Oracle et. al.,
Petitioners
v.
Crossroads Systems
Patent Owner
IPR2014-01197, -01207, -01209

CROSSROADS EXHIBIT 2352
Oracle Corp et al v Crossroads Systems, Inc.
IPR2014-01197, -01207, -01209

CRD-5500 RELATED GROUNDS (IPR 2014-01207)

Overview of CRD Presentation

- Petitioners' reliance on Host LUN Mapping in their combination fails – Host LUN Mapping does not map hosts, it maps host channels
  - Chase admits CRD cannot identify multiple hosts on one channel
  - Chase concedes CRD's "access control granularity" is only per channel

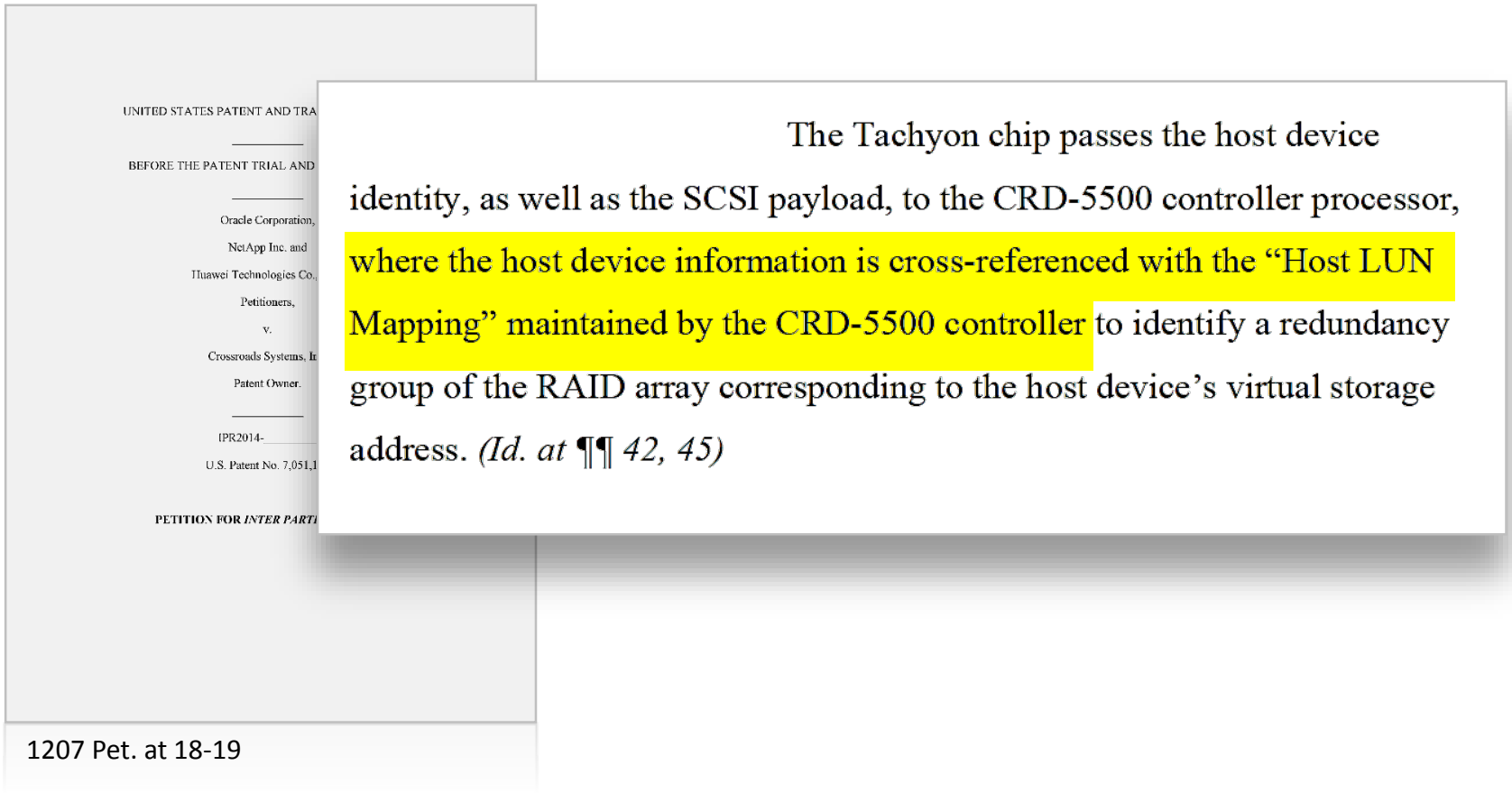
- Petitioners' assertion that channel allocation of storage is per host mapping fails
  - The patent claims are directed to mapping hosts NOT channels

- Petitioners' allegations that the Tachyon interface passes host information to the CRD CPU fails
  - Chase contradicted their combination from the start

Petitioners' Reliance on Host LUN Mapping in their Combination Fails – Host LUN Mapping Does Not Map Hosts, it Maps Host Channels

Petitioners' Combination Utilizes CRD-5500's Host LUN Mapping

Petitioners' asserted combination alleges that the existing Host LUN Mapping will automatically be able to "cross-reference" a host identification.



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BEFORE THE PATENT TRIAL AND

Oracle Corporation,
NetApp Inc. and
Huawei Technologies Co.,
Petitioners,
v.
Crossroads Systems, In
Patent Owner.

IPR2014-
U.S. Patent No. 7,051,1

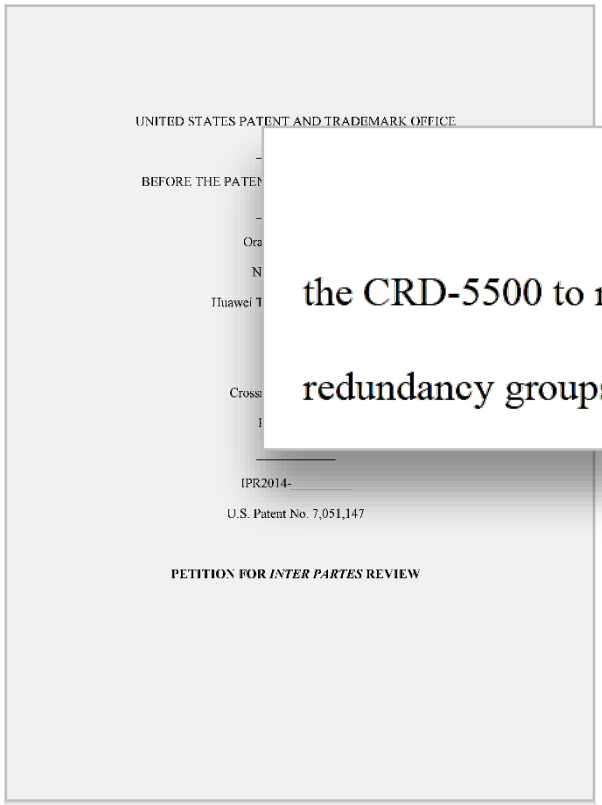
PETITION FOR *INTER PARTI*

The Tachyon chip passes the host device identity, as well as the SCSI payload, to the CRD-5500 controller processor, where the host device information is cross-referenced with the "Host LUN Mapping" maintained by the CRD-5500 controller to identify a redundancy group of the RAID array corresponding to the host device's virtual storage address. *(Id. at ¶¶ 42, 45)*

1207 Pet. at 18-19

cited in 1207 POR at 38

Petitioners Go Further to Allege that the Host LUN Mapping as it Existed Mapped Between Hosts and Storage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U.S. Patent No. 7,051,147

PETITION FOR *INTER PARTES* REVIEW

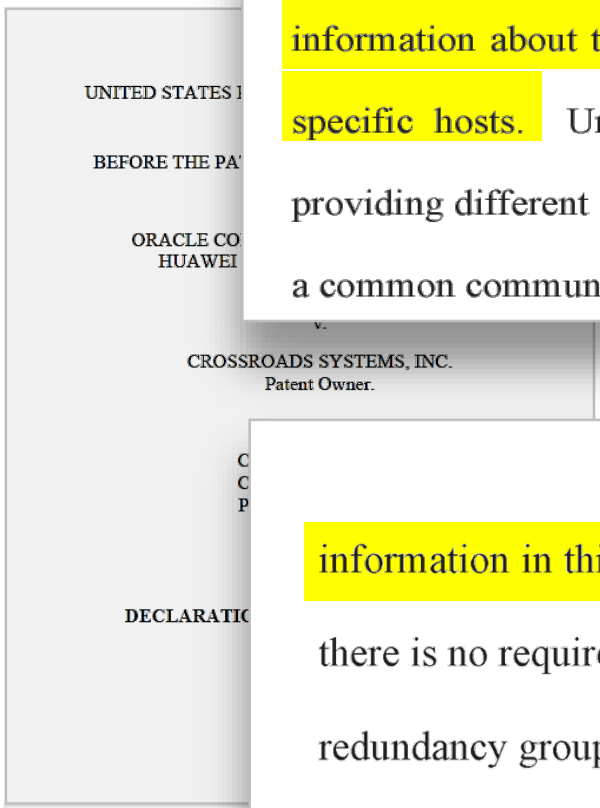
1207 Pet. at 21

The "Host LUN Mapping" is used by the CRD-5500 to map between LUNs assigned to a host device and RAID redundancy groups each representing a physical storage drive. *(Id.)*

cited in 1207 POR at 46

Contrary to Petitioners' Assertion, Both Experts Agree that "Host LUN Mapping" Does Not Map to Hosts

Dr. Levy testified that Host LUN Mapping Cannot Distinguish Between Specific Hosts.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The Host LUN Mapping lacks any information about the hosts and, lacking such, cannot distinguish access between specific hosts. Unlike the claimed apparatus, the CRD-5500 is incapable of providing different storage access to different hosts connected to the CRD-5500 by a common communications link.

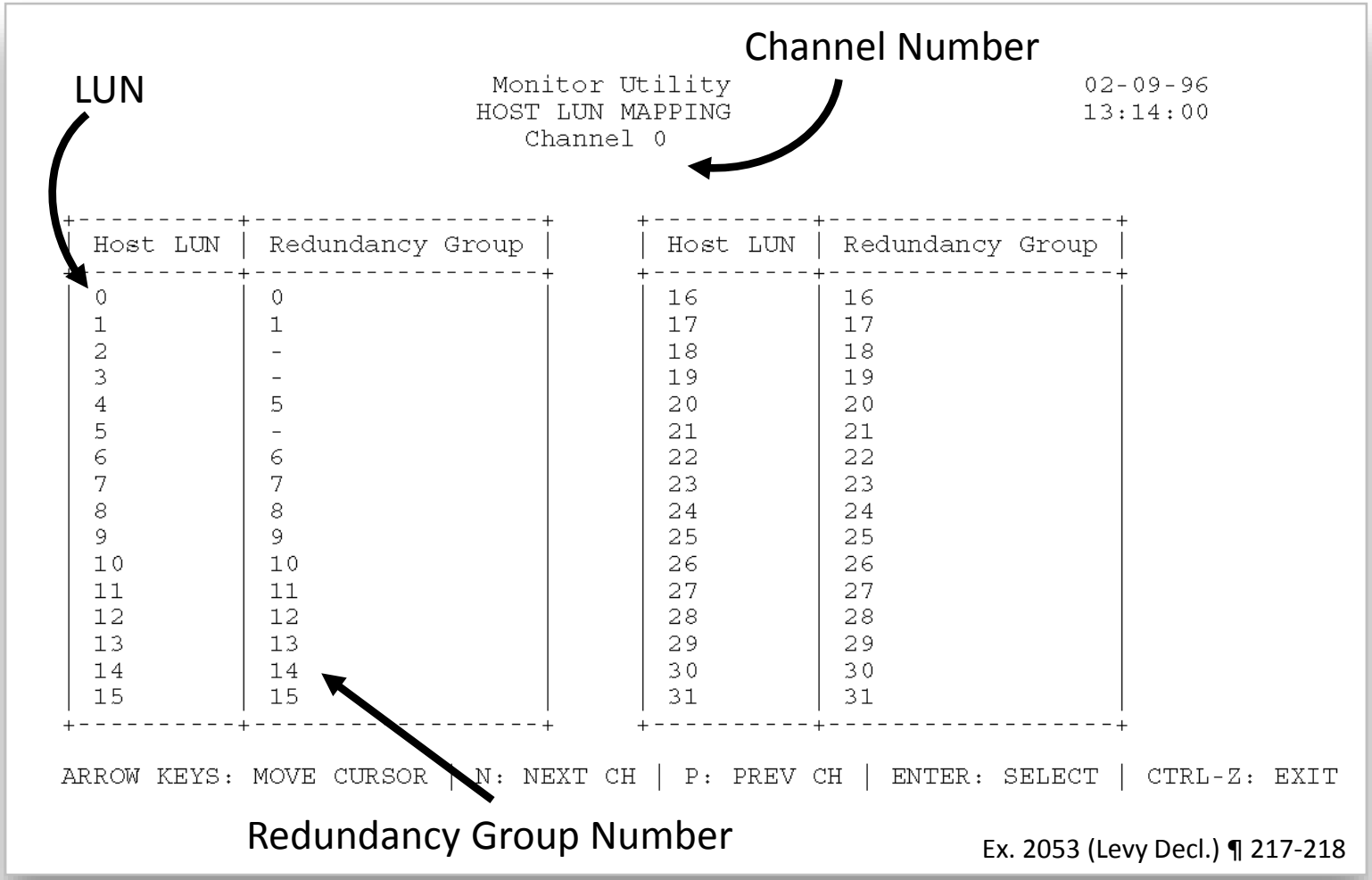
Ex. 2053 (Levy Decl.) ¶ 226

None of the information in this "Host LUN Mapping" table identifies a particular host. In fact, there is no requirement that a host actually be attached to a host channel at the time redundancy groups are assigned to LUNs for that host channel.

Ex. 2053 (Levy Decl.) ¶ 218

cited in 1207 POR at 43, 47-48

Host LUN Mapping Contains No Identification of any Host



Host LUN	Redundancy Group	Host LUN	Redundancy Group
0	0	16	16
1	1	17	17
2	-	18	18
3	-	19	19
4	5	20	20
5	-	21	21
6	6	22	22
7	7	23	23
8	8	24	24
9	9	25	25
10	10	26	26
11	11	27	27
12	12	28	28
13	13	29	29
14	14	30	30
15	15	31	31

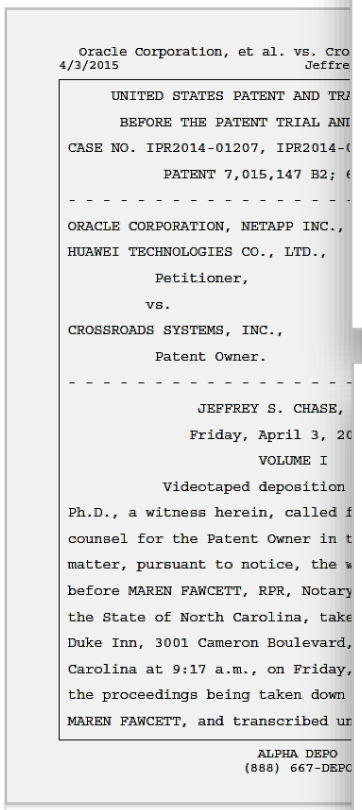
ARROW KEYS: MOVE CURSOR | N: NEXT CH | P: PREV CH | ENTER: SELECT | CTRL-Z: EXIT

Ex. 2053 (Levy Decl.) ¶ 217-218

cited in 1207 POR at 43

Contrary to Petitioners' Assertion Both Experts Agree that "Host LUN Mapping" Does Not Map to Hosts

Professor Chase agrees that Host LUN Mapping does not map to hosts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UNITED STATES PATENT AND TRA
BEFORE THE PATENT TRIAL ANI
CASE NO. IPR2014-01207, IPR2014-(
PATENT 7,015,147 B2; 6

ORACLE CORPORATION, NETAPP INC.,
HUAWEI TECHNOLOGIES CO., LTD.,
Petitioner,
vs.
CROSSROADS SYSTEMS, INC.,
Patent Owner.

JEFFREY S. CHASE,
Friday, April 3, 20
VOLUME I
Videotaped deposition
Ph.D., a witness herein, called f
counsel for the Patent Owner in t
matter, pursuant to notice, the w
before MAREN FAWCETT, RPR, Notary
the State of North Carolina, take
Duke Inn, 3001 Cameron Boulevard,
Carolina at 9:17 a.m., on Friday,
the proceedings being taken down
MAREN FAWCETT, and transcribed ur

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And if you in fact attached multiple hosts to the same host channel, then the CRD-5500 would not distinguish between them with respect to the access controls and LUN mappings in the host LUN mapping table.

Ex. 2055 (Chase Depo.) at 424:8-12

Q. And that would be true if multiple hosts were connected to that same host channel bus for host channel 0, correct?

A. That would be correct. And in that case it is true that the access control granularity in the CRD-5500 is per host channel.

Ex. 2055 (Chase Depo.) at 414:10-15

cited in 1207 POR at 46, 47-48

"Host LUN Mapping" Cannot Allocate Storage to Particular Hosts on the Same Channel Because it Assigns Storage to Channels, not Hosts

- "Host LUN Mapping" Assigns Storage to Channels, Not Hosts. Ex. 2053 (Levy Decl.) ¶ 203

- Any Host on a Channel Has Access to All Storage Assigned to the Channel via "Host LUN Mapping" Ex. 2053 (Levy Decl.) ¶ 228

- There is no way the "Host LUN Mapping" table can Allocate Storage to Specific Hosts on a Channel because it Neither Receives Nor Contains any Host Identity Information. Ex. 2053 (Levy Decl.) ¶¶ 219, 229

cited in 1207 POR at 41-44

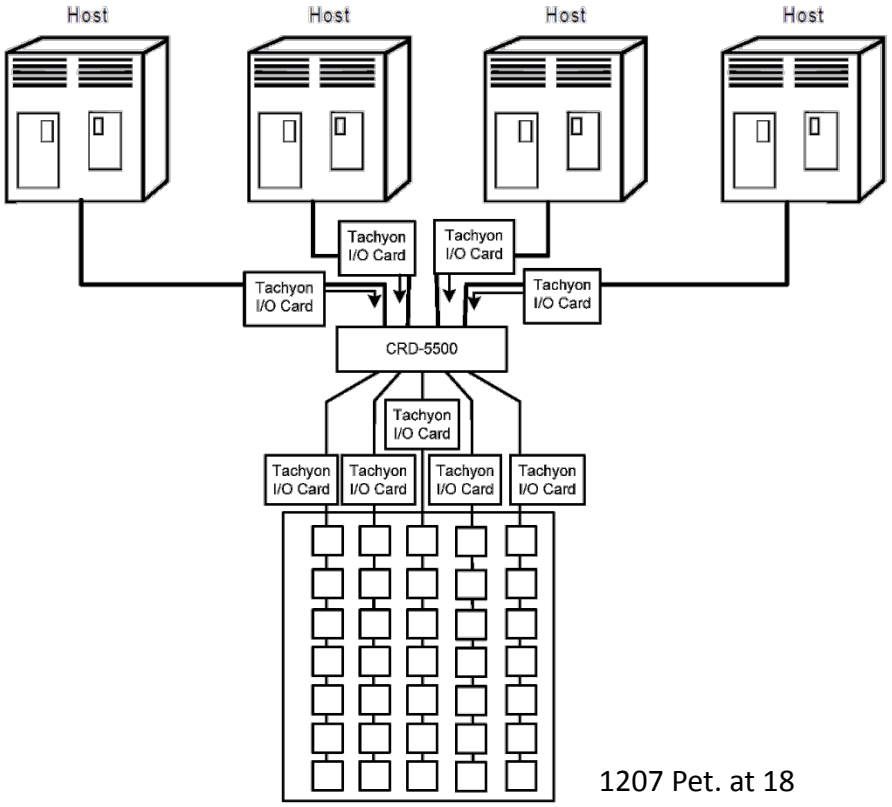
Petitioners' Reliance on the Host LUN Mapping in their Combination Fails – the Host LUN Mapping Does Not Map Hosts, it Maps Host Channels

- Chase admits CRD cannot identify multiple hosts on one channel
- Chase concedes CRD's "access control granularity" is only per channel

Petitioners' Assertion that Channel Allocation of Storage is Per Host Mapping Fails

Petitioners Rely on Channel ID As a Substitute for Host ID in a Single Host Per Channel Configuration

Petitioners' Reply Relies on a Single Host Per Channel Configuration ("[E]ach channel is associated with only one host and thus the channel ID uniquely identifies each host device.") Reply at 3.



1207 Pet. at 18

Using Channel Numbers as Substitutes for Host Identification Never Enables Allocation of Storage to Particular Hosts

- Even if only one host is attached to a channel, the channel number cannot serve as a proxy or substitute for the specific host identity.
- Patents are about control at the host/device level not at the channel/controller level.

cited in 1207 POR at 41-45, 48-49

The Invention is Directed Toward Mapping Storage Space to Each Host

The invention requires the capability to map different storage to different hosts on the same transport medium (i.e., a common communications link):

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PATENT OWNER'S RESPO
PURSUANT

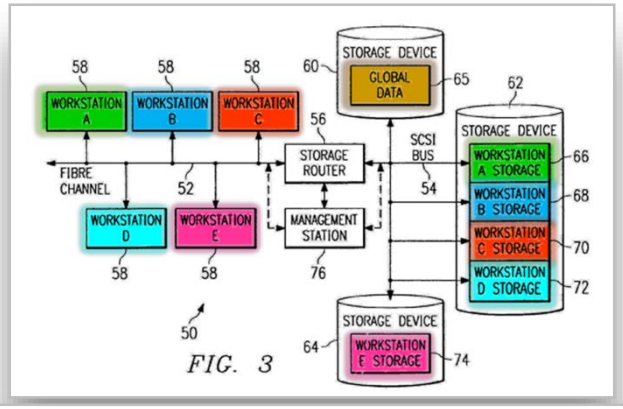


FIG. 3

In Figure 3, workstations 58 are interconnected with storage router 56 by the **same** Fibre Channel high speed serial transport. Ex. 1001, 4:13-17. . . .

The storage router associates each particular workstation on the first transport medium (Fibre Channel transport 52) with storage in order to allocate such storage to the particular workstations in the map. *Id.* at 9:11-17

1209 POR at 3-7 (citing Ex. 2053 (Levy Decl.) ¶¶ 51-53)
1207 POR at 2, 41

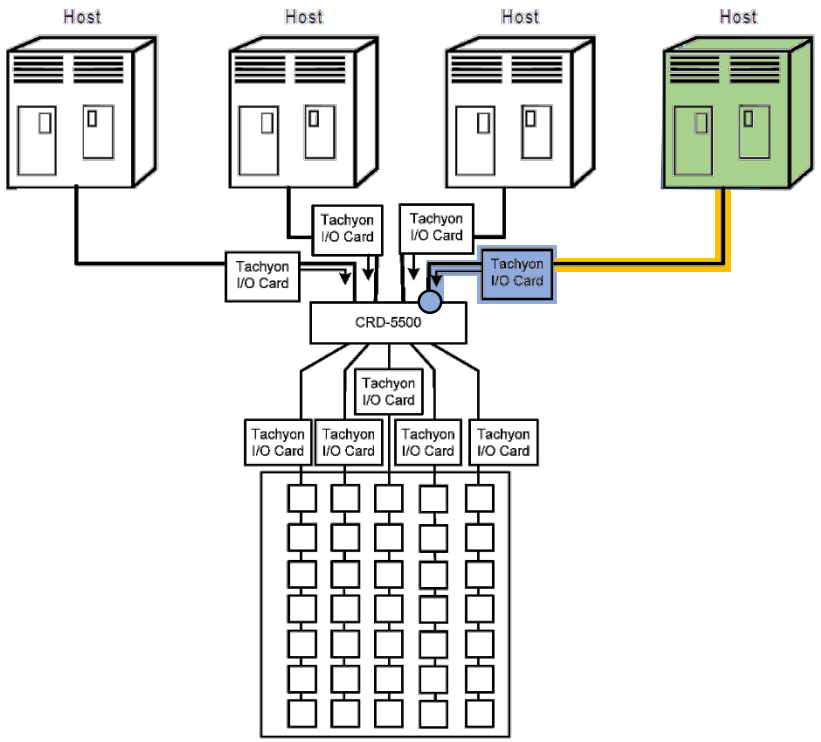
The Claimed Map Includes a Device Not a Channel (i.e. First Controller)

14. An apparatus for providing virtual local storage on a remote storage device to a device operating according to a Fibre Channel protocol, comprising:

a first controller operable to connect to and interface with a first transport medium, wherein the first transport medium is operable according to the Fibre Channel protocol;

a second controller operable to connect to and interface with a second transport medium, wherein the second transport medium is operable according to the Fibre Channel protocol; and

a supervisor unit coupled to the first controller and the second controller, the supervisor unit operable to control access from the device connected to the first transport medium to the remote storage device connected to the second transport medium using native low level, block protocols according to a map between the device and the remote storage device.



Claim 14, '147 Patent

1207 Pet. at 18-20; 1207 POR at 37, 41-47

The Claimed Map Includes a Device Not a Channel (i.e. First Controller)

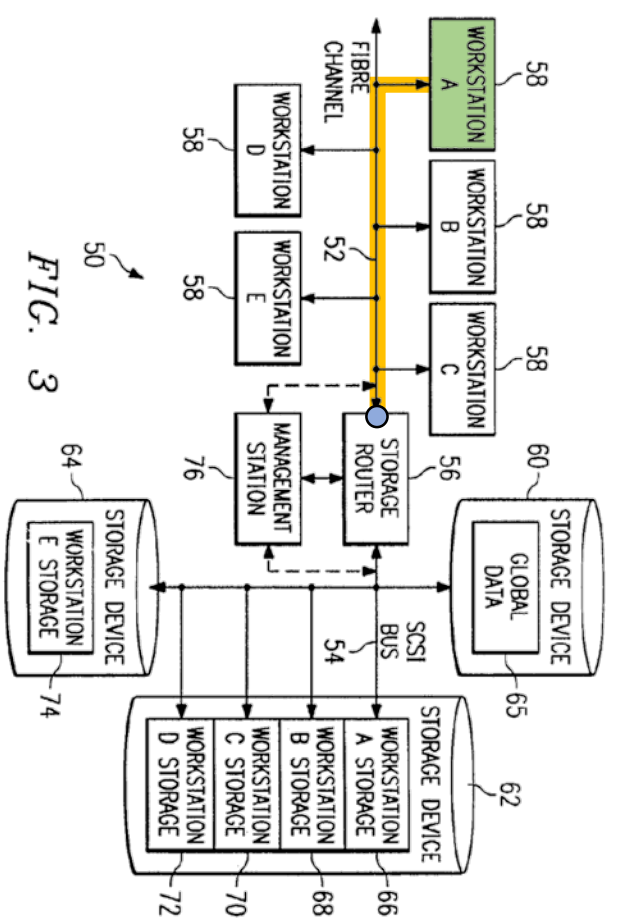
14. An apparatus for providing virtual local storage on a remote storage device to a device operating according to a Fibre Channel protocol, comprising:

a first controller operable to connect to and interface with a first transport medium, wherein the first transport medium is operable according to the Fibre Channel protocol;

a second controller operable to connect to and interface with a second transport medium, wherein the second transport medium is operable according to the Fibre Channel protocol; and

a supervisor unit coupled to the first controller and the second controller, the supervisor unit operable to control access from the device connected to the first transport medium to the remote storage device connected to the second transport medium using native low level, block protocols according to a map between the device and the remote storage device.

Claim 14, '147 Patent



1207 Pet. at 18-20; 1207 POR at 37, 41-47;
1209 POR at 8-9 (citing Ex. 2053 (Levy Decl.) ¶¶ 58-59)

The Claimed Map Includes a Device Not a Channel (i.e. First Controller)

14. An apparatus for providing virtual local storage on a remote storage device to a device operating according to a Fibre Channel protocol, comprising:

a first controller operable to connect to and interface with a first transport medium, wherein the first transport medium is operable according to the Fibre Channel protocol;

a second controller operable to connect to and interface with a second transport medium, wherein the second transport medium is operable according to the Fibre Channel protocol; and

a supervisor unit coupled to the first controller and the second controller, the supervisor unit operable to control access from the device connected to the first transport medium to the remote storage device connected to the second transport medium using native low level, block protocols according to a map between the device and the remote storage device.

