

1 area are informed (eg. manually) of the address space of the hosts in that area. Each router then polls each of its interfaces in turn; that is, for each interface in turn it sends out a series of ARP requests, working through the host address space address by address. It will therefore elicit responses from all
5 hosts attached to it.

This polling is of course distinct from the polling, mentioned above, which standard routers perform. The standard router polling is not through the host address space, but through the actual addresses of hosts which are already
10 recorded in the routers' tables, to confirm their existence.

Provided that the host address space is manageable small, this is the preferred mechanism. This polling automatically takes care of the normal maintenance of the interface tables. Since the router network can only route
15 messages to hosts which it knows about, it is important to confirm the disappearance of a host, eg. by a suitable number of retries. A discovery time of say 500 s (comparable to the ARP time-out), and a polling rate of 7 polls per second will accommodate an address space of 4000 hosts, which is much larger than most practical LANs.

20
The polling message density can be reduced if a router does not poll for addresses which it knows to be attached to other of its interfaces, or to other routers. However, a router needs to poll for hosts which are attached to it to confirm their existence, just as with a standard router; also, polling for hosts
25 which are listed in its tables as being attached to other routers accelerates their discovery if they are moved.

Instead of polling by ARP requests, a router could poll by sending a suitable broadcast message, asking the hosts to report their existence.
30 However, this has two disadvantages. One is that it requires the hosts to return

suitable identification messages in response to the broadcast enquiry; this may require modification of some hosts, and some types of host may not be modifiable. The other is that the response messages from the hosts will temporarily produce a very high message density, which may for example
5 overwhelm the router.

With the preferred mechanism of ARP polling, the polling intensity can be reduced by partitioning the host address space so that certain segments of it will only contain hosts which will announce their presence when first turned
10 on. It will then not be necessary to poll through those address space segments.

A possible refinement of ARP polling is that if a router discovers that a host has disappeared, that host address can be distributed to all routers, with all routers then sending out ARP requests at higher than normal polling
15 frequency for that host for some convenient period of time. (The router which has lost the host should be included in this, because the host may be migrating to another of its interfaces.) This will result in rapid detection of the migrating host if it is reconnected into the network.

20 With the passive technique for routers to discover the existence of silent hosts, they only search for a host when there is a message for that host. If the router network receives a message for a host which it (the router network) does not recognize, then the message is passed around the routers, and each router polls each of its interfaces with an ARP request.

25

This requires a more complex router network organization, to ensure that the message is distributed to all routers, but it may reduce the amount of polling, as the occurrence of messages to silent hosts will usually be relatively uncommon. The message may be distributed rapidly to all routers, with all the
30 routers then polling their LANs; this may impose a significant transient load on

the system. Alternatively, each router in turn may poll its interfaces for the destination host, and forward the message on to the next router only if it fails to find the destination host on any of its interfaces; this may result in a large delay.

5

Host to host communication

In the standard system, there are 4 mechanisms for a source host to send a message to a destination host. First, if the destination has the same subnet address as the source, if the source does not know the destination's MAC identifier it will send an ARP request to the destination; otherwise (second), it sends the message direct to the destination using the MAC identifier. Third, if the destination is on a different subnet, the source sends the message to a router. Fourth, if the destination is on a different subnet but the same extended LAN as the source, the source can send direct to the destination's MAC identifier as a result of a redirect message from a router.

The present system must maintain all these modes of message transmission as far as the hosts are concerned; in particular, it must cope with all possible combinations of source and destination subnet addresses and LAN locations. The source and destination may be on the same or different LANs, and may have the same or different subnet addresses.

If the source and destination are on the same LAN and have the same subnet address, then if the source knows the destination's MAC identifier it will send the message direct to the destination using the MAC identifier. Otherwise, the source will send an ARP request to the destination and, because the two are on the same LAN, it will get an ARP response and then send the message using the MAC identifier returned in the ARP response. This is the same as in the standard system.

30

If the source and destination are on different LANs and have different subnet addresses, the source will send the message to a router, which will forward it to the router to which the destination is attached. This is broadly similar to the standard system (though the router uses the more detailed routing information of the present system).

If the source and destination are on the same LAN but have different subnet addresses, the source will send the message to a router; this will return a redirect message to the source, which will then send the message direct to the destination using the destination's MAC address. This is broadly similar to the standard system (though again the router uses the more detailed routing information of the present system).

If the source and destination are on different LANs but have the same subnet address, then the source will send an ARP request to the destination, expecting to receive an ARP response with the destination's MAC identifier. The router on the source LAN must listen for such ARP requests and return ARP responses (this is the promiscuous listening for ARP requests mentioned above). On hearing an ARP request on an interface, the router must check its link tables and its interface tables for its other interfaces for the destination. If the destination is in those tables, it is in fact on a different LAN from the source. However, the source is expecting an ARP response. The router must therefore return a proxy ARP response - ie, it must return an ARP response on behalf of the destination. This proxy ARP response will of course contain the router's MAC identifier. The source will then send the message to the router, which must then forward it through the router network.

Specific Embodiment

A communication system embodying the invention will now be described, by way of example, with reference to the drawings, in which:

Fig. 1 is a general block diagram of the system; and

Fig. 2 is a highly simplified block diagram of a modified router (ie. the present router).

5 Fig. 1 shows a communication system with various typical features. The system consists of a level 1 network of 3 routers R1-R3 coupled by links LK12, LK23, and LK13 (the digits indicating the routers which each link couples together). This level 1 network forms part of a level 2 system (the rest of which is shown merely as a cloud L-2), and is coupled to the rest of the level
10 2 network by links shown as zig-zag lines.

Router R1 has 2 physical LAN interfaces, with LAN1 (with subnet address 32.17.52) and LAN4 (with subnet address 32.17.66) coupled to them; router R2 has 3 LAN interfaces, with LAN2 (with subnet address 32.17.55),
15 LAN3 (with subnet address 32.20.132), and LAN6 (with subnet address 32.20.154) connected to them; and router R3 has 2 LAN interfaces, with LAN5 (with subnet address 32.27.24) and LAN7 (with subnet address 32.17.102) connected to them. LAN1 and LAN2 are connected together in known manner through a bridge BR1, forming a single extended LAN with two subnet
20 addresses.

Hosts H1-H11 are coupled to the various LANs as shown. Each host has an address consisting of 4 bytes. In the standard system, each host's address will be the address of its LAN plus a final byte added to the end of the
25 subnet address, as shown for hosts H2 (address 32.17.52.32), H3 (address 32.17.52.5), H5 (address 32.17.55.129), and H8 (address 32.17.66.188).

Each host maintains a connection table for its connections. Host H2, for example, will maintain the following table:

Host H2, connection table

Router connection:

R1-MAC

5

Host list:

32.17.52.5 (H3)	H3-MAC
32.17.55.129 (H5)	H5-MAC

...

10

This table has two parts, a router connection and a host list. The router connection part is a single entry, the MAC of router R1, which the host uses for sending messages to hosts which are not on its own extended LAN. The second part lists the hosts which H2 has recently sent messages to, together with the MAC identifiers which it uses to send messages to those hosts.

15 Communication with H3 is direct, over LAN1, so messages to that host are sent to that host's MAC identifier. Communication with H8 is via the router network, so messages to that host are sent to router R1, using that router's MAC identifier. Communication with H5 is also direct; H2 has learnt H5's

20 MAC identifier as the result of a redirect message from router R1 or R2 at some time in the past.

The host maintains this table as a cache with time-out, so that entries which have not been used for more than a certain time are deleted. New

25 entries are added as communication with new hosts is desired, by using the ARP requests as discussed above.

Each router maintains interface and link tables. Router R1, for example, would maintain the following interface tables if it were a standard router.

30

Router R1 (standard form), interface tables

	IF1 (interface)
	32.17.52 (subnet address)
5	5 H3-MAC
	32 H2-MAC
	...
	32.17.55 (subnet address)
	129 H5-MAC
10	...
	IF2 (interface)
	32.17.66 (subnet address)
15	188 H8-MAC
	...

Each interface table is divided into a separate section for each logical subnet address of the (possibly extended) LAN attached to that interface. Each section records the subnet address and then lists the hosts on the LAN with that subnet address. Each host entry consists of the host's address and its MAC identifier. The host's address is recorded as only the final byte, since the first 3 bytes of the address are the address of its subnet. The first interface table has two sections because the two LANs LAN1 and LAN2, with different subnet addresses, are both connected to that physical interface (via the bridge BR1 in the case of LAN2).

The routers also maintain link tables for their links to other routers. In the standard system, each router passes the addresses of the LANs to which it is coupled to the other routers in the level 1 network, and those other routers hold that information in their link tables. Thus if router R1 were standard, it would maintain two link tables as follows.

Router R1 (standard form), link tables

LK12:

5 32.20.154 (LAN6)
 32.20.132 (LAN3)

...

LK13:

10 32.27.24 (LAN5)
 32.17.102 (LAN7)

...

The entries in each table are the addresses of the LANs which can be reached through the associated link. If link LK13 did not exist, then the link
 15 table LK12 would contain the addresses 32.27.24 and 32.17.102 (as well as 32.17.154 and 32.20.132), because the message route for those addresses would then be via router R2.

Each subnet address in the link tables can be regarded as a compressed
 20 version of the set of host addresses on that LAN. This can be represented more fully by writing the subnet addresses as 32.17.154.xx, etc, where the final byte is masked off by a mask.

For the coupling to the rest of the level 2 system, the routers provide
 25 further compressed addresses over the zig-zag links to region L-2. In this case, the level 2 addresses will be simply the single value 32.0001xxxx.xx.xx (where the second byte is written in binary). Similarly, the routers R2 and R3 will maintain level 2 connection tables (with further compressed entries) for addresses in the L-2 region. Also, router R1 will maintain these region L-2
 30 addresses (preferably in the same compressed form) in its link tables LK12 and LK13, so that messages from hosts on its LANs to the L-2 region can be correctly routed. (This is why the tables LK12 and LK13 are shown as having further entries beyond the 2 shown explicitly for each.)

In the present system, the routers are modified from the standard form to maintain the level 1 connection information within the interface and link tables in uncompressed form. Thus the interface table for interface IF1 for router R1 will contain:

5

Router R1 (modified form), interface table IF1

IF1:

10	32.17.52.5	H3-MAC
	32.17.52.32	H2-MAC
	32.17.55.129	H5-MAC
	32.20.154.34	H1-MAC
...		

15 Switching, for convenience, to router R3 to discuss the link tables, this would contain the following link table for link LK13 in the standard form:

Router R3 (standard form), link table LK13

20 LK13:

32.17.52	(LAN1)
32.17.55	(LAN2)
32.17.66	(LAN4)
...	

25

For the modified form of router R3, this link table will contain all the entries for router R1's interface tables, in the same form as in those interface tables, instead of just the compressed or subnet addresses. Thus router R3 will contain the following link table for link LK13 in the modified form:

30

Router R3 (modified form), link table LK13

LK13:

5	32.17.52.5	H3-MAC
	32.17.52.32	H2-MAC
	32.17.55.129	H5-MAC
	32.17.66.188	H8-MAC
	...	

- 10 The connection information relating to connections to the level 2 area L-2 is unchanged from the standard form.

With the host addresses discussed up to now, the operation of the system with the present (modified) routers is substantially unchanged from the 15 operation with standard routers. Suppose, however, that host H1 was originally on LAN6 (address 32.20.154), and was given the address 32.20.154.34 while it was on that LAN. Suppose also that it is desirable to transfer that host to LAN1 as shown.

- 20 In the standard system, it would not be possible for any messages to reach H1, because its address does not match LAN1's address. For H1 to be logically connected to the system, either its address would have to be changed to match that of LAN1 (so that it would effectively be a new host), or LAN1 and LAN6 would have to be coupled together by a bridge (so that H1 could 25 still be reached by router R2), or some form of address conversion would have to be provided.

In the present system, however, messages can reach H1. This is because all the routers' tables (ie. both link and interface tables) contain the individual 30 addresses of all hosts (of the level 1 area) in full; they do not now contain the subnet addresses as such.

Thus router R1 will contain the address 32.20.154.34 in its interface table for interface IF1, so that it can forward a message for H1 reaching it from another router (or from another of its interfaces). Similarly, the link tables of R2 and R3 will contain the address 32.20.154.34 in full, so that any 5 message for H1 reaching either of those routers can be forwarded to router R1 (assuming that for some reason, messages are not passed to it from router R2 through the extended LAN network of the 2 LANs LAN2 and LAN1).

In the standard system, router R2 would contain the address 32.20.154 10 of LAN6 in one of its interface tables, and would capture all messages to any host with that as the first 3 bytes of its address. In the present system, however, router R2 contains only the addresses of the individual hosts attached to it, not the subnet address as such. It will therefore not capture any messages to host H1, ie. to address 32.20.154.34, and will therefore not interfere with 15 the correct routing of messages to that host.

Fig. 1 also shows a second host, host H9, which has migrated, in this case from LAN1 to LAN4. Router R1's interface table for interface IF2 contains the address (32.17.52.47) of this host, and routers R2 and R3 contain 20 this address in their link tables LK12 and LK13, so that messages to this host from LANs attached to R2 and R3 will reach it as desired.

There is however a complication if a host such as H2 on H9's original or "home" subnet wants to send a message to it. H2 finds that its own subnet 25 address is the same as H9's subnet address, and therefore sends an ARP request to H9 on LAN1 (hosts' behaviour is unchanged from in the standard system).

As discussed above, the present routers listen to all ARP requests from hosts on their interfaces, to detect ARP requests for migrated hosts. When a 30 router detects an ARP request, it checks the address of the destination host

- against the contents of its tables (both the interface tables and the link tables). If the destination host is on the same interface as the source host, the router ignores the ARP request (the destination host will respond to the ARP request with an ARP response and message transmission will proceed normally). But
- 5 if the destination is not on the same interface as the source, the router responds with a proxy ARP response which includes its own MAC identifier. The source will then send the message to the router, and the router then forwards the message to the actual location of the destination.
- 10 Thus router R1 will detect the ARP request from host H2 for host H9, find that host H9 is not on interface IF1, and return a proxy ARP response to H2. H2 will then send the message to the router, which will pass it to interface IF2 so that it reaches H9.
- 15 If host H2 has previously been in communication with host H9 over their original common LAN, H2 will of course still have H9's MAC address in its connection table, and will continue to use that MAC address when trying to send messages to H9; and when H9 migrates, H2 will find that H9 has apparently disappeared. H2 will thereupon flush its connection table (or at least
- 20 the entry for H9), and attempt to re-open communication with H9 by sending an ARP request. Router R1 will return a proxy ARP response to this, as just discussed, and communication with H9 will therefore be re-established.

Fig. 2 shows the general logical organization of the preferred form of
25 modified (present) router, which we may take as router R1.

There is a plurality of link registers 10, one per link, for receiving messages (including LSPs) coming in over links from other routers and for holding messages to be transmitted over those links. There is a plurality of
30 interface registers 11, one per interface, for receiving messages coming in over

the router's interfaces and for holding messages to be transmitted over those interfaces. There is a plurality of link table stores 12, one per link, for storing the link tables discussed above. There is a plurality of interface table stores 13, one per interface, for storing the interface tables discussed above. The link and 5 interface registers 10 and 11 are coupled to switching circuitry 15.

Each of the link registers 10 and interface registers 11 has a header section 10A, 11A respectively for containing header information including, for example, the source and destination addresses and (in the case of messages in 10 the interface registers) MAC identifiers. When a message is received in one of these registers, its destination address is compared by a comparator 14 with the addresses in the link and interface tables and moved from its initial register to the appropriate register for output, ie. from a link register to another link register, from a link register to an interface register, or from an interface 15 register to an interface register. In addition, if the message is moved into an interface register, the MAC identifier of the destination is copied over line 16 from the interface table into the header section of the interface register.

(In practice, the messages may be stored in a common memory, with 20 pointers being used to identify different memory areas as the different registers, and the movement of a message from one register to another being achieved by changing the pointers. Also, the headers may be processed separately from the bodies of the messages.)

25 The interface registers 11 are also coupled to an ARP unit 30. All ARP requests on the LANs attached to the interfaces are received by the router, ie. are written into the interface registers 11. When an ARP request is so received, comparator 14 compares the host destination address in its header with the host addresses in the link tables 12 and the interface tables 13.

- If the destination is not in the interface table for the interface on which the ARP request was received, ie. is in some other interface table, or in a link table, then the comparator 14 sends a signal to the ARP unit 30, which then converts the ARP request in the interface register to a proxy ARP response.
- 5 This ARP response includes the router's address and MAC identifier, which are stored in a router address and MAC identifier store 17 and are copied into the header into of the interface register for return to the host as the ARP response.

- If the destination is in the interface table for the interface on which the
- 10 ARP request was received, then the router makes no response. However, for all ARP requests which it receives, the router checks whether the source is listed in the interface table for the interface on which the ARP request was received. If it is not, then it updates its tables by adding the source's address to the appropriate interface table and deleting it from any other tables which it
- 15 is in. In addition, the host's address (ie. the full address) is passed (over line 21) to an LSP processor 20.

- A polling unit 25 is also coupled, through the switching circuitry 15, to the header sections 11A of the interface registers 11. The polling unit 25
- 20 performs two functions, under the control of a timer 26 to which it is coupled.

- First, the polling unit is coupled to the interface tables 13, and selects each entry in the interface tables in turn for verification. For this, the address of each end-station in turn is copied into the appropriate one of the interface
- 25 registers 11 and sent out as an ARP request. The MAC identifier in the response is passed back to the interface table and compared therein with the stored MAC identifier, to verify the entry. If verification fails (after a suitable number of retries), the table entry is deleted and the address of the deleted host is passed to the LSP processor 20.

Second, the polling unit is also coupled to an address space store 27, which is set to contain the address space of the (level 1) system. Under control of the timer 26, the polling unit 25 works sequentially through all addresses of the address space. Addresses which are already in the interface tables are
5 filtered out. The remaining addresses are passed, in sequence, to each of the interface registers for sending out an ARP request, to see whether a host with that address exists. If it does, then the address and MAC identifier in the ARP response are passed to the appropriate interface table and to the LSP processor 20.

10

Turning now to the LSP processor 20, this receives the addresses of hosts newly discovered by the router and of hosts which disappear from the router's interfaces. It constructs LSP options containing these addresses, assembles them into LSPs, and passes them to the set of link registers 10 for
15 transmission to other routers. This processor 20 also processes LSP options received by the link registers 10 from other routers, updating the entries in the corresponding link table 12 by adding and/or deleting entries appropriately. The LSP processor 20 is coupled to an LSP option memory 22 in which LSP options of the new type discussed above are constructed; this memory
20 comprises a header section 22A, an address section 22B for the addresses of the LSP, and a general information section 22C. This memory is used to assemble LSP options of the new type which are to be sent out by the router, and to store incoming new type options received from other routers ready for analysis and transfer of their contents into the link tables 12.

25

In the system shown in Fig. 1, each router is coupled to every other router. In general, however, this will not always be so. LSP options must therefore be forwarded throughout the level 1 area. The LSP processor is responsible for this; it causes an incoming LSP option to be copied to all other
30 link registers 10 for forwarding (as parts of LSPs) to other routers. Various

**techniques can be used to prevent the unlimited circulation and multiplication
of LSP information.**

Claims

1. A digital communication system comprising a network of routers linked together by links and having interfaces with local area networks (LANs)
5 coupled to them, and operating under a protocol under which each LAN has a subnet address, and each host on a LAN has the subnet address as the high-order part of its own address, each router containing a set of interface/LAN tables listing the low-order address portions of the addresses of the hosts attached to the LAN plus the MAC (medium access control) identifiers of those
10 hosts, and a set of link tables listing the subnet addresses of the LANs reachable through those links, wherein:
 - both the interface tables and the link tables in the routers contain the full addresses of all hosts reachable through those interfaces and links;
 - the routers contain means for detecting ARP (address resolution protocol) requests from a source host for a destination host having the same subnet address as the source host but not on the same interface, and returning a proxy ARP response giving the router's identification; and
 - the routers contain means for interrogating the interfaces for unknown hosts.
- 20 2. A digital communication system according to claim 1 wherein the means for interrogating the interfaces comprises polling means.
- 25 3. A digital communication system according to claim 2 wherein the polling means include timing means causing the polling means to perform polling for unknown hosts.
- 30 4. A digital communication system according to claim 3 wherein each router contains an address space store settable to contain the address space of the system.

5. A digital communication system according to claim 2 wherein the polling means of a router poll for unknown hosts is in response to the router receiving a message for an unknown destination host, and the message is passed through the network of routers until the destination host is located.

5

6. A digital communication system according to any previous claim wherein each router contains an LSP option memory for assembling, storing, and analyzing LSP options, the LSP option memory comprising a header section, an address section capable of storing a plurality of addresses, and a general section.

10

7. A method of operating a digital communication system comprising a network of routers linked together by links and having interfaces with local area networks (LANs) coupled to them, said method including the steps of:

15 operating the system under a protocol under which each LAN has a subnet address, and each host on a LAN has the subnet address as the high-order part of its own address;

20 providing each router with a set of interface/LAN tables listing the low-order address portions of the addresses of the hosts attached to the LAN plus the MAC (medium access control) identifiers of those hosts, and a set of link tables listing the subnet addresses of the LANs reachable through those links;

providing both the interface tables and the link tables in the routers with the full addresses of all hosts reachable through those interfaces and links;

25 each router, upon detection of ARP (address resolution protocol) requests from a source host for a destination host having the same subnet address as the source host but not on the same interface, returning a proxy ARP response giving the router's identification; and

providing each router with means for interrogating the interfaces for unknown hosts.

30

8. The method of claim 7 including the step of locating unknown hosts by a router by routine systematic polling of predetermined address space.
9. The method of claim 8 including the step of reserving a second predetermined address space for self-announcing hosts which address space is not systematically polled by a router.
10. The method of claim 7 including the step of initiating a poll for an unknown host in response to a router receiving a message for said unknown destination host, and passing the message through the network of routers until the destination host is located.

Relevant Technical Fields	Search Examiner MR J P COULES
(i) UK Cl (Ed.M) H4P (PPA, PPG) (ii) Int Cl (Ed.5) H04L 12/46, 12/66	Date of completion of Search 7 DECEMBER 1994
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASES: WPI, INSPEC	Documents considered relevant following a search in respect of Claims :- 1-10

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- &: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
A, E	GB 2267418 A (ICL PERSONAL SYSTEMS OY) 1 December 1993 whole document	1 and 7

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

Electronic Acknowledgement Receipt

EFS ID:	6626645
Application Number:	90010422
International Application Number:	
Confirmation Number:	6565
Title of Invention:	Graphic User Interface For Internet Telephony Application
First Named Inventor/Applicant Name:	6,009,469
Customer Number:	42624
Filer:	Michael R. Casey
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	20091214_IDS_0185.pdf	119497 783d4aa5c4f2c919c8bd3258fd7eddc4761 85ds	no	2

Warnings:

Information:

LG v. Straight Path, IPR2015-00209

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2	Information Disclosure Statement (IDS) Filed (SB/08)	20091211_1449_0185.pdf	4789224 7f127aa6e03f166a671fb8a0dfc23fa974e32 d42	no	29
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	NPL Documents	F0000_CircuitSwitching.pdf	72814 4c3f34c22d2f56a6c82c889818a1376a3ae8 35d6	no	2
Warnings:					
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4	NPL Documents	F0001_CCITT_Fax_Recommendation.pdf	2878754 bd5979dd97b05d2d70b3fa5c0d6febda1c 5cef5	no	76
Warnings:					
Information:					
5	NPL Documents	F0002_IBM_Full_Duplex_SpeakerPhone.pdf	188679 cb97c993b041210becea018966bdd22598 94de0f	no	4
Warnings:					
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6	NPL Documents	F0003_One_Per_Desk.pdf	1400117 72c9138f2988bc43ac628c2b75d736de8b7 1c996	no	24
Warnings:					
Information:					
7	NPL Documents	F0004_NTIS_WideBand_Integrated.pdf	1550423 59ffcb33e6fdb5e5941bb0297223ff170728 49aa	no	39
Warnings:					
Information:					
8	NPL Documents	F0005_Integrated_VoiceData_PABX.pdf	87079 b36ad7f1eff3a459b4bee53124753c5ca75f 0b92	no	2
Warnings:					
Information:					
9	NPL Documents	F0006_level_1-5.pdf	83654 885a286424d1ffb70f2eafb905db6695283a 92f9	no	2
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Information:					
10	NPL Documents	F0007_Multi-Service_Networks.pdf	70355 609b6ba08e641be9acd8de0d6c7270ccdc9 3d2a5	no	2

Warnings:					
Information:					
11	NPL Documents	F0008_The_History_Of_TCP_In t.pdf	126453 9f3b2c7baa0e4aba3f052942d3e641aecab1 4c8d	no	2
Warnings:					
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12	NPL Documents	F0009_WideBandPacketAccess. pdf	460534 64d292b8de4355aa835d5f3124ca203a8c2 1daf2	no	7
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13	NPL Documents	F0010_Ahrens_Richard_FAQ. pdf	236274 dd81539f88e976d03f61caf7ae2613dfcae1 65b7	no	6
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15	Foreign Reference	F0012_AU-200059377-A1.pdf	1204979 f4a9fef78f8bf3bbbb696e1e203fc826970a0 d02	no	36
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19	NPL Documents	F0016_Bernard_Gold_Digital_S peech_networks.pdf	1612953 L05e62b2099ad32d328412871327970 Straight Path, IPR2015-00209 Straight Path - Ex. 2015 - Page 601	no	23

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LG v. Straight Path, Inc. R2015-00209 Straight Path - Ex. 2015 - Page 603					

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Information:					
54	NPL Documents	F0051_henning_schulzrinne_voice_communication_across_the_internet.pdf	1685713 9c163be60757acd4173d38dd3b7475c802 602120	no	34
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Information:					
55	NPL Documents	F0052_hiroshi_kobayashi_voice_data.pdf	617388 L03a1dca14228f71416f98a74d0b LG v. Straight Path, Inc. 2015-00209 Straight Path - Ex. 2015 - Page 605	no	10

Warnings:					
Information:					
56	NPL Documents	F0053_hiroyuki_ichikawa_high_speed.pdf	769683 377a37e818156ffcb70429eb16d184d4bc25db4d	no	11
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58	NPL Documents	F0055_Implementation_of_Next_Generation.pdf	1968206 dd14d7a41b57ff073365045bddf33b60f45caf83	no	15
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Total Files Size (in bytes):				49882116	
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION OF:

Net2Phone, Inc. (Patent No. 6,009,469)

Control No.: 90/010,422

Issue Date: December 28, 1999

Title: **GRAPHIC USER INTERFACE FOR
INTERNET TELEPHONY APPLICATION**

Attorney Docket: 2655-0185

Group Art Unit: 3992

Examiner: KOSOWSKI, Alexander

Date: December 14, 2009

Confirmation No.: 6565

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Pursuant to 37 C.F.R. § 1.56, the attention of the Patent and Trademark Office is hereby directed to the reference(s) listed on the attached PTO-1449. One copy of each non-U.S. Patent reference is attached. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the reference(s) be made of record therein and appear among the “References Cited” on any patent to issue therefrom.

The submission of any document herewith, which is not a statutory bar, is not intended that any such document constitutes prior art against any of the claims of the present application or is considered to be material to patentability as defined in 37 C.F.R. § 1.56(b). Applicants do not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference against the claims of the present application.

In re Application of: Net2Phone, Inc.
Control No.: 90/010,422
Information Disclosure Statement dated December 14, 2009
Page 2 of 2

CHARGE STATEMENT: Deposit Account No. 501860, order no. **2655-0185**.

The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficiencies only) now or hereafter relative to this application and the resulting Official Document under Rule 20, or credit any overpayment, to our Accounting/Order Nos. shown above, for which purpose a duplicate copy of this sheet is attached

This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal sheet is filed.

CUSTOMER NUMBER

42624

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Respectfully submitted,

By: /Michael R. Casey /

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PATENT ABSTRACTS OF JAPAN

(11)Publication number : **63-131637**

(43)Date of publication of application : **03.06.1988**

(51)Int.CI. **H04L 11/00**

H04L 11/00

(21)Application number : **61-277727**

(71)Applicant : **FUJITSU LTD**

(22)Date of filing : **20.11.1986**

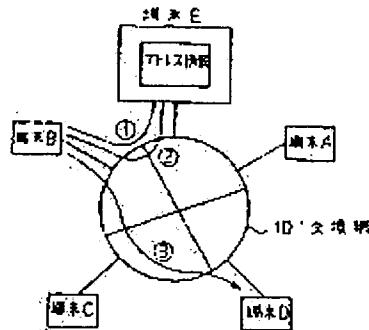
(72)Inventor : **YAHAGI TAKEHIKO**

(54) ADDRESS MANAGEMENT SYSTEM FOR COMMUNICATION NETWORK

(57)Abstract:

PURPOSE: To contrive the reduction of the quantity of address information provided to each terminal equipment by allowing a management terminal equipment to manage address information of a communication network altogether and allowing general terminal equipments to inquire about the information to the management terminal equipment, thereby simplifying the addition/revision of a terminal equipment address.

CONSTITUTION: For example, a terminal equipment E among lots of terminal equipments A, B... connected to an exchange network is used as the address management terminal equipment, to which address information of the all terminal equipments is given. In case of the communication by each terminal equipment, the address of a terminal equipment being an opposite party of communication is inquired about the address management terminal equipment, and the address informed from the said terminal equipment is used to make communication with the terminal equipment being the communication party. That is, when the terminal equipment B makes communication with the terminal equipment D, the terminal equipment B inquires about the address of the terminal equipment D to the equipment E, which informs the address of the terminal equipment D to the terminal equipment B, and the terminal equipment B uses the informed address to call the terminal equipment D to apply communication. Thus, terminal equipments A~D other than the equipment E do not require to have address information in this way, then the memory capacity is saved.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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②日本国特許庁(JP) ①特許出願公開
②公開特許公報(A) 昭63-131637

④Int.Cl.: 識別記号 行内整理番号 ③公開 昭和63年(1988)6月3日
H 04 L 11/00 310 Z-7928-5K
7830-5K

審査請求 未請求 発明の数 1 (全4頁)

④発明の名称 通信ネットワークのアドレス管理方式

②特 願 昭61-277727
③出 願 昭61(1986)11月20日

④発明者 矢作毅彦 神奈川県川崎市中原区上小田中1015番地 富士通株式会社
内

④出願人 富士通株式会社 神奈川県川崎市中原区上小田中1015番地

④代理人弁理士青柳紘

明細書

1.発明の名称

通信ネットワークのアドレス管理方式

2.特許請求の範囲

交換網(10)で接続された多数の端末(A, B, C, ...)を有する通信ネットワークの各端末のアドレス管理方式において、

該多数の端末のうちの1つ(B)をアドレス管理端末としてこれに全端末のアドレス情報を持たせ、

各端末はアドレス管理端末に通じ相手の端末のアドレスを問合せ、アドレス管理端末から知られたアドレスを用いて通信相手の端末と通信することを待機とする通信ネットワークのアドレス管理方式。

3.発明の詳細な説明

(概要)

通信ネットワークのアドレス情報を管理端末に一括管理させ、一般端末は管理端末に問合せるようにした。

(産業上の利用分野)

本発明は、通信ネットワークの各端末のアドレス管理方式に関する。

(従来の技術)

多数の端末があるコンピュータシステムでは、各端末が相手端末のアドレスを持ち、そのアドレスを用いて相手の相手端末と通信している。第2図で説明すると、10は交換網で、これに多数の端末A, B, C, ...が接続される。各端末は相手端末のアドレスを所有、管理し、端末Aは端末B～Eのアドレスを、端末Bは端末A, C～Eのアドレスを(以下同様)所有、管理し、相手端末と通信するときは自端末が所有、管理しているアドレスから相手端末のアドレスを知り、それを用いて通信する。

(発明が解決しようとする問題点)

この方式は、通信相手のアドレスを直ちに知り得る利点はあるものの、端末が追加されるときは

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既設の全端末が所有、管理するアドレス情報を追加端末のアドレスを追加しなければならず、専介である。多数の端末が追信網で接続されるシステムとしては LAN (Local Area Network) があるが、しょNは端末の接続、開放が極めて容易という特徴があり、この LAN で端末追加、廃止の度に全端末のアドレス情報を更新するのでは LAN の便利性が損なわれてしまう。また各端末がアドレス情報を持つので、システム全体としては各端末のアドレスが何重にも重複して保管されることになり、不経済である。

本発明はかかる点を改善し、アドレス管理の簡単化、ネットワーク構築/変更の容易化と、端末で所有する通信相手のアドレス情報量の削減を図るとするものである。

(問題点を解決するための手段)

第1図に示すように、本発明では交換機に接続された多数の端末 A, B, ……のうち、本例では端末 D をアドレス管理端末とし、これに全端末の

アドレス情報を持たせる。そして各端末が通信する際は、通信相手の端末のアドレスをアドレス管理端末に問合せ、該端末から知らされたアドレスを用いて通信相手の端末と通信する。

例えば端末 D が端末 D と通信するときは、端末 D がアドレス管理端末 D に端末 D のアドレスを問合せ、これを受けてアドレス管理端末 D は端末 D のアドレスを端末 D へ知らせ①、端末 D はこの知らされたアドレスを用いて端末 D を呼び出し、通信する②。

(作用)

このようにすれば、アドレス管理端末以外の端末はアドレス情報を持つ必要がないからメモリ容量の削減が可能であり、また端末の加入、廃止に伴なうアドレス情報の更新はアドレス管理端末のみがすればよいかから簡単である。

(実施例)

第3図に本発明の実施例を示す。各端末 A, B,

……はインタフェース変換部、送受信制御部などの他にアドレス管理部を持ち、こゝに自端末の LAN 内アドレスとアドレス管理端末 B の LAN 内アドレスを持つ。またアドレス管理端末 B はインタフェース変換部、送受信制御部などの他にアドレス管理部を持ち、こゝに各端末のアドレス情報テーブルを持つ。このテーブルは各端末の論理名稱 A, B, C, ……とその端末の LAN 内アドレスを対応させたものである。このテーブルは例えばシステムシェーネーション時にアドレス管理端末 B が各端末 A, B, ……に自己の LAN 内アドレスを送出させて作成する。

第4図に示すようにある端末例えば A がある端末例えば B と通信するとき①は、論理名稱 = B からその LAN 内アドレスへの変換を要求する②。自端末が持っているアドレス管理端末の LAN 内アドレスを用いて該アドレス管理端末 B に、論理名稱 = B に対応する LAN 内アドレスの獲得を要求する③。アドレス管理端末 B はアドレス情報テーブルを検索して該端末 B の LAN 内アドレス 2

を得、これを端末 A へ通知する④。端末 A のアドレス管理部はインタフェース変換部へ B = 2 を通知する⑤。

次に第5図に示すように端末 A は、獲得した LAN 内アドレスにより通信を要求する⑥。該端末の送受信制御部は端末 B に通信を要求する。該端末 B は端末 A へ応答を返し、該端末 A の送受信制御部はインタフェース変換部へ通信可能を通知し、該インタフェース変換部は論理名稱 = B との通信可能を通知する。また端末 B の送受信制御部は自端末へ通信要求が来たことを通知する。これにより、端末 A は端末 B のアドレスを知らないで端末 B との通信が可能になる。

(発明の効果)

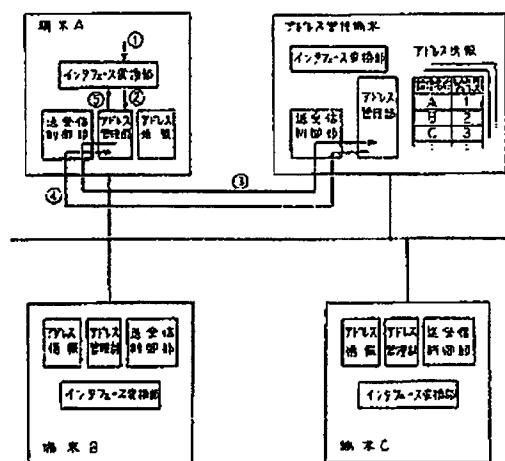
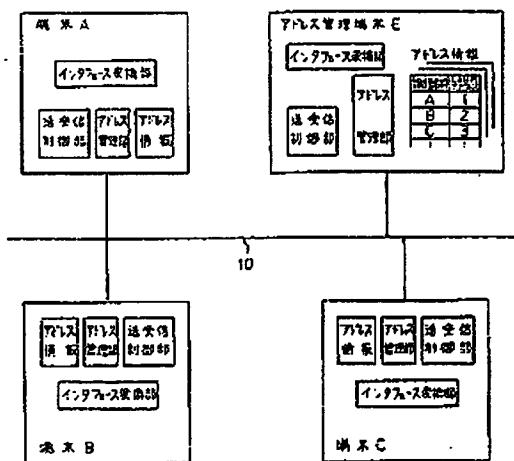
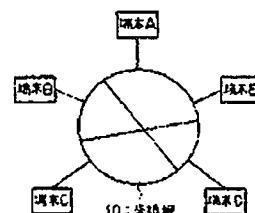
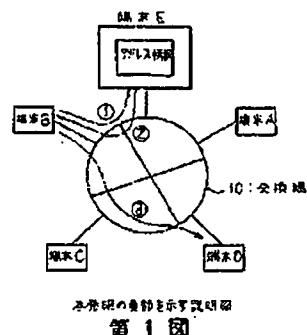
以上説明したように本発明によれば、各端末のアドレスはアドレス管理端末で一括管理するので、端末アドレスの追加、変更が簡単であり、個々の端末が持つアドレス情報量が低減する利点が得られる。

特開昭63-131637(3)

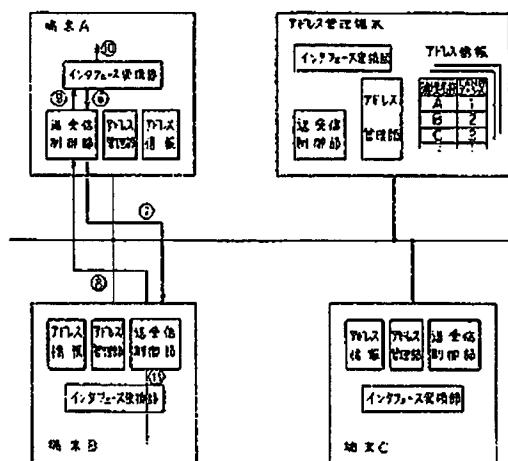
4. 図面の簡単な説明

第1図は本発明の要部を示す説明図、
第2図は従来例の説明図、
第3図～第5図は本発明の実施例の説明図である。

出願人 富士通株式会社
代理人弁理士 傷 権 稔



特開昭63-131637 (4)



本発明の実施例の構成図
第5図

STATEMENT OF RELEVANCY

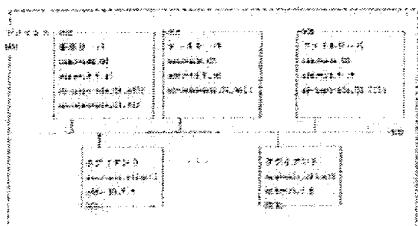
This document was cited in an Office Action corresponding to JP 2008-163825 which is a divisional application corresponding to PCT/US96/15504 (which claims priority to U.S. Patent Application Serial No. 08/533,115, now U.S. Patent No. 6,108,704).

CONSTRUCTING SYSTEM AND CHANGING SYSTEM FOR COMPUTER NETWORK

特許公報番号 JP6062020 (A)
公報発行日 1994-03-04
発明者: TERADA MASATOSHI; FUKUZAWA JUNJI; TAKASHIMA TOSHIBUMI
出願人 HITACHI LTD
分類:
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—欧州: JP19920231282 19920806
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優先権主張番号: JP19920231282 19920806

要約 JP 6062020 (A)

PURPOSE: To provide an address and title managing function accompanied by the transfer of nodes by setting node titles in address request messages and setting the node titles indicating that they belong to other networks in the address request messages. CONSTITUTION: A network system is constituted of a domain A501 managed by a management server 502 and the respective nodes 502-506 are mutually connected by a link 506. Then, when the address request message is present from the node, the server 502 assigns an address imparted beforehand when the node title identical to the specified node title is registered and selects the address from free addresses to be assigned when it is not registered. Also, the effective period of the assigned address is decided corresponding to the length specification of the effective period of the address. Also, when the address request message in which the node title is set is present, the server 502 assigns the address from the free addresses and prepares and transmits a change information message to the management server of the present network.



esp@cenet データベースから供給されたデータ Worldwide

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審査請求 未請求 請求項の数4(全18頁)

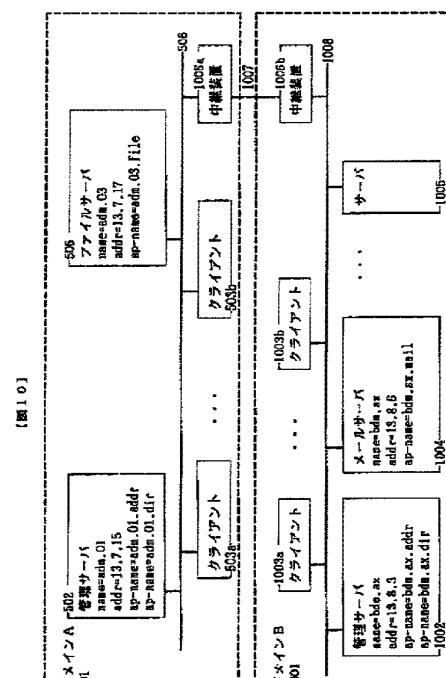
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(54)【発明の名称】コンピュータネットワーク構築方式および変更方式

(57)【要約】

【目的】ノードの移設を考慮したアドレスおよび名称管理機能を持つコンピュータネットワーク構築方式および変更方式を提供することにある。

【構成】ノードからのアドレス要求メッセージがあると、管理サーバはメッセージで指定されたノード名称が登録済なら既付与アドレスを割当て、未登録なら空きアドレスの中から選択して割当てる。また、メッセージ中のアドレスの有効期間の長さ指定に応じて割当アドレスの有効期間を決定する。他ネットワークに属するノード名称を設定したアドレス要求メッセージがあると、管理サーバは、空きアドレスの中から選択してアドレスを割当て、更に現ネットワークの管理サーバへの変更情報メッセージを作成送出する。現ネットワークの管理サーバは、変更情報メッセージを受信し、変更情報に基づき接続変更されたノードに使用されていたアドレスを空きアドレスとして再使用可能にする。



【特許請求の範囲】

【請求項1】 アドレス要求メッセージを送信し自ノードのアドレスの割当てを管理サーバに要求するノードと、アドレスを要求するノードに対してアドレスを割り当てる管理サーバを有するノードを備えるコンピュータネットワークシステムにおけるコンピュータネットワーク構築方式であって、

前記要求するノードはアドレス要求メッセージにノード名称を設定する手段を備え、

前記管理サーバは、前記アドレス要求メッセージで指定されたノード名称をキーとして自管理サーバが既に付与し現在有効であるアドレスを有するノード名称に同一のものが有るか否か調べ、有るときには既に付与したアドレスを前記要求するノードに付与し、否のときには空きアドレスの中から選択して前記要求するノードにアドレスを付与する手段を備えることを特徴とするコンピュータネットワーク構築方式。

【請求項2】 請求項1記載のコンピュータネットワーク構築方式において、前記要求するノードはアドレス要求メッセージに割当てアドレスの有効期間の長さ指定を設定する手段を備え、前記管理サーバは、前記アドレス要求メッセージで指定された有効期間の長さ指定に基づき割当てアドレスの有効期間を決定する手段を備えることを特徴とするコンピュータネットワーク構築方式。

【請求項3】 アドレス要求メッセージを送信し自ノードのアドレスの割当てを管理サーバに要求するノードと、アドレスを要求するノードに対してアドレスを割り当てる管理サーバを有するノードを備える複数のネットワークからなるコンピュータネットワークシステムにおけるコンピュータネットワーク変更方式であって、前記要求するノードは、自ノードが接続された現ネットワークから他ネットワークに接続を変更するとき、アドレス要求メッセージに他ネットワークに属すことを示すノード名称を設定する手段を備え、

前記他ネットワークの管理サーバは、前記アドレス要求メッセージで指定されたノード名称をキーとして自管理サーバが既に付与し現在有効であるアドレスを有するノード名称に同一のものが有るか否か調べ、有るときには既に付与したアドレスを前記要求するノードに付与し、否のときには空きアドレスの中から選択して前記要求するノードにアドレスを付与する手段と前記現ネットワークの管理サーバへの変更情報メッセージを作成送出する手段を備え、

前記現ネットワークの管理サーバは、前記変更情報メッセージを受信し、該変更情報に基づき前記接続変更された要求するノードに使用されていたアドレスを空きアドレスとして再使用可能にする手段を備えることを特徴とするコンピュータネットワーク変更方式。

【請求項4】 請求項3記載のコンピュータネットワーク変更方式において、

前記現ネットワークの管理サーバは、前記変更情報に基づき前記接続変更された要求するノードに使用されていた元のノード名称に対応して変更後のノード名称を別名として登録する手段を備えることを特徴とするコンピュータネットワーク変更方式。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、L A N等のネットワークを用いたコンピュータシステムの計算機アドレス、名称管理方式に係り、特にシステム構築時、および構成変更時の構成変更操作の簡易化を図ることを特徴したコンピュータネットワーク構築方式および変更方式に関するものである。

【0002】

【従来の技術】 従来の技術は、特開平2-22336号公報に記載されているように、アドレスサーバに対してアドレス問い合わせメッセージを送信し、その応答メッセージから自計算機のアドレスを取得し、記憶するものとなっていた。

【0003】

【発明が解決しようとする課題】 上述した従来の計算機アドレス管理方式では、ノード移設に伴いアドレスが変更された場合、移設前に使用していたアドレスを空きアドレスとしてリセットする手順が提供されていない。移設ノードから使用していたアドレスをメッセージの送受信処理を用いてリセットを行う場合には、移設に際し一度ノードを起動させ移設前のアドレスを空きアドレスとしてリセットさせる必要がある。また、アドレスサーバ側のローカルな操作でアドレス情報をリセットする方法もあるが、人手を介する必要があるという欠点があった。本発明の目的は、上述の点を鑑み、ノードの移設を考慮したアドレスおよび名称管理機能を持つコンピュータネットワーク構築方式および変更方式を提供することにある。

【0004】

【課題を解決するための手段】 本発明のコンピュータネットワーク構築方式では、自ノードのアドレスを割当て要求するノードはアドレス要求メッセージにノード名称を設定する手段を備え、アドレスを割り当てる管理サーバは、前記アドレス要求メッセージで指定されたノード名称をキーとして自管理サーバが既に付与し現在有効であるアドレスを有するノード名称に同一のものが有るか否か調べ、有るときには既に付与したアドレスを前記要求するノードに付与し、否のときには空きアドレスの中から選択して前記要求するノードにアドレスを付与する手段を備える。また、自ノードのアドレスを割当て要求するノードはアドレス要求メッセージに割当てアドレスの有効期間の長さ指定を設定する手段を備え、管理サーバは、前記アドレス要求メッセージで指定された有効期間の長さ指定に基づき割当てアドレスの有効期間を決定

する手段を備える。本発明のコンピュータネットワーク変更方式では、自ノードのアドレスを割当て要求するノードは、自ノードが接続された現ネットワークから他ネットワークに接続を変更するとき、アドレス要求メッセージに他ネットワークに属すことを示すノード名称を設定する手段を備え、前記他ネットワークの管理サーバは、前記アドレス要求メッセージで指定されたノード名称をキーとして自管理サーバが既に付与し現在有効であるアドレスを有するノード名称に同一のものが有るか否か調べ、有るときには既に付与したアドレスを前記要求するノードに付与し、否のときには空きアドレスの中から選択して前記要求するノードにアドレスを付与する手段と前記現ネットワークの管理サーバへの変更情報メッセージを作成送出する手段を備え、前記現ネットワークの管理サーバは、前記変更情報メッセージを受信し、該変更情報に基づき前記接続変更された要求するノードに使用されていたアドレスを空きアドレスとして再使用可能にする手段を備える。また、前記現ネットワークの管理サーバは、前記変更情報に基づき前記接続変更された要求するノードに使用されていた元のノード名称に対応して変更後のノード名称を別名として登録する手段を備える。

【0005】

【作用】本発明のコンピュータネットワーク構築方式では、ノードからのアドレス要求メッセージがあると、管理サーバは、アドレス要求メッセージで指定されたノード名称と同一のものが登録されていれば、既に付与したアドレスを割当て、同一のものが登録されていなければ、空きアドレスの中から選択して割当てをする。また、アドレス要求メッセージ中のアドレスの有効期間の長さ指定に応じて割当てアドレスの有効期間を決定する。コンピュータネットワーク変更方式では、ノードからの他ネットワークに属すことを示すノード名称を設定したアドレス要求メッセージがあると、管理サーバは、空きアドレスの中から選択してアドレスを割当て、さらに現ネットワークの管理サーバへの変更情報メッセージを作成して送出する。現ネットワークの管理サーバは、変更情報メッセージを受信し、変更情報に基づき接続変更されたノードに使用されていたアドレスを空きアドレスとして再使用可能にし、さらに現ネットワークの管理サーバは、変更情報に基づき接続変更されたノードに使用されていた元のノード名称に対応して変更後のノード名称を別名として登録する。

【0006】

【実施例】以下、(1)章から(2)章において、本実施例に示すネットワークシステムが稼働する環境について説明し、(3)章から(4)章において、ネットワーク構築時の手順について説明する。

【0007】(1)用語説明

本実施例で使われる用語について説明する。

(a) 管理サーバ

管理サーバはネットワークシステムのアドレス情報、ディレクトリ情報を保持管理するサーバであり、アドレスを管理するアドレス管理サーバアプリケーション（以下、アドレスサーバ）と、名称を管理するディレクトリ管理サーバアプリケーション（以下、ディレクトリサーバ）の2つのサーバ機能から構成される。なお、ここでは、管理プログラム、制御プログラムをアプリケーションと呼ぶ。

10 (b) ドメイン

ドメインは管理サーバの管理範囲であり、本実施例のネットワークシステムを構成するノード、利用者端末、アプリケーション、周辺装置等は管理サーバの管理下に入る。

(c) 論理アドレス

論理アドレスは、ノードに割り当てられたアドレスであり、広域に渡るネットワークを構築する場合にハードウェアアドレス（例えばMAC（Media Access Control）アドレス）の仕様の違いを吸収したり、階層的なアドレス付けをすることにより宛先ノードへの経路選択を容易にすることができる。論理アドレスとしては、TCP/IP（Transmission Control Program/Internet Protocol）のIPアドレス、OSI（Open Systems Interconnection）のNSAP（Network Service Access Point）アドレス等が知られている。本実施例では、" ." で区切られた3桁の数字列を使用する。

30 【0008】(d) アプリケーションアドレス

アプリケーションアドレスは、一つのノード上に複数のアプリケーション（管理プログラム、制御プログラム）が存在する場合、これを識別するために使用する。本実施例では、1桁の数字列を使用する。

(e) ノード名称

ノード名称は、ノードに割り当てられた名前であり、ヒューマンリーダブルな形でノードの識別を行うために使用する。

(f) アプリケーション名称

40 アプリケーション名称は、アプリケーションに割り当てられた名前であり、ヒューマンリーダブルな形でアプリケーションの識別を行うために使用する。

【0009】(g) 有効期間

有効期間はアドレスサーバが割当てた論理アドレスの寿命（単位：分）であり、論理アドレス取得要求者はこの期間の間、割り当てられた論理アドレスを利用することができます。また、ノード起動時には以前に割り当てられた論理アドレスを削除しなければならない。このように、割り当てた論理アドレスに寿命を持たせたり、起動時削除することにより、ノードの移設等に伴う論理ア

レスの使用取り消し操作を省いている。

(e) 有効期間レベル

有効期間レベルは、アドレスサーバが割り当てる論理アドレスの有効期間に対する要求側の提案値であり、*h i g h*（長期的に割当てアドレスを利用したい場合）、*m e d i u m*（中期的に割当てアドレスを使用したい場合）、*l o w*（短期的に割当てアドレスを利用したい場合）の3値の中から選択する。例えば、ファイルサーバとして据置型の高機能ワークステーションを使用する場合にはノードを移動させることは少ないので”*h i g h*”を選択すると良い。この結果、アドレスサーバは寿命の長い有効期間を要求ノードに割り当てるため、論理アドレスの寿命経過に伴う再割当て要求処理が少なくなるとともに、論理アドレスが変更される可能性も少なくなる。また、頻繁にネットワークを移動して利用するような携帯用ワークステーションの場合には”*l o w*”を選択すると良い。この結果、アドレスサーバは寿命の短い有効期間を要求ノードに割り当てるため、移動に伴って使用されなくなる論理アドレスを有效地に再利用することができます。

【0010】(2) 実施例の全体構成

本実施例で対象とするネットワークシステムは以下のような特徴を備えている。

(a) 本ネットワークシステムは外部記憶装置を備え、かつ比較的大きなメモリ及び計算能力を有したノード（以下、サーバ）、例えば据置型の高機能ワークステーションと、より制限されたメモリ及び計算能力しか有さないノードや外部記憶装置を持たないノード（以下、クライアント）、例えば携帯用ワークステーションから構築され、サーバがクライアントに不足する機能を補うことにより、クライアントの利用者であるアプリケーションプログラムや利用者に、より高機能で性能の良いサービスを提供する。

(b) 本ネットワークシステムはドメインという考え方を用いてアドレス管理、名称管理を行う。ドメインとは管理サーバの管理範囲のことであり、このようなドメインの概念を導入することにより管理範囲の分割を行い、論理アドレスの自動割り当て、論理アドレスや名称の変更に伴うデータベースの自動更新を実現する。

(c) 本ネットワークシステムはノード相互の情報転送形式は、宛先が設定されたメッセージという形で転送し、各ノードはメッセージに設定された宛先と、自ノード内のルート（宛先指定）テーブルに基づき受信メッセージの中継を行い、メッセージを正しい宛先にまで届ける機能を持っている。

【0011】次に本ネットワークシステムの構成について説明する。図5は、本ネットワークシステム構成の一例を示す図である。本ネットワークシステムは、管理サーバ502によって管理される一つのドメインA（501）から構成されており、ドメインA内の各ノードはリ

ンク506により相互に接続されている。管理サーバ502はドメインA内の論理アドレスと名称を管理するノードであり、ノード名称”name=a d m. 0 1”、論理アドレス”a d d r = 1 3. 7. 1 5”が割り当てられており、アプリケーション名称”a p-n a m e = a d m. 0 1. a d d r”という名称を持つアドレスサーバと、アプリケーション名称”a p-n a m e = a d m. 0 1. d i r”という名称を持つディレクトリサーバが稼働する。また、メールサーバ504はメールサービスを提供するノードであり、このノードにはノード名称”name=a d m. 0 2”が割り当てられており、アプリケーション名称として”a p-n a m e = a d m. 0 2. m a i l”を持つメールサーバアプリケーションが稼働する。ファイルサーバ505はファイル登録参照サービスを提供するノードであり、このノードにはノード名称”name=a d m. 0 3”が割り当てられており、”アプリケーション名称としてa p-n a m e = a d m. 0 3. f i l e”を持つファイルサーバアプリケーションが稼働する。クライアント503a, bはドメインA内に存在するサーバの利用者であり、それぞれノード名称”name=a d m. c l i e n t 1”, ”name=a d m. c l i e n t 2”が割り当てられている。尚、メールサーバ、ファイルサーバ、およびクライアントの各ノードの論理アドレスについては、ネットワークシステム構築時に管理サーバ502により動的に割り当てが行われる。

【0012】次に図14を用いて、ネットワークシステムを構築する際に使用する名称体系について説明する。図14は、図5、及び後述する図10に示すネットワークシステムを構築する際に使用する名称体系を示す。”／”（1401）はドメインA（501）とドメインB（1001）を取り纏める上位の名称である。”／”の直下の名称はドメインに一意に割り当てられる名称であり、”a d m”（1402）はドメインAを示し、”b d m”（1403）はドメインBを示す。ドメイン名称の直下の名称はノードに一意に割り当てられる名称（1404, 1405）であり、ドメイン名称と連結することによりノード名称が作られる。従って、ドメインAの管理サーバ502のノード名称は”a d m. 0 1”、メールサーバ504のノード名称は”a d m. 0 2”、ファイルサーバ505のノード名称は”a d m. 0 3”となる。同様にドメインBの管理サーバ1002のノード名称は”b d m. a x”、メールサーバ504のノード名称は”b d m. s x”となる。さらにその直下の名称は各ノード上のアプリケーションに一意に割り当てられる名称（1406, 1407）であり、ノード名称と連結することによりアプリケーション名称が作られる。従って、ドメインAのアドレスサーバアプリケーションのアプリケーション名称は”a d m. 0 1. a d d r”、ディレクトリサーバアプリケーションのアプリケーショ

ン名称は”`a d m. 0 1. d i r`”、メールサーバアプリケーションのアプリケーション名称は”`a d m. 0 2. m a i l`”、ファイルサーバアプリケーションのアプリケーション名称は”`a d m. 0 3. f i l e`”となる。同様にドメインBのアドレスサーバアプリケーションのアプリケーション名称は”`b d m. a x. a d d r`”、ディレクトリサーバアプリケーションのアプリケーション名称は”`b d m. a x. d i r`”、メールサーバアプリケーションのアプリケーション名称は”`b d m. s x. m a i l`”となる。

