Remarks begin on **page 5** of this paper.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 09/974,082, 10/09/2001, Han-Gyoo Kim, 3720-101, 6653
Row 2: 6449, 7590, 11/04/2009, ROTHWELL, FIGG, ERNST & MANBECK, P.C., 1425 K STREET, N.W., SUITE 800, WASHINGTON, DC 20005
Row 3: EXAMINER, HAMZA, FARUK
Row 4: ART UNIT, PAPER NUMBER, 2455
Row 5: NOTIFICATION DATE, DELIVERY MODE, 11/04/2009, ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO-PAT-Email@rfem.com

DETAILED ACTION

1. This action is responsive to the communication filed on August 20, 2009. Claims 34, 125 and 133 have been amended. Claims 34-42 and 125-133 are pending.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 20, 2009 has been entered.

Examiner's Note

3. The use of intended use clauses have been noted in the claims (i.e. "adapted to"). Applicant is advised that such terminology may render some limitation optional.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 34-42 and 125-133 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in

such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification failed to provide enough description for the claim limitation of "*no disk access command is required* to be routed through a server associated with the NAD, automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network, and the disk access command is formatted in a format independent of a file system and issued by the host" so that an ordinary skill in the art would be comprehend the claimed invention.

Any negative limitation (i.e. *no disk access command is required*) or exclusionary proviso must have basis in the original disclosure. If alternative elements are positively recited in the specification, they may be explicitly excluded in the claims. See *In re Johnson*, 558 F.2d 1008, 1019, 194 USPQ 187, 196 (CCPA 1977) ("[the] specification, having described the whole, necessarily described the part remaining."). See also *Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983), *aff'd mem.*, 738 F.2d 453 (Fed. Cir. 1984).

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 34-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "as if" in claim 34 is a relative term which renders the claim indefinite. The term "as if" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim 34 recites the limitation "it" in line 3 and 15. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over the U. S. Patent No. 5,566,331, issued to Irwin, Jr. et al., hereinafter Irwin, in view of the U. S. Patent No. 6,421,753 issued to Hoese et al., hereinafter Hoese, and further in view of the U. S. Patent No. 6,389,432 to Pothapragada et al., hereinafter Pothapragada.

Regarding claim 34, Irwin teaches a network-attached disk (NAD) device adapted to be connected through a network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host (Col. 2, lines 54-61), the NAD device comprising: a network adapter for receiving a disk access command in data link frames through the general purpose front-end network (Encapsulating data in the form required by the channel-switching fabric

(col. 10, lines 58-63) transmitted using lower levels of protocol (col. 12, lines 30-35). Implementation of Ethernet that Irwin teaches in col. 13, lines 59-64 inherently requires a storage device connected to the Ethernet to have a network adapter); a disk controller, connected to the network adapter (col. 15, line 67 and col. 16, lines 1-7 - controller of the direct access storage device), for executing the disk access command (col. 16, lines 1-7 - controller of the direct access storage device encapsulates and executes access commands); a disk for storing data (Fig. 1, direct access storage devices 40-1 to 40-m); and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device (Fig. 1, control path 13); wherein access to the disk is operatively controlled by the disk controller (col. 15, lines 59-67 and col. 16, lines 1-7).

Irwin does not explicitly teach the NAD device wherein no disk access command is required to be routed through a server associated with the NAD.

However, Hoese in analogous art, directed to a method for providing virtual local storage on remote SCSI storage devices, teaches the NAD device wherein no disk access command is required to be routed through a server associated with the NAD (Hoese, col. 3, lines 30-37). Hoese essentially takes the invention of Irwin (See Fig. 1 of Hoese, data access server 14), and proposes to eliminate the data storage server in order to speed up the data access (Hoese, col. 1, lines 50-55), and to implement other technical advantages (Hoese, col. 2, lines 25-44).

Irwin and Hoese do not explicitly teach an automatic discovery of the NAD device that occurs when it is connected to the network.

However, Pothapragada, in analogous art, directed to a system with virtual volume access and management, teaches a system wherein discovery of the NAD device occurs when it is connected to the network (6:54-60).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Hoese and Pothapragada into the teachings of Irwin in order to speed up the data access (Hoese, col. 1, lines 50-55) and to implement other technical advantages (Hoese, col. 2, lines 25-44), and in order to increase storage volume utilization. Modified in this manner Irwin is hereinafter referred to as "modified Irwin".

Regarding claim 35, modified Irwin teaches the NAD device of claim 34, wherein the network runs Ethernet (col. 13, lines 59-64).

7. Claims 36-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over modified Irwin in view of the U. S. Patent No. 6,807,581 to Starr et al., hereinafter Starr.

Regarding claim 36, modified Irwin teaches the NAD device of claim 34. Modified Irwin does not explicitly teach such device wherein said disk is formatted as a local disk.

However, Starr in analogous art, related to a network attached storage unit, teaches such device wherein said disk is formatted as a local disk (As per

col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23).

Therefore, it would have been obvious to one having ordinary skills in the art at the time the invention was made to incorporate the teachings of Starr into the teachings of Irwin in order to reduce overhead associated with accessing data stored in different file formats. (Modified Irwin with incorporated teachings of Starr is hereinafter referred to as I/H/S).

Regarding claim 37, I/H/S teaches the NAD device of claim 34, wherein said disk is partitioned as a local disk (Starr, as per col. 6, lines 40-43, storage 66, local to the host, and INIC storage 70 share the same file system 23. Also, as per col. 6, lines 30-35, the file system 23 supports logical file format, and therefore is inherently capable of supporting partitions, partitions being nothing more than logical subdivisions of a physical disk space).

Regarding claim 38, I/H/S teaches the NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller (Starr, col. 5, lines 35-39 and Fig. 1 – Media Access Control 60).

Regarding claim 39, I/H/S teaches the NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device (Starr, Fig. 1, I/O controller 72).

Regarding claim 40, I/H/S teaches the NAD device of claim 34, wherein the controller has a filter for controlling access to the disk (Starr, col. 7, lines 23-

26 – filtering based on authentication and other connection initialization procedures).

Regarding claim 41, I/H/S teaches the NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions (Starr, col. 5, line 67, col. 6, lines 1-4 – optional boot partition).

Regarding claim 42, I/H/S teaches the NAD device of claim 41, wherein each disk partition is controlled by a separate driver (Col. 5, lines 59-64 – RAID. The disks (partitions) in RAID are independent by definition, since RAID stands for “redundant array of independent disks”).

Claims 125-133 do not teach or define any new limitation other than above claims 34-42. Therefore, claims 125-133 are rejected for similar reasons.

Response to Arguments

8. Applicant's arguments have been fully considered but they are not persuasive.

In the remarks the applicant argues in substance that; A) Combined teaching of Irwin, Hoese and Pothapragada does not teach the claim limitation "no disk access command is required to be routed through a server associated with the NAD, automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network, and the disk access command is formatted in a format independent of a file system and issued by the host".

In response to A) The instant specification failed to provide enough description for the claimed limitation so that an ordinary skill in the art could fully comprehend the claimed invention. Therefore, claims are rejected under 35 USC 112 1st paragraph. The examiner is not considering the argument at this time.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faruk Hamza whose telephone number is 571-272-7969. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached at 571-272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 886-217-9197 (toll -free).


Faruk Hamza

Patent Examiner

Group Art Unite 2455

/Faruk Hamza/

Examiner, Art Unit 2455

Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

CLAIM		DATE							
Final	Original	10/29/2009							
	1	-							
	2	-							
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	4	-							
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	33	-							
	34	✓							
	35	✓							
	36	✓							

Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
=	Allowed


-	Cancelled
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N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

CLAIM		DATE							
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	39	✓							
	40	✓							
	41	✓							
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Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

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I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

CLAIM		DATE							
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Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
=	Allowed

-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

CLAIM		DATE							
Final	Original	10/29/2009							
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	123	-							
	124	-							
	125	✓							
	126	✓							
	127	✓							
	128	✓							
	129	✓							
	130	✓							
	131	✓							
	132	✓							
	133	✓							


EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	26887	709/203,217-219,236,246,250.ccls.	US-PGPUB; USPAT	OR	ON	2009/10/29 13:29
L2	2179	automatic near5 discover \$	US-PGPUB; USPAT	OR	ON	2009/10/29 13:32
L3	503084	san or nad	US-PGPUB; USPAT	OR	ON	2009/10/29 13:33
L4	38	2 same 3	US-PGPUB; USPAT	OR	ON	2009/10/29 13:33
L5	41	independent with access adj command	US-PGPUB; USPAT	OR	ON	2009/10/29 13:34
L6	0	4 and 5	US-PGPUB; USPAT	OR	ON	2009/10/29 13:34
S1	2	"09974082"	US-PGPUB; USPAT	OR	ON	2009/05/15 11:40
S2	6	"09/974082"	US-PGPUB; USPAT	OR	ON	2009/05/15 11:41
S3	1	("5566331").PN.	USPAT; USOCR	OR	OFF	2009/05/17 09:52
S4	25174	709/203,217-219,236,246,250.ccls.	US-PGPUB; USPAT	OR	ON	2009/05/18 14:49
S5	467955	san or storage adj access adj network	US-PGPUB; USPAT	OR	ON	2009/05/18 14:50
S6	5233	S4 and S5	US-PGPUB; USPAT	OR	ON	2009/05/18 14:50
S7	52713	access\$ near3 disk	US-PGPUB; USPAT	OR	ON	2009/05/18 14:52
S8	476	S6 and S7	US-PGPUB; USPAT	OR	ON	2009/05/18 14:52
S9	121568	(access\$ or control\$4) near3 disk	US-PGPUB; USPAT	OR	ON	2009/05/18 14:53
S10	656	S6 and S9	US-PGPUB; USPAT	OR	ON	2009/05/18 14:53
S11	323	directly near5 attach\$ near3 network with disk	US-PGPUB; USPAT	OR	ON	2009/05/18 14:58
S12	15	S4 and S11	US-PGPUB; USPAT	OR	ON	2009/05/18 14:58

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Search Notes 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

SEARCHED			
Class	Subclass	Date	Examiner
709	203,217-219,236,246,250	10/29/09	FH

SEARCH NOTES		
Search Notes	Date	Examiner
See East Search Notes	10/29/09	FH

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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Information Disclosure Statement by Applicant (PTO/SB/O8)	<i>Complete if Known</i>	
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	Filing Date:	October 9, 2001
	First Named Inventor:	Han-Gyoo Kim
	Group Art Unit	2455
	Examiner Name:	Faruk HAMZA
	Attorney Docket No.:	3720-101
	Customer No.:	6449
Page 1 of 1	Confirmation No.:	6653

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. ¹	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY
		Number	Kind Code ² (if known)		

FOREIGN PATENT DOCUMENTS							
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		Office ³	Number ⁴	Kind ⁵ Code (if known)			
	1	WO	00/29529	A2	QLOGIC CORPORATION	05-25-2000	

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T ²
	2	EP Communication 94(3) issued in co-pending European Application No. 01 272 932.3 – 2413 (Issued August 3, 2009) (9 pages)	
	3	YARON KLEIN, SANRAD, “Storage Virtualization with iSCSI Protocol; draft-klein-ips-virt-00.txt” (2 November 2000) (15 pages)	
	4	BLUNDEN, MARK, et al, “Storage Networking Virtualization What’s it all about?” IBM Redbooks (December 2000) (124 pages)	
	5	SCHULZ,GREG, “SAN and NAS; Complementary Technologies – SAN and NAS provide Storage and Data Sharing” INTERNET CITATION (May 1, 2000) (11 pages)	

Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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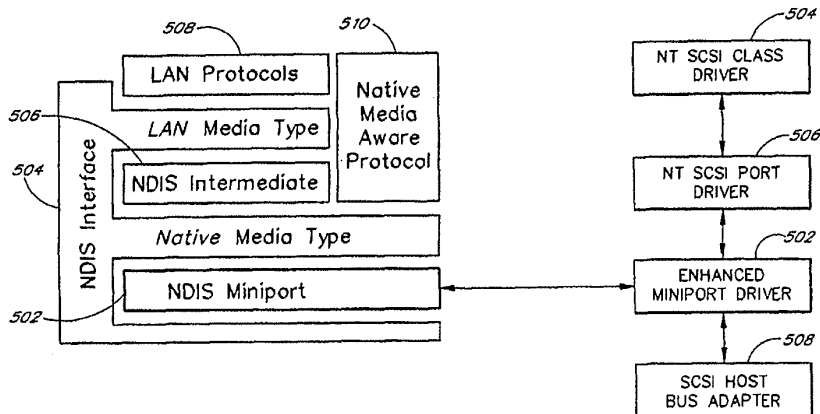


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<p>(21) International Application Number: PCT/US99/25595</p> <p>(22) International Filing Date: 29 October 1999 (29.10.99)</p> <p>(30) Priority Data: 60/108,527 16 November 1998 (16.11.98) US 09/280,506 30 March 1999 (30.03.99) US</p> <p>(71) Applicant: QLOGIC CORPORATION [US/US]; 3545 Harbor Boulevard, Costa Mesa, CA 92626 (US).</p> <p>(72) Inventors: SHAH, Shishir, C.; 22 Cresthaven, Irvine, CA 92604 (US). THOMPSON, Thomas, W.; 1018 Poppy Circle, Costa Mesa, CA 92626 (US). WAGNER, David, K.; 1721 Crystal Ridge Way, Vista, CA 92083 (US).</p> <p>(74) Agent: ALTMAN, Daniel, E.; Knobbe, Martens, Olson & Bear, 620 Newport Center Drive, 16th floor, Newport Beach, CA 92660-8016 (US).</p>	<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>Without international search report and to be republished upon receipt of that report.</i></p>
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(54) Title: SYSTEMS AND METHODS FOR NETWORK AND I/O DEVICE DRIVERS



(57) Abstract

The present invention is directed to systems and methods for transferring storage data and network data using the same interface circuit. Storage data is transferred from an upper layer storage driver to a lower layer storage driver. Network data is transferred from a network driver to the lower layer storage drive. The storage data and the network data are transferred to a communications link interface circuit, wherein the storage data is transferred using a storage protocol and the network data is transferred using a network protocol.

FOR THE PURPOSES OF INFORMATION ONLY

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SYSTEMS AND METHODS FOR NETWORK AND I/O DEVICE DRIVERSBackground of the Invention5 Field of the Invention

The present invention relates to methods and systems for handling network and I/O communications, and in particular, to network and I/O device drivers.

Description of the Related Art

10 Computer systems typically utilize an operating system that provides an interface between application programs and the hardware. For example, operating systems are used to schedule tasks, allocate storage, and handle the interface to peripheral hardware, such as hard drives, optical disk drives, tape drives, network devices and the like. The operating system may be split into a kernel and various system programs. The system programs use facilities
15 provided by the kernel to perform higher-level housekeeping task, often acting as servers in a client-server relationship.

As previously discussed, an operating system interfaces application programs to hardware. For example, an application program may transmit a request to access peripheral hardware. This request is received by the operating system, which in turn translates the
20 request to a format useable by the device. The operating system then transmits the translated request to the appropriate device and handles communications with the device.

The software used to control a peripheral device is typically called a device driver. A driver is usually a routine or set of routines that implements device-specific aspects of generic I/O operations. The device driver may be responsible for accessing the hardware registers of
25 the device, starting and completing I/O operations, performing error processing, and often includes an interrupt handler to service interrupts generated by the device. Device drivers are typically kernel mode drivers and often form part of the lowest level of the operating system kernel, with which they are linked when the kernel is built. Some operating systems, such as Windows NT, have loadable device drivers that can be installed from files after the operating
30 system is running.

In Windows NT, an I/O manager handles communication between a driver and an application program or kernel component. The I/O manager responds to an I/O request by issuing an I/O request packet to the appropriate device driver. The driver translates the request into an appropriate form for the targeted device and causes the device to begin the
35 requested I/O operation. Once the device completes the I/O operation, the device generates

an interrupt which is serviced by the device driver. The I/O manager then completes the I/O request by performing a variety of operations, including, for example, recording the outcome of the I/O operation.

5 Some operating systems, such as Windows NT, or UNIX, use a layered approach in implementing device drivers. These operating systems allow several driver layers to exist between an application program and a device. For example, one or more intermediate drivers may be layered on top of a physical device driver. These intermediate driver layers allow hardware-specific operations to be separated from more general management issues. In Windows NT parlance, one such intermediate driver type is referred to as a "class driver,"
10 while the hardware driver is called a "port driver."