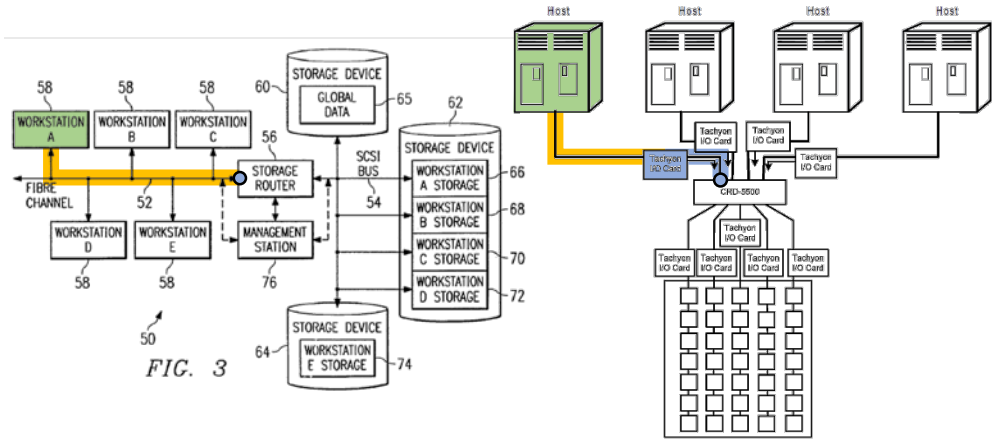


FIG. 3

Claim 14, '147 Patent

1207 Pet. at 18-20; 1207 POR at 37, 41-47;
1209 POR at 8-9 (citing Ex. 2053 (Levy Decl.) ¶¶ 58-59)

The Claimed Map Includes a Device Not a Channel (i.e. First Controller)

a first controller | a first transport medium | device connected to the first transport medium

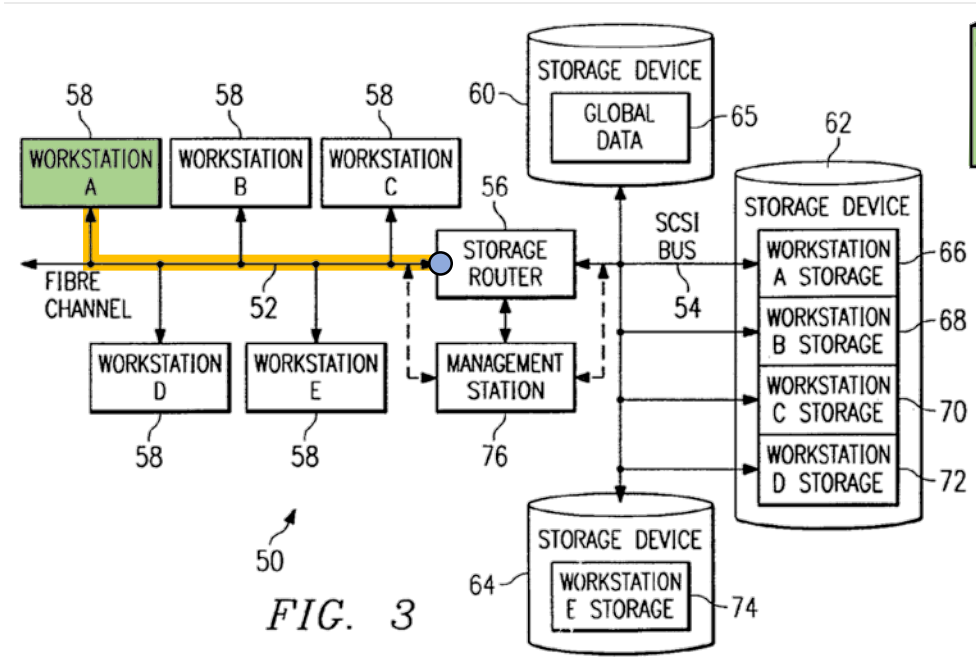
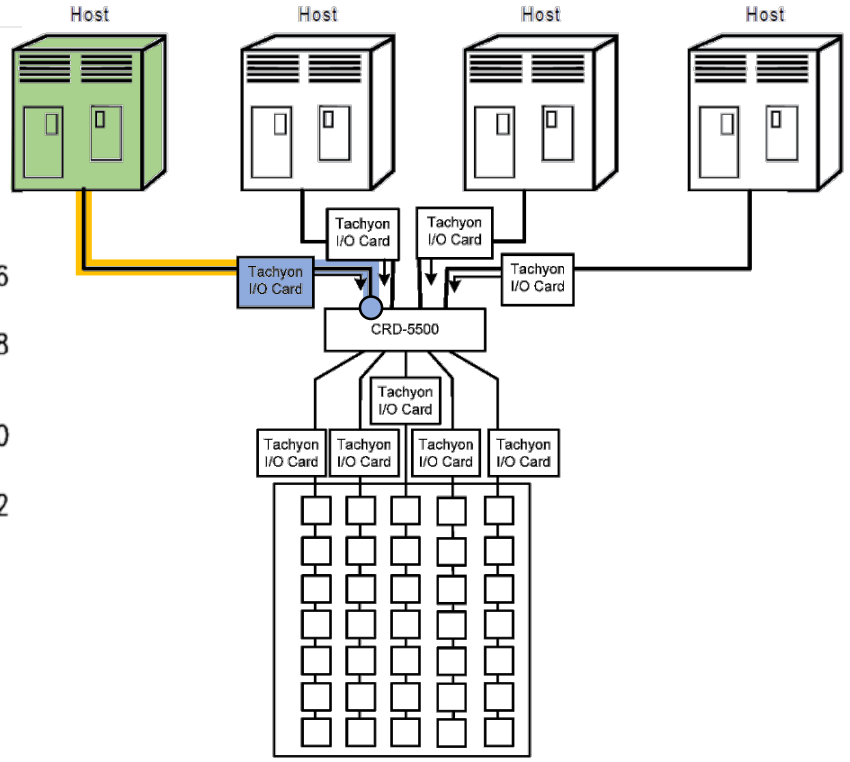


FIG. 3



1207 Pet. at 18-20, 1207 POR at 37, 41-47
1209 POR at 8-9 (citing Ex. 2053 (Levy Decl.) ¶¶ 58-59)

Petitioners Attempt to Overcome the Fact that Host LUN Mapping Does Not Map to Hosts by Mischaracterizing the Testimony of Dr. Levy Related to Fibre Channel ID

Petitioners Attempt to Support Their Channel Argument Through Dr. Levy

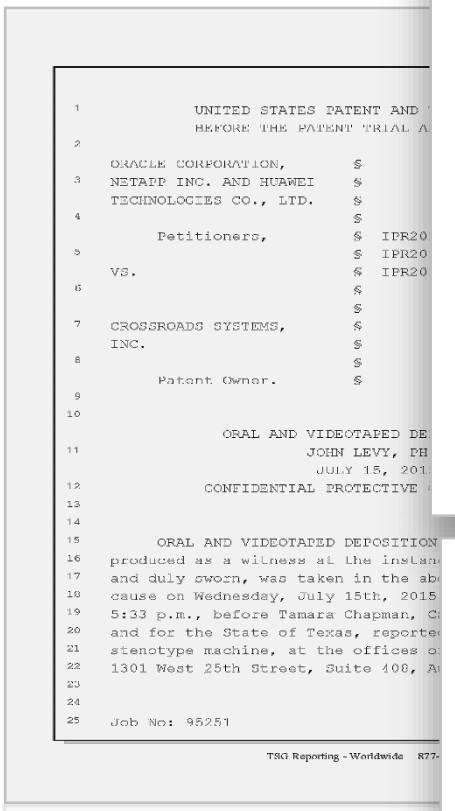
Petitioners assert that Dr. Levy "concedes that a host channel ID (a Fibre Channel ID in the CRD combined system) is sufficient to identify the host device . . . where there is only a single host on each host or fibre channel." Reply at 3 (citing Ex. 1218 (Levy Depo.) at 56:19-57:24)

- Dr. Levy actually says: "Well, on the host side of the map, all that's required in the map is an identifier sufficient to distinguish between multiple hosts on the first transport medium. So a fibre channel ID of some kind would be one example of something that could distinguish between such hosts." Ex. 1218 (Levy Depo.) at 57:19-24

- Further, it is clear in context that Dr. Levy was indicating that a fibre channel ID (*e.g.*, AL_PA or World Wide Name) similar to a SCSI ID would be sufficient to distinguish between host devices on a first transport medium.

cited in 1207 PO Mot. Exclude at 2 (FRE 106)

Petitioners Attempt to Support Their Channel Argument Through Dr. Levy



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INC. $
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Patent Owner. $

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JOHN LEVY, PH
JULY 15, 201
CONFIDENTIAL PROTECTIVE

ORAL AND VIDEOTAPED DEPOSITION
produced as a witness at the instan
and duly sworn, was taken in the ab
cause on Wednesday, July 15th, 2015
5:33 p.m., before Tamara Chapman, C
and for the State of Texas, reporte
stenotype machine, at the offices o
1301 West 25th Street, Suite 408, A

Job No: 95251

TSG Reporting - Worldwide 877-

A. Well, given that an entire storage device is what needs to be represented in the map and that there is only one SCSI bus and that SCSI IDs are unique on that SCSI bus, which they must be, then in that case a SCSI ID could be sufficient to identify the mapped storage.

Q. Okay. So let's discuss the parallel concept on the fibre channel side.

In the circumstance where there is only a single host device on a fibre channel, is the fibre channel ID sufficient to identify the host device?

Well, on the host side of the map, all that's required in the map is an identifier sufficient to distinguish between multiple hosts on the first transport medium. So a fibre channel ID of some kind would be one example of something that could distinguish between such hosts.

Ex. 1218 (Levy Depo.) at 57:3-12, 19-24

cited in 1207 PO Mot. Exclude at 2 (FRE 106)

Petitioners Attempt to Support Their Channel Argument Through Dr. Levy

Moreover, Petitioners' only citation for the meaning of "fiber channel ID" confirms Dr. Levy's use in his testimony:

> To the contrary, the '147 patent itself discusses fiber channel identifiers. "Fibre Channel devices within a fabric are addressed by a unique port identifier. This identifier is assigned to a port during certain well defined states of the FC protocol." Ex. 1001 at 8:1-2.
>
> 1207 Pet. Opp. to Mot. to Exclude at 2

Fibre Channel ID is not the Same Thing as Channel Number

- Petitioners concede that a Fibre Channel identifier is a unique host identifier, but assert for the first time in their Reply that it is the same as a "host channel ID" (Pet. Reply at 3)
- But a "Fibre Channel ID" cannot be the same thing as Channel Number, because Channel Numbers cannot distinguish between multiple hosts on the same channel:

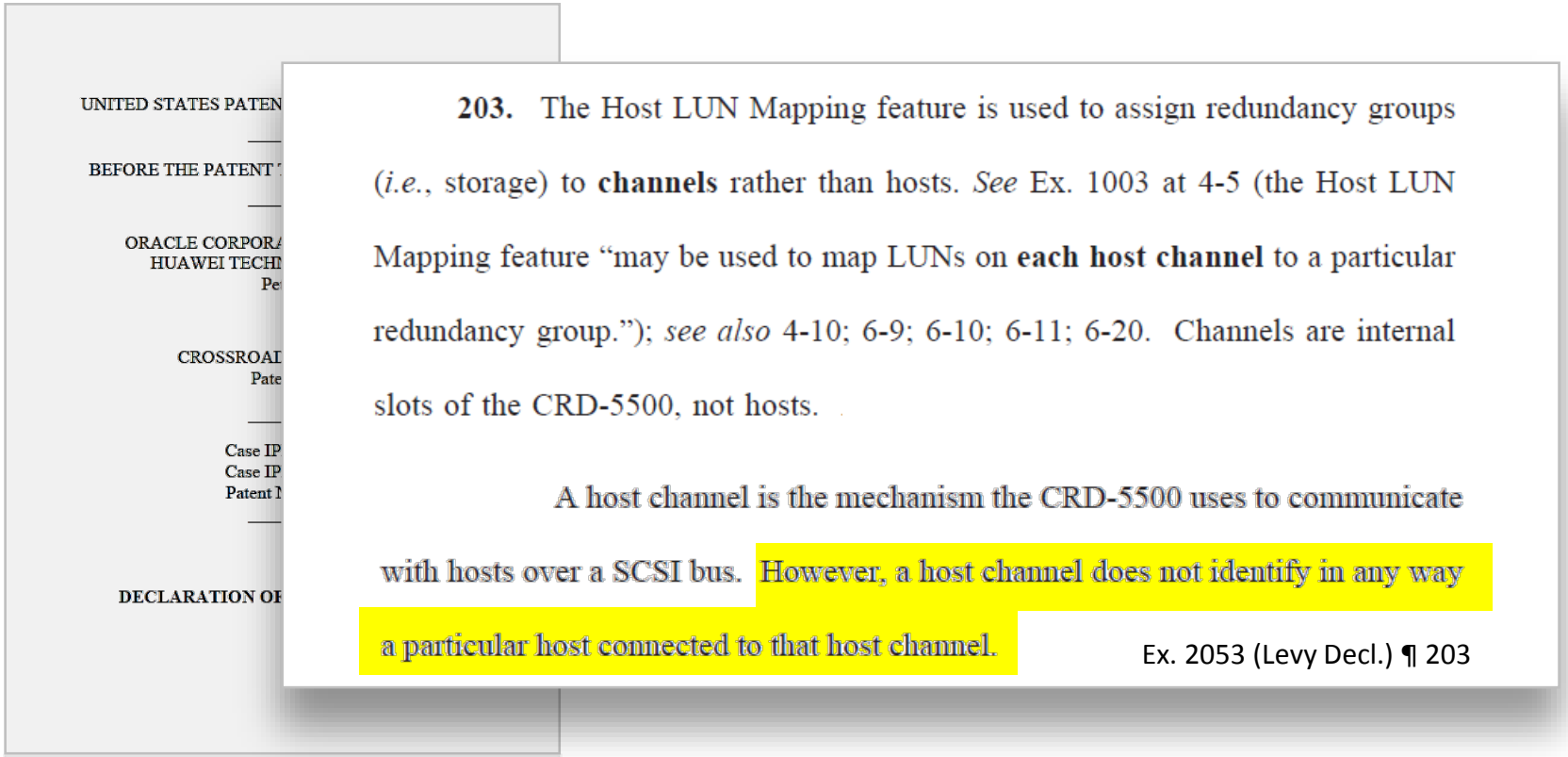
> **220.** There is nothing in the CRD-5500 Manual that indicates that the CRD-5500 can distinguish between devices attached to a host channel.
>
> Ex. 2053 (Levy Decl.) ¶ 220

> And if you in fact attached multiple hosts to the same host channel, then the CRD-5500 would not distinguish between them with respect to the access controls and LUN mappings in the host LUN mapping table.
>
> Ex. 2055 (Chase Depo.) at 424:8-12

cited in 1207 POR at 46, 54

The Combination uses Channel Numbers

The combination's "Host LUN Mapping" only uses the Channel Number



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Patent I

DECLARATION OF

203. The Host LUN Mapping feature is used to assign redundancy groups (*i.e.*, storage) to **channels** rather than hosts. *See* Ex. 1003 at 4-5 (the Host LUN Mapping feature "may be used to map LUNs on **each host channel** to a particular redundancy group."); *see also* 4-10; 6-9; 6-10; 6-11; 6-20. Channels are internal slots of the CRD-5500, not hosts.

A host channel is the mechanism the CRD-5500 uses to communicate with hosts over a SCSI bus. However, a host channel does not identify in any way a particular host connected to that host channel.

Ex. 2053 (Levy Decl.) ¶ 203

So if Petitioners' "Fibre Channel ID" is not a Channel Number, it is not used in the combination

cited in 1207 POR at 42

Petitioners' Assertion that Channel Allocation of Storage is Per Host Mapping Fails

- The patent claims mapping hosts NOT channels.
- Dr. Levy's testimony supports the fact that the CRD allocates storage per channel and does not map hosts to storage space.

Petitioners' Combination Requiring the Tachyon Chip to Pass Host ID Fails

There Has Never Been Any Support for Petitioners' Claim that the Tachyon Passes Host Device Identity for "Host LUN Mapping" Cross-Referencing

Petition/Reply

The **host device's identity can be derived from the incoming message (e.g., via FCP header or SCSI header) and/or from the channel of the host module slot receiving the communication**, if such is recognized. *(Id.)* [citing Ex. 1010 at ¶¶ 42-43]. The Tachyon chip passes the host device identity, as well as the SCSI payload, to the CRD-5500 controller processor, where the host device information is cross-referenced with the "Host LUN Mapping" maintained by the CRD-5500 controller to identify a redundancy group of the RAID array corresponding to the host device's virtual storage address. *(Id. at ¶¶ 42, 45)*

1207 Reply at 6 (citing Pet. at 18-19) (emphasis in Reply)

Chase Declaration

(42.) Functionally the combined CRD-5500 controller supports communications between the host devices and the storage devices in the following manner. A read request may be initiated by a host device on a FC channel. Because the host is transmitting the command via FC, a FC controller within the host encapsulates the command in a FC header structure prior to transmitting the command to the CRD-5500. The command is received via a host module slot of the CRD-5500 controller and passed to the Tachyon logic for processing. The Tachyon logic extracts the SCSI command embedded in the FC wrapper. It forwards this information to the CRD-5500 CPU for processing. The CRD-5500 matches the combination of LUN and host identification (e.g., host channel or FC unique identifier) in the SCSI command with a RAID redundancy group, and then

Ex. 1010 (Chase Decl.) ¶ 42

(45.) As recited by Claim 1[B], the combined system includes "a buffer providing memory work space for the storage router". The CRD-5500 controller includes an onboard cache with "up to 512 megabytes of memory." *See* Ex. 1003 at 1-4.

Ex. 1010 (Chase Decl.) ¶ 45

cited in 1207 POR at 38

The Combination's Tachyon Interface Card Does Not Pass Host Identity to the CRD-5500 CPU

- FCP maps SCSI commands into Fibre Channel Information Units used to transport SCSI commands in the payload of a Fibre Channel frame. Ex. 2053 (Levy Decl.) ¶¶ 30-31.

- All host information is embedded in the Fibre Channel frame-the SCSI commands do not contain any host information.
  Ex. 2053 (Levy Decl.) ¶¶ 31, 199, 201

- Because the extracted SCSI command does not contain any host information, in the proposed combination, host information is never sent to the CRD-5500 CPU.

cited in 1207 POR at 39-40

SCSI Commands Do Not Contain Host Identifiers

Table 13 - FCP_CMND payload

Field Name	Description	Size
FCP_LUN	Logical Unit Number	8 bytes
FCP_CNTL	Control Field	4 bytes
FCP_CDB	SCSI command descriptor block	16 bytes
FCP_DL	Data Length	4 bytes

Nothing in the FCP_CMND IU identifies a host.

There is no host information in the SCSI command.

Ex. 2053 (Levy Decl.) ¶ 201

cited in 1207 POR at 39

The Combination's Tachyon Interface Card Does Not Pass Host Identity to the CRD

- Petitioners argue that because "the sending host would be identifiable" at the Tachyon chip, the combination does not rely on channel numbers. Reply at 7 (citing Ex. 1232 (Levy Depo.) at 119:4-25)

- But the Tachyon never passes the host identity information to the CRD-5500 CPU for use in mapping or access controls.

1207 POR at 39-40

Both Experts State that the Tachyon Only Sends SCSI Commands to the CRD CPU, Not Host ID

Chase:

> The command is received via a host module slot of the CRD-5500 controller and passed to the Tachyon logic for processing. The Tachyon logic extracts the SCSI command embedded in the FC wrapper. It forwards this information to the CRD-5500 CPU for processing.

Ex. 1010 (Chase Decl.) ¶ 42

Levy:

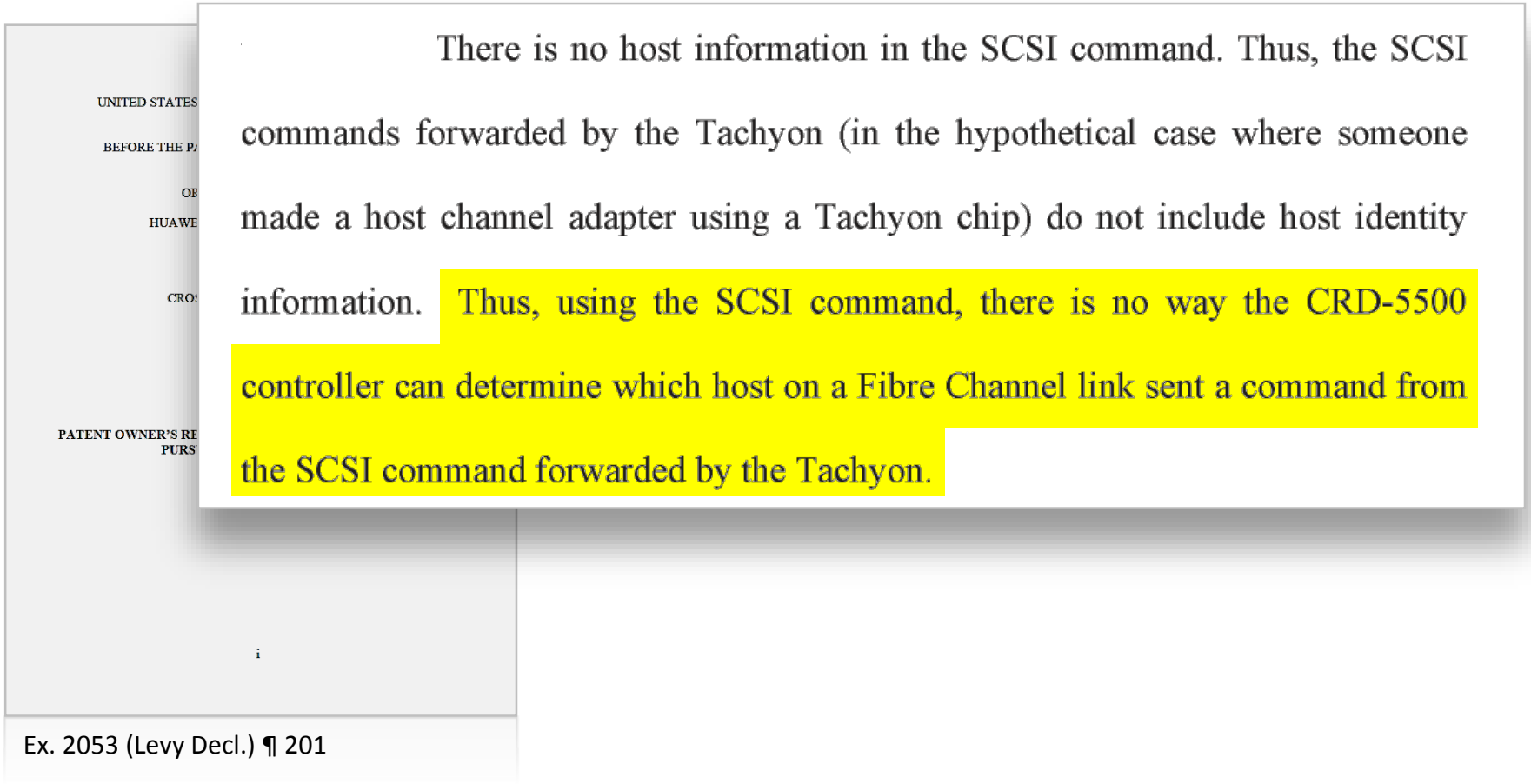
> Thus, the SCSI commands forwarded by the Tachyon chip (in the hypothetical case where someone made a host channel adapter using a Tachyon chip) do not include host identity information. Thus, there is no way the CRD-5500 controller can determine which host on a Fibre Channel link sent a command from the SCSI command forwarded by the Tachyon. *Id.*

Ex. 2053 (Levy Decl.) ¶ 201

cited in 1207 POR at 38-39

The CRD-5500 Cannot "Cross-Reference" "Host Device Information" it Never Receives

The CRD-5500 controller cannot "cross-reference" or identify the particular host which sent the command because it never receives the host identity.



There is no host information in the SCSI command. Thus, the SCSI commands forwarded by the Tachyon (in the hypothetical case where someone made a host channel adapter using a Tachyon chip) do not include host identity information. Thus, using the SCSI command, there is no way the CRD-5500 controller can determine which host on a Fibre Channel link sent a command from the SCSI command forwarded by the Tachyon.

Ex. 2053 (Levy Decl.) ¶ 201

cited in 1207 POR at 40

Petitioners' Allegations that the Tachyon Interface Card Passes Host Information to the CRD CPU Fails

- Chase contradicted their combination from the start
- In fact, both experts agree that the Tachyon chip does not pass host information

Petitioners Have Failed to Prove Unpatentability on any CRD Related Ground

- Petitioners' reliance on Host LUN Mapping in their combination fails – Host LUN Mapping does not map hosts, it maps host channels
  - Chase admits CRD cannot identify multiple hosts on one channel
  - Chase concedes CRD's "access control granularity" is only per channel

- Petitioners' assertion that channel allocation of storage is per host mapping fails
  - The patent claims are directed to mapping hosts NOT channels

- Petitioners' allegations that the Tachyon interface passes host information to the CRD CPU fails
  - Chase contradicted their combination from the start

Petitioners' Motivations to Combine Have Nothing to Do with the Claimed Access Controls or Mapping

Petitioners' Motivations to Combine

- Enhance the communication and storage options of a host device on a FC transport medium
- Benefit from the "Host LUN Mapping" feature of the CRD-5500 controller
- Avail the host computing device of ubiquitous mass storage applications (e.g., RAID)

cited in 1207 POR at 53-54

The Motivations only Relate to Adding Fibre Channel Capability to the CRD-5500

- Petitioners' cited motivations relate only to enhancing the existing CRD-5500 capabilities with the capabilities of the Fibre Channel transport medium
- Petitioners present no motivation to modify the CRD-5500's internal capabilities to add the claimed access controls
- Petitioners never explain how to modify the CRD-5500's internal capabilities to add the claimed access controls
- Petitioners rely on "Host LUN Mapping" which contains no concept of the host connected to a channel, regardless of whether that information may be available

cited in 1207 POR at 53-54

BERGSTEN-HIRAI (IPR2014-01197, -1207, -1209)

Overview of Bergsten-Hirai

- The combination fails because Hirai is at the file system level, not the claimed block level
  - The evidence demonstrates that Petitioners' combination ignores the fact that Hirai was at the file system level
  - Petitioners concede this in their Reply and try to get this Board to ignore the expert evidence and teachings of Hirai to conclude that Hirai uses block level permissions

- Petitioners' original combination could not map to hosts because it failed to pass Host ID to their alleged map
  - Both experts agree the emulation drivers of Bergsten strip host identity before the alleged mapping occurs
  - Petitioners actually conceded this point as they walked away from their original combination and assert a brand new combination in one sentence in their Reply

- Petitioners' combination fails because access controls will fail at the logical device level of Bergsten, where Petitioners place them
  - Petitioners conceded this argument by not even providing a response in their Reply

The Combination Fails Because Hirai is at the File System Level, Not the Claimed Block Level

Petitioners' Use of Hirai Fails

- Petitioners assert that Bergsten would use Hirai's access rights to supply the missing access controls (1197 Pet. at 47)
- Petitioners did not even mention block level permissions associated with Hirai in their Petition
- But, as the evidence shows, Hirai's access rights only apply to high level file system access, not NLLBP

Petitioners Attempt to Turn Hirai into Something it is Not

Recognizing their original error, Petitioners now assert that Hirai is at a block or partition level in their Reply:

> Accordingly, one skilled in the art would understand that *Hirai's* access controls are applied at the block or partition level, as Professor Chase explained in his declaration. Ex. 1010 at ¶¶ 144-46.

1197 Reply at 5

Dr. Chase's Citation to Hirai

while providing the connected computers access at a low-level (block not file) basis. *See, e.g.*, 1008 at [0011].

Ex. 1010 (Chase Decl.) ¶ 145

[0011]

An access request from the personal computers 1, 2, ···to the magnetic disk devices 8-12 is notified to the magnetic disk controlling mechanism 6 through the magnetic disk interface boards 4, 5, ···, and it is converted to an access request to a virtual magnetic disk device that extends over the magnetic disk devices 8-12 in the magnetic disk controlling mechanism 6. Through the process above, the magnetic disk devices 8-12 can be handled from the personal computer main body as 1 virtual magnetic disk device with all of the memory regions of the magnetic disk devices 8-12 as its own [memory] region.

Ex. 1008 at [0011]

cited in 1207 POR at 9

Despite Petitioners' Protestations, Hirai Is Just a Traditional Network File Level Storage System

- Hirai explicitly provides access controls by command where the permissible commands are: READ, WRITE, CREATE, DELETE, and EXECUTE.

Partition	Computer name	Access right
Partition 1	Personal computer 1	RWCX
	Personal computer 2	RWCX
	Personal computer 3	RWCX
Partition 2	Personal computer 1	RW
	Personal computer 3	R
Partition 3	Personal computer 1	R
	Personal computer 2	R
Partition n	⋮	⋮

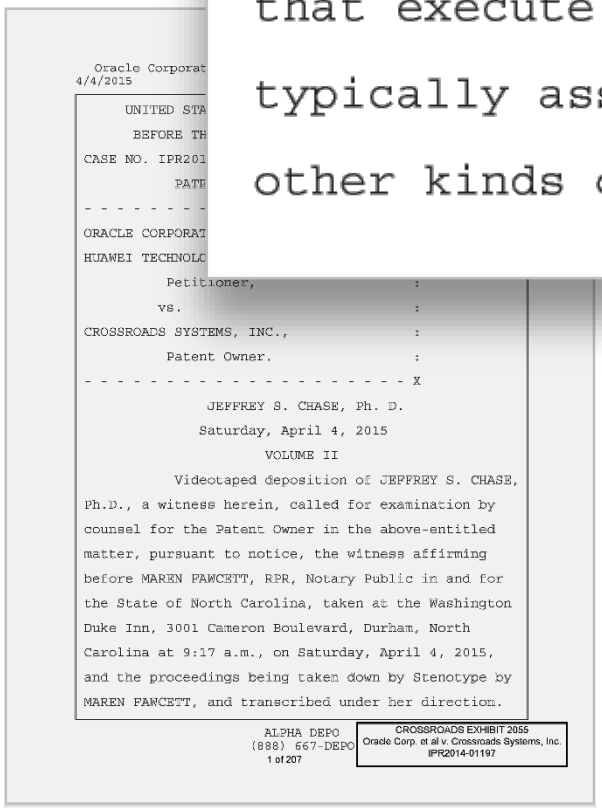
(R: Readable, W: Writable, C: Creatable, X: Executable)

Figure 2

Ex. 1008 Figure 2, see also [0012]

cited in 1197 POR at 19

Dr. Chase Conceded that Execute is Only a File System Command



Oracle Corporat
4/4/2015

UNITED STA
BEFORE TH
CASE NO. IPR201
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ORACLE CORPORAT
HUAWEI TECHNOLC
Petitioner,
vs.
CROSSROADS SYSTEMS, INC.,
Patent Owner.
- X

JEFFREY S. CHASE, Ph. D.
Saturday, April 4, 2015
VOLUME II

Videotaped deposition of JEFFREY S. CHASE, Ph.D., a witness herein, called for examination by counsel for the Patent Owner in the above-entitled matter, pursuant to notice, the witness affirming before MAREN FAWCETT, RPR, Notary Public in and for the State of North Carolina, taken at the Washington Duke Inn, 3001 Cameron Boulevard, Durham, North Carolina at 9:17 a.m., on Saturday, April 4, 2015, and the proceedings being taken down by Stenotype by MAREN FAWCETT, and transcribed under her direction.

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1 of 207

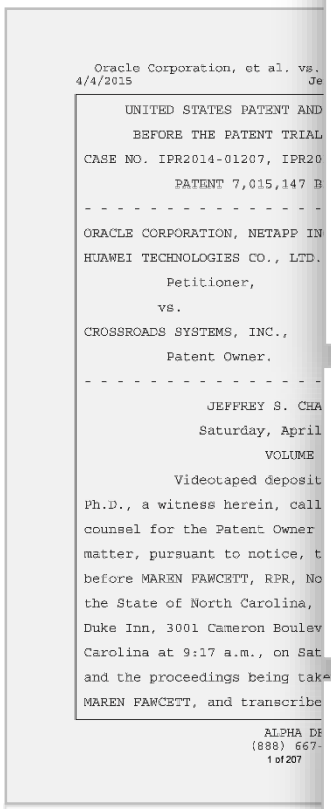
CROSSROADS EXHIBIT 2055
Oracle Corp. et al v. Crossroads Systems, Inc.
IPR2014-01197

I will allow that execute permission is a permission that is typically associated with files and not with other kinds of objects.

Ex.2055 (Chase Depo.) at 318:3-6

cited in 1197 POR at 20

Dr. Chase Conceded that READ, WRITE, CREATE,DELETE, and EXECUTE also are FILE Level Commands


Oracle Corporation, et al. vs.
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UNITED STATES PATENT AND
BEFORE THE PATENT TRIAL
CASE NO. IPR2014-01207, IPR20
PATENT 7,015,147 B
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ORACLE CORPORATION, NETAPP IN
HUAWEI TECHNOLOGIES CO., LTD.
Petitioner,
vs.
CROSSROADS SYSTEMS, INC.,
Patent Owner.
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JEFFREY S. CHA
Saturday, April
VOLUME
Videotaped deposit
Ph.D., a witness herein, call
counsel for the Patent Owner
matter, pursuant to notice, t
before MAREN FAWCETT, RPR, No
the State of North Carolina,
Duke Inn, 3001 Cameron Boulev
Carolina at 9:17 a.m., on Sat
and the proceedings being taken down by Stenotype by
MAREN FAWCETT, and transcribe

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(888) 667-
1 of 207

Q. Read, write and execute are file permissions; is that correct?

A. Read, write and execute could be file permissions.

Q. And are they the standard UNIX file permissions?

A. They are standard UNIX file permissions.

Ex.2054 (Chase Depo.) at 42:15-21

Q. All right. Create -- is create a known file system command or file system operation?

A. Create is a known file system command.

Ex.2055 (Chase Depo.) at 309:18-20

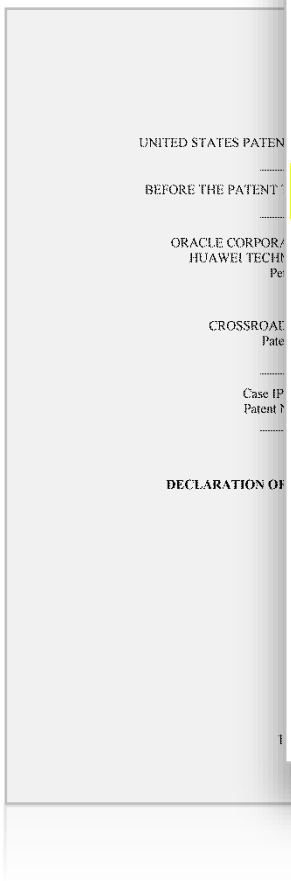
Q. Is delete a known file system command?