【0013】図4はノードのハードウェア構成であり、図2はハードウェア構成例に従って作られたメールサーバ、ファイルサーバ及び、クライアントノードのソフトウェア構成例を示す。403はノード間を接続する回線の入出力等を制御する回線接続制御部、405は情報を外部記憶装置406に保存するために、外部記憶装置との入出力等を制御する制御部、407はキーボードからの入力、ディスプレイへの表示を制御する制御部であり、これらの制御部の中にそれぞれ存在するプロセサとプログラムとにより接続する装置の制御を行う。404はプログラムの他、アドレス情報及び受信メッセージを格納するメモリである。402はプロセサであり、ノード内ハードウェア間の制御を行う。404はメモリ、408はディスプレイ、キーボードである。

【0014】202はメールサーバ、ファイルサーバアプリケーション、及びこれらアプリケーションにアクセスするためのプログラムである。203は管理サーバに論理アドレスを問合せ、応答を受信するためのプログラムである。204は装置の入出力を制御するリンク制御プログラムであり回線制御部403、外部記憶装置制御部405、端末入出力制御部407に置かれる。プログラムスケジューラ205は、203から204までのプログラム実行のスケジューリングと管理を行う。

【0015】図3はハードウェア構成例に従って作られた管理サーバノードのソフトウェア構成例を示す。アドレスサーバ302は、ドメインA内の論理アドレス情報を管理する。ディレクトリサーバ303は、ドメインA内の名称情報を管理し、名称から論理アドレスやAPアドレスを導き、これらのアドレス情報をクライアントに提供する。リンク制御部304は、装置の入出力を制御するリンク制御プログラムであり、プログラムスケジューラ305は、302から304までのプログラム実行のスケジューリングと管理を行う。

【0016】図6に、論理アドレスの取得、応答に使用するメッセージ形式を示す。(a)は、論理アドレスを取得するためにアドレスサーバに転送される要求メッセージである。`L I 6 0 1 a`はメッセージの長さフィールドであり、タイプ602aは本メッセージ`ADD R r e q`(`A d d r e s s r e q u e s t`)が論理アドレスを取得するために転送される情報であることを示し、ア

レスサーバはこの情報を調べ要求メッセージを取り込む。ノード名称603aは送信元ノード名称を設定するフィールドであり、その名称は送信元ノードの利用者が付与する。有効期間レベル604aはアドレスサーバが割り当てる論理アドレスの有効期間に対する送信側の提案値である。履歴情報605aは、ノード名称の変更が発生した場合に使用するフィールドである。(b)は、論理アドレスを割り当てるためにアドレスサーバが送信する応答メッセージである。タイプ602bは本メッセージ`ADD R r e s p`(`A d d r e s s r e s p o n s e`)が割り当てた論理アドレスを通知するために転送される情報であることを示し、ノード名称603bは宛先ノード名称が設定され、論理アドレス606にはアドレスサーバが割り当てる論理アドレスが格納される。また、有効期間607は割当てた論理アドレスの寿命であり、アドレス取得要求者はこの期間(単位:分)の論理アドレスを利用することができる。(c)は、ノード管理情報の再設定を行なう際にアドレスサーバに転送される要求メッセージであり、内容は(a)と同様である。

20 これについては、後述の「(4-2) 論理アドレスの取得」の項でさらに説明する。

【0017】(3) ネットワークの新規構築

図5に示すネットワークシステムにクライアント503aを新規に導入する場合について説明する。

【0018】(3-1) ノード管理情報の設定

図1はノード管理情報の設定手順を示すフローである。ステップ102はノード名称の設定を確認する操作であり、クライアント503aは新規導入のためノード名称が未設定なので、ステップ103でノード名称”`a d m. c l i e n t 1`”を設定する。既にノード名称が設定されており、これを変更する場合にはステップ104を実行する。ステップ106ではノード名称の変更を確認し、変更があれば前回設定されていたノード名称を履歴情報として登録し(107)、なければ現在設定されているノード名称を履歴情報として登録する(108)。ステップ109は有効期間レベルの設定を確認する操作であり、クライアント503aは新規導入のため有効期間レベルが未設定なので、ステップ110で有効期間レベルを設定するが、クライアント503aがネットワークを移動して利用するような携帯用ワークステーションであることから、ステップ110の有効期間レベルとして”`l o w`”を設定する。以降、クライアント503aのノード起動時は、ここで設定されたノード名称、有効期間レベルに基づいてアドレス取得手順が実施される。既に有効期間レベルが設定されており、これを変更する場合にはステップ111を実行する。なお、フローにおいて、“→(1)”は“←(1)”への分岐、“→(2)”は“←(2)”への分岐を示す。

50 【0019】次に、クライアント503aにおけるアドレス取得手順を図7に従い説明する。

(3-2) 論理アドレスの取得

図7は論理アドレス取得手順を示すフローである。ステップ702において図6の(a)に示す要求メッセージのノード名称フィールド603aにノード名称”ad m. c l i e n t 1”を設定、ステップ703において有効期間レベル”l o w”をフィールド604aに設定、ステップ704において履歴情報”ad m. c l i e n t 1”をフィールド605aに設定した後、要求メッセージを送信する(705)。次にステップ706で取得要求の応答を待ち、応答を受信できた場合には応答メッセージの論理アドレスのチェックを行い(707)、応答を受信できなかった場合には再度論理アドレスの取得手順を実行する(711d)。ステップ707で受信論理アドレス値の確認を行い、“n u l l”ならば再度論理アドレスの取得手順(711c)を実行し、それ以外ならば受信論理アドレスを登録後(708)、有効期間の減算手順にはいる(710)。また、有効期間の減算とともに、ステップ709、711bで現在使用している論理アドレスを継続するために、有効期間が切れる前に再度アドレス取得手順を実行する。なお、本実施例では全ての有効期間値を減算の対象としているが、ある特定の有効期間値(例えば有効期間値=”9999”)を持つ論理アドレスについては、有効期間の減算及び、起動時の論理アドレス削除の対象からはずすことにより、一度割り当てられた論理アドレスを有効期間という時間的な制約無しに利用することも可能である。

【0020】(3-3) 論理アドレスの割当

図8は管理サーバ502内のアドレスサーバにおける論理アドレスの割当手順を示すフローである。ステップ802において要求メッセージを受信すると、ステップ803において要求メッセージのノード名称フィールド603aに設定されたノード名称を参照する。ステップ803はノード名称のみを変更した場合に、論理アドレスを極力変更させないための処理であり、指定されノード名称の論理アドレスが、自アドレスサーバによって割り当てられたものであり、さらにその論理アドレスの割り当て有効期間が過ぎていない場合には、前回割り当てた論理アドレスと同一の論理アドレスを割り当てるにより、論理アドレス値の変更を極力抑えている。クライアント503aは新規導入なので、アドレスサーバはステップ804の処理を行わず、ステップ805で空きアドレスを探し、論理アドレスとして使用されていない論理アドレス”13.7.4”を割当て(806)、応答メッセージの論理アドレスフィールド606に”13.7.4”を設定し、ステップ809で提案された有効期間レベルに従い有効期間をフィールド607に設定した後、応答メッセージを論理アドレス取得要求ノードに送信する(810)。また、ステップ808では他のアドレスサーバ、ディレクトリサーバに変更情報を通知する。

【0021】図9に管理サーバ502が管理するアドレス情報、ディレクトリ情報を示す。アドレス情報901はアドレスサーバのデータベースであり、{ノード名称902a, 割り当て論理アドレス903a, 残り有効期間904a}の3項目から構成され、902a, 903a, 904aはクライアント503aに関するエントリ、902b, 903b, 904bはメールサーバ504に関するエントリ、902c, 903c, 904cはファイルサーバ505に関するエントリとなっている。

10 ノード名称902aは論理アドレス取得要求ノードの名称、論理アドレス903aはアドレスサーバによって割り当てられた論理アドレス値、残り有効期間904aはアドレスサーバが割り当てた論理アドレスの有効期間の残り時間である。アドレスサーバにおいてもステップ709に示すような有効期間の減算手順が実行され、残り有効期間がなくなった時点でこの論理アドレスは空きアドレスとして再利用する。ディレクトリ情報905はディレクトリサーバのデータベースであり、{エントリ名称906a, 論理アドレス907a, APアドレス908a, 別名909a}の4項目から構成され、906a, 907a, 908a, 909aはメールサーバ504に関するエントリ、906b, 907b, 908b, 909bはファイルサーバ505に関するエントリとなっている。エントリ名称906aはディレクトリ情報として登録されるアプリケーション名称であり、論理アドレス907a、APアドレス908a、別名909aはその属性値である。

【0022】(4) ネットワークの再構成

図5に示すネットワークシステムを図10に示すネットワークシステムに構成を変更する場合について説明する。図10は、図5に示すネットワークシステムを拡張した構成の一例を示す図である。ドメインA(501)は管理サーバ502によって管理される一つの領域であり既存のネットワークシステムに相当する。ドメインB(1001)は管理サーバ1002によって管理される領域であり、新たに追加された領域である。ドメインB内の各ノードはリンク1008により相互に接続され、さらに中継装置1006a, 1006bとリンク1007を用いてドメインAとの相互接続を可能としている。40 管理サーバ1002はドメインB内の論理アドレスと名称を管理するノードであり、利用者によってノード名称”n a m e = b d m. a x”、論理アドレス”a d d r = 13. 8. 3”が割り当てられており、アプリケーション名称として”a p - n a m e = b d m. a x. a d d r”を持つアドレスサーバと、アプリケーション名称として”a p - n a m e = b d m. a x. d i r”を持つディレクトリサーバが稼働する。メールサーバ1004は、図5のドメインAに置かれていたメールサーバ504を今回の再構成によりドメインB内に移設したもののであり、ドメインBへの移設に伴いノード名称が”n

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UPDATE (Address Update) が変更情報をアドレスサーバ、ディレクトリサーバに通知するための情報であることを示す。ドメインAのアドレスサーバに変更情報を通知する場合には、宛先サーバ名称1103にはドメインAのアドレスサーバ名称を設定し、送信元サーバ名称1104には自アドレスサーバ名称を設定する。変更情報1108には、アドレス取得要求ノードのノード名称1105として”b d m. s x”、履歴情報1106として”a d m. 0 2”、論理アドレス1107として”1 3. 8. 6”を設定する。また、ドメインAのディレクトリサーバに変更情報を通知する場合には、宛先サーバ名称1103にはドメインAのディレクトリサーバ名称を設定する。

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【0023】以下、メールサーバ504をドメインAからドメインBへ移設する場合の処理手順について説明する。

(4-1) ノード管理情報の再設定
図1に従いメールサーバノード管理情報の再設定手順を説明する。移設に伴いノード名称が変更されたのでステップ104でノード名称”b d m. s x”を設定し、ステップ106でノード名称の変更を確認後、ステップ107で前回設定されていたノード名称”a d m. 0 2”を履歴情報として登録する。また、有効期間については前回の設定値”h i g h”を使用するので、ステップ109から112の設定処理は行わない。

(4-2) 論理アドレスの取得

図7に従いメールサーバノードの論理アドレス再取得手順について説明する。ステップ702において要求メッセージのノード名称フィールド603cにノード名称”b d m. s x”を設定、ステップ703において有効期間レベル”h i g h”をフィールド604cに設定、ステップ704において履歴情報”a d m. 0 2”をフィールド605cに設定した後、要求メッセージを送信する(705)。なお、以降の論理アドレスの取得手順については、項番(3-2)のクライアント503aの場合と同一の手順を踏むので説明を省略する。

(4-3) 論理アドレスの割当てと更新

図8に従い管理サーバ1002内のアドレスサーバによるメールサーバノードの論理アドレス割当て手順について説明する。ステップ802において要求メッセージを受信すると、ステップ803において要求メッセージのノード名称を参照する。メールサーバ1004はドメインBにおいて新規導入のため、ステップ805で空きアドレスを探し、論理アドレスとして使用されていない論理アドレス”1 3. 8. 6”を割当て、図6の(b)と同様の応答メッセージの論理アドレスフィールド606に”1 3. 8. 6”を設定し、ステップ809で提案された有効期間レベルに従い有効期間”9 9 9 9”をフィールド607に設定した後、応答メッセージを論理アドレス取得要求ノードに送信する(810)。また、これに合わせてステップ808で他ドメインのアドレスサーバ、ディレクトリサーバに変更情報メッセージを通知する。

【0024】図11は、前記ステップ808で通知する変更情報を他ドメインのアドレスサーバ、自ドメイン及び他ドメインのディレクトリサーバに通知するための変更情報メッセージを示す。L11101はメッセージの長さフィールドであり、タイプ1102は本メッセージ

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【0025】今回のメールサーバ504の移設に伴い、この変更情報メッセージは、管理サーバ1002のアドレスサーバから、管理サーバ502のアドレスサーバ、ディレクトリサーバに通知される。変更情報メッセージを受信したドメインAのアドレスサーバは、履歴情報1106をキーとして、ドメインA内のメールサーバ504に使用されていたアドレスエンタリを検索したのちリフレッシュを行い、使用されていた論理アドレスを空き論理アドレスとして再使用可能な状態とする。

【0026】図12に、メールサーバ504移設に伴う論理アドレス、更新処理が完了した時点での管理サーバ502(ドメインA)のアドレスサーバ(502-1)と管理サーバ1002(ドメインB)のアドレスサーバ(1002-1)が管理するアドレス情報(1201, 1211)を示す。1202b, 1203b, 1204bは管理サーバ1002(ドメインB)のアドレス情報として格納されているドメインB内のメールサーバ504に関するエンタリであり、メールサーバ504がドメインBに移設され、論理アドレスの取得処理が行われた際に登録されたものである。1202a, 1203a, 1204aは管理サーバ502(ドメインA)のアドレス情報として、メールサーバ504がドメインAに存在していた時に使用されていたエンタリであり、変更情報受信時にリフレッシュされ、現時点では空きエンタリとなっている。

【0027】次に変更情報更新後の管理サーバのディレクトリ情報について説明する。本ネットワークシステムにおけるディレクトリサーバアプリケーションは、IOS9594に規定されるOSIディレクトリに従う問い合わせ、登録情報の更新の他に、アドレスサーバとの間で登録情報の更新手順を持つ。図13に、メールサーバ504移設に伴う論理アドレス、更新処理が完了した時点での管理サーバ502(ドメインA)のディレクトリサーバ(502-2)と管理サーバ1002(ドメインB)のディレクトリサーバ(1002-2)が管理するディレクトリ情報(1301, 1311)を示す。変更情報メッセージを受信したドメインAのディレクトリサ

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一バは、図11に示す履歴情報1106をキーとして、ドメインA内のメールサーバ504に使用されていたディレクトリエンティ”ad.m.02.mail”を搜し出したのち、図11に示すノード名称1105からドメインBに移設されたメールサーバアプリケーション名称”bdm.sx.mail”を生成する。次にドメインAのディレクトリサーバは、図11に示す変更情報として通知された論理アドレス”13.8.6”(1107)と、ディレクトリ情報として格納されていたアプリケーションアドレス”5”(908b)を持つエントリ”bdm.sx.mail”(1306b, 1307b, 1308b, 1309b)の生成をドメインBのディレクトリサーバに要求するとともに、ドメインA内のディレクトリ情報の1307a, 1308aをリフレッシュし、別名1309aには移設されたメールサーバのアプリケーション名称”bdm.sx.mail”を登録する。以上のような処理を経て、ネットワーク再構成時の論理アドレスの割当て、名称の変更処理が終了する。

【0028】

【発明の効果】1つのノードに複数のアドレスの割当てを防止でき、また、有効期間付きのアドレス割当てを行なうことができる。また、ノード移設による論理アドレスの変更に伴い、移設前に使用していた論理アドレスは、新たに論理アドレスの割当てが行われた時点で空き論理アドレスとなるため、論理アドレスを効率良く利用することができる。さらに、ノード移設に伴いノード名称が変更された場合にも、旧ノード名称に対応して新名称が登録されているので、旧ノード名称でのアクセスが可能である。

【図面の簡単な説明】

【図1】ノード管理情報の設定手順のフローを示す図である。

【図2】ハードウェア構成例に従って作られたメールサーバ、ファイルサーバ及び、クライアントノードのソフトウェア構成例を示す図である。

【図3】ハードウェア構成例に従って作られた管理サーバノードのソフトウェア構成例を示す図である。

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【図4】ノードのハードウェア構成を示す図である。

【図5】本ネットワークシステム構成の一例を示す図である。

【図6】論理アドレスの取得、応答に使用するメッセージ形式を示す図である。

【図7】論理アドレス取得手順のフローを示す図である。

【図8】管理サーバ内のアドレスサーバにおける論理アドレスの割当て手順のフローを示す図である。

10 【図9】管理サーバが管理するアドレス情報、ディレクトリ情報を示す図である。

【図10】図5に示すネットワークシステムを拡張した構成の一例を示す図である。

【図11】変更情報メッセージの形式を示す図である。

【図12】メールサーバ移設に伴う処理終了時点でのドメインAの管理サーバのアドレスサーバとドメインBの管理サーバのアドレスサーバが管理するアドレス情報を示す図である。

20 【図13】メールサーバ移設に伴う処理終了時点でのドメインAの管理サーバのディレクトリサーバとドメインBの管理サーバのディレクトリサーバが管理するディレクトリ情報を示す図である。

【図14】ネットワークシステムを構築する際に使用する名称体系を示す図である。

【符号の説明】

402 プロセサ

403 回線制御部

405 外部記憶装置制御部

406 外部記憶装置

30 407 端末入出力制御部

408 ディスプレイ、キーボード

502、1002 管理サーバ

503a、503b、1003a、1003b クライアント

504、1004 メールサーバ

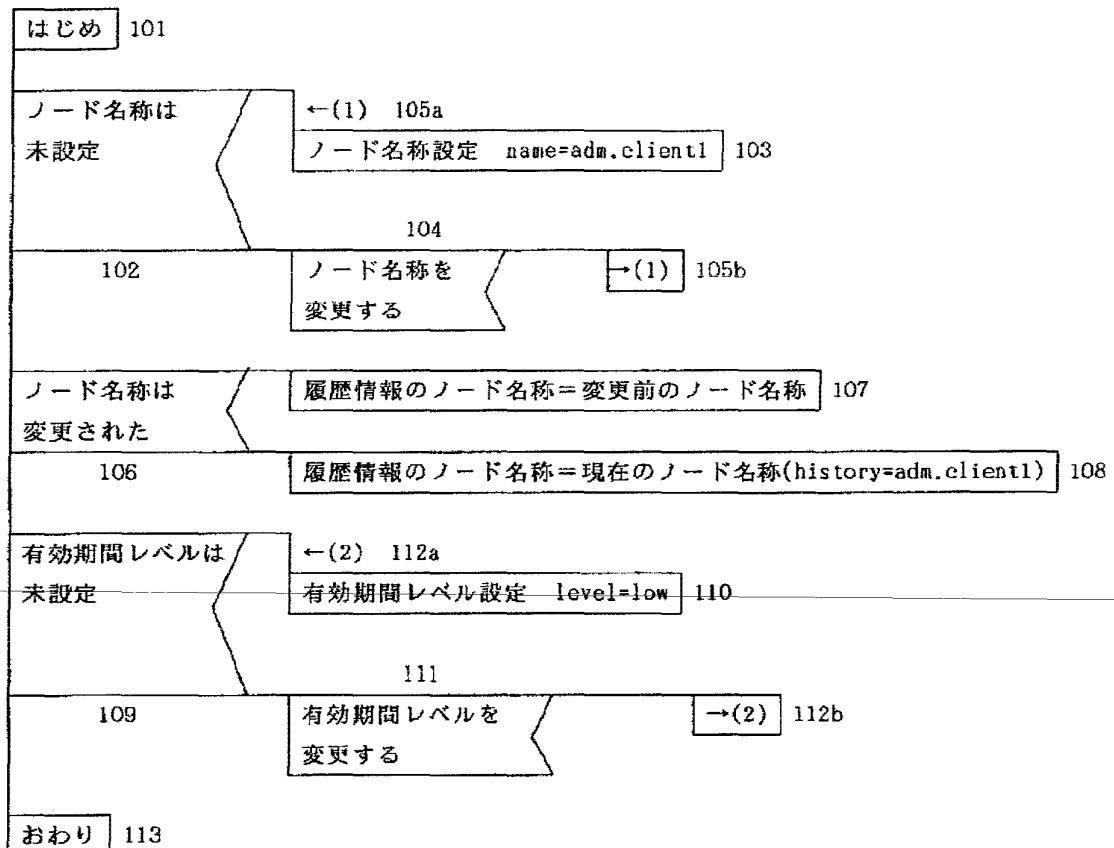
505 ファイルサーバ

1006a、1006b 中継装置

1005 サーバ

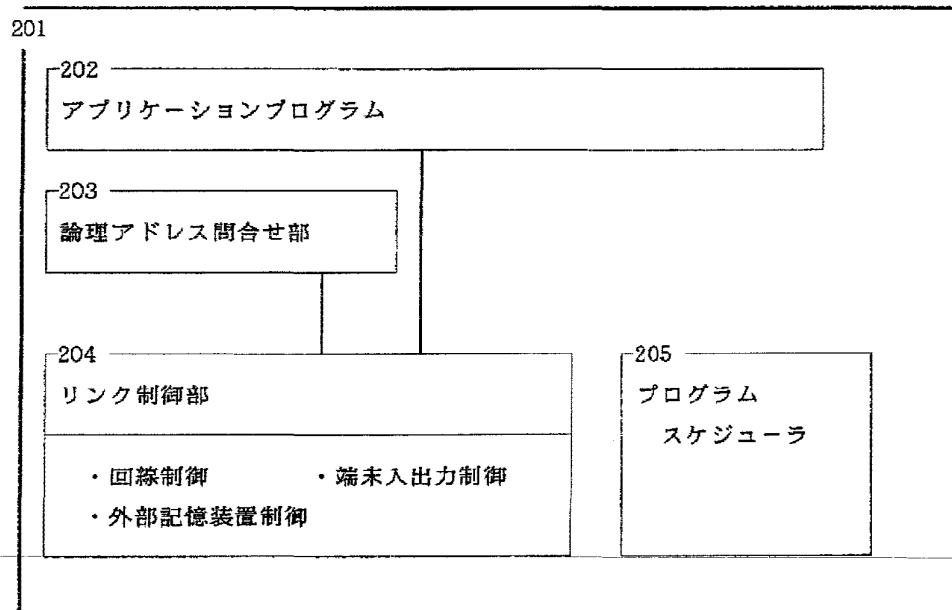
【図1】

【図1】



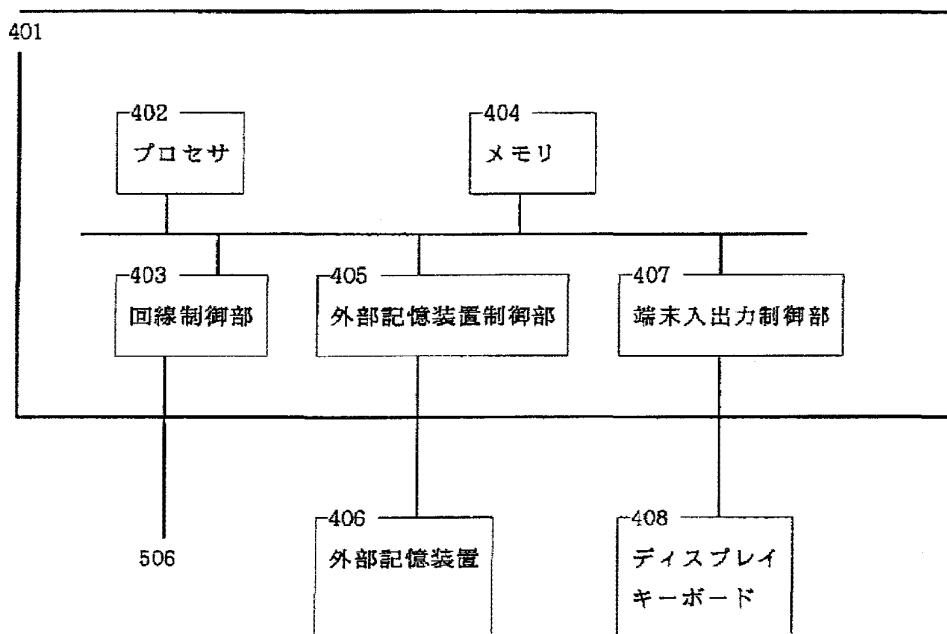
【図2】

【図2】



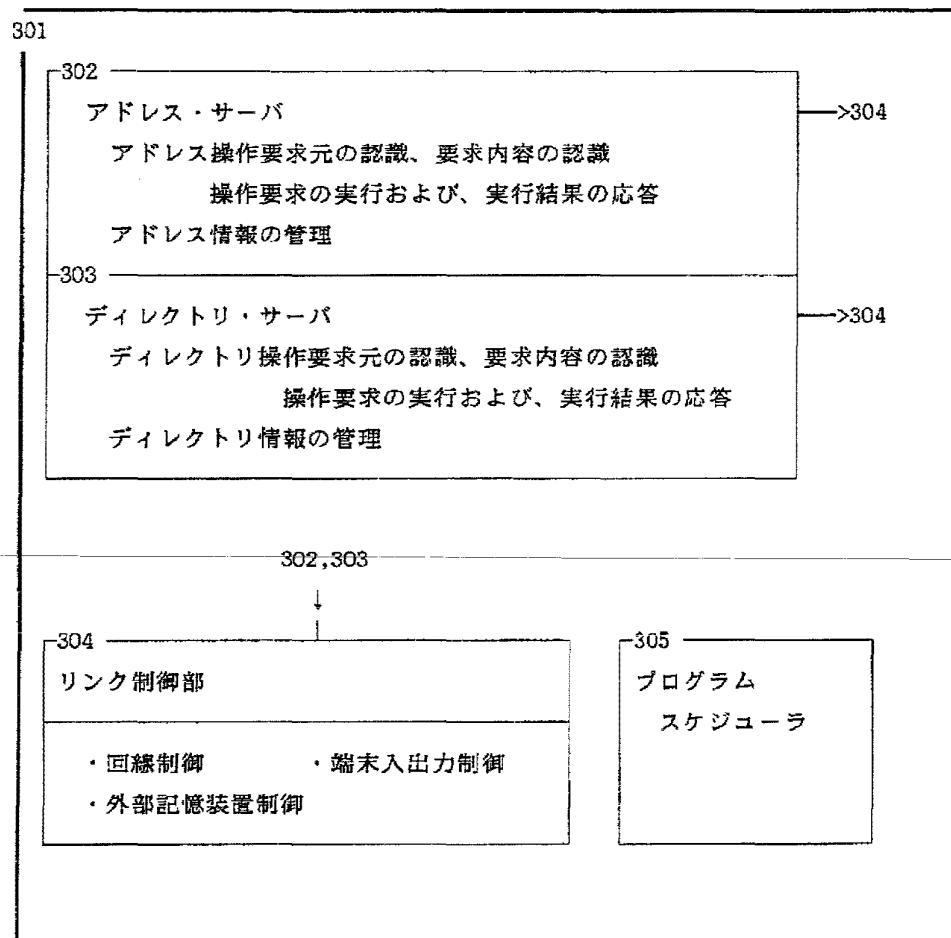
【図4】

【図4】



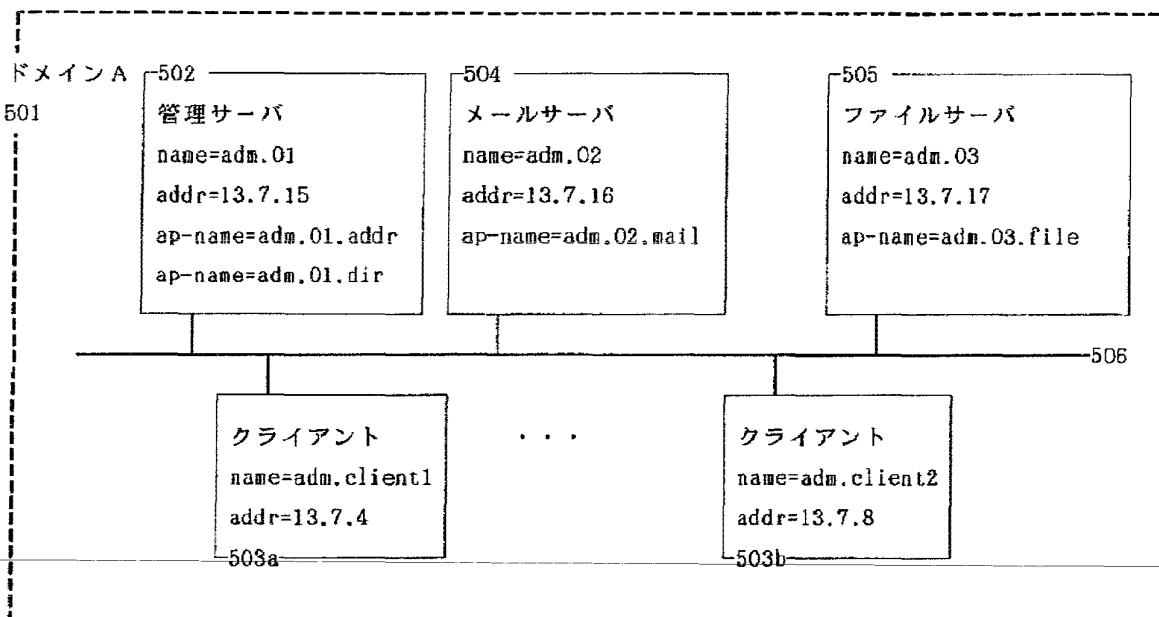
【図3】

【図3】



【図5】

【図5】



【図6】

【図6】

(a)

L I	タイプ	ノード名称	有効期間レベル	履歴情報
601a	602a	603a	604a	605a
	ADDRreq	adm.client1	low	adm.client1

(b)

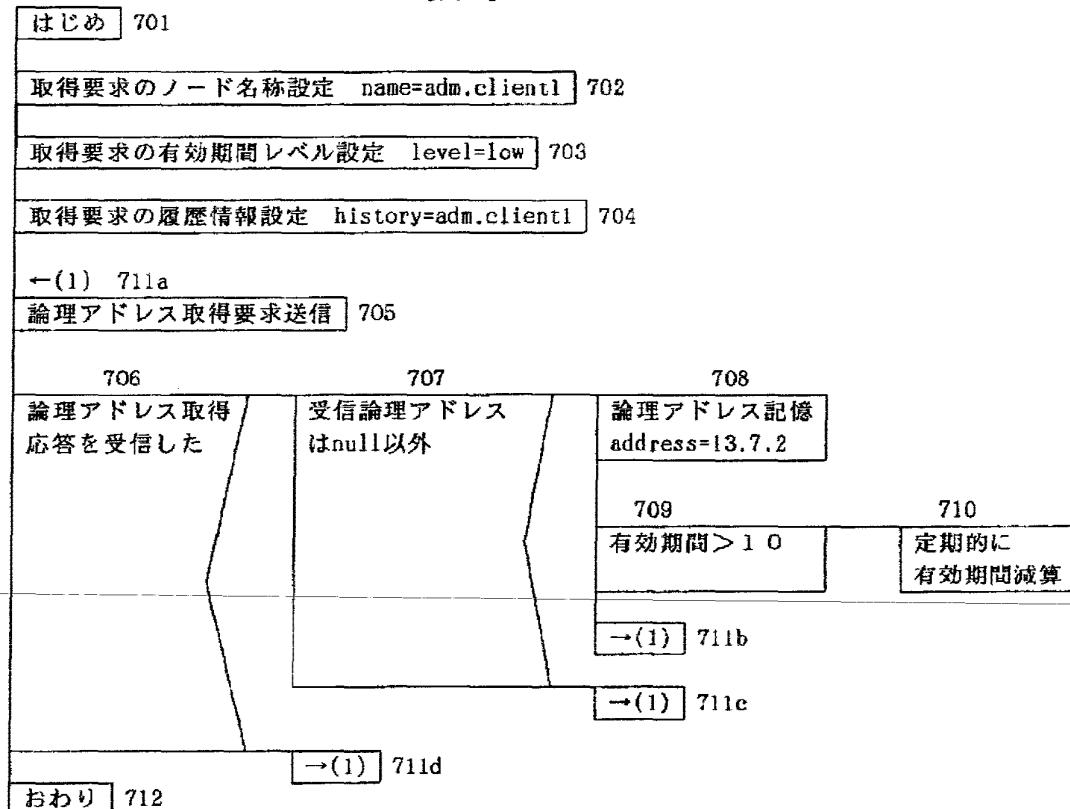
L I	タイプ	ノード名称	論理アドレス	有効期間
601b	602b	603b	606	607
	ADDRresp	adm.client1	13.7.4	1000

(c)

L I	タイプ	ノード名称	有効期間レベル	履歴情報
601c	602c	603c	604c	605c
	ADDRreq	adm.sx	high	adm.02

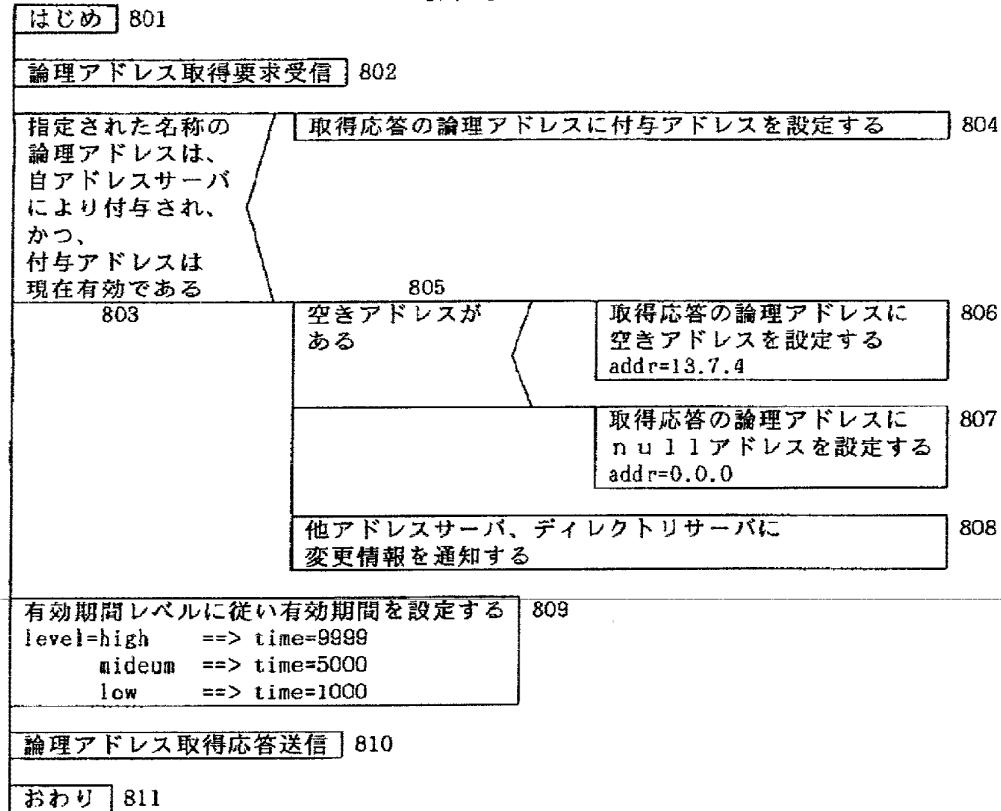
【図7】

【図7】



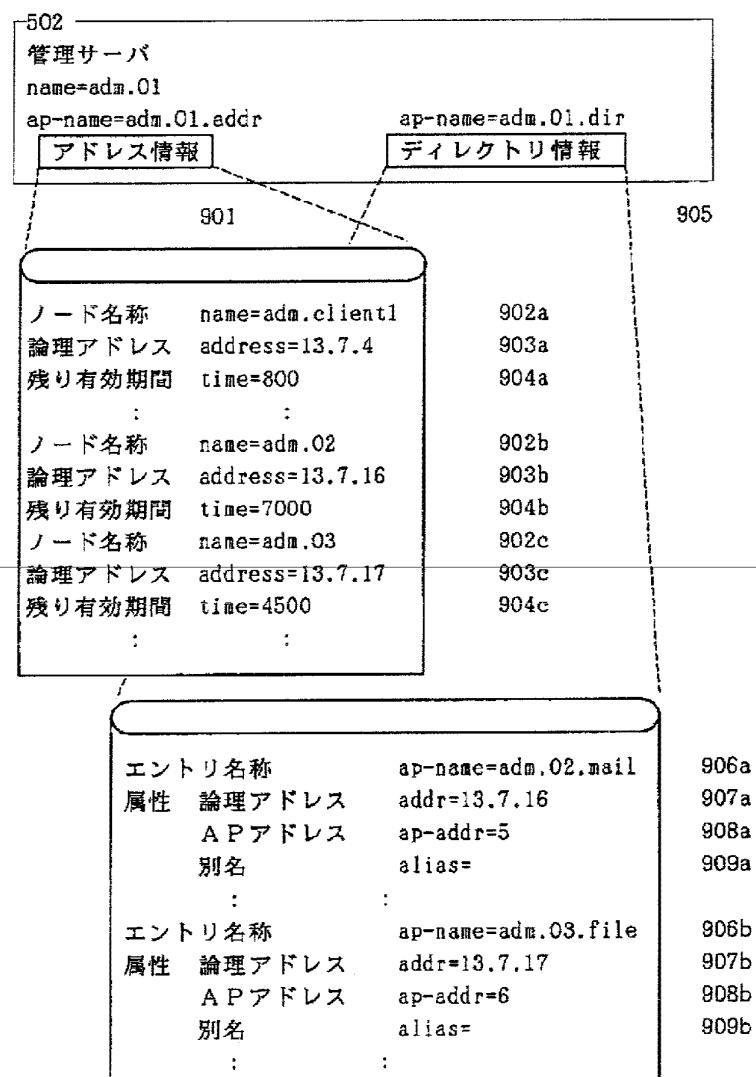
【図8】

【図8】

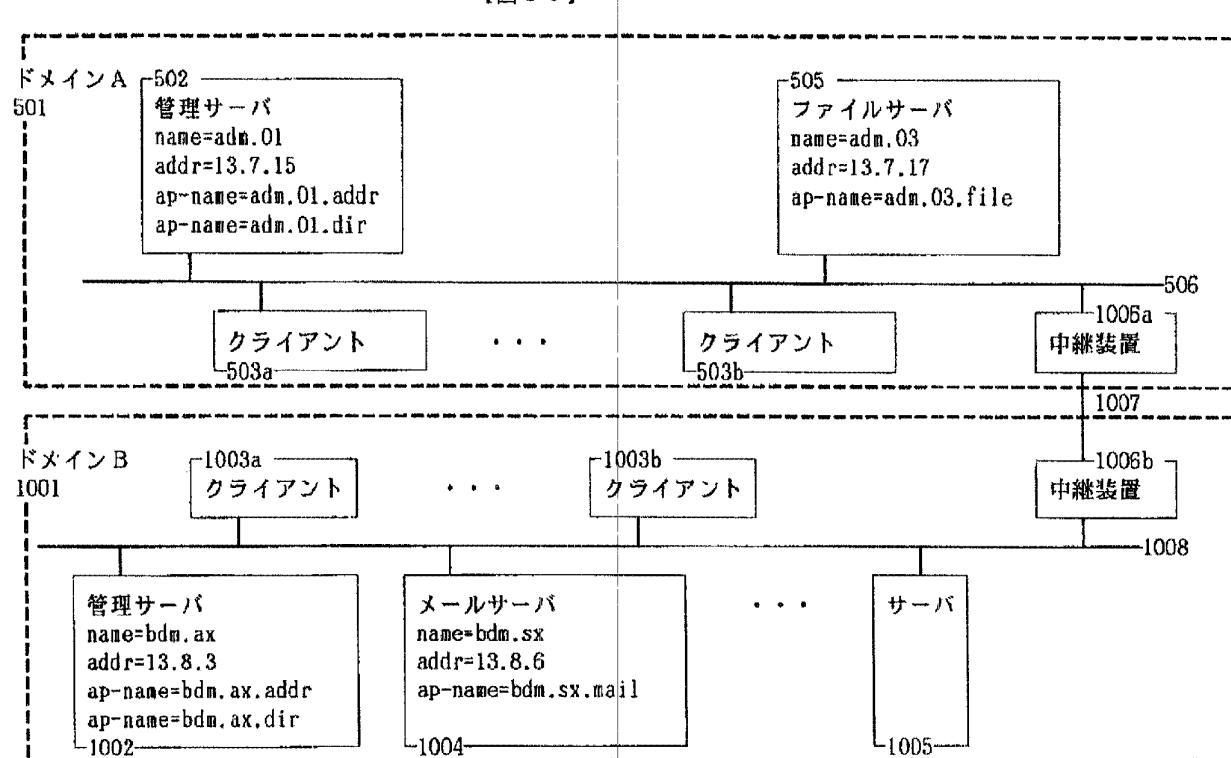


【図9】

【図9】



【図10】



【図11】

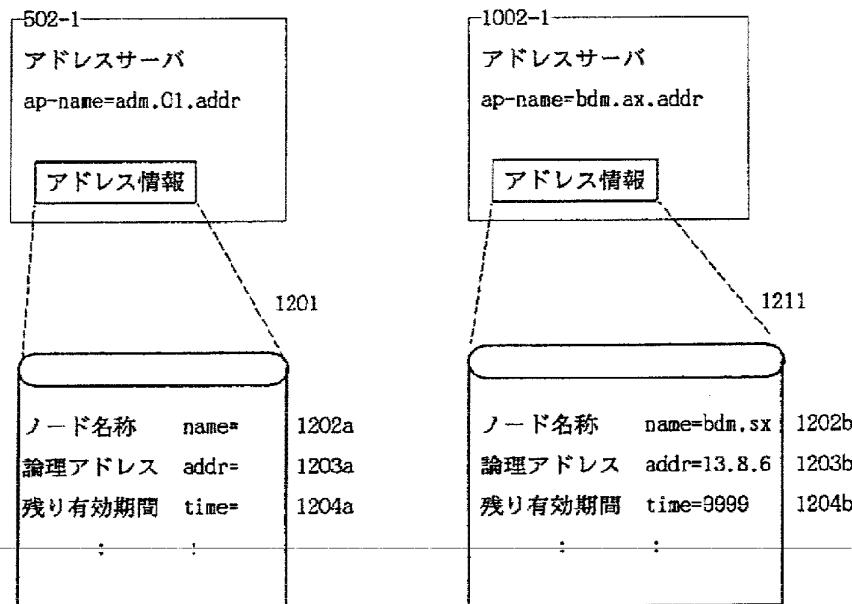
変更情報 1108

LI	タイプ	宛先サーバ名称	送信元サーバ名称	ノード名称	履歴情報	論理アドレス
1101	UPDATE	adm.01.addr	bdm.ax.addr	bdm.sx	adm.02	13.8.6

【図11】

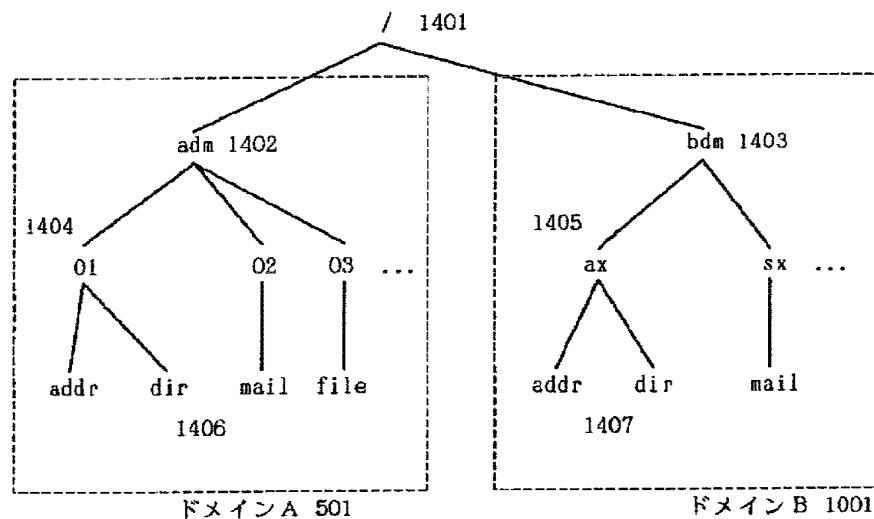
【図12】

【図12】



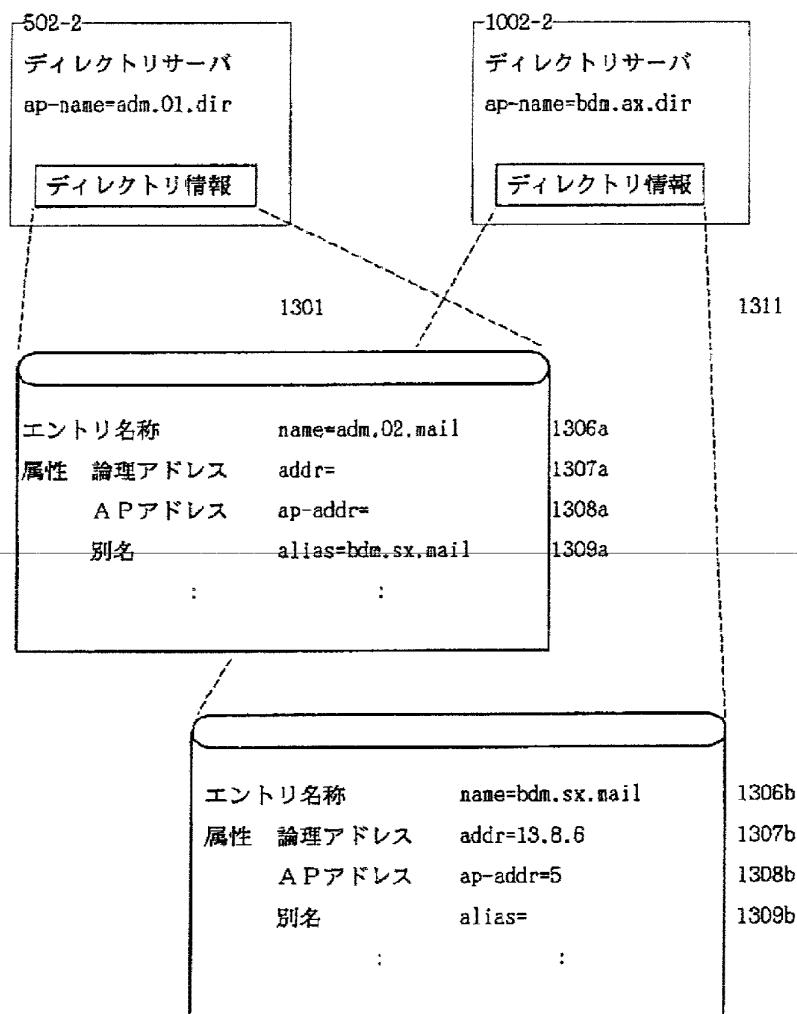
【図14】

【図14】



【図13】

【図13】



MULTIPLEX TRANSMISSION SYSTEM OF VOICE AND DATA

Patent Number: JP59044140
Publication date: 1984-03-12
Inventor(s): KIMURA JIYUNICHI; others: 01
Applicant(s): NIPPON DENKI KK
Requested Patent: JP59044140
Application Number: JP19820154915 19820906
Priority Number(s):
IPC Classification: H04J6/02 ; H04M11/06
EC Classification:
Equivalents:

Abstract

PURPOSE: To improve transmission efficiency by preventing transmitted data from being erased when data information is transmitted by mixing said information with voice information during the transmission at the multiplex transmission of voice data.

CONSTITUTION: Voice packet information is stored in a voice information memory part 61 of a voice transmission queuing part 6 by a voice receiving channel 11 in the terminating order, and data packet information is stored in a data information memory part 71 of a data transmission queuing part 7 by a data receiving channel 12 in the terminating order. A status control transmission part 29 is a main part of a communication control transmission part 22 and consists of a transmission packet memory part 291 storing transmission information, a frame check code formation part 293 and an interruption code adding part 292 preparing the addition of an interruption display code to the interrupted data packet information as an interruption information and the addition of an information completion code. A communication control receiving part 25 includes a discrimination part 252 to discriminate and store the interruption code.

Data supplied from the esp@cenet database - I2

⑨ 日本国特許庁 (JP) ⑩ 特許出願公開
⑪ 公開特許公報 (A) 昭59-44140

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H 04 J 6/02
H 04 M 11/06

識別記号

室内整理番号
6914-5K
A 7345-5K

⑫ 公開 昭和59年(1984)3月12日
発明の数 1
審査請求 有

(全 11 頁)

⑬ 音声・データ多重化伝送方式

特許 願 昭57-154915
出願 昭57(1982)9月6日
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明細書

1. 発明の名稱

音声・データ多重化伝送方式

2. 特許請求の範囲

(1) 本一眼下に記載で伝送中のデータ情報を音声情報を混込させ時分割多重化して伝送する音声・データ多重化伝送方式において、前記1つのフレームでデータ情報を伝送中に音声情報を組み合わせたときに発生したとき伝送済みのデータ情報の後に中断情報などを加えてめぐらしく第2のフレームを形成し、前記第1つのフレームの伝送終了後記録データ情報を取るフレームに記録し、伝送終了のあてに記録音声情報をもつてのフレームに記録して前記第2のフレームに接続して伝送する方法。

述することを特徴とする音声・データ多重化伝送方式。

(2) フレーム分割するとき送信側データ情報に焼けで中継情報を、またフレーム分割された最終データ情報には焼けで完了情報を付加し、中断されたデータ情報ノミリに中断情報を書き込む到達情報に加筆枠を送信側に備えることを特徴とする音声・データ多重化伝送方式。

(3) 受信フレームの最後に前記中断情報を持つデータ情報を並べ、前記完了情報を持つデータ情報の文法でまとめて最終再生する分割情報識別・索引・再生手段を受信側に備えることを特徴とする音声・データ多重化伝送方式。

3. 発明の詳細な説明

本発明は、同一通信路に音声とデータとの情報を混在させて通信を行なう音声・データ多重化伝送方式に関する。

一般に、音声通信とデータ通信とは種々の相違点がある。例えは、データ通信は即時性を重視せず、結果間の伝送遅延を生じても許されるが、列挙形式である音声通信は即時性が厳しく要求され、結果間の遅延を実用上容容えないよう小さくする必要がある。又、トラヒックの点からみると、データ通信はデータの発生がランダムに近い上その大きさは幅内で多様であるのに対し、音声通信は時じ発生がランダムに近くても音声脉冲通信では集中する傾向にあり、しかも音声として送りすべき初期は周期的に発生しその大きさは頗る一元である。

近年、この点に即応的である音声通信とデータ通信とを同一の通信回路に多段化して伝送する複合通信システムが開発されている。

複合の音声・データ多段化伝送方式は、データを送り出すに当たる通信状況が発生すると、通信中のデータが捕捉され音声が遮断された後、再び最初から新たにデータが送信される。

次に音声・データ多段化伝送方式についてバ

ケット通信を例とし第1及び第2回を参照して説明する。第1回は音声の音声・データ多段化伝送方式の一構成例を示すプロック図、また第2回は第1回において同一通信回路に音声パケット情報とデータパケット情報を多段化伝送するときの時間関係を示すタイムチャートである。

第1回において、通信回路1を構成する伝送機及び受信機にそれぞれ回線伝信部3及び回線受信部4がありパケット情報を順次送り替するヘルス1は送信回路2は、音声送信チャンネル1-1からの音声パケット情報をデータ通信チャンネル1-2からのデータパケット情報を交換回路3を経て通信回路1へ送信する。回線受信部4から情報を受けた通信制御装置5は音声パケット情報を音声受信チャンネル1-3へ、又データパケット情報をデータ受信チャンネル1-4へ送る。通信制御装置2は音声送信チャンネル1-1からの音声パケット情報を封送端に並ぶ音声用送信機待行列6と、データパケット情報を封送端に並ぶデータ用送信機待行列7と、音声用送信機待行列6で

各音声パケット情報を引抜し、この待ちがなくなるまでデータ用送信機待行列7で待つデータパケット情報を引出し次のオクタットが空きを待つが、五音パケット情報が音声用送信機待行列6に入つかることを防ぐためには、データパケット航行が送信回路でもこの進出を禁止し、前記音声パケット航行を待ちがなくなるまで待する音声用送信機待行8と、それするパケット情報を受け取るためにアドレス符号A、別種符号C（符号Cは音声のときにない）のそれぞれ1オクタットが付加される。通信回路へは、各フレームの区切りとしてフレーム開始にフラグシーケンス符号Fの1オクタットを第1ビットから前に送信し、次いでアドレス符号A、別種符号C（音声にはない）、パケット情報を始めに、それらのオクタットは第1ビットから並列に送信される。（第2回のフレーム・フレーマット参照）。各オクタットの送信は第8ビットの送信後に送信終了し、次のオクタットの第8ビット送信までの時間内に更に次の送信オクタットの準備をさせる。フレームチェックシーケンス符号FC-Sは、オクタット単位にアドレス符号Aのオクタットから生成多段式によりC-A-C（巡回行性チェック）演算を行って作成し、パケット情報を最後のオクタット送信に統合して送信する。併せてフレーム終結を意味するフラグシーケンス符号Fを送信するが、かくパケット情報をある場合には次のフレームの最初を兼ねるセグメントとなる。

次に第3回及び第4回によりパケット情報を送

ス符号A、別種符号C（符号Cは音声のときにない）のそれぞれ1オクタットが付加される。通信回路へは、各フレームの区切りとしてフレーム開始にフラグシーケンス符号Fの1オクタットを第1ビットから前に送信し、次いでアドレス符号A、別種符号C（音声にはない）、パケット情報を始めに、それらのオクタットは第1ビットから並列に送信される。（第2回のフレーム・フレーマット参照）。各オクタットの送信は第8ビットの送信後に送信終了し、次のオクタットの第8ビット送信までの時間内に更に次の送信オクタットの準備をさせる。フレームチェックシーケンス符号FC-Sは、オクタット単位にアドレス符号Aのオクタットから生成多段式によりC-A-C（巡回行性チェック）演算を行って作成し、パケット情報を最後のオクタット送信に統合して送信する。併せてフレーム終結を意味するフラグシーケンス符号Fを送信するが、かくパケット情報をある場合には次のフレームの最初を兼ねるセグメントとなる。

次に第3回及び第4回によりパケット情報を送

特開昭59- 44140(3)

状態を説明する。第3段は送信要求あるパケット情報を受信、記憶してから送信するまでの手順を示すフローティート、又第4段はパケット情報のフレーム取扱手順を示すフローティートである。サブデータパケット情報D1の例で説明する。動作ステップS0はデータパケット情報D1を状態初期送信既りに記憶し、フラグシーケンス符号Fの送信を示す動作を示す。動作ステップS1はこの指示による符号Fの送信動作を示す。符号Dの送出が終わると動作ステップS2によりこの一オクタット(8ビット)の送信終了をする。動作ステップS1.9は、前に終き今回のパケット情報D1の既述をするとき、動作ステップS1の送信既成の初期のパケット情報を除去し、今回のデータパケット情報D1を記憶する動作である。前記動作ステップS1.9を引き締めから引出されたアドレス符号Aが動作ステップS3で送信される。動作ステップS4は送信中の符号Aに対するCRC演算を行う動作である。動作ステップS5は符号Aの一オクタット及びこれに続く8ビット完の一

において符号FCSの二オクタット分を送信する動作ステップS1.1がある。動作ステップS1.2は動作ステップS1.0の一オクタット送信既成動作を示す。動作ステップS1.3は符号FCSの前半の一オクタットに対する送信既成動作を示し、動作ステップS1.4は符号FCS送信に続くフラグシーケンス符号Dの送信動作を示す。動作ステップS1.5で符号Fの一オクタットが送信され、動作ステップS1.6が符号FCSの後半の一オクタットに対する送信既成することにより、動作ステップS1.7で音声パケット情報符号Vの有無及びデータパケット情報符号Dの有無をチェックする。動作ステップS1.8は送出引データパケット情報D1をメモリから消去する動作を示し、動作ステップS1.9は記憶している符号Aはデータパケット情報D1が既述を示す動作を示す。音声パケット情報の送信も上述同様の動作手順である。

データパケット情報D1の送信中に音声パケット情報Vの送信要求が発生したときは、各オク

タット送信終了後にそれぞれ送信終了する動作を示す。動作ステップS6は動作ステップS4において順次送信する一オクタット分を示す。動作ステップS7は動作ステップS5に引き締め、符号Aの一オクタットから送信中のオクタットまでに対しCRC演算し結果を記憶する動作を示す。動作ステップS8は動作ステップS7に引き締めて、音声パケット情報の符号Vの有無(音声パケット情報送信の場合には省略される)及び符号Dの有無ときは動作ステップS6の次に送信すべきオクタットの有無を調べる動作を示す。(読み出しのデータ分割の有無は本発明による動作のため後で説明する。)動作ステップS9は、符号A、未送信オクタット既に終しのとき、動作ステップ7で記憶した既算結果をフレームチェックシーケンス符号FCSとして送信する指示の動作を示す。第4段において、動作ステップS10で一オクタット送信既成に次に送るべきオクタットが記憶されていないことから動作ステップS9が符号FCSの送信を指示するため、動作ステップS10