One example of a device driver is a SCSI drive device driver. The SCSI device driver typically consists of several layers. For example, the SCSI device driver may include a class driver, a SCSI port driver, and a SCSI miniport driver. When an application program issues a read request for a file located on the disk, the operating system invokes the appropriate SCSI
15 class driver and passes the read request to the class driver. The class driver translates the received I/O request packets into I/O request packets with system defined SCSI request blocks (SRBs) containing SCSI command descriptor blocks. The translated I/O request packets are then sent to the next lower driver, which may be, for example, a SCSI port driver. The SCSI port driver translates the SCSI request blocks from the class driver and passes the SCSI
20 request blocks and the command descriptor blocks to the SCSI miniport. The SCSI miniport driver is dynamically linked with the SCSI port driver and provides hardware-specific support for a particular SCSI host bus adapter (HBA). The SCSI drive performs the read operation and generates an interrupt to the SCSI miniport that then services the interrupt.

Another example of a device driver is a network driver. The network driver handles
25 communication with networking hardware, such as a NIC (Network Interface Card). Many operating systems, such as Windows NT, use driver layering to disengage network protocol management from actual data transfers. Thus, a network driver may include a Windows NT LAN (Large Area Network) driver followed by an NDIS or NIC miniport driver. The network driver layers may be interconnected using a Windows NT NDIS (Network Device
30 Interface Specification) interface. In conventional systems, the NDIS miniport driver interfaces to the NIC. Thus, in conventional systems, the NDIS miniport performs the hardware-specific operations needed to manage the NIC.

Many conventional computer systems include at least two interface cards, an I/O HBA and a network interface card, to respectively handle I/O and network protocols. As described

above, these cards are managed respectively by a SCSI miniport and an NDIS miniport. Each card is typically connected to separate communication media. For example, the I/O HBA might be connected to a high speed Fibre Channel communication link, which in turn might be connected to one or more server systems or other computer systems. The Fibre Channel link would then handle storage related communications. The NDIS miniport might be connected via a NIC to an Ethernet link, which in turn may be connected to other computer systems. The Ethernet link would then handle the network related communications, such as, in the case of a clustered server system, "heartbeat" information. The network heartbeat traffic is typically much less than the storage related traffic, and therefore the lower bandwidth, lower cost, Ethernet link is considered well suited to handle such lower bandwidth communication. Thus, for example, in a typical clustered server system having host systems and storage subsystems, each host system would have at least one I/O HBA and one Ethernet interface card. In addition, each storage subsystem would have at least one I/O HBA. The host systems communicate heartbeat information to each other over the Ethernet link. Both the host systems and the storage subsystems communicate storage information over the Fibre Channel.

However, the conventional approach described above disadvantageously requires at least two slots in each host system computer, one for the storage or I/O HBA and one for the NIC, and two communication links, in order to handle both storage related communication and network related communication. This situation is further exacerbated in systems incorporating redundant channels for both the storage and communication links. In conventional systems, such redundancy requires four host bus adapters, which in turn require four card slots in each host computer system. However, many standard computers have a very limited number of slots available. Hence, in order to accommodate four HBAs, either a non-standard, larger chassis is required, or an additional chassis having additional slot positions must be connected to the host computer system. Either alternative results in an expensive, large system.

Summary of the Invention

One embodiment of the present invention advantageously enables both network protocol and an I/O protocol to be transferred to a communication link using the same interface circuit. For example, in one embodiment two or more computer systems are interconnected using a communication link, such as a Fibre Channel link. Both an I/O protocol, such as a SCSI protocol, and a network protocol, such as an Internet protocol (IP),

are used to transmit data over the same Fibre Channel link using the same host bus adapter. Thus, in comparison with conventional systems, one embodiment of the present requires half as many communication links and half as many host bus adapters to carry data using both SCSI and IP protocols.

5 The reduction in the number of communication links and the number of host bus adapters is even greater in networked systems having redundant links. For example, in one embodiment of the present invention, two or more computer systems are interconnected using two communication links. During normal operation, one link is used to carry data using an I/O protocol, such as SCSI, while the other link is used to carry data using a network protocol,
10 such as IP. In the event of failure of either one of the two links, one embodiment of the present invention detects the failure and uses the remaining link to carry data using both the I/O and network protocols. Thus, one embodiment of the present invention provides redundant links for both network and I/O protocol data using two links and two host bus adapters. This contrasts with conventional systems, which typically use two redundant
15 communication links and two host bus adapters for I/O protocol data, and two additional redundant links and two additional host bus adapters for network protocol data.

Brief Description of the Drawings

Figure 1 illustrates one embodiment of the present invention;
20 Figure 2 illustrates one embodiment of the present invention with redundant communication links;
 Figure 3 illustrates a conventional network driver architecture;
 Figure 4 illustrates a conventional I/O driver architecture; and
 Figure 5 illustrates one embodiment of the driver architecture of the present invention.

25

Detailed Description of the Preferred Embodiment

The present invention provides methods and systems for running network and storage protocols over the same communication link. Thus, by way of example, one embodiment of the present invention advantageously reduces the number of interface cards, interface circuits,
30 and communication links, required to network clustered server systems together. The reduction in the number of interface cards, interface circuits, and communication links provides for reduced costs and smaller systems as compared with conventional systems.

Figure 1 provides an overview of the hardware of an exemplary system incorporating one embodiment of the present invention. The illustrated system is a clustered server system.

A clustered server system typically includes two or more independent servers that can access a common body of data storage and provide services to a common set of clients. However, the present invention is not limited to clustered server systems. For example, the present invention can be incorporated into other systems that utilize both network and storage protocols.

5 As illustrated in Figure 1, the exemplary system 100 includes two storage subsystems 106, 108 and two host systems 102, 104, though the clustered server system 100 can have more or fewer host systems and storage subsystems. Each storage subsystem 106, 108 and host system 102, 104 may include one or more processors, such as, by way of example, a
10 Pentium® II processor or an Alpha® processor. In one embodiment, each host system 102, 104 is running an operating system, such as Microsoft Windows® NT versions 4 or 5, or Unix. For the purposes of illustrating exemplary embodiments of the present invention, it will be assumed that the systems are running a version of Microsoft Windows® NT. Each storage subsystem 106, 108 and host system 102, 104 typically includes random access memory, as well as hard
15 drives and optical drives, such as a CD-ROM drive or a DVD drive (not shown). In addition, each host system typically includes an interface card, such as a host bus adapter (not shown) from one of the QLogic ISP21xx or ISP22xx families. In one embodiment, the host adapter has a processor, such as CISC (complex instruction set computer) or a RISC (reduced instruction set computer) processor, and memory, such as RAM or EEPROM. In one embodiment, at least a
20 portion of the memory is used to hold adapter code downloaded from the host computer system. In one embodiment, each host adapter is located on a separate circuit card. In another embodiment, more than one host adapter is located on a circuit card. Each host bus adapter card is typically connected to a local computer bus slot, such as a PCI bus slot.

In contrast to conventional systems, the system 100 illustrated in Figure 1 runs both
25 storage and network communications using the same host bus adapter interface circuit on a common communication link 110. Thus, in contrast to conventional systems, which use two interface cards and two corresponding communication links and per host system, the embodiment illustrated in Figure 1 only needs one interface card or circuit and one communication link per host system. Furthermore, as discussed below, in one embodiment, use
30 of the present invention is transparent to the operating system. Additionally, in one embodiment of the present invention, Windows NT standard class drivers may be used without modification.

In one embodiment of the present invention, the cluster storage protocol is a SCSI protocol, such as SCSI II, while the network protocol is the Internet Protocol (IP). In one embodiment, the communication link 110 connecting the various cluster systems or "nodes" is a

Fibre Channel Loop (FCL). Fibre Channel is a high-speed data transfer interface technology that advantageously maps common transport protocols, such as SCSI and IP. Thus, using Fibre Channel technology, it is possible to merge high-speed I/O, such as SCSI, and networking functionality in a single connectivity technology. However, alternative embodiments can use other bus technologies, such as a SCSI bus, to run both I/O and networking protocols on a common link. Thus, in one embodiment, the network and storage packets are transferred between computer systems using standard network and I/O protocols, such as the IP and SCSI protocols. This embodiment may be used when the HBA, such as one based on the QLogic ISP2200, supports both IP and SCSI protocols. In another embodiment, if the HBA supports the SCSI protocol, but not the IP protocol, the network packets are encapsulated in SCSI packets or commands. In the "encapsulation" embodiment, the HBA may support the SCSI target mode, as well as the more typical initiator mode, thereby allowing the HBA to receive SCSI packets encapsulating IP packets.

The Fibre Channel Loop 110 is connected to the host bus adapter of the host systems 102, 104 and the storage subsystems 106, 108. Thus, storage and network packets can be routed between the host systems 102, 104 and the storage subsystems 106, 108. The data transferred using the IP protocol may include "heartbeat" related information. "Heartbeats" are transferred across the clustered nodes to ensure that everything is properly synchronized, and so that each node can ensure that the other nodes are functioning.

The Fibre Channel Loop 110 is connected to the host bus adapters residing in each node 102-108. Thus, data is transferred from and to the Fibre Channel Loop 110 via respective host bus adapters. The operating systems running each node communicate with their respective host bus adapters using device drivers. In one embodiment, the device driver is responsible for accessing the host bus adapter's internal registers, starting and completing I/O operations, performing error processing, and servicing interrupts generated by the device.

In one embodiment, a fail-over path is provided to ensure high reliability and to avoid a shutdown of the clustered server system in the event of a communication link failure. By way of example, Figure 2 illustrates a clustered server system 200 which has two Fibre Channel Loops 210, 212. In normal operation, Loop 1 210 handles the I/O traffic, while Loop 2 212 handles the network traffic. Thus, both communication loops 210, 212 are efficiently utilized in normal operation, with the bandwidth of Loop 1 allocated to I/O traffic, and the bandwidth of Loop 2 allocated to network traffic. However, in the event of a Fibre Channel Loop failure, such as the failure of Loop 1 210, one embodiment of the present invention detects the failure. Upon detecting the failure, the remaining operating Fibre Channel Loop, such as Loop 2 212, is used as

a fail-over path to carry both network traffic and I/O traffic. Thus, in contrast to conventional systems, which would utilize four communication links to provide redundancy for both network and I/O traffic, the illustrated embodiment 200 of the present invention utilizes two communication links 210, 212. Furthermore, in contrast to conventional systems, which would
5 utilize at least two HBAs and two NICs to provide such redundancy, the illustrated embodiment 200 uses two HBAs per host system 202, 204 to provide the desired fail-over path.

In one embodiment, the fail-over technique operates as follows. Typically, a Windows NT Cluster Administrator is used to manage and configure network paths and storage devices. In conventional systems, if multiple network paths, with corresponding multiple communication
10 links, have been configured, one path is designated as the primary network path. If the Cluster Administrator determines, via a loss of signal indication or the like, that it is unable to communicate over the primary path, the Windows NT Cluster Administrator can switch to a secondary network path and a corresponding secondary communication link. In contrast to conventional systems, one embodiment of the present invention permits the I/O bus, such as the
15 SCSI bus or the Fibre Channel loop, to be configured as a secondary or primary network path in addition to acting as a I/O or storage path. Thus, upon detection of a network path failure, the Windows NT Cluster Administrator can fail-over to the I/O bus.

To better illustrate the software architecture of one embodiment of the present invention, a description of conventional NIC and SCSI drivers will now be discussed. Figure 3 illustrates a
20 conventional Windows NT NDIS (Network Device Interface Specification) driver architecture 300. An NDIS interface 304 forms a wrapper about an NDIS NIC miniport driver 302, thus providing an interface between the NDIS NIC miniport driver 302, one or more NDIS intermediate drivers 306, LAN protocol drivers 308, and native-media-aware protocol drivers 310. Additionally, the NDIS interface 304 provides common, pre-defined functions to the
25 interface between the NDIS NIC miniport driver 302 and the NIC 312. The NDIS NIC miniport driver 302 uses these pre-defined functions, which in turn call other components, to manage the NIC 312 hardware.

Figure 4 illustrates a conventional Windows SCSI driver architecture 400. At the upper
30 level is a SCSI class driver 404. The SCSI class driver 404 translates I/O requests received from application programs and the like via I/O system services. The translated I/O requests are in the form of packets with system defined SCSI request blocks containing SCSI command descriptor blocks. The translated I/O request packets are then sent to the next lower driver, for example, a SCSI port driver 406. The SCSI port driver 406 translates the SCSI request blocks from the class driver 404 and passes the SCSI request blocks and the command descriptor blocks to the SCSI

miniport driver 402. The SCSI miniport driver 402 is dynamically linked with the SCSI port driver 406 and provides hardware-specific support for a particular SCSI host bus adapter 408. The SCSI driver 400 may include other optional driver layers as well, such as encryption drivers or filter drivers. Thus, as illustrated in Figures 3 and 4, in conventional systems the NIC driver 5
300 and SCSI driver 400 independently interface to their respective interface cards 312, 408.

The software architecture and operation of the embodiment 100 illustrated in Figure 1 will now be discussed in detail. Figure 5 illustrates one embodiment of a driver architecture 500 of the present invention. For example, the illustrated embodiment 500 could be used in one of the host systems illustrated in Figures 1 or 2. The upper layers of the NIC driver and the SCSI driver are similar to those found in the conventional driver architectures 300, 400 illustrated in
10 Figures 3 and 4. However, in contrast to the NIC miniport 302 illustrated in Figure 3, which interfaces to its own network interface card 312, the NDIS miniport 502 illustrated in Figure 5 redirects communication to an enhanced SCSI miniport driver 508 via an interface 504. The enhanced SCSI miniport driver 508, in turn, routes network traffic from the NDIS miniport 502
15 onto the common Fibre Channel Loop 110 illustrated in Figure 1. Therefore, in one embodiment, the network miniport driver 502 and the SCSI miniport driver 508 allow host-to-host network traffic to be overlaid onto a Fibre Channel bus, or, in an alternative embodiment, onto a SCSI bus. This permits the host-to-host traffic to operate in parallel with normal disk storage related traffic on the same bus. Thus, the enhanced driver 502, 508, in combination with
20 the HBA, emulate the network interface card (NIC).

Thus, in one embodiment, the NDIS miniport driver 502 emulates an Ethernet connection between multiple systems sharing a common Fibre Channel or SCSI bus. This Ethernet emulation is overlaid by the enhanced SCSI miniport onto the same data channels used to access disk devices shared between the clustered systems. As previously described
25 with reference to Figure 1, this approach particularly benefits clustered systems that are running short on card slots, such as PCI slots. In addition, as previously described with reference to Figure 2, in one embodiment, the present invention can provide additional fail-over paths to backup NIC adapters used for local host-to-host communications. In one embodiment, the network driver is adapter-type independent and supports multiple Ethernet
30 emulations through multiple enhanced miniport drivers simultaneously.

In one embodiment, several features are incorporated into the driver architecture 500 to enable the enhanced SCSI miniport 508 to handle both the NDIS miniport communications and the standard SCSI miniport communications. For example, the SCSI miniport 508 is enhanced with additional entry points to accommodate the connection to the NDIS miniport 502. These

additional entry points are termed "backdoor" entry points. Similarly, the NDIS miniport 502 addresses communications to the additional SCSI miniport entry points, rather than to the network interface card.

In addition, because the SCSI miniport 508 is not aware of physical addresses of the NIC
 5 command data stored in the host system memory, the SCSI miniport 508 cannot build the scatter/gather list for the network related command data and data buffers. As is understood by one of ordinary skill in the art, scatter/gather lists are used to track logically contiguous data that have non-contiguous physical addresses. Thus, in one embodiment, one or more upper layer drivers generate the scatter/gather list for the network data. For example, a SCSI filter driver, the
 10 SCSI port driver 406, and/or the NDIS driver 502 may complete the scatter/gather list. The scatter/gather list is then passed to the SCSI miniport 508 via a SCSI Request Block (SRB) extension, as discussed below.

In addition, the SRB extension is used to pass pointer and context parameter information for a Command Callback routine. The Command Callback routine is called by the miniport
 15 driver 508 as each command is completed. The Command Callback routine places a pointer to the completed command into a queue of completed command pointers, schedules a DPC (Deferred Procedure Call) service routine, and then returns.