A. Yes.

Ex.2055 (Chase Depo.) at 310:8-9

cited in 1197 POR at 24

Dr. Levy Also Agrees that READ, WRITE, CREATE, DELETE, and EXECUTE are File Level Permissions


UNITED STATES PATEN

BEFORE THE PATENT

ORACLE CORPOR
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CROSSROAD

Case IP
Patent

DECLARATION OF

89. When viewing them collectively, one of ordinary skill in the art would understand that *Hirai's* access rights are file system access rights, not low level block permissions. *Hirai's* access rights are consistent with the access permissions of common network servers at the time. In fact, ***all*** of the five "access rights disclosed in *Hirai* had express equivalents in the Network File System (NFS) of Sun Microsystems, Inc. (now part of Petitioner Oracle):

The following access permissions may be requested:

ACCESS3_READ	Read data from file or read a directory
ACCESS3_LOOKUP	Look up a name in a directory (no meaning for non-directory objects)
ACCESS3_MODIFY	Rewrite existing file data or modify existing directory entries
ACCESS3_EXTEND	Write new data or add directory entries
ACCESS3_DELETE	Delete an existing directory entry
ACCESS3_EXECUTE	Execute file (no meaning for a directory)

Ex. 2048 at 28-29.

Ex. 2053 (Levy Decl.) ¶ 89

cited in 1197 POR at 16, 18, 21, 26

Petitioners in their Reply Attempt to Turn CREATE and DELETE into Partition Level Permissions

Petitioners assert that “an administrator could use the ‘create’ and ‘delete’ commands to control the formation and removal of partitions.” 1197 Reply at 5.

But, Dr. Chase Testified that CREATE Would Not be Applied as a Block Level Permission in Hirai

Q. So you cannot -- you cannot answer the question how a create permission could be verified at a low-level block protocol level by the magnetic disk sharing device?

THE WITNESS: Hirai includes no disclosure about how create permission is to be interpreted or how Hirai understands the role of this create permission within this device.

Ex. 2055 (Chase Depo.) at 326:14-22 (objection omitted)

And with all of that said, yes, it's true that I can't answer how create permission would -- might be applied in this particular disclosure of Hirai.

Ex. 2055 (Chase Depo.) at 327:10-13

cited in 1197 POR at 25

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Petitioners Run From the Evidence in their Reply

The Evidence:

- All five of the access rights in Hirai correspond to the access rights in NFS
- Dr. Levy says all five access rights cited by Hirai are at least file level commands
- Dr. Chase conceded that all five commands cited by Hirai are at least file level commands

Petitioners Ignore that Evidence:

- Petitioners, however, insist that the access rights are block level, claiming that Hirai doesn't understand his own invention: "Moreover, "execute" would be nonsensical…" (1197 Reply at 5)
  - Not supported by Chase or any evidence
  - An attorney saying the other side's position is "nonsensical" is not evidence.

Patent Owner and Both Experts Agree That All Five Commands Are High Level File System

Command	Patent Owner/Levy	Chase	Petitioners
READ	NLLBP/HLFS	NLLBP/HLFS	NLLBP/HLFS
WRITE	NLLBP/HLFS	NLLBP/HLFS	NLLBP/HLFS
CREATE	HLFS	HLFS	Partition
DELETE	HLFS	HLFS	Partition
EXECUTE	HLFS	HLFS	Ignore

Patent Owner and Both Experts Agree That All Five Commands Are High Level File System

Command	Patent Owner/Levy	Chase	Petitioners
READ	NLLBP/HLFS	NLLBP/HLFS	NLLBP/HLFS
WRITE	NLLBP/HLFS	NLLBP/HLFS	NLLBP/HLFS
CREATE	HLFS	HLFS	Partition
DELETE	HLFS	HLFS	Partition
EXECUTE	HLFS	HLFS	Ignore

Chase testified that:

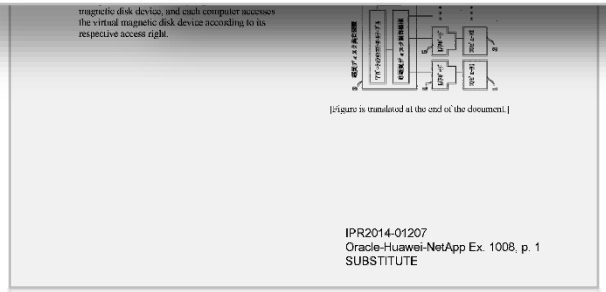
- CREATE made no sense at the Partition Level in Hirai, and
- EXECUTE is a file system permission

Hirai's Access Requests are Converted from High Level File System Protocols to NLLBP, Just Like the Prior Art

- Hirai's Access Requests Are Converted to NLLBP

[0011]

An access request from the personal computers 1, 2, ···to the magnetic disk devices 8-12 is notified to the magnetic disk controlling mechanism 6 through the magnetic disk interface boards 4, 5, ···, and it is converted to an access request to a virtual magnetic disk device that extends over the magnetic disk devices 8-12 in the magnetic disk controlling mechanism 6. Through the process above, the magnetic disk devices 8-12 can be handled from the personal computer main body as 1 virtual magnetic disk device with all of the memory regions of the magnetic disk devices 8-12 as its own [memory] region.


magnetic disk device, and each computer accesses the virtual magnetic disk device according to its respective access right.

[Figure is translated at the end of the document.]

IPR2014-01207
Oracle-Huawei-NetApp Ex. 1008, p. 1
SUBSTITUTE

Ex. 1008 at [0011]

cited in 1197 POR at 22

Hirai Operates at High Level File System Level

- To find Hirai operates at high level file system level, the Board can accept the testimony of both experts and the full teachings of Hirai
- To find that Hirai provides access rights at the NLLBP level, the Board must:
  - Ignore the testimony of Levy saying all commands would be understood to be file level commands
  - Ignore the testimony of Chase stating that EXECUTE is a file level command
  - Ignore Hirai's own use of EXECUTE
  - Ignore Chase stating that CREATE as a block level permission in Hirai makes no sense

Petitioners Concede Hirai is Not at Block Level in their Access Control Arguments

Petition

An artisan skilled in network storage during the relevant timeframe would combine the *Bergsten* and *Hirai* teachings in the above-described manner in order to provide additional levels of granularity to the access controls of the *Bergsten* system based on the mapping-based access controls of *Hirai*.

1197 Pet. at 48

Reply

An artisan skilled in network storage during the relevant timeframe would combine the *Bergsten* and *Hirai* teachings in the above-described manner in order to provide additional levels of granularity to the block-level access controls of the *Bergsten* system using the mapping-based access controls of *Hirai*.

1197 Reply at 7

The Combination Fails Because Hirai is at the File System Level, Not the Claimed Block Level

- The evidence demonstrates that Petitioners' combination ignores the fact that Hirai was at a file system level
- Petitioners concede this in their reply and try to get this Board to ignore the expert evidence and teachings of Hirai to conclude that Hirai uses block level permissions
- Hirai is nothing more than the applicant-admitted prior art

Petitioners' Original Combination Could Not Map to Hosts Because it Failed to Pass Host ID to their Alleged Map

The Original Combination's Access Controls are Implemented at the OS, Downstream of the Emulation Drivers

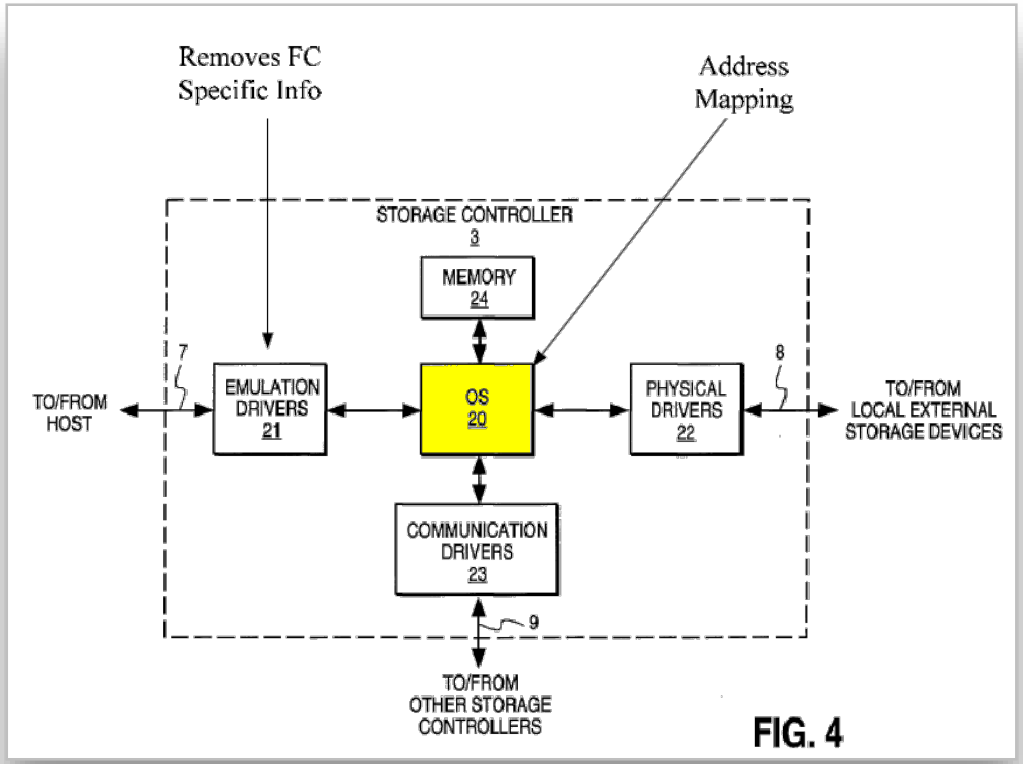
Petition

As explained by Bergsten, the emulation drivers 21 convert host commands 'into a format recognized by the OS' of the storage controller…

1197 Pet. at 46

The emulation drivers 21… provide the command to the processing system of the storage controller. The storage controller, in turn, maps the host address … matches the access controls specified for the host device for the particular logical storage location.

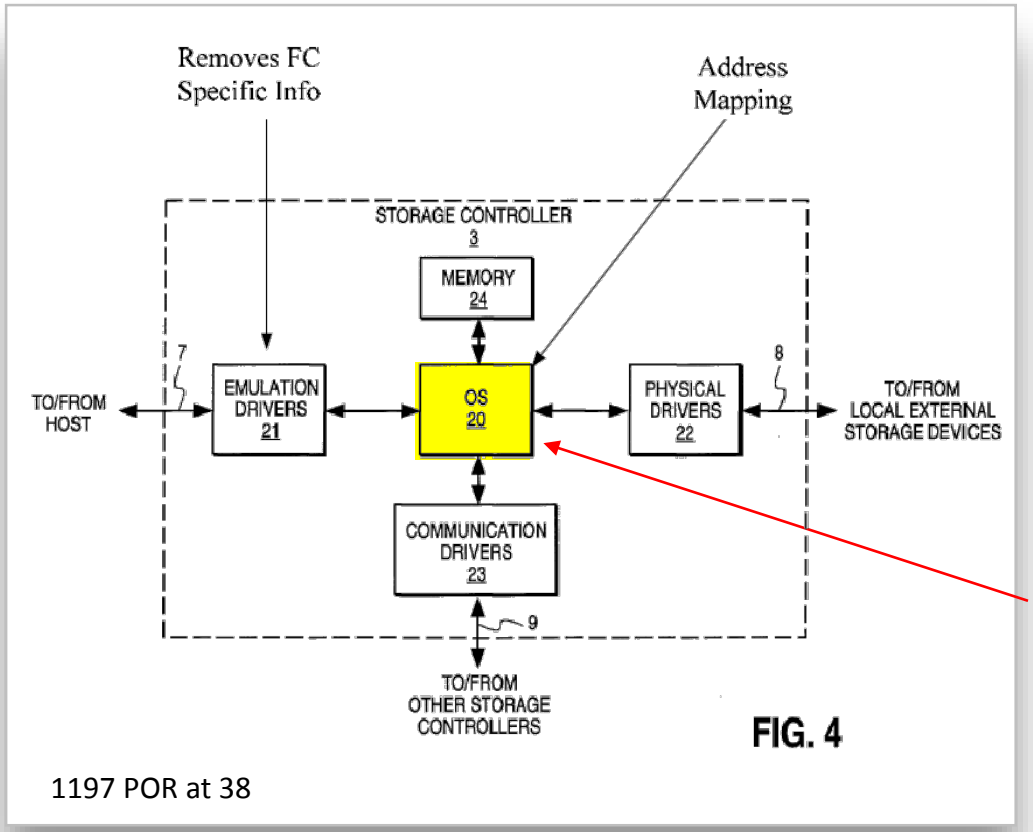
1197 Pet. at 47



cited in 1197 POR at 37-38

In Support of the Petition, Dr. Chase Testified that Access Controls were Implemented in the OS 20

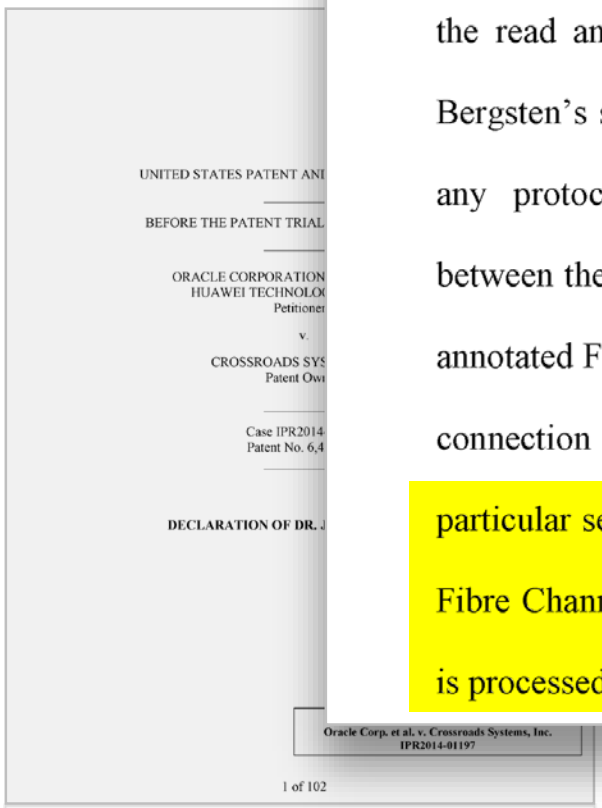
"In the combined system, the supervisor unit resides in the operating system of Bergsten . . . . the supervisor unit is operable to 'map between devices' . . . . the supervisor unit 'implements access controls' for storage space on the storage devices' . . . ." Ex. 1010 (Chase Decl.) ¶ 156-158



1197 POR at 38

cited in 1197 Pet. at 51-52; 1197 POR at 38

The Original Combination's Emulation Drivers Strip Host Identity Before Commands are Passed to OS 20


UNITED STATES PATENT AN

BEFORE THE PATENT TRIAL

ORACLE CORPORATION
HUAWEI TECHNOLO
Petitioner

v.

CROSSROADS SY
Patent Ow

Case IPR2014
Patent No. 6,4

DECLARATION OF DR. J

Oracle Corp. et al. v. Crossroads Systems, Inc.
IPR2014-01197

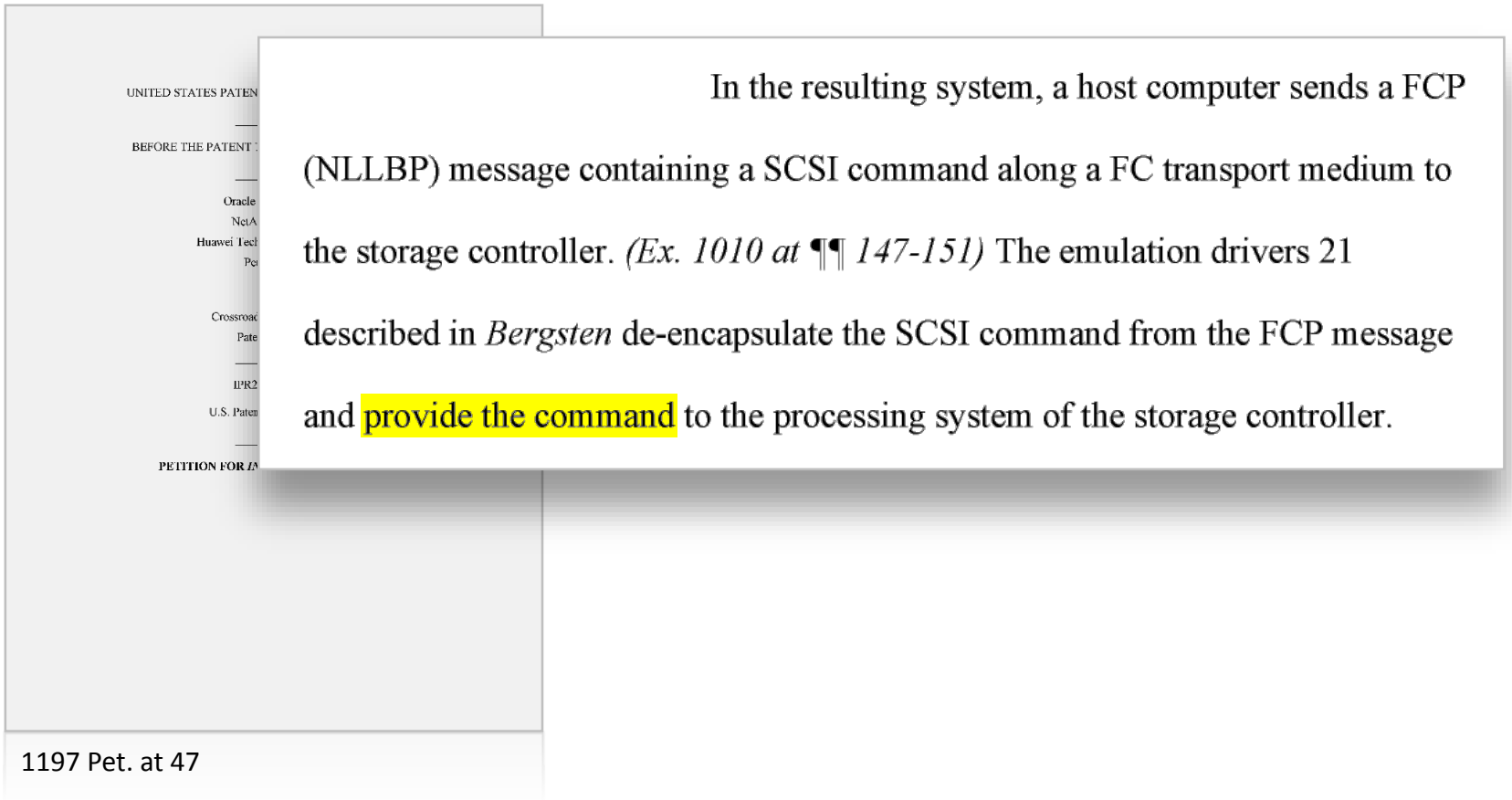
1 of 102

123. The form and content of host identity information is protocol dependent. Therefore, a person of ordinary skill in the art would understand that the read and write commands passed from the emulation drivers to the OS in Bergsten's storage controller would not contain host identity information. Indeed, any protocol-specific information associated with transporting the requests between the host and the storage controller would be removed. Thus, as shown in annotated Figure 4 below, in a system of *Bergsten* which uses Fibre Channel as the connection medium 7 to the host, the specific information used to identify a particular sending device (*i.e.*, identifier of a particular sending host computer in a Fibre Channel frame) is removed by the emulation driver 21 *before* the command is processed by the OS 20 to perform the mappings of *Bergsten*.

Ex. 2053 (Levy Decl.) ¶ 123

cited in 1197 POR at 37-38

Petitioners Agree that the Emulation Drivers Would Only Send a SCSI Command to the OS

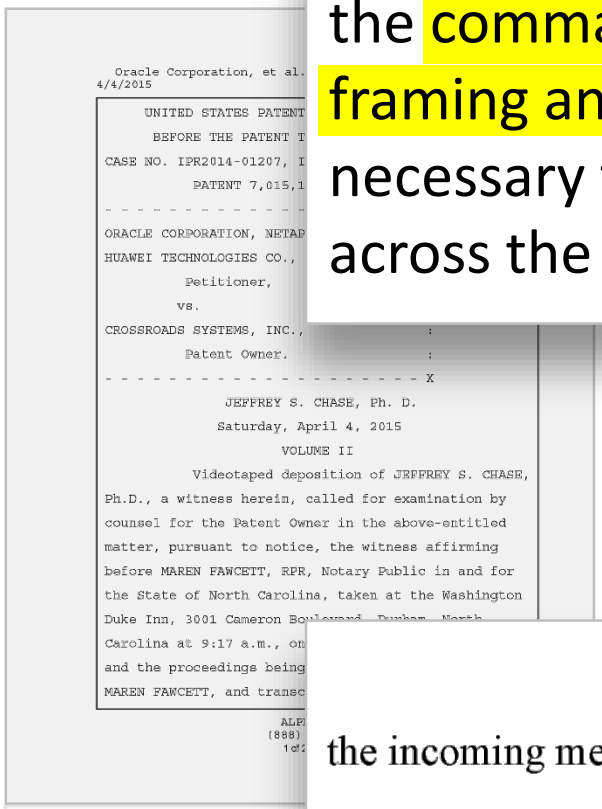


In the resulting system, a host computer sends a FCP (NLLBP) message containing a SCSI command along a FC transport medium to the storage controller. *(Ex. 1010 at ¶¶ 147-151)* The emulation drivers 21 described in *Bergsten* de-encapsulate the SCSI command from the FCP message and provide the command to the processing system of the storage controller.

1197 Pet. at 47

cited in 1197 POR at 37-39

Dr. Chase Testified Further that the Emulation Drivers Would Strip the Host Information and Pass Only the SCSI Command to the OS


Oracle Corporation, et al.
4/4/2015

UNITED STATES PATENT
BEFORE THE PATENT T
CASE NO. IPR2014-01207, I
PATENT 7,015,1

ORACLE CORPORATION, NETAP
HUAWEI TECHNOLOGIES CO.,
Petitioner,
vs.
CROSSROADS SYSTEMS, INC.,
Patent Owner.

JEFFREY S. CHASE, Ph. D.
Saturday, April 4, 2015
VOLUME II

Videotaped deposition of JEFFREY S. CHASE, Ph.D., a witness herein, called for examination by counsel for the Patent Owner in the above-entitled matter, pursuant to notice, the witness affirming before MAREN FAWCETT, RPR, Notary Public in and for the State of North Carolina, taken at the Washington Duke Inn, 3001 Cameron Boulevard, Durham, North Carolina at 9:17 a.m., on and the proceedings being MAREN FAWCETT, and transc

"… that conversion would involve primarily deencapsulating the commands and transmitting the commands to the operating system without the framing and various other information that's necessary to transmit those commands reliably across the network."

Ex. 2055 (Chase Depo.) at 234:5-10

cited in 1197 POR at 38

Petitioners concede that Host ID is only in the framing:

The host device's identity can be derived from the incoming message (e.g., via FCP header or SCSI header)

1197 Pet. at 12

In the Original Combination, No Host Identification Ever Makes it to Where the Alleged Access Controls are Implemented

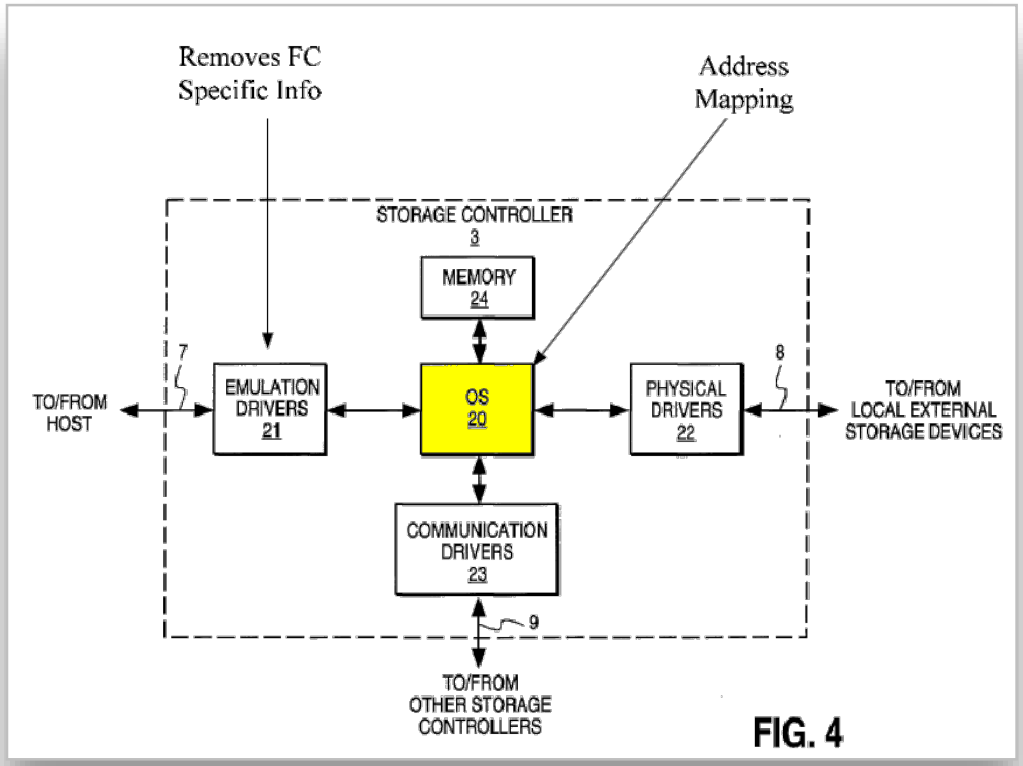
Petition

The emulation drivers 21… provide the command to the processing system of the storage controller. The storage controller, in turn, maps the host address … matches the access controls specified for the host device for the particular logical storage location.

1197 Pet. at 47

In the combined system, the supervisor unit resides in the operating system of Bergsten . . . . the supervisor unit is operable to 'map between devices' . . . . the supervisor unit 'implements access controls' for storage space on the storage devices' . . . .

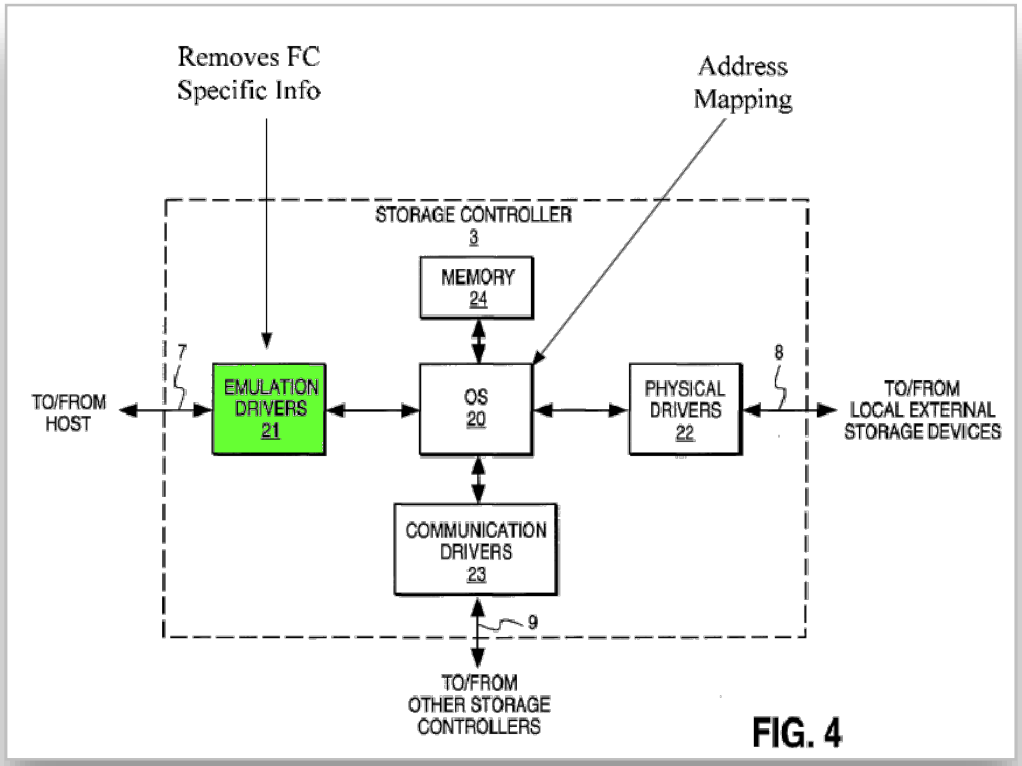
Ex. 1010 (Chase Decl.) ¶ 156-58



cited in 1197 Pet. at 51-52; 1197 POR at 38

In their Reply Petitioners Concede their Error While Impermissibly Attempting to Fix that Error

Reply



In the proposed combination, *Bergsten's* block-level emulation drivers are modified to include access controls.

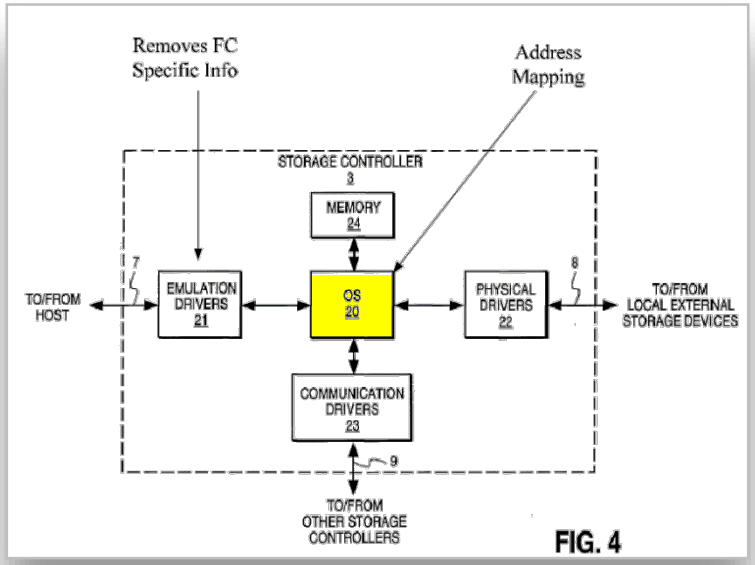
1197 Reply at 1

cited in 1197 POR at 38

In their Reply Petitioners Impermissibly Attempt to Fix their Glaring Error

Petition

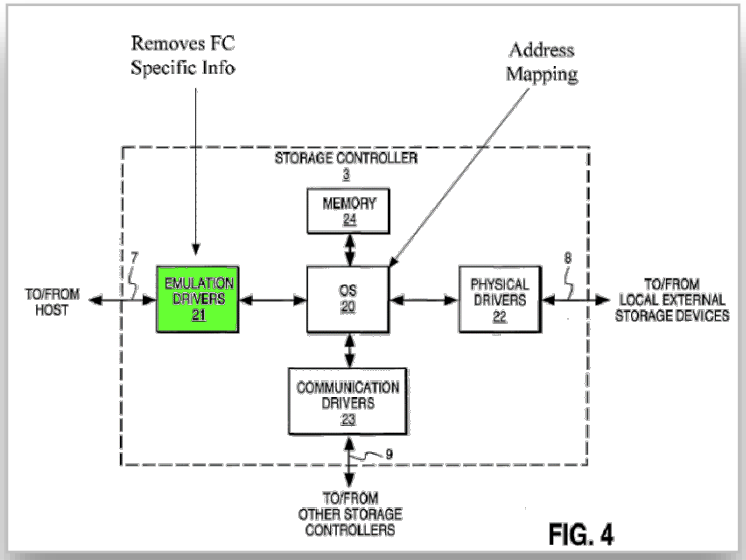
In the combined system, the supervisor unit resides in the operating system of Bergsten . . . . the supervisor unit is operable to 'map between devices' . . . . the supervisor unit 'implements access controls' for storage space on the storage devices' . . . . Ex. 1010 (Chase Decl.) ¶ 156-58



Reply

In the proposed combination, *Bergsten's* block-level emulation drivers are modified to include access controls.