テット送信後の動作ステップS5(送信確認)に続く動作ステップS8でチェックして音声パケット情報の符号Vを知る。既来の送信制御送信部2は動作ステップS8で音声パケット情報Vの符号Vを知ると直ちに7ビット以上連続して'1'を送る放棄信号を送信して、これまで受信した途中までのデータパケット情報D1を状態制御送信部5の記憶から削除し、検査セドの音声パケット情報D1を新たに記憶してゆく。音声パケット情報が前記測定の動作手順で送信終了すると、先に中断したデータパケット情報D1が再び状態制御送信部5に記憶され改めて始めから送信される。データ用送信待列部3のデータパケット情報の記憶は、次順に前送信既成へ転送した分がすべて送信しつつ進捗され、データ用送信待行列部3内の分を最終が一つ残る。

一方受信手順は第5段及び第6段のフレーム受信型を示すフローティートにより説明する。まずフラグシーケンス符号Dの一オクタット分を約1ビットから約8ビットまで動作ステップS3.0

で受信する。動作ステップ S 3-1 は符号 F に続くアクシス符号 A の一オクテット受信動作であり、動作ステップ S 3-2 はフレーム開始の符号 F の識別動作である。動作ステップ S 3-1 で受信した符号は動作ステップ S 3-4 で符号 A と識別され、動作ステップ S 3-5 で受信オクテットが符号 F でないと判断されると動作ステップ S 3-7 で今後受信する情報が音声かデータかを区別する。動作ステップ S 3-3 は符号 A に続くオクテットの受信動作で、データパケット移動受信の場合は制符 C が受信される。また動作ステップ S 3-6 では符号 A 以後の受信オクテットに対し定められた生成多拡張式による CRC 検査を行う。各オクテット受信後は、動作ステップ S 3-9 で符号識別し、動作ステップ S 4-0 で符号 F でないと判断したときは動作ステップ S 4-1 で前記同様 CRC 検査を行う。(動作ステップ S 4-2 は本発明のために追加される動作で音で解説する。) 第 6 回において、動作ステップ S 4-4, S 4-5, S 4-6 は前記第 5 回における動作ステップ S 3-9, S 4-0, S 4-1 と同じである。時

作ステップ S 4-3 でフレーム終端を認識するとアクシス符号 F を受信するとき、動作ステップ S 4-9 は符号 F を識別し、動作ステップ S 5-0 で符号 F の確認後、動作ステップ S 5-1 は符号 F の直前に受信したオクテットまでの CRC 演算結果をビットパターンチェックする動作をする。音声情報受信の場合に、このビットパターンチェックの良否に拘らず、動作ステップ S 5-2 でこの音声情報を次の段階へ転送するが、データ情報の場合、チェック結果が不良のときは動作ステップ S 5-3 により追従側に再送要求動作し、チェック結果が良いときに動作ステップ S 5-7 により音声の場合はと同様、次の段階へこのデータ情報を転送する。(動作ステップ S 5-4, S 5-5, S 5-6 は本発明のために追加される動作であり、音で説明する。) 図面に示していないが、受信ビットが既接して二つ「1」のときは放送信号を除外し、これまでをなし通信側が受信側に記憶したものは復位して除去し、次の受信はフレーム開始の符号 F から読みて受信が始まる。途中まで転送し、音声パケット

(図版 V) に記述されたデータパケット情報①) は音声用送信種別列部 6 で持つ音声パケット情報のすべてを追跡した後に呼び最初から送信される。この場合、記憶されたデータパケット情報①) の転送時間分だけ通信回路 1 の伝送時間が猶豫となり、音声が多い場合は殆んどデータの伝送ができない。そのためのすべてを猶豫とする可能性が大きい。

どのように統合の音声・データ多拡張化伝送方式は、データ情報を通信中に音声情報を割り切れて送信するときそれまで送信側のデータが確保されるとして、記憶されたデータ情報を分の伝送時間が猶豫となる通信回路の伝送効率が低下するという欠点がある。

本発明の目的上記欠点を除去し、音声とデータを多拡張化伝送する通信回路の伝送効率を改善できるもの、データ多拡張化伝送方式を提供することにある。

本発明による前記、データ多拡張化伝送方式は、同一回路回路で通信中の各データ情報を音声情報を

割りきせ時分割多拡張化して伝送する音声・データ多拡張化伝送方式において、第 1 のフレームでデータ情報を転送中に音声情報を転送要求が発生したとき転送側のデータ信号の中に中断情報を加えてかくし第 2 のフレームを形成し、前記第 1 のフレームの未転送データ情報を第 3 のフレームに形成し、転送要求のあつた前記音声情報を第 4 のフレームに形成して前記第 2 のフレームに接けて転送し、前記第 3 のフレームは音声セグメント情報のすべてを処理した後に転送し、且つこの第 3 のフレームが前記第 1 のフレームにおいて分割された前記データ情報をあるときはこのままデータ情報を分に完了情報を加え最終フレームとして転送し、この最後フレームの転送後、それまで分割してされたデータ情報を復元再生することを解放とし、又送信側にはフレーム分割するとき送信側データ情報を抜けて中断情報を、又フレーム分割された最終データ情報には抜けて完了情報を付加し、中断されたデータ情報をメモリに中断情報を書き込む前記転送側に平順を備え、又受信側には受信フレー

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ムの最後に前記中断情報を持つデータ情報を並べ、前記完了情報を持つデータ情報の受信でまとめて映像再生する分割情報識別・蓄積・再生手段を備えることを特徴とする。』

次に本発明について第7回乃至第10回、更に第3回乃至第6回のフローチャートを加え、各照して説明する。第7回は本発明の音声・データ多量化伝送方式の一実例例を示すプロシードル。第8回は第7回において同一通信回路に音声パケット情報とデータパケット情報を混在させて多量化伝送するときの時間関係を示すタイムチャート。第9回は第7回における各部メモリ部及び転送フレーム等のフォーマットを示すフォーマット概要図。また第3回乃至第6回及び第10回は第7回における送信・受信動作を説明するフローチャートである。第7回において、音声パケット情報は音声受信チャンネル11により音声用送信用行列部6の音声情報メモリ部61に搬送され、データパケット情報はデータ受信チャンネル12によりデータ用送信用行列部7のデータ情報メモリ

部25に搬送され。状態制御送信部22は送信パケットメモリ部291と、アドレス符号Aのオクテットから送信段数のオクテットまでのCRC計算をフレームの最後に付加するフレームチェックシーケンス符号FCSを作成するとフレームチェック符号作成成功293と、当該されたデータパケット情報に中断情報として前述参考IN Tを、又完了情報として所定完了符号FINの付加を検出し、本発明のために行なわれる割込み号付加部292とを含む。送信制御受信部25は受信パケットを受信する受信パケットメモリ部251と、分割されたデータ情報を接続するデータ情報メモリ部254に配信して最終的に分割まで得たせる分割データ変換用行列部253と、最終情報の割り当て全分割情報を一つに復元生成する再生部255と、本発明のために必要な割込符号の識別・記憶する割込部252とを含む。第7回において、特に説明のないものに第1回と同じ機能であり同一符号が付与されている。第8

回は第7回において、同一通信回路に音声パケット情報とデータパケット情報を多量化伝送するときの時間関係を示すタイムチャートである。送信側からデータパケット情報D1, D2を送信中に音声パケット情報V1, V2の送信要求がありデータパケット情報D11, D12, D21, D22に分割されて送信され、同時に伸び再びされる時間関係が示されている。送信側のパケット情報V1, V2, V3などがD11, D12, D21, D22にそれぞれ送信用行列部61及び71に記憶され、送信回路1上に送信されるためまず状態制御送信部22の送信パケットメモリ部291へ記憶されてアドレス符号A, 制御符号C (データパケットの場合はのみ) が付加され、パケット情報を送信終了後フレームチェックシーケンス符号FCSが作成され、次に音声送信部3でフレームチェックシーケンス符号FCSが付加され、更に音声送信部3でフラグノーカンクル符号Pを付加し、送信回路1には一オクタニットの符号P, 参考A, 参考Cに続いてパケット情報が更に付いてニオクタニットの符号FCS, 一オクタニットの符号Pで一フレー

ムを終結する。データパケット情報が分割されたときはパケット情報と符号FCSとの間にあらわすIN T, FINが一オクテット挿入される。次に第9回によつてメモリ部のフォーマット及びパケット情報に符号が付加する状況を説明する。第9回(a), (b), (c), (d), (e)及び(f)はそれぞれ第7回における音声情報メモリ部61, データ情報メモリ部71, 送信パケットメモリ部291, 送信フレーム211, 受信パケットメモリ部251及び分割データ情報メモリ部254の符号取扱位置を示すフォーマット概要図で、横一組が8ビット構成(一オクテット)で送信情報の単位となる。各メモリの上側はメモリ情報に対するメモリ制御版でその下から転送された符号、情報を書き込まれる。第9回(c)の符号A, Cの般はパケット送信のフレーム構成として開けたアドレス符号A, 制御符号C(音声の場合はこの符号Cはない)が記述される。第9回(d)は前信回路1上を転送される順序を示すフォーマットで、一枚が一オクテットを意味しフレームチェックシーケンス符号FCSはニオクタ

ント分 16 ビットで構成されることを示す。第 9 図(6)では分割された中断情報が転送情報の内の割り込みエリヤに付加され再生のときに活用される。

次に第 3 図、第 4 図及び第 10 図を参照して送信手順を説明する。第 3 図は送信要求あるパケット情報を受信メモリしてから送信する手順を示すフローチャート、第 4 図はパケット情報送信のフレーム終了手順を示すフローチャート、又第 10 図にはパケット情報の転送結果があつたときの転送中断および送信完了を示すフローチャートである。第 3 図及び第 4 図の一覧転送手順は前に述べたので省略し、本発明に関するデータパケット情報の分割転送について説明する。データパケット情報 D 1 の送出中に、一オクテットの情報転送(動作ステップ S 6)前の送信確認(動作ステップ S 5)に付き、アドレス符号 A から送信中のオクテットまで CRC 成算(動作ステップ S 7)と共に動作ステップ S 8 がある。動作ステップ S 8 で初期転送信号 291 が音声用送信信号列記録 6 の音声情報を、もし記録 6 に音声記憶の存在を確認したと

き、音声はデータに優先転送を必要とするので、第 10 図にかける動作ステップ S 21 でデータパケット情報 D 1 の転送中断を復帰し、判定表示符号 I NT を割り込み付加記録 291 から抽出し転送開始する。この時記録 9 回(6)の一オクテット 2915 を送出中とし、この動作ステップ S 20 が終ると、一方は引抜いて前記符号 I NT を転送する動作ステップ S 23、他方は送信確認の動作ステップ S 22 を経て、送信中の符号 I NT まで CRC 成算及びフレームチェックシーケンス符号 FCS 送信指示(動作ステップ S 25)と共にデータパケット情報 D 1 の中断位置(第 9 図(6)の符号 2915)をデータパケットメモリ記録 7 1 のメモリ割り出し 7 1 (第 9 図(6)に示す)に移込む(動作ステップ S 24)。一オクテットの前記符号 I NT 転送(動作ステップ S 23)が終ると送信確認(動作ステップ S 12)、二オクテットの前記符号 FCS 送信(動作ステップ S 11)となり、前に記載した記録 4 図のフレーム終結手順となる。動作ステップ S 17 で割り込み音声パケット情報の検出があるので、此

動作ステップ S 1 9 で送信パケットメモリ記録 291 のデータパケット情報 D 1 2 を消去した後、動作ステップ S 1 9 で初めて音声情報メモリ記録 6 1 から音声パケット情報 D 1 1 を送信パケットメモリ記録 291 へはいする。記録 3 図に示す、音声パケット情報 D 1 1 は動作ステップ S 1 9 で配達されているので、フレーム転送開始の動作ステップ S 1 でフラグソーケンス符号 F の一オクテット転送から前述の一連のパケット情報の転送中断(第 3 図)とフレーム終結手順(第 4 図)によっても記述される。音声パケット情報 D 1 1 の転送完了のとき動作ステップ S 1 7 では最初表示のデータパケット情報 D 1 2 がつづけて記録 6 1 に記録 S 1 9 でデータパケットメモリ記録 7 1 から送信パケットメモリ記録 291 へ移動の手順があるが動作ステップ S 2 4 (記録 10 2) でも途中断のメモリ記録 7 1 が移込まれているのでその後の移動は次の部分のデータパケット情報 D 1 2 について、第 9 図(6)においては記録 291 6 からが記述される。この構成な送信はステップ S 1 9 によりフラグソーケンス符号 F の一オクテットの転送

(第 3 図動作ステップ S 1)においてアドレス符号 A と残りのデータパケット情報 D 1 2 が第 3 図の転送手順に従つて転送され動作ステップ S 8 で音声パケット情報が無いうえ、転送すべき情報も無ると、本実施例ではデータパケット情報の分割のあつたものに対しては付加完了符号 END 1 N を抽出し転送開始する第 10 図の動作ステップ S 2 6 へ、分割のなかつたものは非分割表示符号 N 1 N の抽出とは送車側との動作ステップ S 2 8 へ進む。動作ステップ S 2 0 の一オクテット情報の転送に付き、一方では準備された符号 F 1 N 又は T 1 N の転送動作ステップ S 2 7 又は S 2 9 、他方では記録の読みは動作ステップ S 2 2 及び前記 D 1 C S の作が、送出の動作ステップ S 2 5 以下第 4 図のフレーム終結手順に行く。

次に受信側の手順を記述するが記述する。第 5 図において、動作ステップ S 3 1 でアドレス符号 A を受信した結果、動作ステップ S 3 7 で受信パケット情報がデータと判別され、動作ステッ

PS 3.3で符号Aに続く一オクタットの受信以後各オクタット毎の動作ステップS39, S40で受信符号がINT, FIN, NINの何れかを記憶したとき、この符号を記憶するがニオクタットの符号FCS に行く一オクタットの符号Fを識別するまでこれらの符号INT, FIN, NINは利用できないので、三オクタットにわたるメモリが作動識別部252に必要となる。このため、動作ステップS42は三オクタット毎に符号INT, FIN又はNINの記憶を焼き次第でここで受信したオクタットの符号を記憶する動作となる。フレーム最初の符号Fを動作シーケンスS50で読みし、フレームチェックシーケンス符号FCSまでのCRC計算により既定のビットパターンチェックがOKの場合は動作ステップS54の判断により、符号INTのときに動作ステップS55で受信したデータパケット情報を分離データ受信行列部253に順次記録し、符号F1トのときに動作ステップS56で受信データパケット情報を分離データ受信行列部253に記録した後、情報再生部255にす

候接せず、転送終了符号を付して取り込まれたことを表示してから音声を送信し、残りのデータを送信すると同時に受信列Dにデータ受信のとどまると記憶し、受信された音声を付したフレームのデータの列Dには受信データ情報を追加し完了荷物の付されたフレームのデータ情報をてまとめて一つのデータに抽出する機能が付加されている。この機能は従来のデータ伝輸のフレーム化が助ける仕事機械のフレーム間隔以上に長くできなかったことも解消する。

以上の説明したように本発明によって、音声とデータとが多道化伝送される通信面版にかける仕事効率を引ききできるところが本発明の特徴である。

4. 図面の簡単な説明

第1図は音声・データ多道化伝送方式の一実施例を示すブロック図、第2図は第1図において同一処理回路に着用パケット転送とデータパケット情報を多道化伝送するときの時間関係を示すタイムチャート、第3図は本発明の音声・データ多道化伝送方式の一実施例を示すブロック図、第4図は第3図における各メモリ部及び転送フレームのフーマットを示すフーマット配置図、第10図は第3図に示す本発明により追加される記述情報付加に関する動作手順を示すフローチャートである。

1 ……通信回数、6 ……音声転送は行行列、7 ……データ転送情報行列数、2 2 ……通信制御転送数、2 5 ……通信制御空行数、2 9 ……状態

べての記憶を取出して順序通り連結供給しデータ受信チャンネル14へ転送し、又符号NINのときは動作ステップS57で固定位臵1から受信して記憶した受信パケットメモリ部251からそれをデータ受信チャンネル14へ転送する。各々パケット情報によって分断されたデータパケット情報は同一通信回路に他のデータパケット情報の組みをして転送されるので記述表示符号INTにより分割データ受信行列部253に順次記憶せしめ完了符号D1Nによりデータパケット情報D11, D12のみを通過削除すれば再び再生できる。なお、第7図に示したブロックの回路はいずれも一般的技術により簡単に実現できるものである。

上記実施例では各種メモリ部及び制御部が分散されているが、伝送端局あるいは受信端局が出来る共通バスで結ばれたレジスタ群及び中央处理器部により本実施の機能を実現できる。

本発明の音声・データ多道化伝送方式はデータ伝送中に音声送信装置があっても送信側データを

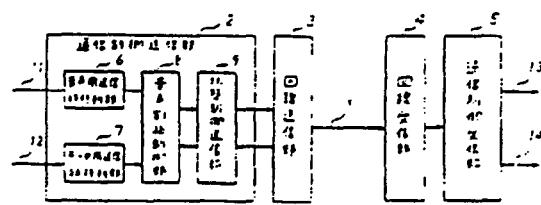
データ多道化伝送方式の一実施例における転送所側パケット情報を送信メモリに記憶してからの送信手順を示すフローチャート、第4図は第3図に様くパケット情報転送のフレーム終始手順を示すフローチャート、第5図は第3図の送信手順によつて送信されたパケット情報の受信手順を示すフローチャート、第6図は第5図に様くパケット情報を転送フレームの終始受信手順を示すフローチャート、第7図は本発明の音声・データ多道化伝送方式の一実施例を示すブロック図、第8図は第7図において同一通信回路に音声パケット転送とデータパケット情報を多道化伝送するときの時間関係を示すタイムチャート、第9図は第7図における各メモリ部及び転送フレームのフーマットを示すフーマット配置図、第10図は第3図に示す本発明により追加される記述情報付加に関する動作手順を示すフローチャートである。

1 ……通信回数、6 ……音声転送は行行列、7 ……データ転送情報行列数、2 2 ……通信制御転送数、2 5 ……通信制御空行数、2 9 ……状態

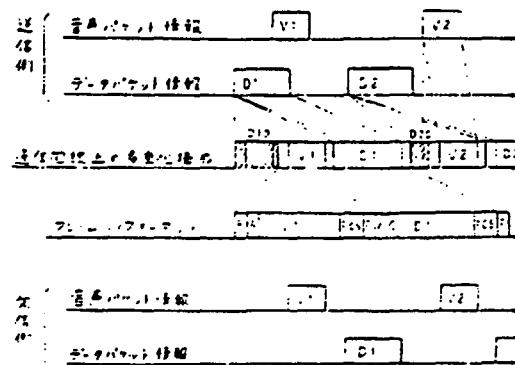
割り込み部、251 ……受信パケットメモリ部、
 252 ……割り込み別部、253 ……分割データ受
 信行列部、255 ……割り込み再生部、291 ……
 受信パケットメモリ部、292 ……割込み符号加
 差（割込み符号付加手段）、293 ……フレームテ
 ズノクソーケンス符号作成部。

代表人：井端士 内原 勇

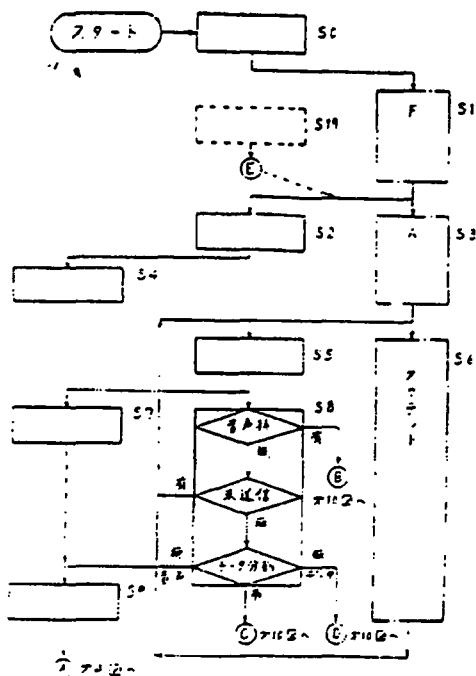
第1回



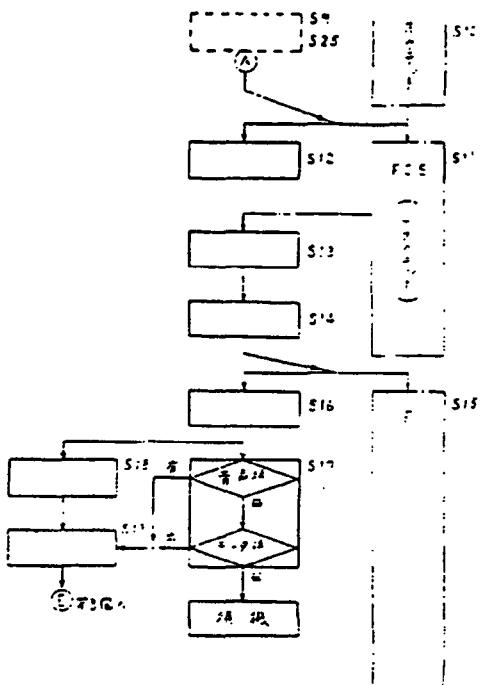
第2回



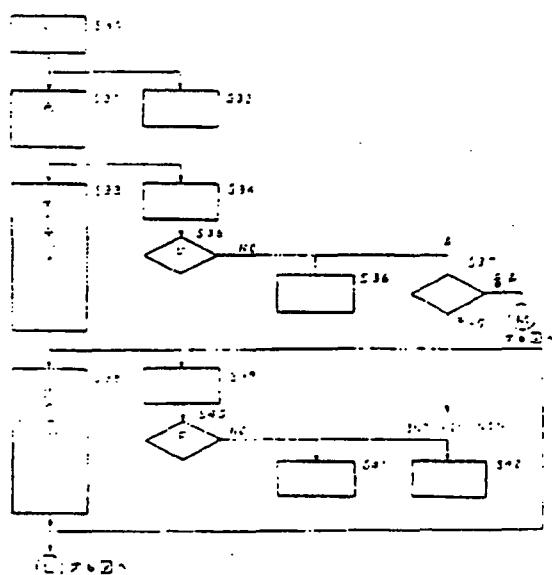
第3回



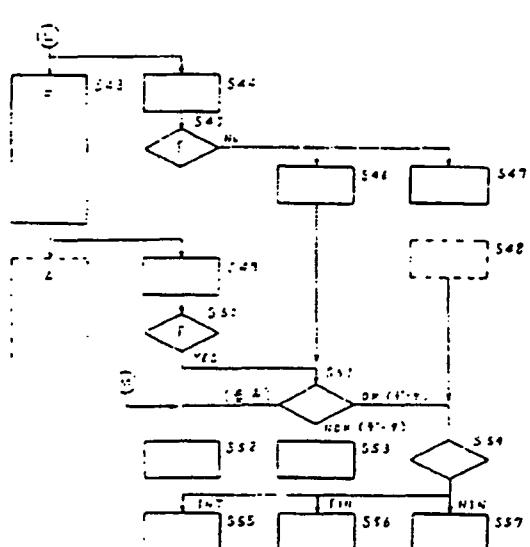
第4回



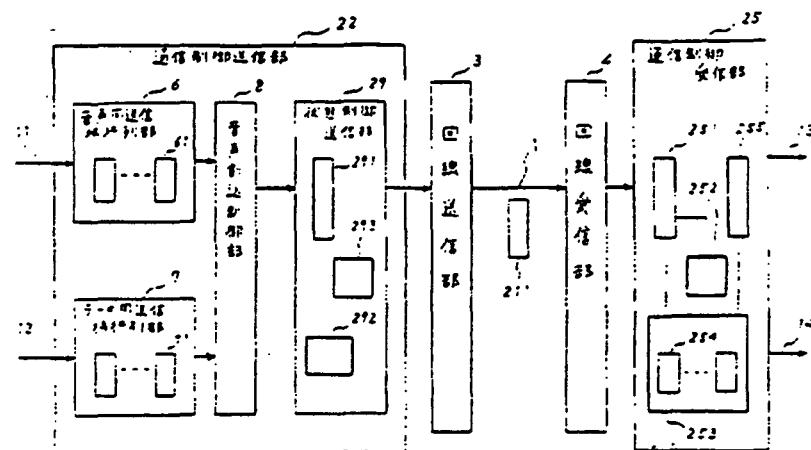
第5回



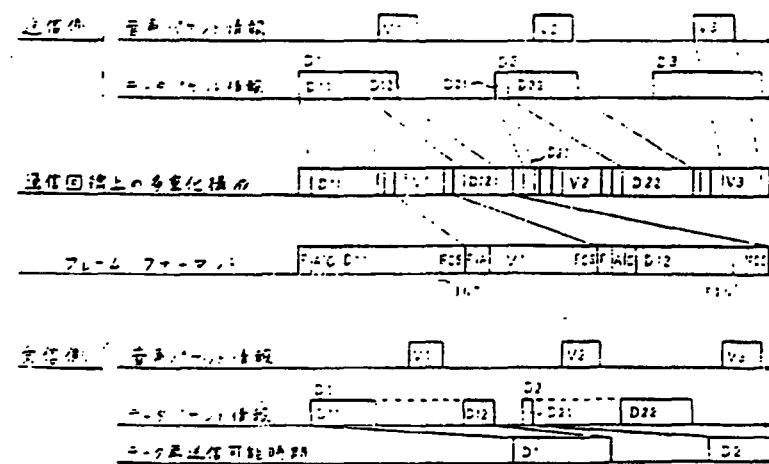
第6回



第 7 図

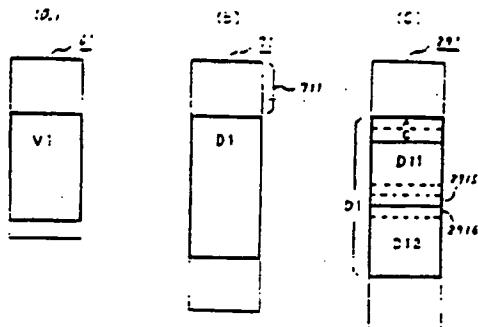


第 8 図

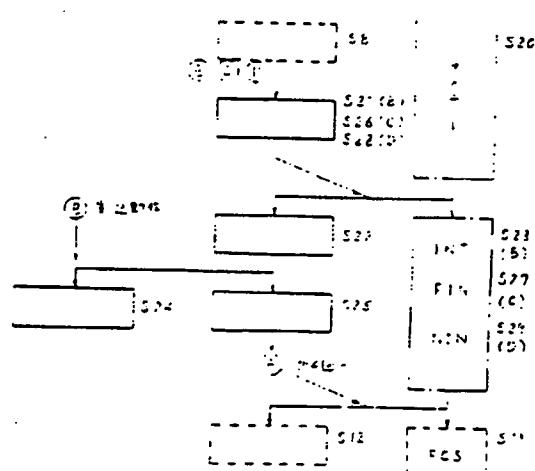


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三



第 10 図



VOICE/DATA MULTIPLEXING TRANSMISSION METHODS
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SPECIFICATION

1. Title of the Invention:

Voice/data Multiplexing Transmission Methods

2. Claim:

- (1) Voice/data multiplexing transmission methods, which are characterized by the fact that in the voice/data multiplexing transmission method in which data information being transmitted using the same communications line, is interrupted by voice information to proceed with time sharing multiplexing to transmit the data information, when a request is made to transmit voice information while the data information is being transmitted in the first frame, an interrupt information is added after the data information which has been transmitted to form a new second frame; a non-transmitted data information in the aforementioned first frame forms a third frame; the aforementioned voice information requested to be transmitted forms a fourth frame which is transmitted after the aforementioned second frame; the aforementioned third frame is transmitted after the queuing voice information is totally transmitted; if the third frame is the final data information divided in the aforementioned first frame, a completion information is added after the final data information to form a last frame to be transmitted.
- (2) Voice/data multiplexing transmission methods as described in Claim (1) in which when divided by frames, an interrupt information is added following the data information which has been transmitted, and a completion information is added following the last data information which has been divided, and a means to add an interrupt information is equipped at the sender side

to write an interrupt information in the data information memory which has been interrupted.

- (3) Voice/data multiplexing transmission methods as described in Claim (1) in which a means of identifying/accumulating/reproducing the divided information is equipped at the receiver side to line up the data information queuing the aforementioned interrupt information at the end of the frame received and edit and reproduce when the data information queuing the aforementioned completion information is received.

3. Detailed Description of the Invention:

This invention concerns voice/data multiplexing transmission methods to perform communications by mixing voice and data information using the same communications line.

In general, there are many differences between voice communications and data communications. For example, real time responses are not important in data communications so that the occurrence of delays in transfer between terminals is allowed.

On the other hand, voice communications in a conversational style strictly requires real time responses so that delays between terminals must be minimized to have practically no harmful effects. From the standpoint of traffic, data occur almost randomly in data communications and the lengths of data are diverse within the limits. Although calls in voice communications occur at random, voice, namely transfer information tends to be concentrated and the information to be transmitted as voice occurs periodically and the lengths are short and constant.

Recently, a complex communications system is being developed to be able to transmit both voice communications and data communications having different characteristics by multiplexing using the same communications line.

In the conventional voice/data multiplexing transmission systems, the data being transmitted are cancelled when a voice transmission request occurs during data transmission to proceed with voice transmission and the aforementioned data are then transmitted again from the beginning.

The conventional voice/data multiplexing transmission methods will be explained using packet communications as an example by referring to Figures 1 and 2. Figure 1 is a block diagram showing an example configuration of the conventional voice/data multiplexing transmission method. Figure 2 is a time chart showing the time relationships when voice packet information and data packet information are multiplexed and transmitted using the same communications line in Figure 1.

In Figure 1, a line transmission unit 3 and a line reception unit 4 are located at the transmission side and at the reception side, respectively, having a communications line 1 in the middle to sequentially transmit the packet information. The communication control transmission unit 2 receives the voice packet information from the voice transmission channel 11 and the data packet information from the data transmission channel 12 and transfers then to the communications line 1 via the line transmission unit 3. The communication control reception unit 5, which receives information from the line reception unit 4, transmits the voice packet information to the voice reception channel 13 and transmits the data packet information to the data reception channel 14. The communication control unit 2 consists of the following units: a voice transmission queue unit 6 which lines up the voice packet information from the voice transmission channel 11 in the order of arrival; a data transmission queue unit 7 which lines up the data packet information in the order of arrival; a voice interrupt control unit 8 which draws the voice packet information queuing in the voice transmission queue unit 6, which draws the data packet information queuing in the data transmission queue unit 7 when all the queuing voice packet information has been withdrawn and transmits them to the status control transmission unit 9 at the next stage, but when it

detects the entrance of the voice packet information to the voice transmission queue unit 6, it stops transmission of the data packet information which has been selected and instead, it transmits the voice packet information until all the queuing information has been exhausted; and a status control transmission unit 9 which receives the packet information to be transmitted and which adds an address code A and a control code C (not added when transmitting the voice packet information) in front of the information and adds a frame check sequence code FCS at the end of each frame.

The format of the packet information transferred will be explained below. The packet to be transferred forms an octet containing 8 bits from the first bit to the eighth bit. For example, the call user data, which is the information containing a maximum of 128 octets is transferred from the transmission channels 11 and 12 to the transmission queue units 6 and 7 and then saved. For transferring from the transmission queue units 6 and 7, one of the information transferred to the status control transmission unit 9 receives an address code A and a control code C (no code C in the case of voice information) so that each one octet is added in front of the information. One octet coded with flag sequence code F is transmitted in the order from the first bit at the beginning of the frame at the division of each frame and subsequently, the address code A, control code C (none in the case of voice information), and the packet information are transmitted in this order in series from the first bit in each octet (See the frame format in Figure 2). The transmission of each octet is checked whenever the eighth bit is transmitted and the next octet to be transmitted is prepared within the time period until the eighth bit of the next octet. A frame check sequence code FCS is created by performing a CRC calculation (cyclic code check) using generating polynomials from the octet of the address code A at each octet unit and transmitted subsequently to the last octet transmission of the packet information. Subsequently, the flag sequence code F implying the frame ending is transmitted. If there is subsequent packet

information, a code F that is also the beginning of the next frame is used.

The transmission procedures for packet information will be explained by referring to Figures 3 and 4. Figure 3 is a flow chart showing the procedures when a request for the packet information to be transmitted is received and saved and until the time when it is transmitted. Figure 4 is a flow chart showing the frame ending procedures for packet information. An example of the data packet information D1 will be explained first. The operational step S0 stores the data packet information D1 in the status control transmission unit 9 and indicates an action to instruct transmission of the flag sequence code F. The operational step S1 shows the transmission operation of the code F under this instruction. When the transmission of the code F is over, the transmission of one octet (8 bits) is checked by the operational step S2. The operational step S19 is an action to delete the previous packet information within the time of transmission of the operational step S1 to store the current data packet information D1. Subsequent to the aforementioned operational step S1, the address code A withdrawn from the memory is transmitted at the operational step S3. The operational step S4 is an action to perform CRC calculation for the code A while being transmitted. The operational step S5 shows an action to check each transmission whenever ending transmission of one octet of the code A and one octet for the following 8 bits. The operational step S6 shows a portion for one octet subsequently transmitted after the operational step S4. The operational step S7 shows an action to perform CRC calculation from the octet of the code A to the octet being transmitted each time after the operational step S5. The operational step S8 is an action following the operational step S5 which is an action to investigate the presence/absence of queuing for voice packet information (omitted in the case of voice packet information transmission) and the presence/absence of the octet to be transmitted next after the operational step S6 if queuing is absent (the presence/absence of data division in Figure 6 is due

to the actions in this invention so that this will be explained later). The operational step S9 is an action of the instruction to transmit the operational results stored at the operational step S7 as the frame check sequence code FCS when both voice queuing and non-transmitted octets are absent. In Figure 4, the operational step S9 instructs the transmission of the code FCS since the octet to be transmitted next while one octet is being transmitted is not stored at the operational step S10 so that the operational step S11 transmits two octet portions for the code FCS after the operational step S10. The operational step S12 is an action to check the transmission of one octet at the operational step S10. The operational step S13 shows an action to check the transmission for the former half of one octet of the code FCS and the operational step S14 shows an action to transmit the flag sequence code F subsequent to the transmission of the code FCS. At the operational step S15, one octet of the code F is transmitted and the operational step S16 checks the transmission for the latter half of the one octet of the code FCS so that the operational step S17 checks the presence/absence of queuing of the voice packet information and the presence/absence of queuing of the data packet information. The operational step S18 shows an action to delete the transmitted data packet information D1 from the memory and the operational step S19 shows an action to store queued voice or data packet information within the status control transmission unit 9. When transmitting the voice packet information, similar operational procedures as mentioned above are followed.

When a transmission request for the voice packet information V1 occurs while the data packet information D1 is being transmitted, the request is checked at the operational step S8 after the operational step S5 (checking the transmission) after transmitting each octet to inform queuing of the voice packet information. The conventional communication control transmission unit 2 transmits abort signals which send more than 7 bits of ``1'' continuously once queuing of the voice packet information V1 is informed at the operational step S8 to delete the data

packet information D1 which has been received in the middle from the status control transmission unit 5 and newly stores the voice packet information V1 being queued. When the transmission of the voice packet information ends through the operational procedures as mentioned above, the data packet information D1 which has been interrupted earlier is stored again in the status control transmission unit 9 from which the data packet information D1 is transmitted from the beginning. The memory of the data packet information in the data transmission queue unit 7 is deleted after the portion transferred to the status control transmission unit 9 is totally transmitted and the order of queuing in the data transmission queue unit 7 is advanced by one position.

The reception procedures will be explained by referring to the flow chart showing the frame reception procedures shown in Figures 5 and 6. One octet portion of the flag sequence code F from the first bit to the eighth bit is initially received at the operational step S30. The operational step S31 is a one-octet reception action for the access code A following the code F and the operational step S32 is a recognition action of the code F for starting the frame. The code received at the operational step S31 is recognized as a code A at the operational step S34 and if the octet received is recognized as not being the code F at the operational step S35, the information which will be received in the future will be distinguished whether they are voice or data information. The operational step S33 is the reception action for the octet following code A and in the case of reception of data packet information, a control code C is received. At the operational step S36, a CRC calculation is carried out using the generating polynomials, which are defined for the octet received after the code A. After receiving each octet, the code is identified at the operational step S39 and if it is recognized as not to be the code F at the operational step S40, the same CRC calculation as mentioned above is carried out at the operational step S41 (the operational step S42 is an additional action added for this invention and will be explained later). In Figure 6, the operational steps S44, S45, and S46 are

the same as operational steps S39, S40, and S41 in Figure 5. When the flag sequence code F implying the frame ending is received at the operational step S43, the code F is identified at the operational step S49 and the code F is checked at the operational step 50. Subsequently, the operational step S51 is an action to check the bit pattern for the CRC calculation results until the octet received immediately before the code F. In the case of receiving the voice information, this voice information is transferred to the next stage at the operational step S52 regardless of the results of this bit pattern checking. In the case of the data information, a resend command is requested to the sender side by the operational step S53 if the result of checking is inadequate. If the result of checking is satisfactory, this data information is transferred to the next stage as in the case of the voice information at the operational step S57 (the operational steps S54, S55, and S56 are the steps added to this invention and will be explained later). If the bits received consist of seven consecutive ``1''s, it implies abort signals so that the contents received and stored in the communications control reception unit 5 are deleted immediately and the next reception starts again from the code F at the beginning of the frame. The data packet information D1 that has been transferred in the middle and interrupted by the voice packet information V1 is transmitted again from the beginning after the voice packet information queuing in the voice transmission queue unit 6 has been totally transmitted. In this case, the transmission time of the communications line 1 is invalidated for the portion of transferring time for the data packet information D10 that has been cancelled so that if the volume of voice information is large, the data are hardly transmitted and there is a high possibility that all the data in the gap become invalid.

According to the conventional voice/data multiplexing transmission method, the data, which is already being transmitted, are cancelled when the voice information interrupts the transmission of data information so that the drawback is that

the transmission time used for the data information cancelled is wasted and the transmission efficiency of the communications line is reduced.

The purpose of this invention is to provide voice/data multiplexing transmission methods, which can improve the transmission efficiency for the communications line, which multiplexes and transmits voice and data information by overcoming the above-mentioned drawbacks.

According to this invention's voice/data multiplexing transmission method, the data information which is being transmitted by the same communications line are interrupted by the voice information, which are transmitted after time sharing multiplexing. This voice/data multiplexing transmission method is characterized as follows. When a transfer of voice information is requested, while the data information is being transferred in the first frame, a second frame is newly formed by adding an interrupt information after the data information which has already been transferred and the non-transferred data information in the aforementioned first frame forms a third frame. The aforementioned voice information, which has been requested to be transferred, forms a fourth frame, which is transferred after the aforementioned second frame. The aforementioned third frame is transferred after the queuing voice information is totally transferred. In this case, if the third frame is the final data information, which has been divided from the aforementioned first frame, completion information is added after this final data information and transferred as a final frame. After the final frame is transferred, the data information, which has been divided and transferred, is restored and reproduced. An interrupt information addition means is equipped at the transmission side so that an interrupt information is added after the transmitted data information when dividing the frame and a completion information is added to the final data information divided from the frame to write the interrupt information in the interrupted data information memory. A divided information identifying/accumulating/reproducing means

is equipped at the receiver side so that the data information having the aforementioned interrupt information is lined up at the end of the reception frame and when the data information having the aforementioned completion information is received, the data information is edited and reproduced.

This invention will be explained by referring to Figures 7 through 10 along with the flow charts shown in Figures 3 through 6. Figure 7 is a block diagram showing an example of this invention's voice/data multiplexing transmission method. Figure 8 is a time chart showing the time relationships when the voice packet information and the data information, which are mixed in the same communications line, are multiplexed and transmitted as in Figure 7. Figure 9 is a format outlined diagram showing various memory units and formats of the transfer frames in Figure 7. Figures 3 through 6 and Figure 10 are flow charts explaining the transmission and reception actions in Figure 7. In Figure 7, the voice packet information is stored in the order of arrival in the voice information memory unit 61 in the voice transmission queue unit 6 by the voice reception channel 11 and the data packet information is stored in the order of arrival in the data information memory unit 71 in the data transmission queue unit 7 by the data reception channel 12. The status control transmission unit 29 contains a transmission packet memory unit 291 which stores the transmission information in the key section of the communication control transmission unit 22; a frame check code creation unit 293 which creates a frame check sequence code FCS which performs a CRC calculation from the octet with the address code A to the octet of the last transmission to be added at the end of the frame; and an interrupt code addition unit 292 added to this invention by providing an interrupt expressing code INT as an interrupt information in the interrupted data packet information and the addition of the information completion code FIN as a completion information. The communication control reception unit 25 contains a reception packet memory 251 to store the reception packet; a divided data reception queue unit 253 which stores the divided data information in the sequentially

divided data information memory unit 254 to queue until the last information arrives, a reproduction unit 255 which restores and reproduces all the divided information into one when the final information arrives; and an identifying unit 252 which identifies and stores the necessary interrupt codes which are needed in this invention. In Figure 7, the symbols, which are not particularly explained, have the same functions as in Figure 1 and the same codes are added. Figure 8 is a time chart showing the time relationships when the voice packet information and the data packet information are multiplexed and transmitted using the same communications line in Figure 7. The transmission of voice packet information V1 and V2 is requested while the data packet information D1 and D2 are transmitted from the transmission side and divided into the data packet information D11, D12, D21 and D22 which are regenerated at the reception side. The packet information V1, V2 and V3 and D1, D2 and D3 at the transmission side are stored respectively in the transmission queue units 61 and 71. Since they are transmitted onto the communications line 1, they are initially transferred to the transmission packet memory unit 291 of the status control transmission unit 29 where the address code A and the control code C (only in the case of data packets) are added. After the end of transmission of the packet information, the frame check sequence code FCS is added in the frame check sequence code creation unit 293, and in addition, a flag sequence code F is added in the line transmission unit 3. One frame ends with one octet code F, code A and code C, packet information, 2 octet coded FCS and one octet code F. When the data packet information is divided, an interrupt codes INT and FIN are inserted between the packet information and the code FCS by one octet. The formats including memory and the statuses when adding codes to the packet information are explained in Figure 9. Figures 9 (a), (b), (c), (d), (e), and (f) are format outlined diagrams showing the storage positions for codes for the units in Figure 7: voice information memory unit 61, data information memory unit 71, transmission packet memory unit 291, transmission frame 211, reception packet memory unit 251, and divided data

information memory unit 254. One horizontal row indicates an 8-bit configuration (one octet), which is the unit, used for checking transmission. The upper side in each memory is a memory control unit for the memory information, and codes and information, which are transferred from the lower side, are written in this side. Specific address code A and control code C (no code C in the case of voice information) in the frame configuration of the packet communication are written in the rows indicated by A and C in Figure 9 (c). Figure 9 (d) is a format showing the order of transfer on the communications line 1. One row means one octet and the frame check sequence code FCS is configured of 16 bits for two octets. Figure 9 (f) is used when reproducing since the divided interrupt information is stored in the control unit area before the transfer information.

The transmission procedures will be explained by referring to Figure 3, Figure 4 and Figure 10. Figure 3 is a flow chart showing the procedures of transmission after the packet information requested for transmission is received and memorized. Figure 4 is a flow chart showing the procedures to end the frames of the packet information transmission. Figure 10 is a flow chart showing the transfer interruption and transfer completion at the time of interrupts transfer of the packet information. Since the general transfer procedures in Figures 3 and 4 have already been described, their explanations will be omitted. Only the division transfer for the data packet information in this invention will be explained. While the data packet information D1 is being transmitted, the transmission is checked (operational step S5) every one octet information transfer (operational step S6) and subsequently the operational step S8 comes in along with the CRC calculation (operational step S7) from the address code A till the octet being transmitted. When the status control transmission unit 29 checks the presence of information memory in the voice information memory unit 61 of the voice transmission queue unit 6 at the operational step S8, voices require priority transfer to data so that transfer interrupt for the data packet information D1 is prepared at the operational step S21 in Figure

10 and the interrupt indication code INT is extracted from the interrupt code addition unit 292 to be ready to be transferred. In this case, one octet 2915 in Figure 9 (c) is being transmitted. When this operational step S20 is completed, one direction follows the operational step S23 to transfer the aforementioned code INT and the other direction follows the operational step S22 to write (operational step S24) the interrupt position for the data packet information D1 (code 2915 in Figure 9 (c)) in the memory control unit 711 of the data information memory unit 71 (indicated in Figure 9 (b)) along with the CRC calculation until the code INT being transmitted and instruction to transmit the frame check sequence code FCS (operational step S25). When the transfer of the aforementioned code INT (operational step S23) of one octet ends, the transmission is checked (operational step S12) and the aforementioned code FCS of two octets is transmitted (operational step S11). Subsequently, the frame ending procedures shown in Figure 4 as described previously takes place. Since the interrupt voice packet information is queuing at the operational step 17, the data packet information D1 in the transmission packet memory unit 291 is deleted at the operational step S18 and then the voice packet information V1 is transferred from the voice information memory unit 61 to the transmission packet memory unit 291 at the operational step S19. Since the voice packet information V1 is stored at the operational step S19 as shown in Figure 3, the voice packet information V1 is transferred by the aforementioned series of packet information transfer procedures starting from one octet transfer of the flag sequence code F (Figure 3) and the frame ending procedures (Figure 4) at the operational step S1 for starting frame transferring. When the transfer of the voice packet information V1 ends, the transfer incomplete data packet D1 is queued at the operational step S17 so that the information transfer from the data information memory unit 71 to the transmission packet memory unit 291 at the operational step S19 will transfer only the incomplete transfer portion of the data packet information D12 at the

current transfer since the memory position for the transfer interrupt is written at the operational step S24 (Figure 10) and only the portion after the code 2916 in Figure 9 (c) is transferred. After one octet of the flag sequence code F is transferred (operational step S1 in Figure 3), the address code A and the remaining data packet information D12 are transferred by the transfer procedures shown in Figure 3 at this information transfer operational step S19. If no voice packet information is present and the information to be transferred is finished, at operational step S8 the information completion code FIN is extracted when the data packet information has been divided and the operational step S26 in Figure 10 follows to be ready for transferring. If there is no division, the operational step S28 is followed to extract a non-division indication code NIN and to be ready for transferring. After the one octet information transfer at the operational step S20, one direction proceeds with the operational steps S27 or S29 to transfer the codes FIN or NIN as provided, and the other direction proceeds with the operational step S22 to check the transmission and the operational step 25 to create the code FCS and to be ready for the transmission followed by the frame ending procedures shown in Figure 4.

The procedures at the reception side will be explained by referring to Figures 5 and 6. Since the general procedures have already been described previously, their explanation will be omitted. The procedures in Figure 5 are as follows. As a result of reception of the address code A at the operational step S31, the packet information received is determined as data at the operational step S37. When the codes received are identified as INT, FIN or NIN at the operational steps S39 and 40 for each octet after receiving one octet following the code A at the operational step S33, these codes INT, FIN and NIN can not be used until one octet code F is identified after the two octet code FCS stored in these codes. Therefore, the information identification unit 252 must have a memory space for three octets. For this reason, at the operational step 42, the codes

INT, FIN or NIN stored before the three octets are deleted and the octet codes newly received are stored. The code F for frame ending is checked at the operational sequence S50 and if the specified bit pattern check is OK after the CRC calculation until the frame check sequence code FCS, the following procedures are determined at the operational step S54. In the case of code INT, the data packet information received at the operational step S55 are sequentially stored in the divided data reception queue unit 253. In the case of code FIN, the data packet information received at the operational step S56 is stored in the divided data reception queue unit 253 and then the memory is totally extracted in the information reproduction unit 255 in the order received to be connected and edited before transferring to the data reception channel 14. In the case of code NIN, the data packet information is received from the communications line 1 at the operational step S57 and directly transferred from the reception packet memory unit 251 where the data is stored to the data reception channel 14. The interrupted data packet information by the voice packet information is transferred without interrupts by other data packet information to the same communications line. Therefore, the interrupted data packet information is stored sequentially in the division data reception queue unit 253 by the interrupt indication code INT and only the data packet information D11 and D12 are connected and edited by the information completion code FIN so that the data packet information can be reproduced easily. The blocked circuits shown in Figure 7 can be easily implemented by the common technology.

In the above-mentioned example, various memory units and control units are decentralized, but this invention's functions can be exhibited by using a group of registers which are connected using a common bus having transmission terminals or switching centers and a central processing unit.

In this invention's voice/data multiplexing control method, a request for voice transmission while the data is being transmitted does not cancel the data, which have already been transmitted. An interrupt indication code is added to indicate

an interrupt and after the voice transmission, the remaining data are transmitted. The data, which has already been transmitted, is temporarily stored at the reception side. The framed data information attached with an interrupt indication code is connected to the subsequent reception data information and the connected reception data information along with the framed data information attached with a completion code are reproduced into single data. This function solves the problem in the conventional system in that the frame lengths of the data information cannot exceed the frame gaps of the periodic voice information.

According to this invention, the transmission efficiency using the communications line by multiplexed transmission of voice and data can be improved.

4. Brief Explanation of the Figures

Figure 1 is a block diagram showing an example configuration for the conventional voice/data multiplexing transmission method. Figure 2 is a time chart showing the time relationships when multiplexing transmissions using the same communications line as in Figure 1 sends the voice packet information and the data packet information. Figure 3 is a flow chart showing the transmission procedures after the desired packet information to be transferred in the transmission memory in the example of this invention's voice/data multiplexing transmission method. Figure 4 is a flow chart showing the frame ending procedures for the subsequent packet information transfer following the procedures shown in Figure 3. Figure 5 is a flow chart showing the reception procedures for the packet information, which has been transmitted, by the transmission procedures shown in Figure 3. Figure 6 is a flow chart showing the ending reception procedures for the subsequent packet information transferred frame after the procedures shown in Figure 5. Figure 7 is a block diagram showing an example of this invention's voice/data multiplexing transmission method. Figure 8 is a time chart showing the time relationships when the multiplexing transmission method using the same communications line in Figure 7 sends the voice packet

information and the data packet information. Figure 9 is a format outline showing the formats of various memory units and transfer frames in Figure 7. Figure 10 is a flow chart showing the operational procedures regarding the interrupt information addition added in this invention after the procedures shown in Figure 3.

- 1: Communications line
- 6: Voice transmission queue unit
- 7: Data transmission queue unit
- 22: Communication control transmission unit
- 25: Communication control reception unit
- 29: Status control transmission unit
- 251: Reception packet memory unit
- 252: Information identification unit
- 253: Division data reception queue unit
- 255: Information reproduction unit
- 291: Transmission packet memory unit
- 292: Interrupt code addition unit (means to add interrupt information)
- 293: Frame check sequence code preparation unit

Figure 1.

- 2: Communications control transmission unit
- 3: Line transmission unit
- 4: Line reception unit
- 5: Communications control reception unit
- 6: Voice transmission queue unit
- 7: Data transmission queue unit
- 8: Voice interrupt control unit
- 9: Status control transmission unit

Figure 2.

- A: Sender side
- B: Voice packet information
- C: Data packet information
- D: Multiplexing configuration on the communications line
- E: Frame format
- F: Receiver side
- G: Voice packet information
- H: Data packet information

Figure 3

A: Start
B: Voice queuing
C: Not transmitted
D: Data division
E: To Figure 4
F: To Figure 10
G: Yes
H: No
I: Voice
J: Data
K: Octet

Figure 4

A: To Figure 3
B: Yes
C: Voice queuing
D: No
E: Data queuing
F: Queuing
G: Octet
H: (2 octet)

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Figure 5

S23: Octet
S38: Octet
L: to Figure 6
M: to Figure 6
A: Data
B: Voice

Figure 6

A: (Voice)
B: OK (Data)
C: NOK (Data)

Figure 7

22: Communications control transmission unit
6: Voice transmission queue unit
7: Data transmission queue unit
8: Voice interrupt control unit
29: Status control transmission unit
3: Line transmission unit
4: Line reception unit
25: Communications control reception unit

Figure 8

A: Sender side
B: Voice packet information
C: Data packet information
D: Multiplexing configuration on the communications line
E: Frame format
F: Receiver side
G: Voice packet information
H: Data packet information
I: Data retransmission possible time

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Figure 9

Figure 10

A: to Figure 4
S20: Octet
B: Interrupt action

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/Message Digest	Multi Part /.zip	Pages (if appl.)
1	NPL Documents	F0057_ISR_US9615504.pdf	396157 e27eccddcd4afad0e46c5474618b0320ce80 4ee73	no	10

Warnings:

Information:

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2	NPL Documents	F0058_gitman_economic_analysis.pdf	1874599 ee5313be03ddc6271d488165e869732cba dd8df5	no	22
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Warnings:

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4	NPL Documents	F0060_RFC978.pdf	102320 21230c20d1270e7c861516a43079c6e0e80 ff401	no	5
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Warnings:

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6	NPL Documents	F0062_james_mills_data_voice.pdf	223076 99ef23fe5bf7c3074fe2a3c50b94bc2a9f6dc 87c	no	6
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Warnings:

Information:

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11	NPL Documents	F0067_Janes_1989.pdf	617418 b157dff49070abeda57d8c608f714d668867 8297	no	5
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12	NPL Documents	F0068_Janes_1990_91.pdf	2431238 42a92bed6d324612d6393dc84cb77220d 5c5fec	no	17
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Warnings:

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19	Foreign Reference	F0075_JP-59-44140.pdf	1272933 cb52899aaa212045567f925588a887a5511 a54ba	no	36
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Warnings:

Information:

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20	NPL Documents	F0076_k_sohraby_ISDN_Primary.pdf	507873 55f333f30db6a34d6cb4023d0e10f62a9728 1ad0	no	9
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Warnings:

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Warnings:

Information:

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29	NPL Documents	F0085_natesa_janakiraman_overview_of_recent.pdf	1075971 d414c99a51bdee8c7e6535564b720d53db79d492	no	15
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Warnings:

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Warnings:

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38	NPL Documents	F0094_r_w_meba_Experiments _in_Wideband.pdf	233947 d37bd24c9482b32dd1ac11c1e925b45a56 301c9d	no	7
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(54) Title: SYSTEM FOR REVERSE ADDRESS RESOLUTION FOR REMOTE NETWORK DEVICE		
<p>Diagram illustrating the system for reverse address resolution. The process involves the following steps:</p> <ul style="list-style-type: none"> RARP REQUEST GENERATION PROCESS (FIG-4) generates a RARP REQUEST (120) or RARP (RFC903) REQUEST (121). The request is sent over a point-to-point channel to a remote device. The remote device sends a RARP MAC INDEP. REQUEST (127) or RARP REFUSED RESPONSE (128) back to the processor. The processor receives the request and performs a RARP RESPONSE GENERATION PROCESS (FIG-5) to generate a RARP RESPONSE (125). The RARP RESPONSE (125) is stored in a MEDIA ADDR./IP ADDRESS DATA BASE (135). The processor also stores CHANNEL NO./IP ADDRESS DATA BASE (136) in a separate data base. The RARP RESPONSE (125) is then sent back to the remote device. The remote device sends an ICMP SUBNET MASK REQUEST (130) to the processor. The processor performs an ICMP SUBNET MASK RESPONSE GENERATION PROCESS (FIG-7) to generate an ICMP SUBNET MASK RESPONSE (131). The ICMP SUBNET MASK RESPONSE (131) is sent back to the remote device. The entire exchange is labeled as "PACKET EXCHANGE OVER WAN MEDIA" (124). 		
(57) Abstract		
<p>A reverse address resolution protocol for use in a communication network which allows resolution logic to provide a higher level protocol information (such as an IP address) to a source of a request (127) for such information (122), independent of the physical network address of such source. The protocol is used in a processor having a plurality of ports, at least one of such ports connected by a point-to-point channel to a remote network device. Reverse address resolution protocol is responsive (129) to a resolution request from the remote network device across the point-to-point channel to supply the higher level protocol information based upon the port through which the resolution request is received (125), rather than the physical network address of the requesting device. Thus, a remote device may be coupled to a network, and connected to a central management site across a point-to-point communication link, in a "plug and play" mode. The person connecting the device to the remote network does not need to determine the physical network address of the device or configure the device with a higher level address protocol.</p>		

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SYSTEM FOR REVERSE ADDRESS RESOLUTION FOR REMOTE NETWORK DEVICE

FIELD OF THE INVENTION

The present invention relates to start up protocols for devices in communication networks; and more particularly to systems which allow a machine without a configured higher level protocol address to obtain such address without a unique machine identifier.

DESCRIPTION OF RELATED ART

A widely accepted series of international standards describing network architectures is known as the OSI reference model. See, generally,
10 Tannenbaum, Computer Networks, 2nd Ed., 1988, Prentice-Hall. According to this model, network communications are divided into a plurality of protocols within layers of the model. Local Area Networks (LANs) operate using medium access protocols within the lower layers, layers 1 and 2, of the OSI model, such as the carrier sense multiple access with collision detection
15 CSMA/CD, IEEE Standard 802.3, also known as ETHERNET, and the token ring access ring method of IEEE Standard 802.5. These two lower layers are typically broken down into the physical layer and the data link layer, with the data link layer being further broken down into a media access control (MAC) layer, and a logical link layer.