An exemplary backdoor (BD) SRB extension shown below contains link pointers, a completion routine pointer and context, a scatter/gather count, and a list of scatter/gather
 20 elements. The exemplary SRB extension may be used when network packets are to be encapsulated in SCSI packets before the packets are transferred over the communications link.

```

typedef struct _BD_SRB_EXTENSION
{
25   SRB_EXTENSION                stdExt;

   PSCSI_REQUEST_BLOCK          nextSrb;
   PSCSI_REQUEST_BLOCK          previousSrb;
   PCOMPLETION_CALLBACK         completionRoutine;
30   PVOID                        completionContext;
   PVOID                        driverContext;
   LONG                          sgEntryCnt;
   BD_SG_ELEMENT                sgList[MAX_SG_ENTRIES];
   } BD_SRB_EXTENSION, *PBD_SRB_EXTENSION;

```

35

The PSCSI_REQUEST_BLOCK is a standard NT type, as is PVOID, indicating that the associated parameter is untyped, and LONG, indicating that the associated parameter is 32 bits. The nextSrb and the previousSrp parameters are SRB pointers associated with,

respectively, the previous and the next SRB. These pointers are used to chain or queue SRBs. When the enhanced SCSI miniport 508 is finished with a given SRB, the SCSI miniport 508 calls the Completion Callback routine identified by the completionRoutine parameter, and passes the completion context parameter completionContext. The driverContext parameter is used as a scratchpad to store context related information needed to return to a previous context upon a command completion. The sgEntryCnt and sgList parameters are used to pass the number of scatter/gather entries and the entries themselves.

In addition, several items are added to the SCSI driver object extension structure for supporting the enhanced miniport 508. This structure is allocated for each adapter managed by the SCSI miniport 508 for keeping HBA context. The structure includes the following:

- A spinlock used to synchronize access to a request queue for the HBA processor and to a SRB request queue.
- A port database array containing a list of the SCSI, network, and other devices, currently connected. The port database array is typically built during driver initialization using data received from corresponding HBAs.
- Pointer and context parameter information, including information for imported Notification Callback routines and imported Get Buffer routines described below.

In one embodiment, a host or storage system may be multiprocessor-based. The host or storage system may further include an operating system configured to run on either a uniprocessor system or a multiprocessor system, such as a Symmetric Multiprocessor System (SMP). One problem that arises in multiprocessor systems is synchronizing two threads of execution that share resources that can be accessed at the same time on a multiprocessor computer. For example, two threads could be running simultaneously on different processors and attempting to modify the same data. Such accesses need to be synchronized. Windows NT utilizes locks, such as spinlocks, to provide a synchronization mechanism for protecting resources shared by kernel-mode threads running at interrupt level. A spinlock handles synchronization among various threads of execution running concurrently on a multiprocessor computer. A thread acquires a spinlock before accessing protected resources, such as data structures. The spinlock keeps any thread except the one holding the spinlock, from using the resource. A thread that is waiting on the spinlock loops, or “spins” attempting to acquire the spinlock until it is released by the thread holding the spinlock. Since only one processor at a time can own a spinlock, the resource is safe from collisions.

A typical use for a spinlock is to protect a queue used by more than one layer of a driver. For example, a miniport function might queue packets passed to it by a protocol

driver. Because other driver functions also use this queue, the miniport function needs to protect the queue with a spinlock, so that only one thread at a time can manipulate the links or contents. The miniport function acquires the spinlock, adds the packet to the queue, and then releases the spinlock. Using a spinlock ensures that the thread holding the spinlock is the only thread modifying the queue links while the packet is safely added to the queue.

In one embodiment of the present invention, the enhanced SCSI miniport 508 uses a spinlock to synchronize access to a host bus adapter processor request queue, used to pass SCSI and IP packets to the HBA processor, and the SCSI Request Block (SRB) queue.

In addition, the device extension structure is used to store pointer and context parameter information for the Notification Callback routine and the Get Buffer routine. The Notification Callback routine may be used to pass error types, such as a loop down error, for communication to other drivers needing the information.

The driver architecture is further supported by a variety of routines. Some of these routines are standard or modified Windows NT-type routines, such as a Driver Entry routine, a Find Adapter routine, an Initialize Adapter routine, a Start IO routine, an Interrupt Service routine, an interrupt DPC routine, as well as other routines discussed below.

One embodiment of a procedure for initializing and utilizing the SCSI miniport 508 will now be described. Initially, a Driver Entry routine is executed when the miniport driver is loaded. The Driver Entry routine builds and returns a hardware initialization data structure to the SCSI port driver. The hardware initialization data structure includes information which identifies the HBA type supported by the SCSI miniport driver 508, as well as other SCSI miniport driver entry points which may be called by the SCSI port driver. In one embodiment, no modifications of the Driver Entry routine are required for the enhanced miniport driver.

Next, a Find Adapter routine is called for each instance of the SCSI miniport driver adapter-type found in the computer system. The Find Adapter routine builds and returns a port configuration information data structure to the SCSI miniport driver 508. The port configuration information data structure includes information related to the characteristics of the SCSI miniport driver 508 and the HBA. In addition, in one embodiment, the Find Adapter routine sets the initial state of the spinlock used to control access to the HBA processor request queue. The Find Adapter routine may also set the initial synchronization interrupt request (IRQ) level to dispatch level to ensure that other processes can be run in parallel. Furthermore, in the embodiment where the IP packets are encapsulated in a SCSI packet, the Find Adapter routine will initialize the "initialize inquiry" data used for target

mode response to inquiry commands received from other connected systems. This last step is used to ensure that the other connected systems are aware that the present system is capable of encapsulating IP packets in SCSI packets.

During system initialization, an Initialize Adapter routine is called once for each host adapter found in the system. The Initialize Adapter routine is responsible for initializing the host adapter, which, in one embodiment, includes resetting the host adapter processor, downloading code to the host adapter, and starting and initializing the host adapter code. For the enhanced SCSI miniport driver 508, the Initialize Adapter routine will also initialize the port database, and, if IP packets are to be embedded in SCSI packets, enable the host adapter target mode so that the HBA can receive as well as transmit SCSI commands.

A StartIO routine is called by the SCSI port driver to pass an SRB, containing a command, to the enhanced SCSI miniport 508 for execution. In a Windows NT driver, the StartIo routine is responsible for starting an I/O operation on the physical device. In one embodiment, the StartIO routine is enhanced to reserve and release the spinlock when accessing the host bus adapter processor queue and the SRB queue.

In one embodiment, the StartIO routine is further enhanced to support two additional commands. The first command, termed the "IOCTL_BD_INQUIRY" command, is used to locate host bus adapters being managed by the enhanced SCSI miniport 508. This command gets the StartIO IRQ level that is used for synchronized access to the spinlock-controlled resources, and saves the IRQ level in the device extension. This command also exports the backdoor StartIO entry point and the entry point for the Reset routine as discussed below.

One embodiment of a data structure associated with the IOCTL_BD_INQUIRY command, which may be used when the network packets are encapsulated in storage or I/O packets, is as follows:

```

typedef struct  _BD_INQUIRY_DATA
{
    ULONG          options;                // Export miniport supported options
    PSTARTIO_BACKDOOR startIoRoutine;     // Export backdoor StartIo entry
    PVOID          startIoContext;        // Export miniport pDevExt pointer
    PRESET_BACKDOOR resetRoutine;        // Export backdoor Reset entry
    PVOID          resetContext;         // Export miniport pDevExt pointer
    USHORT         numberBuses;          // Export adapter bus count
    USHORT         idsPerBus;            // Export number of IDs per bus
    USHORT         adapterBusId[MAX_BUS_COUNT]; // Export adapter bus IDs
    USHORT         maxDataSegments;     // Export max data segment count
} BD_INQUIRY_DATA, *PBD_INQUIRY_DATA;

```

15 Thus, the above data structure is used to export the enhanced SCSI miniport options. The inquiry data structure also exports the startIoRoutine backdoor StartIo entry address with the associated startIoContext pointer, used for passing StartIo context information. In addition, the inquiry data structure exports a backdoor resetRoutine entry address and associated resetContext, used by the NDIS miniport 502 to cause the SCSI miniport 508 to initiate an

20 HBA reset. Furthermore, the inquiry data structure is used to export the numberBuses, IdsPerBus, and BusIds parameters, to thereby pass the adapter bus count, the number of IDs per bus, and the bus adapter IDs.

In one embodiment, the enhanced SCSI miniport supported options include support for a filter driver, support for the enhanced NDIS NIC miniport driver, and support for a port

25 database. The options are defined as follows:

```

// IOCTL_BD_INQUIRY options
#define BDI_FILTER_SUPPORT      0x00000001 // Filter driver supported
#define BDI_LAN_SUPPORT        0x00000002 // LAN driver supported
30 #define BDI_PORT_DATABASE     0x00000004 // Port database supported

```

The second command used to enhance the StartIO routine is termed the IOCTL Backdoor Enable command, or the "IOCTL_BD_ENABLE" command. The IOCTL_BD_ENABLE backdoor enable command is issued by the network driver to enable

35 backdoor operation with the enhanced SCSI miniport driver 508. After locating host adapters associated with enhanced miniport drivers using the inquiry command, and after completing initialization of the host adapters, the network driver issues the enable command to enable the link to the enhanced SCSI miniport driver 508. For the embodiment where network packets are encapsulated in storage or I/O packets, the following data structure is used with the

40 IOCTL_BD_ENABLE command to import to corresponding data to the enhanced SCSI miniport 508:

```

typedef struct  _BD_ENABLE_DATA
{

```

```

        ULONG                options;                // Import driver supported options
        PNOTIFY_CALLBACK     notifyRoutine;          // Import notification routine
        PVOID                notifyContext;         // Import notification parameter
5      PPORT_DATA_CALLBACK   portDataUpdateRoutine; // Import port database routine
        PVOID                portDataUpdateContext; // Import port database parameter
        PGET_BUFFER_CALLBACK getBufferRoutine;     // Import get buffer routine
        PVOID                getBufferContext;     // Import get buffer parameter
        USHORT               receiveBufferCount;   // Import buffer count
10     } BD_ENABLE_DATA, *PBD_ENABLE_DATA;

```

The backdoor enable options include the following:

```

// IOCTL_BD_ENABLE options

15 #define BDE_NOTIFY_ROUTINE      0x00000001    // Notify routine imported
   #define BDE_DATABASE_ROUTINE  0x00000002    // Port database routine imported
   #define BDE_BUFFER_ROUTINE    0x00000004    // Get buffer routine imported

```

For the embodiment where network packets are embedded in SCSI commands, a backdoor StartIO routine is called by the network miniport driver for sending the network packets that are to be embedded in SCSI commands. The backdoor StartIO routine is similar to the StartIO routine described above. For the embodiment which encapsulates network packets in storage or I/O packets, this routine builds an I/O command block (IOCB) in the command request queue and passes the SCSI command to the host bus adapter processor for execution. SRBs use the SRB extension described above to pass in the scatter/gather list for the command. The standard StartIO routine runs at the same IRQ level as the Interrupt Service routine (ISR), while this routine is called at DISPATCH_LEVEL or lower. Therefore, the backdoor StartIO routine uses the saved IRQ level from the device extension and raises its IRQL to the same level as the standard start IO routine before acquiring the spinlock to access the request queue or the SRB queue.

The Interrupt Service routine (ISR) is called by the SCSI port driver when an adapter is requesting service from the host system. This routine will normally be called for fast posting command completion through mailbox registers. A flag in the SRB extension is used to identify the backdoor SRBs. For those commands, the SRB extension also contains the pointer and parameter for the Command Completion callback routine. This callback routine is part of an upper SCSI layer driver or the network driver and is called by the ISR to return the completed command to the appropriate driver.

In addition, the ISR also handles other various asynchronous events posted by the adapter. In one embodiment, for most of these events, the ISR will set a flag representing the event in the device extension and schedule the execution of the interrupt DPC routine to further process the event. The interrupt DPC routine is also scheduled to process commands

that are completed through the adapter response queue and incoming target mode requests from the host adapter.

Thus, for example, the interrupt DPC routine is scheduled by the Interrupt Service routine to handle more time consuming tasks, such as error handling. The IRQ level is set to DISPATCH_LEVEL for the DPC routine. When accessing the adapter request queue and the SRB queue, this routine raises the IRQL to the saved start IO level and acquires the spinlock. The following is an exemplary list of tasks which may be performed by the interrupt DPC routine:

- Upon detection of fatal error, the DPC routine returns all commands and reinitializes adapter.
- Upon detection of a bus reset, the DPC routine cleans up queued commands, restarts the host adapter queue, and notifies other connected drivers. If an upper layer SCSI driver and/or network drivers imported a Notify routine, the Notify routine is called with a ResetDetected event code.
- Upon receipt of a port database updated event from the host adapter, the DPC routine obtains updates from the host adapter and updates data in the SCSI miniport device extension. If an upper layer SCSI driver and/or network drivers imported a Port Database callback routine, the Port Database callback routine is called with a pointer to the updated port database in the SCSI miniport device extension.
- The DPC routine handles host adapter response queue entries. Commands with an error status are returned through the response queue. The response queue is also used for supporting target mode operation. To support the network driver, the enhanced SCSI miniport driver 508 includes support for I/O command block-types needed for target mode.
- For incoming network data packets, the host adapter sends the SCSI miniport driver 508 an ATIO (accept target I/O) entry in the response queue. The SCSI miniport driver 508, in-turn, calls the Get Buffer routine imported from the network miniport driver to get an address of a free buffer which can be used as a destination buffer. The SCSI miniport driver 508 then sends a CTIO (continue target I/O) entry to the host adapter, passing the destination buffer address for the incoming data packet. When the data transfer is complete, the host adapter fast posts the completion through the mailbox registers, and the ISR will call the network driver Command Completion callback routine, passing the received packet to the NDIS miniport driver 502.
- The DPC routine is used to start commands waiting in the SRB queue.

The Reset routine resets the bus and cleans up outstanding commands. The Reset routine is typically called when a command timeout, or the like, occurs. A Reset routine entry point is exported to one or more upper layer SCSI drivers and the network drivers. When the Reset routine is called from the SCSI port, the IRQ level is set to the same level as the ISR. When called from the backdoor drivers, the IRQ level is set to DISPATCH_LEVEL. When accessing the SRB queue from this routine, the current IRQ level is checked and, if not at ISR level, raised, before acquiring the spinlock.

The SCSI miniport Database routine is called from the interrupt DPC routine when a port database updated asynchronous event is received from the bus adapter. The asynchronous event may be the “hot” insertion or removal of a “hot plug” device, necessitating the update of the port database. The Database routine issues mailbox commands to the bus adapter to get the port data and to update the port database in the device extension. If the upper SCSI driver layers and/or network drivers imported a Port Database callback routine, the routine is called with a pointer to the updated port database in the SCSI device extension.

The enhanced NDIS miniport routines and data structures will now be described. As previously discussed, in one embodiment the NDIS miniport 502 is enhanced to permit network and I/O protocols to be transferred using the same host adapter over the same communications link. For example, in the embodiment where the NDIS miniport 502 performs an Ethernet emulation, an adapter control block structure is allocated for each Ethernet emulation driver initialization. This adapter control block structure includes the following data:

- A current network address created from a host adapter IEEE ID and an adapter bus ID, where the physical address is encapsulated in the network address. The encapsulation of the physical SCSI address within the network address allows the encapsulation of IP packets in SCSI packets to be accomplished quickly, with little overhead.
- Current packet filter flags passed down from higher-level network driver.
- The backdoor start IO entry point and parameter exported from the SCSI enhanced miniport driver.
- A queue of free send buffers.
- A queue of free receive buffers.
- A queue of received data packets.
- A multicast list passed down from higher-level network driver.
- A broadcast list of other adapters on the bus, built from the port database.

- Statistical counters.

The following is a description of various routines used in conjunction with the enhanced NDIS miniport 502.

5 Typically, an NDIS Driver Entry routine is the first routine executed when the NDIS miniport driver is loaded. The NDIS Driver Entry routine is responsible for registering the NDIS miniport driver 502 with the NDIS layer and exporting other driver entry points and driver characteristics.