1197 Reply at 1



cited in 1197 Pet. at 51-52; 1197 POR at 38

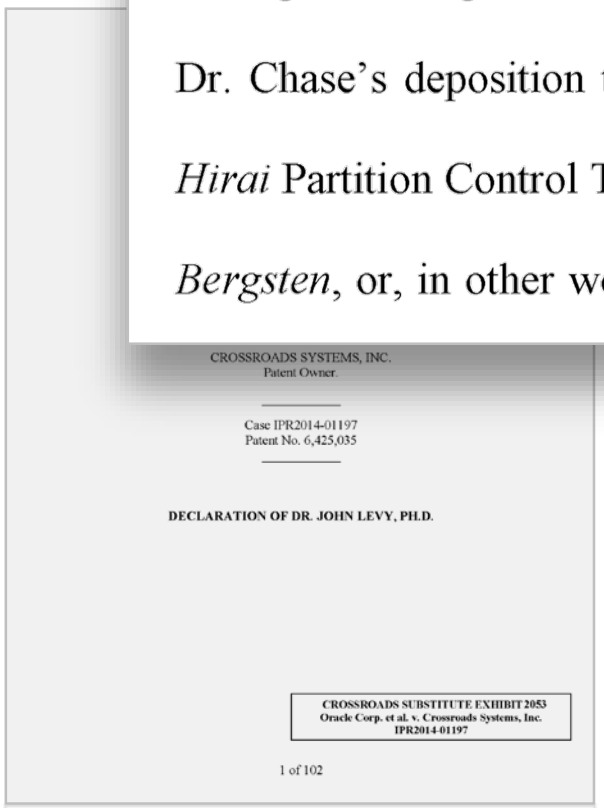
Petitioners' Original Combination Could Not Map to Hosts Because it Failed to Pass Host ID to their Alleged Map

- Both experts agree that the emulation drivers of Bergsten strip host identity before the alleged mapping occurs
- Petitioners conceded this point by walking away from their original combination and asserting a brand new combination in one sentence in their Reply

The Combination Fails Because Access Controls Will Fail at the Logical Device Level of Bergsten as the Petitioners Assert

Petitioners' Combination Cannot Workably Provide "Per Host" Access Rights At The Logical Device Level

131. Petitioners argue that the access rights of *Hirai* would be applied to the logical storage locations of *Bergsten*. See Pet. at 51. Specifically, according to Dr. Chase's deposition testimony, in Petitioners' proposed combined system, the *Hirai* Partition Control Table would be utilized between the two mapping stages of *Bergsten*, or, in other words, in the logical addressing space.


CROSSROADS SYSTEMS, INC.
Patent Owner.

Case IPR2014-01197
Patent No. 6,425,035

DECLARATION OF DR. JOHN LEVY, PH.D.

CROSSROADS SUBSTITUTE EXHIBIT 2053
Oracle Corp. et al. v. Crossroads Systems, Inc.
IPR2014-01197

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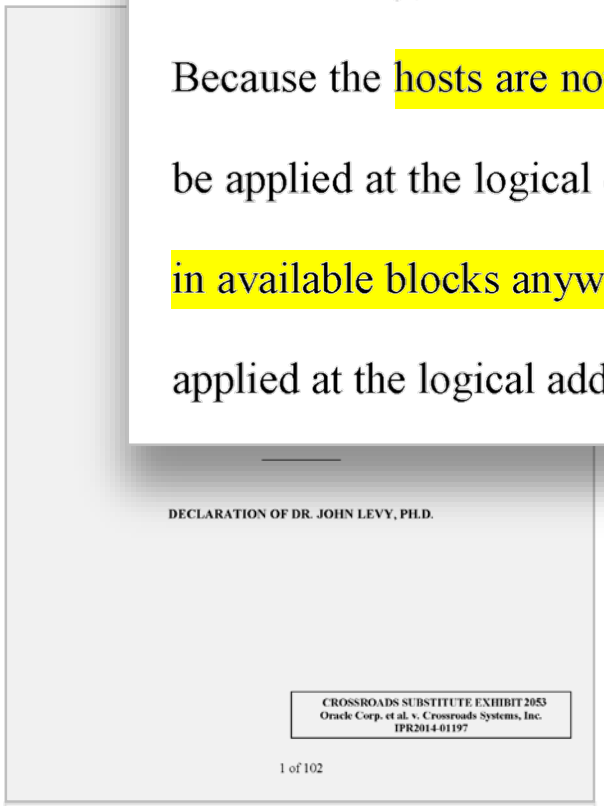
Ex. 2053 (Levy Decl.) ¶ 131

cited in 1197 POR at 41-42

But as Dr. Levy Explained, Hosts Would Be Unaware of Access Controls Applied at the Logical Device Level

133. The hosts store files to the virtual device of *Bergsten*. Ex. 1007, 5:27-30. Generally, a host's file system can store a file anywhere on a (virtual) disk. Because the hosts are not aware of the "access rights" that Petitioners allege would be applied at the logical device (LD) level, the hosts could choose to store file data in available blocks anywhere on the virtual disk, with no regard to the access rights applied at the logical addressing level that correspond to such virtual blocks.


DECLARATION OF DR. JOHN LEVY, PH.D.

CROSSROADS SUBSTITUTE EXHIBIT 2053
Oracle Corp. et al. v. Crossroads Systems, Inc.
IPR2014-01197

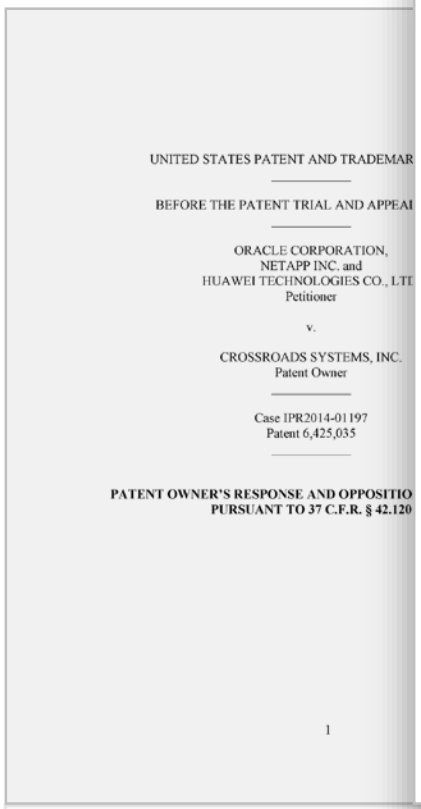
1 of 102

Ex. 2053 (Levy Decl.) ¶ 133

cited in 1197 POR at 42

Dr. Levy Specifically Explains the Problem

If hosts are denied access due to rights they cannot see at the logical address level, they have no logic to reformulate their requests to clear the access rights hurdle


UNITED STATES PATENT AND TRADEMAR

BEFORE THE PATENT TRIAL AND APPEAL

ORACLE CORPORATION,
NETAPP INC. and
HUAWEI TECHNOLOGIES CO., LTD
Petitioner

v.

CROSSROADS SYSTEMS, INC.
Patent Owner

Case IPR2014-01197
Patent 6,425,035

PATENT OWNER'S RESPONSE AND OPPOSITIO
PURSUANT TO 37 C.F.R. § 42.120

1

For example, with reference to the diagram above, if PC1 wants to store a document, PC1 is only aware of the virtual device (that all PCs see) and has no idea of the access rights applied at the logical device level. Thus, PC1 will "write" the document to available space on the Virtual Device without regard to the logical devices that make up the Virtual Device. Levy ¶ 134. . . .

In this scenario, there is no access control on the document—every PC has access. *Id.*

However, if the same document was, instead, stored by PC1 in Area 2 as the next available location, then only PC1 and PC 3 could read the file (because Area 2 is mapped to LD1 and only PC1 and PC3 have read access to LD1). Levy ¶ 135.

. . . Again, the result is uncontrolled and unpredictable. *See also* Levy ¶136.

1197 POR at 43

As Patent Owner States in its Response, Access Controls at the Logical Device Level are not Workable

The foregoing problems with the combination show that providing "per host" access rights at the logical address level, per the asserted combination, could not successfully apply access controls in any useful manner, even assuming it had none of the flaws previously discussed. Accordingly, there is no reasonable expectation of success. *Id.* at ¶ 137.

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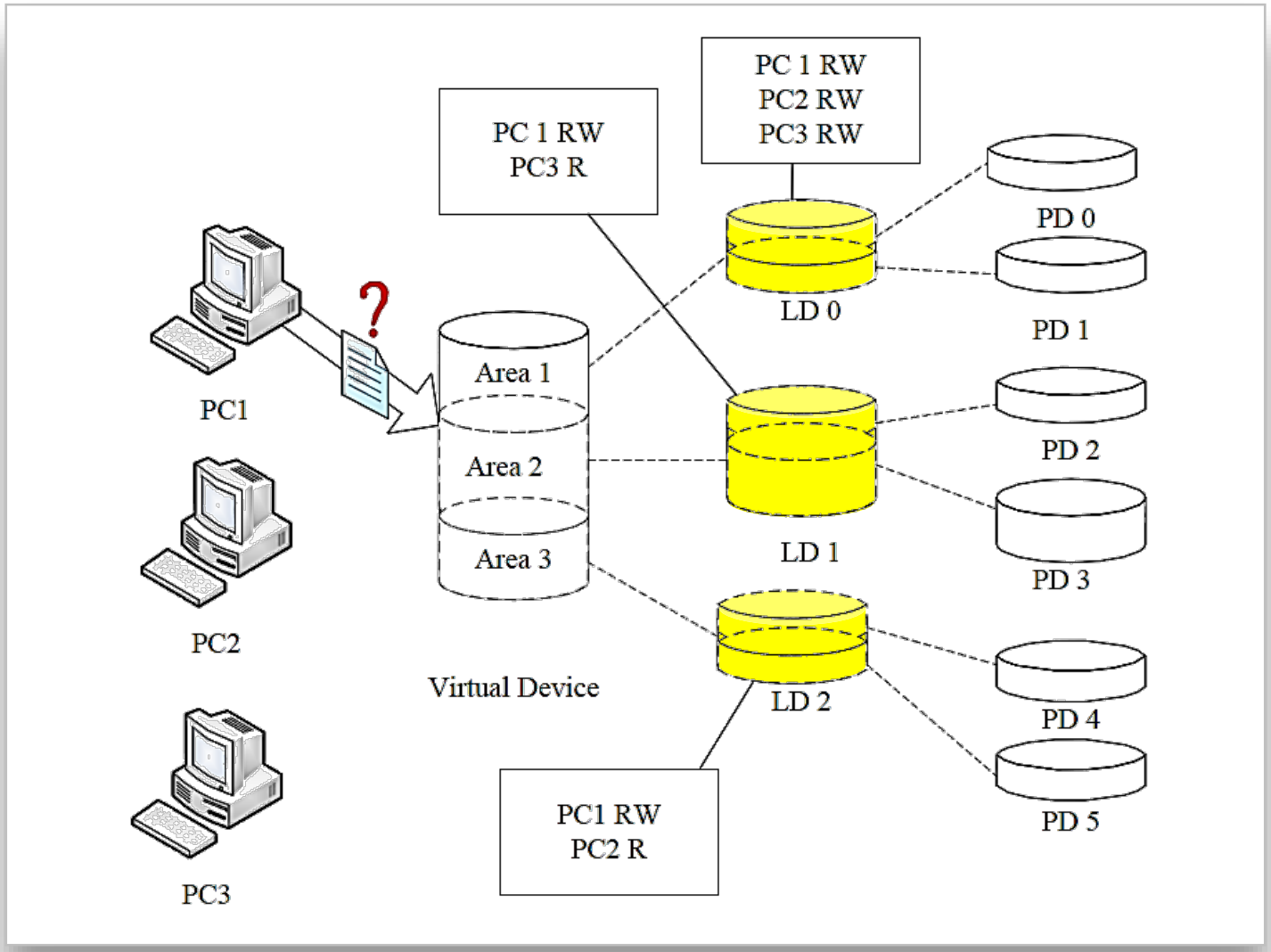
CROSSROADS SYSTEMS, INC.
Patent Owner

Case IPR2014-01197
Patent 6,425,035

PATENT OWNER'S RESPONSE AND OPPOSITION TO PETITION PURSUANT TO 37 C.F.R. § 42.120

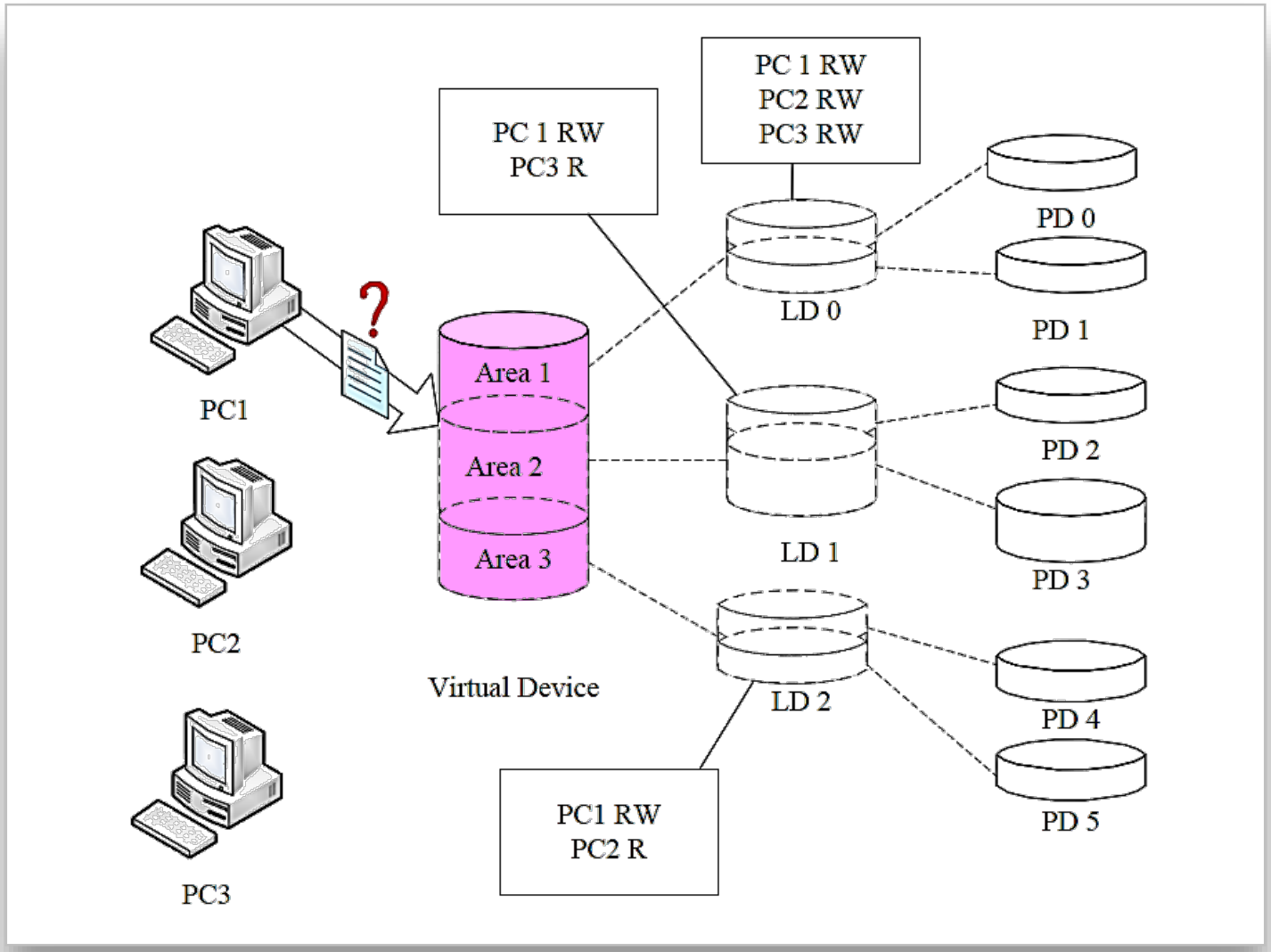
1197 POR at 44

The Logical Device Layer of Bergsten



1197 POR at 42

The Virtual Device Seen by the PCs



1197 POR at 42

The Combination Fails Because Access Controls Will Fail at the Logical Device Level of Bergsten as the Petitioners Assert

Petitioners conceded this argument by not even providing a response in their Reply

Petitioners Have Failed to Prove Unpatentability on any Asserted Grounds Based on Bergsten-Hirai

- The combination fails because Hirai is at the file system level, not the claimed block level
  - The evidence demonstrates that Petitioners' combination ignores the fact that Hirai was at the file system level
  - Petitioners concede this in their Reply and try to get this Board to ignore the expert evidence and teachings of Hirai to conclude that Hirai uses block level permissions

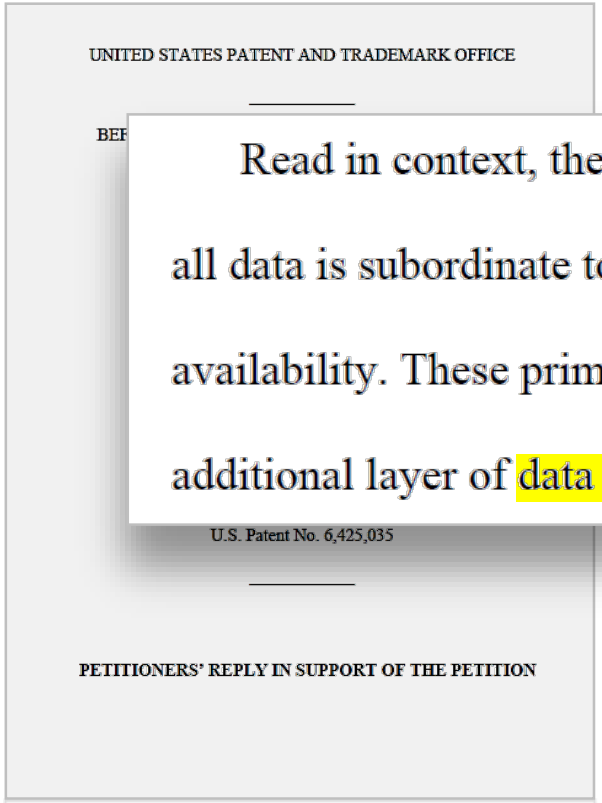
- Petitioners' original combination could not map to hosts because it failed to pass Host ID to their alleged map
  - Both experts agree the emulation drivers of Bergsten strip host identity before the alleged mapping occurs
  - Petitioners actually conceded this point as they walked away from their original combination and assert a brand new combination in one sentence in their Reply

- Petitioners' combination fails because access controls will fail at the logical device level of Bergsten, where Petitioners place them
  - Petitioners conceded this argument by not even providing a response in their Reply

NO MOTIVATION TO COMBINE

Petitioners' Motivation Analysis is Defective

Petitioners' only reason to include access controls is to further Bergsten's goal of "data protection."


UNITED STATES PATENT AND TRADEMARK OFFICE

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U.S. Patent No. 6,425,035

PETITIONERS' REPLY IN SUPPORT OF THE PETITION

Read in context, the objective of providing multiple host computers access to all data is subordinate to *Bergsten*'s primary goals of data protection and high availability. These primary goals are furthered by access controls that provide an additional layer of data protection.

1197 Reply at 7

There is No Basis to Read Any Motivation to Limit Access to Data into Bergsten's Goal of Data Protection

Bergsten is an open access system designed to "allow recovery from many possible failure modes" by ensuring that all copies of data can be accessed by any host:

> The remote data access, data mirroring, and path redundancy provided by the present invention allow recovery from many possible failure modes, such as failure of communication medium, failure a host computer, or failure of a storage device.

Ex. 1007 at 5:48-52

> Multiple copies of data are maintained in storage arrays that are geographically remote to each other, such that any copy can be accessed by any host.

Ex. 1007 Abstract

cited in 1197 POR at 45

There is No Basis to Read Any Motivation to Limit Access to Data into Bergsten's Goal of Data Protection

Bergsten is an open access system designed to "allow recovery from many possible failure modes" by ensuring that all copies of data can be accessed by any host:

> Moreover, the Chase Declaration cuts off *Bergsten*'s description of the problem, which is "to ensure that valuable data is adequately protected against loss or damage." *Id.* at 19-21. *Bergsten* simply does not suggest that there is a problem solved by controlling a specific computer's access to data. Indeed, *Bergsten* suggests the opposite, that it is desirable to allow all computers to access any copy of the data. Ex. 1007, 3:1-4, 4:7-9, 4:39-47, 15:36-38. Accordingly, Dr. Chase's alleged motivation is not supported by *Bergsten*.
>
> Ex. 2053 (Levy Decl.) ¶ 119

cited in 1197 POR at 45

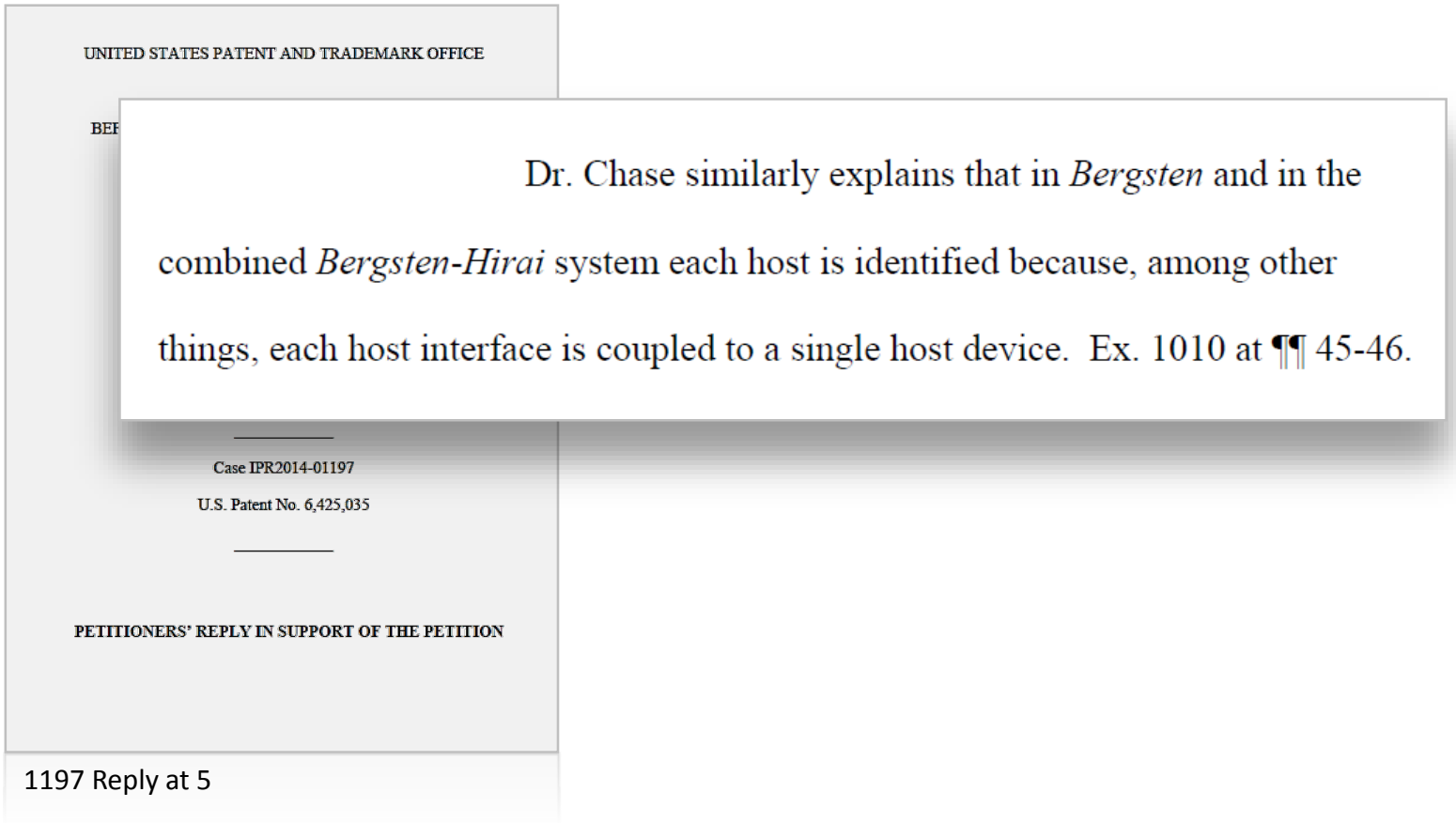
Petitioners' Motivations to Combine Are Circular and Infected with Hindsight Reasoning

- Petitioners originally cited as a motivation "to provide additional levels of granularity to the access controls of the Bergsten system based on the mapping-based access controls of Hirai." 1197 Pet. at 48.
- In Reply, Petitioners now cite the motivation was to "provide additional levels of granularity ***to block-level access controls*** of the Bergsten system using the mapping-based access controls of Hirai." 1197 Reply at 7 (emphasis added).
- Petitioners fail to explain why one of skill in the art would want to "provide additional levels of granularity" to Bergsten's access controls.
- Petitioners never explain why one would want access controls in an open access system designed to "allow multiple host computers at different locations to **access any copy** of stored data." Ex. 1007 at 1:40-42 (emphasis added).

THE COMBINATION DOESN'T HAVE A MAP IDENTIFYING THE PARTICULAR HOST

Petitioners Allege that Bergsten Identifies a Particular Host in a Single Host Device Per Host Interface Combination

Petitioners cite Ex. 1010 (Chase Decl.) ¶ 45-46 to support their "single host device per interface" argument.



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Dr. Chase similarly explains that in *Bergsten* and in the combined *Bergsten-Hirai* system each host is identified because, among other things, each host interface is coupled to a single host device. Ex. 1010 at ¶¶ 45-46.

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U.S. Patent No. 6,425,035

PETITIONERS' REPLY IN SUPPORT OF THE PETITION

1197 Reply at 5

Petitioners' Evidence Does Not Support Its Assertion

Ex. 1010 ¶ 45-46 Does Not Relate to Bergsten/Hirai, but to the CRD-5500

(45.) As recited by Claim 1[B], the combined system includes "a buffer providing memory work space for the storage router". The CRD-5500 controller includes an onboard cache with "up to 512 megabytes of memory." *See* Ex. 1003 at 1-4.

(46.) As in Claim 1[C], the combined system includes "a first controller" created through the incorporation of the Tachyon chip into a FC host interface module designed for installation in a host I/O slot of the CRD-5500 controller, as detailed above. The "first controller" is "operable to interface with a first transport medium" (FC transport medium). As illustrated in Fig. 8 of Smith (reproduced below), for example, the Tachyon logic of the host interface module would interface with the FC transport medium (illustrated as the "Link"). *See* Ex. 1005 at 8.

Ex. 1010 (Chase Decl.) ¶ ¶ 45 - 46

Even if One Host Per Interface Were Relevant to the Claims, the Combination Does Not Have the Claimed Map

- The claimed inventions use access controls to limit a host's access to storage according to a map.
  1197 POR at 8, 11.
- The host interface ID, like the channel number in the CRD, does not identify the host.
  1197 POR at 34-36.
- Even though the messages may go back to the right host in a one host per interface embodiment, it is not achieving this using the claimed invention.