20 Systems, such as personal computers, workstations, and mainframe computers, attached to the LANs each have a distinct lower level protocol identifier known as the physical network address or MAC address. LAN frames forwarded to a destination system on the network under these lower level protocols contain the destination system MAC address, or other physical network address, as a destination. LAN frames forwarded from a source system on the network contain the source system MAC address, or other physical network address, as a source address. Systems

communicate by encapsulating additional protocols (OSI layers 3-7) within the lower layer LAN frames. These higher level protocols are grouped into suites such as the TCP/IP protocol suite and the XNS protocol suite. Many LANs contain groups of end systems that use different higher level protocol suites. These higher level protocol suites also assign unique higher level protocol identifiers to systems which transmit or receive frames in the network.

For instance, an internet protocol IP address is assigned to each system operating within an internet protocol network. The internet protocol address includes a network address portion and a host address portion. The network address portion identifies a network within which the system resides, and the host address portion uniquely identifies the system in that network. Processors routing packets in an internet protocol network rely on the network address portion of the IP address in a frame to find the local area network of the destination machine. Once the local area network of the destination is located, the frame is forwarded to that network where the host address portion is relied upon to assign a MAC address for the destination machine to the packet. Thus, higher level protocol address places the device in a particular network or subnetwork, so that the higher level protocol can effectively manage the routing of packets among the networks, without maintaining a table of the unique physical access layer identifiers for all of the terminals in the network.

In order to communicate in such a network, the machine must first obtain its higher level protocol address. This address is typically assigned by a central authority, such as the Internet Activities Board, or by a network manager. Normally, a particular machine learns its IP address by a configure operation, in which a technician uses a local terminal to configure the machine. In a centrally managed network, this could be a cumbersome task, involving travel of skilled personnel away from the central management location. However, a reverse address resolution protocol RARP has been

developed for networks such as TCP/IP or SNMP protocols. The RARP allows a machine without a configured IP address to obtain an IP address from a remote server. The machine broadcasts a request and waits until an RARP server responds. In the request, the requesting machine must provide 5 its physical network address (MAC address) to uniquely identify itself, allowing the server to map it into an IP address.

This RARP protocol works fine, so long as the central management site is aware of the physical network address of the devices being added to the network. In order to find out the physical network address, all of the 10 system being added to the network must be passed through the central management site so that the address can be read from these machines, or a local technician must read the physical network address from the machine and telephone the central site. This process makes connecting a new device to a network difficult. Further, this process of physically reading the physical 15 network address from the box is prone to human errors. Such addresses are typically very long (MAC addresses are 48 bits long), and can be misread or typed in erroneously.

It is desirable to have so-called "plug and play" network devices. Such devices can be plugged in and turned on by unskilled personnel. 20 However, the need to find out the physical network address of the box detracts from this ability.

Accordingly, it is desirable to provide a technique for resolving higher level protocol addresses, without reliance on the lower level protocol addresses.

25

SUMMARY OF THE INVENTION

The present invention provides a reverse address resolution protocol for use in a communication network which allows resolution logic to provide 30 a higher level protocol address, or other information, to a source of a request for such address, independent of the physical network address of such

source. The protocol according to the present invention is used in a processor having a plurality of ports, at least one of such ports connected by a point-to-point channel to a remote network device. The reverse address resolution protocol is responsive to a resolution request from the remote 5 network device across the point-to-point channel to supply the higher level protocol address based upon the port through which the resolution request is received, rather than the physical network address of the requesting device. Thus, a remote device may be coupled to a network, and connected to a central management site across a point-to-point communication link in 10 a "plug and play" mode. The person connecting the device to the remote network does not need to determine the physical network address of the device or configure the device with a higher level address protocol. All this 15 can be handled automatically.

Thus, the present invention can be characterized as an apparatus for 15 resolving higher level protocol addresses in response to resolution requests from a source of resolution requests in a communication network. The apparatus comprises a central processor having a plurality of ports for connection to the communication network, and resolution logic which is coupled to the communication network and in communication with the central 20 processor. The resolution logic provides a higher level protocol identifier in response to a particular port in the plurality of ports through which the resolution request is received by the central processor, independent of the lower level protocol identifier of the source of the resolution request. The resolution logic may be a routine executed by the central processor, or a 25 routine executed by a network management processor coupled to the communication network, and in communication with the central processor.

The resolution logic, according to one aspect, includes a resolution table that is configurable independent of the lower level protocol identifiers, which assigns higher level protocol identifiers to particular ports of the central 30 processor through which the resolution requests may be received.

The higher level protocol identifier may comprise an internet protocol IP address, which includes a network address for the source of the resolution request, and a host address for the source of the resolution request. Further, the higher level protocol may be utilized by a network management system, which communicates network-wide, while the lower level protocol comprises a medium access protocol.

The resolution logic, according to the present invention, relies on the source of the resolution request being coupled across a point-to-point communication channel to the particular port of the processor receiving the request. In this way, the port serves as a virtual identifier for the source of the request.

Thus, the present invention can also be characterized as an apparatus for connecting a first network and a second network. This apparatus includes a communication link, a first processor, and a second processor. The first processor has a first interface coupled to the first network and a second interface coupled to the communication link. The second processor has a lower level protocol identifier and is coupled to the second network and to the communication link. Resolution logic is coupled to the first network to provide a higher level protocol identifier to the second processor in response to a resolution request through the second interface of the first processor, independent of the lower level protocol identifier of the second processor. In this manner, the first processor can configure the higher level protocol addresses for devices in the system, independent of the lower level protocol addresses.

According to another aspect of the invention, the first processor includes resources to provide network services to frames of data in the first and second networks through the first and second interfaces, and the second processor includes resources to extend the second interface of the first processor transparently to the second network.

The resolution logic may comprise a routine executed by the first processor, or a routine executed by a network management processor located in the first network.

Accordingly, a technique which greatly improves the "plug and play" 5 capability of a network device has been provided. Remote networks may be set up using this system, without requiring error prone and cumbersome techniques to acquire the physical network address of each device being added to the network.

Other aspects and advantages of the present invention can be seen 10 upon review of the figures, the detailed description, and the claims which follow.

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 is a schematic diagram of a system including the reverse 15 address resolution logic according to the present invention.

Fig. 2 illustrates a prior art packet exchange sequence for reverse address resolution over LAN media.

Fig. 3 illustrates a packet exchange sequence over a WAN medium as extended according to the present invention.

20 Fig. 4 illustrates the resolution request generation process used in the sequence of Fig. 3.

Fig. 5 illustrates the resolution request response generation process used in the sequence of Fig. 3.

25 Fig. 6 illustrates the resolution request response acceptance process used in the sequence of Fig. 3, which results in a request for a subnet mask in IP networks.

Fig. 7 is a diagram of the subnet mask response generation process used in the sequence of Fig. 3.

30 Fig. 8 is a diagram of the subnet mask response acceptance process used in the sequence of Fig. 3.

Fig. 9 is a schematic diagram illustrating one network environment in which the present invention may be used.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 A detailed description of preferred embodiments of the present invention is provided with respect to Figs. 1-9. Fig. 1 illustrates application of the present invention in a preferred embodiment. Figs. 2-8 illustrate the extended protocol for reverse address resolution used in a preferred embodiment of the present invention. Fig. 9 provides an overview of a
10 network in which the present invention may be applied.

Fig. 1 provides a schematic diagram of an apparatus for connecting a first network 10 to a second network 11 using address resolution logic 25 according to the present invention. The first network 10 includes a first LAN 9 which includes a plurality of end systems and a server, and may be interconnected to other LANs using intermediate systems (not shown) known in the art. Coupled to the LAN 9 is a boundary router 12. The boundary router 12 is an intermediate system in the network which provides network resources serving higher level protocol suites which, in one unique embodiment, constitute routing resources. As such, the boundary router 12
15 maintains end system directories 13 for the local LAN 9 and global routing information 14 to serve the routing functions according to the higher level protocol suites. Thus, the end system directories will include DEC end system tables, IPX end system tables, IP end system tables, and others to serve other protocol suites that are operating in the network 10. The
20 boundary router 12 may also be coupled to other portions of the corporate data network as schematically illustrated at arrow 15.
25

The boundary router 12 includes a local interface 16 which serves the local LAN 9 providing access to the network resources within the boundary router to end systems on LAN 9. The boundary router could also have
30 interfaces to other local LANs as well. In addition, the boundary router 12

includes a remote routing interface 17, which provides an interface to the network resources for end systems in the remote network 11. In support of the remote interface 17, the boundary router maintains end system directories 18 serving the higher level protocol suites in the remote network
5 11.

As illustrated schematically by the hatched symbol 19, the remote network 11 appears to the end systems in the local LAN 9 as if it were a LAN connected locally to the boundary router 12. This appearance is maintained across a communication link 20, which may use telephone or
10 other dial up lines, leased lines, satellites, wireless systems, or other communication media configured as a point-to-point channel, to a routing adapter 21, which is coupled to the remote network 11. The remote network 11 includes a remote LAN 22 to which a plurality of end systems and servers may be connected as known in the art. In addition, the LAN 22 may be
15 coupled to other LANs in the remote network 11 through intermediate systems (not shown) as known in the art. The routing adapter 21 provides resources for extending the remote routing interface 17 transparently to the remote network 11 across the communication link 20. From the perspective of the remote network 11, the routing adapter 21 provides the same
20 functionality as a router, while the routing adapter itself operates independent of the higher level protocol suites.

The system thus provides efficient communication between remote networks, and a corporate network, through a boundary router (e.g., net 11, routing adaptor 21, link 20, boundary router 12, net 9).

25 The routing adapter 21 includes hardware performing physical network access protocols for connection to the network 22. Also, such hardware is assigned a physical network address, or MAC address, to uniquely identify the system for the lower level protocol suites. However, in order to participate in the higher level protocol suites managed by the boundary
30 router 12 or elsewhere in the central network 10, an identifier which serves

such higher level protocols is needed for the routing adapter 21. Thus, the boundary router 12 includes resolution logic 25 to provide such identifier in response to the interface 17 across which a request for such identifier is received.

5 Figs. 2-8 illustrate the reverse address resolution protocol executed by the resolution logic 25 in the boundary router of Fig. 1 according to a preferred embodiment, in which the higher level protocol address comprises an internet protocol IP address, such as used by SNMP (Simple Network Management Protocol) standard network management servers.

10 Fig. 2 illustrates the prior art mechanism which is utilized in the preferred system on ports of the routing adaptor coupled to LAN media. The structure of Fig. 2 includes a first interface 100 corresponding to the RARP client port of the routing adapter 21, and a second interface 101 corresponding to an RARP server in the local network 11. The routing adapter includes RARP request generation process 102, an RARP response acceptance process 103, and an ICMP subnet mask response acceptance process 104. The resolution logic 25 in the RARP server includes an RARP response generation process 105, and an ICMP subnet mask response generation process 106.

20 Using the industry standard RARP request generation process, as specified in RFC 903 dated June, 1984, the RARP request generation process 102 in the client generates an RARP RFC 903 request 107, which includes the client's MAC address. This request 107 is received at the server interface 101 and the RARP response generation process 105 generates a response 108 by accessing a database or other logic which assigns an IP address based upon the MAC address in the request 107. The RARP response acceptance process 103 in the client receives the IP address from the response 108, stores it as appropriate in the client, and generates an ICMP subnet mask request 109. The server 101 receives the request 109 and the ICMP subnet mask response generation process 106

supplies a subnet mask response 110 to the client 100. The ICMP subnet mask response acceptance process 104 then configures the client with the IP address and the subnet mask, and assigns the address of the server 101 as the default gateway address.

5 Fig. 3 illustrates this process as extended according to the present invention for reverse address resolution independent of the physical network address of the client. In this aspect, the interface 120 corresponds to the routing adapter 21 operating as an RARP client. The interface 121 corresponds to the interface 17 of the boundary router 12 operating as an RARP server. The RARP server 121 need not be located in the boundary router 12. Rather, it can be located in any in system or intermediate system coupled to the networks served by the boundary router 12.

10 15 In the extended sequence, as illustrated in Fig. 3, the routing adapter also includes an RARP request generation process 122 (Fig. 4), an RARP response acceptance process 123 (Fig. 6), and an ICMP subnet mask response acceptance process 124 (Fig. 8). The RARP server in the boundary router includes an RARP response generation process 125 (Fig. 5) and an ICMP subnet mask response generation process 126 (Fig. 7).

20 As in the prior art system, the RARP request generation process 122 in the client 120 generates an RARP RFC 903 request 127. Also, the process 122 generates an extended request 128, which indicates to the receiver that the address resolution must be conducted independent of the MAC address.

25 The RARP response generation process 125 receives both the RFC 903 request 127 and the MAC independent request 128. If the response can be served with the RFC 903 request, then the response generation process 125 proceeds that way. However, if the MAC address of the client 120 has not been previously communicated to the response generation process 125, then the MAC independent request 128 must be utilized.

The RARP response generation process 125 is coupled to a media address/IP address database 135 and to a channel number/IP address database 136. These databases are configured by the network manager to assign IP addresses throughout the network. The channel number/IP address database is relied upon when the media address (MAC address) of the client 120 is not available at the time the IP address is configured.

In either event, the RARP response generation process 125 generates an RARP RFC 903 response 129 which includes an IP address. The RARP response acceptance process 123 in the client 120 accepts the IP address and generates an ICMP subnet mask request 130. In the server 121, the ICMP subnet mask response generation process 126 supplies an ICMP subnet mask response 131. The client 120 receives that response and executes the ICMP subnet mask acceptance process 124.

Fig. 4 shows the RARP request generation process corresponding to block 122 of Fig. 3. This routine loops through all of the interfaces or ports on the remote node, also called a leaf node, to determine its IP address. The algorithm starts with an interface up message 400. After an interface up message, the algorithm tests whether the IP address is available in local storage (step 401). If the address is available in local storage, then the routine is done, as indicated at step 402. If the IP address is not available, then an index for the interfaces is set to the first interface (step 403). Next, the algorithm tests whether the interface is up (step 404). If the interface is up, then the RFC 903 RARP request is sent through the interface (step 405). Next, the algorithm tests whether the interface is wide area network WAN interface (step 406). If it is a WAN interface, then the extended RARP request is sent which requires response independent of the MAC address (step 407).

If at step 404, the interface is not up, or if at step 406, the interface is not a WAN interface, or after the extended RARP request is sent in step 407, the algorithm loops to step 408. In step 408, the algorithm tests

whether the index indicates that the last interface has been tested. If not, the index is incremented in step 409 and the algorithm returns to step 404. If the last interface has been served, then the algorithm tests whether any requests have been successfully sent out and are still pending (step 410).

- 5 If there are no requests pending because no request was successfully sent, then a send request alarm is set (step 411) and the algorithm is done. If there are requests pending in step 410 because one or more requests were successfully sent, then a request retransmission alarm is set in step 412, and the algorithm is done.

- 10 The request retransmission alarm results in re-execution of the loop beginning at step 413 which proceeds directly to step 401. The send request alarm set by step 411 results in re-execution of the loop beginning with step 414. After step 414, the algorithm tests whether any requests are still pending in step 415. If there are pending requests, the algorithm is done, if there are no pending requests, then the loop is entered by proceeding to step 401.

- 15 Thus, the RARP request generation process 122, as shown in Fig. 4, sends both the standard RFC 903 RARP request, which requires response based on the MAC address, and an extended RARP request, which requires response independent of the MAC address, across WAN interfaces. The WAN interface in the preferred system is the point-to-point communication channel 120 between the boundary router and the routing adapter of Fig. 1.

- 20 Thus, the extended RARP interface composes a message using the standard message format according to RFC 903. The message is sent in the data portion of an ethernet frame. An Ethernet frame carrying an RARP request has the usual preamble, ethernet source and destination addresses, and packet type fields in front of the frame. The frame type contains the value 0x8035 to identify the contents as an RARP message. The data portion of the frame contains the 28-octet RARP message.

The RARP client obtains the physical network address of the interface on which the RARP request will be sent out according to the standard techniques known in the art. The RARP request contains the RARP client's physical network address (MAC address) as the source hardware address field, and 0xFFFFFFFFFFFF as the destination hardware address. Both the source and destination higher level protocol addresses are undefined, thus,

5 0. The RARP request opcode is 3 for the standard RARP RFC 903. The protocol according to the present invention uses opcode 16 for the extended request requiring MAC address independent resolution. Of course, any other available opcode could be used.

10

When the RARP client sends out its first broadcast request for address resolution, it also sets a retransmission timer at 5 seconds according to one embodiment (step 412). This large delay ensures that the server has ample time to satisfy the request and return an answer. When the timer expires, if the client already has an IP address, it cancels the timer and the RARP client goes idle. Otherwise, for each interface which is up, it broadcasts another request and sets the timer again. It will retransmit indefinitely until it receives a response. At each retransmission, the timer will double until it reaches a maximum value 15 minutes. From then on, it will 15 continue using this value.

20

The RARP client accepts only one response and discards any duplicate responses. Thus, before accepting any response, the client first ensures that no IP address has already been assigned to it.

Fig. 5 illustrates the RARP response generation process corresponding to block 125 of Fig. 3. This algorithm begins with receiving the RARP request 127 or 128 in step 500. After step 500, the algorithm tests whether it is a standard RFC 903 request (step 501).

25

If the request is the standard RFC 903 format request at step 501, then the algorithm searches the media address/IP address database 135 in 30 step 502.

If the request was not in the standard RFC 903 format, then the algorithm tests whether it is in the extended format (e.g. opcode 16) in step 503. If it is in the extended format, then the channel number/IP address database is searched in step 504. If the request is not in either format, then 5 the algorithm is done as indicated at step 505.

After searching the database in step 502 or in step 505, the algorithm tests whether a matching entry was found in step 506. If no matching entry was found, then the algorithm is done in block 505. If a matching entry was found, then the algorithm formats and sends an RFC 903 RARP response 10 packet which provides an IP address to the client (step 507).

Fig. 6 illustrates the RARP response acceptance process 123 of Fig. 3. This algorithm begins with receiving the RARP response in step 600 which was generated in step 507 of Fig. 5. First, the algorithm determines whether the response is expected in step 601. If it is not expected, then the 15 RARP response is discarded in step 602, and the algorithm is done in step 603. If the response is expected, then the algorithm tests whether an IP address is already available in local storage (step 604). If the address is already available, then the process loops to step 602. If the IP address is not available in step 604, then the IP address from the RARP response is 20 saved in local storage (step 605). After step 605, all pending alarms in the client are cancelled (step 606), and an ICMP subnet mask request is sent across the interface (block 607). After sending the subnet mask request in step 607, an ICMP subnet mask request retransmission alarm is set in step 608, and the algorithm is done.

25 Thus, once the client or leaf node has obtained the IP address, it initiates an ICMP address mask request to the responder, and sets a retransmission timer of 5 seconds (step 608). The request specifies the RARP server which provided the IP address as the destination. If the leaf node does not obtain a successful response, and its retransmission timer 30 expires, it will broadcast another ICMP subnet mask request on all available

interfaces and reset the timer to 5 seconds. The maximum number of retransmissions is 10 in one embodiment. If the tenth retransmission fails, it assigns the natural subnet mask to the IP address class. This ensures that the software does not flood the network indefinitely with unnecessary traffic.

5

Fig. 7 illustrates the ICMP subnet mask response generation process corresponding to block 126 of Fig. 3. This process begins with receiving the ICMP subnet mask request in step 700. After receipt of the request, a response is generated and sent to the client in step 701. After sending the 10 response, which includes a subnet mask for the previously sent IP address, the algorithm is done (step 702).

10

Fig. 8 illustrates the ICMP subnet mask response acceptance process corresponding to block 124 of Fig. 3. This algorithm is initiated upon receipt of the ICMP response in step 800. When the response is received, the 15 subnet mask is saved in step 801. Next, any pending alarms are cancelled in step 802. After cancelling the alarms in step 802, the RARP server which supplied the responses to the earlier request is defined as the default gateway in step 803. After defining the default gateway, the algorithm is done as indicated at step 804.

15

If an ICMP retransmission alarm is asserted, this routine receives an indication in step 805. First, the algorithm determines in response to this alarm whether a maximum number of retries has been exceeded in step 806. If it has been exceeded, then the natural mask is utilized for the IP address as indicated at step 807, and the RARP server is set as the default gateway 20 in step 803. If the maximum number of retries has not been exceeded, then an ICMP subnet mask request is generated in step 807, and the ICMP request retransmission alarm is reset in step 808. Finally, the algorithm is done as indicated at step 804.

20

Thus, a preferred embodiment of the present invention extends the 30 RARP standard reverse address resolution protocol to provide for a special

request independent of the MAC address of the client. The RARP server uses the standard ARP table for mapping network physical addresses to IP addresses. It also includes a port-to-IP address table (channel number/IP address) which is used to respond to the extended RARP requests for MAC 5 independent resolution. This table maps a port number or channel number to an IP address. This method of assigning IP addresses avoids the hassle of having to know the MAC address of the RARP client in advance.

This technique may be extended to other types of protocols, such as the BootP protocol which provides for vendor extensions. In this aspect, the 10 vendor extensions may also be used for other functions that can be initialized based on the channel number or port upon which request is received by the server. Thus, the BootP request may request an IP address, a configuration manager ID, and configuration information independent of its MAC or physical network address.

15 Fig. 9 illustrates a network configuration in which the present invention may be utilized. According to the configuration of Fig. 9, a central node 900 includes a plurality of ports labelled 1, 2, 3, 4, 5, and 6. Ports 2, 4, and 5 are coupled to respective LANs 901, 902, and 903. LAN 903 includes a system operating as a network management processor 904, which may be 20 executing such protocols as the SNMP or a Telnet protocol relying on IP addresses to access end systems and intermediate systems in the network.

Port 1 is coupled across a point-to-point communication link 905 to a leaf node 906. Leaf node 906 is coupled to LAN 907.

Similarly, node 3 is coupled across point-to-point channel 908 to leaf 25 node 909. Leaf node 909 is coupled to a LAN 910.

Port 6 is coupled across point-to-point channel 911 to leaf node 912. Leaf node 912 is coupled to LAN 913.

As illustrated in the figure, LAN 913, link 911, LAN 903, and LAN 902 30 are all managed as a single IPX network, IPX 1. LAN 907 and LAN 901 are managed as a single IPX network, IPX 2. LAN 910 is managed as an

AppleTalk network. The entire configuration is managed as a single IP network for the purposes of the network management processor 904. Thus, all of the leaf nodes 906, 909, 912 need an IP address for the purposes of the network management processor 904. These IP addresses may be 5 assigned according to the present invention independent of the physical network address of the leaf node using the MAC address independent IP address resolution logic 914 according to the present invention.

Also, the network management processor 904 may include a server to manage the IP address configuration according to the present invention. 10 For instance, a BootP protocol vendor extension could be used to tag a request packet requesting an IP address for a leaf node (e.g., node 906) with a channel number for link 905 and node number for central node 900. The central node 900 would then pass the tagged request packet to the remote network management processor 904. The network management processor 15 904 could then service the request packet with a database based upon the channel number and node number in the tagged request packet.

In the implementation described above based on the modified RARP protocol, the point-to-point channels were implemented using a PPP link, such that the physical port on the central node 900 could be used as a basis 20 for configuring IP addresses. This node number is passed along with the packet to the processor in the central node according to standard techniques.

Other systems may implement more than one channel on a given physical port on the central node. For instance, a frame relay system may 25 be used on a given link. In such a system, the DLCI (Data Link Communication Identifier) is carried with every packet on every logical connection between two points in the network. An X.25 type network which uses switched virtual circuits may also be coupled through a particular physical port on the central node 900. In such system, the X.25 address of 30 the calling device could be used as a basis for specifying the point-to-point

channel. Similarly, an ISDN port could use the unique identifier for the calling node (Q.931 address) which is used for call set up.

Accordingly, the present invention provides the ability to add new leaf nodes to a network, without requiring the network manager to know the physical network address of the leaf node before it is connected to the network. This greatly simplifies the process of adding new leaf nodes to the network, minimizes the chance of error in communicating the physical network addresses to the network manager, and otherwise contributes to the desired "plug and play" aspect of leaf node hardware.

The foregoing description of preferred embodiments of the present invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously, many modifications and variations will be apparent to practitioners skilled in this art. The embodiments were chosen and described in order to best explain the principles of the invention and its practical application, thereby enabling others skilled in the art to understand the invention for various embodiments and with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims and their equivalents.

CLAIMS

What is claimed is:

1 1. An apparatus for resolving higher level protocol identifiers in
2 response to resolution requests from a source of resolution requests in a
3 communication network, the source having a lower level protocol identifier,
4 comprising:

5 a processor having a plurality of channels for connection to the
6 communication network; and

7 resolution logic, coupled with the communication network and in
8 communication with the processor, to provide a higher level protocol
9 information in response to a particular channel in the plurality of channels
10 through which a resolution request is received by the processor independent
11 of the lower level protocol identifier of the source of the resolution request.

1 2. The apparatus of claim 1, wherein the resolution logic
2 comprises a routine executed by the processor.

1 3. The apparatus of claim 1, wherein the communication network
2 includes a network management processor in communication with the
3 processor, and the resolution logic comprises a routine executed by the
4 network management processor.

1 4. The apparatus of claim 1, wherein the resolution logic includes
2 a resolution table configurable independent of lower level protocol identifiers,
3 for assigning the higher level protocol information to particular channels of
4 the processor through which resolution requests may be received.

1 5. The apparatus of claim 1, wherein the higher level protocol
2 information comprises a network address for the source of the resolution
3 request.

1 6. The apparatus of claim 5, wherein the lower level protocol
2 information comprises a physical network address for the source of the
3 resolution request.

1 7. The apparatus of claim 6, wherein the higher level protocol
2 information comprises an internet protocol IP address.

1 8. The apparatus of claim 1, wherein the higher level protocol
2 information comprises a network address for the source of the resolution
3 request, and a host address for the source of the resolution request.

1 9. The apparatus of claim 1, wherein the higher level protocol
2 comprises a network management protocol, and the lower level protocol
3 comprises a medium access protocol.

1 10. The apparatus of claim 1, wherein the processor includes
2 resources to provide network services to frames of data in the
3 communication network through the plurality of channels.

1 11. An apparatus for connecting a first network and a second
2 network, comprising:
3 a communication link;
4 a first processor, having a first interface coupled to the first network
5 and a second interface coupled to the communication link;
6 a second processor having a lower level protocol identifier and
7 coupled to a second network and to the communication link; and
8 resolution logic, coupled with the first network, to provide a higher
9 level protocol information to the second processor in response to a resolution
10 request through the second interface of the first processor independent of the
11 lower level protocol identifier of the second processor.

1 12. The apparatus of claim 11, wherein the higher level protocol
2 information comprises a network address for the second network.

1 13. The apparatus of claim 12, wherein the lower level protocol
2 identifier comprises a physical network address for the second processor.

1 14. The apparatus of claim 13, wherein the higher level protocol
2 information comprises an internet protocol IP address.

1 15. The apparatus of claim 11, wherein the higher level protocol
2 information comprises a network address for the second network, and a host
3 address for the second processor.

1 16. The apparatus of claim 11, wherein the higher level protocol
2 comprises a network management protocol, and the lower level protocol
3 comprises a medium access protocol.

1 17. The apparatus of claim 11, wherein the first processor includes
2 resources to provide network services to frames of data in the first and
3 second networks through the first and second interfaces, and the second
4 processor includes resources to extend the second interface of the first
5 processor transparently to the second network.

1 18. The apparatus of claim 11, wherein the resolution logic
2 comprises a routine executed by the first processor.

1 19. The apparatus of claim 11, wherein the first network includes
2 a network management processor, and the resolution logic comprises a
3 routine executed by the network management processor.

1 20. The apparatus of claim 11, wherein the resolution logic includes
2 a resolution table configurable independent of the lower level protocol
3 identifier of the second processor, for assigning the higher level protocol
4 information to the second processor in response to the interface through
5 which the resolution request is received by the first processor.

1 21. The apparatus of claim 11, wherein the communication link
2 comprises a point-to-point channel, connecting the second interface of the
3 first processor and the second processor.

1 22. An apparatus for connecting a first local area network and a
2 second local area network, comprising:
3 a communication link including a point-to-point channel;
4 a first processor, having a first interface coupled to the first local area
5 network and a second interface coupled to the point-to-point channel of the
6 communication link;

7 a second processor having a physical network identifier and coupled
8 to the second local area network and to the point-to-point channel of the
9 communication link; and

10 network management resources, coupled with the first local area
11 network, operating according to a network management protocol, and
12 including resolution logic to provide a network management protocol
13 information to the second processor in response to a resolution request
14 through the second interface of the first processor, independent of the
15 physical network identifier of the second processor.

1 23. The apparatus of claim 22, wherein the resolution logic includes
2 a resolution table configurable independent of the physical network identifier
3 of the second processor, for assigning the network management protocol
4 information to the second processor in response to the interface through
5 which the resolution request is received by the first processor.

1 24. The apparatus of claim 22, wherein the network management
2 protocol information comprises an internet protocol IP address.

1 25. The apparatus of claim 22, wherein the resolution logic
2 comprises a routine executed by the first processor.

1 26. The apparatus of claim 22, wherein the first network includes
2 a network management processor controlling the network management
3 resources, and the resolution logic comprises a routine executed by the
4 network management processor.

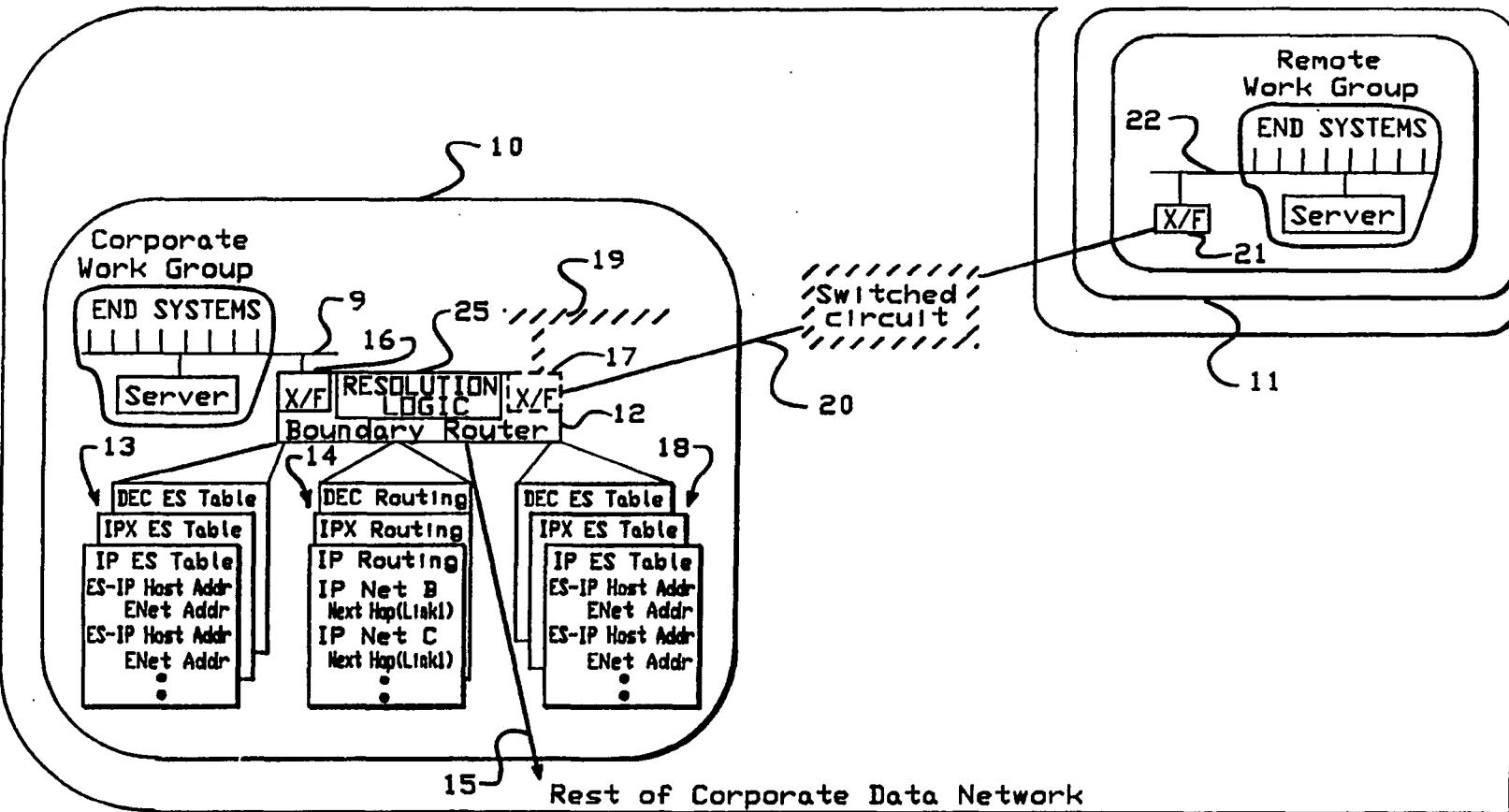


FIG. - 1

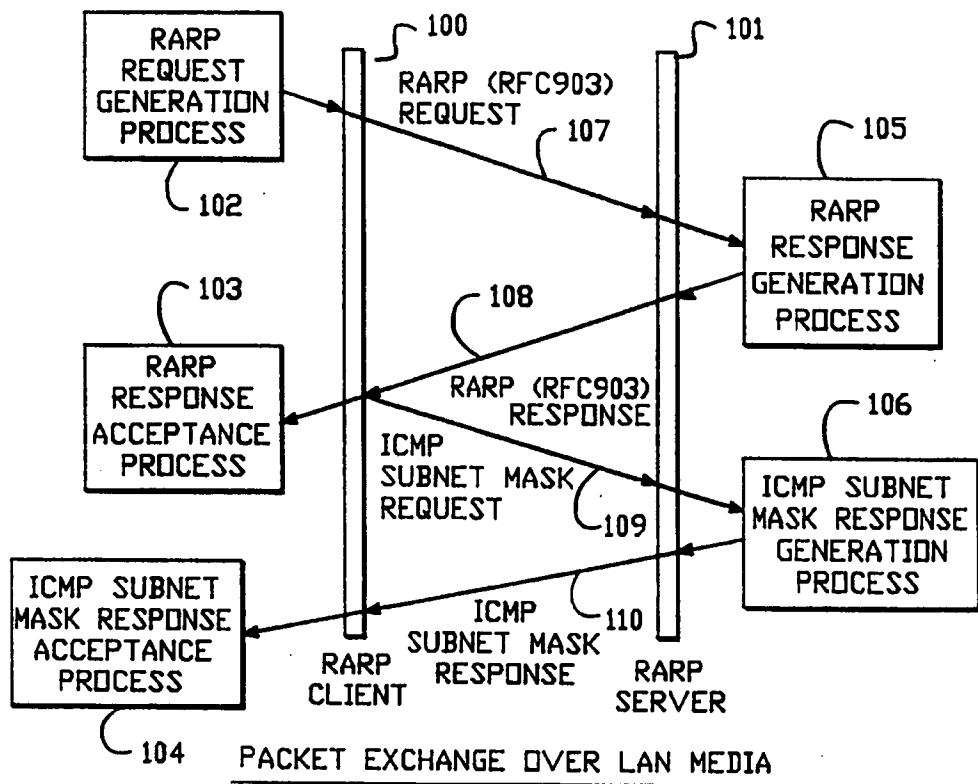


FIG.-2
(PRIOR ART)

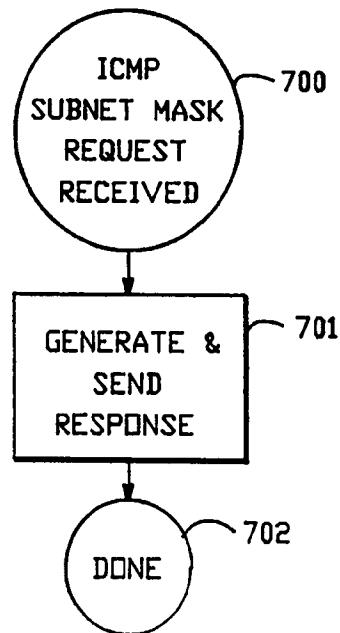


FIG.-7
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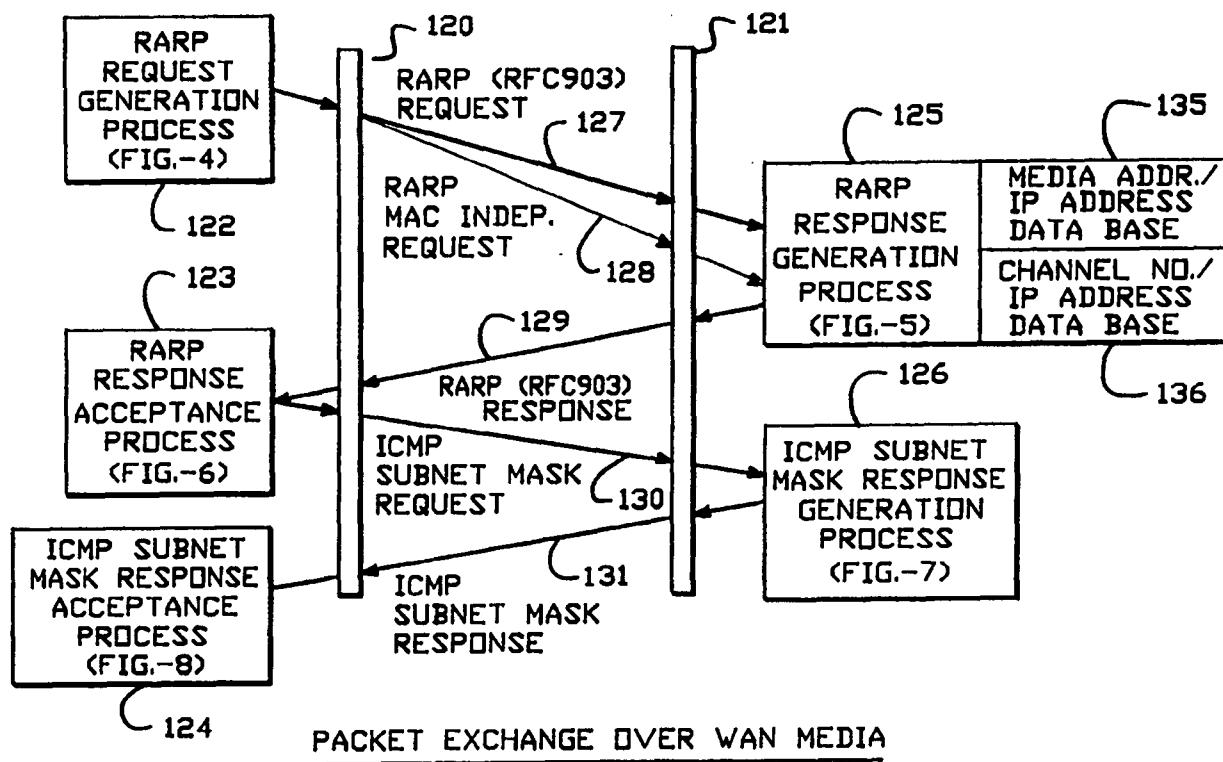
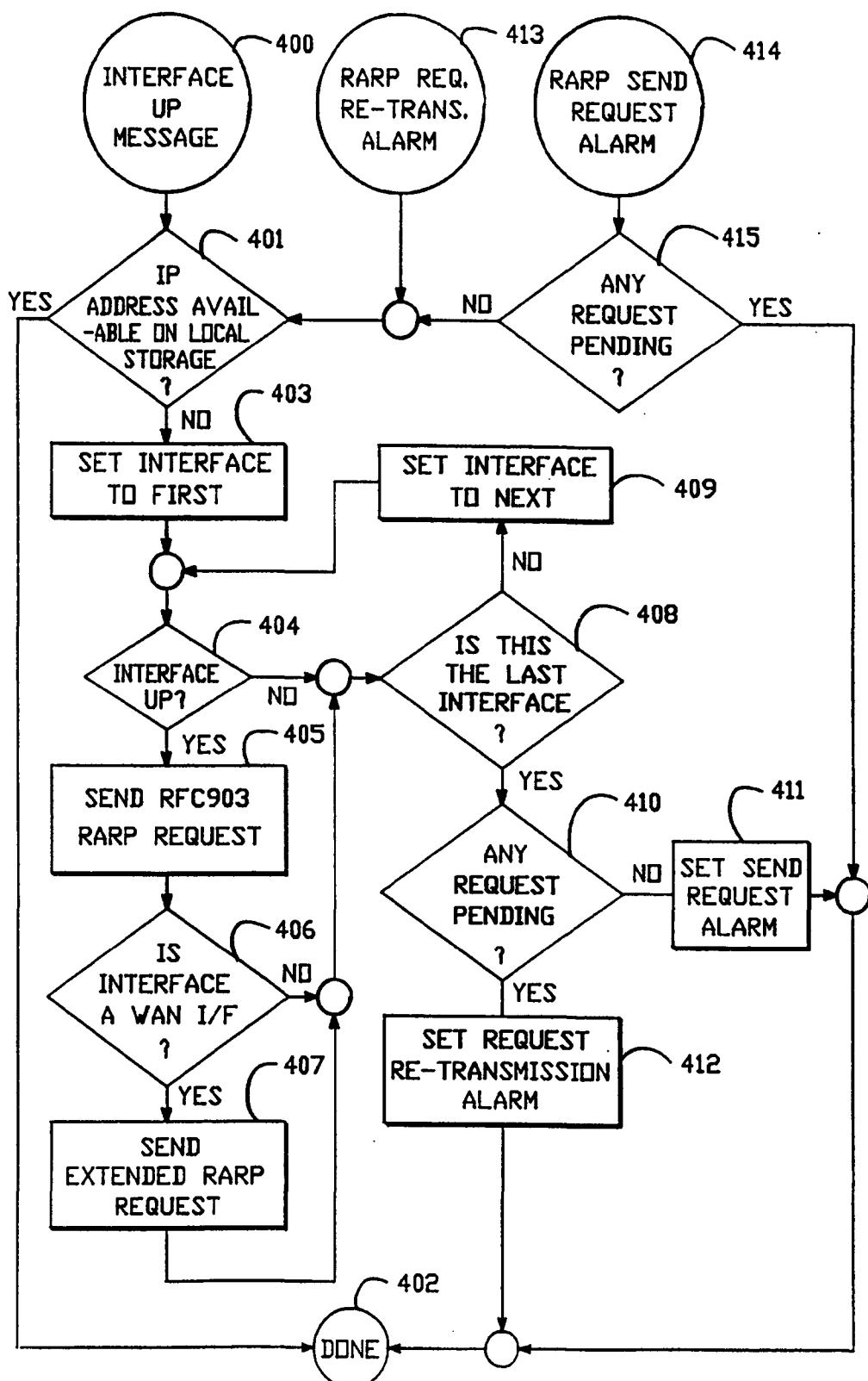


FIG.-3

FIG.-4
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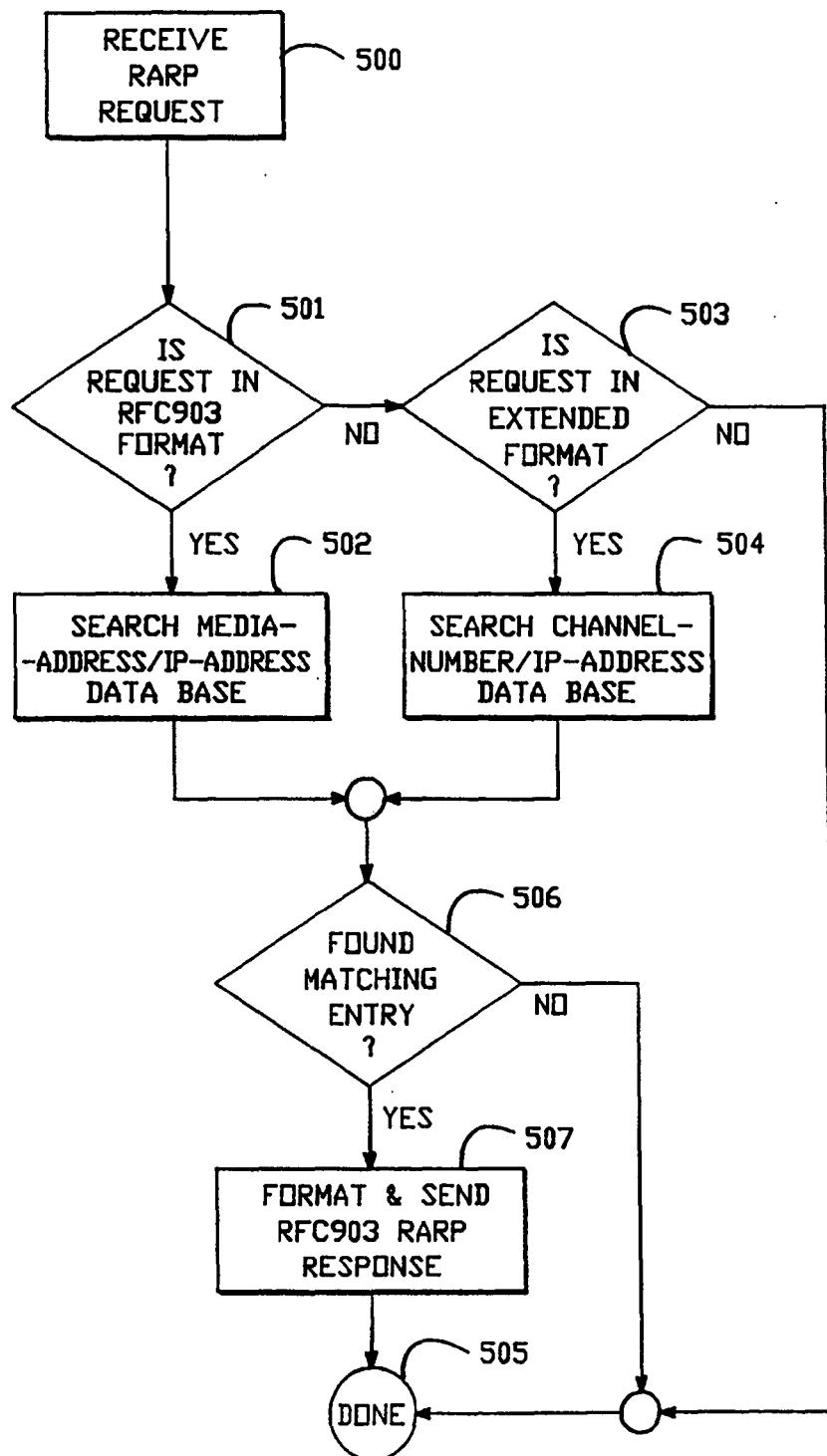


FIG.-5

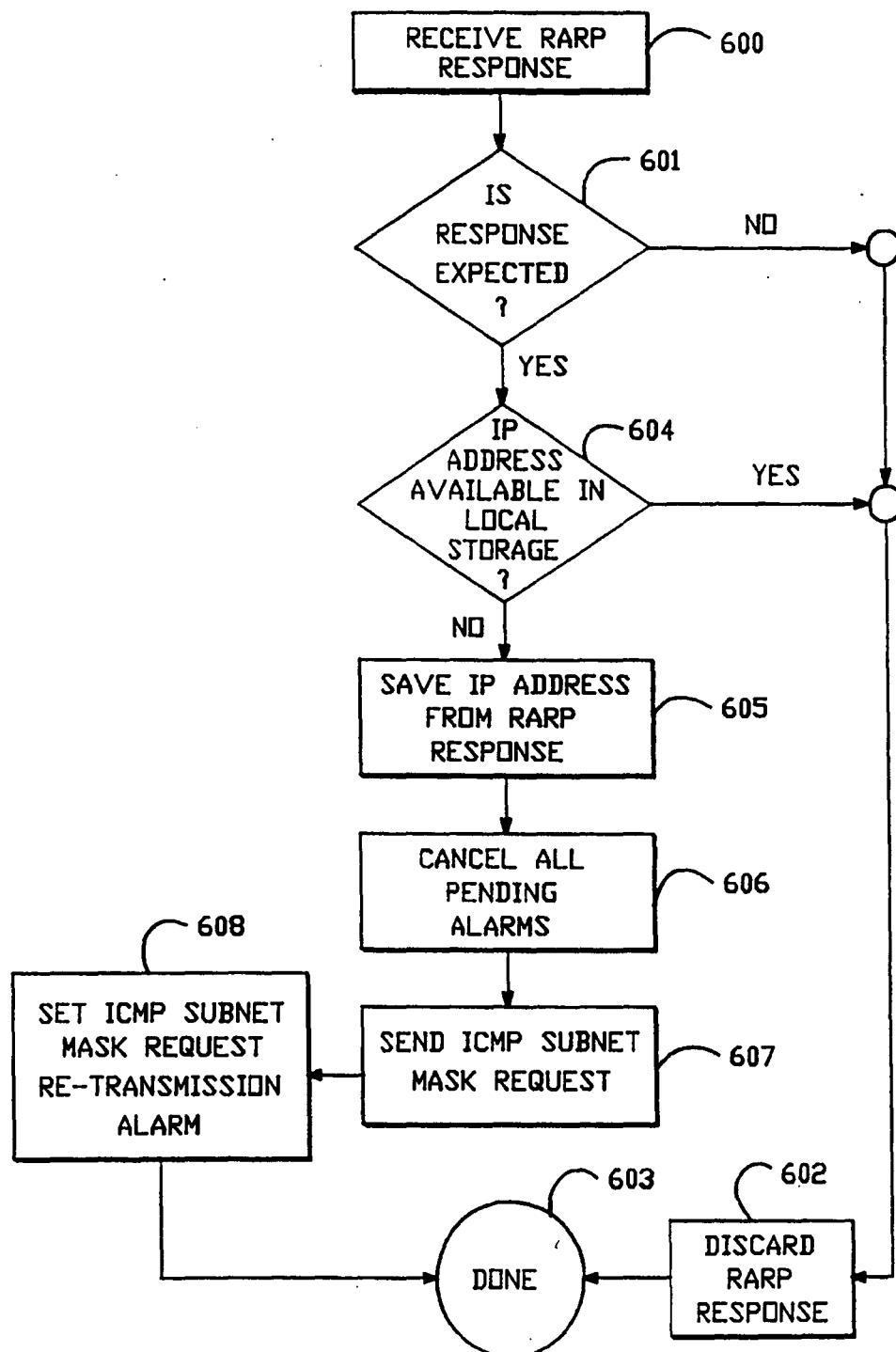


FIG.-6

6 / 8

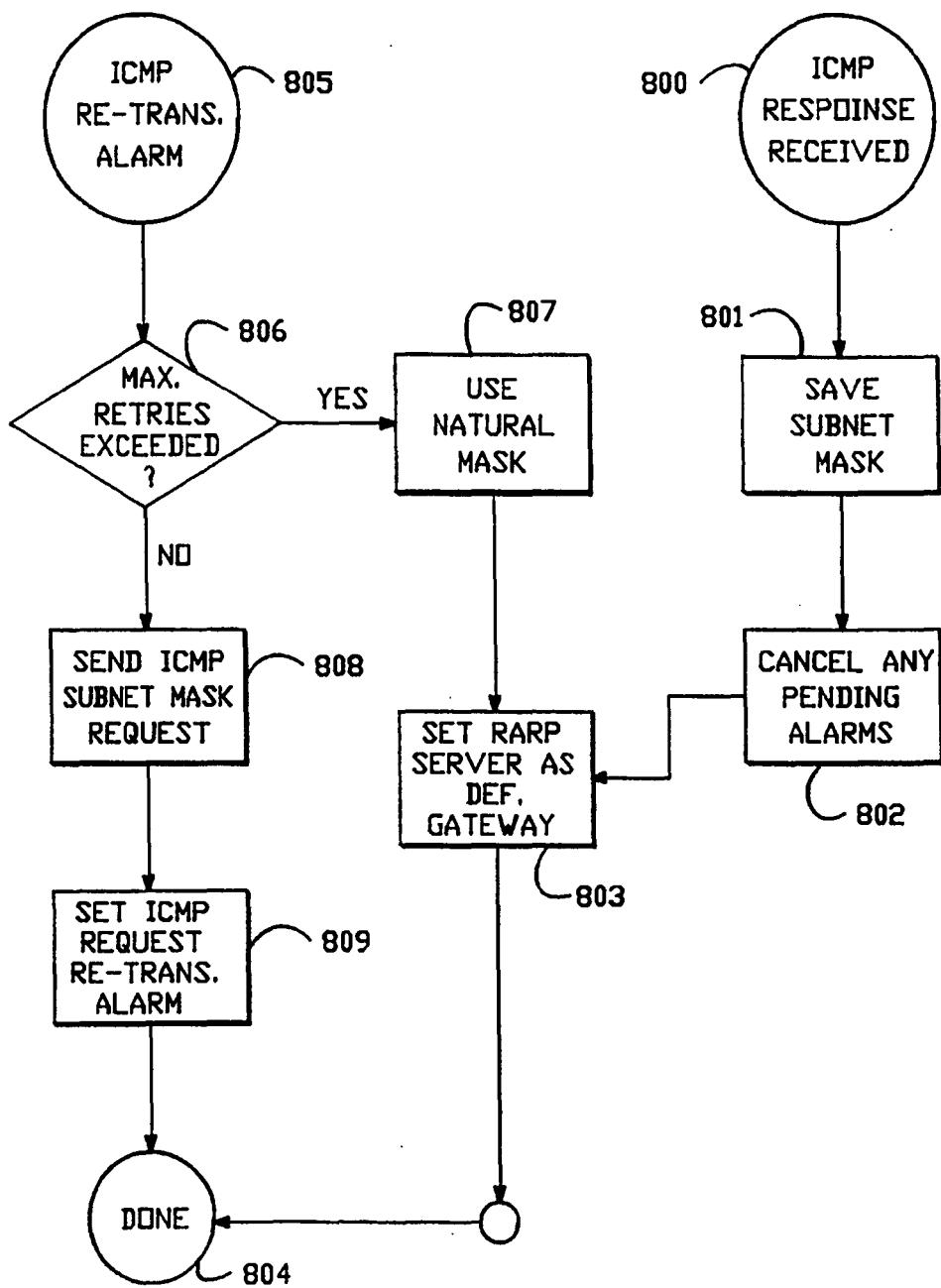


FIG.-8

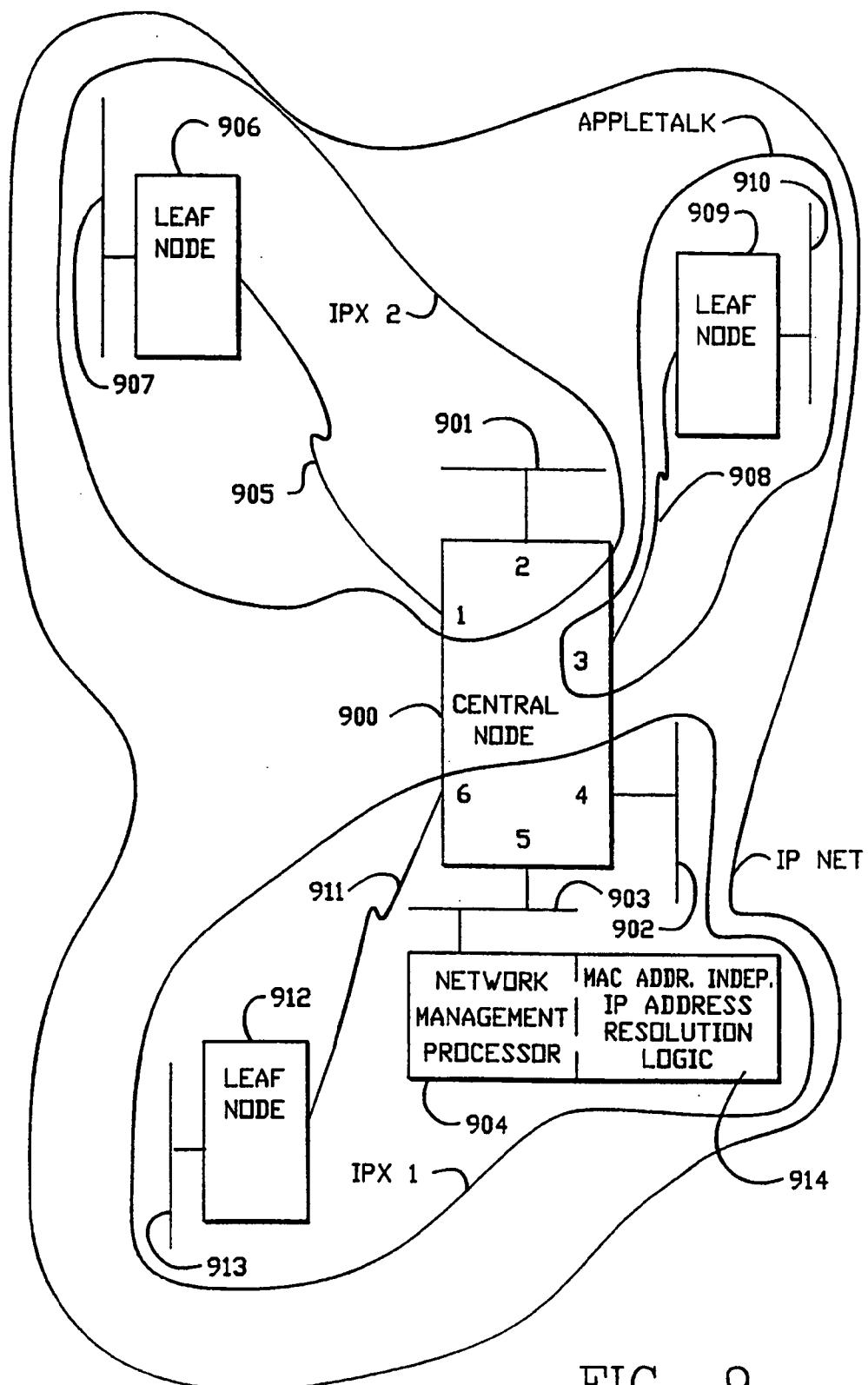


FIG.-9

INTERNATIONAL SEARCH REPORT

In national application No.
PCT/US94/00004

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :G06F 13/00
US CL :395/200

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 395/200

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A, E	US, A, 5,289,579 (PUNJ) 22 February 1994, col. 2 lines 48-56.	1-26
X, E	US, A, 5,287,103 (KASPRZYK ET AL) 15 February 1994, col. 2 lines 15-25, col. 4 lines 45-51, 67-68.	1-26
X, P	US, A, 5,251,300 (HALLIWELL ET AL) 5 October 1993, col. 1 lines 32-43, 46-50, 55-56, col. 2 lines 21-24.	1-5, 11, 12, 18-23, 25, 26
X	US, A, 5,113,495 (UEHARA) 12 May 1992, col. 1 lines 16-19, col. 2 lines 34-37, col. 6 lines 8-10, 22-25, col. 7 lines 16-34, 59-67.	1-5, 11-12, 17-23, 25-26

Further documents are listed in the continuation of Box C. See patent family annex.