10 An NDIS miniport Initialization routine is then executed once for each Ethernet emulation installed. This NDIS miniport Initialization routine performs one or more of the following tasks:

- The Initialization routine scans for the next available bus adapter being managed by an enhanced SCSI miniport driver 508 using the Backdoor Inquiry IOCTL command.
- The Initialization routine allocates and initializes the adapter control block described above.
- 15 • The Initialization routine allocates and initializes a queue of send buffers. An SRB and SRB extension is allocated and initialized for each buffer.
- The Initialization routine allocates and initializes a queue of receive buffers. An SRB and SRB extension is allocated and initialized for each buffer.
- The Initialization routine initializes DPC routines.
- 20 • The Initialization routine sends the Backdoor Enable IOCTL described above to the enhanced SCSI miniport driver and exports the Get Buffer routine and the Port Database callback routine.

25 A Send routine is called by a higher-level network driver to transmit a data packet on the communication link. In one embodiment, the Send routine allocates the next available send buffer and moves the discontinuous data packet into the contiguous send buffer. In another embodiment, a discontinuous scatter/gather list is built within the SRB extension. Small segments, 256 bytes or less in size, may be loaded into a small buffer and passed as one segment. Larger packets may then be sent with the corresponding scatter/gather list.

30 The SRB associated with the send buffer is initialized with a SCSI Send CDB (command data block) and sent to the enhanced SCSI miniport driver 508 through the backdoor Start IO routine. The destination address at the front of the data packet is checked for the unique broadcast address (for example, all Fs). If the packet is a broadcast message, the Send routine will send it to the addresses in the broadcast list. Thus, an IP broadcast may be simulated by sending the same packet to every node in the driver's broadcast list. If no

send buffer is available, the Send routine will set a flag indicating the send queue is stopped and return an NDIS_STATUS_RESOURCES error status. As discussed below, in another embodiment, the broadcasting may be handled by an IP-capable host bus adapter. Hence, the broadcast list is not included in the adapter control block structure.

5 A Send Callback routine is exported to the enhanced miniport driver in the SRB extension. After transmitting the network data packet, the enhanced SCSI miniport driver 508 calls the Send Callback routine from its interrupt service routine. The Send Callback routine returns the send buffer to the queue of free send buffers and checks the queue stopped flag to see if the send queue is stopped. If stopped, this routine will schedule the execution of a send
10 DPC routine.

 The send DPC routine is scheduled by the Send Callback routine upon the stoppage of the send queue resulting from a shortage of send buffers. The send DPC routine is responsible for notifying the appropriate higher level network driver that resources are now available to receive additional packets. This notification is performed by a standard
15 NdisMSendResourcesAvailable call. However, prior to issuing this call, the send DPC routine needs to synchronize with other network miniport functions by acquiring a network miniport spinlock using the standard NdisIMSwitchToMiniport call. The spinlock is returned with a call to NdisIMRevertBack.

 A Receive Buffer routine is exported to the enhanced SCSI miniport driver 508 via the
20 Backdoor Enable IOCTL function. When the enhanced SCSI miniport 508 receives a SCSI Send CDB from a second host adapter on a shared bus, the enhanced SCSI miniport 508 calls the Receive Buffer routine to obtain a free receive buffer for an incoming data packet.

 A Receive Callback routine is used to insert the receive buffer into the queue of received packets and to schedule the execution of a receive DPC routine. After receiving the
25 incoming data packet, the enhanced SCSI miniport driver 508 calls this routine from its interrupt service routine. The Receive Callback routine is exported to the enhanced miniport driver in the SRB extension.

 The receive DPC routine is scheduled by the Receive Callback routine after queuing an incoming data packet. The receive DPC routine is responsible for passing the received
30 packets up to the protocol driver using standard NdisMEthIndicateReceive and NdisMEthIndicateReceiveComplete calls. This backdoor routine also needs to synchronize with other network miniport functions by acquiring and releasing the network miniport spinlock using NdisIMSwitchToMiniport and NdisIMRevertBack calls.

The receive DPC routine also includes support for packet filtering and multicast lists. The packet filtering flags and the multicast list are passed down to the network miniport via NDIS_OID functions described below. The destination address at the front of the data packet indicates the type of message, for example, direct address, broadcast, or multicast message types. The receive DPC routine enforces the filter flags, discarding the types of messages that the higher level driver is not interested in receiving. If multicast messages are enabled and a multicast message is received, the receive DPC routine verifies that the packet destination address is in the multicast list prior to passing the packet up to the protocol driver. The receive buffers are returned to the queue of free receive buffers after the data packet has either been passed up to the protocol driver or discarded.

In another embodiment, a single DPC routine handles both the task of notifying the higher level driver that resources are available to send packets, and the task of passing packets to the protocol driver.

The Port Database callback routine is exported to the enhanced miniport driver via the Backdoor Enable IOCTL function. As previously described, this routine is called by the SCSI miniport driver 508 initially from the IOCTL function and later whenever the port database is updated. This routine scans the port database looking for host adapters on the bus. Each adapter found is added to the broadcast list maintained in the adapter control block so that the driver has a current broadcast list.

A Query Information routine handles NDIS_OID (NDIS Object Identifier) query requests from higher-level network drivers. Each NDIS driver contains an information block in which the driver stores dynamic configuration information, such as a multicast address list, and statistical information that a management entity can query or set. Each information element within the information block is typically referred to as an object. An Object identifier (OID) is used to refer to the object. Thus, a management entity needs to provide an appropriate OID when querying or setting a given object.

A Set Information routine handles NDIS_OID requests from higher-level network drivers to pass information to the network miniport driver. The Set Information routine is used to pass down the filter flags and the multicast list to the network miniport driver.

The embodiment where network and storage packets are transferred between computer systems using standard IP and SCSI protocols, rather than by encapsulating IP packets in SCSI packets, will now be described. The data structures and routines for this embodiment are similar to the data structures and routines for the "encapsulation" embodiment described above, with the following modifications. In general, the modifications enable the NDIS

miniport driver 502 and the HBA processor to send network unencapsulated IP packets and the associated scatter/gather lists to be sent to the HBA processor. Furthermore, the modifications allow the receive buffers to be immediately pushed onto the HBA processor receive buffer queue, rather than having the enhanced SCSI miniport 508 get the receive buffers from the enhanced NDIS miniport 502 when requested. The modifications help take advantage of HBAs that support both network and I/O protocols.

Several routines and data structures are substantially the same as for the “encapsulation” embodiment. For example, the enhanced SCSI miniport Driver Entry routine and Reset routine are substantially the same for both the present embodiment and the “encapsulation” embodiment. Similarly, the enhanced NDIS miniport Send Callback routine, Query Information routine and Set Information Routine are substantially unaltered.

First, modifications to the SCSI miniport driver routines and structures will be discussed. The SCSI driver object extension structure previously described is modified to provide storage for additional data imported from the enhanced NDIS miniport 502. In addition, the SCSI driver object extension structure is modified to include a queue for passing receive buffers to the HBA processor for incoming IP packets, and to support a separate port database used to contain a list of connected IP devices. The additional data imported from the enhanced NDIS miniport 502 includes information relating to the receive buffers and the ReturnReceive routine, as illustrated below in the backdoor enable data structure BD_ENABLE_DATA.

As the HBA supports both I/O and network protocols, and can therefore receive IP packets directly, the HBA does not need to support SCSI target mode. The SCSI miniport Find Adapter routine may therefore be modified to eliminate support for the SCSI target mode. Thus, the Find Adapter routine no longer needs to initialize data for the SCSI target mode. The Find Adapter routine may be further modified to initialize the IP receive buffer queue. Support for the SCSI target mode may also be eliminated from the Interrupt DPC Routine.

The SCSI miniport Initialize Adapter routine may be similarly modified to remove support for the SCSI target mode. For example, the Initialize Adapter routine no longer needs to enable target mode in the HBA. The Initialize Adapter routine may be further modified to enable the IP mode in the HBA and to pass the receive buffer queue address to the HBA.

As illustrated below, the BD_INQUIRY_DATA data structure is modified to export additional information from the enhanced SCSI miniport driver 508 to the NDIS miniport driver 502. For example, the data structure includes a pointer to the receive buffer queue, as

well as the size of the receive buffer queue, which can be passed to the NDIS miniport driver 502. This allows the NDIS miniport driver 502 to directly pass the free receive buffers to the HBA processor. Furthermore, an Add Buffers backdoor routine entry is also passed to the NDIS miniport driver 502. The Add Buffers backdoor routine permits the NDIS miniport driver 502 to inform the SCSI miniport driver 508 if free buffers have been added to the receive buffer queue. In addition, the data structure also includes an entry for passing a Fibre Channel adapter world wide node name. Thus, rather than encapsulating the physical address in the network address, as described above, the node name may be used.

```

10 typedef struct _BD_INQUIRY_DATA
    {
        ULONG           Options;           // Export miniport supported options
        PSTARTIO_BACKDOOR StartIoRoutine; // Export backdoor StartIo entry
        PVOID           StartIoContext;    // Export miniport DevExt pointer
15     PRESET_BACKDOOR  ResetRoutine;      // Export backdoor Reset entry
        PVOID           ResetContext;      // Export miniport DevExt pointer
        USHORT         ReceiveBufferSize; // Export receive buffer queue size
        PVOID           ReceiveBufferQueue; // Export receive buffer queue pointer
        PBUFFERS_BACKDOOR AddBuffersRoutine; // Export backdoor Add Buffers entry
20     PVOID           AddBuffersContext; // Export miniport DevExt pointer
        UCHAR          acNodeName[8];     // Export adapter node name
    } BD_INQUIRY_DATA, *PBD_INQUIRY_DATA;

```

The `_BD_ENABLE_DATA` data structure is correspondingly modified to import additional information from the enhanced NDIS miniport driver 502 to the enhanced SCSI miniport driver 508. For example, the data structure is used to import the size of each receive buffer and the maximum size of IP packets supported. The data structure is also used to import pointer and context parameters for the ReturnReceive routine, which is used to pass received packets from the SCSI miniport driver 508 to the NDIS miniport driver 502. The data structure also is used to import the IP address for NIC emulation. Note that the NDIS miniport 502 no longer imports the Port Database routine, the Get Buffer routine, or the Notification Routine. The NDIS miniport driver 5902 does not need the port database, because all addressing is handled by the SCSI miniport driver 508. In the present embodiment, the SCSI miniport driver 508 takes the network node name in the IP packet header, searches for a corresponding Loop ID in the IP port database, and provides the Loop ID to the HBA.

```

40 typedef struct _BD_ENABLE_DATA
    {
        ULONG           Options;           // Import driver supported options
        USHORT         ReceiveBufferCount; // Import buffer count
    }

```

```

        ULONG                ReceiveBufferSize; // Import buffer size
        ULONG                MaximumTransferSize; // Import maximum transfer size
        PRETURN_PACKETS_CALLBACK ReturnReceivePacketsRoutine; // Import return
                                                                packets routine
5       PVOID                ReturnReceivePacketsContext; // Import return packets parameter
        PVOID                ReceiveBufferCBs; // Import receive buffer control blocks
        ULONG                IpAddress; // Import IP address
    } BD_ENABLE_DATA, *PBD_ENABLE_DATA;

```

10

The Backdoor Start IO routine is also modified, as it no longer needs to build an IOCB that passes SCSI commands with encapsulated IP packets to the HBA processor. Instead, in the present embodiment, the Backdoor Start IO routine builds and sends an IOCB for sending unencapsulated IP packets, along with the associated scatter/gather lists, to the HBA. In another embodiment, the Backdoor Start IO routine is modified to handle multiple send

15

packets on a single call from the NDIS miniport driver 502.

The Interrupt Service routine (ISR) operates substantially the same as in the “encapsulation” embodiment when sending IP packets. The SRB extension contains the pointer to the NDIS miniport Callback routine, which is used for returning the send buffer to the NDIS miniport 502. For incoming receive IP packets, the HBA processor takes empty receive buffers from the receive buffer queue as needed. When an entire packet has been received into one or more receive buffers, the HBA interrupts the host. The ISR routine then passes the received packet to the NDIS miniport 502 using the ReturnReceivePackets callback routine.

20

25

The Port Database routine may be modified to keep a separate list of all IP type devices, such as other HBAs attached on the same Fibre loop. This list is used by the enhanced SCSI miniport 508 to get the Fibre Channel address when sending a packet. Because all Fibre Channel addressing is resolved by the SCSI miniport 508, the NDIS miniport 502 no longer uses the port database.

30

Modifications to the NDIS miniport driver routines and structures will be now be discussed. In one embodiment, the IP-capable HBA now handles IP broadcasting operations. Hence, the broadcast list of other loop-connected devices may be deleted from the adapter control block structure. The adapter control block structure may be further modified to provide storage for the additional information exported from the SCSI miniport driver 508, as previously discussed.

35

Because the NDIS miniport 502 no longer uses the port database, the Port Database Callback routine may be eliminated.

The Initialization routine may be modified to import/export additional information to and from the SCSI miniport driver 508, as described above. In the present embodiment, SRBs and SRB extensions are no longer used to allocate or initialize receive buffer queues. Instead, the receive buffer queue is initialized by the SCSI miniport driver 508, as discussed
5 above. The receive buffers are then directly added to the HBA processor receive buffer queue. The Initialization routine may therefore be modified to call the SCSI miniport backdoor routine, AddBuffersRoutine, which informs the SCSI miniport 508 and the HBA processor how many buffers were added to the queue.

As network data is no longer encapsulated in a SCSI command, the Send routine may
10 be modified to no longer build the SCSI Send CDB in the SRB. Furthermore, because the IP-capable HBA now handles broadcast messages, the Send routine code that simulated an IP broadcast may be eliminated. In addition, in one embodiment, the Send routine may be modified to support NDIS calls to send multiple packets at a time. Thus, multiple send packets can be sent to the SCSI miniport backdoor Start IO routine in a single call.

In one embodiment, the Send DPC routine and the Receive DPC routine may be
15 combined into a single DPC routine to handle both functions. After the received packets have been indicated up the driver layer stack to higher level network drivers, the free receive buffers are returned directly to the HBA processor receive buffer queue. The SCSI miniport backdoor routine, AddBuffersRoutine, is called to notify the SCSI miniport and the HBA
20 processor of the additional free buffers.

In the present embodiment, all free receive buffers are immediately pushed onto the HBA processor receive buffer queue. Therefore, the Receive Buffer routine may be completely removed.

No changes to the Receive Callback routine are needed. However, the Receive
25 Callback routine pointer is now imported to the SCSI miniport driver 508 via the IOCTL command, instead of by the SRB extension.

While certain preferred embodiments of the invention have been described, these
embodiments have been presented by way of example only, and are not intended to limit the scope of the present invention. Accordingly, the breadth and scope of the present invention
30 should be defined only in accordance with the following claims and their equivalents.

WHAT IS CLAIMED IS:

1. A system for sending both network and storage protocols over the same host adapter, said system comprising:

a network driver, including at least one network miniport;

5 a SCSI miniport driver layer coupled to said network driver to receive network related information from said network miniport;

a SCSI driver layer higher than said SCSI miniport driver layer, said higher SCSI layer passing storage related information to said SCSI miniport driver layer;

10 a bus adapter coupled to said SCSI miniport driver layer, wherein said SCSI miniport driver layer transfers both network and storage related information to said bus adapter; and

15 a communication medium link coupled to said bus adapter, wherein said communication link is configured to receive both said network related information and said storage related information, and said communication medium link is configured to couple a first computer system to a second computer system.

2. The system for sending both network and storage protocols over the same host adapter as defined in Claim 1, wherein said network driver includes at least a intermediate driver.

20 3. The system for sending both network and storage protocols over the same host adapter as defined in Claim 1, wherein said communication medium link is fibre channel-compatible.

4. The system for sending both network and storage protocols over the same host adapter as defined in Claim 1, wherein said communication medium link is SCSI-compatible.

25 5. The system for sending both network and storage protocols over the same host adapter as defined in Claim 1, wherein said network related information is transferred using an Ethernet protocol.

6. The system for sending both network and storage protocols over the same host adapter as defined in Claim 1, wherein said storage related data is transferred using a SCSI protocol.

30 7. The system for sending both network and storage protocols over the same host adapter as defined in Claim 1, wherein said storage related data is transferred using a fibre channel protocol.

8. A method of transferring data using a storage protocol and a network protocol over the same host adapter, said method comprising the acts of:

transferring storage data from an upper layer storage driver layer to a lower layer storage driver;

transferring network data from a network driver to said lower layer storage driver; and

5 transferring said storage data and said network data to a communication link interface circuit.