BERGSTEN-KIKUCHI
IPR2014-1207, -1209

Overview of Bergsten-Kikuchi

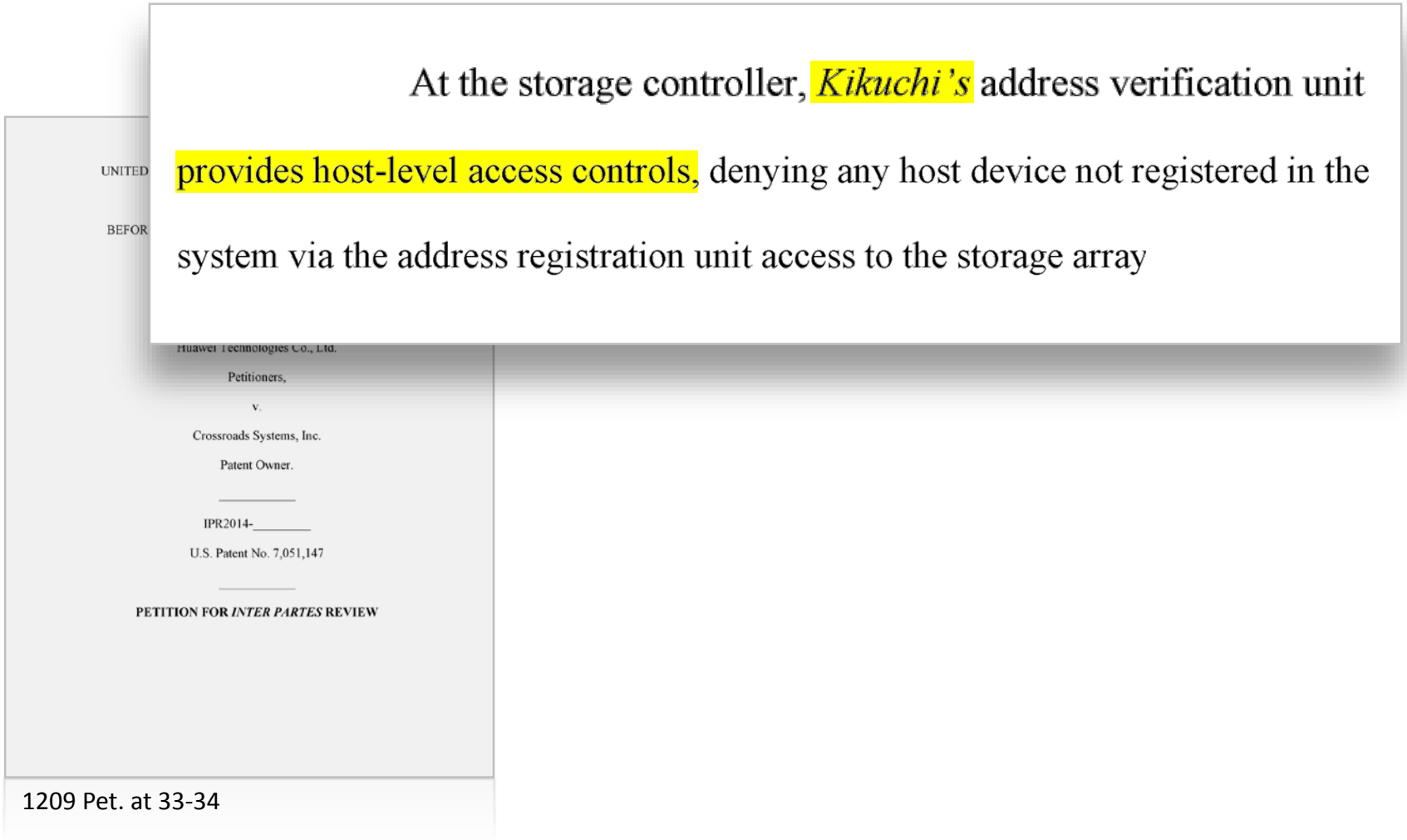
- The Bergsten-Kikuchi combination does not have the claimed access controls
  - Access controls require limiting a host's access to a specified storage space
  - Kikuchi's offsets do not specify storage space
  - Kikuchi cannot limit access to specified storage

- Just like in the Bergsten-Hirai combination, Petitioners place the emulation drivers of Bergsten before the alleged map – rendering it impossible to map to hosts
  - Unlike in Hirai, where Petitioners asserted a new combination, here Petitioners fail to respond to Patent Owner's argument at all
  - Both experts agree that the emulation drivers of Bergsten strip ALL host identification, so nothing is left to map against

- One of ordinary skill in the art would not have combined Kikuchi and Bergsten as Petitioners assert
  - If a combination would have been made at all, it would have been made without the complicated changes suggested by Dr. Chase
  - That combination would not practice the claimed invention
  - The complicated changes Dr. Chase proposes could only come from hindsight
- Patent Owner created its invention before Kikuchi

The Bergsten-Kikuchi Combination Does Not Have the Claimed Access Controls

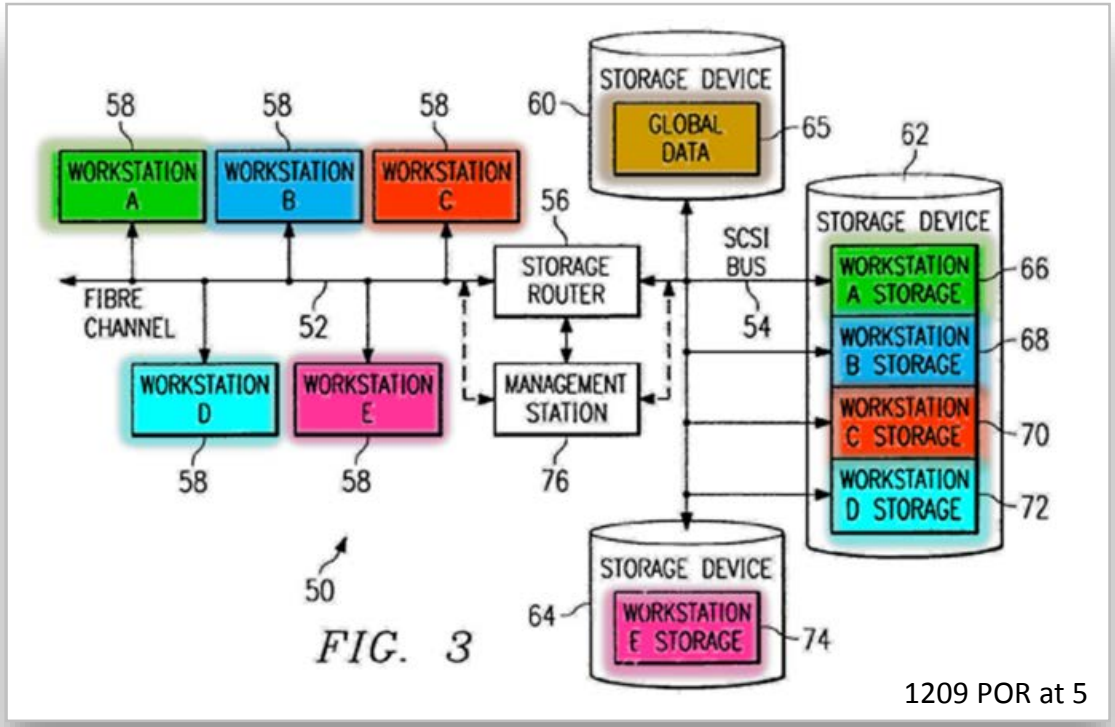
Petitioners Rely on the Alleged Access Controls of Kikuchi for their Combination



1209 Pet. at 33-34

The Invention is Directed Toward Mapping Each Host to Specified Storage Space

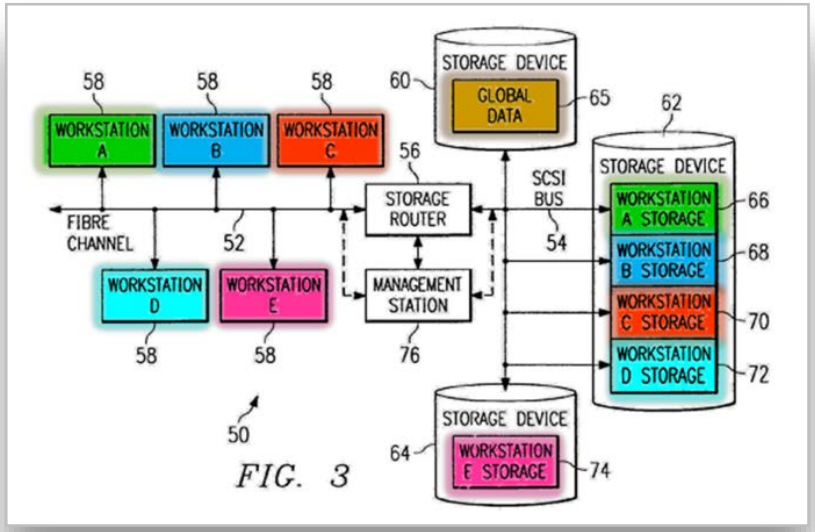
The invention requires the capability to map different storage to different hosts on the same transport medium (i.e., a common communications link):

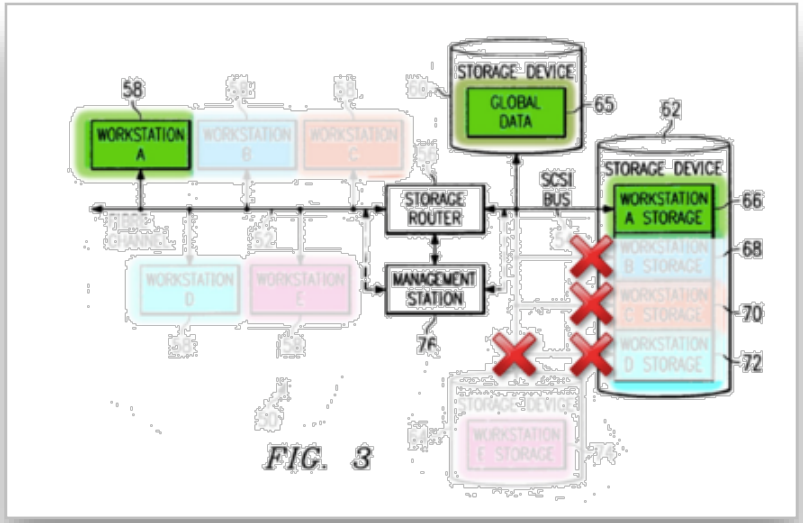


1209 POR at 5

cited in 1209 POR at 3-7 (citing Ex. 2053 (Levy Decl.) ¶¶ 51-53

So That Each Host Will Only See and Have Access to its Designated Storage



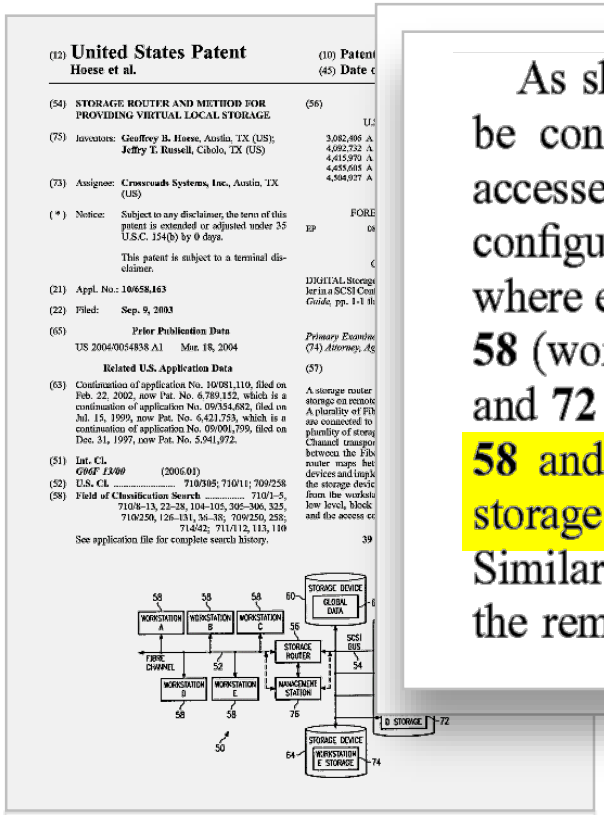


In Figure 3, each workstation 58 connected to the storage router on Fibre Channel interconnect 52 sees, and therefore has access to, different storage. As shown below, for example, because Workstation A is mapped to storage subset 66, Workstation A is "shown" storage subset 66 by the storage router.

1209 POR at 8 (citing Levy Decl (Ex. 2053)) ¶ 59

“Access Controls” Limitations

“The claimed access controls/controlling access limitations . . . are device specific in that the storage router controls what storage access is available to specified hosts so that different hosts can be provided different storage access.”



(12) **United States Patent**
Hoese et al.

(10) Patent
(45) Date

(54) **STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE**

(75) Inventors: **Geoffrey B. Hoese**, Austin, TX (US); **Jeffry T. Russell**, Cibolo, TX (US)

(73) Assignee: **Crossroads Systems, Inc.**, Austin, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/658,163**

(22) Filed: **Sep. 9, 2003**

(65) **Prior Publication Data**

US 2004/0054838 A1 Mar. 18, 2004

Related U.S. Application Data

(63) Continuation of application No. 10/081,110, filed on Feb. 22, 2002, now Pat. No. 6,789,152, which is a continuation of application No. 09/354,682, filed on Jul. 15, 1999, now Pat. No. 6,421,753, which is a continuation of application No. 09/001,799, filed on Dec. 31, 1997, now Pat. No. 5,941,972.

(51) **Int. Cl.**
G06F 13/00 (2006.01)

(52) **U.S. Cl.** 710/305; 710/11; 709/258

(58) **Field of Classification Search** 710/1–5, 710/8–13, 22–28, 104–105, 305–306, 325, 710/250, 126–131, 36–38; 709/250, 258; 714/42; 711/112, 113, 110

See application file for complete search history.

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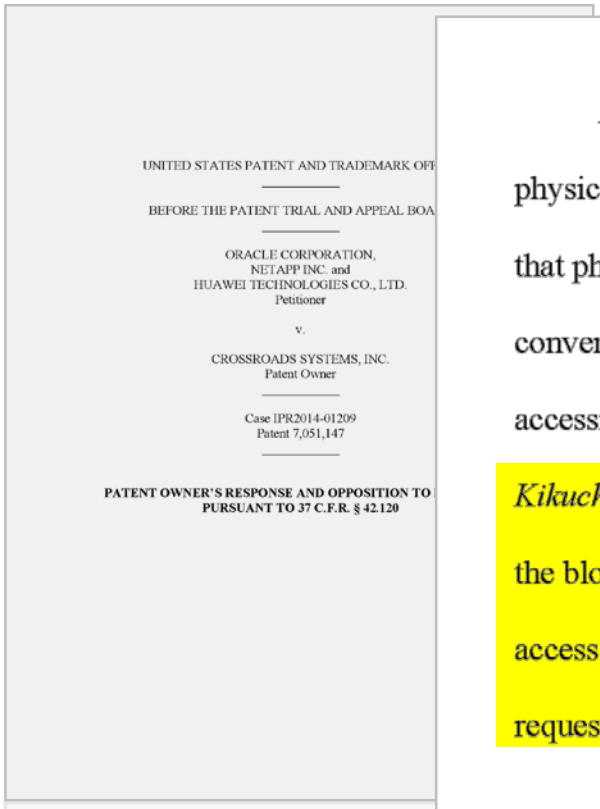
(57)

As shown in FIG. **3**, for example, storage device **60** can be configured to provide global data **65** which can be accessed by all workstations **58**. Storage device **62** can be configured to provide partitioned subsets **66**, **68**, **70** and **72**, where each partition is allocated to one of the workstations **58** (workstations A, B, C and D). These subsets **66**, **68**, **70** and **72** can only be accessed by the associated workstation **58** and appear to the associated workstation **58** as local storage accessed using native low level, block protocols. Similarly, storage device **64** can be allocated as storage for the remaining workstation **58** (workstation E).

‘147 Patent at 4:35-38

cited in 1207 POR at 2-3, 47

Kikuchi is Directed to the Sharing of a Single Large Volume Disk Between Several Hosts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HUAWEI TECHNOLOGIES CO., LTD.
Petitioner

v.

CROSSROADS SYSTEMS, INC.
Patent Owner

Case IPR2014-01209
Patent 7,051,147

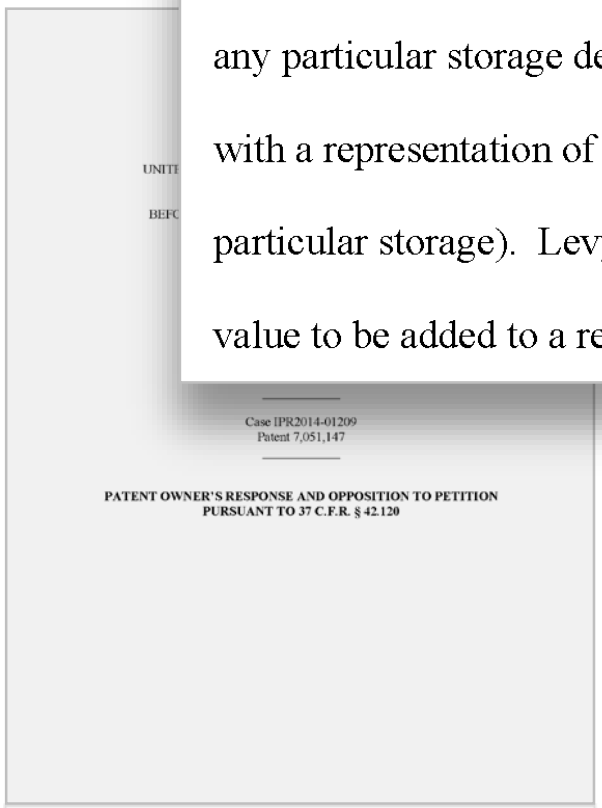
PATENT OWNER'S RESPONSE AND OPPOSITION TO
PURSUANT TO 37 C.F.R. § 42.120

Kikuchi teaches that "disk apparatus 119" can connect host computers to a physical disk where all of the hosts can see and make requests for any location on that physical disk. Ex. 1006, 7:42-8:9; Levy ¶ 144. *Kikuchi* recognizes that conventional disk apparatuses of the time had difficulty with multiple hosts accessing large volume physical disks. Ex. 1006 at 1:58-63. To address this, *Kikuchi*'s disk apparatus applies an "address offset" from a "correlation chart" to the block address in a host's read or write command; this offset redirects host access requests to block addresses on the physical disk different than the originally requested addresses. Ex. 1006, 3:24-32, 7:58-83; Levy ¶ 149-50.

1209 POR at 32

Kikuchi's Correlation Chart Does Not Map Storage to Hosts

In contrast, *Kikuchi*'s "correlation chart" includes no information identifying any particular storage device, nor does it associate a "representation of storage" with a representation of the host (*e.g.*, an offset of "100" does not identify any particular storage). Levy ¶ 152. The correlation chart provides only an integer value to be added to a requested block address.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Case IPR2014-01209
Patent 7,051,147

PATENT OWNER'S RESPONSE AND OPPOSITION TO PETITION
PURSUANT TO 37 C.F.R. § 42.120

1209 POR at 35

Kikuchi's Correlation Chart Does Not Map Storage to Hosts

152. The use of offsets as described in *Kikuchi* has partition-like aspects, but does not associate representations of hosts with representations of storage as described in the '147 Patent. As explained above in paragraphs 57-59, the '147 Patent describes a system where each workstation can only see and make access requests to the subset(s) of storage to which it has been associated in the map. Ex. 1001, 4:48-54. The Correlation Chart in *Kikuchi* does not contain representations of storage and is not itself a representation of storage (*e.g.*, an offset of "100" does not identify any particular storage). Thus, it cannot associate representations of hosts with representations of storage. Accordingly, the Correlation Chart of *Kikuchi* is not a "map" as claimed in the '147 Patent.

Ex. 2053 (Levy Decl.) ¶ 152

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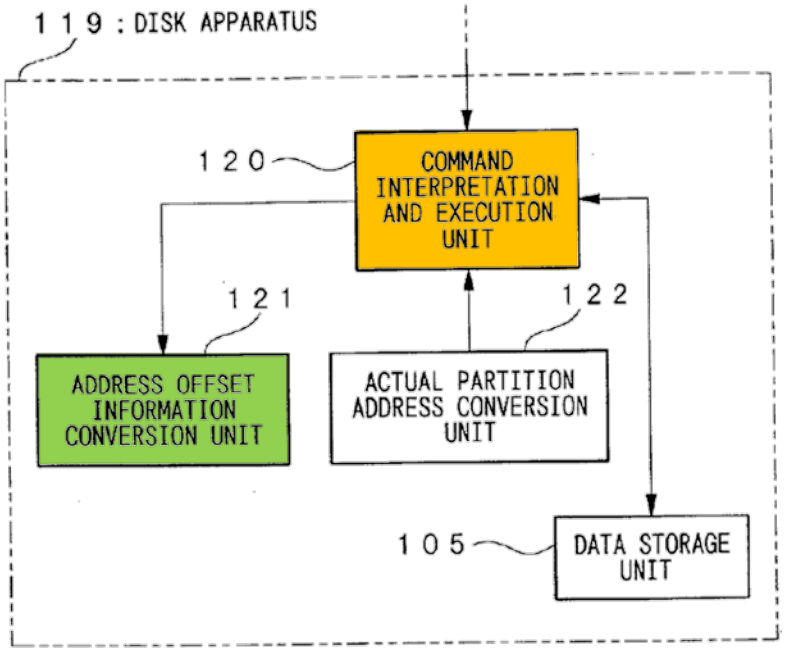
CROSSROADS SUBSTITUTE EXHIBIT 2053
Oracle Corp. et al. v. Crossroads Systems, Inc.
IPR2014-01207 and IPR2014-1209

cited in 1209 at 34

Kikuchi Does Not Utilize Host Identification to Permit or Limit Access to Particular Storage Space but Instead Merely Uses Offsets

FIG.5



from a host device. The command interpretation and execution unit **120** extracts a host address from any disk read/write command sent from a host device and outputs it to an address offset information conversion unit **121**, and also outputs a disk partition address extracted from the read/write command to an actual partition address conversion unit **122**.

The technique used by the command interpretation and execution unit **120** for extracting a host address is as was outlined for the first embodiment. The host address output from the command interpretation and execution unit **120** is input into the address offset information conversion unit **121**. Offset information which indicates a disk partition corresponding to each host device, has been stored in advance in the address offset information conversion unit **121**, and the host address input from the command interpretation and execution unit **120** is converted to this offset information.

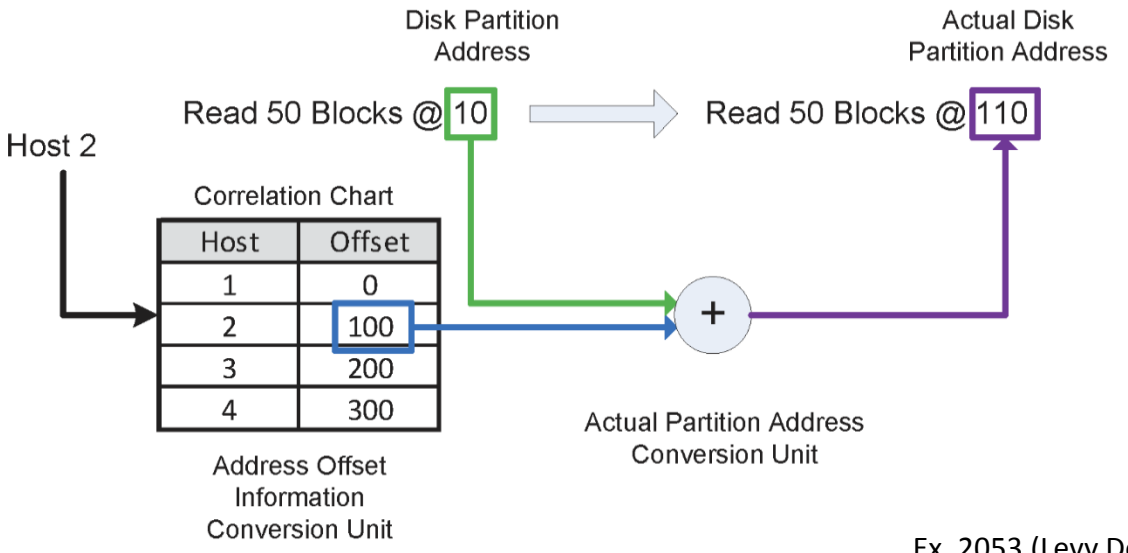
Ex. 1006, 7:46-63

cited in 1209 POR 35-36

Offsets Are Just an Integer and Cannot Identify Storage Space

Offsets were well known in the art at the time of *Kikuchi*; for SCSI commands, an offset is simply an integer added to the block address in the command. Levy ¶ 146; *see also* Ex. 2054 at 125:25-126:20, 107:10-16. The offset is added to the block address number requested by the host in the read or write command. Ex. 1006, 3:24-32; 7:47-53; 7:58-83; Levy ¶ 150.

1209 POR at 33



Ex. 2053 (Levy Decl.) ¶ 150

Offsets Are Just an Integer and Cannot Identify Storage Space

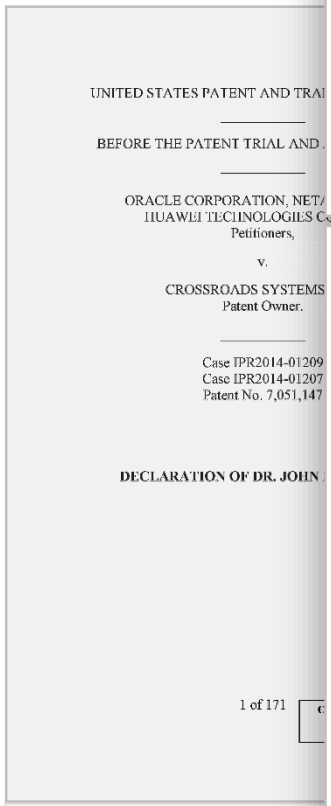
Dr. Chase agreed that an offset is merely an added number:

> Q. Is "offset" a term of art in the computer field?
>
> A. Yes, and its meaning is broadly the plain meaning of the word. The term is typically used to refer to a displacement, if you will, or a number of bytes or a number of blocks from some base and this is context of storage systems.

Ex. 2054 (Chase Depo.) at 107:10-16

cited in 1209 POR at 33

Kikuchi's Correlation Chart Does Not Limit a Host's Visibility or Access to Storage Allocated in the Map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BEFORE THE PATENT TRIAL AND

ORACLE CORPORATION, NET/
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Petitioners,

v.

CROSSROADS SYSTEMS
Patent Owner.

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Patent No. 7,051,147

DECLARATION OF DR. JOHN

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The Correlation Chart in *Kikuchi* does not contain representations of storage and is not itself a representation of storage (*e.g.*, an offset of "100" does not identify any particular storage). Thus, it cannot associate representations of hosts with representations of storage.

Ex. 2053 (Levy Decl.) ¶ 152

Therefore, the host computers using the *Kikuchi* disk apparatus can see the entire drive regardless of the offset. Accordingly, each host must, through some type of coordination which would be external to *Kikuchi*, be instructed that less than the entire capacity is available for its use. In fact, *Kikuchi* expressly indicates that coordination with hosts should occur. Ex. 1006, 3:19-21. *Kikuchi* explains that the "the various host addresses and the offset information for each partition are coordinated beforehand." Ex. 1006, 3:19-21.

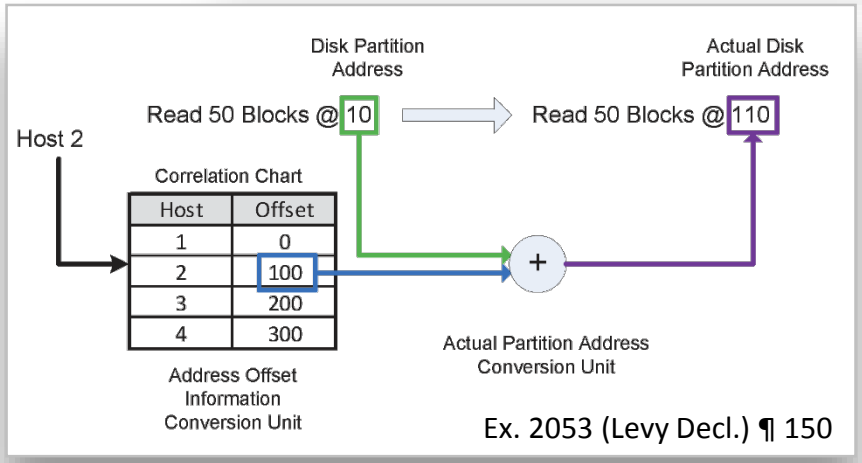
Ex. 2053 (Levy Decl.) ¶ 153

cited in 1209 POR at 35

Access Controls Limit a Host Computer's Access to a Specific Subset of Storage Devices or Section of a Single Storage Device According to a Map

Thus, applying *Kikuchi*'s "correlation chart" (instead of the map described in the '147 Patent) to Workstations A-D in Figure 3 of the '147 Patent no longer results in each workstation only being able to access the storage "associated" with the workstation. *Id.* If a host attempts (intentionally or unintentionally) to make a request that exceeds the allocated "partition," the correlation chart cannot prevent it from doing so and would, in fact, allow that access to occur. *Id.* ¶ 154. *See* Section IV.B.1.

1209 POR at 36



Ex. 2053 (Levy Decl.) ¶ 150

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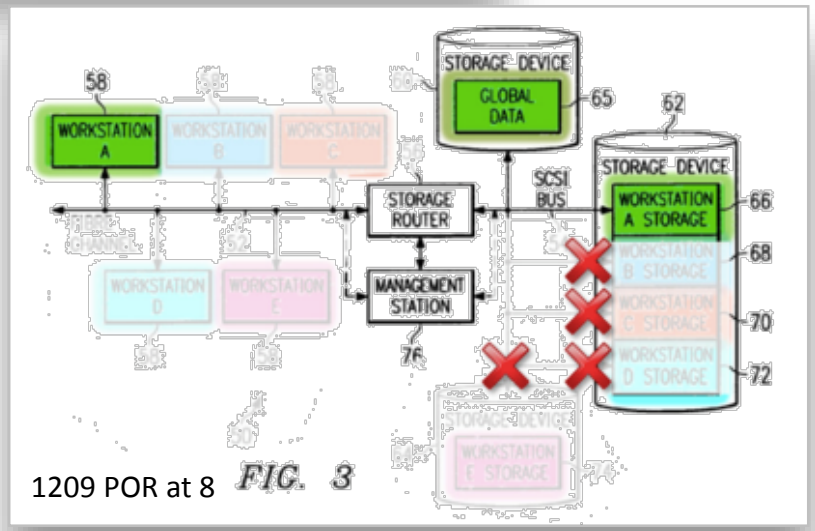

1209 POR at 8 FIG. 3

The Bergsten-Kikuchi Combination Does Not Have the Claimed Access Controls

- Access controls require limiting a host's access to a specified storage space
- Kikuchi's offsets do not specify storage space
- Kikuchi cannot limit access to specified storage

Just Like in the Bergsten-Hirai Combination, Petitioners Place the Emulation Drivers of Bergsten Before the Alleged Map – Rendering It Impossible to Map to Hosts

The Combination Incorporates Bergsten's Emulation Drivers

Petitioners incorporate Bergsten's emulation drivers into Kikuchi.

A combined system architecture is illustrated below, incorporating features of the Bergsten disclosure into the cumulative Kikuchi architecture as described by the Kikuchi disclosure. In the combined system, the data storage apparatus of Kikuchi is enhanced with the Bergsten emulation drivers at the host device interface of Kikuchi and the Bergsten physical drivers at the disk interface of Kikuchi.

Ex. 1010 (Chase Decl.) ¶ 143

(1.) My name is Jeffrey S. Chase. I am a Professor at Duke University in the Computer Science Department. I have studied and practiced in the field of computer science for over 30 years, and have taught Computer Science at Duke since 1995.

(2.) I received my Doctor of Philosophy (Ph.D.) degree in the field of Computer Science from the University of Washington in 1995. I received my Masters of Science (M.S.) degree in Computer Science from the University of Washington and my Bachelor of Arts (B.A.) degree in Mathematics and Computer Science from Dartmouth College.

(3.) Before and during graduate school, I worked as a software design engineer at Digital Equipment Corporation, developing operating system kernel functionality for storage systems and network storage. During the period 1985-

- 1 -

Oracle-Huawei-NetApp Ex. 1010, pg. 1

UNITED STATES PATENT AND TRADEMARK OFFICE

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Huawei Technologies Co., Ltd.,

Petitioners,

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In the combined system, the limitation of a "first [FC] controller" is met by the emulation drivers 21 described in *Bergsten*, which are included within the host device interface described *Kikuchi* and which are coupled to FC, a serial transport media.

1209 Pet. at 36

cited in 1209 POR 47

Petitioners' Combination Expressly Incorporates Bergsten's Emulation Drivers at the Host Device Interface Well Before Commands Reach the Correlation Chart

UNITED STATES PATENT AND TRADEMARK

BEFORE THE PATENT TRIAL AND APPEAL I

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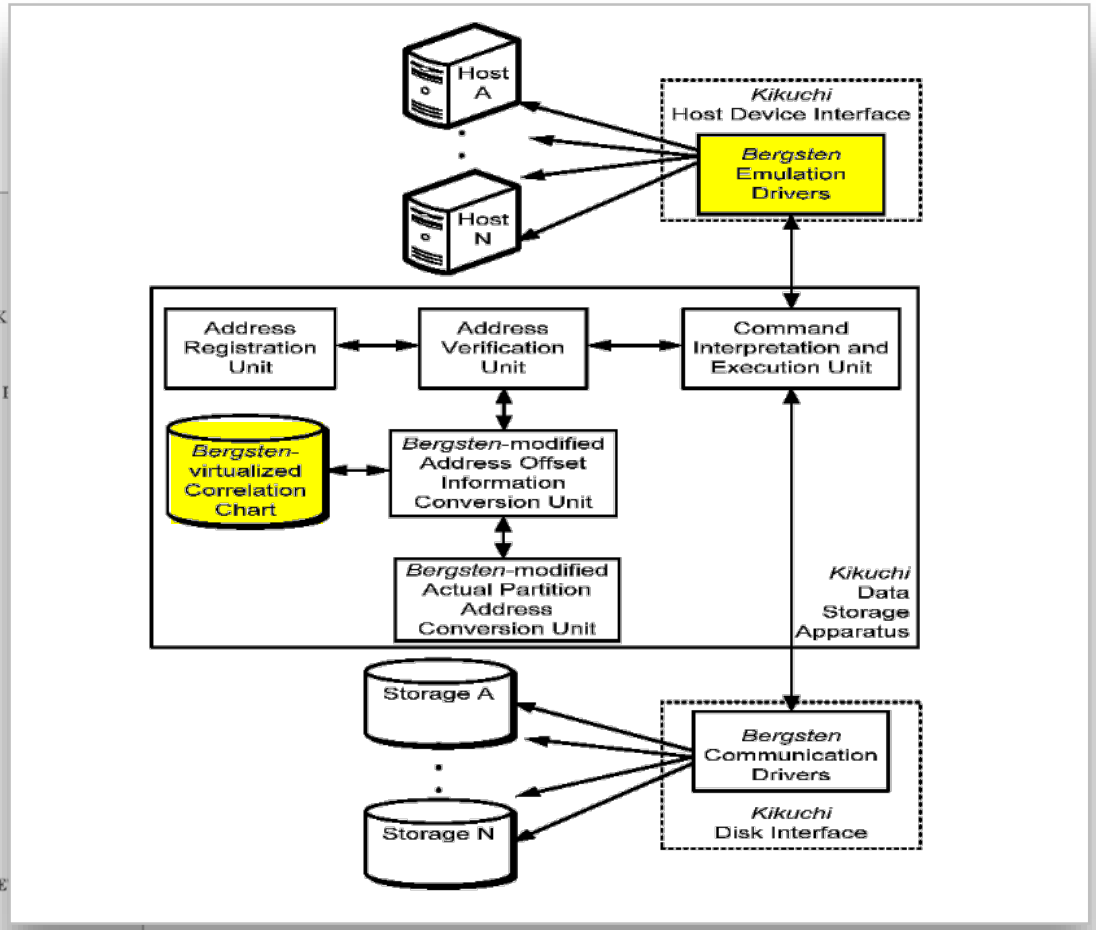
IPR2014-_____

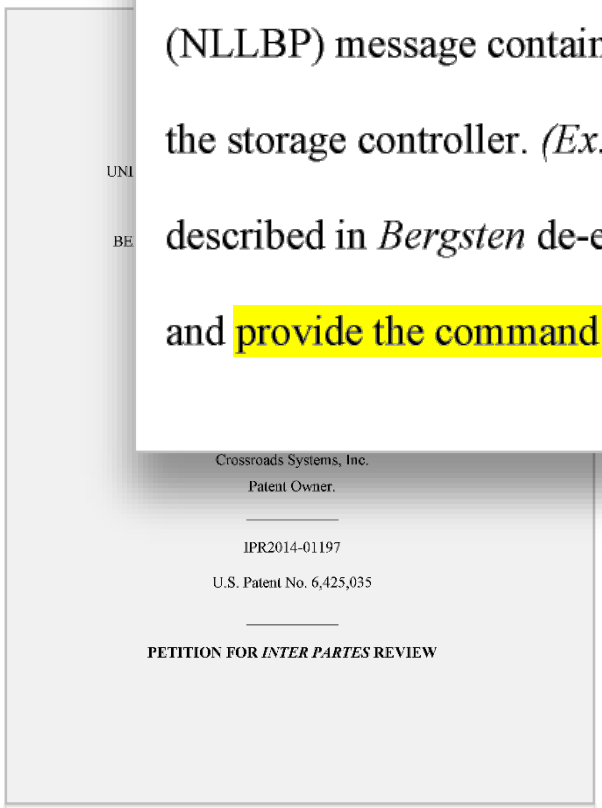
U.S. Patent No. 7,051,147

PETITION FOR *INTER PARTES* REVIE



1209 Pet. at 33

Petitioners Agree that the Emulation Drivers Would Only Provide the SCSI Command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Crossroads Systems, Inc.
Patent Owner.