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P document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search Date of mailing of the international search report

29 March 1994

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US94/00004

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Loi, "RARP Design Specification"-Draft, 21 August 1992 3Com Corp-Network Systems Div., pages 1-11.	1-26
A	Arunkumar, "Boundary Routing Design Specification"-Draft, 14 September 1992 3Com Corp-Network Systems Div., pages 1-13.	1-26
A	Plummer, "An Ethernet Address Resolution Protocol -or- Converting Network Protocol Address to 48.bit Ethernet Address for Transmission on Ethernet Hardware", November 1982 Symbolics, Inc.	1-26
A	Finlayson et al., "A Reverse Address Resolution Protocol", June 1984 Stanford University.	1-26

Form PCT/ISA/210 (continuation of second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/00004

B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

APS

search terms: reverse address resolution protocol, RARP, processor, channels, communication network, resolution logic, logic, table, internet protocol, IP address

PCT

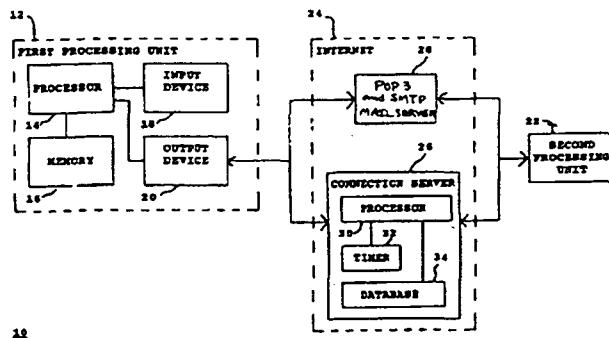
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: POINT-TO-POINT INTERNET PROTOCOL



(57) Abstract

A point-to-point Internet protocol exchanges Internet Protocol (IP) addresses between units to establish a point-to-point communication link between the processing units through the Internet. In accordance with the disclosed protocol, a method of locating a user process over a computer network, the user process having a dynamically assigned network protocol address comprises the steps of (a) maintaining in a computer memory a compilation of entries, each entry comprising a network protocol address of a user process connected to the computer network; and (b) in response to identification of one of the entries by a requesting user processor, providing the network protocol address of the identified entry to the requesting user process. In accordance with another embodiment of the invention, a computer system having an audio transducer and a display device and being operatively coupled to other computers and a server over a computer network comprises (a) means for transmitting an E-mail signal containing a network protocol address of a first process to a second process over the computer network; (b) means for receiving a second network protocol address from the second process over the computer network; and (c) means, for responsive to the second network protocol address for establishing a communication link between the first process and the second process over the computer network.

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POINT-TO-POINT INTERNET PROTOCOL

FIELD OF THE INVENTION

The present invention relates, in general, to data processing systems, and more specifically, to a method and apparatus for facilitating audio communications over computer networks.

5

BACKGROUND OF THE INVENTION

The increased popularity of on-line services such as AMERICA ONLINE™, COMPUUSERVE®, and other services such as Internet gateways have spurred applications to provide multimedia, including 10 video and voice clips, to online users. An example of an online voice clip application is VOICE E-MAIL FOR WINCIM and VOICE E-MAIL FOR AMERICA ONLINE™, available from Bonzi Software, as described in "Simple Utilities Send Voice E-Mail Online", MULTIMEDIA WORLD, VOL. 2, NO. 9, August 1995, p. 52. Using such Voice E-Mail software, a user 15 may create an audio message to be sent to a predetermined E-mail address specified by the user.

Generally, devices interfacing to the Internet and other online services may communicate with each other upon establishing respective device addresses. One type of device address is the Internet Protocol 20 (IP) address, which acts as a pointer to the device associated with the IP address. A typical device may have a Serial Line Internet Protocol or Point-to-Point Protocol (SLIP/PPP) account with a permanent IP address for receiving E-mail, voicemail, and the like over the Internet. E-mail and voicemail is generally intended to convey text, audio, etc., with any 25 routing information such as an IP address and routing headers generally

being considered an artifact of the communication, or even gibberish to the recipient.

Devices such as a host computer or server of a company may include multiple modems for connection of users to the Internet, with a temporary IP address allocated to each user. For example, the host computer may have a general IP address "XXX.XXX.XXX," and each user may be allocated a successive IP address of XXX.XXX.XXX.10, XXX.XXX.XXX.11, XXX.XXX.XXX.12, etc. Such temporary IP addresses may be reassigned or recycled to the users, for example, as each user is successively connected to an outside party. For example, a host computer of a company may support a maximum of 254 IP addresses which are pooled and shared between devices connected to the host computer.

Permanent IP addresses of users and devices accessing the Internet readily support point-to-point communications of voice and video signals over the Internet. For example, realtime video teleconferencing has been implemented using dedicated IP addresses and mechanisms known as reflectors. Due to the dynamic nature of temporary IP addresses of some devices accessing the Internet, point-to-point communications in realtime of voice and video have been generally difficult to attain.

SUMMARY OF THE INVENTION

The above deficiencies in the prior art and the previously described needs are fulfilled by the present invention which provides, a directory server utility for providing the dynamically assigned network protocol addresses of client processes currently coupled to the computer network. Accordingly to one embodiment of the present invention, a method of locating users having dynamically assigned network protocol addresses comprises the steps of

5 maintaining a compilation of entries, each entry comprising a network protocol address of a client process connected to the computer network, and, in response to identification of one of the entries by a requesting client process, providing the network protocol address of the identified entry to the requesting client process.

In accordance with another embodiment of the invention, a computer system having an audio transducer and a display device and being operatively coupled to other computers and a server over a computer network comprises (a) means for transmitting an E-mail signal containing a network protocol address of a first process to a second process over the computer network; (b) means for receiving a second network protocol address from the second process over the computer network; and (c) means, for responsive to the second network protocol address for establishing a communication link between the first process and the second process over the computer network.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the invention will become more readily apparent and may be better understood by referring to the following detailed 20 description of an illustrative embodiment of the present invention, taken in conjunction with the accompanying drawings, in which:

FIG. 1 illustrates, in block diagram format, a system for the disclosed point-to-point Internet protocol;

25 FIG. 2 illustrates, in block diagram format, the system using a secondary point-to-point Internet protocol;

FIG. 3 illustrates, in block diagram format, the system of FIGS. 1-2 with the point-to-point Internet protocol established;

FIG. 4 is another block diagram of the system of FIGS 1-2 with audio communications being conducted;

FIG. 5 illustrates a display screen for a processing unit;

FIG. 6 illustrates another display screen for a processing unit;

FIG. 7 illustrates a flowchart of the initiation of the point-to-point Internet protocols;

5 FIG. 8 illustrates a flowchart of the performance of the primary point-to-point Internet protocols; and

FIG. 9 illustrates a flowchart of the performance of the secondary point-to-point Internet protocol.

DETAILED DESCRIPTION

Referring now in specific detail to the drawings, with like reference numerals identifying similar or identical elements, as shown in FIG. 1, the present disclosure describes a point-to-point network protocol and system 10 for using such a protocol.

In an exemplary embodiment, the system 10 includes a first processing unit 12 for sending at least a voice signal from a first user to a second user. The first processing unit 12 includes a processor 14, a memory 16, an input device 18, and an output device 20. The output device 20 includes at least one modem capable of, for example, 14.4 kbaud communications and operatively connected via wired and/or wireless communication connections to the Internet or other computer networks such as an Intranet, i.e., a private computer network. One skilled in the art would understand that the input device 18 may be implemented at least in part by the modem of the output device 20 to allow input signals from the communication connections to be received. The second processing unit 22 may have a processor, memory, and input and output devices, including at least one modem and associated communication connections, as described above for the first processing unit 12. In an exemplary embodiment, each of the processing units 12, 22 may execute the WEBPHONE™ Internet telephony application available from NetSpeak Corporation, Boca Raton, FL, which is capable of performing the disclosed point-to-point Internet protocol and system 10, as described herein.

The first processing unit 12 and the second processing unit 22 are operatively connected to the Internet 24 by communication devices and software known in the art, such as an Internet Service Provider (ISP) or an Internet gateway. The processing units 12, 22 may be operatively interconnected through the Internet 24 to a connection server 26, and

may also be operatively connected to a mail server 28 associated with the Internet 24.

The connection server 26 includes a processor 30, a timer 32 for generating time stamps, and a memory such as a database 34 for storing, for example, E-mail and Internet Protocol (IP) addresses of logged-in units. In an exemplary embodiment, the connection server 26 may be a SPARC 5 server or a SPARC 20 server, available from SUN MICROSYSTEMS, INC., Mountain View, CA, having a central processing unit (CPU) as processor 30, an operating system (OS) such as UNIX, for providing timing operations such as maintaining the timer 32, a hard drive or fixed drive, as well as dynamic random access memory (DRAM) for storing the database 34, and a keyboard and display and/or other input and output devices (not shown in FIG. 1). The database 34 may be an SQL database available from ORACLE or INFORMIX.

In an exemplary embodiment, the mail server 28 may be a Post Office Protocol (POP) Version 3 mail server including a processor, memory, and stored programs operating in a UNIX environment, or, alternatively, another OS, to process E-mail capabilities between processing units and devices over the Internet 24.

The first processing unit 12 may operate the disclosed point-to-point Internet protocol by a computer program described hereinbelow in conjunction with FIG. 6, which may be implemented from compiled and /or interpreted source code in the C++ programming language and which may be downloaded to the first processing unit 12 from an external computer. The operating computer program may be stored in the memory 16, which may include about 8 MB RAM and/or a hard or fixed drive having about 8 MB. Alternatively, the source code may be implemented in the first processing unit 12 as firmware, as an erasable read only memory (EPROM), etc. It is understood that one skilled in the

art would be able to use programming languages other than C++ to implement the disclosed point-to-point network protocol and system 10.

The processor 14 receives input commands and data from a first user associated with the first processing unit 12 through the input device 18, which may be an input port connected by a wired, optical, or a wireless connection for electromagnetic transmissions, or alternatively may be transferable storage media, such as floppy disks, magnetic tapes, compact disks, or other storage media including the input data from the first user.

10 The input device 18 may include a user interface (not shown) having, for example, at least one button actuated by the user to input commands to select from a plurality of operating modes to operate the first processing unit 12. In alternative embodiments, the input device 18 may include a keyboard, a mouse, a touch screen, and/or a data reading device such as a disk drive for receiving the input data from input data files stored in storage media such as a floppy disk or, for example, an 8 mm storage tape. The input device 18 may alternatively include connections to other computer systems to receive the input commands and data therefrom.

20 The first processing unit 12 may include a visual interface for use in conjunction with the input device 18 and output device 20 similar to those screens illustrated in FIGS. 5-6, discussed below. It is also understood that alternative devices may be used to receive commands and data from the user, such as keyboards, mouse devices, and graphical user interfaces (GUI) such as WINDOWS™ 3.1 available from MICROSOFT Corporation, Redmond, WA., and other operating systems and GUIs, such as OS/2 and OS/2 WARP, available from IBM CORPORATION, Boca Raton, FL. Processing unit 12 may also include microphones and/or telephone handsets for receiving audio voice data

and commands, speech or voice recognition devices, dual tone multi-frequency (DTMF) based devices, and/or software known in the art to accept voice data and commands and to operate the first processing unit 12.

5 In addition, either of the first processing unit 12 and the second processing unit 22 may be implemented in a personal digital assistant (PDA) providing modem and E-mail capabilities and Internet access, with the PDA providing the input/output screens for mouse interactions or for touchscreen activation as shown, for example, in FIGS. 5-6, as a
10 combination of the input device 18 and output device 20.

For clarity of explanation, the illustrative embodiment of the disclosed point-to-point Internet protocol and system 10 is presented as having individual functional blocks, which may include functional blocks labeled as "processor" and "processing unit". The functions represented 15 by these blocks may be provided through the use of either shared or dedicated hardware, including, but not limited to, hardware capable of executing software. For example, the functions of each of the processors and processing units presented herein may be provided by a shared processor or by a plurality of individual processors. Moreover, the use of 20 the functional blocks with accompanying labels herein is not to be construed to refer exclusively to hardware capable of executing software. Illustrative embodiments may include digital signal processor (DSP) hardware, such as the AT&T DSP16 or DSP32C, read-only memory (ROM) for storing software performing the operations discussed below, 25 and random access memory (RAM) for storing DSP results. Very large scale integration (VLSI) hardware embodiments, as well as custom VLSI circuitry in combination with a general purpose DSP circuit, may also be provided. Any and all of these embodiments may be deemed to fail within the meaning of the labels for the functional blocks as used herein.

The processing units 12, 22 are capable of placing calls and connecting to other processing units connected to the Internet 24, for example, via dialup SLIP/PPP lines. In an exemplary embodiment, each processing unit assigns an unsigned long session number, for example, a 5 32-bit long sequence in a *.ini file for each call. Each call may be assigned a successive session number in sequence, which may be used by the respective processing unit to associate the call with one of the SLIP/PPP lines, to associate a <ConnectOK> response signal with a <Connect Request> signal, and to allow for multiplexing and 10 demultiplexing of inbound and outbound conversations on conference lines, as explained hereinafter.

For callee (or called) processing units with fixed IP addresses, the caller (or calling) processing unit may open a "socket", i.e. a file handle or address indicating where data is to be sent, and transmit a <Call> 15 command to establish communication with the callee utilizing, for example, datagram services such as Internet Standard network layering as well as transport layering, which may include a Transport Control Protocol (TCP) or a User Datagram Protocol (UDP) on top of the IP. Typically, a processing unit having a fixed IP address may maintain at 20 least one open socket and a called processing unit waits for a <Call> command to assign the open socket to the incoming signal. If all lines are in use, the callee processing unit sends a BUSY signal or message to the callee processing unit. As shown in FIG. 1, the disclosed point-to-point Internet protocol and system 10 operate when a callee processing 25 unit does not have a fixed or predetermined IP address. In the exemplary embodiment and without loss of generality, the first processing unit 12 is the caller processing unit and the second processing unit 22 is the called processing unit. When either of processing units 12, 22 logs on to the Internet via a dial-up connection, the respective unit is provided a

dynamically allocated IP address by the a connection service provider.

Upon the first user initiating the point-to-point Internet protocol when the first user is logged on to the Internet 24, the first processing unit 12 automatically transmits its associated E-mail address and its 5 dynamically allocated IP address to the connection server 26. The connection server 26 then stores these addresses in the database 34 and time stamps the stored addresses using timer 32. The first user operating the first processing unit 12 is thus established in the database 34 as an active on-line party available for communication using the 10 disclosed point-to-point Internet protocol. Similarly, a second user operating the second processing unit 22, upon connection to the Internet 24 through the a connection service provider, is processed by the connection server 26 to be established in the database 34 as an active on-line party.

15 The connection server 26 may use the time stamps to update the status of each processing unit; for example, after 2 hours, so that the on-line status information stored in the database 34 is relatively current. Other predetermined time periods, such as a default value of 24 hours, may be configured by a systems operator.

20 The first user with the first processing unit 12 initiates a call using, for example, a Send command and/or a command to speeddial an NTH stored number, which may be labeled [SND] and [SPD] [N], respectively, by the input device 18 and/or the output device 20, such as shown in FIGS. 5-6. In response to either the Send or speeddial commands, the 25 first processing unit 12 retrieves from memory 16 a stored E-mail address of the callee corresponding to the NTH stored number. Alternatively, the first user may directly enter the E-mail address of the callee.

The first processing unit 12 then sends a query, including the E-mail address of the callee, to the connection server 26. The connection

- server 26 then searches the database 34 to determine whether the callee is logged-in by finding any stored information corresponding to the callee's E-mail address indicating that the callee is active and on-line. If the callee is active and on-line, the connection server 26 then performs
- 5 the primary point-to-point Internet protocol; i.e. the IP address of the callee is retrieved from the database 34 and sent to the first processing unit 12. The first processing unit 12 may then directly establish the point-to-point Internet communications with the callee using the IP address of the callee.
- 10 If the callee is not on-line when the connection server 26 determines the callee's status, the connection server 26 sends an OFF-LINE signal or message to the first processing unit 12. The first processing unit 12 may also display a message such as "Called Party Off-Line" to the first user.
- 15 When a user logs off or goes off-line from the Internet 24, the connection server 26 updates the status of the user in the database 34; for example, by removing the user's information, or by flagging the user as being off-line. The connection server 26 may be instructed to update the user's information in the database 34 by an off-line message, such as
- 20 a data packet, sent automatically from the processing unit of the user prior to being disconnected from the connection server 26. Accordingly, an off-line user is effectively disabled from making and/or receiving point-to-point Internet communications.

As shown in FIGS. 2-4, the disclosed secondary point-to-point Internet protocol may be used as an alternative to the primary point-to-point Internet protocol described above, for example, if the connection server 26 is non-responsive, inoperative, and/or unable to perform the primary point-to-point Internet protocol, as a non-responsive condition. Alternatively, the disclosed secondary point-to-point Internet protocol may

be used independent of the primary point-to-point Internet protocol. In the disclosed secondary point-to-point Internet protocol, the first processing unit 12 sends a <ConnectRequest> message via E-mail over the Internet 24 to the mail server 28. The E-mail including the 5 <ConnectRequest> message may have, for example, the subject

[*wp#XXXXXXXX#nnn.nnn.nnn.#emailAddr]

where nnn.nnn.nnn.nnn. is the current (i.e. temporary or permanent) IP address of the first user, and XXXXXXXX is a session number, which may be unique and associated with the request of the first user to initiate 10 point-to-point communication with the second user.

As described above, the first processing unit 12 may send the <ConnectRequest> message in response to an unsuccessful attempt to perform the primary point-to-point Internet protocol. Alternatively, the first processing unit 12 may send the <ConnectRequest> message in 15 response to the first user initiating a SEND command or the like.

After the <ConnectRequest> message via E-mail is sent, the first processing unit 12 opens a socket and waits to detect a response from the second processing unit 22. A timeout timer, such as timer 32, may be set by the first processing unit 12, in a manner known in the art, to wait 20 for a predetermined duration to receive a <ConnectOK> signal. The processor 14 of the first processing unit 12 may cause the output device 20 to output a Ring signal to the user, such as an audible ringing sound, about every 3 seconds . For example, the processor 14 may output a *.wav file, which may be labeled RING.WAV, which is processed by the 25 output device 20 to output an audible ringing sound.

The mail server 28 then polls the second processing unit 22, for example, every 3-5 seconds, to deliver the E-mail. Generally, the second processing unit 22 checks the incoming lines, for example, at regular intervals to wait for and to detect incoming E-mail from the mail server 28

through the Internet 24.

Typically, for sending E-mail to users having associated processing units operatively connected to a host computer or server operating an Internet gateway, E-mail for a specific user may be sent over the Internet 24 and directed to the permanent IP address or the SLIP/PPP account designation of the host computer, which then assigns a temporary IP address to the processing unit of the specified user for properly routing the E-mail. The E-mail signal may include a name or other designation such as a user name which identifies the specific user regardless of the processing unit assigned to the user; that is, the host computer may track and store the specific device where a specific user is assigned or logged on, independent of the IP address system, and so the host computer may switch the E-mail signal to the device of the specific user. At that time, a temporary IP address may be generated or assigned to the specific user and device.

Upon detecting and/or receiving the incoming E-mail signal from the first processing unit 12, the second processing unit 22 may assign or may be assigned a temporary IP address. Therefore, the delivery of the E-mail through the Internet 24 provides the second processing unit 22 with a session number as well as IP addresses of both the first processing unit 12 and the second processing unit 22.

Point-to-point communication may then be established by the processing unit 22 processing the E-mail signal to extract the <ConnectRequest> message, including the IP address of the first processing unit 12 and the session number. The second processing unit 22 may then open a socket and generate a <ConnectOK> response signal, which includes the temporary IP address of the second processing unit 22 as well as the session number of the first processing unit.

The second processing unit 22 sends the <ConnectOK> signal

directly over the Internet 24 to the IP address of the first processing unit 12 without processing by the mail server 28, and a timeout timer of the second processing unit 22 may be set to wait and detect a <Call> signal expected from the first processing unit 12.

5 Realtime point-to-point communication of audio signals over the Internet 24, as well as video and voicemail, may thus be established and supported without requiring permanent IP addresses to be assigned to either of the users or processing units 12, 22. For the duration of the realtime point-to-point link, the relative permanence of the current IP
10 addresses of the processing units 12, 22 is sufficient, whether the current IP addresses were permanent (i.e. predetermined or preassigned) or temporary (i.e. assigned upon initiation of the point-to-point communication).

15 In the exemplary embodiment, a first user operating the first processing unit 12 is not required to be notified by the first processing unit 12 that an E-mail is being generated and sent to establish the point-to-point link with the second user at the second processing unit 22. Similarly, the second user is not required to be notified by the second processing unit 22 that an E-mail has been received and/or a temporary IP address is associated with the second processing unit 22. The
20 processing units 12, 22 may perform the disclosed point-to-point Internet protocol automatically upon initiation of the point-to-point communication command by the first user without displaying the E-mail interactions to either user. Accordingly, the disclosed point-to-point Internet protocol may be transparent to the users. Alternatively, either of the first and second users may receive, for example, a brief message of "CONNECTION IN PROGRESS" or the like on a display of the respective
25 output device of the processing units 12, 22.

After the initiation of either the primary or the secondary point-to-

point Internet protocols described above in conjunction with FIGS. 1-2, the point-to-point communication link over the Internet 24 may be established as shown in FIGS. 3-4 in a manner known in the art. For example, referring to FIG. 3, upon receiving the <ConnectorOK> signal from the second processing unit 22, the first processing unit 12 extracts the IP address of the second processing unit 22 and the session number, and the session number sent from the second processing unit 22 is then checked with the session number originally sent from the first processing unit 12 in the <ConnectRequest> message as E-mail. If the session numbers sent and received by the processing unit 12 match, then the first processing unit 12 sends a <Call> signal directly over the Internet 24 to the second processing unit 22; i.e. using the IP address of the second processing unit 22 provided to the first processing unit 12 in the <ConnectOK> signal.

Upon receiving the <Call> signal, the second processing unit 22 may then begin a ring sequence, for example, by indicating or annunciating to the second user that an incoming call is being received. For example, the word "CALL" may be displayed on the output device of the second processing unit 22. The second user may then activate the second processing unit 22 to receive the incoming call.

Referring to FIG. 4, after the second processing unit 22 receives the incoming call, realtime audio and/or video conversations may be conducted in a manner known in the art between the first and second users through the Internet 24, for example, by compressed digital audio signals. Each of the processing units 12, 22 also display to each respective user the words "IN USE" to indicate that the point-to-point communication link is established and audio or video signals are being transmitted.

In addition, either user may terminate the point-to-point

communication link by, for example, activating a termination command, such as by activating an [END] button or icon on a respective processing unit, causing the respective processing unit to send an <End> signal which causes both processing units to terminate the respective sockets, 5 as well as to perform other cleanup commands and functions known in the art.

FIGS. 5-6 illustrate examples of display screens 36 which may be output by a respective output device of each processing unit 12, 22 of FIGS. 1-4 for providing the disclosed point-to-point Internet protocol and 10 system 10. Such display screens may be displayed on a display of a personal computer (PC) or a PDA in a manner known in the art.

As shown in FIG. 5, a first display screen 36 includes a status area 38 for indicating, for example, a called user by name and/or by IP address or telephone number; a current function such as C2; a current 15 time; a current operating status such as "IN USE", and other control icons such as a down arrow icon 40 for scrolling down a list of parties on a current conference line. The operating status may include such annunciators as "IN USE," "IDLE," "BUSY," "NO ANSWER," "OFFLINE," "CALL," "DIALING," "MESSAGES," and "SPEEDDIAL."

Other areas of the display screen 36 may include activation areas 20 or icons for actuating commands or entering data. For example, the display screen 36 may include a set of icons 42 arranged in columns and rows including digits 0-9 and commands such as END, SND, HLD, etc. For example, the END and SND commands may be initiated as described 25 above, and the HLD icon 44 may be actuated to place a current line on hold. Such icons may also be configured to substantially simulate a telephone handset or a cellular telephone interface to facilitate ease of use, as well as to simulate function keys of a keyboard. For example, icons labeled L1-L4 may be mapped to function keys F1-F4 on standard

PC keyboards, and icons C1-C3 may be mapped to perform as combinations of function keys, such as CTRL-F1, CTRL-F2, and CTRL-F3, respectively. In addition, the icons labeled L1-L4 and C1-C3 may include circular regions which may simulate light emitting diodes (LEDs) 5 which indicate that the function or element represented by the respective icon is active or being performed.

Icons L1-L4 may represent each of 4 lines available to the caller, and icons C1-C3 may represent conference calls using at least one line to connect, for example, two or more parties in a conference call. The 10 icons L1-L4 and C1-C3 may indicate the activity of each respective line or conference line. For example, as illustrated in FIG. 5, icons L1-L2 may have lightly shaded or colored circles, such as a green circle, indicating that each of lines 1 and 2 are in use, while icons L3-L4 may have darkly shaded or color circles, such as a red or black circle, indicating that each 15 of lines 3 and 4 are not in use. Similarly, the lightly shaded circle of the icon labeled C2 indicates that the function corresponding to C2 is active, as additionally indicated in the status area 38, while darkly shaded circles of icons labeled C1 and C3 indicate that such corresponding functions are not active.

20 The icons 42 are used in conjunction with the status area 38. For example, using a mouse for input, a line that is in use, as indicated by the lightly colored circle of the icon, may be activated to indicate a party's name by clicking a right mouse button for 5 seconds until another mouse click is actuated or the [ESC] key or icon is actuated. Thus, the user may 25 switch between multiple calls in progress on respective lines.

Using the icons as well as an input device such as a mouse, a user may enter the name or alias or IP address, if known, of a party to be called by either manually entering the name, by using the speeddial feature, or by double clicking on an entry in a directory stored in the

memory, such as the memory 16 of the first processing unit 12, where the directory entries may be scrolled using the status area 38 and the down arrow icon 40.

Once a called party is listed in the status area 38 as being active
5 on a line, the user may transfer the called party to another line or a conference line by clicking and dragging the status area 38, which is represented by a reduced icon 46. Dragging the reduced icon 46 to any one of line icons L1-L4 transfers the called party in use to the selected line, and dragging the reduced icon 46 to any one of conference line
10 icons C1-C3 adds the called party to the selected conference call.

Other features may be supported, such as icons 48-52, where icon 48 corresponds to, for example, an ALT-X command to exit the communication facility of a processing unit, and icon 50 corresponds to, for example, an ALT-M command to minimize or maximize the display
15 screen 36 by the output device of the processing unit. Icon 52 corresponds to an OPEN command, which may, for example, correspond to pressing the O key on a keyboard, to expand or contract the display screen 36 to represent the opening and closing of a cellular telephone. An "opened" configuration is shown in FIG. 5, and a "closed"
20 configuration is shown in FIG. 6. In the "opened" configuration, additional features such as output volume (VOL) controls, input microphone (MIC) controls, waveform (WAV) sound controls, etc.

The use of display screens such as those shown in FIGS. 5-6 provided flexibility in implementing various features available to the user.
25 It is to be understood that additional features such as those known in the art may be supported by the processing units 12, 22.

Alternatively, it is to be understood that one skilled in the art may implement the processing units 12, 22 to have the features of the display screens in FIGS. 5-6 in hardware; i.e. a wired telephone or wireless

cellular telephone may include various keys, LEDs, liquid crystal displays (LCDs), and touchscreen actuators corresponding to the icons and features shown in FIGS. 5-6. In addition, a PC may have the keys of a keyboard and mouse mapped to the icons and features shown in FIGS.

5 5-6.

Referring to FIG. 7, the disclosed point-to-point Internet protocol and system 10 is illustrated. First processing unit 12 initiates the point-to-point Internet protocol in step 56 by sending a query from the first processing unit 12 to the connection server 26. If connection server 26 is operative to perform the point-to-point Internet protocol, in step 58, first processing unit 12 receives an on-line status signal from the connection server 26, such signal may include the IP address of the callee or a "Callee Off-Line" message. Next, first processing unit 12 performs the primary point-to-point Internet protocol in step 60, which may include receiving, at the first processing unit 12, the IP address of the callee if the callee is active and on-line. Alternatively, processing unit 60 may initiate and perform the secondary point-to-point Internet protocol in step 62, if the called party is not active and/or on-line.

Referring to FIG. 8, in conjunction with FIGS. 1 and 3-4, the disclosed point-to-point Internet protocol and system 10 is illustrated. Connection server 26 starts the point-to-point Internet protocol, in step 64, and timestamps and stores E-mail and IP addresses of logged-in users and processing units in the database 34 in step 66. Connection server 26 receives a query from a first processing unit 12 in step 68 to determine whether a second user or second processing unit 22 is logged-in to the Internet 24, with the second user being specified, for example, by an E-mail address. Connection server 26 retrieves the IP address of the specified user from the database 34 in step 70, if the specified user is logged-in to the Internet, and sends the retrieved IP address to the first

cellular telephone may include various keys, LEDs, liquid crystal displays (LCDs), and touchscreen actuators corresponding to the icons and features shown in FIGS. 5-6. In addition, a PC may have the keys of a keyboard and mouse mapped to the icons and features shown in FIGS.

5 5-6.

Referring to FIG. 7, the disclosed point-to-point Internet protocol and system 10 is illustrated. First processing unit 12 initiates the point-to-point Internet protocol in step 56 by sending a query from the first processing unit 12 to the connection server 26. If connection server 26 is 10 operative to perform the point-to-point Internet protocol, in step 58, first processing unit 12 receives an on-line status signal from the connection server 26, such signal may include the IP address of the callee or a "Callee Off-Line" message. Next, first processing unit 12 performs the primary point-to-point Internet protocol in step 60, which may include 15 receiving, at the first processing unit 12, the IP address of the callee if the callee is active and on-line. Alternatively, processing unit 60 may initiate and perform the secondary point-to-point Internet protocol in step 62, if the called party is not active and/or on-line.

Referring to FIG. 8, in conjunction with FIGS. 1 and 3-4, the 20 disclosed point-to-point Internet protocol and system 10 is illustrated. Connection server 26 starts the point-to-point Internet protocol, in step 64, and timestamps and stores E-mail and IP addresses of logged-in users and processing units in the database 34 in step 66. Connection server 26 receives a query from a first processing unit 12 in step 68 to 25 determine whether a second user or second processing unit 22 is logged-in to the Internet 24, with the second user being specified, for example, by an E-mail address. Connection server 26 retrieves the IP address of the specified user from the database 34 in step 70, if the specified user is logged-in to the Internet, and sends the retrieved IP address to the first

processing unit 12 in step 72 to enable first processing unit 12 to establish point-to-point communications with the specified second user.

The disclosed secondary point-to-point Internet protocol operates as shown in FIG. 9. First processing unit 12 generates an E-mail signal, 5 including a session number and a first IP address corresponding to a first processing unit in step 76. First processing unit 12 transmits the E-mail signal as a <ConnectRequest> signal to the Internet 24 in step 78. The E-mail signal is delivered through the Internet 24 using a mail server 28 to the second processing unit 22 in step 80. Second processing unit 22 extracts the session number and the first IP address from the E-mail 10 signal in step 82 and transmits or sends the session number and a second IP address corresponding to the second processing unit 22, back to the first processing unit 12 through the Internet 24, in step 84. First processing unit 12 verifies the session number received from the second 15 processing unit 22 in step 86, and establishes a point-to-point Internet communication link between the first processing unit 12 and second processing unit 22 using the first and second IP addresses in step 88.

While the disclosed point-to-point Internet protocols and system have been particularly shown and described with reference to the 20 preferred embodiments, it is understood by those skilled in the art that various modifications in form and detail may be made therein without departing from the scope and spirit of the invention. Accordingly, modifications such as those suggested above, but not limited thereto, are to be considered within the scope of the invention.

What is claimed is:

1. 1. A method of locating a user over a computer network comprising
2. the steps of :
 3. A. maintaining a list having a plurality of entries, each entry
4. comprising the current Internet protocol address for a user
5. connected to the Internet; and
 6. B. in response to selection of one of the list entries by a
7. requesting user, providing the corresponding Internet
8. protocol address of the selected entry to the requesting user.
1. 2. A method for locating users having dynamically assigned network
2. protocol addresses over a computer network, the method
3. comprising the steps of:
 4. A. maintaining in a computer memory, a compilation of entries,
5. each entry comprising a network protocol address of a user
6. process connected to the computer network;
 7. B. in response to identification of one of the entries by a
8. requesting user process, providing the network protocol
9. address of the identified entry to the requesting user
10. process.
1. 3. The method of claim 2 wherein the network protocol address is an
2. Internet protocol address.
1. 4. The method of claim 2 further comprising the step of:
 2. C. modifying the compilation of entries.
1. 5. The method of claim 4 wherein step C further comprises:

- 1 C.1 modifying an entry of the compilation upon the occurrence of
2 a predetermined event.
- 1 6. The method of claim 5 wherein the predetermined event
2 comprises notification from a user process that the user process is
3 coupled to the network.
- 1 7. The method of claim 5 wherein the predetermined event
2 comprises expiration of a predefined time interval since notification
3 from the user process.
- 1 8. In a computer system having a display and audio transducer, the
2 computer system coupled to other computers and a server over a
3 computer network, the apparatus for establishing a point-to-point
4 communication link comprising:
5 a. means for transmitting, from the first process to a server, a
6 query as to whether a second process is connected to the
7 computer network;
8 b. means for receiving a network protocol address of the
9 second process from the server when the second process is
10 connected to the computer network; and
11 c. means, responsive to the network protocol address of the
12 second process, for establishing a point-to-point
13 communication link between the first process and the second
14 process over the computer network.
- 1 9. The computer apparatus of claim 8 further comprising:
2 d. means for receiving audio data and transmitting the audio
3 data to the second processor over the established point-to-

1 point communication link.

- 1 10. In a computer system, the computer system having an audio
2 transducer and a display device and being operatively coupled to
3 other computer system and a server over a computer network,
4 apparatus for establishing a point-to-point communication link
5 comprising:
6 a. means for transmitting an E-mail signal containing a network
7 protocol address from the first process to a second client
8 process over the computer network;
9 b. means for receiving a second network protocol address from
10 the second process over the computer network; and
11 c. means, responsive to the second network protocol address,
12 for establishing a point-to-point communication link between
13 the first process and the second process over the computer
14 network.

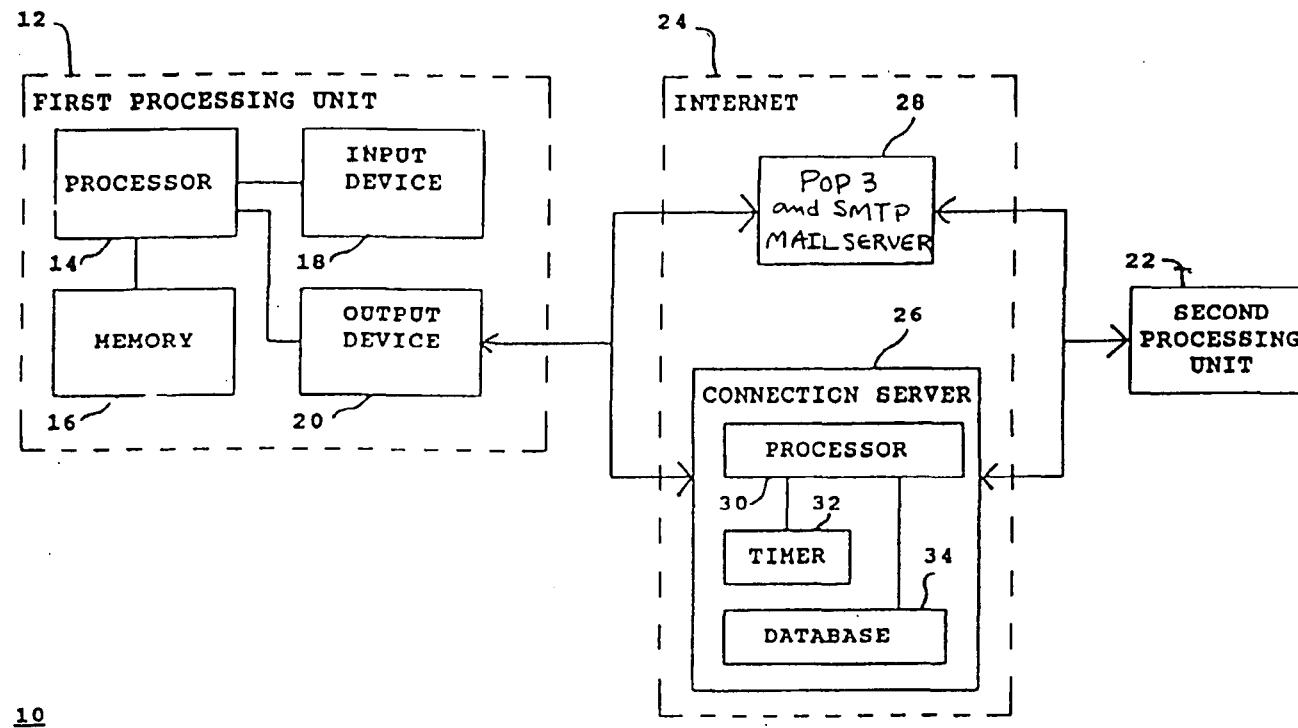


FIG. 1

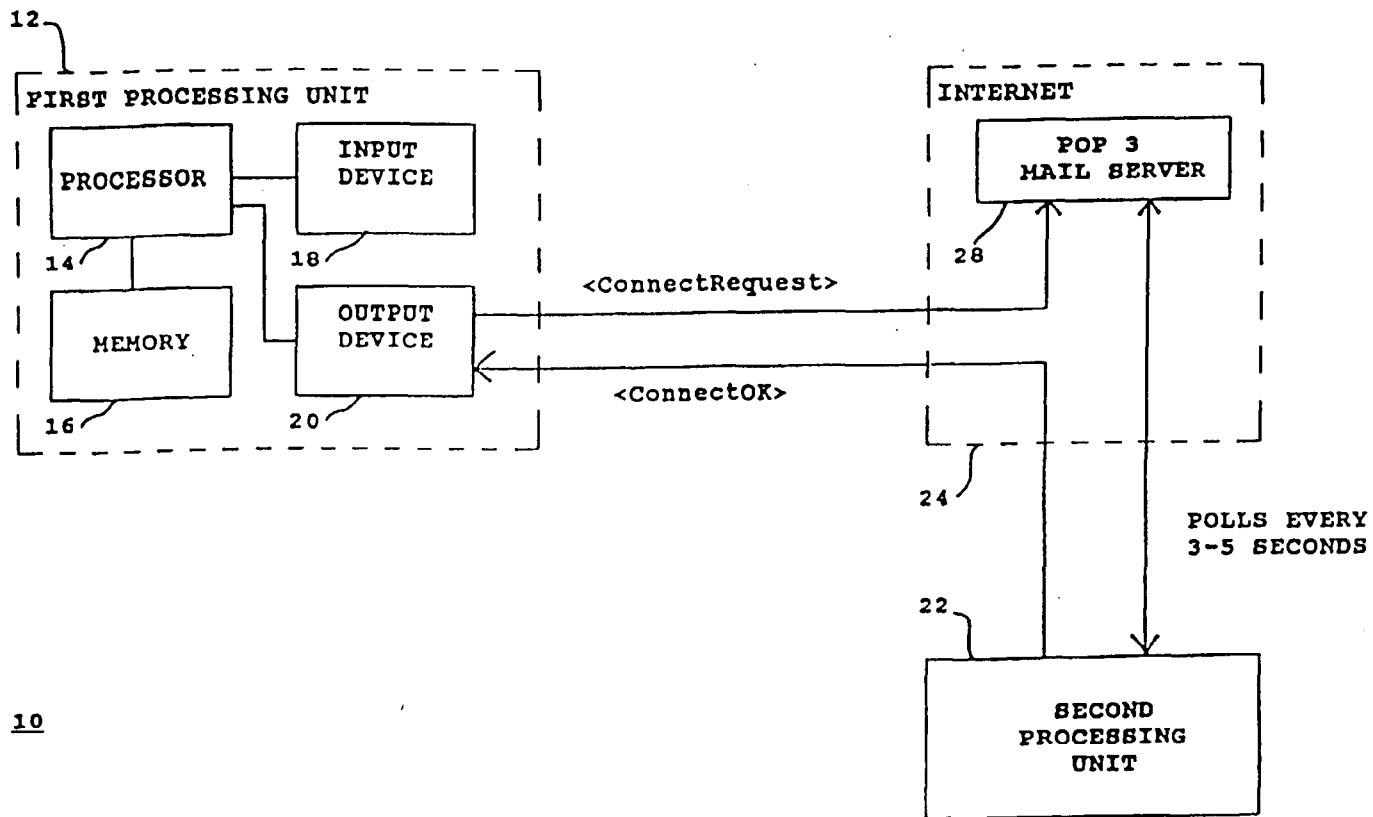
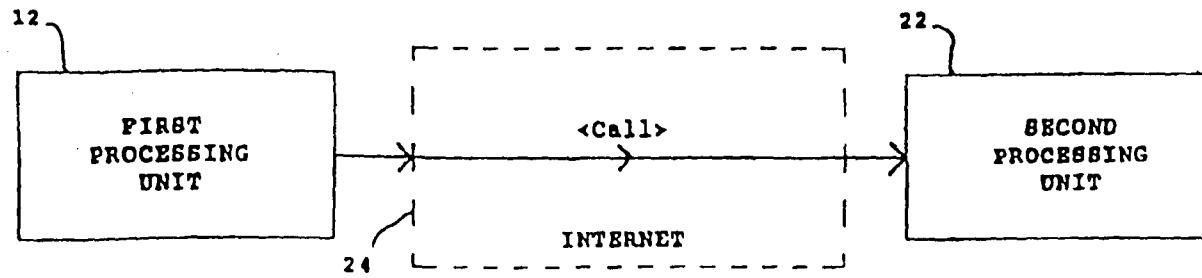


FIG. 2



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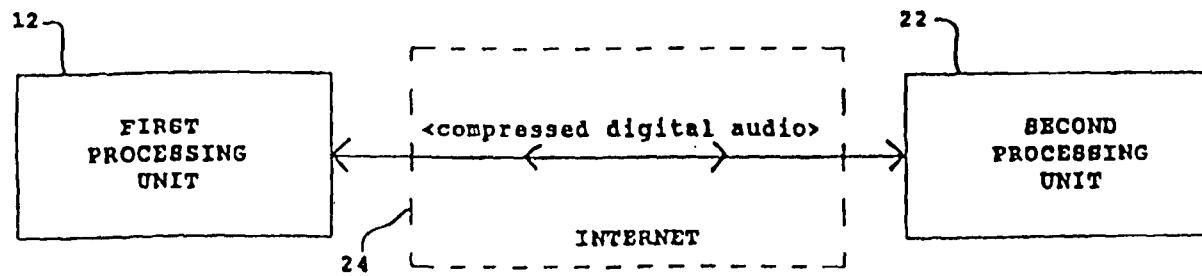


FIG. 4

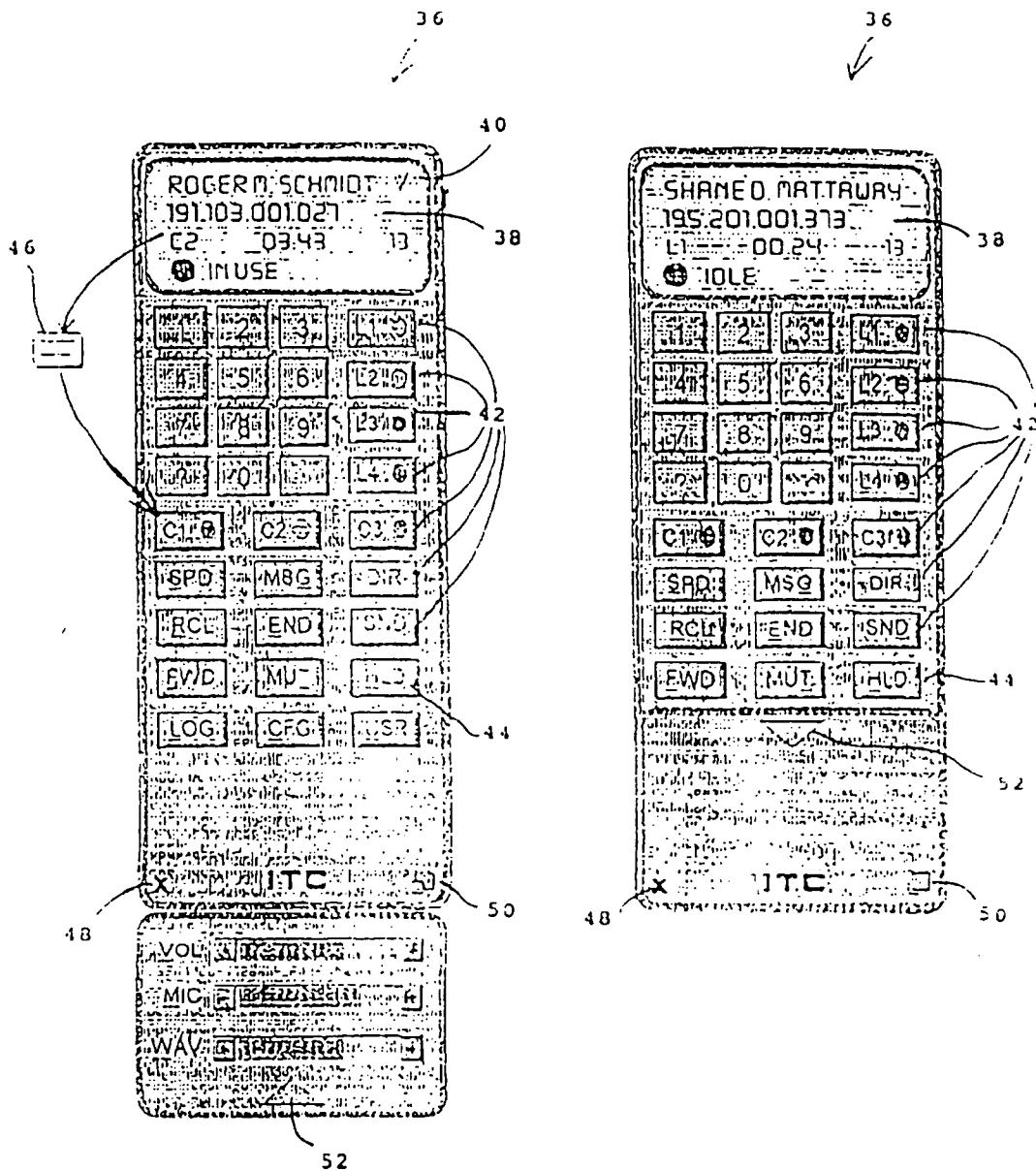
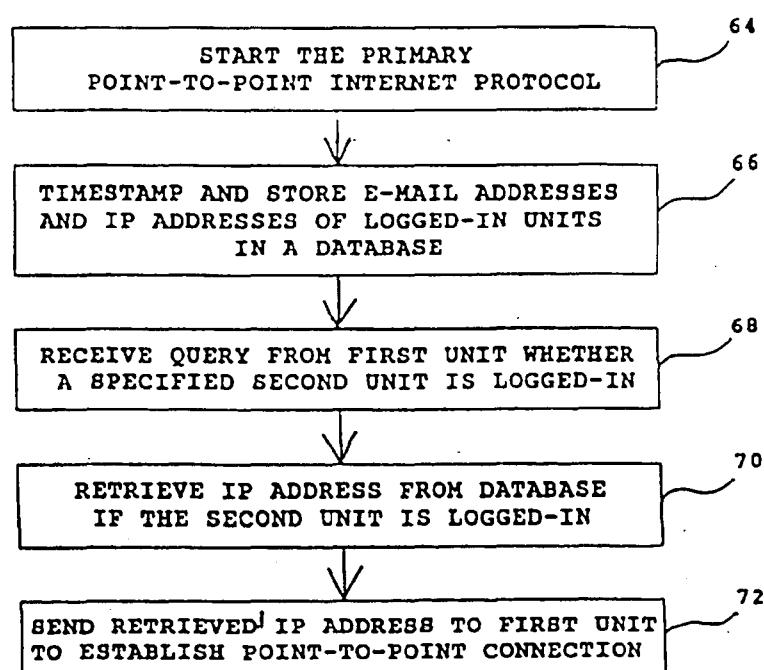
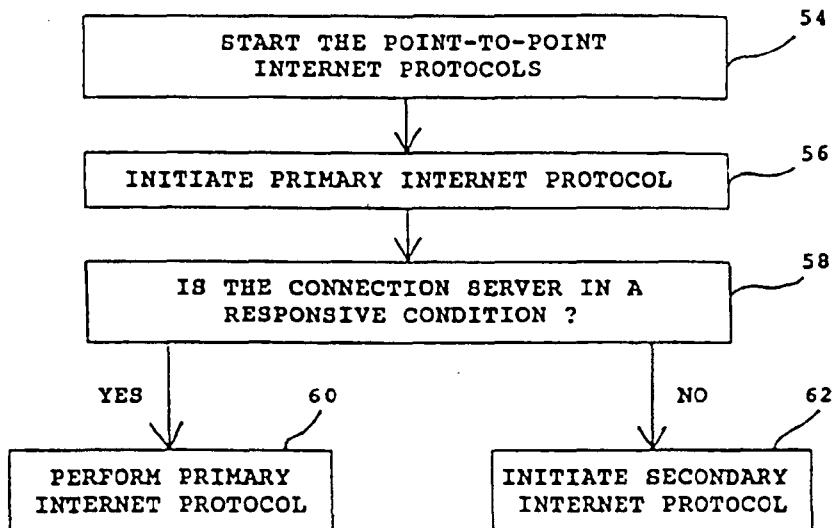


FIG. 5

FIG. 6

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6/6

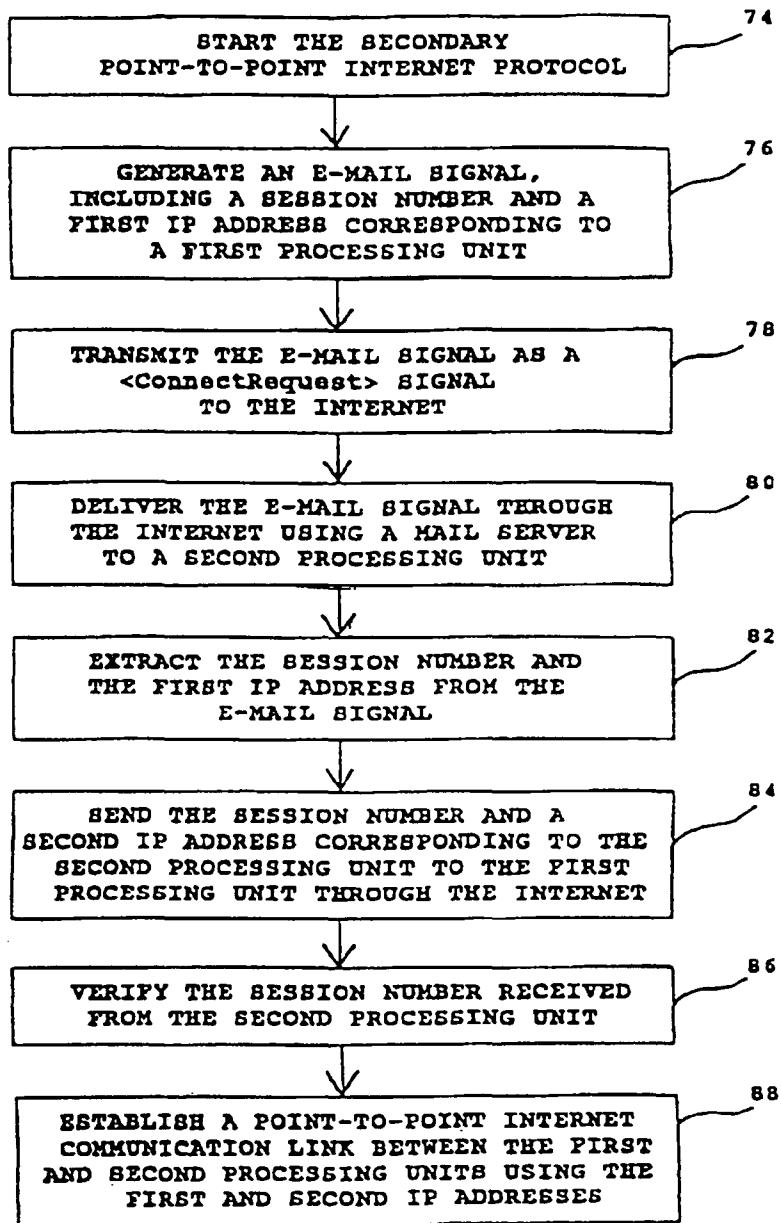


FIG. 9



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04M		A2	(11) International Publication Number: WO 98/11704 (43) International Publication Date: 19 March 1998 (19.03.98)									
<p>(21) International Application Number: PCT/US97/16504</p> <p>(22) International Filing Date: 12 September 1997 (12.09.97)</p> <p>(30) Priority Data:</p> <table> <tr> <td>08/713,077</td> <td>12 September 1996 (12.09.96)</td> <td>US</td> </tr> <tr> <td>08/832,709</td> <td>11 April 1997 (11.04.97)</td> <td>US</td> </tr> <tr> <td>Not furnished</td> <td>27 August 1997 (27.08.97)</td> <td>US</td> </tr> </table> <p>(71) Applicant: DIALNET, INC. [US/US]; 148 Allston Street, Cambridge, MA 02139 (US).</p> <p>(72) Inventors: LEE, Don, Joon; 148 Allston Street #2, Cambridge, MA 02139 (US). YAN, Charles; 29 Knollwood Court, Burlington, MA 01803 (US).</p> <p>(74) Agent: GORDON, Peter, J.; Wolf, Greenfield & Sacks, P.C., 600 Atlantic Avenue, Boston, MA 02210 (US).</p>		08/713,077	12 September 1996 (12.09.96)	US	08/832,709	11 April 1997 (11.04.97)	US	Not furnished	27 August 1997 (27.08.97)	US	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>Without international search report and to be republished upon receipt of that report.</i></p>	
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Not furnished	27 August 1997 (27.08.97)	US										
<p>(54) Title: DEDICATED SYSTEM AND PROCESS FOR DISTRIBUTED COMMUNICATION ON A PACKET-SWITCHED NETWORK</p> <pre> graph TD CentralProcessor[Central Processor 30,34] --- OtherOptionalFunctions[Other Optional Functions 66] CentralProcessor --- ManualInputDevice[Manual Input Device 68] CentralProcessor --- InformationOutputUnit[Information Output Unit 70] CentralProcessor --- NetworkInterfaceModule[Network Interface Module 48] CentralProcessor --- RAM[Random Access Memory 60, 62] CentralProcessor --- ROM[ROM Memory 64] CentralProcessor --- AV[Audio / Video Compression/ Decompression Module 58] CentralProcessor --- PowerSupply[Power Supply 72] CentralProcessor --- BatteryBackup[Battery Backup 74] CentralProcessor --- RJ11Jack50[RJ11 Jack 50] CentralProcessor --- RJ11Jack54[RJ11 Jack 54] CentralProcessor --- RJ11Jack56[RJ11 Jack 56] CentralProcessor --- ConventionalTelephone[Conventional Telephone 76] NetworkInterfaceModule --- ConnectionJack70[Connection Jack 70] ConnectionJack70 --- LocalInternetAccessMedium36[Local Internet Access Medium 36] ConnectionJack70 --- LocalPSTNLine24[Local PSTN Line 24] RJ11Jack54 --- ConventionalTelephone76[Conventional Telephone 76] RJ11Jack56 --- ConventionalTelephone76 </pre>												
<p>(57) Abstract</p> <p>A dedicated appliance for packet-switched voice communication is provided with a mechanism to ensure that both the caller and a recipient of voice communication having a similar appliance have a connection to the packet-switched network. Such an appliance eliminates the need for complex and expensive multimedia computer systems and Internet telephony software which requires a pre-existing network connection for both parties prior to initiating communication. In one embodiment of the invention, a caller's appliance may cause a recipient's appliance to connect to the packet-switched network through the access medium of the recipient. Another mechanism which enables switching between circuit-switched and packet-switched voice communication allows for both kinds of communication to be used by the same appliance. Once connected to the network, the caller and recipient may establish a connection therebetween over the packet-switched network to permit communication. Network service providers (NSP) which provide access to the packet-switched networks for users do not need to dedicate connection ports to voice communication and therefore can allow use of any connection port for any purpose with the existing infrastructure.</p>												

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**DEDICATED SYSTEM AND PROCESS FOR DISTRIBUTED
COMMUNICATION ON A PACKET-SWITCHED NETWORK**

Field of the Invention

5 The present invention is related to communication over packet-switched networks. The present invention is more particularly related to voice communication using such networks.