9. The method of transferring data as defined in Claim 8, wherein said lower layer storage driver is a miniport driver.

10 10. The method of transferring data as defined in Claim 8, wherein said upper layer storage driver is a port driver.

11. 11. The method of transferring data as defined in Claim 8, wherein said network driver includes at least a network miniport driver.

12. 12. The method of transferring data as defined in Claim 8, further comprising the act of encapsulating said network data in a storage command.

15 13. The method of transferring data as defined in Claim 8, further comprising the act of passing a network scatter/gather list to said lower layer storage driver.

14. 14. The method of transferring data as defined in Claim 8, further comprising the act of determining if said lower layer storage driver supports an interface to said network driver.

20 15. A system for sending both network and storage data using the same driver, said system comprising:

 a network driver; and

 a storage driver coupled to said network driver to receive network related information, said storage driver configured to receive storage related information from
25 an operating system, and said storage driver configured to transfer both said network and said storage related data to an interface card.

16. 16. The system for sending both network and storage data as defined in Claim 15, wherein said storage driver further comprises at least one entry point for communication with said network driver.

30 17. The system for sending both network and storage data as defined in Claim 15, further comprising a spinlock managed by said storage driver, said spinlock used to control access to at least a first resource.

18. 18. The system for sending both network and storage data as defined in Claim 15, wherein said interface card is configured to be coupled to a fibre channel network.

19. The system for sending both network and storage data as defined in Claim 15, wherein said interface card is configured to be coupled to a SCSI bus.

20. A device driver for communicating both network and storage information over the same interface circuit, said device driver comprising:

5 a first entry point used to receive storage data intended for transfer to at least one communication link; and

a second entry point used to receive network data intended for transfer to said at least one communication link; and

10 an interface used to communicate said storage data using a storage protocol and said network data using a network protocol to a communication link interface circuit.

21. The device driver as defined in Claim 20, further comprising at least a standard Windows NT class layer.

15 22. The device driver as defined in Claim 20, further comprising at least a class layer, a port layer, and a miniport layer, wherein said second entry point is associated with said miniport layer.

23. A networked system, including at least two computer systems coupled by a communication link which transfers data between said computer systems using both network and storage protocols, said system comprising:

20 at least a first processor located in at least a first of said at least two computer systems;

a first operating system configured to be executed by said first processor;

25 a first network driver configured to be executed by said first computer system, said first network driver having an interface used to receive network related information from said operating system; and

a first storage driver, configured to be executed by said first computer system, said first storage driver having at least a first interface used to receive said network related information from said network driver, and said first storage driver having at least a second interface used to receive storage related information from said operating system;

30 a first bus adapter in communication with said first storage driver, said first bus adapter used to receive both said network related information and said storage related information; and

a communication medium in communication with said first adapter, said communication medium used to transfer both said network and said storage related data, using respectively, a network protocol and a storage protocol, to at least a second of said at least two computer systems.

5 24. The networked system as defined by Claim 23, further comprising:

a second host adapter coupled to at least a second processor in a second of said at least two computers, said second host adapter coupled to said communication medium; and

10 a second storage driver, configured to be executed by said second computer system, said second storage driver having at least a first interface used to receive said network related information and storage related information from said second host adapter;

15 a second network driver configured to be executed by said second computer system, said second network driver having at least a first interface for receiving network related information from said storage driver; and

a second operating system configured to be executed by at least a first processor of said second computer system, said second operating system having at least one interface for receiving information from said storage driver and said network driver.

20 25. The networked system as defined by Claim 23, wherein said communication medium is a fibre channel.

26. The networked system as defined by Claim 23, wherein said communication medium is SCSI-compatible.

25 27. The networked system as defined by Claim 23, wherein said first operating system is Windows NT.

28. The networked system as defined by Claim 23, wherein said first computer system further comprises at least a second processor configured to execute said first operating system.

30 29. A networked system, including at least two computer systems coupled by at least two communication links, said networked system comprising:

a first computer system;

a second computer system;

a first communication link coupling said first computer system and said second computer system, said first communication link configured to transfer data using an I/O protocol;

5 a second communication link coupling said first computer system and said second computer system, said second communication link configured to transfer data using a network protocol;

a failure detection routine configured to detect the failure of said first communication link and said second communication link, wherein upon detecting the failure of either of said first and said second communication links, said failure
10 detection routine causes both I/O and network protocols to be used to transfer, respectively, storage and network data, on the non-failed communication link.

30. The networked system as defined by claim 29, wherein said I/O protocol is a SCSI protocol.

31. A method of providing redundant communication between at least two
15 computer systems, said method comprising the acts of:

transferring data over a first communication link using an I/O protocol;

transferring data over a second communication link using a network protocol;

detecting when either said first communication link or said second communication link have experienced at least a first mode of failure;

20 transferring data using said network protocol over said first communication link in response to detecting said failure in said second communication link; and

transferring data using said I/O protocol over said second communication link in response to detecting said failure in said first communication link.

32. A device driver for communicating both network and storage information
25 using the same interface circuit, said device driver comprising:

a first interface used to receive storage data intended for transfer to at least one communication link; and

a second interface used to receive network data intended for transfer to at least one communication link; and

30 a third interface used to communicate said storage data using said storage protocol and said network data, where said network data is encapsulated using said storage protocol, to a communication link interface circuit.

33. A device driver for communicating both network and I/O information using the same interface circuit using respectively network and I/O protocols, said device driver comprising:

5 a means for receiving I/O data intended for transfer to at least one communication link; and

a means for receiving network data intended for transfer to at least one communication link; and

10 a means for communicating said I/O data using an I/O protocol and said network data using said network protocol to a means for interfacing to a communication medium.