IPR2014-01197

U.S. Patent No. 6,425,035

PETITION FOR *INTER PARTES* REVIEW

In the resulting system, a host computer sends a FCP (NLLBP) message containing a SCSI command along a FC transport medium to the storage controller. *(Ex. 1010 at ¶¶ 147-151)* The emulation drivers 21 described in *Bergsten* de-encapsulate the SCSI command from the FCP message and provide the command to the processing system of the storage controller.

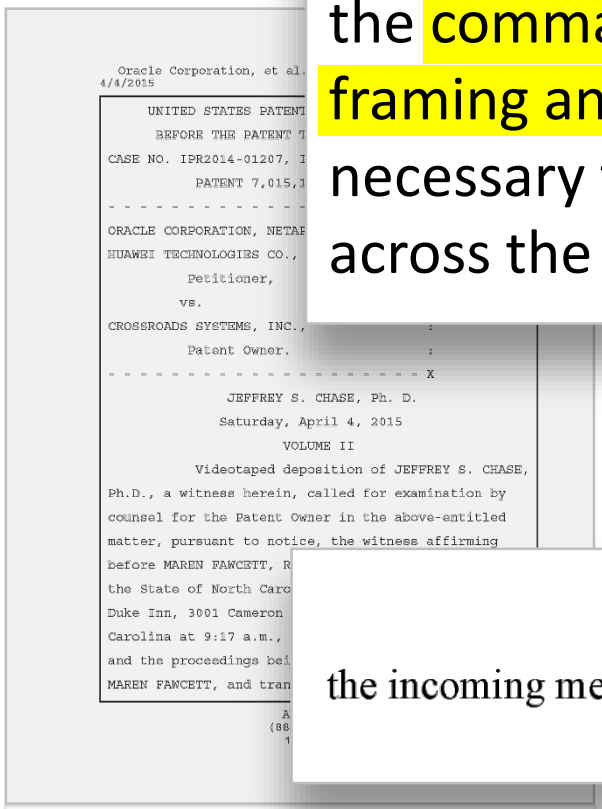
1197 Pet. at 47

cited in 1197 POR at 37-39

Dr. Chase Testifies that the Emulation Drivers Would Strip the Host Information and Pass Only the SCSI Command

"… that conversion would involve primarily deencapsulating the commands and transmitting the commands to the operating system without the framing and various other information that's necessary to transmit those commands reliably across the network."

Ex. 2055 (Chase Depo.) at 234:5-10;
1209 Ex. 2053 (Levy Decl.) ¶ 122


Oracle Corporation, et al.
4/4/2015

UNITED STATES PATENT
BEFORE THE PATENT
CASE NO. IPR2014-01207,
PATENT 7,015,
ORACLE CORPORATION, NETAP
HUAWEI TECHNOLOGIES CO.,
Petitioner,
vs.
CROSSROADS SYSTEMS, INC.,
Patent Owner.

JEFFREY S. CHASE, Ph. D.
Saturday, April 4, 2015
VOLUME II
Videotaped deposition of JEFFREY S. CHASE, Ph.D., a witness herein, called for examination by counsel for the Patent Owner in the above-entitled matter, pursuant to notice, the witness affirming before MAREN FAWCETT, R
the State of North Caro
Duke Inn, 3001 Cameron
Carolina at 9:17 a.m.,
and the proceedings bei
MAREN FAWCETT, and tran

Petitioners concede that Host ID is only in the framing.

The host device's identity can be derived from the incoming message (e.g., via FCP header or SCSI header) and/or from the

1209 Pet. at 18

cited at 1209 POR at 22, 47-48

Because the Emulation Drivers Strip Host Information, the Combination Does Not Work

The emulation drivers remove the Host Identifier (e.g., host identity information) **before** passing the command to the command interpretation and execution unit that is supposed to extract the Host Identifier and pass it to the address offset information conversion unit (where the Host Identifier is purportedly used in the mapping tables of the "enhanced correlation chart"). Levy ¶ 182; Ex. 2055 at 233:15-234:10, 290:2-291:10.

Patent Owner.

The emulation drivers 21 described in *Bergsten* de-encapsulate the SCSI command from the FCP request and provide the command to the processing system of the storage controller. *(Id. at ¶¶ 139, 247, 254)*

1209 Pet. at 48

cited in 1209 POR 47-48

Just Like in the Bergsten-Hirai Combination, Petitioners Place the Emulation Drivers of Bergsten Before the Alleged Map – Rendering it Impossible to Map to Hosts

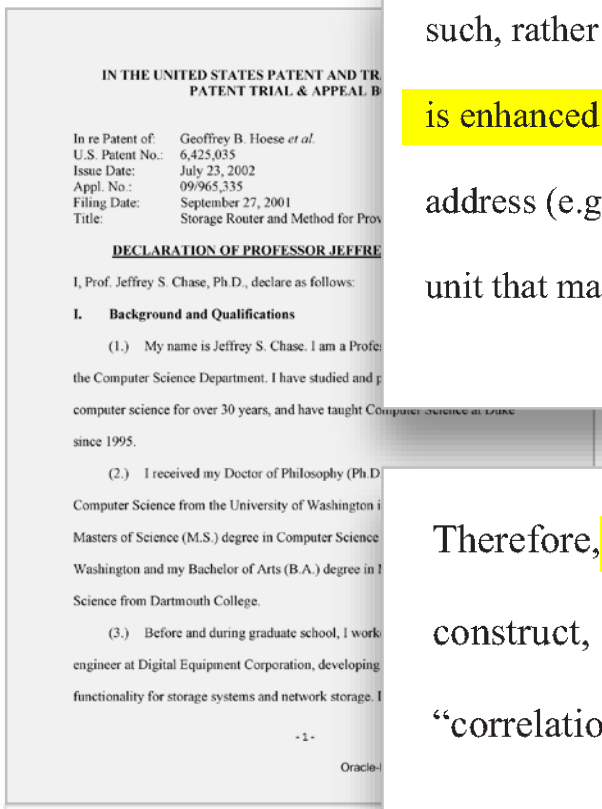
- Unlike in Hirai, where Petitioners asserted a new combination, here Petitioners fail to respond to Patent Owner's argument at all

- Both experts agree that the emulation drivers of Bergsten strip ALL host identification, so nothing is left to map against

One of Ordinary Skill in the Art Would Not Have Combined Kikuchi and Bergsten as Petitioners Assert

Petitioners Propose Changes to Both Kikuchi and Bergsten to Get the Alleged "Enhanced" Correlation Chart

Petitioners "enhance" Kikuchi's correlation chart and dispense with Bergsten's mapping tree.



IN THE UNITED STATES PATENT AND TR
PATENT TRIAL & APPEAL B

In re Patent of: Geoffrey B. Hoese *et al.*
U.S. Patent No.: 6,425,035
Issue Date: July 23, 2002
Appl. No.: 09/965,335
Filing Date: September 27, 2001
Title: Storage Router and Method for Prov

DECLARATION OF PROFESSOR JEFFRE

I, Prof. Jeffrey S. Chase, Ph.D., declare as follows:

I. Background and Qualifications

(1.) My name is Jeffrey S. Chase. I am a Profe
the Computer Science Department. I have studied and p
computer science for over 30 years, and have taught Co
since 1995.

(2.) I received my Doctor of Philosophy (Ph.D
Computer Science from the University of Washington i
Masters of Science (M.S.) degree in Computer Science
Washington and my Bachelor of Arts (B.A.) degree in
Science from Dartmouth College.

(3.) Before and during graduate school, I work
engineer at Digital Equipment Corporation, developing
functionality for storage systems and network storage. I

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Oracle-

such, rather than hosts mapping to address offsets as in Kikuchi, the mapping table is enhanced with the teachings of Bergsten to map a host address to a logical address (e.g., using a modified version of the address offset information conversion unit that maps from the host address to a logical address), then map the logical

Ex. 1010 (Chase Decl.) ¶ 144

Therefore, the tree mapping may be collapsed into a simple mapping table construct, similar to the simple mapping table construct taught in Kikuchi (a "correlation chart of host devices and offset information").

Ex. 1010 (Chase Decl.) ¶ 145

cited in 1209 POR at 37-38

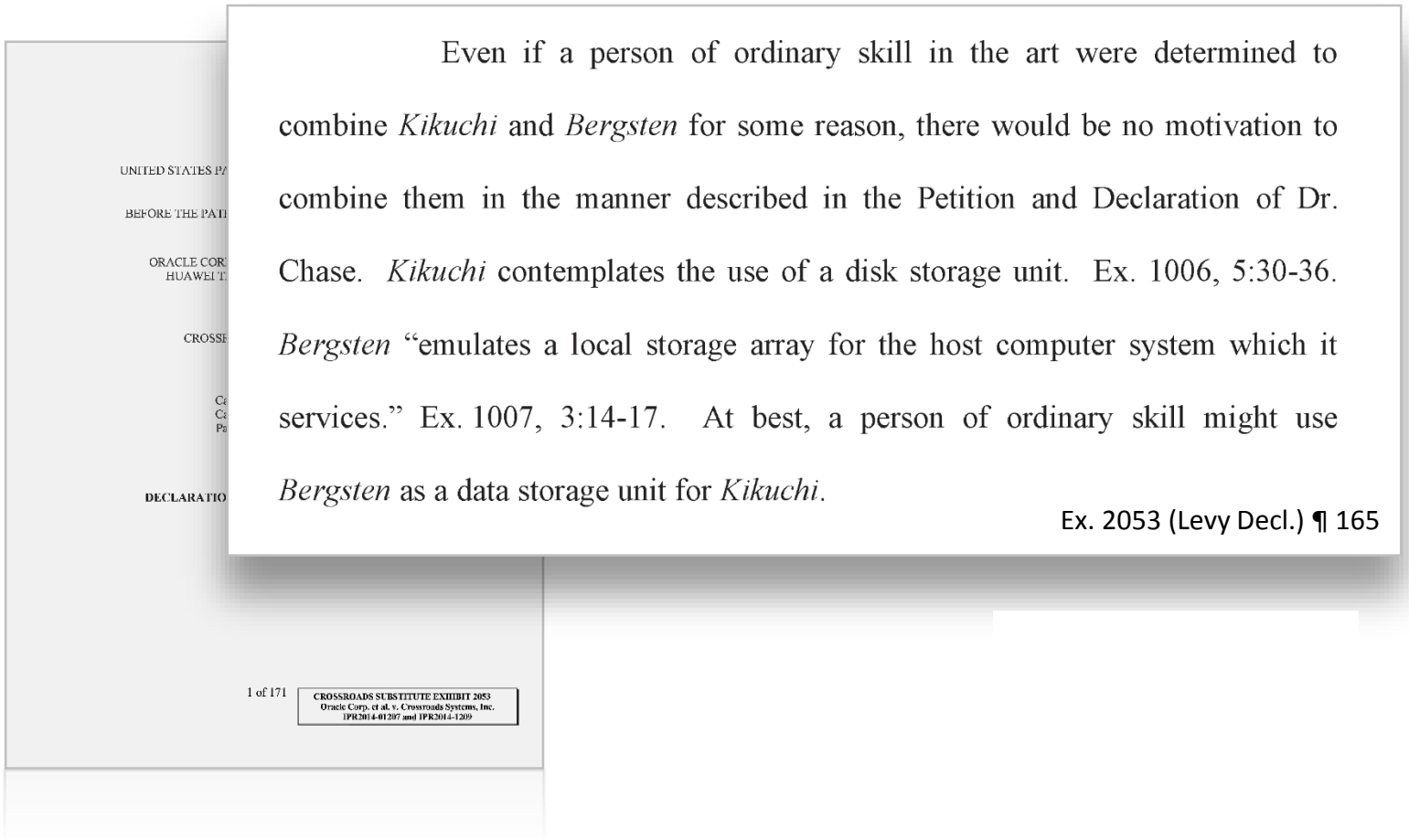
When Dr. Chase Was Asked How to "Enhance" the Correlation Chart to Permit Access to Specific Storage He Testified to a Complex Modification Process

- Developing and Programming an Algorithm for a "Virtual to Logical" table based on the requested block number in the incoming read/write command
- Replacing Bergsten's mapping tree with a separate "virtual to logical" mapping table for each host;
- Creating new, additional "logical to physical" tables for the hosts to map to physical addresses;
- Developing and programming an algorithm for the "logical to physical" table based on logical block number
- Determine the logical block number for a requested block by determining the range into which the requested block falls, subtracting the base of the range and adding the difference to the logical block
- Based on the logical block number calculated, determine the physical block number by determining the range into which the requested block falls, subtracting the base of the range, and adding the difference to the physical block;
- Perform each series of steps multiple times to account for all of the blocks in the request

1209 POR at 38-39 (citing Ex. 2054 (Chase Depo) at 180:17-182:18, 195:4-196:10, 198:8-200:25, 211:21-213:4)

As No Person of Skill in the Art Would Create Such Complex Changes, Petitioners' Modifications to Kikuchi and Bergsten are Clearly Based on Hindsight Reconstruction

Bergsten and Kikuchi do not suggest to a POSITA Petitioners' "enhanced" correlation chart or Chase's complex modifications.



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DECLARATIO

1 of 171

CROSSROADS SUBSTITUTE EXHIBIT 2053
Oracle Corp. et al. v. Crossroads Systems, Inc.
IPR2014-01207 and IPR2014-1209

Even if a person of ordinary skill in the art were determined to combine *Kikuchi* and *Bergsten* for some reason, there would be no motivation to combine them in the manner described in the Petition and Declaration of Dr. Chase. *Kikuchi* contemplates the use of a disk storage unit. Ex. 1006, 5:30-36. *Bergsten* "emulates a local storage array for the host computer system which it services." Ex. 1007, 3:14-17. At best, a person of ordinary skill might use *Bergsten* as a data storage unit for *Kikuchi*.

Ex. 2053 (Levy Decl.) ¶ 165

cited in 1209 POR at 46

The References Do Not Suggest Petitioners' Modifications which Require Development of Significant New Functionality

Kikuchi:

- Partitioning scheme designed for the case where a single disk has more storage than is needed or usable by a single host.
  Ex. 2053 (Levy Decl.) ¶ 137
- Is concerned with simplicity, speed, efficiency and conservation of limited resources. Ex. 2053 (Levy Decl.) ¶ 170 (citing Kikuchi Ex. 1006 at 6:38-40, 6:48-50, 8:34-36; 8:40-45)
- Uses offsets precisely because they are fast and simple.
  Ex. 2053 (Levy Decl.) ¶ 170
- Must only modify the starting block number in a request, regardless of how many consecutive blocks are requested, saving time.
  Ex. 2053 (Levy Decl.) ¶ 178

cited in 1209 POR at 39, 41-42, 51

The References Do Not Suggest Petitioners' Modifications which Require Development of Significant New Functionality

Bergsten:

- Emulates a local storage array for the host computer system which it services. Ex. 2053 (Levy Decl.) ¶ 165
- Uses a plurality of storage controllers to achieve its goal of providing "multiple back-up copies of data in geographically separate locations, while still permitting quick and easy access by a host computer." Ex. 2053 (Levy Decl.) ¶ 168
- Solves the problem of data reliability and availability by using multiple storage controllers. Ex. 2053 (Levy Decl.) ¶ 168
- Uses two-step virtualization mapping precisely because there are multiple storage controllers. Ex. 2053 (Levy Decl.) ¶ 169

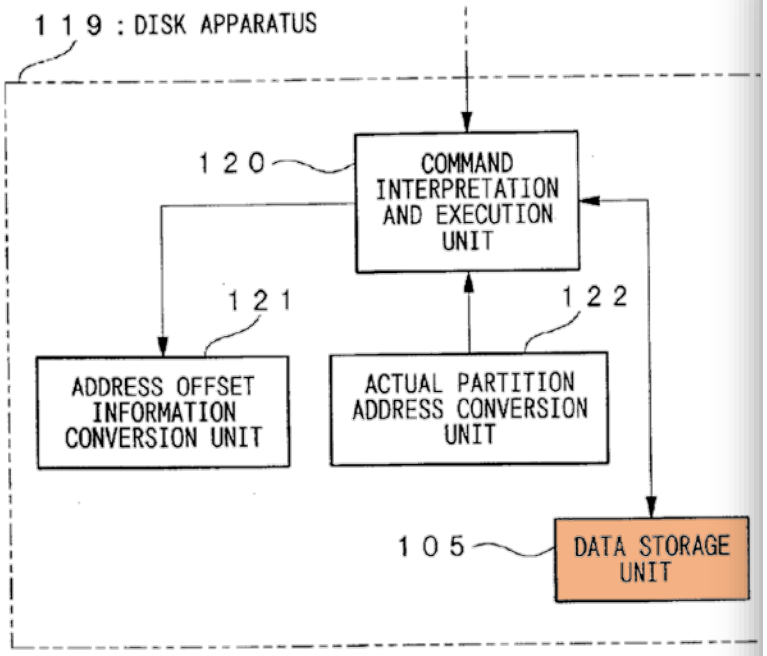
cited in 1209 POR at 42-44

Petitioners' Modifications Are Complex and Not a Simple Design Choice as Petitioners Assert in their Reply

- Petitioners' Reply states that "alternating between a mapping tree and a mapping chart" was a "routine design choice" (1209 Reply at 12)
- Petitioners' Modifications Are Not Limited to "Alternating Between a Mapping Tree and a Mapping Chart"
- The References Provide No Reason to Make Such Modifications

If Made at All, a Combination of Kikuchi and Bergsten Would Combine the Original Kikuchi Correlation Chart with the Virtual Storage of Bergsten, But Would Not Practice the Invention

FIG.5



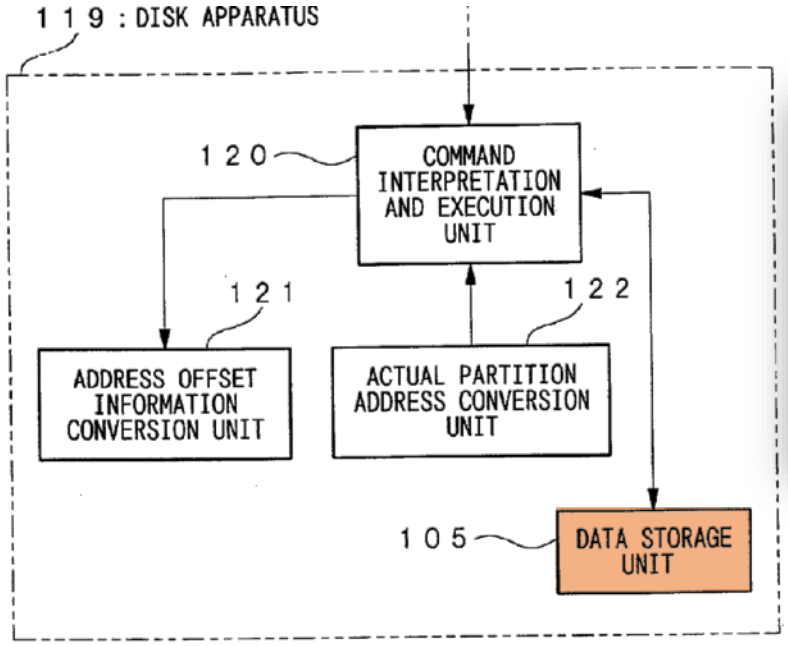
165. Even if a person of ordinary skill in the art were determined to combine *Kikuchi* and *Bergsten* for some reason, there would be no motivation to combine them in the manner described in the Petition and Declaration of Dr. Chase. *Kikuchi* contemplates the use of a disk storage unit. Ex. 1006, 5:30-36. *Bergsten* "emulates a local storage array for the host computer system which it services." Ex. 1007, 3:14-17. At best, a person of ordinary skill might use *Bergsten* as a data storage unit for *Kikuchi*. Whatever benefits could be had from a theoretical combination could be achieved in this manner without making the complicated modifications suggested by Petitioners. However, if a person of ordinary skill in the art were to combine *Bergsten* and *Kikuchi* in this manner, both references would be unchanged.

Ex. 2053 (Levy Decl.) ¶ 165

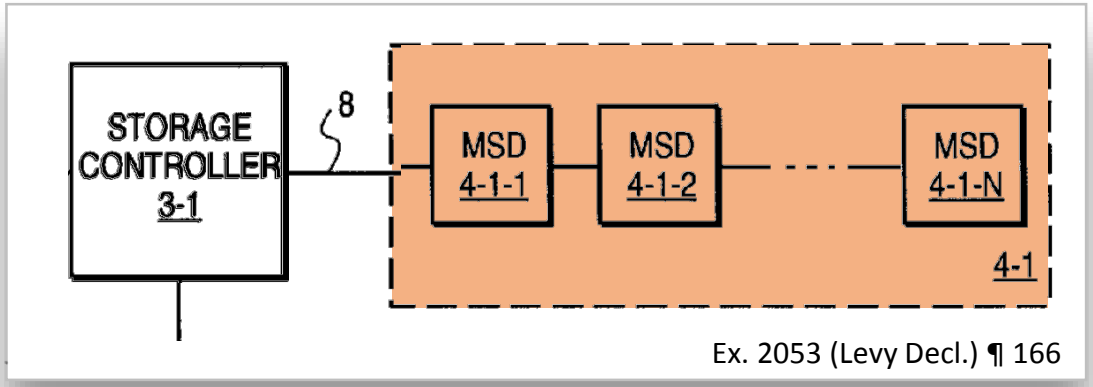
cited in 1209 POR at 44-46

A Combination of Kikuchi and Bergsten Would Utilize the Original Kikuchi Correlation Chart with the Virtual Storage of Bergsten

Kikuchi



Bergsten

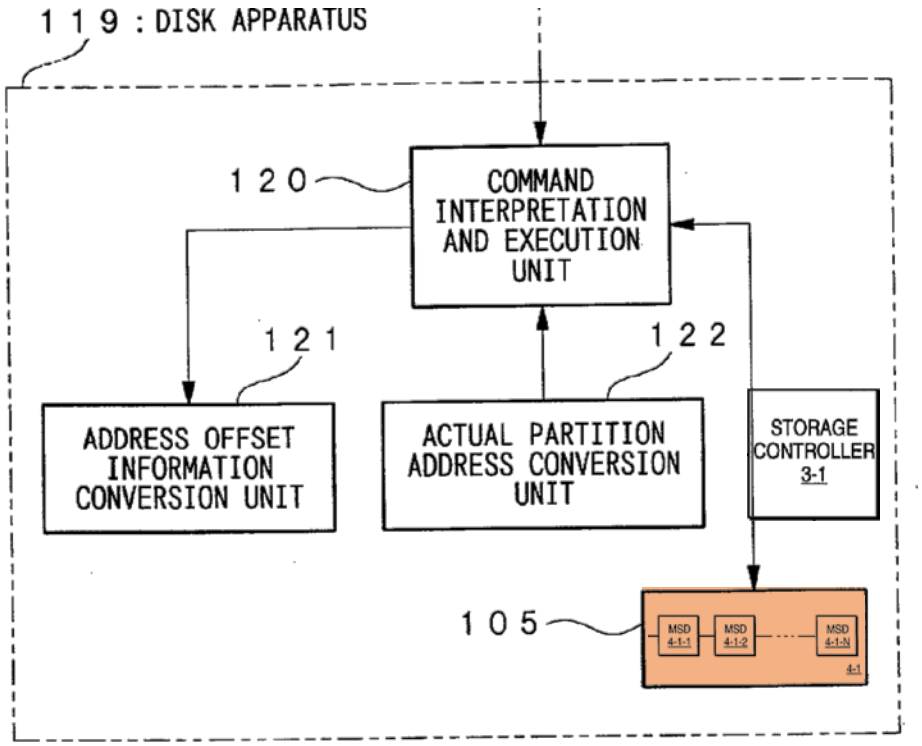


Ex. 2053 (Levy Decl.) ¶ 166

The storage controller of Bergsten with its virtualization map would be connected via its SCSI connection between command interpretation unit and execution unit 120 in data storage unit 105 of the Kikuchi disk apparatus which could be replaced by mass storage devices of Bergsten 4-1-1 to 4-1-N. Ex. 2053 (Levy Decl.) ¶ 166

A Combination of Kikuchi and Bergsten Would Utilize the Original Kikuchi Correlation Chart with the Virtual Storage of Bergsten

Kikuchi



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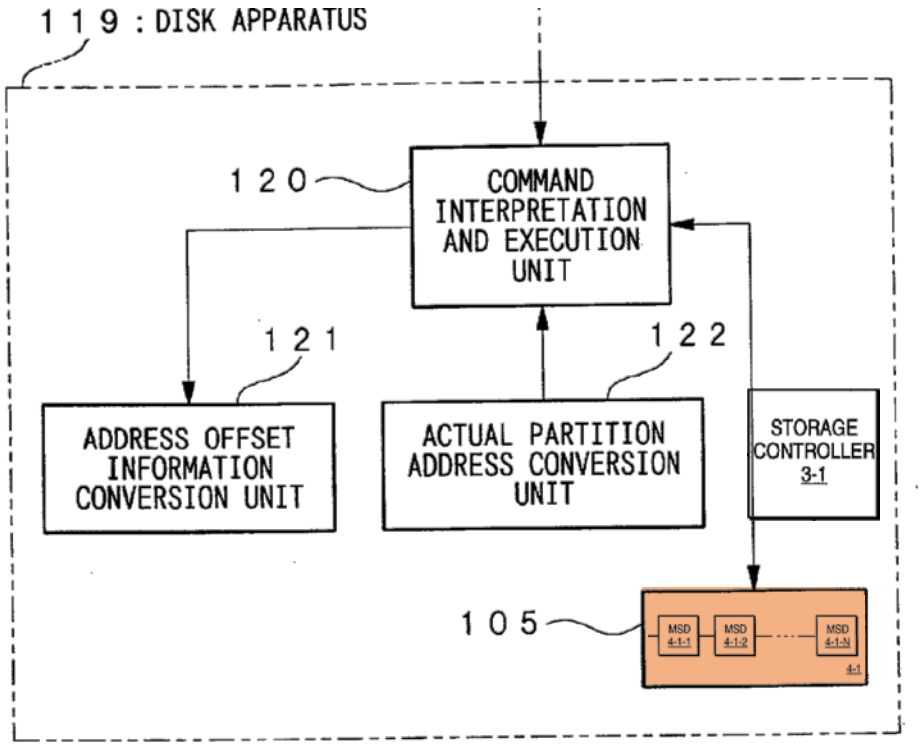
A Combination of Kikuchi and Bergsten Would Utilize the Original Kikuchi Correlation Chart with the Virtual Storage of Bergsten

Kikuchi



Assuming there is motivation to combine, one of skill in the art would combine the references in this straightforward manner without Dr. Chase's complex modifications. The resulting system would still not possess the claimed map or access controls.

cited in 1209 POR at 44-46

One of Ordinary Skill in the Art Would Not Have Combined Kikuchi and Bergsten as Petitioners Assert

- If a combination would have been made at all, it would have been made without the complicated changes suggested by Dr. Chase, and that combination would not practice the claimed invention

- The complicated changes Dr. Chase proposes could only come from hindsight

Patent Owner Created its Invention Before Kikuchi

The Invention was Conceived Before Kikuchi

- Kikuchi – Filed August 18, 1997
- Draft Patent Application – July 11, 1997 (Ex. 2303)

Patent Owner was Developing a Foundational Product

- Petitioners argue that Patent Owner "opted to omit the access controls from the Verrazano product to accelerate commercial introduction of that product" because it "would delay the commercial launch of the product." Reply at 5-6.

- Verrazano—without access controls—was Crossroad's first storage bridge product, and was not commercially launched until after the diligence period ended on December 31, 1997. Ex. 2305 (Middleton Decl.) ¶ 2; Ex. 2043 (Bianchi Decl.) ¶ 3; Ex. 1220 (Middleton Depo.) at 73:9-12 (cited in 1209 PO Motion to Exclude at 8).

- Even if Crossroads could have added access controls to Verrazano, it would not have been reduced to practice before the critical period ended

Access Controls Could Not Be Tested Until Verrazano Was Completed

- Ex. 1220 (Middleton Depo.) at 52:3-12: “Q. So are you aware of a reason that the Verrazano software could not have been tested on the testbed? . . . I can't tell you the specific reason, but I know that we couldn't do that because, if we could have, we would have gone down a whole different development path, I think.”

- Ex. 1220 (Middleton Depo.) at 113:7-18: “I don't believe it's possible to implement a testbed to fully test the bridge. Q. (BY MR. GARDELLA) Okay. How about to partially test the access control software? A. To the best of my knowledge, that would not have been possible.”