Background of the Invention

Voice communication typically uses a circuit-switched network. Such a network is
10 maintained by regional and long distance telecommunication carriers, and typically provides a dedicated channel for each connection established between subscribers for voice communication. A circuit-switched network is expensive to operate, which in turn causes users to incur significant charges, particularly for long distance calls. Additionally, each connection requires a direct path between two locations, typically determined using a complex algorithm.
15 Additionally, each connection is recorded for billing purposes. The overhead incurred for billing is a substantial portion of the cost in maintaining the network.

Recently there has been an increased interest in the use of packet-switched networks for voice communication. In particular, a global network of computers using a packet-switched network, commonly known as the Internet, has been the platform for some computer software
20 that allows for voice communication between two or more individuals connected to the Internet.

Because packet-switched networks are less expensive to use and more versatile than circuit-switched networks, there is an increasing interest in developing their use for voice and video communication. However, there are some drawbacks to packet-switched networks. First, packet-switched networks are used primarily for general data communication. At present, it
25 generally does not guarantee reliable real-time performance, particularly for voice communication. The lack of reliable real-time communication results in degradation of the quality of voice data transmitted over the network. These problems will eventually be overcome as technology and communication standards develop. A second problem is that both users who wish to communicate by voice over a packet-switched network have to have operative
30 connections to the network. It is not possible at the present time to initiate voice communication over the packet-switched network without each party establishing their own connection to the network prior to communication being initiated by one of the parties. This requirement is in stark contrast to the circuit-switched networks where the recipient of a conventional telephone

call is notified, for example, by ringing of a telephone.

Some current proposals for using packet-switched networks for telephone communication either are computer software (e.g., the Internet Phone software from VocalTec of Northvale, New Jersey and the WebPhone software by Netspeak of Boca Raton, Florida) which are loaded onto a general purpose multimedia computer system with a modem or use centralized systems known as "hop-off" servers which translate between packet-switched data packets and electronic voice signals expected by a circuit-switched network and which generate outgoing phone calls through a regular telephone network (also called a plain old telephone system (POTS)). Some of the problems with the first kind of computer software are that the cost, complexity, and inconvenience of using the computer and the software is significant. To receive incoming calls, the computer system needs to be continuously on wasting much electricity, and needs to have a continuous link to the Internet which can incur online charges from an access provider. Furthermore, the computer system uses much of the computer's central processor power that could otherwise be used for increasing performance on other software applications. The problem with the second kind of system is that it has operations costs similar to those associated with circuit-switched networks for general-purpose consumer and business use. In particular, current service providers to the Internet might have to dedicate bandwidth and connection ports for the sole purpose of providing voice communication and these dedicated servers are not useful for other kinds of data communication. Additionally, it is becoming increasingly likely that individual consumers may have one or more means to access the packet-switched network via various media such as cable television lines, optical fibers, wireless, digital subscriber lines, other than telephone lines. Having such versatility to easily switch among several options to conduct voice communication through any of these media would benefit consumers and businesses.

25

Summary of the Invention

A dedicated appliance for packet-switched voice communication is provided with a mechanism to ensure that both the caller and a recipient of voice communication having a similar appliance has a connection to the packet-switched network. Such an appliance eliminates the need for complex and expensive multimedia computer systems and Internet telephony software which requires a pre-existing network connection for both parties prior to initiating communication. In one embodiment of the invention, a caller's appliance may cause a

recipient's appliance to connect to the packet-switched network through the access medium of the recipient. Another mechanism which enables switching between circuit-switched and packet-switched voice communication allows for both kinds of communication to be used by the same appliance.

5 Once connected to the network, the caller and recipient may establish a connection therebetween over the packet-switched network to permit communication. Network service providers (NSP) which provides access to the packet-switched networks for users do not need to dedicate connection ports to voice communication and therefore can allow use of any connection port for any purpose with the existing infrastructure.

10 Accordingly, one aspect of the invention is a communication system using a packet-switched network. The communication system includes a first network access system for providing access to the packet-switched network. A second network access system also provides access to the packet-switched network. A first appliance has a mechanism for connecting to the first network access system through a first access medium, and sends and receives packets 15 through this connection to the packet-switched network. A second user appliance has similar capabilities. In addition, the second user appliance has mechanisms for causing the first appliance to connect to the packet-switched network through the first network access system. The first and second appliances then can send and receive packets to and from one another through the packet-switched network.

20 Another aspect of the invention is an appliance for communication using a packet-switched network. The appliance connects to a first access medium, and in turn connects to a first network access system connected to the packet-switched network using the access medium. The appliance includes a mechanism for causing another appliance to be connected, through a second access medium, to a second network access system connected to the packet-switched 25 network. After the connection of the other appliance is made, the two appliances may send and receive packets through the packet-switched network to each other.

In one embodiment of the invention, the first appliance is caused to connect to the packet-switched network by first connecting with the first appliance using a public switched telephone network (PSTN) encompassing a local exchange carriers (LEC) and an inter-exchange carrier 30 (IXC) then instructing the first appliance to connect to the first network access system using its access medium. In another embodiment of the invention, the first appliance is caused to connect to the packet-switched network by the second appliance dialing the first appliance using PSTN

and then having the first appliance use the caller identification service of the LEC to connect to the first network access system using its access medium. In another embodiment of the invention, the first appliance is caused to connect to the packet-switched network by the second appliance identifying the first network access system and then by instructing the first network access system to connect with the first appliance through the access medium connected to the first appliance. In another embodiment of the invention, the first appliance is caused to connect to the packet-switched network by the second appliance identifying and instructing the first network dial-out service provider to inform the first appliance to connect through the access medium connected to the first appliance. In yet another embodiment, the first appliance is continuously connected to the first network access system and is caused to connect to the packet-switched network by the second appliance. In any embodiment of the invention, the appliance also may initiate any conventional calls using the PSTN.

Another aspect of the invention, which may be used in combination with other aspects of the invention, is a database system for storing information supporting a communication system using a packet-switched network, wherein first and second appliances are connected through first and second access media to first and second network access systems which are connected to the packet-switched network. The database stores user information for each of the first and second appliances, such as a first unique identifier indicating an address for the appliance accessible using the packet-switched network and a second unique identifier indicating an access mechanism for establishing a connection over an access medium between the first and second network access systems and the first and second appliances. The database responds to queries to return one of the first and second unique identifiers as well as any other pertinent user information.

In another aspect of the invention, an appliance selects whether a conventional telephone call is made or whether the call is made over the packet-switched network. In another aspect of the invention, the connection to the packet-switched networks made after the identifier of the recipient is input to the appliance by the caller.

Brief Description of the Drawings

30 In the drawings,

Fig. 1 is a block diagram of a voice communication system in accordance with the present invention:

Fig. 2a is a more detailed block diagram of one embodiment of the telephone appliance shown in Fig. 1;

Fig. 2b is a more detailed block diagram of another embodiment of the telephone appliance shown in Fig. 1;

5 Fig. 3 is a more detailed block diagram of the central database (CBD) shown in Fig. 1;

Fig. 4 is a more detailed diagram of the dedicated communication facility (DCF) as shown in Fig. 1;

Fig. 5a is a flow chart of one embodiment of a process for making an Internet telephone call using the voice communication system of the present invention;

10 Fig. 5b is a flow chart of another embodiment of a process for making an Internet telephone call using the LEC caller identification service with the voice communication system of the present invention;

Fig. 6a is a flow chart of an embodiment of a process for using the voice communication system of the present invention using dial-out possibilities with existing network service providers;

15 Fig. 6b is a flow chart of another embodiment of a process for using the voice communication system of the with dedicated dial-out service providers;

Fig. 7 is a flow chart of an embodiment of a process for using the voice communication system of the present system with a continuous link to a packet-switched network;

20 Fig. 8 is a flow chart describing the process to check if a recipient's telephone number has an appliance.

Fig. 9 is a flow chart describing how the telephone appliance contacts a local Internet service provider to establish a PPP/SLIP link;

Fig. 10 is a flow chart describing how the central database is updated;

25 Fig. 11 is a flow chart describing how the recipient's dedicated communication facility makes an outgoing telephone call;

Fig. 12 is a flow chart describing query processing in the central database;

Fig. 13 illustrates an example information packet for the central database; and

30 Fig. 14 is a diagram illustrating an example data portion of a packet containing one or more type length and value entities.

Detailed Description

The present invention will be more completely understood through the following detailed description which should be read in conjunction with the attached drawing in which similar reference numbers indicate similar structures.

- 5 Referring now to Fig. 1, the voice communication system of the present invention is shown in comparison to a conventional voice communication system. A conventional system includes a conventional telephone 20 connected to a telephone network 22. The telephone network 22 includes a local exchange carrier (LEC) 24 connected to an inter-exchange carrier 26 (IXC) (i.e., long distance carrier) and a second LEC 28. The network 22 allows users of
- 10 conventional phone 20 to contact a recipient using conventional telephone 20' over long distances. In one embodiment of the present invention, an appliance 30, described in more detail below, is used to access a packet-switched network 32, such as the Internet, to contact a recipient having another similar appliance 34 or any compatible systems abiding to International Telecommunications Union (ITU) multimedia communications standards for packet-switched
- 15 communication, such as H.320, H.323 and H.324. While the invention is described herein with reference to the Internet, it should be understood that it is generally applicable to any packet-switched protocols and networks that allow for packet-switching capabilities, included but not limited to, TCP/IP, IPX, ATM, Ethernet, ISDN, and PSTN, using a variety of communications standards, including, but not limited to, ITU standards H.320, H.323 and H.324. The network
- 20 32 is accessed by appliances 30 and 34 via network access media 36 and 38. Such access may be provided over several possible access media. Such access media include, but are not limited to POTS, cable television cable lines, electric power lines, optical fibers, wireless, satellite, digital subscriber lines, etc. The term "access media" as used herein is intended to mean any mechanism for access to the network, whether analog, digital, optical or wireless. The access
- 25 media allow access to a public or private network service provider 40 or 42 such as an Internet service provider, which may be local to each user. The network service providers 40 and 42 access a packet-switched network 44, such as a large global network, commonly called the Internet, and have access to a central database 46, described in more detail below, of users of the appliances 30 and 34 or an otherwise compatible system which may utilize such a database.
- 30 Using the conventional communications network 22, the user 20 typically has access charges incurred for access to the local telephone company, and per call access charges due to a long distance carrier that supports the public switched telephone network. In the present

invention, the users of appliances 30 and 34 typically incur charges for obtaining access through a local network access medium 36 and 38 such as the local telephone company and/or a network service provider 40 and 42.

The appliance 30, 34 will now be described in connection with Figs. 2a and 2b. One form 5 of packaging of the appliance may be a separate box that connects between a connector to the network access medium and a conventional telephone 76 for which the circuitry is shown in Fig 2a. This form of packaging may be integrated with other appliances such as cable television converter boxes and high-definition digital televisions to provide integrated telephony services using cable Internet access or video telephony using a small window image on a high-definition 10 television (HDTV) set.

Another form of packaging of the appliance may be like a conventional telephone for which the circuitry shown in Fig. 2b is same as in Fig. 2a except for numeric keypad 66', handset with a transmitter 78 (e.g., microphone) and receiver 80 (e.g., speaker), and an integrated 15 conventional telephone interface electronics 77. Yet another form of packaging could be a single household model for allowing all phones connected to the main household phone line to use Internet telephony.

The appliance has an Internet access jack 48 to permit connection to a network service provider. The Internet access jack can also accommodate other network connections depending on the network access medium such as coaxial cable connector for cable access or a conventional 20 phone jack such as an RJ-11 connector if connecting to an LEC via a POTS modem. If the connection jack 48 is not a conventional phone jack, a conventional phone jack 50 such as an RJ11 jack can be made available for connection to the PSTN line for making conventional calls. Such means of network and phone connection allows the appliance to function just like a regular 25 phone for local phone calls, but for long-distance phone calls, which may be detected by examining the telephone number of the appliance users from the central database 46, it may connect automatically into the network, if there is an appliance user corresponding to the telephone number, or into an IXC if there is no appliance user corresponding to the telephone number.

The appliance does not require both parties to be already linked to the network to initiate 30 communication. At least five modes of operation may be provided for establishing a connection with the recipient. One mode uses a conventional long-distance telephone call to cause the recipient's appliance 34 to initiate a connection with its own network service provider, as

described in more detail below. A second mode causes the recipient's appliance to connect with its own network service provider by using caller identification of the caller as described in more detail below. A third mode causes the network service provider local to the recipient to initiate the connection with the recipient, as described in more detail below. A fourth mode causes a 5 network dial-out service provider local to the recipient to initiate the connection with the recipient as described in more detail below. A fifth mode causes the caller's appliance to directly connect to the recipient's appliance with a continuous connection to the network service provider as described in more detail below. These modes of operation may be compatible with each other depending on the available type of network access by each of the calling parties. The software 10 for causing these operation modes can also be adapted for running on conventional computer systems running on various operating systems for example Unix, Microsoft's Windows, IBM OS/2, and Apple operating system.

The appliance 30, 34 in Fig.2a and 2b shows two possible embodiments of the invention. The appliance 30, 34 includes a network interface module 50 and 50' such as a POTS modem for 15 establishing communication with the network access medium 36 through connection jack or port 48, a central processor, a random access memory 60 and 60', digital signal processor chip 56 and 56' to conduct dedicated audio and/or video compression and decompression, a manual input device 68 and 68' such as a keypad, and an information output unit 70 and 70' such as an LCD display and/or voice messaging software system directly to a receiver 80' or to the handset of a 20 conventional telephone 76 to inform the appliance user of any necessary status or decision requests.

A power supply 72 and 72' provides power to the appliance 30 and a back-up battery 74 and 74' maintains operation during a power outage. Other features 66 and 66' may also be included such as those for data encryption and decryption, speaker phone, caller ID, call waiting, 25 conferencing, and voice mail. A manual switch 64 and 64' or software setup change allows for switching between operation modes, of which three are described in more detail below. The appliance operates in full-duplex mode to allow both parties to talk at once.

The central processor unit 58 and 58' may be a microprocessor such as Motorola 68000 or Intel 486 chip. The central processor performs all high-level controls such as providing a 30 point-to-point protocol (PPP) or Serial Line Internet Protocol (SLIP) for TCP/IP (Transmission Control Protocol/Internet Protocol) communications, protocols of ITU standards such as H.323 for real-time multi-media communications, and may also conduct encryption/decryption

functions. The appliance uses the random access memory 60 and 60' to temporarily store operation code and data during operation. The network interface module 52 and 52' may be a stand-alone chip, chipsets, and/or other means that provide communication between the local communication medium 36 such as but not limited to POTS, ISDN, wireless such as satellite or 5 cellular, or cable television networks. A POTS modem may be implemented using a commercially available modem chipset such as those produced by Rockwell which are prevalent in the market. For cable Internet access, a cable modem by Motorola and an Ethernet interface chipset can be used as the network interface module. These network interface modules may be designed to be modular such as using the PCMCIA standard so that the appliance can be easily 10 modified for interfacing to the desired choice of network access.

A read only memory (ROM) chip 62 and 62', such as programmable erasable read only memory (EPROM) chip or Flash ROM chip, contains high-level control computer program code to manage all the other devices and deal with network protocols and standards. Flash ROMs provide the added benefit for automatic field upgradability for quick and easy software updates 15 and patches which can be easily performed by the user. Such control code is described in more detail below by the flowcharts describing the appliance operation. The memory chip 62 and 62' may also be programmed to contain a unique network address, a phone number of a local network access provider, memory cache to store information such as recipients' network addresses and telephone numbers, long-distance calling codes that are currently serviced by 20 network service providers for communication with such an appliance, and networking information such as gateway and authentication information. These user setups will be discussed in detail.

Audio compression and decompression may be provided by the central processor 58 and 58' or by dedicated audio/video compressors/decompressors 56 and 56' such as the TrueSpeech 25 CT8020 Digital Signal Processor (DSP) chip available from DSP Group, Inc. of California or by general purpose DSP chips such as Analog Devices' AD21xx family of DSP chips or Texas Instruments' TMS320 family of DSP chips that can be programmed with audio or video compressors and decompressors (codecs) licensed or sold by numerous vendors, such as Lucent Technologies, Intel, and DSP Group. Audio codecs can comply to the following International 30 Telecommunications Union (ITU) standard such as G.711, G.722, G.728, G.723, G.723.1, and G.729. G.723 and G.723.1 standards are preferred for low bit-rate voice communications on low bandwidth network access medium such as POTS. Video compression and decompression may

comply to the following ITU standard such as H.261 and H.263. H.263 is preferred for low bit-rate video communications on low bandwidth network access media.

Both the audio and video codec standards mentioned support ITU H.32x multimedia communication standards. The use of these ITU standards allow the appliance to be
5 interoperable with other computer systems or software that use the same standards.

The central processor in connection with the network interface module operate to establish a network connection such as TCP/IP through the network access medium. The multimedia communications standard used for network communications can include ITU standards such as H.320, H.323, and H.324.

10 When the connection is established, incoming packets are processed by the DSP chip as directed by the central processor to convert analog audio signals from the transmitter 78 usually a microphone for voice, a charge coupled display (CCD) camera, or the handset of a conventional phone 76 and output digital audio and/or video information to the network. The DSP chip also converts the digital audio information to an analog signal to be output to the receiver 70 such as a
15 speaker or an LCD or television video display or to the handset of a conventional phone 76. The central processor 58 and 58' and the DSP chip can produce packets abiding by a specific communication and network protocols to be transferred via the network interface module 52 and 52' and the local network access medium 36 to the other party. It is also possible to integrate the voice compression & decompression, the high-level central processing functions, and modem
20 functions controlled by a single DSP chip applications specific integrated circuit (ASIC) chip eliminating the need for dedicated chips.

The central database (CDB) 46 will now be described in more detail in connection with Fig. 3. This database is directly connected to a packet-switched network with a static network address as a place of information reference to allow lookup of appliance users or compatible
25 system users as part of the call connection process. A dedicated CDB comprises of a server 80, such as a Digital Alpha server and a fast database 82, such as those commercially-available from Oracle Corporation. The dedicated database also should include a router 84, such as those available from Cisco Systems or Bay Networks, which connects to the network using a high-speed access medium such as a T1 or T3 line connection to network backbones. Duplicates 80' and 82' of the server and database located physically in a geographically different location
30 provides for redundancy for fast access or in case one system becomes inoperative. Databases also may reside at any available network service provider.

The information stored in both the primary and redundant databases are synchronized at regular intervals using standard coherency techniques to maintain the same information. The user information stored in the database includes a unique identifier such as the user's telephone number. The slot for this value in the database is generally permanent for all users of appliances or a compatible appliance or system that is allowed to use this communication system. The value may be modified for example, if a user changes location. The database also includes for each user an identifier which indicates an address for the user when the user's appliance is connected to the packet-switched network. This identifier may be dynamic or fixed, depending on how the addresses are assigned by the network. These network identifiers are used to establish call connection between two or more users. The database may also include other useful or pertinent information for each user such as a subscriber's name, residential address, e-mail address, network service provider's IP address, and billing information.

As the user base increases, the CDBs may be distributed geographically to maximize the efficiency of CDB access and for redundancy. Multiple CDBs can be synchronized to make sure that the databases contain the same information for redundancy. It is also possible to have distinct databases with respective redundant databases for separate groups of users in different locations especially as subscriptions increase. Queries can be processed, for example, by multicasting or broadcasting them to each database.

The following is a scenario of using distinct databases for specific regions. Each database, wherever located world-wide, contains the network addresses of every CDB and the information of every appliance user in that local region. If a new CDB is installed, all existing CDBs are updated with the new CDB's IP address. If a caller in one location calls a recipient at a remote location and the recipient's information is unavailable when the caller's appliance contacts the local CDB, the CDB associates the long-distance dialing codes (e.g. country and area code) with the remote CDB's network address to allow the caller's appliance to establish a link with the remote CDB at the recipient's location. The remote CDB may then take over to continue the process of linking the communication channel between the caller and recipient. In instances where some other recipient's information is used which does not provide sufficient locale information such as the recipient's Internet username or domain name, the CDB can multicast or broadcast the recipient's information to all other CDBs in order to identify the locale of the recipient. Once the remote CDB has been identified, it can then take over to continue the process of establishing the communication channel between the caller and the recipient.

The central database responds to queries from dedicated communication facilities (described below), individual appliances, or any otherwise compatible system that complies to a database query protocol. The response includes packets of stored user data when a match is found. The database permits users with dynamically assigned network addresses to be located.

- 5 Additionally, this database allows one person to request a connection with another person who is not presently connected to the network. The database also can identify a phone number that allows the network service provider of the individual to make an outgoing phone call from the network to the local individual.

Referring now to Fig. 4, each network service provider supporting this voice
10 communication system also should include functions of a dedicated communication facility (DCF) in order to support a mode of operation where a connection to a recipient appliance is initiated by the service provider. Each DCF may be comprised of a router 90 which may be connected via a high speed access medium (e.g., T1 or T3) to the network, a server 92, remote and network access hardware 94, switch 96 to access the access medium used by the user of
15 appliance, such as a telephone switch, and POTS modem pools 98.

The construction of the system shown in Fig. 4 is very similar to systems used by conventional network service providers. However, most of such network service providers are not programmed to allow outgoing dial-out to subscribers using a network access medium such as POTS, ISDN or Cable. Generally, they are programmed only to respond to incoming
20 telephone calls. However, many systems may have the capability to make such outgoing phone calls. By providing additional functionality to identify an available access line, such capability may be used to initiate a telephone call with a recipient appliance 30. Such capability is useful in the second mode of operation to be described in more detail below.

A first mode of operation of this system uses a conventional long distance call via PSTN
25 for initiating a connection between the recipient and its network service provider. The process of establishing a communication channel between two appliances using this mode of operation will now be described in connection with Fig. 5a using the Internet as an example. First, the caller dials the recipient's telephone number into the appliance using a conventional telephone connected to the appliance or directly into an appliance that is integrated with a conventional
30 telephone in step 100. The appliance then determines, in step 101, whether the telephone call is long distance. If the telephone call is not a long distance call, the appliance allows for a conventional local telephone call over a plain old telephone system (POTS), in step 102. For

example, in the U.S., if the call is determined to be a long distance call from the standard telephone number prefix such as a "1" for inter-state or intra-state long-distance call or "011 + country code" for international long-distance call, the caller's appliance then checks its internal phonebook to see if the recipient's number is present (step 103) as described in detail with Fig. 8.

- 5 If the recipient's number is found in the phonebook, the calling process continues to step 104. The appliance establishes in step 104 a connection with the recipient's appliance by a conventional circuit-switched network call. If the call is not answered, as determined in step 105, and if no retry is to be performed (step 106), the user may hang up (step 108) by placing the phone handset on-hook. If the call is answered, the caller informs the recipient that a call with
10 this appliance is being made. For example, the caller may request that the recipient press a key on the telephone handset, such as the "*" key or pressing a button the appliance. If the recipient cannot be connected via the appliance for any reason (step 112), a conventional toll call may be continued (step 114) and eventually terminated (step 116); the phonebook check of step 103 helps to minimize this occurrence but it is conceivable that the recipient's appliance could be
15 malfunctioning or has been disconnected. If the recipient has a properly functioning appliance, both appliances hang up (in step 118) and both parties' appliances automatically connect with their network service providers, as described in more detail below in connection with Fig. 8. They may obtain an IP address (steps 120 and 122) dynamically or may already have a static IP address assigned by their network service provider.
20 With an IP address, each party's appliance then contacts a centralized database to exchange the network addresses to each party (steps 124 and 126) referencing each party's unique identifier such as their respective telephone numbers, as described in more detail below in connection with Fig. 10. In particular, the central database is updated with the recipient's IP address in step 124 and the central database is updated with the caller's IP address in step 126.
25 The caller then queries the central database to receive the recipient's IP address in step 128, as described in more detail below in connection with Fig. 12. If the address is not found, as determined in step 130, the caller's appliance continuously tries to identify the recipient's IP address as indicated by 130 in the loop back to step 128. If one minute or other time limit, has passed, the attempts to access an IP address are terminated and the caller is informed in step 134.
30 The telephone call then may be terminated. If the IP address is found, the caller may establish contact and make a TCP connection with the recipient as indicated at step 136. Also, if the recipient is using the telephone line for general Internet access and the recipient's computer

- system has a software that is compatible with the appliance running, a connection also may be attempted. If the connection is not obtained as determined in step 138, and if a retry operation is not to be performed as determined in step 140, the caller may be informed of the lack of connection in step 142 and the phone hangs up in step 144. For example, if the recipient is using
- 5 a telephone line and receives a busy signal or is already on the phone with an Internet call in progress, the recipient's DCF will send a packet to the caller's appliance of the busy signal. However, upon establishing network access and a connection, the two parties may begin talking as indicated in step 146. When the call is terminated by either party by placing the handset on-hook, the TCP/IP connection is terminated in step 148 and the appliance hangs up in step 150.
- 10 One benefit to the first mode of operation is that it uses the existing services available from most POTS network service providers without modifying their software or hardware. Another benefit to this mode is that the caller may call from any compatible communication system rather than an appliance if the caller somehow knows that the recipient has this appliance or the caller's appliance is provided with the protocol to contact the central database and conduct
- 15 outgoing PSTN toll calls to the recipient.

There are a couple of minor drawbacks with this first mode of operation. First, there could be delays possibly from one-half to around five minutes depending on distance and network traffic conditions to establish a connection. Second, every time a long-distance call is initiated, the caller may incur charges for this initial connection making frequent calls somewhat

20 costly and reducing the freedom to call as frequently as desired. In order to minimize costs for these initial toll-calls, third-party conventional long-distance service providers may be used to allow the caller to be charged on a fraction of a second segments (e.g. one-sixth of a minute) rather than for a full minute.

A second mode of distributed operation is similar to the first mode which requires an

25 initiating conventional long-distance call, however, the toll charge can be eliminated using a local caller identification (Caller ID) service as shown in Fig. 5b. The caller dials the recipient's number using the telephone handset in step 430. The appliance will determine if the call is local or long-distance by counting the digits and checking the calling area code. If the call is long-distance, the caller's appliance automatically looks up the internal phonebook in step 432 to

30 check if the telephone number is associated with an appliance user. If the telephone number is determined to be associated with an appliance user, the caller's appliance will request if an Internet call is desired. The caller's appliance may be set-up to automatically select the Internet

- call mode if the number dialed checks with the internal phonebook. If an Internet call is not desired, the appliance will just continue with PSTN toll call (step 436). If an Internet call is desired, the caller's appliance will dial the number and will make sure to allow for a maximum of only two or three rings (usually two) to let the recipient's appliance identify the caller's
- 5 telephone number (step 440). If the recipient has not yet picked up the phone and the appliance detects that the caller is an appliance user by checking its internal phonebook in step 442, the recipient's appliance will wait until the ringing stops in step 446. If the recipient picks up the phone before the appliance has had a chance to identify the caller, the operation reverts back to the first mode. If the caller is identified not to be an appliance user as determined by the internal
- 10 phone book, then the recipient's appliance will let the call process as a conventional one (step 444) and let the phone ring. After waiting for two or three rings, the caller's appliance will then automatically hang up in step 448 and continue with the rest of the first mode of operation beginning with step 122'. If the recipient has not yet picked up the phone and the caller has been identified as an appliance user by the recipient's appliance, the recipient's appliance will then
- 15 continue to establish an Internet connection with steps 120' and 124'. While the appliance attempts to establish an Internet call connection and the recipient picks up the phone, the appliance will so inform the recipient that an Internet call is in progress with the caller identified on, for example, an LCD display. The recipient will have control to cancel an Internet call in progress if so desired by pressing a button on the appliance or a button on the handset such as the
- 20 "*" or "#."

Benefits to the second mode of operation is that it uses the existing services available from most POTS network service providers without modifying their software or hardware just like the first mode of operation. Another same benefit to this mode is that the caller may call from any compatible communication system rather than an appliance if the caller somehow

25 knows that the recipient has this appliance or the caller' appliance is provided with the protocol to contact the central database and conduct outgoing PSTN toll calls to the recipient. However, one major disadvantage of the caller being charged for the initial PSTN toll call associated with the first mode of operation is reduced or eliminated. The second mode of operation also eliminates the need for the recipient to intervene by picking up the handset and pressing a button

30 to initiate an Internet call as in the first mode of operation. The second mode of operation increases the ease of establishing an Internet call and also helps to reduce PSTN long-distance charges even further.

A third mode of distributed operation is used when network service providers have the ability to call out to the recipient via its network access medium, with similar capabilities of a DCF, for example, as shown in Fig. 4. This mode of operation will now be described in connection with Fig. 6. With this embodiment, the appliance is configured with a local DCF 5 telephone number, however assigned, or other mechanism to access the network. The customer information including at least the subscriber's telephone number and DCF's network address may then be transferred to the central database (CDB) of subscribers and/or maintained on a DCF database.

The flow of information in the third mode of operation will first be described using the 10 Internet protocol as an example. When a caller attempts to make a long-distance call, the appliance automatically accesses a local DCF or an NSP (since an outgoing call to the caller is unnecessary) by means of the local network access medium to gain network access to the packet-switched network via for example a standard PPP/SLIP and authentication. When connection to the DCF/NSP is established, the caller's appliance sends a query packet (described below) 15 containing the recipient's telephone number or other distinct identification information such as a residential address, IP address, electronic mail address, to initiate a long-distance call.

Upon determining at least the recipient's DCF network address, the caller's appliance, 20 caller's DCF/NSP, or the CDB contacts the recipient's DCF to transmit an information packet (described below) that contains the recipient's local telephone number or other information such as the caller's network address. To minimize delays, one method is to have the CDB directly send the recipient's telephone number and caller's network address directly to the recipient's DCF. However, selected information, its point of origin and its transfer method may vary among 25 different implementations.

With the recipient's local telephone number, the recipient's DCF then makes an outgoing 25 call to authenticate and to establish network access via PPP/SLIP if using POTS with the recipient's appliance. Authentication may be made by the DCF prior to making the outgoing call if the recipient's information received is sufficient for such pre-authentication in order to minimize delays.

The following will describe a few methods of initiating a communication channel through 30 a packet-switched network. In one method, if the recipient answers the call and the recipient's appliance is provided with the caller's network address by a CDB or its DCF, the recipient's appliance may directly contact the caller's appliance with the caller's network address to initiate

a communication channel. In another method, the recipient's appliance or DCF sends an information packet containing the recipient's network address to the caller's appliance upon which the caller's appliance initiates the communications channel using the recipient's network address. Whichever way, a communication link between the caller and the recipient may be 5 established to begin transmitting information packets over the network.

One embodiment of the data flow associated with the third mode of operation will now be described in more detail in connection with the flow chart of Fig. 6a. In particular, the caller dials the recipient's telephone number into the appliance using a conventional telephone connected to the appliance or directly into the appliance integrated with a conventional telephone 10 in step 200. The appliance then determines whether the telephone call is long distance, as determined in step 202. If the telephone call is not a long distance call, the appliance makes a local telephone call over a plain old telephone system (POTS), in step 204. If the call is determined to be a long distance call, the caller's appliance checks its internal phonebook to see if the recipient's number is present (step 205) as described in detail with Fig. 8. If the recipient's 15 number is found in the phonebook, the calling process continues to step 206. The caller's appliance automatically dials a local network service provider (NSP) or DCF to establish a PPP/SLIP link (step 206), as described in more detail below in connection with Fig. 9. If a PPP/SLIP link is not established as determined in step 208, a retry may be performed in steps 20 210 and 206 or the appliance or caller may hang up in step 212. If a PPP/SLIP link is established, the caller's appliance sends a packet with the recipient's access information to the local central database (step 214) and queries the central database for the IP address of the recipient's dedicated communication facility step 216. This step is described in more detail below in connection with Fig. 12. If the IP address of the recipient's dedicated communication 25 facility is not found, as determined in step 218, the caller may be given an option to make a conventional toll call in step 220. If no toll call is to be made, the appliance or caller hangs up in step 222. Otherwise, a toll call may be made through a conventional public switched telephone network in step 224. When the call is completed, the caller hangs up in step 226.

If the caller connects to the network and identifies the IP address of the recipient's dedicated communication facility, the appliance then sends a packet with a caller's IP address and 30 the recipient's access information, e.g., its telephone number, to the recipient's dedicated communication facility in step 228. This information allows the recipient's DCF to connect with the recipient's appliance over the recipient's network access medium, for example, by making a

DOSP is not found, as determined in step 518, the caller may be given an option to make a conventional toll call in step 520. If no toll call is to be made, the appliance or caller hangs up in step 524. Otherwise, a toll call may be made through a conventional public switched telephone network in step 522. When the call is completed, the caller hangs up in step 514.

- 5 If the caller connects to the network and identifies the IP address of the recipient's DOSP, the caller's appliance then sends a packet with the recipient's access information, e.g., its telephone number, to the recipient's DOSP in step 526. This information allows the recipient's DOSP to connect with the recipient's appliance over the recipient's network access medium, for example, by making a telephone call, to establish a point-to-point protocol link in step 528.
- 10 During this process, the caller may be informed of the call status with phone ringing sounds on the recipient's telephone. This process is described in more detail below in connection with Fig. 11. If a link is established, the DOSP requests the recipient to indicate acceptance of the network phone call by, for example, pressing the "*" button on the handset in step 530. Steps 530 through 566 is essentially the same as that of the first and second modes of operation shown in
- 15 Fig. 5a from steps 110 through 144.

A benefit of the fourth mode of operation is that initial long distance toll calls over the public switched telephone network for establishing an network connection between the caller and the recipient are completely eliminated. Another benefit of the fourth mode is that it does not involve modification to network service providers but rather uses less expensive (compared to

- 20 network service providers) dedicated dial-out service providers to allow the outgoing telephone calls to be made to the recipient. However, the delay in making a connection may be twice as long in comparison to the first mode.

The fifth mode of operation will now be described with reference to Fig. 7. If continuous network access such as cable Internet access is used by the caller, a continuous network link is provided so that there will not be a need to dial into the service provider nor conduct authentication. If the recipient has such continuous Internet access, the caller automatically dials the recipient via packet-switched means without the need for conducting a short long-distance call as associated with the first mode of operation; the caller could have accessed the Internet via any means. This is similar to the third mode of operation described above using POTS Internet access however, using a continuous Internet access such as cable does not require any modifications to the cable service provider. This operation mode is also much faster for connection than the first, second, or third mode of operation.

telephone call, to establish a point-to-point protocol link in step 230. During this process, the caller may be informed of the call status with phone ringing sounds on the recipient's telephone. This process is described in more detail below in connection with Fig. 11. If a link is established, the recipient's DCF sends a packet with a recipient's appliance IP address to the 5 caller's appliance in step 232. The caller's appliance then connects to the recipient's appliance via a TCP/IP connection in step 236. Also, if the recipient is using the telephone line for Internet access and the recipient's computer system has a software that is compatible with the appliance running, a connection also may be attempted. If a connection is not achieved as determine in step 238, a retry operation may be performed in steps 240 and 236. Otherwise, the caller may be 10 informed that no connection is established in step 242 and the appliance hangs up in step 244. For example, if the recipient is using a telephone line and receives a busy signal or is already on the phone with an Internet call in progress, the recipient's DCF sends a packet to the caller's appliance of the busy signal. If a TCP/IP connection is made, the two parties may begin talking 15 as indicated in step 246. When the call is terminated, the TCP/IP connection is terminated in step 248 and the parties may hang up as indicated at 244.

A benefit of the third mode of operation is that initial long distance toll calls over the public switched telephone network for establishing an network connection between the caller and the recipient are completely eliminated. The delay in making a connection may be reduced in comparison to the first mode as well. This third mode does involve modification to network 20 service providers to allow the outgoing telephone calls to be made.

The fourth mode of operation is similar to the third mode by using dial-out service providers (DOSP) that could be located at many locations world-wide where there are large concentrations of appliance users rather than depending on network service providers to provide dial-out service. These dial-out service providers would be connected to the Internet and have 25 dial-out capability using modem banks to inform the recipient's appliance of an incoming Internet call. This operation eliminates the need to modify existing network service providers for dial-out capability. Figure 6b shows the operation and will be described.

Steps 500 through 514 is the same as the third mode of operation described previously. If a PPP/SLIP link is established in step 510, the caller's appliance sends a packet with the 30 recipient's access information to the local central database (step 516) and queries the central database for the IP address of the recipient's dial-out service provider in step 518. This step is described in more detail below in connection with Fig. 12. If the IP address of the recipient's

An example of using the appliance with a continuous cable television Internet access will be described. The appliance may be equipped with a network interface module comprising an Ethernet interface card connected to a cable modem such as those manufactured by Motorola. The appliance may be connected to both the cable Internet access line and the local exchange carrier. The unique MAC address that comes with each Ethernet interface card is registered with the cable Internet access provider for authentication. If static IP address is not assigned, the cable Internet access provider will automatically assign a dynamic IP address to the user whenever a connection is established using the Ethernet interface card's unique MAC address. If dynamic IP addressing is used, the appliance updates the central database upon obtaining a new IP address.

Fig. 7 shows an example of a task flow for establishing a connection using a continuous Internet link. Caller dials the recipient's number (step 450) and the appliance determines if the call is a long-distance call in step 452. If it is not a long-distance call, a local POTS call may be made. Otherwise, the caller's appliance may check the phonebook (step 455) as an option and if the recipient's telephone number is found, it sends a packet with the recipient's phone number to the central database (CDB) in step 456. Regardless of whether the phonebook function is used or not used, a CDB query is made (step 458) with the recipient's phone number and if the recipient's IP address is found (step 460) the caller's appliance attempts to establish a connection with the recipient's appliance in step 470. If the recipient's IP address is not found, then the caller is notified to decide on making a conventional toll call in step 462. After a conventional toll call is made in step 464, the caller then hangs up (step 466). If a conventional call is not made, the caller simply hangs up (step 468). If the recipient's IP address is found, the caller's appliance attempts to connect in step 472. If a connection is not made, the caller's appliance attempts to retry in step 474. If after several retries the connection could not be established, the caller is informed (step 480) and the caller hangs up in step 482. If a connection is made, the call is initiated in step 476 via TCP. Upon call completion, the TCP connection is closed with the recipient's appliance (step 478) and the call is terminated in step 482. The continuous connection to the network such as those with cable Internet access provider simplifies and speeds up the network call connection process.

Fig. 8 describes in more detail how a caller's appliance or compatible system checks and updates the phonebook of a recipient such as performed in step 101 of Fig. 5a and step 205 of Fig. 6a. The process of looking up a phone book eliminates the requirement of establishing a

long-distance call and incurring toll charges to determine if a recipient is capable of receiving a network call via the Internet and also provides the caller an option to cancel the call without establishing a toll connection with the recipient. If the recipient's phone number is found in its internal phonebook, the processes in Fig. 5 or Fig. 6 continue. However, if the recipient's phone
5 number is not found, the caller is informed of this status (step 404) and requests the caller to decide if the appliance or compatible system should check if the recipient is a subscriber (step 406). If the caller decides not to conduct the check, the caller is given the option to continue with a PSTN toll call (step 408). If the caller decides not to continue with a toll call, the appliance hangs-up (step 414). Otherwise, a conventional long-distance call is made (step 410)
10 and upon call completion, the appliance hangs-up. If the caller decides to check if a recipient is a subscriber, the caller's appliance dials into the local network service provider to establish a PPP/SLIP link (step 416). Upon establishing the PPP/SLIP link, the caller's appliance queries a central database server with the recipient's telephone number to check the status of the recipient's subscriber status (step 418). If the recipient is determined to be not a subscriber, i.e.,
15 not in the database at the decision step 420, then the procedure for a request to continue with a PSTN toll call (steps 408-414) is carried out. Otherwise, the central database sends a confirmation packet to the caller's appliance with the telephone number and any other pertinent information (step 422). The caller's appliance automatically updates the phonebook with the recipient's information (step 424) and the caller is informed of the update (step 426). Upon
20 completion the subsequent steps are then continued. The appliance's user interface will allow any telephone number in the phonebook to be added, deleted, or edited.

How the appliance dials into a network service provider or dedicated communication facility to establish PPP/SLIP link will now be described in more detail in connection with Fig. 9. This example assumes that the network service providers are accessed using a regular telephone line (i.e. POTS). It is possible to make such a connection via a cable television modem or by connection through electrical power lines, among other mechanisms. In this embodiment, the appliance makes a regular telephone call to a network service provider to make a connection as indicated at step 250. If a connection is not made, as determined in step 252, the appliance may retry this operation as indicated at 254 and 250. Otherwise, the caller may be
25 informed that connection was not made in step 256 and the appliance hangs up in step 258. If a connection to the network service provider is made, authentication information is sent to the provider in step 260. If authentication is not achieved, as determined in step 262, a retry of the
30

authentication operation may be performed as indicated at 264 and 260. Otherwise, the caller may be informed that authentication was not achieved in step 266 and the appliance hangs up in step 268. If authentication is achieved, a PPP/SLIP link may be established in step 270.

Successful establishment of this link, as determined in step 272 results in the appliance being 5 successfully connected to the network. Otherwise, a retry operation may need to be performed in step 274 and 250.

Referring now to Fig. 10, the process of updating the central database with a network address will now be described in more detail. Each appliance has a CDB network address already encoded. If the appliance happens to have a CDB network address not in its locale, 10 during initial setup when the user inputs the telephone number and other calling codes, the remote CDB automatically assigns a network address of a CDB in the appliance's locale and updates the appliance with the new CDB network address. Using a local CDB should help decrease connection time for calling. It also may help increase the connection speed for someone who wants to call the appliance because the recipient's local CDB may be directly contacted 15 rather than by multicasting or broadcasting.

The CDB updating process involves sending information which comprise of the current network address and any other correlating unique information such as a telephone number for updating to the central database server in step 280. This information is sent in a packet, of which example formats will be described in more detail below in connection with Figs. 13 and 14. The 20 appliance then awaits for a reply from the central database in step 282. If a reply does not indicate that data has been successfully updated, as determined in step 284, an attempt to update the information is retried in step 280. It may be desirable to put a time out operation in this loop, as indicated at 283. If a time out occurs, the caller is informed and may hang up as indicated at 285.

25 Referring now to Fig. 12, the logic flow of the central database will now be described in more detail. In particular, the central database server receives a request in step 290 that indicates the recipient's telephone number or other means for access that provides a unique identification of how the recipient connects to the network. This may be, for example, a telephone number. The database is then searched by the server for the recipient's unique identification information in 30 step 292. If it is not found, a "not found" packet is then sent in step 294. If the information is found, the recipient's data, such as the network address of the dedicated communication facility used by the recipient and its personal network address and any other pertinent information, are

packaged in a packet which is then sent to the caller's appliance in step 298.

- The CDB request may be substituted by broadcasting and multicasting for any mode of operation. In such an embodiment, the caller's appliance processes the information packet and broadcast/multicast it to the world-wide Internet or other "white-page" services such as the
- 5 "People Find" service from Lycos, or the "Big Yellow" Internet business yellow pages to obtain the recipient's individual information. The CDB or the recipient's DCF answers with at least the DCF network address when a matching recipient is found. After establishing contact with the CDB or recipient's DCF, the caller's appliance has the option to store and maintain the recipient's information in a local cache, i.e., phonebook for future use to minimize continual connections
- 10 with CDB in an effort to reduce delays in establishing contact with the recipient for subsequent phone calls. If the recipient's or recipient's DCF network address is unavailable, the caller's appliance is informed and may be provided with an option to make a conventional long-distance phone call or automatically switch to the first mode of operation if the recipient was determined to be a subscriber as described above.

- 15 Example packet types which may be used by the system are shown in Figs. 13 and 14. These packets are transmission control protocol (TCP) packets that communicate over dedicated ports. The TCP packet shown in Fig. 13 includes a first byte of data indicating a type which may include a central database query, phone query, dedicated communication facility update, phone update, additions and deletions, or message indicating the party is ready to talk. The next 20 four bytes of data indicate a length which represents the length of the data field 304 which follows. The data portion of the packet may contain one or more type, length and value entities, such as shown in Fig. 14. The type field 306 indicates a type such as whether the data includes a phone number. The length field 308 indicates the length of the value field 310. By using such packets, each of the central database, dedicated communication facility and the appliance readily 25 may identify information which it needs to process, and how that information should be processed.

- How a recipient's dedicated communication facility dials a recipient's appliance to establish a PPP/SLIP link, such as performed in step 230 of Fig. 6, will now be described in more detail in connection with Fig. 11. This operation is performed in manner similar to how a 30 computer generally contacts a network server provider via a modem. In particular, the dedicated communication facility dials out to the recipient via the plain old telephone system (POTS) or other access media used by the appliance, in step 320. After step 320, if the caller hangs up

during the outgoing call step 328, the caller's appliance will inform the recipient's DCF to cancel the call before disconnecting from TCP/IP connection in step 330. In step 322, upon being informed of the caller appliance's on-hook status, the recipient's DCF cancels the outgoing call to the recipient. If the call is answered in step 322, authentication is performed in step 323. If 5 authentication is not achieved, the appliance hangs up in step 328. If authentication is achieved, then an IP address is set in 324 and a PPP/SLIP link is established in 326. If the call is not answered, the dedicated communication facility hangs up in step 328 and informs the caller.

A user interface also may be provided for call status notification and setting up the appliance for initial and continual use. The user may be presented with menu items or call status 10 such as by visual means with a liquid crystal display, audible means with voice messages to the speaker, or a combination thereof. The user may interact with the appliance via one or more means such as with a numeric keypad found on a conventional phone attached to the appliance, pushbuttons, dials, or by voice commands to the handset that may be recognized by the appliance.

15 A set of main menu items for the appliance may include (a) phonebook, (b) Internet access setup, (c) dialing setup, and (d) auto upgrade. When the phone book menu item is selected, phone numbers may be displayed and scrolled using an electro-mechanical thumb-dial interface attached to a potentiometer. Push buttons for deleting and editing a telephone number may be provided. New telephone numbers might be added, edited, or deleted manually using the 20 numeric dialing keypad on the conventional telephone connected to the appliance. The Internet access setup if using POTS might include an Internet service provider's telephone number, username, and password. ASCII or foreign characters may be entered into the appliance by, for example, using the same thumb-nail dial described previously to select a character, the numeric dialing keypad on the conventional telephone attached to the appliance, or a dedicated keypad.

25 The dialing setup might include the user's telephone number with area code and country code, call waiting cancel, and other dial-out prefixes. The auto upgrade menu item, which may be used with Flash ROM for field upgradability, may be executed with a single command from the user. Upon receiving the user command, the appliance automatically upgrades the appliance's software by auto-dialing into the network service provider, establishing a networking link such 30 as PPP and TCP/IP, contacting a pre-programmed network address supporting a software download, uploading to the network address the model and version of the appliance, receiving the updated software or patches, hanging up, and executing the downloaded software in the

appliance.

- By using the mechanisms described above, a caller's appliance ensures that a connection is made between the packet-switched network and the recipient of a telephone call. At least three modes of operation may be used in order to ensure that this connection is made. Additionally,
- 5 with these appliances the network service providers of the caller and recipient do not require dedicated ports for voice communication. Accordingly, the cost of long distance calls may be reduced without substantially increasing the cost of maintenance of specialized voice communication hardware on the part of the network access providers. By providing a dedicated appliance such telephony is not limited to computer users and owners. With these features this
- 10 telephony appliance may be used in the same manner as a conventional telephone.

Having now described a few embodiments of the invention, it should be apparent to those skilled in the art that the foregoing is merely illustrative and not limiting, having been presented by way of example and practice. Numerous modifications and other embodiments are within the scope of one of ordinary skill in the art.

- 15 For example, other communication protocols over a packet-switched network may be used such as TCP/IP, Frame Relay, ISDN, and IPX providing for reliable transmission or User Datagram Protocol (UDP) that uses Real-Time Protocol (RTP) to handle streaming audio and video and which is a part of the ITU H.323 standard for unreliable transmission. Wireless and asynchronous transfer mode (ATM) networks operating using packet or cell switching also may
- 20 be used.

Additional functionality also may be provided, such as video and wireless capabilities. An example of video and wireless capability might include a mobile appliance that functions in a vehicle such as an automobile where the outgoing packet-switched communications signals such as video signals are sent by processing video images of the sender using a charge-coupled display (CCD) area sensors such as those sold by Sony Corporation and audio signals are sent by processing voice or audio from the sender using a microphone with active acoustical error cancellation circuitry for full-duplex hands-free speakerphone operation. The incoming packet-switched communication signals are also processed and delivered to the recipient via same wireless means. The incoming processed audio may be transmitted, for example, through the automobile's speakers via radio frequency (RF) signals sent directly to a radio's antenna inside the vehicle. The incoming processed video may be transmitted via a high-resolution liquid crystal display (LCD) such as those sold by Fujitsu or a miniature cathode ray tube (CRT) such

as those found on small television sets for which the image of the recipient can be seen directly from a visual display or viewed, for example, reflected off the front windshield of an automobile so that the driver quickly can focus in and out of the visual image while driving.

Flowing fax transmissions to conventional fax machines or storing fax transmissions also 5 may be added by using standard fax and reliable network transmission protocols. Capability commonly found in conventional telephones also may be added, such as number memory, a mute button, a redial button, speed dial, alphanumeric keypad, answering service, caller identification, call-waiting option, calling capability without using telephone number, caller identification memory, teleconferencing, full duplex speaker phone, cordless handset, voice mail, etc. These 10 functions may be integrated using telephony application programming interfaces (TAPI) developed by Microsoft and Intel for computer telephony application development such as those for PBX systems.

An appliance also may be constructed so as to accommodate different telephony standards such as telephone jacks and various POTS transmission laws such as A-law and Mu- 15 law.

These and other modifications are contemplated as falling within the scope of the invention as defined by the appended claims and equivalents thereto.

CLAIMS

1. A communication system for communication using a packet switched network, comprising:
 - a first network access system for providing access to the packet switched network;
 - a second network access system for providing access to the packet switched network;
- 5 a first appliance having means for connecting to the first network access system through a first access medium, and means for sending and receiving packets through the means for connecting to the packet switched network;
- 10 a second user appliance having means for connecting to the second network access system through a second access medium, wherein the second appliance includes means for causing the first appliance to connect to the packet switched network through the first network access system using the means for connecting to the first network access system, and means for sending and receiving packets to and from the first appliance through the means for connecting and the packet switched network.
- 15 2. The communication system of claim 1, wherein the means for causing the first appliance to connect to the packet switched network in the second appliance comprises:
 - means for connecting with the first appliance using a public switched telephone network; and
 - means for instructing the first appliance to connect to the first network access system using the means for connecting of the first appliance.
- 20 3. The communication system of claim 1, wherein the means for causing the first appliance to connect to the packet switched network in the second appliance comprises:
 - means for identifying the first network access system; and
 - means for instructing the first network access system to connect with the first appliance
- 25 4. The communication system of claim 1, further comprising:
 - a central database of user information including, for each of the first and second appliances, a first unique identifier indicating an address for the appliance accessible using the packet switched network and a second unique identifier indicating an access mechanism for establishing a connection over an access medium between the first and second network access systems and the first and second appliances, and comprising means, operative in response to a query, for returning one of the first and

second unique identifiers.

5. An appliance for communication using a packet switched network,
means for connecting the appliance to a first access medium;
- 5 means for connecting to a first network access system connected to the packet switched
network using the access medium;
means for causing another appliance to be connected through a second access medium to a
second network access system connected to the packet switched network; and
means for sending communication packets through the packet switched network to the other
10 appliance after connection of the other appliance to the packet switched network is established.
6. A database system for storing information supporting a communication system using a
packet switched network, wherein first and second appliances are connected through first and second
access media to first and second network access systems which are connected to the packet switched
15 network, comprising:
means for storing user information including, for each of the first and second appliances, a
first unique identifier indicating an address for the appliance accessible using the packet switched
network and a second unique identifier indicating an access mechanism for establishing a connection
over an access medium between the first and second network access systems and the first and second
20 appliances; and
means, operative in response to a query, for returning one of the first and second unique
identifiers.
7. The database system of claim 6, further comprising means for adding user information to the
25 database.
8. The database system of claim 6, further comprising means for deleting user information from
the database.
- 30 9. The database system of claim 6, further comprising means for updating user information in
the database.