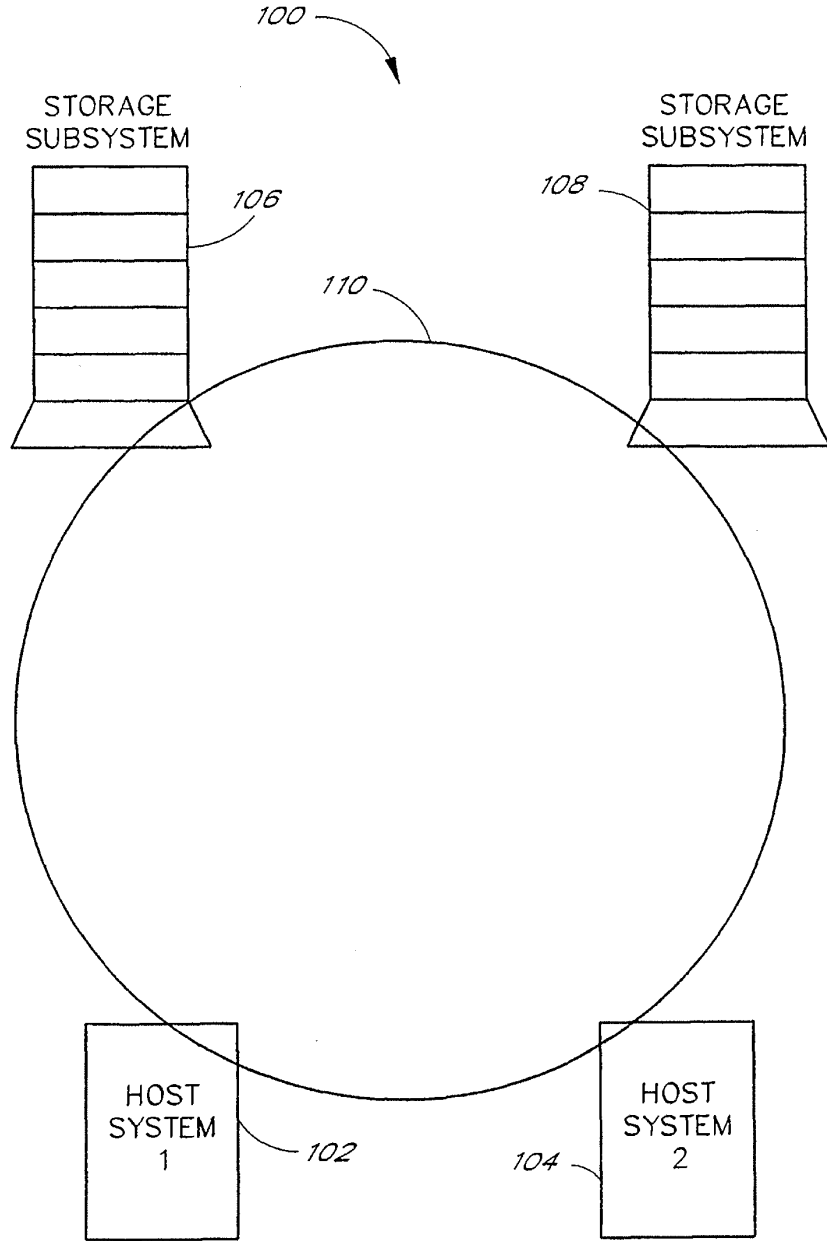


FIG. 1

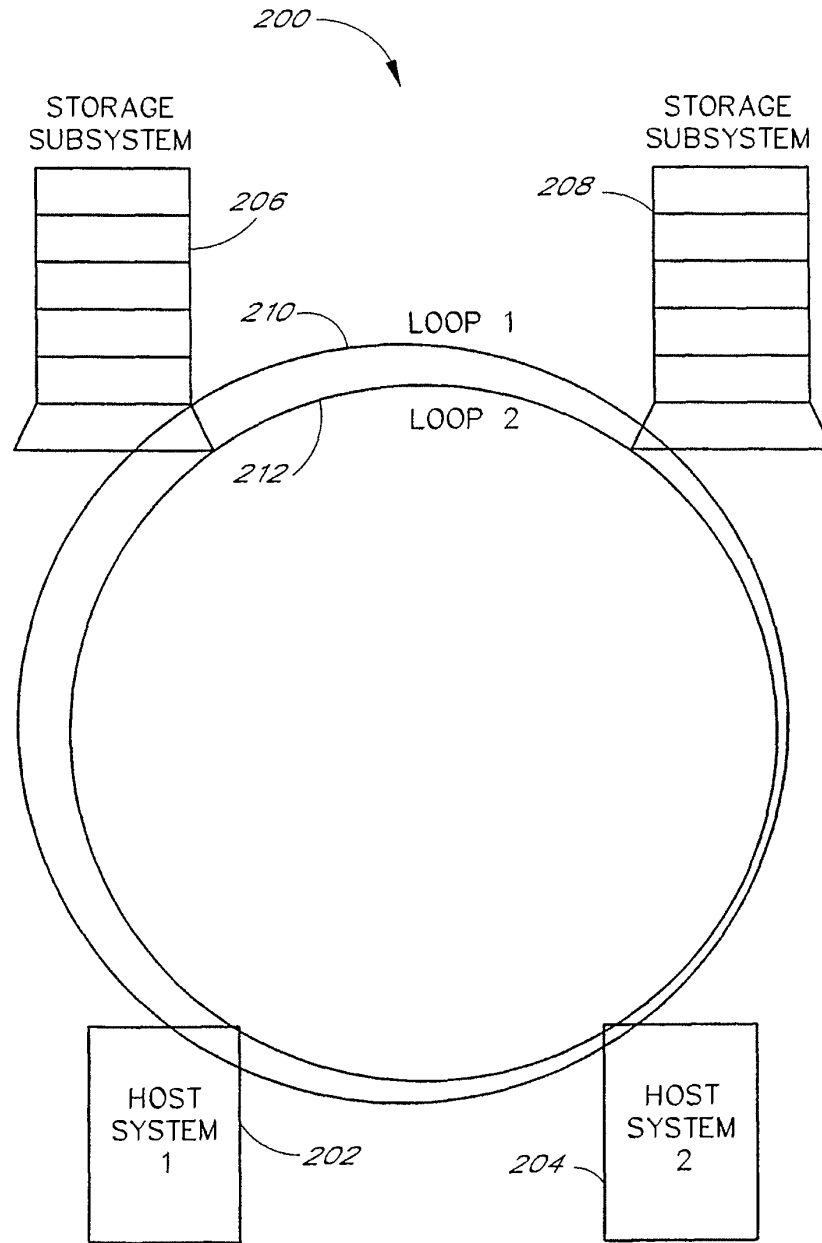


FIG. 2

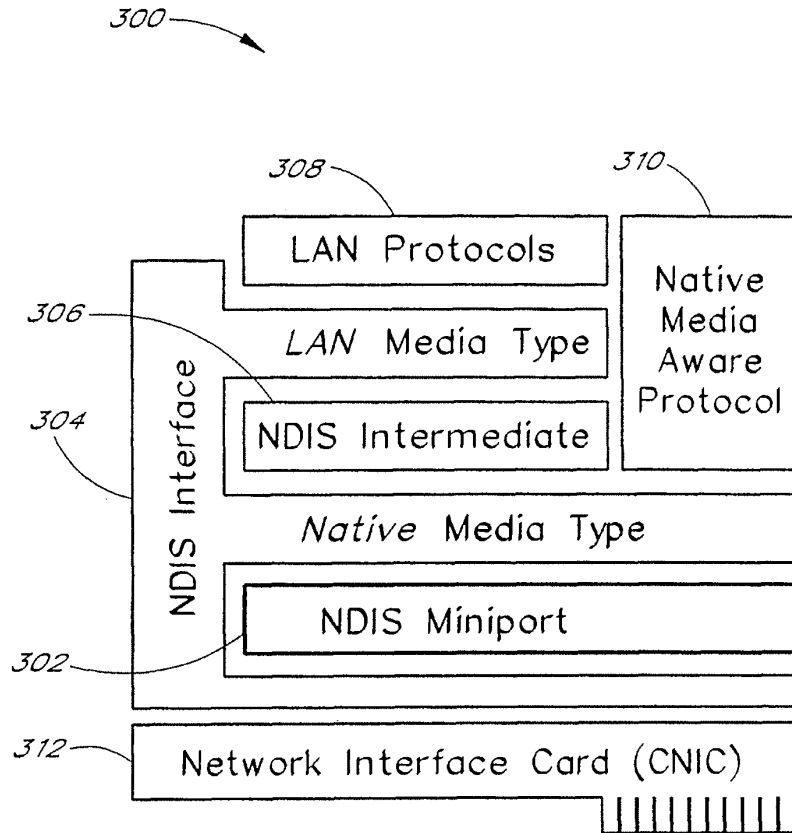


FIG. 3

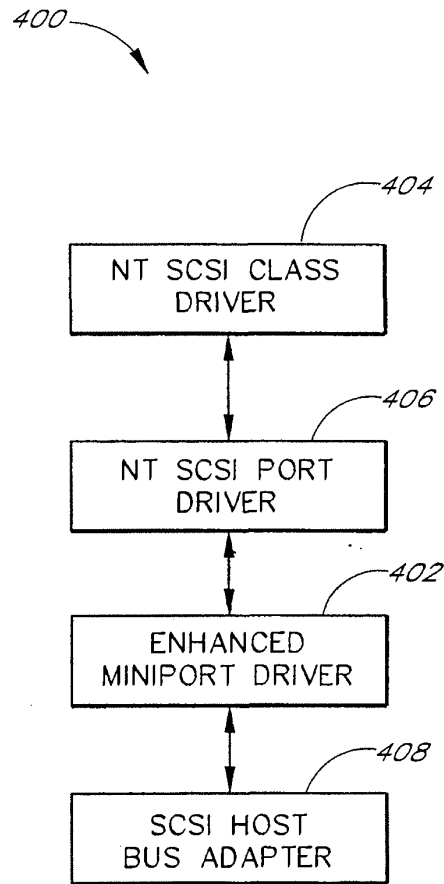


FIG. 4

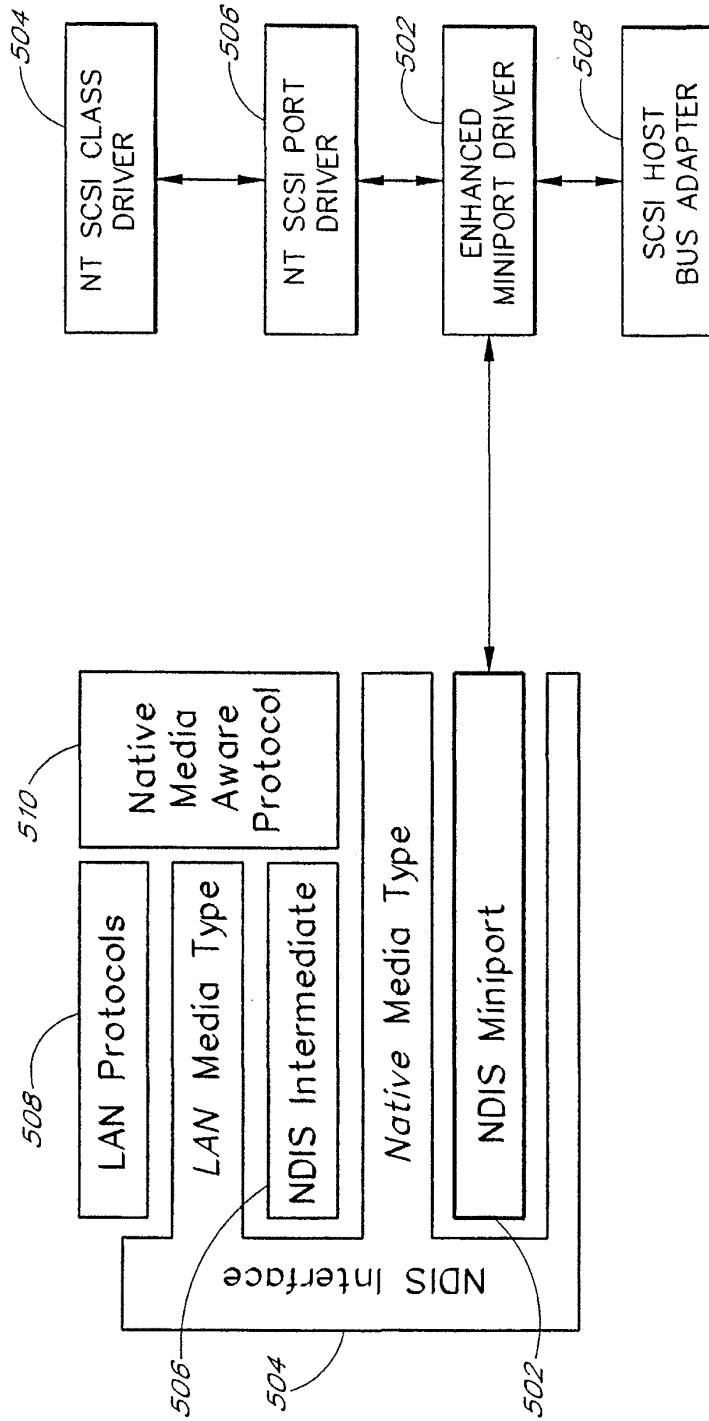


FIG. 5

Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	Disk system adapted to be directly attached to network			
First Named Inventor/Applicant Name:	Han-Gyoo Kim			
Filer:	Richard Wydeven/marie lucier			
Attorney Docket Number:	3720-101			
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	6573550
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	06449
Filer:	Richard Wydeven/marie lucier
Filer Authorized By:	Richard Wydeven
Attorney Docket Number:	3720-101
Receipt Date:	04-DEC-2009
Filing Date:	09-OCT-2001
Time Stamp:	14:29:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	777
Deposit Account	022135
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IDS.PDF	44246 aec7fc673d3737c9110e0a506a00f7572c94a8cd	no	1
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Filed (SB/08)	SB08.pdf	159593 0f792bd5dd0b78bb0e157c5e302850e2bd51ccc2	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	WO0029529.PDF	1887811 a897c45230f54daefca48e6283fced08c894b79	no	36
Warnings:					
Information:					
4	NPL Documents	EP-Office-Action.pdf	337574 1bc19c92cfe0c5b204dd142a686d984398faa501	no	9
Warnings:					
Information:					
5	NPL Documents	Storage-Virtualization-with-iSCSI-Protocol.pdf	495606 c9815a19ba5ad14ca27fd450d073d1a8479eaab9	no	15
Warnings:					
Information:					
6	NPL Documents	Storage-Networking-Virtualization.pdf	5161485 b762fb0ce4f392a8bc95cf6dcd2d1b607d6b77e	no	124
Warnings:					
Information:					
7	NPL Documents	SAN-and-NAS-provide-Storage-and-Data-Sharing.pdf	536228 cd5a1018358226e946c92f5394f9f024ab632990	no	11
Warnings:					
Information:					
8	Fee Worksheet (PTO-875)	fee-info.pdf	29946 ce3b5d73739861280139c2059d61c703c8c172af	no	2
Warnings:					
Information:					

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/974,082
Applicant : Han-Gyoo Kim
Filed : October 9, 2001
TC/A.U. : 2455
Examiner : Faruk HAMZA
Docket No. : 3720-101
Customer No. : 06449
Confirmation No. : 6653

INFORMATION DISCLOSURE STATEMENT

Director of U.S. Patent and Trademark Office
P. O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Under the provisions of 37 C.F.R. §§ 1.56, 1.97 and 1.98, Applicant submits herewith information that the Office may wish to consider in examination of the subject application. Materials submitted for consideration are listed on the attached form PTO/SB/08.

Applicant submits herewith a copy of European Patent Office Communication 94(3) issued August 3, 2009 in co-pending EP Application No. 01 272 932.3 – 2413. Applicant also submits the four references cited therein.

This statement is being filed after the mailing of a first Office Action on the merits and therefore the requisite fee is submitted electronically herewith. If any additional fee is required by the Patent Office in connection with this submission, please charge the cost thereof to Deposit Account No. 02-2135.

Respectfully submitted,

Date: 12-4-09

By



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/974,082
Applicant : Han-Gyoo Kim
Filed : October 9, 2001
TC/A.U. : 2455
Examiner : Faruk HAMZA
Docket No. : 3720-101
Customer No. : 06449
Confirmation No. : 6653

AMENDMENT AND REPLY UNDER 37 C.F.R. § 1.111

Director of U.S. Patent and Trademark Office
P. O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In reply to the Office Action mailed November 4, 2009, please amend the above-identified application as indicated below. This reply is being filed February 4, 2010, and is therefore timely filed.

Amendments to the **Claims** are reflected in the listing of claims which begins on **page 2** of this paper.

Remarks begin on **page 6** of this paper.

Amendments to the Claims

The following listing of the claims replaces and supersedes all previous listings.

Listing of Claims:

Claims 1-33. (Canceled)

34. (Currently Amended) A network-attached disk (NAD) device adapted to be connected through a general purpose front-end network to a host having a system bus, wherein the host has a virtual host bus adapter that recognizes the device as if it is a local device connected directly to the system bus of the host, the NAD device comprising:

a network adapter for receiving a disk access command in data link frames through the general purpose front-end network;

a disk controller, connected to the network adapter, for executing the disk access command;

a disk for storing data; and

a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device;

wherein access to the disk is operatively controlled by the disk controller, no disk access command is required to be routed through a server associated with the NAD, the NAD device is configured to be automatically discovered by the host of the NAD device occurs when [[it]] the NAD device is connected to the general purpose front-end network, the NAD device is not directly connected to a system bus of the host, and the NAD device is configured to be recognized by the virtual host bus driver created by a NAD device driver of the host, the NAD device driver comprising a device file and device driver routines for the device driver to register the device driver to the host, and ~~the disk access command is formatted in a format independent of a file system and issued by the host.~~

35. (Original) The NAD device of claim 34, wherein the network runs Ethernet.

36. (Original) The NAD device of claim 34, wherein said disk is formatted as a local disk.

37. (Original) The NAD device of claim 34, wherein said disk is partitioned as a local disk.

38. (Original) The NAD device of claim 34, wherein the network adapter has a physical network interface for receiving data from a host and a media access control (MAC) controller.

39. (Original) The NAD device of claim 34, wherein the controller has a state machine for controlling the operation of the NAD device.

40. (Original) The NAD device of claim 34, wherein the controller has a filter for controlling access to the disk.

41. (Original) The NAD device of claim 34, wherein the disk is partitioned into a plurality of disk partitions.

42. (Original) The NAD device of claim 41, wherein each disk partition is controlled by a separate driver.

Claims 43-124. (Canceled)

125. (Currently Amended) A network-attached disk (NAD) device adapted to be connected through a general purpose front-end network to a host computer having a system bus, the NAD device comprising:

a network adapter for receiving a disk access command through the general purpose front-end network, said network adapter including:

a physical network interface for interfacing with the general purpose front-end network to receive a disk I/O request packet from the host computer, and

a media access control (MAC) controller connected to the physical network interface to extract necessary data from the disk I/O request packet;

a disk controller, connected to the network adapter, for executing the disk access command;

a disk for storing data; and

a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device;

wherein no disk access command is required to be routed through a server associated with the NAD, and the disk access command is formatted in a format independent of a file system and issued by the host computer, the NAD device is not directly connected to a system bus of the host, and the NAD device is configured to be automatically recognized by a virtual host bus driver created by a NAD device driver of the host, the NAD device driver comprising a device file and device driver routines for the device driver to register the device driver to the host.

126. (Previously Presented) The NAD device of claim 125, wherein automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network.

127. (Previously Presented) The NAD device of claim 125, wherein the general purpose front-end network runs Ethernet.

128. (Previously Presented) The NAD device of claim 125, wherein said disk is formatted as a local disk.

129. (Previously Presented) The NAD device of claim 125, wherein said disk is partitioned as a local disk.

130. (Previously Presented) The NAD device of claim 125, wherein the controller has a state machine for controlling the operation of the NAD device.

131. (Previously Presented) The NAD device of claim 125, wherein the controller has a filter for controlling access to the disk.

132. (Previously Presented) The NAD device of claim 125, wherein the disk is partitioned into a plurality of disk partitions.

133. (Previously Presented) The NAD device of claim 132, wherein each disk partition is controlled by a separate driver.

134. (New) The NAD device of claim 34, wherein the NAD device is configured to be accessed by the NAD device driver having a device accessing thread for accessing the NAD device.

135. (New) The NAD device of claim 34, wherein the NAD device is configured to be identified by the NAD device driver having a device searching thread for identifying a device attached to the network.

136. (New) The NAD device of claim 34, wherein the NAD device is configured for connections with the NAD device driver having a network connection setting thread for making a connection between the device driver and the NAD device.

137. (New) The NAD device of claim 34, wherein the NAD device is configured to be controlled by the NAD device driver further including: a bus driver for creating the virtual host adapter to access the NAD device as a local device connected directly to the system bus of the host; and a port driver for communicating the disk access command from the host to the NAD device through a network port.

Remarks

The Office Action dated November 4, 2009, has been carefully reviewed. The foregoing amendments and following remarks form a full and complete response thereto. Claims 34 and 125 are amended. Claims 134-137 are newly presented. No new matter is added. Thus, claims 34-42 and 125-137 are pending. Reconsideration and allowance are requested.

Claim Amendments

Claims 34 and 125 are amended to recite that the NAD device is not directly connected to a system bus of the host. Support for this amendment may be found at least in paragraph [0042] (paragraph number references are to the paragraphs as numbered in the patent application publication 2002/0069245). Claims 34 and 125 are amended to recite the NAD device is configured to be recognized by the virtual host bus driver created by a NAD device driver of the host, the NAD device driver comprising a device file and device driver routines for the device driver to register the device driver to the host. Support for these amendments may be found at least in paragraphs [0053], [0054], [0106], [0110] and [0126]. Claim 34 is amended as to form. No new matter is added.

New Claims

Claims 134-137 are newly presented. No new matter is added. Claim 134 recites a NAD device configured to be accessed by the NAD device driver having a device accessing thread for accessing the NAD device. Support may be found at least in paragraphs [0067] and [0083]. Claim 135 recites a NAD device configured to be identified by the NAD device driver having a device searching thread for identifying a device attached to the network. Support may be found at least in paragraphs [0075]-[0076]. Claim 136 recites a NAD device configured for connections with the NAD device driver having a network connection setting thread for making a connection between the device driver and the NAD device. Support may be found at least in paragraph [0079] and [0082]. Claim 137 recites a NAD device configured to be controlled by the NAD device driver having a bus driver for creating the virtual host adapter to access the NAD device as a local device connected directly to the system

bus of the host; and a port driver for communicating the disk access command from the host to the NAD device through a network port. Support may be found at least in paragraph [0107]. Applicant submits that claims 134-137 are patentable at least due to their dependencies on patentable claim 34 as further discussed below.

Claim rejections under 35 U.S.C. § 112

Claims 34-42 and 125-133 were rejected under 35 U.S.C. § 112, first paragraph as allegedly failing to comply with the written description requirement. The Office stated that the specification failed to provide enough description for the claim limitation of “no disk access command is require to be routed through a server associated with the NAD.” The Office indicated that the negative limitation “no disk access command is required” must have basis in the original disclosure. The test for written description support is whether the specification conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, the applicant was in possession of the invention as now claimed. See MPEP 2163.02. Applicant submits the specification supports the limitation at least in paragraph [0012] which provides that “[a]nother object is to provide a disk system that can be recognized and used as a local disk to a host without requiring additional facility such as an additional file server, a special switch, or even an IP address, if appropriate” (emphasis added). Paragraph [0012] would have conveyed with reasonable clarity to a person skilled in the art, at the time of the application, that the applicant was in possession of a NAD that could be used in a serverless environment and that the disk access commands recited in the claims would therefore not have been required to be routed through a server. See also Figs. 1 and 9 (illustrating disk access command paths not having a server). Additionally, Applicant has amended independent claims 34 and 125 to delete “associated with the NAD” to clarify this limitation.

The Office further implicated the limitation “automatic discovery of the NAD device occurs when it is connected to the general purpose front-end network” in the rejection. Applicant has amended this limitation in claim 34 to recite that the NAD device is configured to be automatically discovered when the NAD device is connected to the general purpose front-end network. Applicant submits that the specification

would have conveyed with reasonable clarity to a person skilled in the art, at the time of the application, that the applicant had possession of a NAD that could be automatically detected by the host in view of at least paragraphs [0075] and [0076] (“[t]he [NAD] drivers may be generated automatically by using a device searching thread that periodically identifies NAD devices attached to the network”).

The Office further implicated the limitation “the disk access command is formatted in a format independent of a file system and issued by the host” in the rejection. Applicant has amended claims 34 and 125 to delete this limitation.

Applicant submits that the grounds for the rejection under 35 U.S.C. § 112, first paragraph, have been overcome and request that the rejection of claims 34-42 and 125-133 be withdrawn.

Claims 34-42 were rejected under 35 U.S.C. § 112, second paragraph as allegedly being indefinite. The Office contended that the term “as if” rendered the claim indefinite and that the limitation “it” had insufficient antecedent basis. Applicant has amended claim 34 to delete the term “as if” and to replace “it” with “the NAD device.” Applicant submits that the amendments overcome the rejection and request that it be withdrawn.

Claim rejections under 35 U.S.C. § 103(a)

Claims 34 and 35 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable as obvious in view of Patents 5,566,331 to Irwin, 6,421,753 to Hoese, and 6,389,432 to Pothapragada. Applicant submits that the combination of Irwin, Hoese and Pothapragada (altogether “Examiner’s modified Irwin”) fails to teach each element of amended claim 34, upon which claim 35 depends.

Irwin teaches a system in which client data processors access a file-system on a shared, channel-attached direct access storage device. Abstract of Irwin. Hoese discloses a storage router interfacing SCSI-based storage devices with a Fibre Channel transport medium. Abstract of Hoese. Pothapragada discloses an intelligent virtual volume access scheme in which a data storage request specifies criteria for storage space and a data structure is searched for an entry specifying a data storage device whose attributes best match the criteria. See Abstract of Pothapragada.

In contrast, claim 34 defines a network-attached disk (NAD) device adapted to be connected through a general purpose front-end network to a host having a system bus, the host having a virtual host bus adapter that recognizes the device as a local device connected directly to the system bus of the host. The NAD device includes a network adapter for receiving a disk access command in data link frames through the general purpose front-end network, a disk controller, connected to the network adapter, for executing the disk access command, a disk for storing data, and a controller, connected to the network adapter and the disk controller, for controlling the operation of the NAD device. The disk is operatively controlled by the disk controller and no disk access command is required to be routed through a server. The NAD device is configured to be automatically discovered by the host when the NAD device is connected to the general purpose front-end network and the NAD device is not directly connected to a system bus of the host. The NAD device is configured to be recognized by the virtual host bus driver created by a NAD device driver of the host, the NAD device driver comprising a device file and device driver routines for the device driver to register the device driver to the host.