- Ex. 1220 (Middleton Depo.) at 115:14-17 “Q. (BY MR. GARDELLA) Could the access controls which were ultimately included in the 4100 with access controls have been simulated completely in software? A. Completely, no.”

cited in 1209 PO Motion to Exclude at 7 (FRE 106)

Constant Work is Not Required for Diligence

- Proof of reasonable diligence does not require constant work on the invention
- Crossroads showed reasonable diligence throughout the critical period

> Crossroads had approximately 10 technical employees (in other words, those that would be involved in designing and building working products). During that time, all of those personnel, including myself, were dedicated to work on the Verrazano project—that is, creating a functional, working product.
>
> Ex. 2305 (Middleton Decl.) ¶ 3

> Based on my own experience at Crossroads working on the "Verrazano" project, and my understanding of the workload of the involved employees in the fall of 1997, it does not surprise me to see that a draft patent application from counsel was received in July 1997 and finally filed at the end of December 1997.
>
> Ex. 2324 (Bianchi Decl.) ¶ 3

cited in 1209 POR at 27-32

Patent Owner Created its Invention Before Kikuchi

- Patent owner was in the process of developing product during the critical period
- Patent owner not only created products which made it to the market but also pursued patents on the inventions intended for those products
- The undisputed evidence demonstrates diligence

Petitioners Have Failed to Prove Unpatentability on any Asserted Grounds Based on Bergsten-Kikuchi

- The Bergsten-Kikuchi combination does not have the claimed access controls
  - Access controls require limiting a host's access to a specified storage space
  - Kikuchi's offsets do not specify storage space
  - Kikuchi cannot limit access to specified storage

- Just like in the Bergsten-Hirai combination, Petitioners place the emulation drivers of Bergsten before the alleged map – rendering it impossible to map to hosts
  - Unlike in Hirai, where Petitioners asserted a new combination, here Petitioners fail to respond to Patent Owner's argument at all
  - Both experts agree that the emulation drivers of Bergsten strip ALL host identification, so nothing is left to map against

- One of ordinary skill in the art would not have combined Kikuchi and Bergsten as Petitioners assert
  - If a combination would have been made at all, it would have been made without the complicated changes suggested by Dr. Chase
  - That combination would not practice the claimed invention
  - The complicated changes Dr. Chase proposes could only come from hindsight
- Patent Owner created its invention before Kikuchi

Each of Petitioners' Combinations Fail for Similar Reasons

- None of the combinations proposed by Petitioners pass host identification to the controller that does the alleged mapping and access control
  - Tachyon or emulation drivers strip that information, as Petitioners' expert testified from the beginning
- CRD only allocates storage to channels, not hosts
  - CRD cannot identify hosts
- Bergsten is an open access system that does not allocate storage to hosts
- Hirai is at a file system level
  - Patent Owner, BOTH experts and Hirai agree
- Kikuchi does not have the claimed access control
  - Offset is not storage space

None of the Combinations Provide the Claimed Map and/or Claimed Access Control

The Basic Function of the Patents is to Allow Host Access to Remote Storage using NLLBP, while Controlling Access to Specific Storage Space by Specific Hosts Through Use of a Map of Hosts to Storage Space

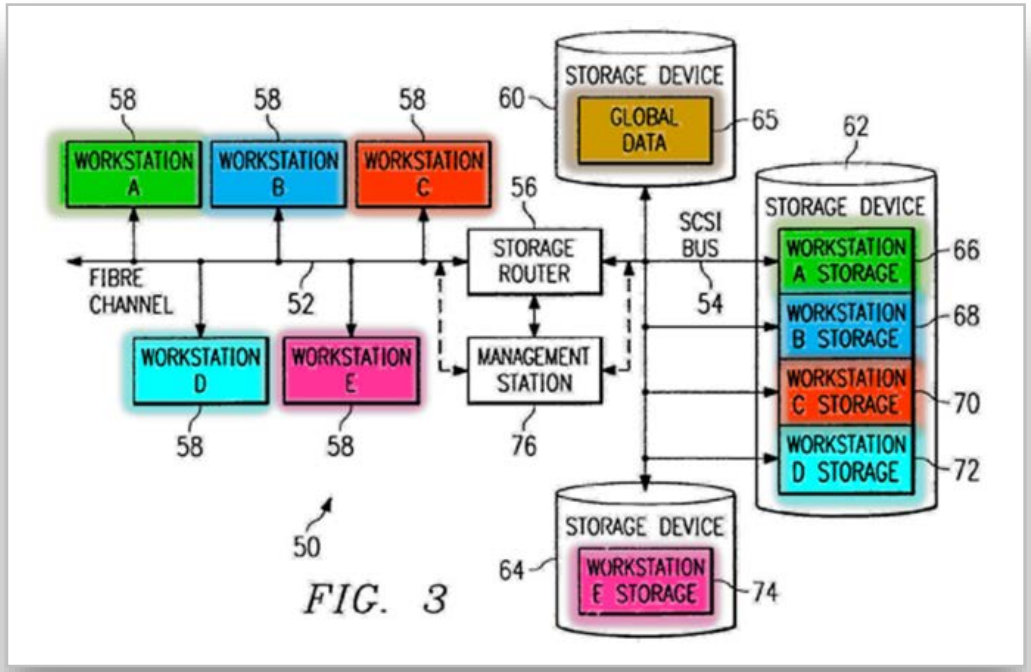


FIG. 3

Thank You

CLAIM TERMS

MAP

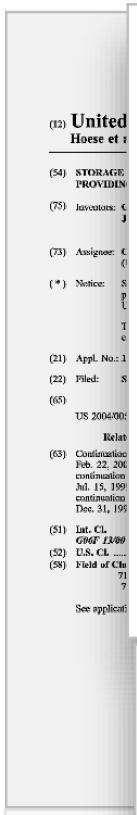
“Map” Limitations

The “map” of the [’035 Patent/‘147 Patent] associates specific representations of hosts on one side of the storage router with representations of storage on the other side of the storage router in order to define what storage is available to each specific host.

1197 POR at 7; 1207 POR at 2, 1209 POR at 3-4

"Map" Limitations

The specification requires the claimed map/mapping to specifically identify the host and its associated storage in order to allocate storage to particular hosts.



Storage router **56** allows the configuration and modification of the storage allocated to each attached workstation **58** through the use of mapping tables or other mapping techniques.

As shown in FIG. **3**, for example, storage device **60** can be configured to provide global data **65** which can be accessed by all workstations **58**. Storage device **62** can be configured to provide partitioned subsets **66**, **68**, **70** and **72**, where each partition is allocated to one of the workstations **58** (workstations A, B, C and D).

The storage router can use tables to map, for each initiator, what storage access is available and what partition is being addressed by a particular request.

'147 Patent at 4:26-35, 9:11-14

cited in 1207 POR at 2-3

"Map" Limitations

Petitioners and Petitioners' expert agree:

Petitioners' expert agrees that storage is allocated to 'particular hosts':

"The storage router may implement access controls to control a computer device's access to only those storage regions allocated to the **particular** computer device." Ex. 1010 (Chase Decl.) ¶ 18 (1209 POR at 6).

Petitioners unequivocally stated in the underlying litigation that "mapping" requires an association between the particular host devices an storage:

"One of ordinary skill in the art therefore would understand from the **plain language and context of the claims** that 'map[ping]' **requires specifying** a particular configuration—namely, **the association between a particular workstation** and a particular remote storage device." Ex. 2032 at 3 (1209 POR at 6)

See 1209 POR at 3-7

ACCESS CONTROLS

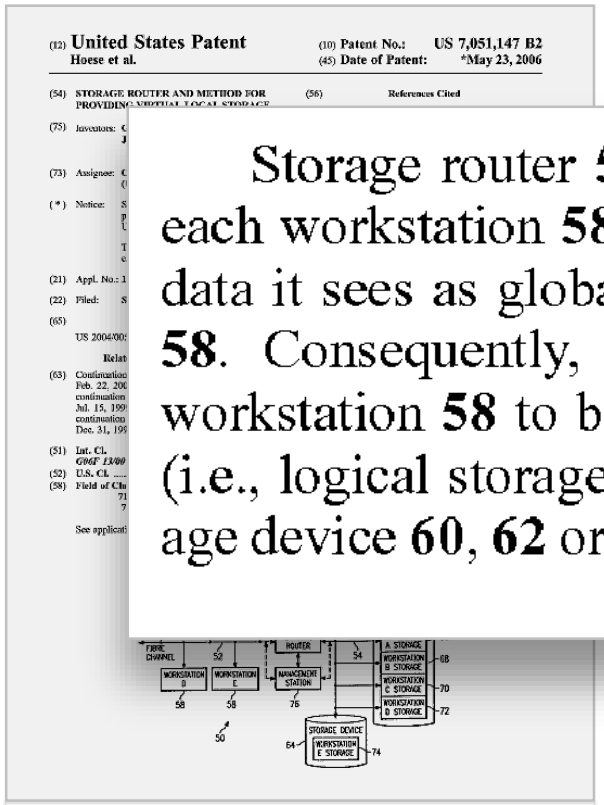
"Access Controls" Limitations

"The claimed access controls/controlling access limitations . . . are device specific in that the storage router controls what storage access is available to specified hosts so that different hosts can be provided different storage access."

1207 POR at 47; *see also* 1209 POR at 7

“Access Controls” Limitations

Centralized access controls are provided by controlling what virtual local storage each host sees.



Storage router **56** provides centralized control of what each workstation **58** sees as its local drive, as well as what data it sees as global data accessible by other workstations **58**. Consequently, the storage space considered by the workstation **58** to be its local storage is actually a partition (i.e., logical storage definition) of a physically remote storage device **60**, **62** or **64** connected through storage router **56**.

‘147 Patent at 4:60-66

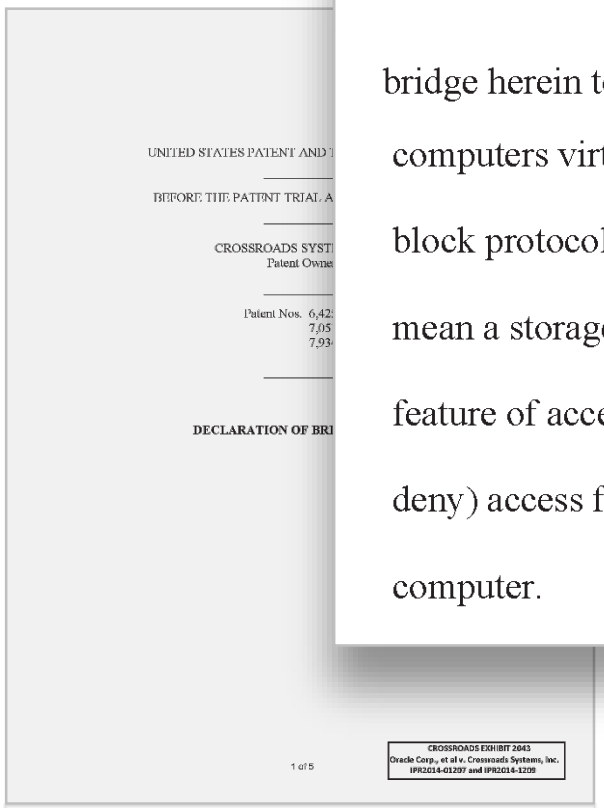
cited in 1207 POR at 3

SECONDARY CONSIDERATIONS / OBJECTIVE EVIDENCE

Patent Owner Presented Evidence of Commercial Success

- Patent Owner's Evidence Shows Commercial Success is Due to the Claimed Features of Access Controls
- Objective evidence of Non-obviousness Need Only Be Reasonably Commensurate with the Scope of the Claims

Crossroads' Sales Records Show Routers with Access Controls Were Preferred Over Bridges Without Access Controls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DECLARATION OF BRI

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CROSSROADS EXHIBIT 2043
Oracle Corp., et al v. Crossroads Systems, Inc.
IPR2014-01209 and IPR2014-1209

I am using the term bridge herein to mean a storage appliance that provides one or more host computers virtual local storage on remote storage devices using native, low-level block protocols, but without access controls. I am using the term router herein to mean a storage appliance with the same features as a bridge, but with the additional feature of access controls. By access controls I mean the ability to control (allow or deny) access from a host computer to the same storage available to another host computer.

Ex. 2043 (Bianchi Decl.) ¶ 2

cited in 1209 POR at 55-56

Crossroads' Sales Records Show Routers with Access Controls Were Preferred Over Bridges Without Access Controls

CROSSROADS
BRIDGE AND ROUTER REVENUE

Product Name/Description	Bridge or Router	FY'05	FY'06	FY'07	FY'08	FY'09	FY'10
4100	Bridge	0	2,070	0	0	0	0
4150	Router	0	0	0	0	0	0
4200	Bridge	0	0	0	0	0	0
4250	Router	2,000	0	0	0	0	0
4350	Router	0	0	0	0	0	0
4400	Bridge	0	0	0	0	0	0
4450	Router	0	0	8,000	0	0	0
6000							
6000-Router	Router	3,413,703	1,589,403	842,064	677,220	488,720	229531
6000-b	Bridge	0	15,360	12,800	2,560	2,560	0
6240							
6240-Router	Router	195,226	142,596	106,332	84,081	42,023	16007
6240-b	Bridge	0	0	16,800	16,800	0	0
240f DataMover	Router	6,995	0	0	0	0	0
Brumbies	Router	0	(1,185)	0	0	0	0
Embedded Routers	Router	2,213,825	3,295,862	1,240,680	0	0	0
8000	Router	0	0	0	0	0	0
10000	Router	2,806,505	878,851	0	0	8,474	0
Server Attach	Router	230,531	160,218	226,940	69,400	58,762	71300
Ranger in a box (RIB)							
7120-Router	Router	0	644,394	1,053,979	688,907	182,009	74568
7120-b	Bridge	0	0	14,550	2,910	0	2910
Achenar	Router	5,080,141	2,177,395	(106,590)	0	0	0
Ranger	Router	0	1,680,690	2,243,520	1,999,560	776,910	614910
yager No Access Controls	Bridge	2,091,800	1,558,200	2,075,500	782,570	404,490	62550
Voyager with Access Controls	Router	865,400	631,400	1,180,221	1,129,749	846,403	615457
Total		$16,906,126	$12,775,254	$8,914,796	$5,453,757	$2,810,351	$1,687,233
Total Bridges		$2,091,800	$1,575,630	$2,119,650	$804,840	$407,050	$65,460
Total Routers		$14,814,326	$11,199,624	$6,795,146	$4,648,917	$2,403,301	$1,621,773

CROSSROADS
BRIDGE AND ROUTER SHIPMENTS

Product Name/Description	Bridge or Router	FY'07	FY'08	FY'09	FY'10
4100	Bridge	0	0	0	0
4150	Router	0	0	0	0
4200	Bridge	0	0	0	0
4250	Router	1	0	0	0
4350	Router	0	0	0	0
4400	Bridge	0	0	0	0
4450	Router	2	0	0	0
6000					
6000-Router	Router	188	159	172	44
6000-b	Bridge	5	1	1	0
6240					
6240-Router	Router	21	15	7	3
6240-b	Bridge	4	4	0	0
240f DataMover	Router	0	0	0	0
Brumbies	Router	0	0	0	0
Embedded Routers	Router	211	0	0	0
8000	Router	0	0	0	0
10000	Router	0	0	2	0
Server Attach	Router	48	18	12	15
Ranger in a box (RIB)					
7120-Router	Router	443	302	82	33
7120-b	Bridge	5	1	0	1
Achenar	Router	(187)	0	0	0
Ranger	Router	3,936	3,508	1,363	1,118
Voyager No Access Controls	Bridge	2,422	535	183	(261)
Voyager with Access Controls	Router	543	591	399	351
Total		7,642	5,134	2,221	1,304
Total Bridges		2,436	541	184	(260)
Total Routers		5,206	4,593	2,037	1,564

Ex. 2044 (Bianchi Decl.) at 3,5

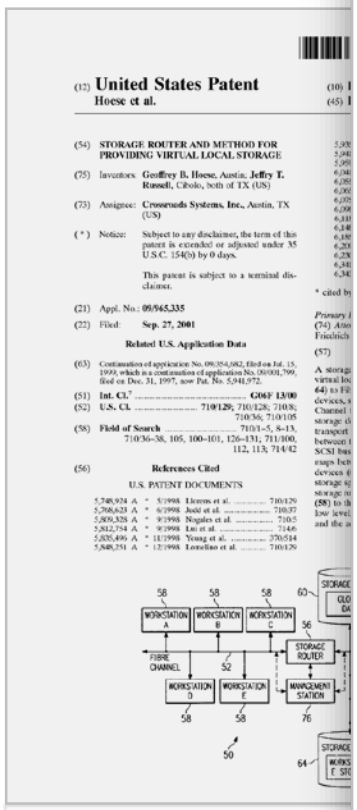
cited in 1209 POR at 55-56

The Nexus Requirement Does Not Require Patent Licenses to Recite Claim Limitations

- Petitioners' Position Effectively Requires Licenses to Recite Particular Claims or Claim Limitations (1209 Reply at 22)
- Crossroads' Licenses Specify the Patent Family at Issue
- Requiring Licenses to Recite Claims instead of Patents or Families Ignores the Real World and Would Mean Licenses Can Never Be Used as Objective Evidence
- Crossroads' Licensing Program as a Whole, Including Non-Litigation Related Licenses, indicates the Invention was Non-Obvious

cited in 1207 POR at 58-60

Claim 1 U.S. Patent Number 6,425,035 B2



(12) **United States Patent**
Hoese et al.

(54) STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE

(75) Inventors: **Geoffrey B. Hoese**, Austin; **Jeffry T. Russell**, Cibolo, both of TX (US)

(73) Assignee: **Crossroads Systems, Inc.**, Austin, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **09/545,335**

(22) Filed: **Sep. 27, 2001**

Related U.S. Application Data

(63) Continuation of application No. 09/354,682, filed on Jul. 15, 1999, which is a continuation of application No. 08/801,799, filed on Dec. 31, 1997, now Pat. No. 5,941,972.

(51) **Int. Cl.**[7] **G06F 13/00**

(52) **U.S. Cl.** **710/129**; 710/128; 710/8; 710/36; 710/105

(58) **Field of Search** 710/1–5, 8–13, 710/36–38, 105, 100–101, 126–131, 711/100, 112, 113; 714/42

(56) **References Cited**

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5,768,623 A * 6/1998 Judd et al. 710/37
5,809,328 A * 9/1998 Nogales et al. 710/5
5,812,754 A * 9/1998 Lui et al. 714/6
5,835,496 A * 11/1998 Yeung et al. 370/514
5,949,251 A * 12/1998 Lomelino et al. 710/129

1. A storage router for providing virtual local storage on remote storage devices to devices, comprising:

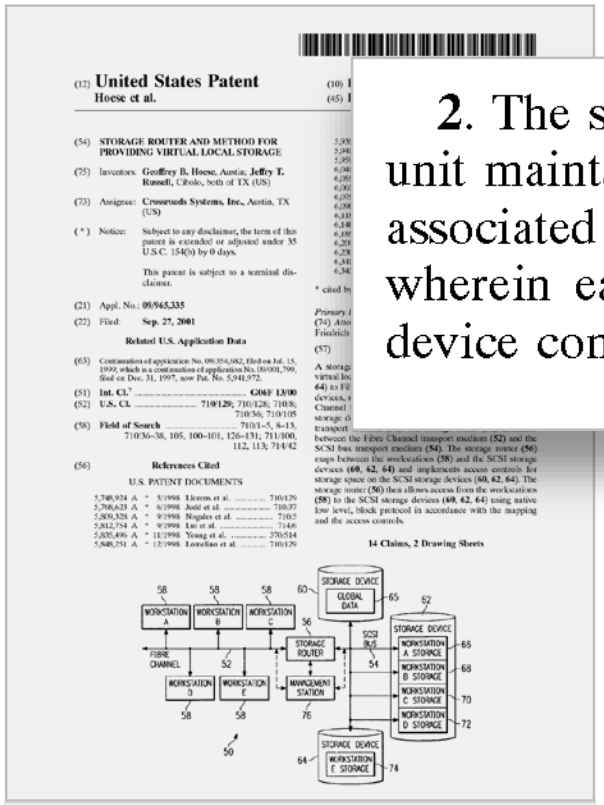
a buffer providing memory work space for the storage router;

a first controller operable to connect to and interface with a first transport medium;

a second controller operable to connect to and interface with a second transport medium; and

a supervisor unit coupled to the first controller, the second controller and the buffer, the supervisor unit operable to map between devices connected to the first transport medium and the storage devices, to implement access controls for storage space on the storage devices and to process data in the buffer to interface between the first controller and the second controller to allow access from devices connected to the first transport medium to the storage devices using native low level, block protocols.

Claim 2 U.S. Patent Number 6,425,035 B2



(12) **United States Patent**
Hoese et al.

(54) STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE

(75) Inventors: Geoffrey B. Hoese, Austin; Jeffry T. Russell, Cibolo, both of TX (US)

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(51) **Int. Cl.**[7] **G06F 13/00**

(52) **U.S. Cl.** **710/129**; 710/128; 710/8; 710/36; 710/105

(58) **Field of Search** 710/1–5, 8–13, 710/36–38, 105, 100–101, 126–131, 711/100, 112, 113, 714/42

(56) **References Cited**

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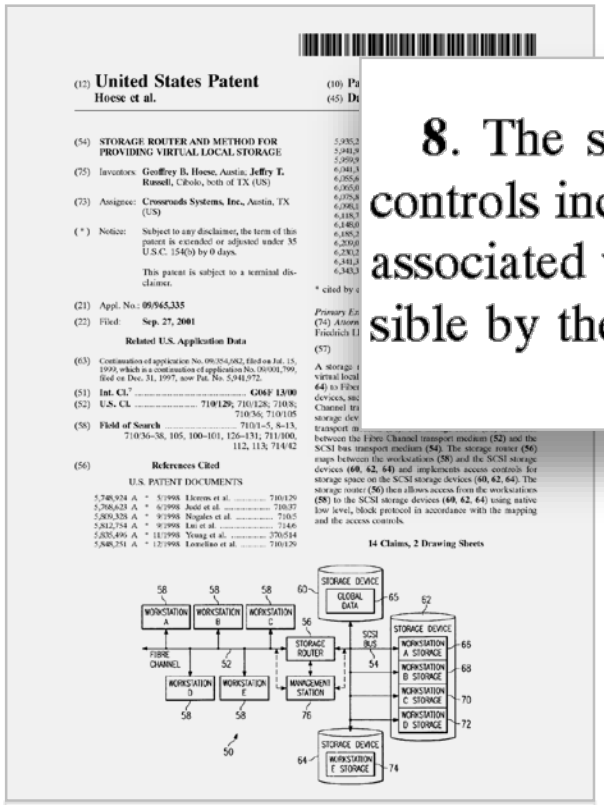
5,835,496 A * 11/1998 Yeung et al. 370/514
5,949,751 A * 12/1998 Lonelino et al. 710/129

14 Claims, 2 Drawing Sheets

2. The storage router of claim **1**, wherein the supervisor unit maintains an allocation of subsets of storage space to associated devices connected to the first transport medium, wherein each subset is only accessible by the associated device connected to the first transport medium.

Claim 8 U.S. Patent Number 6,425,035 B2



(12) **United States Patent**
Hoese et al.

(10) Pa
(45) Da

(54) **STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE**

(75) Inventors: **Geoffrey B. Hoese**, Austin; **Jeffry T. Russell**, Cibolo, both of TX (US)

(73) Assignee: **Crossroads Systems, Inc.**, Austin, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **09/545,335**

(22) Filed: **Sep. 27, 2001**

Related U.S. Application Data

(63) Continuation of application No. 09/354,682, filed on Jul. 15, 1999, which is a continuation of application No. 08/001,709, filed on Dec. 31, 1997, now Pat. No. 5,941,972.

(51) **Int. Cl.**[7] **G06F 13/00**

(52) **U.S. Cl.** **710/129**; 710/128; 710/8; 710/36; 710/105

(58) **Field of Search** 710/1–5, 8–13, 710/36–38, 105, 100–101, 126–131, 711/100, 112, 113; 714/42

(56) **References Cited**

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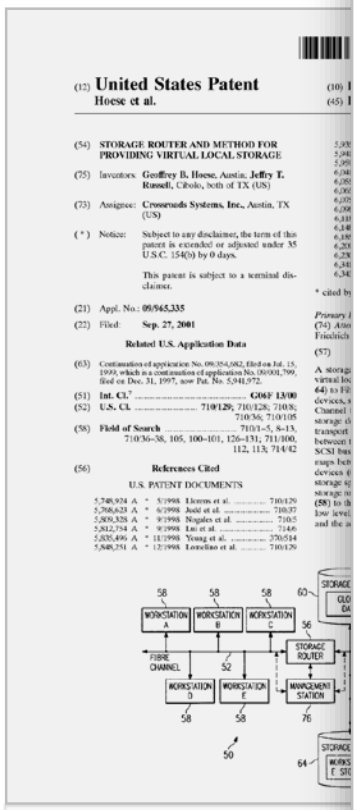
5,835,496 A * 11/1998 Yeung et al. 370/514
5,848,251 A * 12/1998 Lomelino et al. 710/129

14 Claims, 2 Drawing Sheets

8. The storage network of claim **7**, wherein the access controls include an allocation of subsets of storage space to associated workstations, wherein each subset is only accessible by the associated workstation.

Claim 11 U.S. Patent Number 6,425,035 B2



(12) **United States Patent**
Hoese et al.

(54) STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE

(75) Inventors: Geoffrey B. Hoese, Austin; Jeffry T. Russell, Cibolo, both of TX (US)

(73) Assignee: Crossroads Systems, Inc., Austin, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: 09/945,335

(22) Filed: Sep. 27, 2001

Related U.S. Application Data

(63) Continuation of application No. 09/354,682, filed on Jul. 15, 1999, which is a continuation of application No. 08/801,799, filed on Dec. 31, 1997, now Pat. No. 5,941,972.

(51) Int. Cl.[7] G06F 13/00

(52) U.S. Cl. 710/129; 710/128; 710/8; 710/36; 710/105

(58) Field of Search 710/1–5, 8–13, 710/36–38, 105, 100–101, 126–131, 711/100, 112, 113, 714/42

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5,812,754 A * 9/1998 Lui et al. 714/6
5,835,496 A * 11/1998 Yeung et al. 370/514
5,949,751 A * 12/1998 Lonelino et al. 710/129

11. A method for providing virtual local storage on remote storage devices connected to one transport medium to devices connected to another transport medium, comprising:

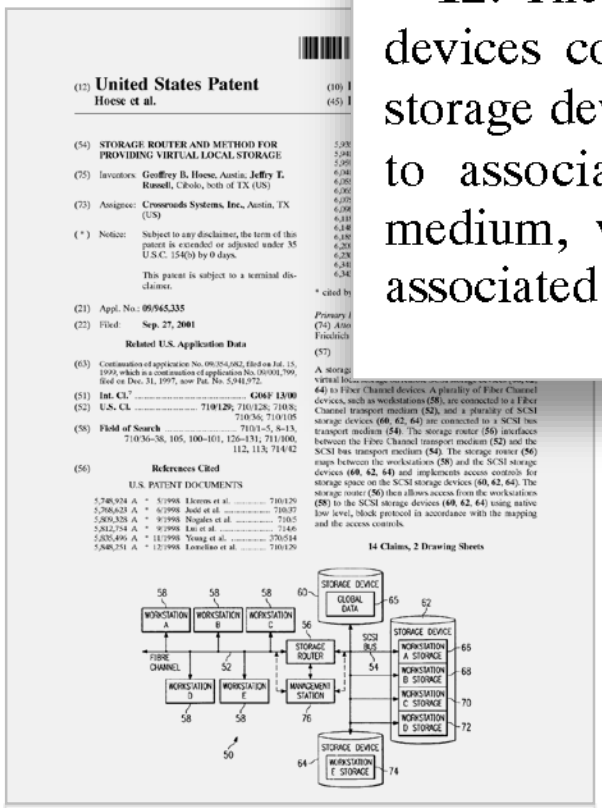
interfacing with a first transport medium;

interfacing with a second transport medium;

mapping between devices connected to the first transport medium and the storage devices and that implements access controls for storage space on the storage devices; and

allowing access from devices connected to the first transport medium to the storage devices using native low level, block protocols.

Claim 12 U.S. Patent Number 6,425,035 B2



(12) **United States Patent**
Hoese et al.

(54) STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE

(75) Inventors: Geoffrey B. Hoese, Austin; Jeffry T. Russell, Cibolo, both of TX (US)

(73) Assignee: Crossroads Systems, Inc., Austin, TX (US)

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This patent is subject to a terminal disclaimer.

(21) Appl. No.: 09/545,335

(22) Filed: Sep. 27, 2001

Related U.S. Application Data

(63) Continuation of application No. 09/354,682, filed on Jul. 15, 1999, which is a continuation of application No. 08/801,799, filed on Dec. 31, 1997, now Pat. No. 5,941,972.

(51) **Int. Cl.**[7] **G06F 13/00**

(52) **U.S. Cl.** **710/129**; 710/128; 710/8; 710/36; 710/105

(58) **Field of Search** 710/1–5, 8–13, 710/36–38, 105, 100–101, 126–131, 711/100, 112, 113; 714/42

(56) **References Cited**

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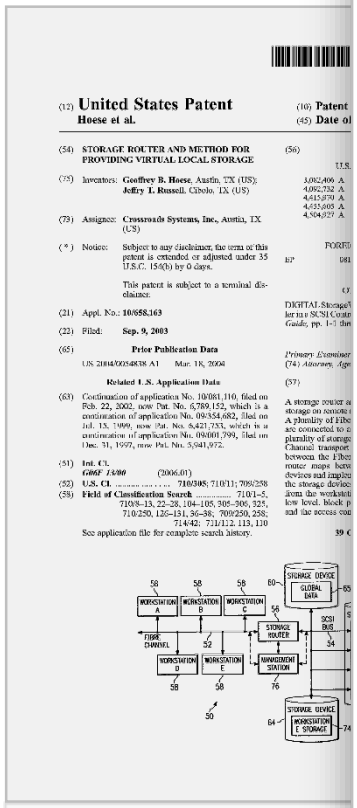
5,812,754 A * 9/1998 Lui et al. 714/6
5,835,496 A * 11/1998 Yeung et al. 370/514
5,848,251 A * 12/1998 Lomelino et al. 710/129

14 Claims, 2 Drawing Sheets

12. The method of claim **11**, wherein mapping between devices connected to the first transport medium and the storage devices includes allocating subsets of storage space to associated devices connected to the first transport medium, wherein each subset is only accessible by the associated device connected to the first transport medium.

Claim 1 U.S. Patent Number 7,051,147 B2



(12) **United States Patent**
Hoese et al.

(10) **Patent**
(45) **Date of**

(54) **STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE**

(75) Inventors: **Geoffrey B. Hoese**, Austin, TX (US); **Jeffry T. Russell**, Cibolo, TX (US)

(73) Assignee: **Crossroads Systems, Inc.**, Austin, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/658,163**

(22) Filed: **Sep. 9, 2003**

(65) **Prior Publication Data**

US 2004/0054838 A1 Mar. 18, 2004

Related U.S. Application Data

(63) Continuation of application No. 10/081,110, filed on Feb. 22, 2002, now Pat. No. 6,789,152, which is a continuation of application No. 09/354,682, filed on Jul. 15, 1999, now Pat. No. 6,421,753, which is a continuation of application No. 08/001,799, filed on Dec. 31, 1997, now Pat. No. 5,941,972.

(51) **Int. Cl.**
G06F 13/00 (2006.01)

(52) **U.S. Cl.** 710/305; 710/11; 709/258

(58) **Field of Classification Search** 710/1–5, 710/8–13, 22–28, 104–105, 305–306, 325, 710/250, 126–131, 36–38; 709/250, 258; 714/42; 711/112, 113, 110

See application file for complete search history.

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U.S.

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4,615,870 A
4,635,005 A
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Primary Examiner
(74) *Attorney, Age*

(57)

A storage router a
storage on remote
A plurality of Fibre
are connected to a
plurality of storage
Channel transport
between the Fibre
router maps betw
devices and implem
the storage devices
from the workstati
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1. A storage router for providing virtual local storage on remote storage devices to a device, comprising:

a buffer providing memory work space for the storage router;

a first Fibre Channel controller operable to connect to and interface with a first Fibre Channel transport medium;

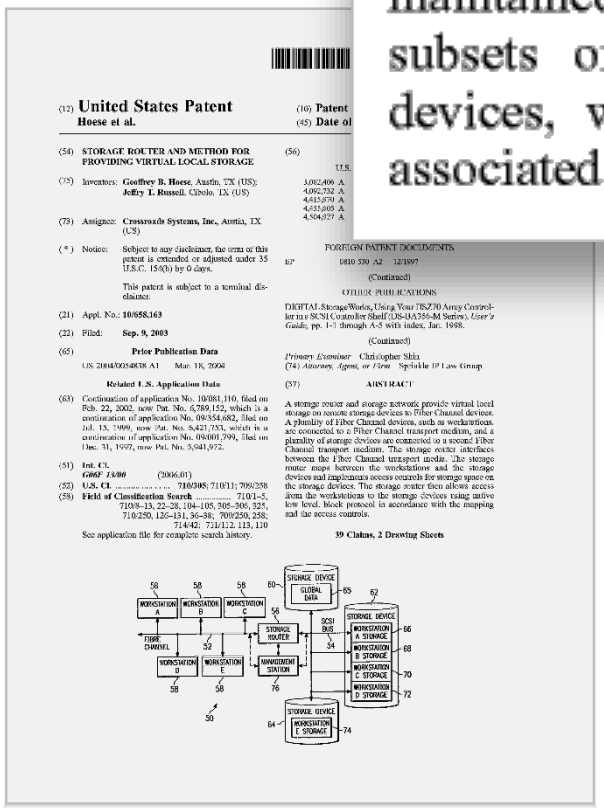
a second Fibre Channel controller operable to connect to and interface with a second Fibre Channel transport medium; and

a supervisor unit coupled to the first and second Fibre Channel controllers and the buffer, the supervisor unit operable:

to maintain a configuration for remote storage devices connected to the second Fibre Channel transport medium that maps between the device and the remote storage devices and that implements access controls for storage space on the remote storage devices; and

to process data in the buffer to interface between the first Fibre Channel controller and the second Fibre Channel controller to allow access from Fibre Channel initiator devices to the remote storage devices using native low level, block protocol in accordance with the configuration.