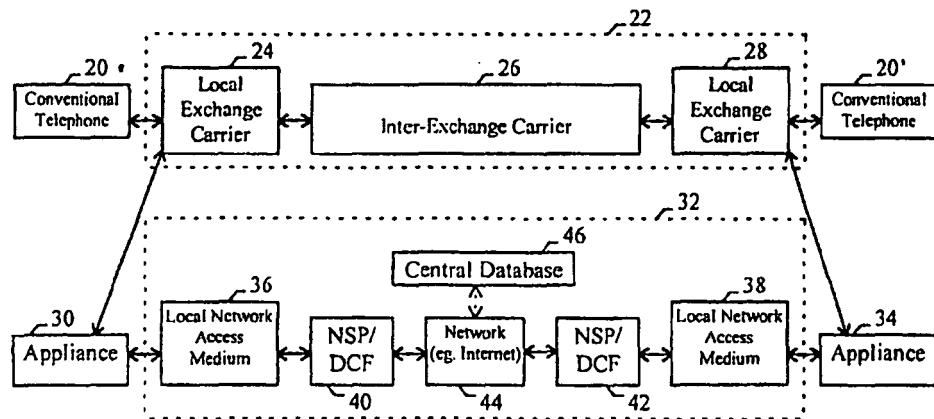


FIG. 1

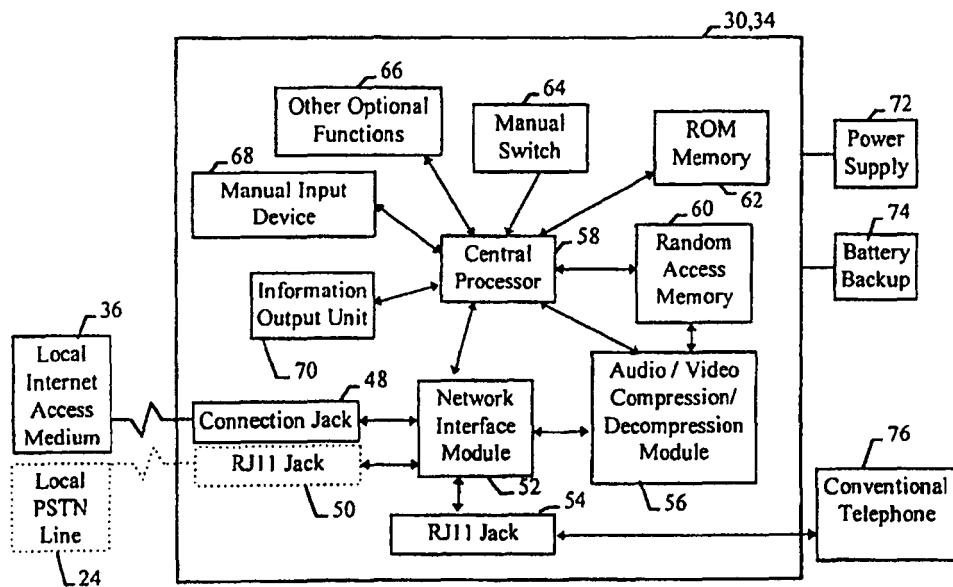


FIG. 2a

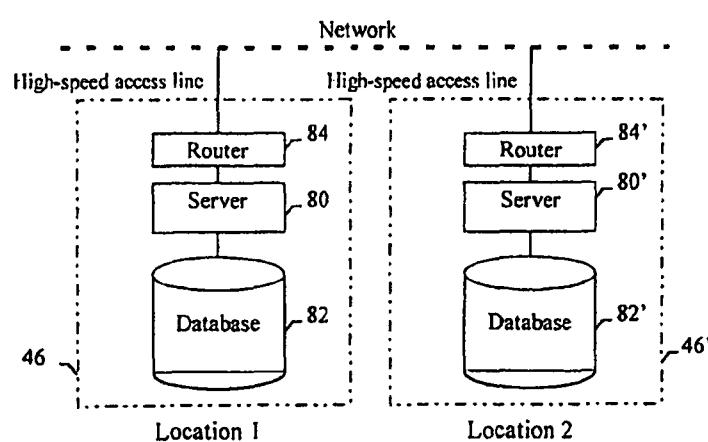
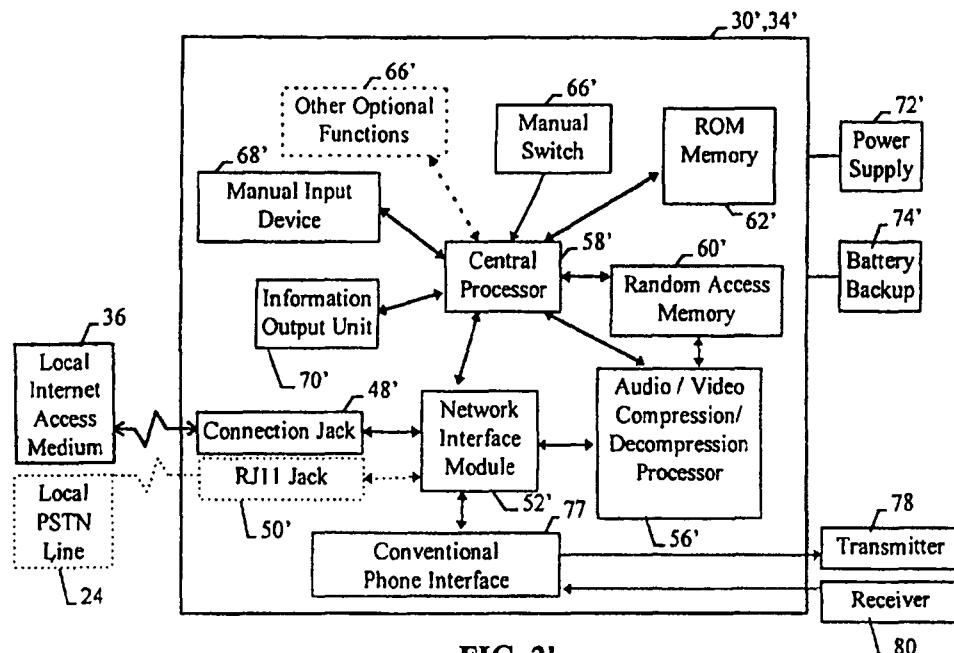


FIG. 3

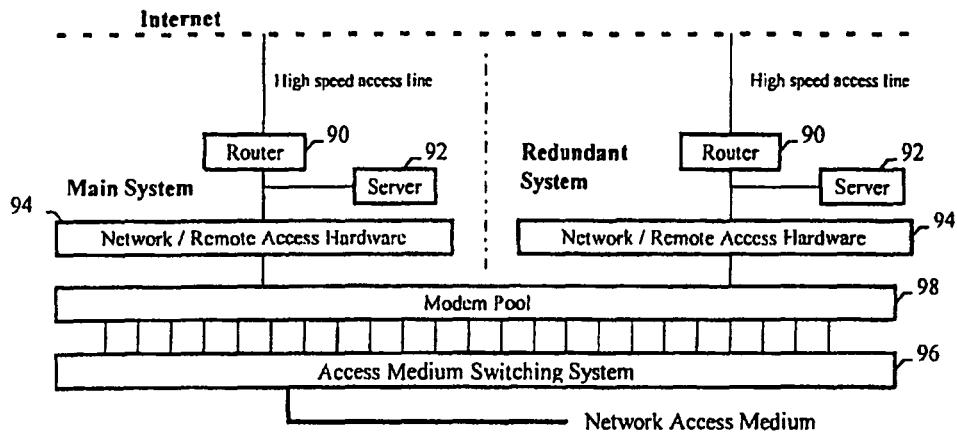


FIG. 4

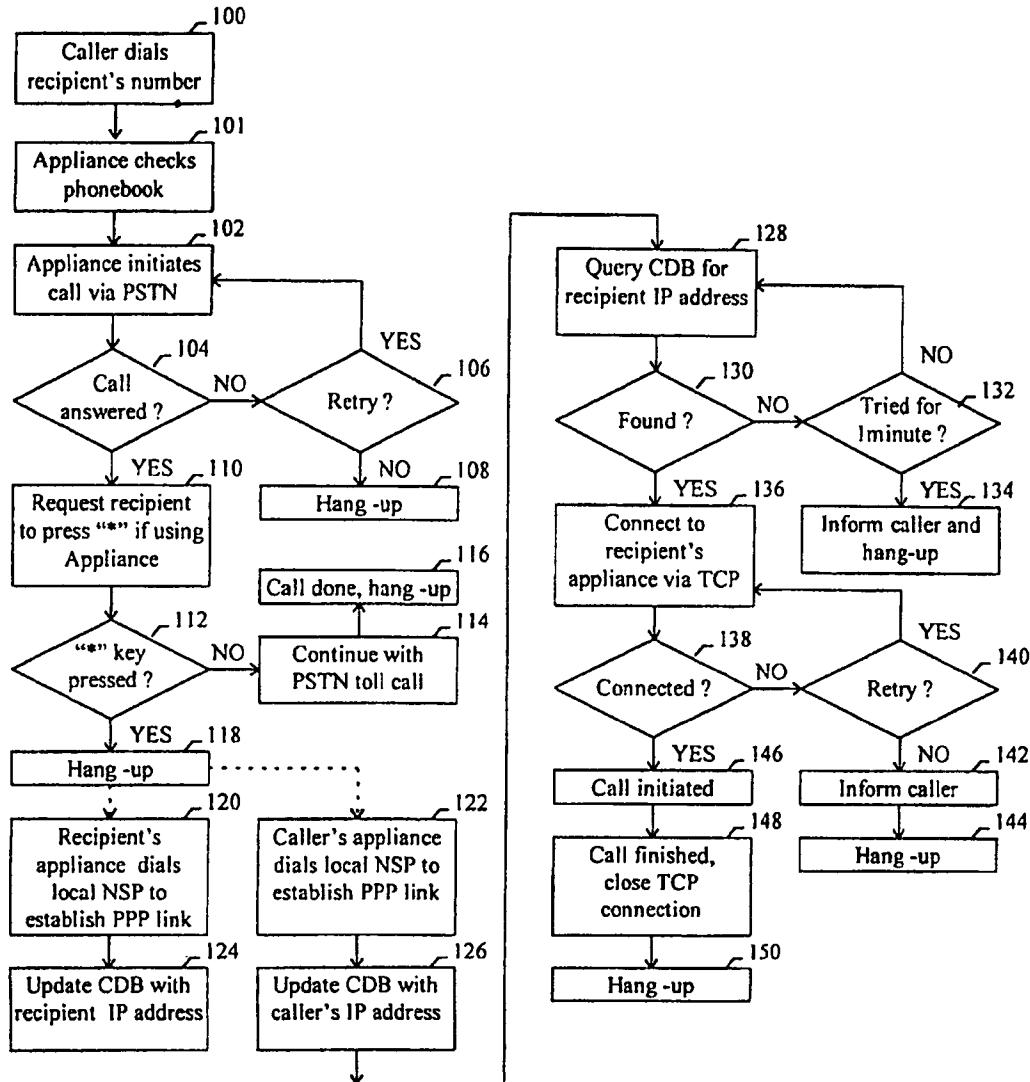


FIG. 5a

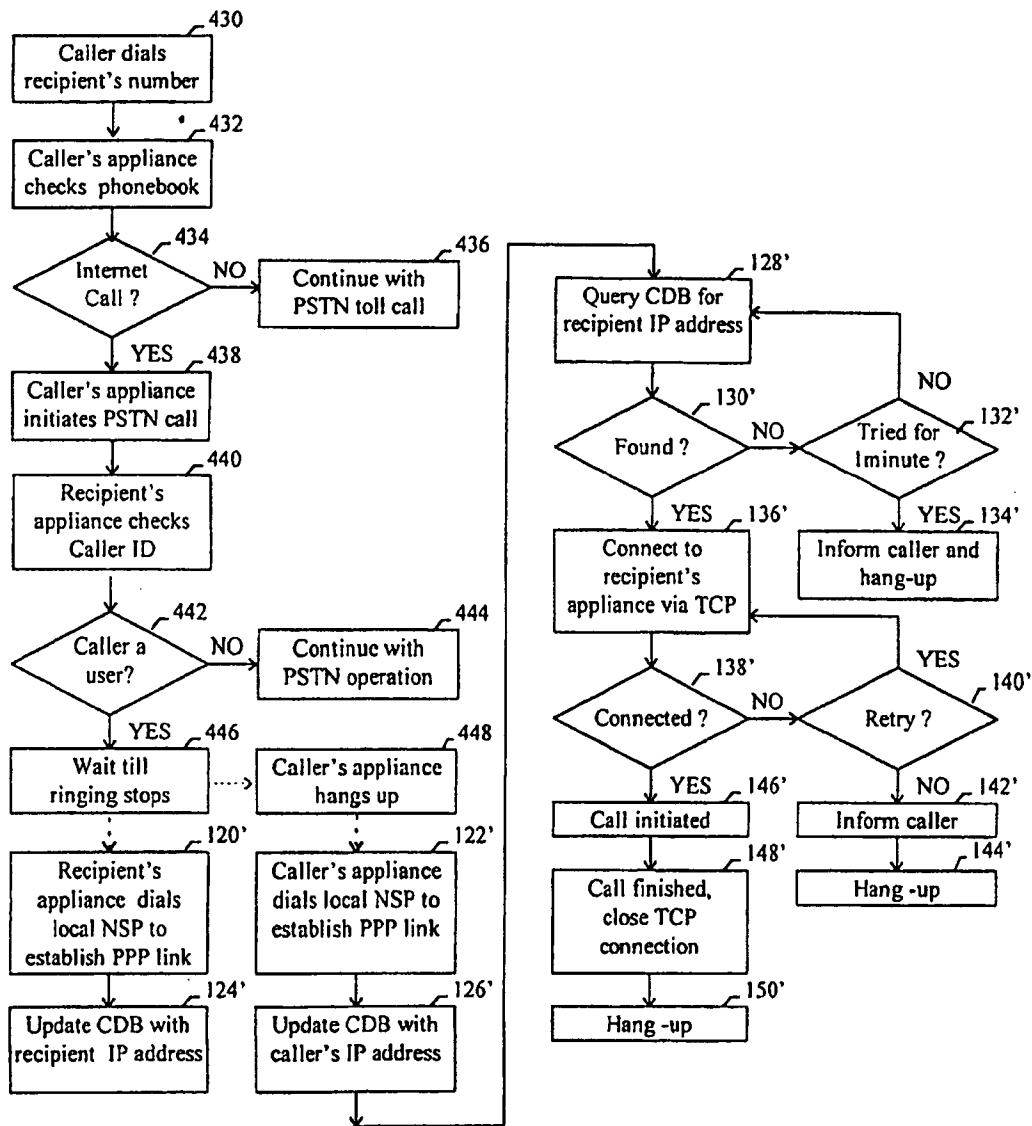


FIG. 5b

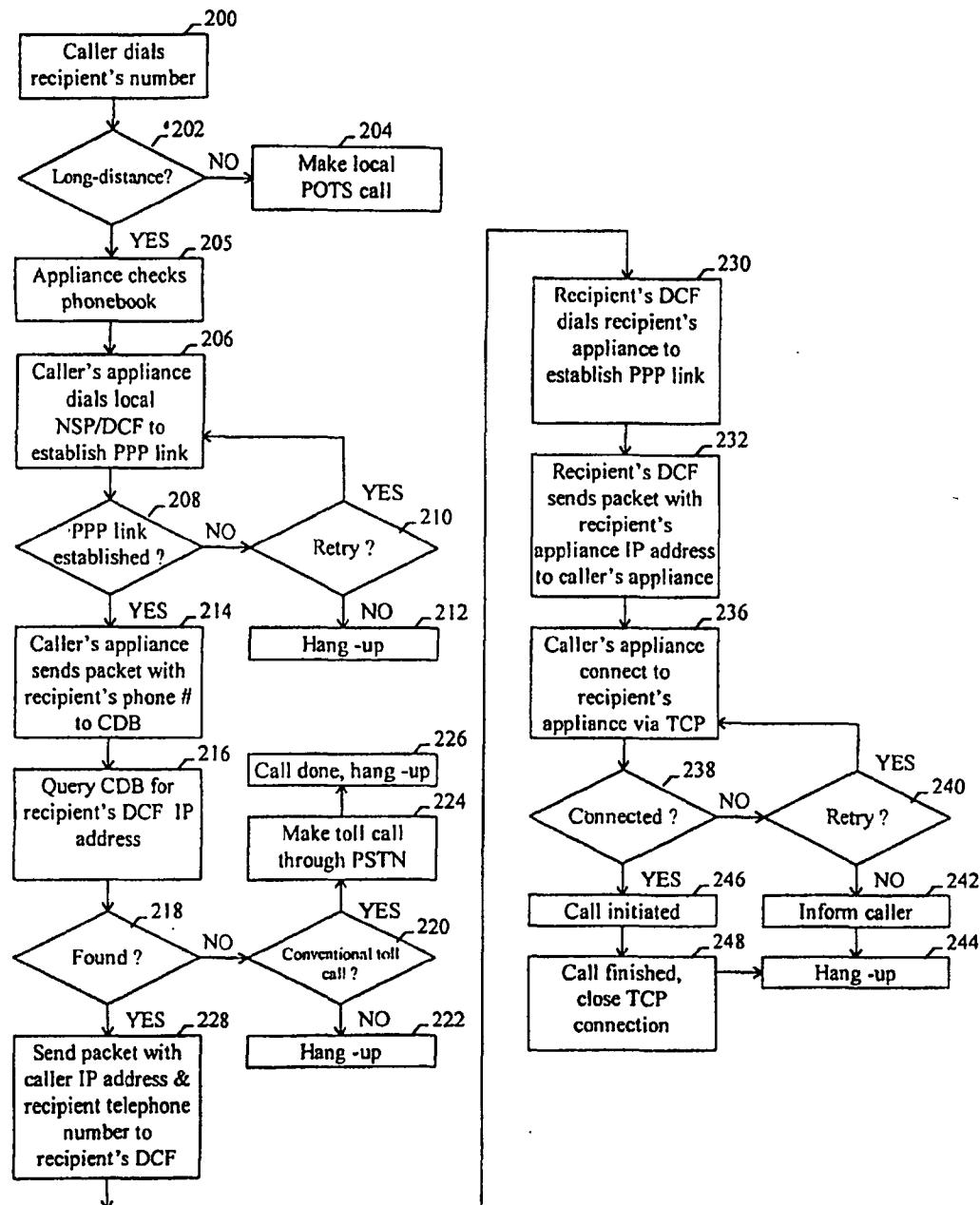


FIG. 6a

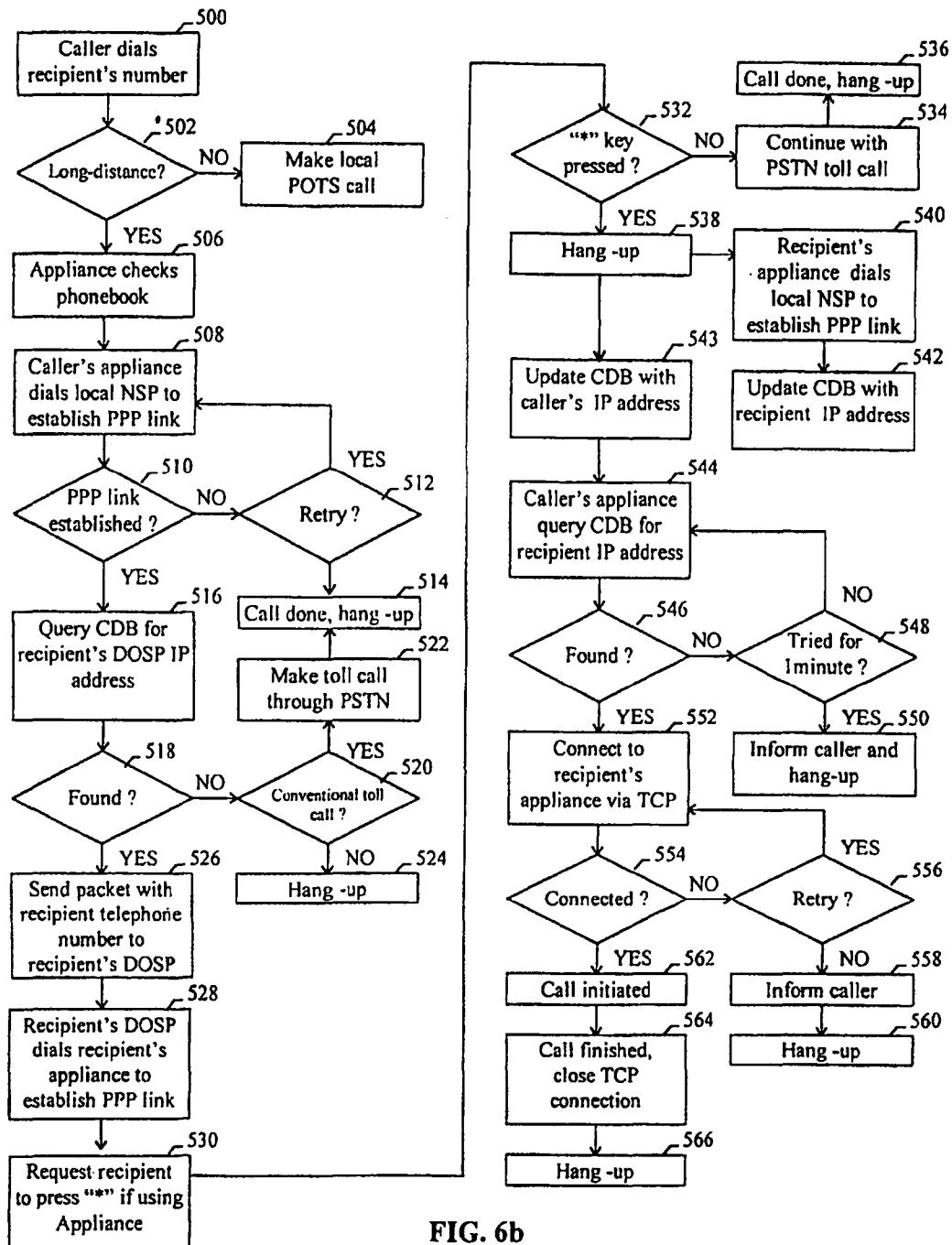


FIG. 6b

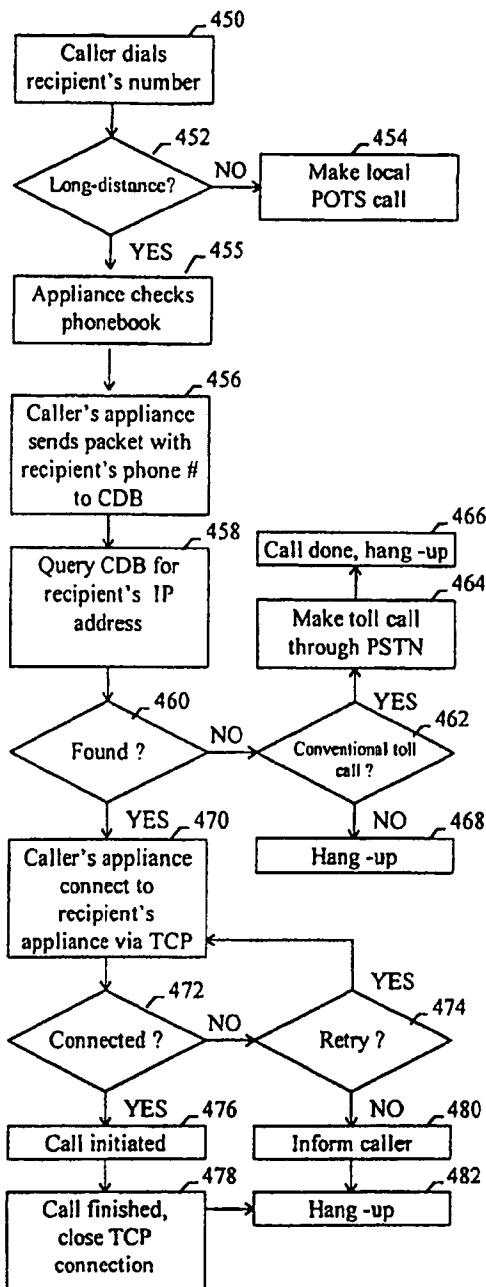


FIG. 7

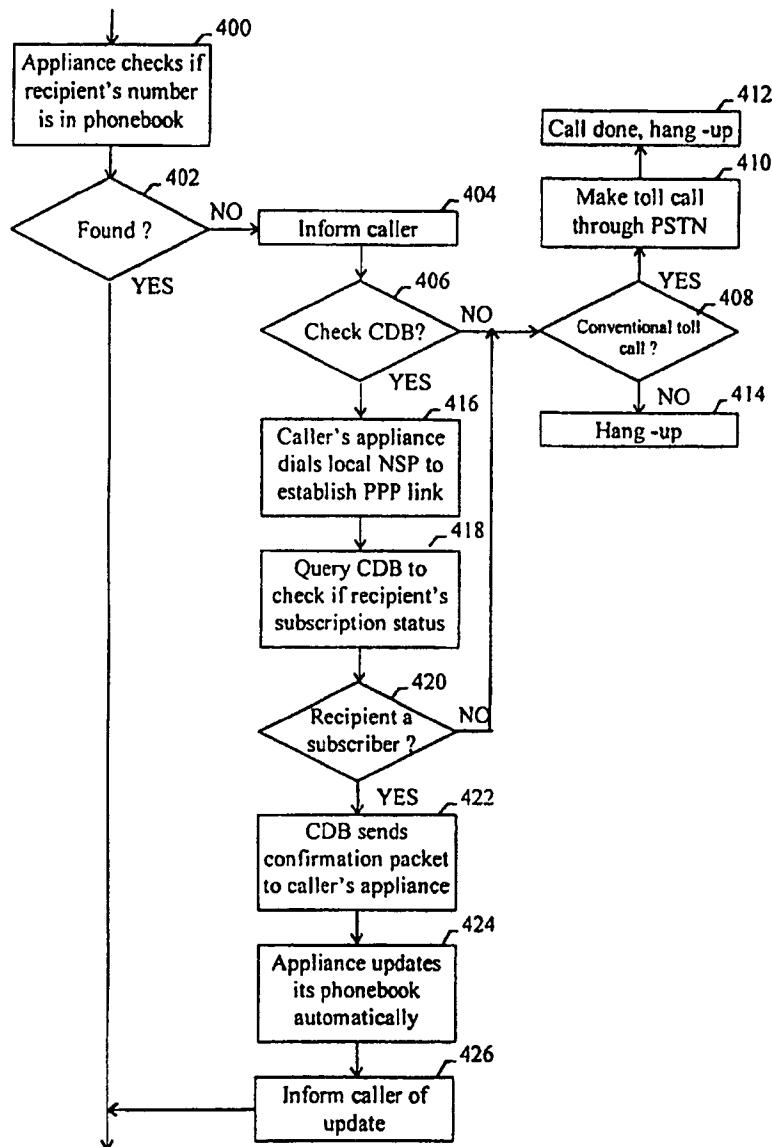


FIG. 8

10/12

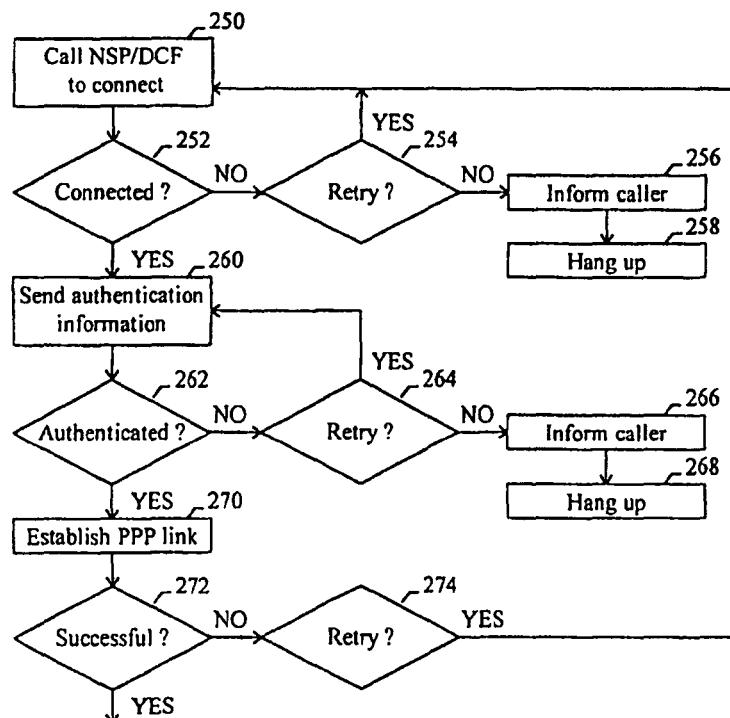


FIG. 9

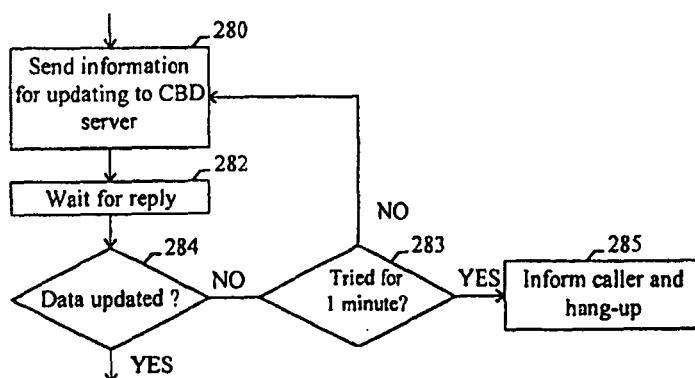


FIG. 10

11/12

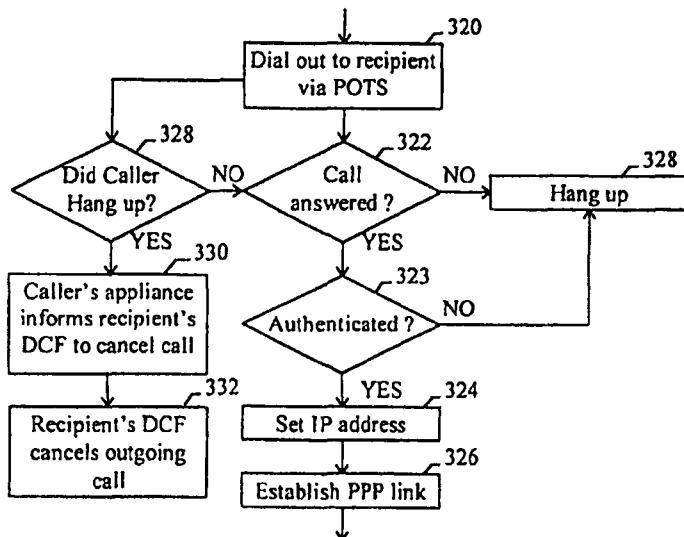


FIG. 11

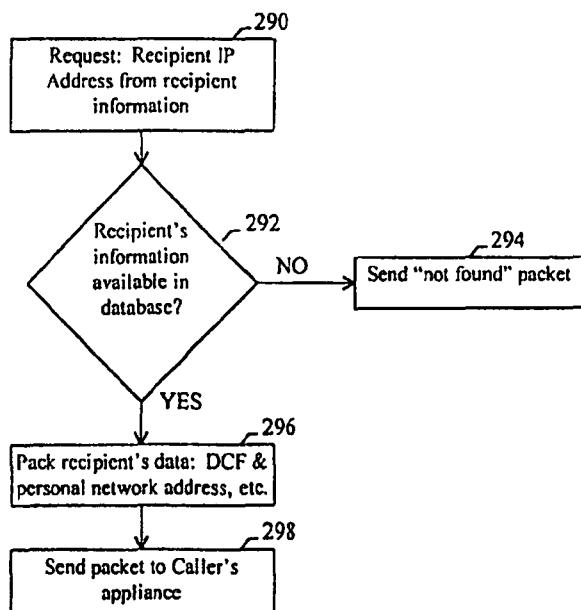
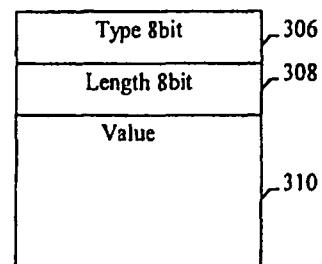
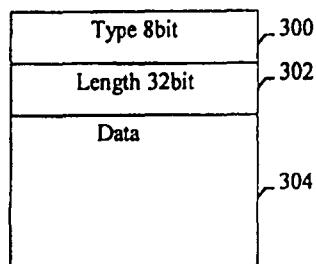


FIG. 12

12/12



Electronic Acknowledgement Receipt

EFS ID:	6626950
Application Number:	90010422
International Application Number:	
Confirmation Number:	6565
Title of Invention:	Graphic User Interface For Internet Telephony Application
First Named Inventor/Applicant Name:	6,009,469
Customer Number:	42624
Filer:	Michael R. Casey
Filer Authorized By:	
Attorney Docket Number:	2655-0185
Receipt Date:	14-DEC-2009
Filing Date:	26-FEB-2009
Time Stamp:	12:38:07
Application Type:	Reexam (Third Party)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/Message Digest	Multi Part/.zip	Pages (if appl.)
1	NPL Documents	F0095_r_p_mcNamara_some_considerations.pdf	292918 5a0807f235f0a2a9d5b567dd8774603dda7 914c2	no	5

Warnings:

Information:

LG v. Straight Path, IPR2015-00209

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2	NPL Documents	F0096_randy_cole_packet_voice_when.pdf	662089 2ef3af38d393b013e58d9dbb1aa29715601 a7a07	no	10
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Warnings:

Information:

3	NPL Documents	F0097_scott_flinn_coordinating_heterogeneous.pdf	1104908 160e963fe6320d1247d97276dfd8c255129 7bf8	no	16
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Warnings:

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4	NPL Documents	F0098_shimmi_hattori_integrated_digital_switching.pdf	656025 5701ee25e31d8c6361c49a8e318ed6fbf46c 7494	no	7
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Warnings:

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5	NPL Documents	F0099_steve_oltmanns_voice_and_comm.pdf	391732 c05641632275c8278bc8ad63a144a10fdf d8d4	no	6
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Warnings:

Information:

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7	NPL Documents	F0101_susan_angebranndt_integrating_audio.pdf	1090942 c89e79c6ba015c7db698853b50f1db619f0 a7232	no	19
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Warnings:

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Warnings:

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Warnings:

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Warnings:

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Warnings:

Information:

15	NPL Documents	F0109_toru_tsuda_approach_to_multi-service.pdf	420528 e13729eeaf92cbcaf69e3892bca4add454dc 364a	no	7
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Warnings:

Information:

16	NPL Documents	F0110_Translation_Kokai_H7-1_29488.pdf	1380439 93da8abe7003f0a96bc5f683c173ddd234e 7f94a	no	7
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Warnings:

Information:

17	NPL Documents	F0114_v_jacobson_rfc1185.pdf	664872 0624db5bd5c7bd08fce1d2d3d94916429a b2c805	no	20
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Warnings:

Information:

18	NPL Documents	F0115_v_jacobson_rfc1323.pdf	1169785 247de0bb795a6e552f26558b785cd21a869 92559	no	35
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Warnings:

Information:

19	NPL Documents	F0116_vinton_cerf_packet_satellite.pdf	185290 18850c4eb7093f475750badff637d51083fb2 f5fa	no	5
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Warnings:

Information:

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20	NPL Documents	F0117_vocaltec_internet_phone.pdf	946693 89a0631dbb3477a904b2c38f3a043c91070 b94f4	no	5
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Warnings:

Information:

21	Foreign Reference	F0118_WO-94-22087.pdf	1152846 92391f87f9a32fdfe9fd61b1307306bb2244 edee	no	36
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Warnings:

Information:

22	Foreign Reference	F0119_WO-97-14234.pdf	1135850 2e57db3d957190c4e5d1bbf6d9f9cd6a1fa 4ec01	no	32
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Warnings:

Information:

23	Foreign Reference	F0120_WO-98-11704.pdf	1721918 d0b89d65d64480fa15abe7af93f510dedfd2 8777	no	42
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Warnings:

Information:

24	NPL Documents	F0121_written_opinion_in_PCT_US9615504.pdf	227005 8d4e06cf9e2b33fa0d2c65c78dc585b248e9 2e9f	no	7
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Warnings:

Information:

25	NPL Documents	F0111_90010416_20090827_Office_Action.pdf	2144633 4bdc8ac8d581175ac57c458f9e50fb4d8a91 31a8	no	18
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Warnings:

Information:

26	NPL Documents	F0112_90010421_20090814_Office_Action.pdf	2727622 eb422d24f5c7b035f4674bdc4439fc080b b33b1	no	22
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Warnings:

Information:

27	NPL Documents	F0113_90010424_20090825_Office_Action.pdf	1618055 41849c265a0dd903718eb79041a4aae3ebf 9f57b	no	14
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Warnings:

Information:

28	Reexam Certificate of Service	20091214_COS_0185.pdf	56773 fc2ff2d493804f00a3ed99f6c4fd603d119bab	no	1
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Warnings:

Information:

LG v. Straight Path, IPR2015-00209

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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION OF: Attorney Docket: 2655-0185
Net2Phone, Inc. (Patent No. 6,009,469) Group Art Unit: 3992
Control No.: 90/010,422 Examiner: KOSOWSKI, Alexander
Issue Date: December 28, 1999 Date: November 25, 2009
**Title: GRAPHIC USER INTERFACE FOR
INTERNET TELEPHONY APPLICATION** Confirmation No.: 6565

RESPONSE TO NON-FINAL REJECTION IN A RE-EXAMINATION

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

Sir:

In response to the Office Action dated August 25, 2009 (and having had the deadline for responding extended one month), the Assignee hereby submits:

Amendments to the Claims beginning on page 2 of this paper; and
Remarks/Arguments beginning on page 3 of this paper.

Re-Examination of Patent No. 6,009,469
Control No.: 90/010,422
Filed: February 24, 2009
Reply to Office Action of August 25, 2009

AMENDMENTS TO THE CLAIMS

In the re-examination, please amend claim 1 as follows:

1. (Amended) A computer program product for use with a computer system having a display and an audio transducer, the computer system capable of executing a first process and connecting to other processes and a server process over a computer network, the computer program product comprising a computer usable medium having computer readable code means embodied in the medium comprising:
 - a. program code for generating a user-interface enabling control of a first process executing on the computer system;
 - b. program code for determining the currently assigned network protocol address of the first process upon connection to the computer network;
 - c. program code responsive to the currently assigned network protocol address of the first process, for establishing a communication connection with the server process and for forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process; and
 - d. program code means, responsive to user input commands, for establishing a point-to-point communications with another process over the computer network.

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REMARKS/ARGUMENTS

Favorable reconsideration, in view of the present amendment and in light of the following discussion, is respectfully requested.

STATUS OF THE CLAIMS AND SUPPORT FOR THE CHANGES TO CLAIM 1

Upon entry of this amendment, the status of the claims will be as follows:

Claims 1-3, 5, 6, 8, 9 and 14-18 will be pending and are the subject of this re-examination. Claims 4, 7 and 10-13 are not subject to re-examination.

Claim 1 has been amended to provide a missing “of” between “control” and “a.” The change is self-supporting and does not introduce any new matter. No claims other than claim 1 have been amended, and no claims have been added or canceled herewith.

RESPONSE TO REJECTIONS

In the outstanding Office Action, three rejections under 35 U.S.C 103(a) were made as follows:

1. Claims 1-3, 5, 6, 8, 9, and 14-18 were alleged to be obvious over the combination of NetBIOS and RFC 1531, Pinard and the VocalChat User’s Guide;
2. Claims 1-3, 5, 6, 8, 9, and 14-18 were alleged to be obvious over the combination of the Etherphone papers in view of Vin and further in view of RFC 1531, Pinard and the VocalChat User’s Guide; and
3. Claims 1-3, 5, 6, 8, 9, and 14-18 were alleged to be obvious over the combination of the VocalChat references in view of RFC 1531 and Pinard.

Each of those rejections is respectfully traversed for the reasons set forth below. Reference is made throughout this response to the Declaration Of Ketan Mayer-Patel Under 37 C.F.R. 1.132 (hereinafter the “Mayer-Patel Declaration”) attached hereto as Exhibit 1.

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The rejection of Claims 1-3, 5, 6, 8, 9, and 14-18 over the combination of NetBIOS, RFC 1531
Pinard and VocalChat User's Guide

Claims 1-3

Claim 1 recites “a. program code for generating a user-interface enabling control of a first process executing on the computer system.” With respect to the limitation of “program code for generating a user-interface enabling control of a first process executing on the computer system,” the Office Action alleges that “computers executing NetBIOS **may contain** DOS operating systems or may operate on other operating systems, which examiner notes inherently contain at least text-based user interfaces.” That “inherency” argument is respectfully challenged. First, even stating that NetBIOS “may contain” DOS operating systems is an admission by itself that NetBIOS need not actually contain a DOS operating system, and, therefore, NetBIOS does not inherently contain at least text-based user interfaces. Furthermore, the recitation of “other operating systems” also does not inherently mean that “text-based user interfaces” are provided. For example, embedded systems need not have a display or a text interface even though they may have operating systems. The Office Action also has not asserted that this limitation is taught by RFC 1531. Thus, limitation (a) has not been shown to be taught by either applied reference. See Exhibit 1, Mayer-Patel Declaration, paragraphs 18-19.

Claim 1 also recites “b. program code for determining the currently assigned network protocol address of the first process upon connection to the computer network.” With respect to that limitation, the Office Action admits that NetBIOS does not teach this limitation. To address the admitted deficiency, the Office Action alleges that such a limitation is taught by RFC 1531 because “RFC 1531 teaches dynamically assigning IP address on a TCP/IP network by an Internet access server.” An examination of limitations (a) and (b) together, however, shows that the Office Action has not alleged, much less proven, that the currently assigned network protocol address is that of the first process which the Office Action alleged was the “text-based user interface.” The Office Action has not even identified any motivation for the text-based interface to have its currently assigned network protocol address determined. Thus, limitation (b) has not

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been shown to be taught by either applied reference. See Exhibit 1, Mayer-Patel Declaration, paragraph 20.

Claim 1 further recites “c. program code responsive … for forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process.” As the Office Action has not shown that the assigned network protocol address of the first process is determined, the Office Action also has not shown that the assigned network protocol address of the first process would be forwarded to the server upon establishing a communication connection with the server process. Similarly, the Office Action has not shown that the alleged text-based user interfaces would have a unique identifier to be forwarded to the server. The Office Action further has not shown that such a limitation is taught by RFC 1531. Accordingly, limitation (c) has not been shown to be taught by either applied reference. See Exhibit 1, Mayer-Patel Declaration, paragraph 21.

Claim 1 also recites “d. program code, responsive to user input commands, for establishing a point-to-point communications with another process over the computer network.” The Office Action cites NetBIOS, pgs. 397-400, as teaching that “point-to-point communication is established upon initiation between nodes once target names and addresses have been found.” This assertion, however, fails to allege, much less prove, that such code is “responsive to user input commands” as no user input commands have been identified. Even assuming that text-based user interfaces were taught by NetBIOS, the Office Action still would not have shown that point-to-point communications are inherently established “responsive to user input commands.” The text-based user interfaces could have been used for non-communicating functions or even functions that use non-point-to-point communications. The Office Action further has not shown that such a limitation is taught by RFC 1531. Accordingly, limitation (d) has not been shown to be taught by either applied reference. See Exhibit 1, Mayer-Patel Declaration, paragraph 22.

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Since none of the limitations of claim 1 have been shown to be taught by the applied combination of references, claim 1 and dependent claims 2 and 3 are not rendered obvious by the proposed combination. See Exhibit 1, Mayer-Patel Declaration, paragraph 23.

No Ability to Combine the References as in Claims 1-3, 5, 6, 8, 9, and 14-18

In addition, the Office Action has not proven that one of ordinary skill in the art would have been able to combine the references as proposed. The Office Action acknowledges that NetBIOS does not teach “program code for determining the currently assigned network protocol address of the first process upon connection to the computer network.” The Office Action asserts that it would have been obvious to one skilled in the art at the time the invention was made to utilize dynamically assigned IP addresses from Internet access servers in the invention taught by NetBIOS. The Office Action further alleges that “it would have been obvious ... to determine the currently assigned network address of the first process upon connection to the computer network in the invention taught by NetBIOS above since this allows for automatic reuse of an address ... and since examiner notes the use of dynamic IP address assignment ... are old and well known ... and are useful to eliminate the burdensome task of manually assigning IP addresses for all networked computers.” See Exhibit 1, Mayer-Patel Declaration, paragraph 24.

The assignee respectfully submits that the obviousness conclusion drawn by the Office Action is mistaken. The Office Action speculates, with hindsight, as to why a person of ordinary skill might want to combine the two references, but does not acknowledge the problems that would arise in doing so, and does not provide any prior art that would indicate how the problems that dynamic addressing would bring into a NetBIOS type system could be resolved by those of ordinary skill at the time the patent was filed. See Exhibit 1, Mayer-Patel Declaration, paragraph 24.

In the context of point-to-point communication, widespread use of dynamically assigned addresses does not solve NetBIOS problems, it creates further problems. The assignee agrees

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that dynamically assigned addresses were known, and the patent in re-examination specifically states in that regard, “Due to the dynamic nature of temporary IP addresses of some devices accessing the Internet, point-to-point communications in realtime of voice and video have been generally difficult to attain.” Col. 2, lines 35-38. See Exhibit 1, Mayer-Patel Declaration, paragraph 25.

But it is not enough to prove that the cause of a problem existed, namely the problematic use of changing addresses. The Office Action must show by citation of prior art that the problem was recognized, and that the solution for NetBIOS was either known or trivially apparent from the known art. See *Innogenetics, N.V. v. Abbott Laboratories*, 512 F.3d 1363, 1373 (Fed Cir. 2008). (“The district court was nevertheless correct that knowledge of a problem and motivation to solve it are entirely different from motivation to combine particular references to reach the particular claimed method.”). If the requester of reexamination had such prior art it would undoubtedly have been provided as part of its exhaustive reexamination request. The fact that there is none is testimony to the lack of teaching in the prior art sufficient to enable the person of ordinary skill to make the suggested combination.

The NetBIOS reference cited in the request, moreover, indicates the opposite. For example, Section 15.1.7 of the NetBIOS reference (entitled “Consistency of the NBNS Data Base”) recognizes that the association between a node, a registered name and an IP address is tenuous, even in an environment that uses static IP addresses. “Even in a properly running NetBIOS scope the NBNS and its community of end-nodes may occasionally lose synchronization with respect to the true state of name registrations.” To minimize the impact of this problem, the reference states, “Various approaches have been incorporated into the NetBIOS-over-TCP protocols” which it then proceeds to describe. See Exhibit 1, Mayer-Patel Declaration, paragraph 25.

However, by incorporating DHCP and adopting dynamic address allocation as used by Internet access providers, the synchronization problem would become more disruptive, not less. Dynamic addressing introduced a new uncertainty to the relationships among the NBNS and its

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community of end-nodes and a new set of obstacles to NetBIOS synchronization that *are not addressed by the NetBIOS reference*. Consider the case of a node that is turned-off and then subsequently turned back on, or a node that has simply lost its Internet connection for some technical reason or whose DHCP lease has expired and then re-established a connection. In a dynamic addressing environment, such a node would most likely obtain a new IP address when it was turned back on that was different than the one it had when it registered its name. This change could lead to any number of node-name-IP address synchronization problems for the disclosed NetBIOS protocols. See Exhibit 1, Mayer-Patel Declaration, paragraph 26.

For example, because the NBNS does not know the node's new address, the NBNS would be unable to send to the node a Name Release Request or a Name Conflict Demand or request that the node send it a Name Status Request. Because communication from the node would be originating at a new address that was not recognized by the NBNS, a node's response to a Name Query Request (assuming it somehow knew that its name had been challenged, perhaps from before it lost network connectivity) would not be recognized. A node would also be unable to confirm its association with registered names by sending Name Refresh Request packets to the NBNS. If a session between two NetBIOS applications were cut-off, re-establishing the communication would be especially difficult where the ability of a called entity to obtain both its associated name and its associated IP address were in doubt. As a result, the Office Action has not demonstrated that a solution to the problems created by exposure of NetBIOS to DHCP and dynamic addressing has been addressed by any of the applied references.¹ See Exhibit 1, Mayer-Patel Declaration, paragraph 27.

¹ Besides dynamic addressing, Internet access would pose other challenges to a NetBIOS system. For example, because NetBIOS was designed for use on local area networks with small numbers of computers, trust among the network participants is assumed. That assumption cannot be transferred to a global Internet made up of unknown, and sometimes malevolent, entities. An implementation of NetBIOS on the public Internet would necessitate non-trivial adaptations to ensure that its services perform correctly and return accurate information. There is no discussion of security issues in the cited references. See Exhibit 2, from http://www.w3schools.com/Site/site_security.asp which instructs Microsoft Windows users whose computers access the Internet to disable NetBIOS over TCP/IP in order to solve their security problems. See Exhibit 1, Mayer-Patel Declaration, paragraph 27.

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The Office Action also has not identified anything in the cited art that suggests how a person of ordinary skill is to go about the redesign of NetBIOS and the solving of obstacles to NetBIOS operation that are created by Internet access; *problems that were recognized and left as warnings unresolved in the NetBIOS reference.*² See Exhibit 1, Mayer-Patel Declaration, paragraph 28.

Merely citing to dynamic addressing, i.e., the source of those problems, is insufficient as the Supreme Court and the Federal Circuit have repeatedly made clear. See *Depuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1326 (Fed. Cir. 2009) citing *inter alia KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007) and *U.S. v. Adams*, 383 U.S. 39 (1966), for the proposition that obviousness requires not only “the expectation that prior art elements are capable of being physically combined, but also that the combination would have worked for its intended purpose,” and also quoting *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1382 (Fed. Cir. 2007) as saying “[A] reference teaches away from a combination when using it in that combination would produce an inoperative result.”

In view of the foregoing, the proposed rejection of claims 1-3 over the combination of NetBIOS and RFC 1531 can be compared to a patent that claims a vehicle that travels on water where one piece of prior art shows a land vehicle and another shows water. The fact that water creates a problem for the land vehicle does not disclose that the person of ordinary skill would know how to build a vehicle capable of crossing the water. Thus, claims 1-3 are patentable over the combination of NetBIOS and RFC 1531. See Exhibit 1, Mayer-Patel Declaration, paragraph 29.

² The cited references go out of their way to avoid describing how a NetBIOS protocol might work in interconnected network environments that are less complex than the Internet and that predate DHCP. See Section 4.6 (“The proposed standard recognizes the need for NetBIOS operation across a set of networks interconnected by network (IP) level relays (gateways.) However, the standard assumes that this form of operation will be less frequent than on the local MAC bridged-LAN.”)

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Claims 5 and 6

Claim 5 recites “determining the currently assigned network protocol address of the first process upon connection to the computer network.” The Office Action admits that this limitation is not taught by NetBIOS but alleges that “RFC 1531 teaches dynamically assigning IP addresses on a TCP/IP network by an Internet access server.” The Office Action further alleges that “it would have been obvious ... to determine the currently assigned network address of the first process upon connection to the computer network in the invention taught by NetBIOS above since this allows for automatic reuse of an address ... and since examiner notes the use of dynamic IP address assignment ... are old and well known ... and are useful to eliminate the burdensome task of manually assigning IP addresses for all networked computers.” However, as described above with respect to claims 1-3 and the alleged motivation to combine NetBIOS and RFC 1531, the Office Action has only speculated, with hindsight, as to why a person of ordinary skill might want to combine the two references, and has neither addressed the problems that would arise in doing so, nor provided any prior art that would indicate how these problems could be designed-around or otherwise resolved by those of ordinary skill at the time the patent was filed. Thus, claim 5 and dependent claim 6 are patentable over the applied NetBIOS and RFC 1531 references. See Exhibit 1, Mayer-Patel Declaration, paragraph 30.

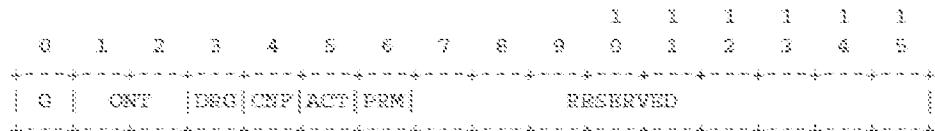
Claims 8, 9 and 14-18

Claim 8 recites “querying the server process to determine if the first callee process is accessible.” The Office Action asserts that this limitation is taught by NetBIOS and cites pages 377, 388, 389 and 446 as supporting the proposition that “a query is sent to the NBNS to determine if another node is logged in and discover[s] the node[’]s IP address.” However, the Office Action has not shown how knowing that a name has been registered equates to “determin[ing] if the first callee process is accessible.” While NetBIOS uses name entries with “active” statuses as part of its name management process, an analysis of how that “active” status is used shows that “an active name” is not synonymous with determining if the first callee

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process is accessible. An active name simply refers to a name that has been registered and that has not yet been de-registered, independent of whether the associated computer is or is not accessible. As shown on page 447 (and reproduced below), the Node_Name entries stored with respect to a NetBIOS Name Server contain a series of fields including the “ACT” field. See Exhibit 1, Mayer-Patel Declaration, paragraph 31.

The NAME_FLAGS field:



The NAME_FLAGS field is defined as:

Symbol	Bit(s)	Description:
RESERVED	7-15	Reserved for future use. Must be zero (0).
PRM	6	Permanent Name Flag. If one (1) then entry is for the permanent node name. Flag is zero (0) for all other names.
ACT	5	Active Name Flag. All entries have this flag set to one (1).
CNF	4	Conflict Flag. If one (1) then name on this node is in conflict.
DEG	3	Deregister Flag. If one (1) then this name is in the process of being deleted.
CNT	1,2	Owner Node Type: 00 = B node 01 = P node 10 = M node 11 = Reserved for future use
G	0	Group Name Flag. If one (1) then the name is a GROUP NetBIOS name. If zero (0) then it is a UNIQUE NetBIOS name.

The ACT field is a single bit field (in bit 5) that signifies an “Active Name Flag. *All entries have this flag set to one (1).*” (Emphasis added.) If all name entries have this flag set to one (1), then the NetBIOS name server cannot be using the Active Name Flag as a means of

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separately tracking whether the entity that owns the name is “active,” let alone what its “on-line” status might be. See Exhibit 1, Mayer-Patel Declaration, paragraph 32.

The NetBIOS reference also does not teach that the active status of a name in the NetBIOS server is an indication of the active status of the owner of that name. To the contrary, when information about whether the owner of a name is “active” may be relevant, for example when a new entity seeks to register a name that has already been registered in the NetBIOS name server, the NetBIOS reference describes an elaborate set of interactions used to test whether the existing owner of the registered name is active or inactive. It does not rely on the fact that the name is active in the NetBIOS name server (See Section 15.2.2.2 and 15.2.2.3 entitled “Existing Name and Owner is Inactive”). See Exhibit 1, Mayer-Patel Declaration, paragraph 33.

The NetBIOS reference also does not teach that an acquired IP address can be reasonably relied upon by a requesting end-node to confirm that an end-node associated with a sought name is, in fact, “accessible.” The NetBIOS reference describes at least two different scenarios where a second end-node sends a rejection response to the first end-node notwithstanding the fact that an end-node is connected to the computer network and active with respect to the sought name. See Section 16.1.1 (“There exists a NetBIOS LISTEN compatible with the incoming call, but there are inadequate resources to permit establishment of a session...The called name does, in fact, exist on the called node, but there is no pending NetBIOS LISTEN compatible with the incoming call.”). No distinction is made in the reference between the rejection response in these cases and the rejection response in cases where the called name does not exist on the called end-node. Section 16.1.1 also states “In all but the first case, a rejection response is sent back over the TCP connection to the caller.” See Exhibit 1, Mayer-Patel Declaration, paragraph 34.

The Office Action also has not alleged that any of the remaining references teach this limitation missing from the NetBIOS reference. As such, claim 8 and its dependent claims (claims 9 and 14-18) are not rendered obvious by the cited combination of references. See Exhibit 1, Mayer-Patel Declaration, paragraph 35.

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The rejection of claims 1-3 over the combination of the Etherphone papers in view of Vin and further in view of RFC 1531

Claims 1-3

Claim 1, as amended, recites “a. program code for generating a user-interface enabling control of a first process executing on the computer system” and “d. program code means, responsive to user input commands, for establishing a point-to-point communications with another process over the computer network.” When read together, it can be seen that the Office Action has not alleged that these limitations are taught by the applied combination of references. See Exhibit 1, Mayer-Patel Declaration, paragraph 37.

With respect to the limitation “a. program code for generating a user-interface enabling control of a first process executing on the computer system,” the Office Action cites Swinehart and Zellweger as teaching that “workstations include GUI’s.” Later, with respect to the limitation “d. program code means, responsive to user input commands, for establishing a point-to-point communications with another process over the computer network,” the Office Action asserts that “after acquiring the network address of a callee, voice datagrams are transmitted directly among [sic; among] the participants, bypassing the control server.” However, by “participants” it appears that the Office Action is referring to Etherphones participating in a telephone call. As such, the Office Action has not shown that the datagrams are transmitted as part of a point-to-point communication from the workstation (which was alleged as having the first process) to one of the Etherphones. In fact, with respect to limitation (c), the Office Action confirms that its interpretation is that the “workstation address [is] transmitted to the Voice Control Server when connected” -- not the Etherphone’s network address. See Exhibit 1, Mayer-Patel Declaration, paragraph 38.

Similarly, looking at it from the opposite perspective, if the voice datagrams are actually going from one Etherphone to another, then the Office Action has not shown how the “currently assigned network protocol address of the first process” is the address of the Etherphone and how

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the Etherphone has a display or “a user-interface enabling control a first process” on that Etherphone. The Office Action also has not alleged that RFC 1531 teaches this limitation missing from the Etherphone references. Thus, claims 1-3 are not rendered obvious by the proposed combination. See Exhibit 1, Mayer-Patel Declaration, paragraph 39.

Claims 5 and 6

Claim 5 recites “A. determining the currently assigned network protocol address of the first process upon connection to the computer network” and “D. establishing a point-to-point communication with another process over the computer network.” As described above with respect to claim 1, when these two limitations are examined together, it can be seen that the Office Action has not met its burden of showing that these limitations are met. See Exhibit 1, Mayer-Patel Declaration, paragraph 40.

With respect to the limitation “A. determining the currently assigned network protocol address of the first process upon connection to the computer network,” the Office Action again cites the GUI’s of the workstation as meeting this limitation. Then, with respect to the limitation “D. establishing a point-to-point communication with another process over the computer network,” the Office Action again states “voice datagrams are transmitted directly among [sic; among] the participants, bypassing the control server.” Thus, as discussed above with respect to claim 1, the Office Action appears to have overlooked that the Etherphone, not the workstation with the GUI, is receiving the voice datagrams, so the Etherphone reference does not teach limitations (A) and (D). The Office Action also has not alleged that RFC 1531 teaches this limitation missing from the Etherphone references. Thus, claim 5 and dependent claim 6 are not rendered obvious by the proposed combination. See Exhibit 1, Mayer-Patel Declaration, paragraph 41.

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Claims 8, 9 and 14-18

Claim 8 recites “a method for establishing a point-to-point communication from a caller process to a callee process over a computer network, the caller process capable of generating a user interface and being operatively connected to the callee process and a server process over the computer network.” That method includes “querying the server process to determine if the first callee process is accessible” and “establishing a point-to-point communication link from the caller process to the first callee process.” See Exhibit 1, Mayer-Patel Declaration, paragraph 42.

With respect to the limitation of “establishing a point-to-point communication link from the caller process to the first callee process,” the Office Action asserts that Swinehart and Zellweger teach “voice datagrams are transmitted directly among participants.” However, it appears that the Office Action means that the Etherphone are the “participants.” If this is the case, there is no indication that the combination meets the limitation of “the caller process capable of generating a user interface” as the Office Action has not alleged that the Etherphone has such a capability. The Office Action has also not alleged that the other references overcome this deficiency of the Etherphone references. Thus, claim 8 and its dependent claims are patentable over the applied combination of references. See Exhibit 1, Mayer-Patel Declaration, paragraph 43.

The rejection of claims 1-3 over the combination of the VocalChat references in view of RFC 1531

Claims 1-3, 5, 6, 8, 9 and 14-18 stand rejected under 35 U.S.C. § 103(a) as obvious over VocalChat User’s Guide in view of VocalChat Readme, VocalChat Networking, VocalChat Help File and VocalChat Troubleshooting Help file (collectively the “VocalChat References”) and further in view of RFC 1531 and Pinard. As a preliminary matter, the Office Action has not established that the VocalChat references constitute printed publications as required by statute. See 35 U.S.C. §§ 301 and 302.

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The VocalChat References Are Not Printed Publications

The Office Action appears to rely on, but does not expressly reference, Exhibit L of the Request for Re-examination (i.e., the Declaration of Alon Cohen), to establish that the VocalChat references are, in fact, printed publications. As found by the Federal Circuit in *Carella v. Starlight Archery*, 804 F.2d 135, 139, 231 USPQ 644, 646-7 (Fed. Cir. 1986), “one who wishes to characterize the information, in whatever form it may be, as a ‘printed publication’ … should produce sufficient proof of its dissemination or that it has otherwise been available and accessible to persons concerned with the art to which the document relates and thus most likely to avail themselves of its contents.” (Citing *In re Wyer*, 655 F.2d 221, 227, 210 USPQ 790, 795 (CCPA 1981) as quoting *Phillips Electronics & Pharmaceutical Industries Corp. v. Thermal & Electronic Industries, Inc.*, 450 F.2d 1164, 1171, 171 USPQ 641, 646 (3rd. Cir. 1971)).