In contrast to conventional arrangements in which a host bus adapter is a hardware interface connecting a host to storage devices attached to a system bus of the host, the NAD device defined in claim 34 is not directly connected to a system bus of the host. Rather, the NAD device is connected to a general purpose front-end network and is configured to be controlled by a virtual host bus adapter so that the host recognizes the NAD device as a local device. Accordingly, the virtual host bus adapter may be created via computer program instructions executed at the host. See para. [0046]. This advantageous arrangement permits the NAD to operate without a requirement for additional facilities such as a file server, a special switch, or even an IP address for controlling the NAD device via the virtual host bus adapter. See para. [0012].

Additionally, Applicant submits that Irwin, Hoese, and Pothapragada, singly and in combination, fail to teach or suggest at least a NAD device configured to be automatically discovered by the host when connected to the general purpose front-end

network as recited in amended claim 34 and that the NAD device is not directly connected to a system bus of the host, the NAD device is configured to be recognized by the virtual host bus driver created by a NAD device driver of the host, the NAD device driver having a device file and device driver routines for the device driver to register the device driver to the host as further recited in amended claim 34. Rather, Hoese teaches that a management workstation allocates storage devices. See col. 4 ll. 34-36. Irwin teaches that a file must be requested prior to determining whether a file system is mounted and mounting it. See Fig. 6. Pothapragada teaches that a device may register with a manager independent from a server upon boot up, or device attributes may be statically configured in the server. See col. 7 ll. 1-12. Applicant requests that the rejection of independent claim 34 and dependent claim 35 be withdrawn at least for this reason that the cited references fail to teach or disclose each limitation of claim 34.

Claims 36-42 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable as obvious in view of Examiner's modified Irwin in further view of Patent 6,807,581 to Starr. Applicant submits that the rejection of claims 36-42, which depend directly or through an intervening claim to independent claim 34, should be withdrawn for at least the same reasons as provided above regarding claim 34 because Starr fails to remedy the deficiencies of Examiner's modified Irwin.

Starr discloses an interface device connected to a host system's PCI or I/O bus for accelerating data transfers between a network and a storage unit. Abstract, Fig. 23. The interface device can use a dedicated fast-path for data transfer between the network and the storage unit. Id. The fast-path is set up by the host and allows the host CPU to avoid protocol processing for data transfer over the fast-path. Id.

Starr fails to disclose or suggest, singly and in combination with Irwin, Hoese, and Pothapragada, at least a NAD device configured to be automatically discovered when connected to the general purpose front-end network as recited in amended claim 34 and that the NAD device is not directly connected to a system bus of the host, the NAD device is configured to be recognized by the virtual host bus driver created by a NAD device driver of the host, the NAD device driver having a device file and device

driver routines for the device driver to register the device driver to the host as further recited in amended claim 34. Rather, the architecture disclosed by Starr suggests that the host must be shut down in order for the INIC to be connected to the I/O bus or PCI bus. See Starr, col. 5 ll. 26-28. Thus, Applicant requests that the rejection of claims 36-42 be withdrawn for at least this reason.

The Office Action asserted that claims 125-133 “do not teach for [sic] define any new limitation other than above claims 34-42. Therefore, claims 125-133 are rejected for similar reasons.” Office Action at 8. No other explanation of the rejection is provided.

Applicant submits that the rejection of claims 125-133 is improper at least because the Office Action’s assertion that claims 125-133 define no new limitations is incorrect. For example, independent claim 125, upon which claims 126-133 depend, recites that a network adapter includes a physical network interface for interfacing with the general purpose front-end network to receive a disk I/O request packet from the host computer, and a media access control (MAC) controller connected to the physical network interface to extract necessary data from the disk I/O request packet. Contrary to the Office’s assertion, claims 34-42 do not recite these elements. Applicant therefore requests that the rejection of claims 125-133 be withdrawn for at least this reason. Applicant further requests that if the Office determines to maintain the rejection, that the basis for the rejection be properly communicated in a non-final Office Action so that Applicant has a fair opportunity to respond to the rejection. See MPEP 706.02(j).

Applicant further submits that the rejection of claims 125-133 is improper for the additional, independent reason that claims 125-133 define subject matter not disclosed or suggested by the cited references. As discussed above with regard to claims 36-42, Irwin, Hoese, Pothapragada, and Starr, singly and in combination, fail to disclose or suggest at least and that the NAD device is not directly connected to a system bus of the host, the NAD device is configured to be recognized by the virtual host bus driver created by a NAD device driver of the host, the NAD device driver having a device file and device driver routines for the device driver to register the device driver to the host

as further recited in independent claim 125, upon which claims 126-133 depend directly or through an intervening claim. Applicant requests that the rejection of claims 125-133 be withdrawn for this additional, independent reason.

In view of the above, all rejections have been sufficiently addressed. Applicant submits that the application is now in condition for allowance and request that claims 34-42 and 125-137 be allowed and this application be passed to issue.

In the event that this paper is not timely filed, the Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account No. 02 2135.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the Applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

Respectfully submitted,

Feb. 4, 2010
Date

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Electronic Acknowledgement Receipt

EFS ID:	6950420
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	06449
Filer:	Oliver Lee Edwards/marie lucier
Filer Authorized By:	Oliver Lee Edwards
Attorney Docket Number:	3720-101
Receipt Date:	04-FEB-2010
Filing Date:	09-OCT-2001
Time Stamp:	16:11:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Amendment.pdf	105867 <small>f833d57027a0ab158709f67e92000903a7d05d9b</small>	yes	12

Multipart Description/PDF files in .zip description		
Document Description	Start	End
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Claims	2	5
Applicant Arguments/Remarks Made in an Amendment	6	12
Warnings:		
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Total Files Size (in bytes):	105867	
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 09/974,082		Filing Date 10/09/2001		<input type="checkbox"/> To be Mailed					
APPLICATION AS FILED – PART I														
(Column 1)			(Column 2)			SMALL ENTITY <input checked="" type="checkbox"/>		OR		OTHER THAN SMALL ENTITY				
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)	OR		RATE (\$)	FEE (\$)				
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>		N/A	N/A		N/A				N/A					
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>		N/A	N/A		N/A		N/A							
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>		N/A	N/A		N/A		N/A							
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>		minus 20 =	*		X \$ =		OR		X \$ =					
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>		minus 3 =	*		X \$ =		OR		X \$ =					
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).												
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>														
* If the difference in column 1 is less than zero, enter "0" in column 2.														
APPLICATION AS AMENDED – PART II														
(Column 1)			(Column 2)			(Column 3)			SMALL ENTITY		OR		OTHER THAN SMALL ENTITY	
AMENDMENT	02/04/2010		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR		RATE (\$)	ADDITIONAL FEE (\$)		
	Total <small>(37 CFR 1.16(i))</small>		* 22	Minus	** 111	= 0	X \$26 =	0	OR		X \$ =			
	Independent <small>(37 CFR 1.16(h))</small>		* 2	Minus	***14	= 0	X \$110 =	0	OR		X \$ =			
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>													
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>													
TOTAL ADD'L FEE							0		OR		TOTAL ADD'L FEE			
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR		RATE (\$)	ADDITIONAL FEE (\$)		
	Total <small>(37 CFR 1.16(i))</small>		*	Minus	**	=	X \$ =		OR		X \$ =			
	Independent <small>(37 CFR 1.16(h))</small>		*	Minus	***	=	X \$ =		OR		X \$ =			
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>													
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>													
TOTAL ADD'L FEE									OR		TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.														
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".														
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".														
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.														
Legal Instrument Examiner: /PATRICIA F. LEWIS/														

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		09974082	
	Filing Date		2001-10-09	
	First Named Inventor	Kim, Han-Gyoo		
	Art Unit	2455		
	Examiner Name	HAMZA, FARUK		
	Attorney Docket Number	3720-101		

U.S.PATENTS Remove						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	5845104		1998-12-01	Rao	
	2	5455926		1995-10-03	Keele et al.	
	3	5642337		1997-06-24	Oskay et al.	
	4	6941576	B2	2005-09-06	Amit	
	5	6518965	B2	2003-02-11	Dye et al.	
	6	6393569	B1	2002-05-21	Orenshteyn	
	7	5812930		1998-09-22	Zavrel	
	8	5889942		1999-03-30	Orenshteyn	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	09974082
	Filing Date	2001-10-09
	First Named Inventor	Kim, Han-Gyoo
	Art Unit	2455
	Examiner Name	HAMZA, FARUK
	Attorney Docket Number	3720-101

	9	6327594	B1	2001-12-04	Van Huben et al.	
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U.S.PATENT APPLICATION PUBLICATIONS

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
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EXAMINER SIGNATURE

Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	09974082
	Filing Date	2001-10-09
	First Named Inventor	Kim, Han-Gyoo
	Art Unit	2455
	Examiner Name	HAMZA, FARUK
	Attorney Docket Number	3720-101

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	09974082
	Filing Date	2001-10-09
	First Named Inventor	Kim, Han-Gyoo
	Art Unit	2455
	Examiner Name	HAMZA, FARUK
	Attorney Docket Number	3720-101

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Oliver L. Edwards/	Date (YYYY-MM-DD)	2010-04-27
Name/Print	Oliver L. Edwards	Registration Number	64711

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	Disk system adapted to be directly attached to network			
First Named Inventor/Applicant Name:	Han-Gyoo Kim			
Filer:	Oliver Lee Edwards/marie lucier			
Attorney Docket Number:	3720-101			
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	7497650
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	06449
Filer:	Oliver Lee Edwards/marie lucier
Filer Authorized By:	Oliver Lee Edwards
Attorney Docket Number:	3720-101
Receipt Date:	27-APR-2010
Filing Date:	09-OCT-2001
Time Stamp:	15:54:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	26845
Deposit Account	022135
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IDS.pdf	95237	no	1
			8fe20558891e57300591aa8d3a536b66b0e c5945		
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Filed (SB/08)	SB08a.pdf	836853	no	5
			7d990633bf650e2a7ad187a438722b431fa d61d5		
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	29754	no	2
			47140c5c23458151847526e5117d8d319a1 c3b7c		
Warnings:					
Information:					
Total Files Size (in bytes):			961844		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Electronic Acknowledgement Receipt

EFS ID:	7497650
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	Disk system adapted to be directly attached to network
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	06449
Filer:	Oliver Lee Edwards/marie lucier
Filer Authorized By:	Oliver Lee Edwards
Attorney Docket Number:	3720-101
Receipt Date:	27-APR-2010
Filing Date:	09-OCT-2001
Time Stamp:	15:54:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	26845
Deposit Account	022135
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IDS.pdf	95237	no	1
			8fe20558891e57300591aa8d3a536b66b0e c5945		
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Filed (SB/08)	SB08a.pdf	836853	no	5
			7d990633bf650e2a7ad187a438722b431fa d61d5		
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	29754	no	2
			47140c5c23458151847526e5117d8d319a1 c3b7c		
Warnings:					
Information:					
Total Files Size (in bytes):			961844		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 09/974,082
Applicant : Han-Gyoo KIM
Filed : 10-09-2001
TC/A.U. : 2455
Examiner : Faruk HAMZA
Docket No. : 3720-101
Customer No. : 6449
Confirmation No. : 6653

INFORMATION DISCLOSURE STATEMENT

Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Under the provisions of 37 C.F.R. §§ 1.56, 1.97 and 1.98, Applicant submits herewith information that the Office may wish to consider in examination of the subject application.

The information is listed on the accompanying PTO/SB/08a and was disclosed in related applications 11/029,775 and 11/153,985 and, for completeness, is being disclosed in the present application. Applicant respectfully requests that the Examiner consider these references with respect to the present application.

Respectfully submitted,

Date April 27, 2010

By /Oliver L. Edwards/

Oliver L. Edwards
Attorney for Applicant
Registration No. 64,711
ROTHWELL, FIGG, ERNST & MANBECK, p.c.
Suite 800, 1425 K Street, N.W.
Washington, D.C. 20005
Telephone: (202)783-6040



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

6449 7590 05/19/2010
ROTHWELL, FIGG, ERNST & MANBECK, P.C.
1425 K STREET, N.W.
SUITE 800
WASHINGTON, DC 20005

EXAMINER: HAMZA, FARUK
ART UNIT: 2455
PAPER NUMBER:
DATE MAILED: 05/19/2010

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 09/974,082, 10/09/2001, Han-Gyoo Kim, 3720-101, 6653
TITLE OF INVENTION: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK

Table with 7 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE
Row 1: nonprovisional, YES, \$755, \$300, \$0, \$1055, 08/19/2010

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.
B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

6449 7590 05/19/2010
 ROTHWELL, FIGG, ERNST & MANBECK, P.C.
 1425 K STREET, N.W.
 SUITE 800
 WASHINGTON, DC 20005

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,082	10/09/2001	Han-Gyoo Kim	3720-101	6653

TITLE OF INVENTION: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$755	\$300	\$0	\$1055	08/19/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
HAMZA, FARUK	2455	709-218000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
 Change of correspondence address (or Change of Correspondence Address Form PTO/SB/122) attached.
 "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
 (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)
 PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.
 (A) NAME OF ASSIGNEE _____ (B) RESIDENCE: (CITY and STATE OR COUNTRY) _____

Please check the appropriate assignee category or categories (will not be printed on the patent): Individual Corporation or other private group entity Government

4a. The following fee(s) are submitted:
 Issue Fee
 Publication Fee (No small entity discount permitted)
 Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)
 A check is enclosed.
 Payment by credit card. Form PTO-2038 is attached.
 The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
 a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____
 Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes application details for Han-Gyoo Kim and examiner Hamza, Faruk.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 361 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 361 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Examiner-Initiated Interview Summary	Application No. 09/974,082	Applicant(s) KIM, HAN-GYOO	
	Examiner FARUK HAMZA	Art Unit 2455	

All Participants:
(1) FARUK HAMZA.
(2) Oliver Edards.

Date of Interview: 26 April 2010

Type of Interview:
 Telephonic
 Video Conference
 Personal (Copy given to: Applicant Applicant's representative)

Exhibit Shown or Demonstrated: Yes No
If Yes, provide a brief description: .

Part I.
Rejection(s) discussed:

Claims discussed:

Prior art documents discussed:

Part II.
SUBSTANCE OF INTERVIEW DESCRIBING THE GENERAL NATURE OF WHAT WAS DISCUSSED:
The examiner proposed to amend the claim language to recite "configured to" instead of "adapted to" in claims 34 and 125.

Part III.
 It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview directly resulted in the allowance of the application. The examiner will provide a written summary of the substance of the interview in the Notice of Allowability.
 It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview did not result in resolution of all issues. A brief summary by the examiner appears in Part II above.

/Faruk Hamza/
Primary Examiner, Art Unit 2455

(Applicant/Applicant's Representative Signature – if appropriate)

Notice of Allowability	Application No.	Applicant(s)	
	09/974,082	KIM, HAN-GYOO	
	Examiner	Art Unit	
	FARUK HAMZA	2455	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. This communication is responsive to amendment filed 02/04/10.
2. The allowed claim(s) is/are 34-42 and 125-137, renumbered as 1-22.
3. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some* c) None of the:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date _____.
 - (b) including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>12/04/09</u> 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>4/26/10</u>. 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other _____. |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

/Faruk Hamza/
 Primary Examiner, Art Unit 2455

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.
2. Authorization for this examiner's amendment was given in an interview with attorney of record Oliver Edwards (Reg. No 64,711) on April 26, 2010.
3. The application has been amended as follows:
a) In the Claims:
Claim 34 line 1, "adapted to" has been replaced with – configured to --.
Claim 125 line 1, "adapted to" has been replaced with – configured to --.
4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance or Examiner Amendment."
5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faruk Hamza whose telephone number is 571-272-7969. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached at 571-272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 886-217-9197 (toll -free).