Claim 2 U.S. Patent Number 7,051,147 B2



(12) **United States Patent**
Hoese et al.

(10) **Patent**
(45) **Date of**

(54) **STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE**

(75) Inventors: **Geoffrey B. Hoese**, Austin, TX (US); **Jeffry T. Russell**, Cibolo, TX (US)

(73) Assignee: **Crossroads Systems, Inc.**, Austin, TX (US)

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This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/658,163**

(22) Filed: **Sep. 9, 2003**

(65) **Prior Publication Data**

US 2004/0054838 A1 Mar. 18, 2004

Related U.S. Application Data

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(51) **Int. Cl.**
G06F 13/00 (2006.01)

(52) **U.S. Cl.** 710/305; 710/11; 709/258

(58) **Field of Classification Search** 710/1–5, 710/8–13, 22–28, 104–105, 305–306, 325, 710/250, 126–131, 36–38; 709/250, 258; 714/42; 711/112, 113, 110

See application file for complete search history.

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(Continued)

Primary Examiner Christopher Shin
(74) *Attorney, Agent, or Firm* Spyhalle IP Law Group

(57) **ABSTRACT**

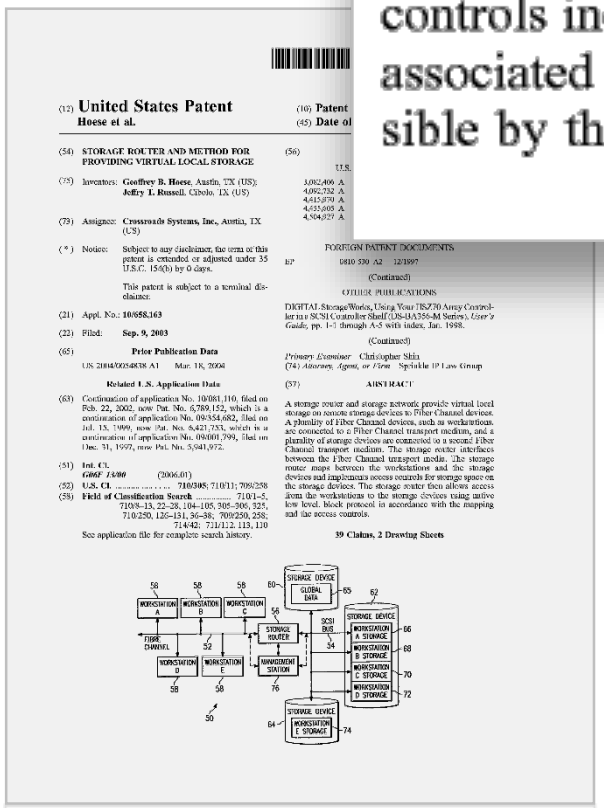
A storage router and storage network provide virtual local storage on remote storage devices to Fiber Channel devices. A plurality of Fiber Channel devices, such as workstations, are connected to a Fiber Channel transport medium, and a plurality of storage devices are connected to a second Fiber Channel transport medium. The storage router interfaces between the Fiber Channel transport media. The storage router maps between the workstations and the storage devices and implements access controls for storage space on the storage devices. The storage router then allows access from the workstations to the storage devices using native low level, block protocol in accordance with the mapping and the access controls.

39 Claims, 2 Drawing Sheets

2. The storage router of claim **1**, wherein the configuration maintained by the supervisor unit includes an allocation of subsets of storage space to associated Fibre Channel devices, wherein each subset is only accessible by the associated Fibre Channel device.

Claim 7 U.S. Patent Number 7,051,147 B2

7. The storage network of claim 6, wherein the access controls include an allocation of subsets of storage space to associated workstations, wherein each subset is only accessible by the associated workstation.



(12) **United States Patent**
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(10) **Patent**
(45) **Date of**

(54) **STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE**

(75) Inventors: **Geoffrey B. Hoese**, Austin, TX (US); **Jeffry T. Russell**, Cibolo, TX (US)

(73) Assignee: **Crossroads Systems, Inc.**, Austin, TX (US)

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(51) **Int. Cl.**
G06F 13/00 (2006.01)

(52) **U.S. Cl.** 710/305; 710/11; 709/258

(58) **Field of Classification Search** 710/1–5, 710/8–13, 22–28, 104–105, 305–306, 325, 710/250, 126–131, 36–38; 709/250, 258; 714/42; 711/112, 113, 110

See application file for complete search history.

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(Continued)

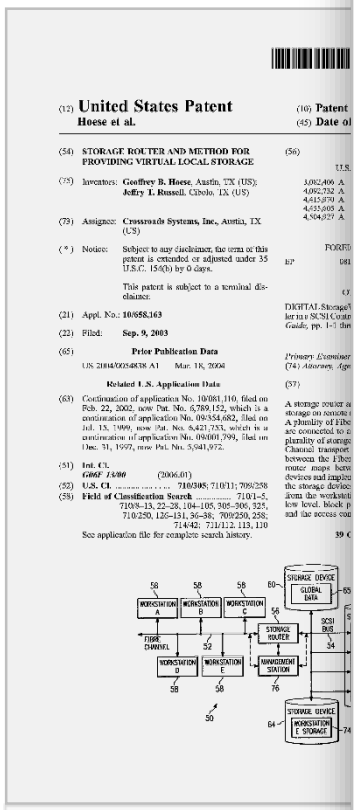
Primary Examiner Christopher Shin
(74) *Attorney, Agent, or Firm* Spyhalle IP Law Group

(57) **ABSTRACT**

A storage router and storage network provide virtual local storage on remote storage devices to Fiber Channel devices. A plurality of Fiber Channel devices, such as workstations, are connected to a Fiber Channel transport medium, and a plurality of storage devices are connected to a second Fiber Channel transport medium. The storage router interfaces between the Fiber Channel transport media. The storage router maps between the workstations and the storage devices and implements access controls for storage space on the storage devices. The storage router then allows access from the workstations to the storage devices using native low level, block protocol in accordance with the mapping and the access controls.

39 Claims, 2 Drawing Sheets

Claim 10 U.S. Patent Number 7,051,147 B2



(12) **United States Patent**
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(10) **Patent**
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(51) **Int. Cl.**
G06F 13/00 (2006.01)

(52) **U.S. Cl.** 710/305; 710/11; 709/258

(58) **Field of Classification Search** 710/1–5, 710/8–13, 22–28, 104–105, 305–306, 325, 710/250, 126–131, 36–38; 709/250, 258; 714/42; 711/112, 113, 110

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Primary Examiner
(74) *Attorney, Age*

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10. A method for providing virtual local storage on remote storage devices to Fibre Channel devices, comprising:

interfacing with a first Fibre Channel transport medium;

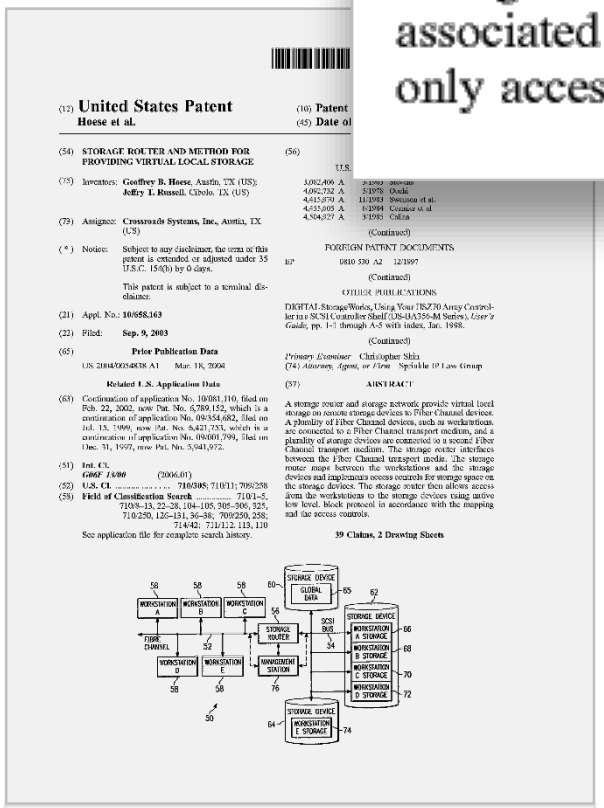
interfacing with a second Fibre Channel transport medium;

maintaining a configuration for remote storage devices connected to the second Fibre Channel transport medium that maps between Fibre Channel devices and the remote storage devices and that implements access controls for storage space on the remote storage devices; and

allowing access from Fibre Channel initiator devices to the remote storage devices using native low level, block protocol in accordance with the configuration.

Claim 11 U.S. Patent Number 7,051,147 B2

11. The method of claim **10**, wherein maintaining the configuration includes allocating subsets of storage space to associated Fibre Channel devices, wherein each subset is only accessible by the associated Fibre Channel device.



(12) **United States Patent**
Hoese et al.

(10) **Patent**
(45) **Date of**

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(21) Appl. No.: **10/658,163**

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(51) **Int. Cl.**
G06F 13/00 (2006.01)

(52) **U.S. Cl.** 710/305; 710/11; 709/258

(58) **Field of Classification Search** 710/1–5, 710/8–13, 22–28, 104–105, 305–306, 325, 710/250, 126–131, 36–38; 709/250, 258; 714/42; 711/112, 113, 110

See application file for complete search history.

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(Continued)

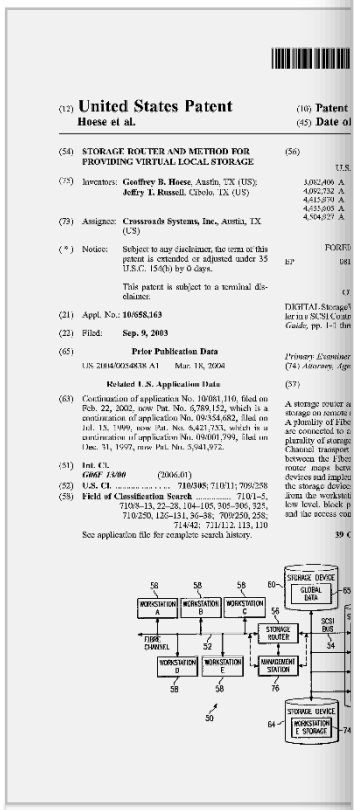
Primary Examiner Christopher Shin
(74) *Attorney, Agent, or Firm* Spyrkle IP Law Group

(57) **ABSTRACT**

A storage router and storage network provide virtual local storage on remote storage devices to Fiber Channel devices. A plurality of Fiber Channel devices, such as workstations, are connected to a Fiber Channel transport medium, and a plurality of storage devices are connected to a second Fiber Channel transport medium. The storage router interfaces between the Fiber Channel transport media. The storage router maps between the workstations and the storage devices and implements access controls for storage space on the storage devices. The storage router then allows access from the workstations to the storage devices using native low level, block protocol in accordance with the mapping and the access controls.

39 Claims, 2 Drawing Sheets

Claim 14 U.S. Patent Number 7,051,147 B2



(12) **United States Patent**
Hoese et al.

(10) Patent
(45) Date of

(54) **STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE**

(75) Inventors: **Geoffrey B. Hoese**, Austin, TX (US); **Jeffry T. Russell**, Cibolo, TX (US)

(73) Assignee: **Crossroads Systems, Inc.**, Austin, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/658,163**

(22) Filed: **Sep. 9, 2003**

(65) **Prior Publication Data**

US 2004/0054838 A1 Mar. 18, 2004

Related U.S. Application Data

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DIGITAL Storage
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Guide, pp. 1-1 thr

Primary Examiner
(74) *Attorney, Age*

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plurality of storage
Channel transport
between the Fibre
router maps betw
devices and implen
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and the access con

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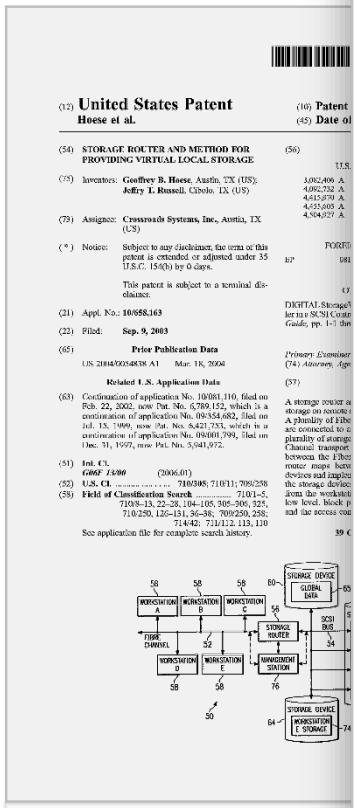
14. An apparatus for providing virtual local storage on a remote storage device to a device operating according to a Fibre Channel protocol, comprising:

a first controller operable to connect to and interface with a first transport medium, wherein the first transport medium is operable according to the Fibre Channel protocol;

a second controller operable to connect to and interface with a second transport medium, wherein the second transport medium is operable according to the Fibre Channel protocol; and

a supervisor unit coupled to the first controller and the second controller, the supervisor unit operable to control access from the device connected to the first transport medium to the remote storage device connected to the second transport medium using native low level, block protocols according to a map between the device and the remote storage device.

Claim 21 U.S. Patent Number 7,051,147 B2



(12) **United States Patent**
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(54) **STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE**

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See application file for complete search history.

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plurality of storage
Channel transport
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router maps betw
devices and implem
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21. A system for providing virtual local storage on remote storage devices, comprising:

a first controller operable to connect to and interface with a first transport medium operable according to a Fibre Channel protocol;

a second controller operable to connect to and interface with a second transport medium operable according to the Fibre Channel protocol;

at least one device connected to the first transport medium;

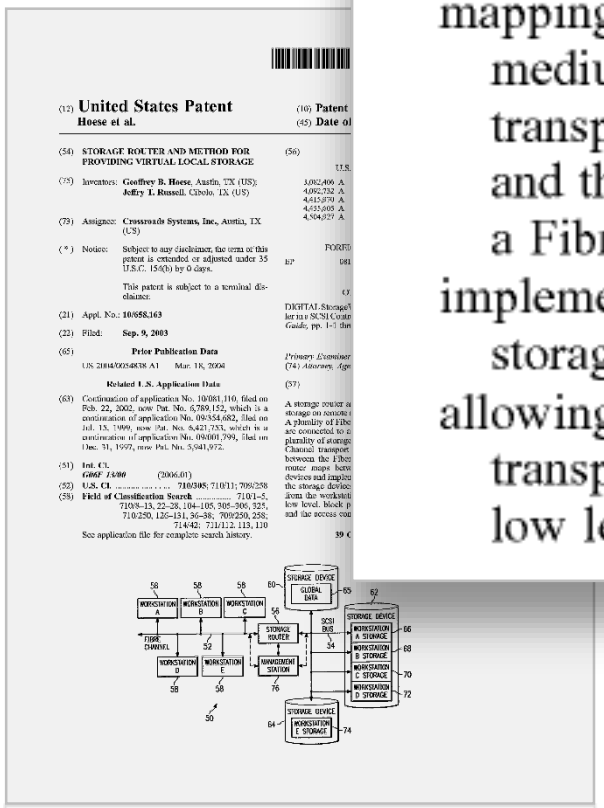
at least one storage device connected to the second transport medium; and

an access control device coupled to the first controller and the second controller, the access control device operable to:

map between the at least one device and a storage space on the at least one storage device; and

control access from the at least one device to the at least one storage device using native low level, block protocol in accordance with the map.

Claim 28 U.S. Patent Number 7,051,147 B2



(12) **United States Patent**
Hoese et al.

(10) **Patent**
(45) **Date of**

(54) **STORAGE ROUTER AND METHOD FOR PROVIDING VIRTUAL LOCAL STORAGE**

(56)

U.S.

(75) Inventors: **Geoffrey B. Hoese**, Austin, TX (US); **Jeffry T. Russell**, Cibolo, TX (US)

(73) Assignee: **Crossroads Systems, Inc.**, Austin, TX (US)

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See application file for complete search history.

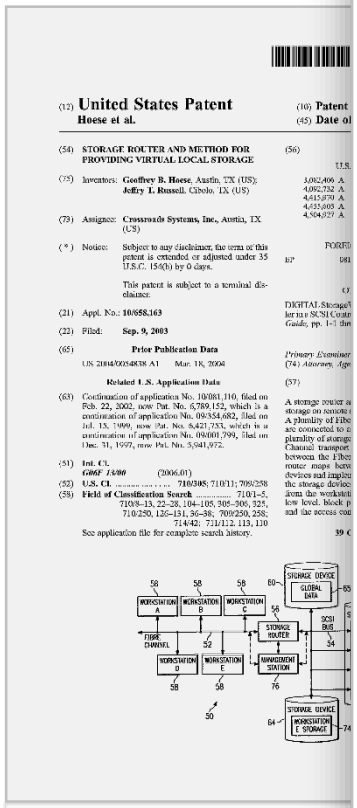
28. A method for providing virtual local storage on remote storage devices, comprising:

mapping between a device connected to a first transport medium and a storage device connected to a second transport medium, wherein the first transport medium and the second transport medium operate according to a Fibre Channel protocol;

implementing access controls for storage space on the storage device; and

allowing access from the device connected to the first transport medium to the storage device using native low level, block protocols.

Claim 34 U.S. Patent Number 7,051,147 B2



(12) **United States Patent**
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Channel transport
between the Fibre
router maps betw
devices and implem
the storage devices
from the workstati
low level, block p
and the access con

39 C

34. A system for providing virtual local storage, comprising:

a host device;

a storage device remote from the host device, wherein the storage device has a storage space;

a first controller;

a second controller

a first transport medium operable according to a Fibre Channel protocol, wherein the first transport medium connects the host device to the first controller;

a second transport medium operable according to the Fibre Channel protocol, wherein the second transport medium connects the second controller to the storage device;

a supervisor unit coupled to the first controller and the second controller, the supervisor unit operable to:

maintain a configuration that maps between the host device and at least a portion of the storage space on the storage device; and

implement access controls according to the configuration for the storage space on the storage device using native low level, block protocol.

Kikuchi Does Not Have Access Controls

139. *Kikuchi* discloses several apparatuses that are directed towards sharing control of an entire storage device among several hosts. Host devices send storage commands to a disk apparatus. In one of the apparatuses (the "first apparatus"), depending on whether the host is authorized, a command will either be executed (*e.g.*, sent to data storage unit 105) or discarded. Ex. 1006, 4:17-34. In another described apparatus (the "fourth apparatus"), read and write commands may also be altered prior to execution. In both of these apparatuses, the Host Identifier is used to identify the host device issuing the command.

Ex. 2053 (Levy Decl.) ¶ 139

140. The first apparatus of *Kikuchi* is illustrated in Figure 1 (below).

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The command interpretation and execution unit **102** first receives a command from a host device, extracts the host address from the command and outputs it to the address verification unit **103**. The address verification unit **103** reads the host addresses stored in the address registration unit **104** for the purpose of determining access authorization and verifies the host address sent from the command interpretation and execution unit **102**. The access authorization information generated as a result of this verification process is then relayed back to the command interpretation and execution unit **102** by the address verification unit **103**.

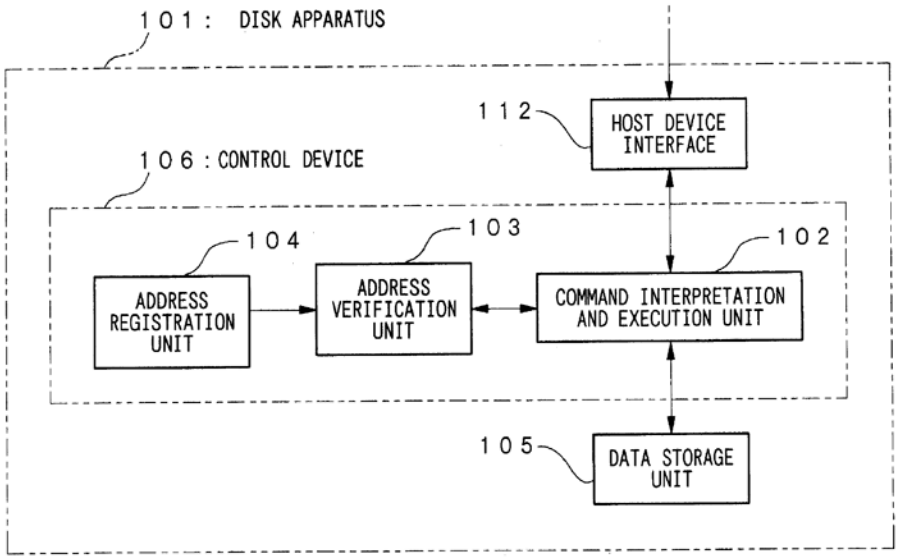
In those cases where access is authorized, the command interpretation and execution unit **102** sends the command received from the host device to the data storage unit **105**, and the disk apparatus command, such as a data read/write command, is carried out in the same manner as for conventional disks.

Ex. 1006, 4:17-34

cited in 1209 POR at 33-36

Kikuchi Only Blocks Access From Hosts to the Entire Device

FIG.1



Ex. 1006 figure 1, column 4:17-24, 12-16, 28-34

The command interpretation and execution unit **102** first receives a command from a host device, extracts the host address from the command and outputs it to the address verification unit **103**. The address verification unit **103** reads the host addresses stored in the address registration unit **104** for the purpose of determining access authorization and verifies the host address sent from the command interpretation and execution unit **102**. The access authorization

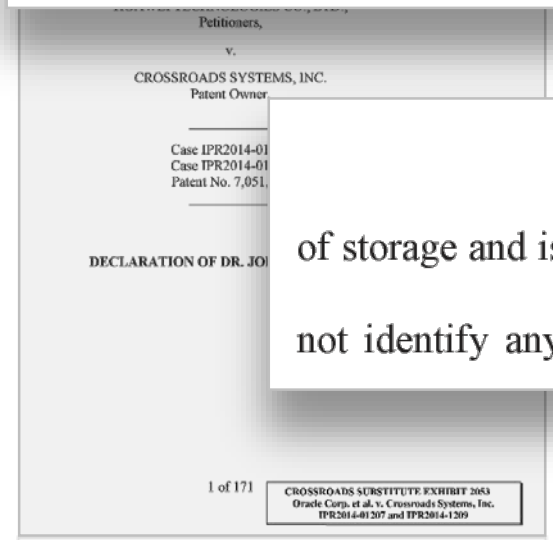
The command interpretation and execution unit **102** incorporates an authorization pending function, so that on receipt of a command from a host device, the command is interpreted and executed only after access is authorized by the address verification unit **103**.

In those cases where access is authorized, the command interpretation and execution unit **102** sends the command received from the host device to the data storage unit **105**, and the disk apparatus command, such as a data read/write command, is carried out in the same manner as for conventional disks.

cited in 1209 POR at 33-36, Ex. 2053 ¶ 139

Kikuchi Does Not Utilize Host Identification to Permit or Limit Access to Particular Storage Space

156. The Correlation Chart of Kikuchi and, more specifically, the address offsets do not prevent a host from accessing storage that has not been allocated to that specific host. …For example, by simply sending in a command requesting logical block 110, Workstation A would be able to access physical block 110 on the disk (based on its offset of 0). However, physical block 110 is storage intended for Workstation B, based on Workstation B's offset of 100. The address offset would do nothing to prevent Workstation A from making those requests. Thus, the Correlation Chart of Kikuchi does not provide "access controls" as claimed in the '147 Patent.
Ex. 2053 (Levy Decl.) ¶ 156-57


Petitioners,

v.

CROSSROADS SYSTEMS, INC.
Patent Owner

Case IPR2014-01
Case IPR2014-01
Patent No. 7,051,

DECLARATION OF DR. JO

1 of 171

CROSSROADS SUBSTITUTE EXHIBIT 2053
Oracle Corp. et al. v. Crossroads Systems, Inc.
IPR2014-01207 and IPR2014-1209

The Correlation Chart in *Kikuchi* does not contain representations of storage and is not itself a representation of storage (*e.g.*, an offset of "100" does not identify any particular storage).

Ex. 2053 (Levy Decl.) ¶ 152

cited in 1209 POR 35-36

Petitioners Inaccurately Claim that Kikuchi's Correlation Chart Blocks Access

The combined system identifies a requesting host address, and subsequently, if the host is authorized, the requesting host address is allowed to access allocated storage space matching an address supplied by the host device; if no match exists in the correlation chart, the host is not allowed to access stored data using the requested address. *(Ex. 1006 at 3:21-35, 8:37-45; Ex. 1010 at ¶ 154)*

1209 Pet. at 38

The offset information generation unit then uses a correlation chart of host devices and offset information which has been stored in advance, and generates offset information which corresponds to the particular host device and sends this information to the actual partition address generation unit. The actual partition address generation unit combines the theoretical disk address included in the command from the host device and the offset information, and generates an actual disk partition address.

Ex. 1006 at 3:24-32

cited in 1207 POR at 32-33 (citing Ex. 2053 (Levy Decl.) ¶ 149-50)

Even if One Host Per Interface Were Relevant to the Claims, the Combination Does Not Implement Access Controls According to a Map

Dr. Levy stated that identifying a host interface would be sufficient to route messages to the appropriate host, but it would not identify the host.

Q. (BY MR. GARDELLA) Given that there is only a single host identified to each host interface, why, again, for routing purposes, is it not sufficient to identify the host interface?

A. Well, if by "routing purposes" you mean to be sure that the response to a command goes back to the correct host, then responding on this correct interface would be responding to the correct host.

Q. Okay. So in that context and for that purpose, it would be sufficient to identify the host interface?

…

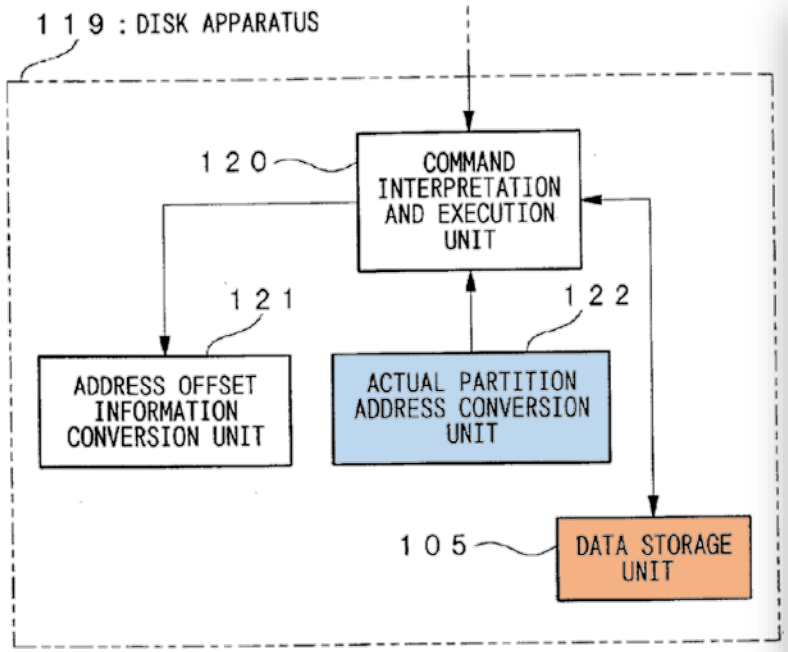
A. -- I still disagree with identifying the host because it doesn't actually identify the host.

Ex. 1218 (Levy Depo.) at 94:23-95:12

cited in 1197 PO Motion to Exclude Evidence at 2-3 (FRE 106)

A Combination of Kikuchi and Bergsten Would Not Result in Creating a Claimed Map

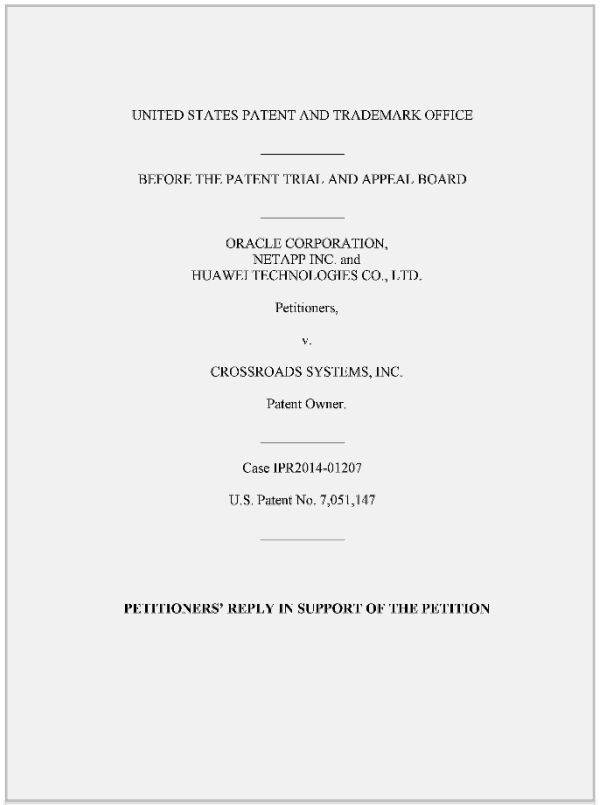
FIG.5



The actual partition address conversion unit **122** combines the disk partition address output from the command interpretation and execution unit **120** with the offset information output from the address offset information conversion unit **121**, and generates an actual disk partition address which it then outputs to the command interpretation and execution unit **120**. The command interpretation and execution unit **120** outputs a read/write command to the data storage unit **105** based on the actual disk partition address. The data storage unit **105** executes the command output from the actual partition address conversion unit **122** by, for example, reading out data to the host device, or receiving and storing data from the host device.

Ex. 1006 7:64-8:9

Petitioners' Asserted Motivations to Combine Does Not Support or Suggest the Asserted Modifications



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ORACLE CORPORATION,
NETAPP INC. and
HUAWEI TECHNOLOGIES CO., LTD.

Petitioners,

v.

CROSSROADS SYSTEMS, INC.

Patent Owner.

Case IPR2014-01207

U.S. Patent No. 7,051,147

PETITIONERS' REPLY IN SUPPORT OF THE PETITION

1209 Reply at 13

- "to increase both the number of storage devices accessible to hosts connecting to the disk apparatus and the storage and the storage address range available within the combined system"
- To benefit from "increased restructuring capabilities because an administrator could replace or update equipment and reassign host storage regions without requiring host-side involvement"
- These reasons do not suggest the complex modifications required of both references

Petitioners' Motivations are Conclusory and Unsupported

- Why would one of skill in the art modify Kikuchi to increase the storage available when Kikuchi already had an excess of storage?
- Why would one of skill in the art add the complex and time consuming modified Bergsten mapping to Kikuchi when it was designed for simple and fast operation?
- Petitioners cite nothing showing how the combination possesses "increased restructuring capabilities" over Bergsten or Kikuchi.
- None of the motivations suggest the complex modifications required by Petitioners' combination.

1209 POR at 51-52