Faruk Hamza

Patent Examiner

Group Art Unite 2455

/Faruk Hamza/
Primary Examiner, Art Unit 2455

Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

CLAIM		DATE							
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Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

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I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
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Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

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Index of Claims 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected


Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

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Issue Classification 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

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	18	3	36		54		72		90		108	13	126						

NONE		Total Claims Allowed:	
		22	
(Assistant Examiner)	(Date)		
/FARUK HAMZA/ Primary Examiner. Art Unit 2455	04/26/10	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	34	1

Search Notes 	Application/Control No. 09974082	Applicant(s)/Patent Under Reexamination KIM, HAN-GYOO
	Examiner FARUK HAMZA	Art Unit 2455

SEARCHED			
Class	Subclass	Date	Examiner
709	203,217-219,223-226,236,246,250	04/26/10	FH

SEARCH NOTES		
Search Notes	Date	Examiner
See East Search Notes (USPAT, USPGPUB, USCOR, EPO, JPO, DERWENT, IBM_TDB)	04/26/10	FH
Inventor Name Search	04/26/10	FH
NPL Search (IEEE,XPLORE,ACM,Google)	04/26/10	FH

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
709	203,217-219,223-226,236,246,250	04/26/10	FH

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	29107	709/203,217-219,236,246,250.ccls.	US-PGPUB; USPAT	OR	ON	2010/04/26 09:46
L4	29107	709/203,217-219,236,246,250.ccls.	US-PGPUB; USPAT	OR	ON	2010/04/26 09:47
L5	399	directly near5 attach\$ near3 network with disk	US-PGPUB; USPAT	OR	ON	2010/04/26 09:47
L6	19	L4 and L5	US-PGPUB; USPAT	OR	ON	2010/04/26 09:47
L7	60	independent with access adj command	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/04/26 09:47
L8	2350	automatic near5 discover \$	US-PGPUB; USPAT	OR	ON	2010/04/26 09:47
L9	531944	san or nad	US-PGPUB; USPAT	OR	ON	2010/04/26 09:47
L10	42	L8 same L9	US-PGPUB; USPAT	OR	ON	2010/04/26 09:47
L11	49150	709/203,217-219,223-226,236,246,250.ccls.	US-PGPUB; USPAT	OR	ON	2010/04/26 09:54
L12	1	7 and 11	US-PGPUB; USPAT	OR	ON	2010/04/26 09:55
L13	631856	san or storage adj access adj network	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/04/26 14:02
L14	71443	access\$ near3 disk	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/04/26 14:02
L15	951	13 same 14	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/04/26 14:02

L16	67	4 and 15	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/04/26 14:03
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S2	6	"09/974082"	US-PGPUB; USPAT	OR	ON	2009/05/15 11:41
S3	1	("5566331").PN.	USPAT; USOCR	OR	OFF	2009/05/17 09:52
S4	25174	709/203,217- 219,236,246,250.ccls.	US-PGPUB; USPAT	OR	ON	2009/05/18 14:49
S5	467955	san or storage adj access adj network	US-PGPUB; USPAT	OR	ON	2009/05/18 14:50
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S15	503084	san or nad	US-PGPUB; USPAT	OR	ON	2009/10/29 13:33
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4/ 26/ 2010 2:36:12 PM

C:\Documents and Settings\ fhamza\ My Documents\ EAST\ Workspaces\ 09974082.wsp

Information Disclosure Statement by Applicant (PTO/SB/O8)	<i>Complete if Known</i>	
	Application No.:	09/974,082
	Filing Date:	October 9, 2001
	First Named Inventor:	Han-Gyoo Kim
	Group Art Unit	2455
	Examiner Name:	Faruk HAMZA
	Attorney Docket No.:	3720-101
	Customer No.:	6449
Page 1 of 1	Confirmation No.:	6653

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. ¹	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY
		Number	Kind Code ² (if known)		

FOREIGN PATENT DOCUMENTS							
Examiner Initials*	Cite No. ¹	Foreign Patent Document			Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	T ⁶
		Office ³	Number ⁴	Kind ⁵ Code (if known)			
	1	WO	00/29529	A2	QLOGIC CORPORATION	05-25-2000	

NON PATENT LITERATURE DOCUMENTS				
Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published		T ²
	2	EP Communication 94(3) issued in co-pending European Application No. 01 272 932.3 – 2413 (Issued August 3, 2009) (9 pages)		
	3	YARON KLEIN, SANRAD, "Storage Virtualization with iSCSI Protocol; draft-klein-ips-virt-00.txt" (2 November 2000) (15 pages)		
	4	BLUNDEN, MARK, et al, "Storage Networking Virtualization What's it all about?" IBM Redbooks (December 2000) (124 pages)		
	5	SCHULZ,GREG, "SAN and NAS; Complementary Technologies – SAN and NAS provide Storage and Data Sharing" INTERNET CITATION (May 1, 2000) (11 pages)		

Examiner Signature	/Faruk Hamza/	Date Considered	04/26/2010
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹Unique citation designation number. ²See attached Kinds of U.S. Patent Documents. ³Enter Office that issued the document, by the two-letter code. ⁴For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶Applicant is to place a check mark here if English language translation is attached. AB indicates that only an English language abstract is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /F.H./



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 09/974,082, 10/09/2001, Han-Gyoo Kim, 3720-101, 6653
Row 2: 6449, 7590, 07/09/2010, ROTHWELL, FIGG, ERNST & MANBECK, P.C., 1425 K STREET, N.W., SUITE 800, WASHINGTON, DC 20005, EXAMINER HAMZA, FARUK, ART UNIT 2455, PAPER NUMBER, NOTIFICATION DATE 07/09/2010, DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
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 Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
09974082	10/9/2001	KIM, HAN-GYOO	3720-101

ROTHWELL, FIGG, ERNST & MANBECK, P.C.
 1425 K STREET, N.W.
 SUITE 800
 WASHINGTON, DC 20005

EXAMINER

FARUK HAMZA

ART UNIT	PAPER
2455	20100630

2455 20100630

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

IDS filed on 4/27/10 is considered

/Faruk Hamza/
 Primary Examiner, Art Unit 2455

PTO-90C (Rev.04-03)

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		09974082	
	Filing Date		2001-10-09	
	First Named Inventor	Kim, Han-Gyoo		
	Art Unit	2455		
	Examiner Name	HAMZA, FARUK		
	Attorney Docket Number	3720-101		

U.S.PATENTS							Remove
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	
	1	5845104		1998-12-01	Rao		
	2	5455926		1995-10-03	Keele et al.		
	3	5642337		1997-06-24	Oskay et al.		
	4	6941576	B2	2005-09-06	Amit		
	5	6518965	B2	2003-02-11	Dye et al.		
	6	6393569	B1	2002-05-21	Orenshteyn		
	7	5812930		1998-09-22	Zavrel		
	8	5889942		1999-03-30	Orenshteyn		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		09974082	
	Filing Date		2001-10-09	
	First Named Inventor	Kim, Han-Gyoo		
	Art Unit	2455		
	Examiner Name	HAMZA, FARUK		
	Attorney Docket Number	3720-101		

	9	6327594	B1	2001-12-04	Van Huben et al.	
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U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ² j	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
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If you wish to add additional Foreign Patent Document citation information please click the Add button.

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
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If you wish to add additional non-patent literature document citation information please click the Add button.

EXAMINER SIGNATURE

Examiner Signature	/Faruk Hamza/	Date Considered	06/30/2010
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	09974082
	Filing Date	2001-10-09
	First Named Inventor	Kim, Han-Gyoo
	Art Unit	2455
	Examiner Name	HAMZA, FARUK
	Attorney Docket Number	3720-101

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

6449 7590 05/19/2010

ROTHWELL, FIGG, ERNST & MANBECK, P.C.
 1425 K STREET, N.W.
 SUITE 800
 WASHINGTON, DC 20005

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974.082	10/09/2001	Han-Gyoo Kim	3720-101	6653

TITLE OF INVENTION: DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$755	\$300	\$0	\$1055	08/19/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
HAMZA, FARUK	2455	709-218000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
 Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
 "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
 (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
 1 Rothwell, Figg, Ernst
 2 & Manbeck, P.C.
 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)
 PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.
 (A) NAME OF ASSIGNEE: Zhe Khi PAK
 (B) RESIDENCE: (CITY and STATE OR COUNTRY) Moscow, RUSSIAN FEDERATION

Please check the appropriate assignee category or categories (will not be printed on the patent) : Individual Corporation or other private group entity Government

4a. The following fee(s) are submitted:
 Issue Fee
 Publication Fee (No small entity discount permitted)
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5. Change in Entity Status (from status indicated above)
 a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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Authorized Signature Michael Battaglia Date July 29, 2010
 Typed or printed name Michael V. Battaglia Registration No. 64,932

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Electronic Patent Application Fee Transmittal				
Application Number:	09974082			
Filing Date:	09-Oct-2001			
Title of Invention:	DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK			
First Named Inventor/Applicant Name:	Han-Gyoo Kim			
Filer:	Michael Vincent Battaglia/Jessica Fu			
Attorney Docket Number:	3720-101			
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl issue fee	2501	1	755	755
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Printed copy of patent - no color	8001	5	3	15
Total in USD (\$)				1070

Electronic Acknowledgement Receipt

EFS ID:	8116182
Application Number:	09974082
International Application Number:	
Confirmation Number:	6653
Title of Invention:	DISK SYSTEM ADAPTED TO BE DIRECTLY ATTACHED TO NETWORK
First Named Inventor/Applicant Name:	Han-Gyoo Kim
Customer Number:	06449
Filer:	Michael Vincent Battaglia/Jessica Fu
Filer Authorized By:	Michael Vincent Battaglia
Attorney Docket Number:	3720-101
Receipt Date:	29-JUL-2010
Filing Date:	09-OCT-2001
Time Stamp:	15:36:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 1070
RAM confirmation Number	1958
Deposit Account	022135
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

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 Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	IFTransmittal.pdf	95067 2bbd9ef879a98d4a4f966edc76f84ce61233a887	no	1

Warnings:

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	33747 1e488798a0e6f10fd6c88ba3f72d9551096bc62	no	2
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Warnings:

Information:

Total Files Size (in bytes):	128814
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

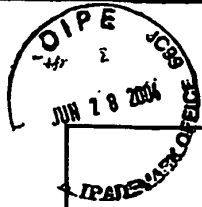
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



Substitute for form 1449A/PTO (Modified) INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)			Complete if Known	
			Application Number	09/974,082
			Filing Date	10/09/2001
			First Named Inventor	HAN-GYOO KIM
			Art Unit	2155
			Examiner Name	ALAM, HOSAIN T.
			Attorney Docket Number	34253/US/2 - RMA
Sheet	1	of	1	

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	U.S. Patent Document Number-Kind Code ³ (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
VAK	A1	US 2003/0028614 A1	FEB. 06, 2003	JEON	RECEIVED JUL 01 2004 Technology Center 2100
VAK	A2	US 6,167,490	DEC. 26, 2000	LEVY ET AL.	
VAK	A3	US 5,838,916	NOV. 17, 1998	DOMENIKOS ET AL	
VAK	A4	US 6,128,690	OCT. 03, 2000	PURCELL ET AL	
	A5				
	A6				

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No.	Foreign Patent Document Country Code ³ Number ³ Kind Code ³ (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁴
	B1					
	B2					

NON PATENT LITERATURE DOCUMENTS						
Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.				T ⁴
	C1					
	C2					
	C3					
	C4					
	C5					
	C6					
	C7					
	C8					
	C9					
	C10					

Examiner Signature	Vitali A. Korobov	Date Considered	08/08/2005
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
¹Applicant's unique citation designation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 801.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 18 if possible. ⁶ Applicant is to place a check mark here if English Language Translation is attached.
 This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the complete application form to the USPTO. Time will vary depending on the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,082	09/07/2010	7792923	3720-101	6653

6449 7590 08/18/2010
ROTHWELL, FIGG, ERNST & MANBECK, P.C.
1425 K STREET, N.W.
SUITE 800
WASHINGTON, DC 20005

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 864 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Han-Gyoo Kim, Seoul, KOREA, REPUBLIC OF;

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT5133627

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
HEON SU LEE	08/31/2018
RECEIVING PARTY DATA	
Name:	SYNKLOUD TECHNOLOGIES, LLC
Street Address:	8 THE GREEN, SUITE A
City:	DOVER
State/Country:	DELAWARE
Postal Code:	19901
PROPERTY NUMBERS Total: 9	
Property Type	Number
Patent Number:	7870225
Patent Number:	7860943
Patent Number:	7849257
Patent Number:	7849153
Patent Number:	7792923
Patent Number:	7746900
Patent Number:	7664836
Patent Number:	7483967
Patent Number:	7457880
CORRESPONDENCE DATA	
Fax Number:	
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Email:	hs.ko@ideahub.co.kr
Correspondent Name:	HYUNGSEOK KO
Address Line 1:	8 THE GREEN, SUITE A
Address Line 4:	DOVER, DELAWARE 19901
NAME OF SUBMITTER:	HYUNGSEOK KO
SIGNATURE:	/harold ko_ideahub/
DATE SIGNED:	09/11/2018

This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 2

source=Patent Assignment Agreement_Ximeta_20180831#page1.tif

source=Patent Assignment Agreement_Ximeta_20180831#page2.tif

EXHIBIT B

PATENT ASSIGNMENT AGREEMENT

WHEREAS, HEON SU LEE, an individual resides at 506 Banseok Blessville, 1615-17, Bongcheon-7 Dong, Gwanak-gu, Seoul, Republic of Korea (hereinafter, "Seller") is the sole and exclusive owner of certain United States and/or foreign patents and/or patent applications listed in Schedule A annexed hereto (collectively referred to as the "Patents"); and

WHEREAS SYNKLOUD TECHNOLOGIES, LLC, having a place of business at 8 the Green, Suite A, Dover, Delaware 19901 U.S.A. (hereinafter, "Purchaser") is desirous of acquiring the right, title and interest in, to and under the said Patents (and all foreign counterparts and related foreign patents).

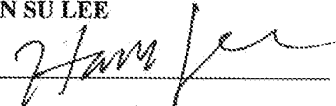
Now, Therefore,

For good and valuable consideration, the receipt of which is hereby acknowledged, Seller does hereby sell, assign, transfer and set over to Purchaser, the Patents aforesaid, and any inventions claimed in said Patent, any reissue or reissues of said Patents already granted and which may be granted, any certificates of reexamination already granted and which may be granted the same to be held and enjoyed by Purchaser for its own use and enjoyment, and for the use and enjoyment of its successors, assigns or other legal representatives, to the end of the term or terms for which said Patents are or may be granted, reissued or extended as fully and entirely as the same would have been held and enjoyed by Seller, if this assignment and sale had not been made; together with all claims for damages by reason of past, current, and future infringement and/or provisional rights under said Patents, with the right to sue for, and collect the same for its own use and behalf, and for the use and behalf of its successors, assigns or other legal representatives.

And, Seller, hereby authorizes and requests the Commissioner of Patents and Trademarks to issue any and all Letters Patents of the United States on said inventions to Purchaser as assignee of the entire interest, and hereby covenants that Seller has full right to convey the entire interest herein assigned, and that, except as otherwise provided between the parties, Seller has not executed, and will not execute, any agreements in conflict therewith.

In Witness Whereof, Seller has caused this Patent Assignment Agreement to be executed by its duly authorized representative.

HEON SU LEE

By: 

Date: 

SCHEDULE A

Patent No.	Filing No.	Priority Date	Current Assignee	Inventor	Title	Family
7870225	2010-701335	2000-10-13	Lee Hans	Han-gyoo Kim	Disk system adapted to be directly attached to network	
7860943	2006-360331	2004-08-23	Lee Hans	Han-gyoo Kim Shin Hwan Hwang Han Kyu Lim	Enhanced network direct attached storage controller	
7849257	2006-326810	2005-01-06	Lee Hans	Han-gyoo Kim	Method and apparatus for storing and retrieving data	
7849153	2005-153985	2000-10-13	Lee Hans	Han-Gyoo Kim	Disk system adapted to be directly attached	
7792923	2001-974082	2000-10-13	Lee Hans	Han-gyoo Kim	Disk system adapted to be directly attached to network	
7746900	2005-187762	2004-07-22	Lee Hans	Han-gyoo Kim Kyung Tae Kim Il-gu Hong Jung Kyun Ahn Jun Mo Park Han Kyu Lim	Low-level communication layers and device employing same	
7664836	2005-061760	2004-02-17	Lee Hans	Han-Gyoo Kim	Device and method for booting an operation system for a computer from a passive directly attached network device	
7483967	2004-829399	2000-08-30	Lee Hans	Han-gyoo Kim	Scalable server architecture based on asymmetric 3-way TCP	
7457880	2004-951474	2004-07-22	Lee Hans	Han-gyoo Kim	System using a single host to receive and redirect all file access commands for shared data storage device from other hosts on a network	