Mr. Cohen states in paragraph 3 of his declaration that “the first version of the VocalChat product was commercially released to the public in 1993.” However, this provides no indication of what information was distributed with that version (or even what the version number was of that version).

In paragraph 4 of his declaration, Mr. Cohen alleged that VocalChat 1.01 Networking Information “was publicly distributed in 1994 as part of the VocalChat version 1.01 software, which was commercially released and on sale to the general public in 1994.” Mr. Cohen did not, however, allege the facts necessary to show that the files are actually printed publications. For example, to whom was the software distributed, if anyone, outside of VocalTec? Second, how many copies were distributed and under what conditions? For example, were the copies distributed under a confidentiality agreement such that the associated files were not available to the general public? Were they distributed in such a way as to have been sufficiently available to one of ordinary skill in the art that she/he could have found them when trying to solve a similar problem? Without evidence on these factors, the mere allegation that VocalChat 1.01 Networking Information “was publicly distributed in 1994 as part of the VocalChat version 1.01

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software, which was commercially released and on sale to the general public in 1994” is insufficient to show that this reference constitutes a printed publication.

Similarly, with respect to the VocalChat Help File and the VocalChat Troubleshooting Help file, Mr. Cohen alleges in paragraph 6 of his declaration that “Electronic copies of these documents were publicly distributed in 1994 as part of the VocalChat version 2.02 software, which was commercially released and on sale to the general public as a boxed product in 1994.” However, this too fails to provide the same relevant facts required to make a *prima facie* case that the VocalChat Help file and VocalChat Troubleshooting Help file constitute printed publications.

As also described in *Carella*, “Although in some circumstances unsupported oral testimony can be sufficient to prove prior knowledge or use, it must be regarded with suspicion and subject to close scrutiny.” 804 F.2d at 138, 231 USQP at 646. Although not disclosed in the declaration, the declarant, Mr. Cohen, is a paid consultant for the Defendants in the litigation relating to the patent in re-examination. See Exhibit 3 where the Court found Mr. Cohen to be a “consultant[] who the defendant has paid, see Deposition of Alon Cohen...” Mr. Cohen also co-founded a company named BitWine that partners with Defendant Skype. See Exhibit 4 (from <http://techaddress.wordpress.com/2006/12/06/interview-with-alon-cohen-co-founder-and-co-ceo-of-bitwine>). Mr. Cohen also offers personal services to the public through the BitWine-Skype partnership. See Exhibit 5 (from <http://www.bitwine.com/search?query=alon+cohen&=>). Moreover, Mr. Cohen’s company, VocalTec, produced Internet Phone, and the original patentee, NetSpeak, produced a competing product called WebPhone, thereby creating a potential for bias -- especially when at least one person compared the two products and stated “WebPhone may well become the killer app that puts to shame similar offerings from VocalTec (Internet Phone) and Quarterdeck (WebTalk). See Exhibit 6 (N2P-001-00005919).

TheVocalChat References Do Not Teach All of the Claim Limitations

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Even assuming that the VocalChat references constitute printed publications (which has not been established), the combination of references still does not render obvious the claims under re-examination.

Claims 1-3

Claim 1 recites “program code responsive to the currently assigned network protocol address of the first process, for establishing a communication connection with the server process and for forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process.” The Office Action admits that this limitation is not disclosed by the VocalChat references. However, the Office Action attempts to overcome this deficiency by combining the VocalChat references with RFC 1531. See Exhibit 1, Mayer-Patel Declaration, paragraph 45.

The assignee respectfully submits that the Office Action is mistaken. In the context of point-to-point communication, widespread use of dynamically assigned addresses is not the solution to a problem, it is the problem itself. See Exhibit 1, Mayer-Patel Declaration, paragraph 25. The assignee agrees that dynamically assigned addresses were known, and the patent in re-examination specifically states in that regard, “Due to the dynamic nature of temporary IP addresses of some devices accessing the Internet, point-to-point communications in realtime of voice and video have been generally difficult to attain.” Col. 2, lines 35-38.

But it is not enough to prove that the cause of a problem existed. The Office Action must show by citation of prior art that the problem was recognized, and that the solution was either known or trivially apparent from the known art. See *Innogenetics, N.V. v. Abbott Laboratories*, 512 F.3d 1363, 1373 (Fed Cir. 2008). (“The district court was nevertheless correct that knowledge of a problem and motivation to solve it are entirely different from motivation to combine particular references to reach the particular claimed method.”).

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The development history of the VocalChat products indicates the opposite. See Exhibit 1, Mayer-Patel Declaration, paragraph 48. As the Examiner is aware, the Request cites a Generic version of the VocalChat client which, according to Mr. Cohen, was used on local area networks. See Cohen Declaration, paragraph 3. Absent from the Request, however, is any reference to the subsequent versions of VocalChat that were released by VocalTec to the public for use on the Internet. The first of those versions was released in 1994, at least in beta, and was called VocalChat Gateway To Interent (or “VocalChat GTI”). This Internet version is believed to have required users to manually input callee addresses into static local address files. (See paragraph 393 of the Pre-Trial Order (filed with the IDS dated August 11, 2009) and Exhibit 7, SKYPE-N2P00286659.) Likewise, it is believed that VocalChat GTI did not utilize a server at all. See Pre-Trial Order at paragraph 390.

The use of manually input static addresses and the absence of a server suggests that the VocalTec designers—presumably software developers of at least ordinary skill in the art—did not consider the alleged combination of their own VocalChat references with RFC 1531, or it suggests that they did consider it but were unable to overcome the non-trivial obstacles to doing so. See Exhibit 1, Mayer-Patel Declaration, paragraph 50.

The next version of VocalChat was released soon thereafter and was also meant for use on the Internet. This version, again, did not combine the Request’s disclosed versions of VocalChat with RFC 1531. Instead, it used the Internet Relay Chat (IRC) to help VocalChat clients with dynamically assigned IP addresses find one another. See Pre-Trial Order at paragraph 392 and Exhibit 7, SKYPE-N2P00286660. The development history of VocalChat—from the Generic version disclosed by the Request for use on local area networks to the GTI and IRC versions for use on the Interent—is strong, objective evidence of nonobviousness. If the designers of the VocalChat Generic implementation did not see fit to combine dynamic addressing with the implementation disclosed in the VocalChat references, it is respectfully submitted that one of ordinary skill in the art would not have done so either, *a fortiori*. See Exhibit 1, Mayer-Patel Declaration, paragraph 51.

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Claim 1 also recites “forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process.” The VocalChat Generic implementation does not disclose such a limitation. In the VocalChat Generic implementation, a local process reads a “USERS” file or a Connections file in its entirety and writes it back in its entirety rather than “forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process.” This causes the VocalChat system to have to send an increasing amount of information as the number of users increases. Sending the whole file such that the new file replaces the old file also creates problems with consistency such that one user’s changes could overwrite the changes of another user -- especially as networks got larger which would have increased the problem of inconsistent files being written. See Exhibit 1, Mayer-Patel Declaration, paragraph 47.

Accordingly, the subject matter of claim 1 is not rendered obvious by the combination of the VocalChat references and RFC 1531. Since claim 1 is not rendered obvious by the proposed combination, claims 2-3 are not rendered obvious as well. See Exhibit 1, Mayer-Patel Declaration, paragraph 52.

With respect to claim 3, claim 3 further recites “program code for transmitting, from the first process to the server process, a query as to whether the second process is connected to the computer network.” As is discussed in greater detail below with respect to claim 8, the VocalChat references do not disclose querying whether processes are connected to the computer network. Thus, claim 3 is also separately patentable from claim 1. See Exhibit 1, Mayer-Patel Declaration, paragraph 53.

Claims 5 and 6

Claim 5 recites “A. determining the currently assigned network protocol address of the first process upon connection to the computer network” and “C. forwarding the assigned network

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protocol address of the first process to the server process upon establishing a communication connection with the server process.” As was discussed above with respect to claim 1, the combination of the VocalChat references and RFC 1531 does not disclose either of those elements. Thus, claim 5 and its dependent claim 6 are not rendered obvious by the combination of the VocalChat references and RFC 1531. See Exhibit 1, Mayer-Patel Declaration, paragraph 54.

Claims 8, 9 and 14-18

Claim 8 recites “C. querying the server process to determine if the first callee process is accessible.” The Office Action cites the Help file, pgs. 2 and 26, and Network information, page 10, and asserts that “a server can receive[] queries to determine status and information of users.” However, the Office Action has not identified what portion of those references teach the claimed “querying.” At best, the references teach that a local process reads a “USERS” file or a Connections file. As can be seen from page 4 of the VocalChat Network Information (reproduced below), when the VocalChat system uses the Generic mode, a USERS file is used. See Exhibit 1, Mayer-Patel Declaration, paragraph 55.

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2.5. Network parameters in the VocalChat INI files

These are the network parameters in the VocalChat VOCLCHAT.INI and VCSETUP.INI files (under the Network section):

```
(Network)
Network=           / description of the selected network
NetworkUser=       / user services: NetWare / WinWorkgroups / Generic*
NetworkProtocol=   / network protocol: IPX / NetBIOS
NetworkType=       / name of the selected network, for future use
UsersFile=         / path name of users file (when Generic is set)
MyUserName=        / the name of the user (when Generic is set)**
```

* When Generic is set, a USERS file is used.

** This line appears only in the VOCALCHAT.INI file of each user.

The VOCLCHAT.INI files are in the windows directory of each user. The VCSETUP.INI file is in the VOCLCHAT directory, where VocalChat was installed, and is used only to supply default values for the different installations.

The USERS file configuration parameter includes a “UsersFile” entry that specifies the “path name of users file (when Generic is set).” However, it is also stated that “The VOCLCHAT.INI files are in the windows directory of each user.” Thus, this “UsersFile” entry is a local configuration parameter such that the local VocalChat client reads and writes the USERS file on its own -- without performing the claimed query. See Exhibit 1, Mayer-Patel Declaration, paragraph 55.

Similarly, page 8 of the VocalChat Help file states “If your network type is not NetWare or Windows for Workgroups, the Setup program creates a Connection List file which is used to identify and access users.” The Connection List file and the USERS file apparently have the same function. Thus, the identification and access enabled by the Connection List is performed by the local client reading and writing the file itself -- without performing the claimed query. Accordingly, claims 8, 9 and 14-18 are not rendered obvious by the applied combination of references. See Exhibit 1, Mayer-Patel Declaration, paragraph 56.

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Objective Evidence of Non-Obviousness

In addition to the reasons set forth above showing that all of the elements of the claims under re-examination are not taught by the applied references, it is respectfully submitted that objective evidence supports a finding that the claims are non-obviousness. Objective indicia of non-obviousness, which include commercial success, licenses showing industry respect, and the failure of others, “provide evidence of how the patented device is viewed by the interested public: not the inventor, but persons concerned with the product in the objective arena of the marketplace.” *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966); *WMS Gaming Inc. v. International Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999); *Arkie Lures, Inc. v. Gene Larew Tackle, Inc.*, 119 F.3d 953, 957 (Fed. Cir. 1997). Evidence supporting the objective indicia of non-obviousness is set out below.

Commercial Success

NetSpeak’s WebPhone, an exemplary embodiment of the ‘469 patent (see, e.g., col. 4, ll. 44-49), was a commercial success as evidenced by the recognition it received in the industry. WebPhone’s commercial success is attributable to the novelty and non-obviousness of the invention. *Demaco Corp. v. F. Von Langsdorff Licensing, Ltd.*, 851 F.2d 1387, 1393 (Fed. Cir. 1988) (“A prima facie case of nexus is generally made out when the patentee shows both that there is commercial success, and that the thing (product or method) that is commercially successful is the invention disclosed and claimed in the patent.”).

NetSpeak’s WebPhone won Internet Telephony’s 1998 Product of the Year in the category of Internet Telephony Clients. Exhibit 8, page 6 (N2P-200-00012627).

NetSpeak’s WebPhone product also won significant praise when compared to other products in the same timeframe. “WebPhone may well become the killer app that puts to shame

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similar offerings from VocalTec (Internet Phone) and Quarterdeck (WebTalk). See Exhibit 6 (N2P-001-00005919).

The importance of the claimed invention can also be seen in its praise by other companies in the industry. In a joint press release of NetSpeak and Durand Communications Network (“Durand”), Durand’s president and CEO stated “NetSpeak’s WebPhone is hands-down the best PC-voice communications package available in the market today. ... We wanted to work with a company whose leading edge technology would add value to our existing MindWire NT CommunityServer by offering unique telephony services so integral to fostering growth within online communities.” Exhibit 9, page 1.

NetSpeak’s WebPhone was also praised in the Computer Telephony Magazine. The July 1996 Edition included an article on the WebPhone trial version and stated “You’ve gotta try this Internet telephony package. NetSpeak ... makes WebPhone. ... Does it work? Yes.” Exhibit 10 (N2P-200-00012630).

As set forth in the original Assignee’s Amended S-1 Registration form (Exhibit 11), NetSpeak’s technology was a commercial success as further evidenced by the investments made in the company. At least three different stock offerings were made which raised millions of dollars for the company. The Amended S-1 Registration form describes on numbered page 19:

In January and February of 1996, the Company sold 1,204,000 shares of Common Stock at \$2.50 per share in a private offering raising \$2,992,028

In June 1996, the Company issued 207,679 shares of Common Stock to Creative at a price of \$5.05 per share raising \$943,698

In August 1996, the Company issued 769,853 shares of Common Stock and the Motorola Warrant to purchase up to an additional 452,855 shares of Common Stock at a price of \$5.50 per share for a six year period expiring in August 2002 to Motorola raising \$3,993,864....

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Later, in 1998, Motorola took an even larger interest in NetSpeak by acquiring an additional 27% of the stock that it did not already own at a cost of \$90 million. See Press Release, Exhibit 12 (N2P-200-00012891). See also March 30, 1998 article from Telephony online describing strategic alliance between Motorola and NetSpeak. See Exhibit 13 (N2P-102-00000048).

Also in 1998, the Company issued approximately 1.3 million shares of common stock to Bay Networks for \$36.8 million. See Exhibit 14, NetSpeak Form 10-K for the Fiscal Year ending December 31, 1997.

See also, the 8-K related to the acquisition of NetSpeak by Net2Phone. Exhibit 15.

As more fully detailed in NetSpeak's 10-K for Fiscal Year 1997 (Exhibit 14), NetSpeak's communications technology was a commercial success as further evidenced by the strategic alliances it made with "with leaders in various segments of the telecommunications and networking industries," including Siemens (whereby Siemens agrees to market NetSpeak's "IP telephony server products"), Bay Networks (whereby the Company agrees "not to provide its source code to...competitors for a period of three years), Fujitsu and Rockwell International (whereby NetSpeak was "integrating its software into the[se] companies' proprietary hardware platforms"), MCI (see Exhibit 16 announcing that MCI signs contract with NetSpeak to incorporate WebPhone in networkMCI Click'NConnect Web-Based Service) and NTC (whereby NetSpeak would "supply IP telephony products and systems"), and others.

NetSpeak's WebPhone client software products were a commercial success as further evidenced by the number and extent of the channels through which they were sold, including "distribution agreements with over 900 ISPs worldwide." See Exhibit 14, 10-K cited above. Details of the operation of the WebPhone client can be found in Exhibits 17 and 18. For example, Exhibit 17 states "the CS [i.e., connection server] updates the user e-mail address, IP address, and online status fields, and uses them to

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perform IP address resolution and track account activation information. ... When a user calls ... using a WebPhone, the CS is used to resolve the target e-mail address to an IP address." Similarly, Exhibit 18 states "Connection and Information servers are the addresses here at NetSpeak that your WebPhone uses to find and call other parties. ... Connection Server: is used when you dial someone by e-mail address. If you try to dial someone by e-mail address, the WebPhone, calls the connection server, matches the desired e-mail address to an IP address, disconnects from the Connection server, and dials the IP address."

Licenses Showing Industry Respect

In connection with Motorola's 1998 investment described above, and as set forth more fully in the NetSpeak Form 10-K for the Fiscal Year 1997 (Exhibit 14), NetSpeak and Motorola entered into a joint development and licensing agreement pursuant to which the two companies would seek to join their technologies to enable Internet Protocol multimedia communications on wireless networks. Under that agreement, Motorola obtained a license to develop RF products using NetSpeak's technology, to include NetSpeak's technology in wireless devices such as cellular phones, pagers, satellite phones and two way radios to support real-time multimedia communications (voice, audio, video, data, etc.), and to manufacture and sell NetSpeak products. See description of NetSpeak's technology at page 6 of Exhibit 14 under the header "NETSPEAK'S CORE COMMUNICATIONS TECHNOLOGY" (reciting, *inter alia*, "allows users to connect to other users in a point-to-point fashion, rather than through an intermediate routing mechanism."). NetSpeak's licenses included a license to the WebPhone product and network address resolution technology, see Exhibit 14, which are commercial embodiments of the patented claims. NetSpeak's success in licensing is attributable to the novelty and non-obviousness of the invention. *Demaco Corp.*, 851 F.2d at 1393.

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Failure of Others

The inventions claimed in the '469 Patent resolved the problem of locating a computer process connected to a network, where the computer process was assigned a temporary network address. See, e.g., specification at col. 1, line 67 to col. 2, line 3. Each time a particular computer process connected to the network, it would have a different address. Such addresses were largely a by-product of the near-universal adoption of the Dynamic Host Configuration Protocol ("DHCP"), described in RFC 1531 (Exhibit x0012). DHCP disclosed the dynamic allocation of scarce network addresses and permitted addresses to be reused when a computer process disconnected from the network. As shown in Exhibit x0013 and as discussed above, others, including the developers of the VocalChat references cited by the Request, attempted to resolve the problem of locating a computer process with a dynamically assigned address and failed to suggest the claimed steps using querying.

Recognition in the Patent Literature

The Federal Circuit has left itself open to acknowledging that the patent citations of later patent applicants and examiners can be objective evidence of an earlier patent's nonobviousness. See *In re: Mettke*, 570 F.3d 1356, 1361 (Fed. Cir. 2009). This position is supported by the academic literature. See, e.g., Trajtenberg, Manuel , "A Penny for Your Quotes: Patent Citations and the Value of Innovations," The RAND Journal of Economics, Vol. 21, No. 1 (Spring 1990), pp. 172-187 at 174. ("Thus, if citations keep coming, it must be that the innovation originating in the cited patent had indeed proven to be valuable.") (Exhibit 19.) The '469 patent under re-examination is a divisional of U.S. Patent No. 6,108,704. As shown in Exhibit 20, according to the USPTO's own records, the '704 patent and its continuations and divisionals have been cited in 76 issued patents. This supports an inference that the '469 patent in re-examination advanced the art in a nonobvious way that was neither cumulative of the art that came before it nor predictable in its view.

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This inference of nonobviousness is especially compelling over the NetBIOS references. Not one issued patent that cites the patent in re-examination (or one of its related patents) also cites a NetBIOS reference. See Exhibit 21 (including variations on the name for NetBIOS such that it includes RFC 1001 and RFC 1002). This phenomenon is especially significant given that NetBIOS is a well known piece of networking art that has been cited frequently in the patent literature -- 33 times according to the USPTO's records.³ The assignee respectfully submits that there is a simple explanation for this otherwise highly improbably dichotomy: NetBIOS and the patent in re-examination do not overlap because the scope and content of what they disclose are distinct.

The assignee also notes in this regard that the cover page of U.S. Patent No. 6,389,127, assigned to ICQ Inc., an unrelated company, and entitled "Telephone Status Notification System," references U.S. Patent No. 6,108,704 (of which the patent in re-examination is a continuation-in-part), but does not cite to any of the references submitted in the Request. Their absence from the ICQ patent is especially significant since both NetBIOS and Etherphone are well known pieces of art, and each has been cited frequently in the patent literature—33 times and 135 times, respectively. The assignee respectfully submits that there is a simple explanation for this difference: the references in the Request were not cited by the ICQ patent because they did not teach anything plausibly related to "Status Notification," whereas 6,108,704 was cited because it (and its continuation-in-part, the patent in re-examination) plainly did.

³ In fact, there are 43 references to NetBIOS if the search includes any of: NetBIOS, RFC 1001, RFC 1002, NBT and NetBT (excluding references to "NBT" in the medical field). See Exhibit 22.

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Consequently, in light of the above discussions, the outstanding grounds for rejection are believed to have been overcome and the patentability of the claims subject to re-examination should be indicated as confirmed. An early and favorable action to that effect is respectfully requested.

CHARGE STATEMENT: Deposit Account No. 501860, order no. **2655-0185**.

The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficiencies only) now or hereafter relative to this application and the resulting Official Document under Rule 20, or credit any overpayment, to our Accounting/ Order Nos. shown above, for which purpose a duplicate copy of this sheet is attached.

This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal sheet is filed.

<p>CUSTOMER NUMBER 42624</p>	<p>Respectfully submitted, By: / Michael R. Casey / _____ Michael R. Casey, Ph.D. Registration No.: 40,294</p>
<p>Davidson Berquist Jackson & Gowdey LLP 4300 Wilson Blvd., 7th Floor, Arlington, Virginia 22203 Main: (703) 894-6400 • FAX: (703) 894-6430</p>	

Exhibit 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION OF:

Net2Phone, Inc. (Patent No. 6,009,469)

Control No.: 90/010,422

Issue Date: December 28, 1999

Attorney Docket: 2655-0185

Group Art Unit: 3992

Examiner: KOSOWSKI, Alexander

Confirmation No.: 6565

Title: **GRAPHIC USER INTERFACE FOR
INTERNET TELEPHONY APPLICATION**

DECLARATION OF KETAN MAYER-PATEL UNDER 37 C.F.R. 1.132

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

I. INTRODUCTION

1. I have been retained as an independent expert witness by Net2Phone, Inc., the assignee of the patent presently undergoing re-examination (i.e., U.S. Patent No. 6,009,469 (hereinafter "the '469 patent")).
2. I am an expert in the field of networking protocols including networking protocols supporting multimedia streams including digital audio data. See Curriculum Vitae attached as Exhibit 1.
3. I received Bachelors of Arts degrees in Computer Science and Economics in 1992, a Masters of Science in 1997 from the Department of Electrical Engineering and Computer Science and a Ph.D. in 1999 from the Department of Electrical Engineering and Computer Science, all from the University of California, Berkeley.
4. I received the National Science Foundation CAREER Award in 2003 while an Assistant Professor at the University of North Carolina, Chapel Hill.
5. I have had extensive experience in both industry and academia as it relates to the technical fields relevant here. For example, I have been a programmer, a visiting researcher, and an Assistant and Associate professor.

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Declaration of Ketan Mayer-Patel under 37 C.F.R. 1.132

6. I am a co-author of numerous articles that have appeared in a number of refereed publications and proceedings.
7. Governmental agencies, such as the National Science Foundation and the Office of Naval Research, have provided funding for my research.

II. RETENTION AND COMPENSATION

8. I have been retained to offer an expert opinion on the prior art relevant to the '469 patent (and other patents currently under re-examination) and the validity of the claims undergoing re-examination.
9. My work on this case is being billed at a rate of \$400 per hour, with reimbursement for actual expenses. My compensation is not contingent upon the outcome of the case.

III. BASIS OF MY OPINION AND MATERIALS CONSIDERED

10. In preparation for this report, I have considered and relied on data or other documents identified in this report. For example, I have reviewed the Office Action dated August 25, 2009 as well as the Request for Re-examination that was filed for the '469 patent including the Exhibits to the Request for Re-examination. I have also reviewed the file history of the '469 patent.
11. I have familiarized myself with the state of the art at the time the '469 patent was filed by reviewing both patent and non-patent references from prior to the filing date of the application that became the '469 patent.
12. My opinions are also based upon my education, training, research, knowledge, and experience in this technical field.

IV. SUMMARY OF MY OPINIONS

13. Based on my prior experience in the field of computer systems and networking, including network communication protocols, and based on my review of the documents relating to the

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pending re-examination proceeding, I have developed an understanding of the '469 patent and the claimed inventions.

14. I have been asked to compare the claims of the '469 patent to the references applied in the outstanding Office Action. The results of my comparison are provided below.

15. In general, it is my opinion that all of the claims undergoing re-examination (i.e., claims 1-3, 5, 6, 8, 9 and 14-18) are patentable over the applied references for at least the reasons set forth below.

The rejection of claims 1-3, 5, 6, 8, 9, and 14-18 over NetBIOS, RFC 1531, Pinard and the VocalChat User's Guide

16. Claims 1-3, 5, 6, 8, 9, and 14-18 were rejected under 35 U.S.C. § 103(a) as being obvious in light of Protocols for X/Open PC Interworking SMB, Version 2, The Open Group (1992) (hereinafter "NetBIOS"), in view of RFC 1531, Pinard and the VocalChat User's Guide.

17. I understand that a rejection under 35 U.S.C. § 103(a) means that an examiner believes that although no single reference includes all of the claimed limitations, nonetheless the combination of references made by the examiner would have been obvious to one of ordinary skill in the art at the time the invention was made.

Claims 1-3

18. Claim 1 recites "a. program code for generating a user-interface enabling control of a first process executing on the computer system." With respect to the limitation of "program code for generating a user-interface enabling control of a first process executing on the computer system," the Office Action alleges that "computers executing NetBIOS *may contain* DOS operating systems or may operate on other operating systems, which examiner notes inherently contain at least text-based user interfaces." By stating that NetBIOS "may contain" DOS operating systems I believe the Examiner is indicating that NetBIOS need not actually contain or be running on a

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DOS operating system. Since that is true, NetBIOS (or the computer running NetBIOS) does not inherently include text-based user interfaces.

19. Furthermore, the recitation of “other operating systems” also does not inherently mean that “text-based user interfaces” are provided. For example, embedded systems need not have a display or a text interface even though they may have operating systems. The Office Action also has not asserted that this limitation is taught by RFC 1531. Thus, I do not believe that limitation (a) has been shown to be taught by either applied reference.

20. Claim 1 also recites “b. program code for determining the currently assigned network protocol address of the first process upon connection to the computer network.” The Office Action admits that NetBIOS does not teach this limitation. The Office Action alleges that such a limitation is taught by RFC 1531 because “RFC 1531 teaches dynamically assigning IP address on a TCP/IP network by an Internet access server.” By looking at limitations (a) and (b) together, however, it can be seen that the Office Action has not shown that the currently assigned network protocol address is that of the first process which the Office Action alleged was the “text-based user interface.” The Office Action also has not explained why the text-based interface would have to have its currently assigned network protocol address determined. Thus, I do not believe that limitation (b) is taught by either applied reference.

21. Claim 1 recites “c. program code responsive ... for forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process.” The Office Action has not shown that the assigned network protocol address of the first process is determined, so the Office Action also has not shown that the assigned network protocol address of the first process would be forwarded to the server upon establishing a communication connection with the server process. Similarly, the Office Action has not shown that the text-based user interfaces would have a unique identifier to be forwarded to the server. The Office Action further has not shown that such a limitation is taught by RFC 1531. Accordingly, I do not believe that limitation (c) is taught by either applied reference.

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22. Claim 1 also recites “d. program code, responsive to user input commands, for establishing a point-to-point communications with another process over the computer network.” The Office Action cites NetBIOS, pgs. 397-400, as teaching that “point-to-point communication is established upon initiation between nodes once target names and addresses have been found.” However, the Office Action has not shown that the code is “responsive to user input commands” as no user input commands have been identified. Even assuming that text-based user interfaces were taught by NetBIOS, the Office Action still would not have shown that point-to-point communications are inherently established “responsive to user input commands.” The text-based user interfaces could have been used for non-communicating functions or even functions that use non-point-to-point communications. The Office Action further has not shown that such a limitation is taught by RFC 1531. Accordingly, I do not believe that limitation (d) is taught by either applied reference.

23. Since none of the limitations of claim 1 have been shown to be taught by the applied combination of references, I do not believe that claim 1 and dependent claims 2 and 3 are obvious in light of the proposed combination.

24. The Office Action states that “it would have been obvious … to determine the currently assigned network address of the first process upon connection to the computer network in the invention taught by NetBIOS above since this allows for automatic reuse of an address … and since examiner notes the use of dynamic IP address assignment … are old and well known … and are useful to eliminate the burdensome task of manually assigning IP addresses for all networked computers.” However, the Office Action does not acknowledge the problems that could arise in doing so or how those problems would be resolved by those of ordinary skill at the time the patent was filed.

25. In the context of point-to-point communication, widespread use of dynamically assigned addresses can create additional problems for a NetBIOS environment. For example, Section 15.1.7 of the NetBIOS reference (entitled “Consistency of the NBNS Data Base”) recognizes that the association between a node, a registered name and an IP address is tenuous, even in an

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environment that uses static IP addresses. “Even in a properly running NetBIOS scope the NBNS and its community of end-nodes may occasionally lose synchronization with respect to the true state of name registrations.” To minimize the impact of this problem, the reference states, “Various approaches have been incorporated into the NetBIOS-over-TCP protocols” which it then proceeds to describe.

26. However, by incorporating DHCP and adopting of dynamic address allocation (e.g., as used by Internet access providers), the synchronization problem would become more disruptive, not less. Dynamic addressing introduced a new uncertainty to the relationships among the NBNS and its community of end-nodes and a new set of obstacles to NetBIOS synchronization that *are not addressed by the NetBIOS reference*. Consider the case of a node that is turned-off and then subsequently turned back on, or the case of a node that has simply lost its Internet connection for some technical reason or whose DHCP lease has expired which then re-establishes a connection. In such a dynamic addressing environment, such a node would most likely obtain a new IP address when it was turned back on that was different than the one it had when it registered its name. This change could lead to any number of node-name-IP address synchronization problems for the disclosed NetBIOS protocols.

27. For example, because the NBNS does not know the node’s new address, the NBNS would be unable to send to the node a Name Release Request or a Name Conflict Demand or request that the node send it a Name Status Request. Because communication from the node would be originating at a new address that was not recognized by the NBNS, a node’s response to a Name Query Request (assuming it somehow knew that its name had been challenged, perhaps from before it lost network connectivity) would not be recognized. A node would also be unable to confirm its association with registered names by sending Name Refresh Request packets to the NBNS. If a session between two NetBIOS applications were cut-off, re-establishing the communication would be especially difficult where the ability of a called entity to obtain both its associated name and its associated IP address were in doubt. As a result, the Office Action has not demonstrated that a solution to the problems created by exposure of

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NetBIOS to DHCP and dynamic addressing has been addressed by any of the applied references.¹

28. The Office Action also has not identified anything in the cited art that suggests how a person of ordinary skill is to go about the redesign of NetBIOS and the solving of obstacles to NetBIOS operation that are created by Internet access; problems that were recognized and left as warnings unresolved in the NetBIOS reference.²

29. Thus, I believe claims 1-3 are patentable over the combination of NetBIOS and RFC 1531.

Claims 5 and 6

30. Claim 5 recites “determining the currently assigned network protocol address of the first process upon connection to the computer network.” The Office Action acknowledges that this limitation is not taught by NetBIOS but alleges that “RFC 1531 teaches dynamically assigning IP addresses on a TCP/IP network by an Internet access server.” The Office Action further alleges that “it would have been obvious ... to determine the currently assigned network address of the first process upon connection to the computer network in the invention taught by NetBIOS above since this allows for automatic reuse of an address ... and since examiner notes the use of dynamic IP address assignment ... are old and well known ... and are useful to eliminate the burdensome task of manually assigning IP addresses for all networked computers.” However, as described above with respect to claims 1-3, I do not believe that the Office Action has shown that in light of the problems that worsen by combining NetBIOS and RFC 1531, that a person of

¹ Besides dynamic addressing, Internet access would pose other challenges to a NetBIOS system. For example, because NetBIOS was designed for use on local area networks with small numbers of computers, trust among the network participants is assumed. That assumption cannot be transferred to a global Internet made up of unknown, and sometimes malevolent, entities. An implementation of NetBIOS on the public Internet would necessitate non-trivial adaptations to ensure that its services perform correctly and return accurate information. See Exhibit 2, from http://www.w3schools.com/Site/site_security.asp which instructs Microsoft Windows users whose computers access the Internet to disable NetBIOS over TCP/IP in order to solve their security problems.

² See Section 4.6 (“The proposed standard recognizes the need for NetBIOS operation across a set of networks interconnected by network (IP) level relays (gateways.) However, the standard assumes that this form of operation will be less frequent than on the local MAC bridged-LAN.”)

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ordinary skill in the art would have combined the two references as proposed. Thus, I believe that claims 5 and 6 are patentable over the applied NetBIOS and RFC 1531 references.

Claims 8, 9 and 14-18

31. Claim 8 recites “querying the server process to determine if the first callee process is accessible.” The Office Action asserts that this limitation is taught by NetBIOS and cites pages 377, 388, 389 and 446 as supporting the proposition that “a query is sent to the NBNS to determine if another node is logged in and discover[s] the node[’]s IP address.” However, the Office Action has not shown how knowing that a name has been registered equates to “determin[ing] if the first callee process is accessible.” While NetBIOS uses name entries with “active” statuses as part of its name management process, an analysis of how that “active” status is used shows that “an active name” is not synonymous with determining if the first callee process is accessible. An active name simply refers to a name that has been registered and that has not yet been de-registered, independent of whether the associated computer is or is not accessible. As shown on page 447 (and reproduced below), the Node_Name entries stored with respect to a NetBIOS Name Server contain a series of fields including the “ACT” field.

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The NAME_FLAGS field:

0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1	5
G	ONT	[DRG]	CNF	ACT	PRM														
RESERVED																			

The NAME_FLAGS field is defined as:

Symbol	Bit(s)	Description:
RESERVED	7-15	Reserved for future use. Must be zero (0).
PRM	6	Permanent Name Flag. If one (1) then entry is for the permanent node name. Flag is zero (0) for all other names.
ACT	5	Active Name Flag. All entries have this flag set to one (1).
CNF	4	Conflict Flag. If one (1) then name on this node is in conflict.
DRG	3	Deregister Flag. If one (1) then this name is in the process of being deleted.
ONT	1,2	Owner Node Type: 00 = B node 01 = P node 10 = M node 11 = Reserved for future use
G	0	Group Name Flag. If one (1) then the name is a GROUP NetBIOS name. If zero (0) then it is a UNIQUE NetBIOS name.

32. The ACT field is a single bit field (in bit 5) that signifies an “Active Name Flag. *All entries have this flag set to one (1).*” (Emphasis added.) If all name entries have this flag set to one (1), then the NetBIOS name server cannot be using the Active Name Flag as a means of separately tracking whether the entity that owns the name is “active,” let alone what its “on-line” status might be.

33. The NetBIOS reference also does not teach that the active status of a name in the NetBIOS server is an indication of the active status of the owner of that name. To the contrary, when information about whether the owner of a name is “active” may be relevant, for example when a new entity seeks to register a name that has already been registered in the NetBIOS name server, the NetBIOS reference describes an elaborate set of interactions used to test whether the

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existing owner of the registered name is active or inactive. It does not rely on the fact that the name is active in the NetBIOS name server (See Section 15.2.2.2 and 15.2.2.3 entitled “Existing Name and Owner is Inactive”).

34. The NetBIOS reference also does not teach that an acquired IP address can be reasonably relied upon by a requesting end-node to confirm that an end-node associated with a sought name is, in fact, “accessible.” The NetBIOS reference describes at least two different scenarios where a second end-node sends a rejection response to the first end-node notwithstanding the fact that an end-node is connected to the computer network and active with respect to the sought name. See Section 16.1.1 (“There exists a NetBIOS LISTEN compatible with the incoming call, but there are inadequate resources to permit establishment of a session...The called name does, in fact, exist on the called node, but there is no pending NetBIOS LISTEN compatible with the incoming call.”). No distinction is made in the reference between the rejection response in these cases and the rejection response in cases where the called name does not exist on the called end-node. Section 16.1.1 also states “In all but the first case, a rejection response is sent back over the TCP connection to the caller.”

35. The Office Action also has not alleged that any of the remaining references teach this limitation missing from the NetBIOS reference. As such, claim 8 and its dependent claims (claims 9 and 14-18) are not rendered obvious by the cited combination of references.

The rejection of claims 1-3, 5, 6, 8, 9, and 14-18 over the combination of the Etherphone papers in view of Vin and further in view of RFC 1531, Pinard and the VocalChar User’s Guide

36. Claims 1-3 were rejected under 35 U.S.C. § 103(a) as obvious over Etherphone: Collected Papers 1987-1988 (May 1989) (hereinafter “Etherphone”) in view of Harrick M. Vin, et al. *Multimedia Conferencing in the Etherphone Environment*, IEEE Computer Society (October 1991) (hereinafter “Vin”) and further in view of RFC 1531, Pinard and VocalChat User’s Guide. The Etherphone Collected Papers include *An Overview of the Etherphone System and its Applications* (hereinafter “Zellweger”), *Telephone Management in the Etherphone*

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System (hereinafter “Swinehart”), and *Managing Stored Voice in the Etherphone System* (hereinafter “Terry”).

37. Claim 1, as amended, recites “a. program code for generating a user-interface enabling control of a first process executing on the computer system” and “d. program code means, responsive to user input commands, for establishing a point-to-point communications with another process over the computer network.” When read together, it can be seen that the Office Action has not shown that these limitations are taught by the applied combination of references.

38. With respect to the limitation “a. program code for generating a user-interface enabling control of a first process executing on the computer system,” the Office Action cites Swinehart and Zellweger as teaching that “workstations include GUI’s.” Later, with respect to the limitation “d. program code means, responsive to user input commands, for establishing a point-to-point communications with another process over the computer network,” the Office Action asserts that “after acquiring the network address of a callee, voice datagrams are transmitted directly among [sic; among] the participants, bypassing the control server.” However, by “participants” it appears that the Office Action is referring to Etherphones participating in a telephone call. As such, the Office Action has not shown that the datagrams are transmitted as part of a point-to-point communication from the workstation (which was alleged as having the first process) to one of the Etherphones. In fact, with respect to limitation (c), the Office Action confirms that its interpretation is that the “workstation address [is] transmitted to the Voice Control Server when connected” -- not the Etherphone’s network address.

39. Similarly, looking at it from the opposite perspective, if the voice datagrams are actually going from one Etherphone to another, then the Office Action has not shown how the “currently assigned network protocol address of the first process” is the address of the Etherphone and how the Etherphone has a display or “a user-interface enabling control a first process” on that Etherphone. The Office Action also has not alleged that RFC 1531 teaches this limitation missing from the Etherphone references. Thus, claims 1-3 are not rendered obvious by the proposed combination.

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Claims 5 and 6

40. Claim 5 recites “A. determining the currently assigned network protocol address of the first process upon connection to the computer network” and “D. establishing a point-to-point communication with another process over the computer network.” As described above with respect to claim 1, when these two limitations are examined together, it can be seen that the Office Action has not shown that these limitations are met.

41. With respect to the limitation “A. determining the currently assigned network protocol address of the first process upon connection to the computer network,” the Office Action again cites the GUI’s of the workstation as meeting this limitation. Then, with respect to the limitation “D. establishing a point-to-point communication with another process over the computer network,” the Office Action again states “voice datagrams are transmitted directly among [sic; among] the participants, bypassing the control server.” Thus, as discussed above with respect to claim 1, the Office Action appears to have overlooked that the Etherphone, not the workstation with the GUI, is receiving the voice datagrams, so the Etherphone reference does not teach limitations (A) and (D). The Office Action also has not alleged that RFC 1531 teaches this limitation missing from the Etherphone references. Thus, claims 5 and 6 are not rendered obvious by the proposed combination.

Claims 8, 9 and 14-18

42. Claim 8 recites “a method for establishing a point-to-point communication from a caller process to a callee process over a computer network, the caller process capable of generating a user interface and being operatively connected to the callee process and a server process over the computer network.” That method includes “querying the server process to determine if the first callee process is accessible” and “establishing a point-to-point communication link from the caller process to the first callee process.”

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43. With respect to the limitation of “establishing a point-to-point communication link from the caller process to the first callee process,” the Office Action asserts that Swinehart and Zellweger teach “voice datagrams are transmitted directly among participants.” However, it appears that the Office Action means that the Etherphone are the “participants.” If this is the case, there is no indication that the combination meets the limitation of “the caller process capable of generating a user interface” as the Office Action has not alleged that the Etherphone has such a capability. The Office Action has also not alleged that the other references overcome this deficiency of the Etherphone references. Thus, claim 8 and its dependent claims are patentable over the applied combination of references.

The rejection of claims 1-3, 5, 6, 8, 9, and 14-18 over the combination of the VocalChat references in view of RFC 1531 and Pinard

44. Claims 1-3, 5, 6, 8, 9 and 14-18 were rejected under 35 U.S.C. § 103(a) as obvious over VocalChat User’s Guide in view of VocalChat Readme, VocalChat Networking, VocalChat Help File and VocalChat Troubleshooting Help file (collectively the “VocalChat References”) and further in view of RFC 1531 and Pinard.

Claims 1-3

45. Claim 1 recites “program code responsive to the currently assigned network protocol address of the first process, for establishing a communication connection with the server process and for forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process.” The Office Action admits that this limitation is not disclosed by the VocalChat references. However, the Office Action attempts to overcome this deficiency by combining the VocalChat references with RFC 1531.

46. However, the Office Action does not acknowledge the problems that could arise in doing so or how those problems would be resolved by those of ordinary skill at the time the patent was

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filed. Thus, I do not believe that the Office Action has proven that one of ordinary skill at the time the patent was filed would have made the proposed combination.

47. Claim 1 also recites “forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process.” The VocalChat Generic implementation does not disclose such a limitation. In the VocalChat Generic implementation, a local process reads a “USERS” file or a Connections file in its entirety and writes it back in its entirety rather than “forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process.” This causes the VocalChat system to have to send an increasing amount of information as the number of users increases. Sending the whole file such that the new file replaces the old file also creates problems with consistency such that one user’s changes could overwrite the changes of another user -- especially as networks got larger which would have increased the problem of inconsistent files being written.

48. The Office Action also has not shown that one of ordinary skill in the art would have made the proposed combination. The Office Action proposes a modification to the VocalChat References by incorporating the teachings of RFC 1531 because it allegedly “would have been obvious to utilize dynamically assigned IP addresses from Internet access servers in the invention taught by VocalChat ... since this allows for automatic reuse of an address that is no longer needed by the host to which it is assigned.” Such an allegation ignores the development history of the VocalChat products themselves.

49. The Request cites a Generic version of the VocalChat client which, according to Mr. Cohen, was used on local area networks. See Cohen Declaration, paragraph 3. There apparently was a subsequent version of VocalChat that was also released by VocalTec to the public in 1994, at least in beta. This version, called VocalChat Gateway To Interent (or “VocalChat GTI”) was designed for use on the Internet, and I have been informed that Net2Phone believes that VocalChat GTI used static local address files into which static callee addresses were manually

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input. I have also been informed that Net2Phone believes that VocalChat GTI did not utilize a server at all.

50. Based on the above, I believe the use of manual inputting of static addresses and the absence of a server suggests that the VocalTec designers—presumably software developers of at least ordinary skill in the art—did not consider the alleged combination of their own VocalChat references with RFC 1531, or it suggests that they did consider it but were unable to overcome the non-trivial obstacles to doing so.

51. I have also been informed that Net2Phone believes that soon after the release of the VocalChat GTI version, VocalTec released another VocalChat version that used Internet Relay Chat (IRC) to help VocalChat clients with dynamically assigned IP addresses find one another. This change from VocalChat GTI to VocalChat IRC appears to be further objective evidence that even the VocalChat designers recognized that the “improvement” to the Generic VocalChat implementation was still deficient. If the designers of the VocalChat Generic implementation did not see fit to combine dynamic addressing with the Generic implementation disclosed in the VocalChat references, then I do not believe that one of ordinary skill in the art would not have done so either.

52. Accordingly, I do not believe that the Office Action has shown that claim 1 is rendered obvious by the combination of the VocalChat references and RFC 1531. Since claim 1 is not rendered obvious by the proposed combination, claims 2-3 are not rendered obvious as well.

53. With respect to claim 3, claim 3 further recites “program code for transmitting, from the first process to the server process, a query as to whether the second process is connected to the computer network.” As is discussed in greater detail below with respect to claim 8, the VocalChat references do not disclose querying whether processes are connected to the computer network. Thus, claim 3 is also separately patentable from claim 1.

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Claims 5 and 6

54. Claim 5 recites “A. determining the currently assigned network protocol address of the first process upon connection to the computer network” and “C. forwarding the assigned network protocol address of the first process to the server process upon establishing a communication connection with the server process.” As was discussed above with respect to claim 1, the combination of the VocalChat references and RFC 1531 does not disclose either of those elements. Thus, I believe claim 5 and its dependent claim 6 are not rendered obvious by the combination of the VocalChat references and RFC 1531.

Claims 8, 9 and 14-18

55. Claim 8 recites “C. querying the server process to determine if the first callee process is accessible.” The Office Action cites the Help file, pgs. 2 and 26, and Network information, page 10, and asserts that “a server can receive[] queries to determine status and information of users.” However, the Office Action has not identified what portion of those references teach the claimed “querying.” At best, the references teach that a local process reads a “USERS” file or a Connections file. As can be seen from page 4 of the VocalChat Network Information (reproduced below), when the VocalChat system uses the Generic mode, a USERS file is used.

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2.5. Network parameters in the VocalChat INI files

These are the network parameters in the VocalChat VOCLCHAT.INI and VCSETUP.INI files (under the Network section):

```
[NetWork]
NetWork=           / description of the selected network
NetWorkUsers=      / user services: NetWare / WinWorkgroups / Generic*
NetWorkProtocol=   / network protocol: IPX / NetBIOS
NetWorkType=        / name of the selected network, for future use
UsersFile=          / path name of users file (when Generic is set)
MyUserName=         / the name of the user (when Generic is set)**
```

* When Generic is set, a USERS file is used.

** This line appears only in the VOCALCHAT.INI file of each user.

The VOCLCHAT.INI files are in the windows directory of each user. The VCSETUP.INI file is in the VOCLCHAT directory, where VocalChat was installed, and is used only to supply default values for the different installations.

The USERS file configuration parameter includes a “UsersFile” entry that specifies the “path name of users file (when Generic is set).” However, it is also stated that “The VOCLCHAT.INI files are in the windows directory of each user.” Thus, this “UsersFile” entry is a local configuration parameter such that the local VocalChat client reads and writes the USERS file on its own -- without performing the claimed query.

56. Similarly, page 8 of the VocalChat Help file states “If your network type is not NetWare or Windows for Workgroups, the Setup program creates a Connection List file which is used to identify and access users.” The Connection List file and the USERS file apparently have the same function. Thus, the identification and access enabled by the Connection List is performed by the local client reading and writing the file itself -- without performing the claimed query. Accordingly, I do not believe that claims 8, 9 and 14-18 are obvious over the applied combination of references.

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57. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: November 25, 2009



Ketan Mayer-Patel, Ph.D.

EXHIBIT 1 TO MAYER-PATEL DECLARATION

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Parallel Software-only Video Effects Processing
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Majors: Computer Science and Economics

Professional Experience

- Associate Professor
University of North Carolina, Chapel Hill, NC (August 2005 – present)
Assistant Professor
University of North Carolina, Chapel Hill, NC. (January 2000 – August 2005)
Visiting Researcher
Microsoft Bay Area Research Center (BARC), San Francisco, CA. (June 2003 – December 2003)
Graduate Student Researcher
University of California, Berkeley, CA. (June 1993 – November 1999)
Graduate Student Instructor
University of California, Berkeley, CA. (August 1997 – December 1997)
Programmer
University of California, Berkeley, CA. (June 1992 – June 1993)
Programmer
United States Department of Agriculture, Albany, CA. (May 1991 – June 1992)

Honors and Notables

- National Science Foundation CAREER Award, 2003
- Computer Science Student Association Teaching Award, 2003
- Invited to three major meetings (one domestic and two international) of top multimedia researchers to discuss future directions for the field.
- In the sixteen-year history of the ACM SIGMultimedia Conference, considered to be the premier conference in the field of multimedia, I have published twelve papers in ten different years.

Publications

Refereed Journals

K. Mayer-Patel and D. Gotz, “Scalable, Adaptive Streaming for Nonlinear Media,” *IEEE Multimedia*, vol. 14, no. 3 (15 pages).

- D. Ott and K. Mayer-Patel, "An open architecture for transport-level protocol coordination for distributed multimedia applications," *ACM Transactions on Multimedia Computing, Communications, and Applications*, vol. 3, no. 3 (22 pages).
- D. Gotz and K. Mayer-Patel, "GAL: A middleware library for multidimensional adaptation," under review for *ACM Transactions on Multimedia Computing, Communications, and Applications* (21 pages).
- K. Mayer-Patel, B. Smith, and L.A. Rowe, "The Berkeley software MPEG-1 video decoder," to appear in *ACM Transactions on Multimedia Computing, Communications, and Applications*, vol. 1, no. 1 (23 pages).
- K. Mayer-Patel and S.-U. Kum, "Real-time multi depth stream compression," *ACM Transactions on Multimedia Computing, Communications, and Applications*, vol. 1, no. 2 (26 pages).
- D. Gotz and K. Mayer-Patel, "A Framework for Scalable Delivery of Digitized Spaces," *International Journal on Digital Libraries*, vol. 5, no. 3 (14 pages).
- J. Considine, K. Mayer-Patel, and J. Byers, "A case for testbed embedding services," *Computer Communication Review*, vol. 34, no. 1, January 2004, pp. 137-142.

Refereed Conferences and Workshops

- K. Mayer-Patel, "Systems challenges of media collectives: Supporting media collectives with adaptive MDC," *Proceedings of the 15th International ACM Conference on Multimedia*, Augsberg, Germany, 2007, pp. 625-630.
- S. Krishnan and K. Mayer-Patel, "A utility-driven framework for loss and encoding aware video adaptation," *Proceedings of the 15th International ACM Conference on Multimedia*, Augsberg, Germany, 2007, pp. 1026-1035.
- D. Gotz and K. Mayer-Patel, "A general framework for multidimensional adaptation," *Proceedings of the 12th International ACM Conference on Multimedia*, New York, 2004, pp 612-619.
- D. Ott and K. Mayer-Patel, "Coordinated multi-streaming for 3D tele-immersion," *Proceedings of the 12th International ACM Conference on Multimedia*, New York, NY, 2004, pp. 596-603.
- D. Ott and K. Mayer-Patel, "Aggregate congestion control for distributed multimedia applications," *Proceedings of IEEE Infocom '04*, Hong Kong, 7-11 March 2004, vol. 1, pp. 13-23.

- K. Mayer-Patel and W. Miaw, "Evaluating the effectiveness of automatic PVR management," *Proceedings of the SPIE Conference on Storage and Retrieval Methods and Applications for Multimedia*, San Jose, CA, January 2004, vol. 5307, pp. 360-365.
- S.-U. Kum, K. Mayer-Patel and H. Fuchs, "Real-time compression for dynamic 3D environments," *Proceedings of the 11th International ACM Conference on Multimedia*, Berkeley, CA, 2003, pp. 185-194.
- N. Kelshikar, X. Zabulis, J. Mulligan, K. Daniilidis, V. Sawant, S. Sinha, T. Sparks, S. Larsen, H. Towles, K. Mayer-Patel, H. Fuchs, J. Urbanic, K. Benninger, R. Reddy and G. Huntoon, "Real-time terascale implementation of tele-immersion," *Proceedings of the International Conference on Computation Science*, Melbourne, Australia, 2003, Springer-Verlag Lecture Notes in Computer Science vol. 2660, pp. 33-42.
- K. Mayer-Patel, L. Le and G. Carle, "An MPEG performance model and its application to adaptive forward error correction," *Proceedings of the 10th International ACM Conference on Multimedia*, Juan-les-Prins, France, 2002, pp. 1-10.
- D. Gotz and K. Mayer-Patel, "IRW: an incremental representation for image-based walkthroughs," *Proceedings of the 10th International ACM Conference on Multimedia*, Juan-les-Prins, France, 2002, pp. 67-76.
- D. Ott and K. Mayer-Patel, "A mechanism for TCP-friendly transport-level protocol coordination," *Proceedings of the USENIX Technical Conference*, Monterrey, CA, 2002 (14 pages).
- A. Wilson, K. Mayer-Patel and D. Manocha, "Spatially-encoded far-field representations for interactive walkthroughs," *Proceedings of the 9th International ACM Conference on Multimedia*, Ottawa, Canada, 2001, pp. 348-357.
- D. Ott and K. Mayer-Patel, "Transport-level protocol coordination in cluster-to-cluster applications," *Proceedings of the 8th International Workshop on Interactive Distributed Multimedia Systems (Lecture Notes in Computer Science)*, vol. 2158, Springer, 2001, pp. 10-22.
- D. Yu, D. Wu, K. Mayer-Patel and L.A. Rowe, "dc: a live webcast control system," *Proceedings of the SPIE Conference on Multimedia Computing and Networking*, vol. 4312, San Jose, CA, 2001, pp. 111-122.
- K. Mayer-Patel, "Incorporating application-level knowledge into the MPEG-2 coding model," *Proceedings of the Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV)*, Chapel Hill, CA, 2000, (6 pages).
- K. Mayer-Patel and L.A. Rowe, "Exploiting spatial parallelism for software-only video effects processing," *Proceedings of the SPIE Conference on Multimedia Computing and Networking*, vol. 3654, San Jose, CA, 1999, pp. 252-263.

- K. Mayer-Patel and L.A. Rowe, "A multicast control scheme for parallel software-only video effects processing," *Proceedings of the 7th International ACM Conference on Multimedia*, Orlando, FL, 1999, pp. 409-418.
- K. Mayer-Patel and L.A. Rowe, "Exploiting temporal parallelism for software-only video effects processing," *Proceedings of the 6th International ACM Conference on Multimedia*, Bristol, England, 1998, pp. 161-169.
- T.H. Wong, K. Mayer-Patel and L.A. Rowe, "A software-only video production switcher for the Internet MBone," *Proceedings of the SPIE conference on Multimedia Computing and Networking*, vol. 3310, San Jose, CA, 1998, pp. 28-41.
- K. Mayer-Patel and L.A. Rowe, "Design and performance of the Berkeley Continuous Media Toolkit," *Proceedings of the SPIE conference on Multimedia Computing and Networking*, vol. 3020, San Jose, CA, 1997, pp. 194-206.
- K. Mayer-Patel, D. Simpson, D. Wu, and L.A. Rowe, "Synchronized continuous media playback through the World Wide Web," *Proceedings of the 4th International ACM Conference on Multimedia*, Boston, MA, 1997, pp. 435-436.
- L.A. Rowe, K. Patel, and B. Smith, "MPEG video in software: representation, transmission, and playback," *Proceedings of the SPIE conference on High-Speed Networking and Multimedia Computing*, vol. 2188, San Jose, CA, 1994, pp. 134-144.
- K. Patel, B. Smith, and L.A. Rowe, "Performance of a software MPEG video decoder," *Proceedings of the 1st International ACM Conference on Multimedia*, Los Angeles, CA, 1993, pp. 75-82.

Software Artifacts

mpeg_play

The first publicly available MPEG-1 video decoder originally released in 1993. Over 1,000,000 copies of this program have been downloaded. It has been used as a code base for innumerable research and open source systems. Mayer-Patel was the architect of the original code that was later refactored and maintained by a number of other individuals.

The Berkeley Continuous Media Toolkit

The Berkeley CMT provided a framework within which to develop experimental multimedia tools and applications. Although primarily used by researchers at UC Berkeley, it was employed by a number of different research groups world-wide. Development of CMT ended in approximately 1998.

MPEG2Event

This recently released C# library allows researchers to rapidly develop MPEG-2 analysis tools that are interested in the details of bit-level coding elements. Although currently in use

by only a small number of researchers, it is freely available at <http://www.cs.unc.edu/~kmp/mpeg2event>. Further development of the library is on-going.

Teaching

COMP 416: Introduction to Web Programming

My goal with this course is to pique student interest for more detailed upper-division courses in operating systems, networking, databases, security, etc. while satisfying their practical interest in developing web programming skills.

COMP 426: Advanced Web Programming

A follow-on course to COMP 416, this course expands on client-server programming concepts and concentrates more attention to the design and use of databases and XML-related technologies.

COMP 249: Multimedia Computing and Networking

This course is an advanced graduate-level course that covers the fundamental concepts in multimedia computing and networking. Students are expected to complete an extensive final project, some of which have led to publications in refereed conferences and workshops.

COMP 249-080: Topics in Multimedia Systems

This seminar course provides students with an opportunity to read and present the most research literature in multimedia systems.

Research Areas

Coordinated Multistreaming

In this project, we are developing mechanisms to address the needs of distributed multimedia applications that employ many (i.e., 10's or 100's) of different media flows with complex inter-stream semantics and adaptation requirements. This project addresses fundamental problems in protocol coordination and aggregate congestion control.

Multidimensional Adaptation

We are developing a framework for compactly expressing and evaluating adaptation policies that must negotiate tradeoffs in real-time within very large multiresolutional datasets with high dimensionality.

StrandCast

StrandCast is an application-layer multicast protocol intended for latency-insensitive multimedia applications such as receiver-driven layered multicast and pyramid broadcasting. The design and implementation of StrandCast exploits the lax latency requirements of these applications to optimize for link stress, rapid joins and leaves, and robustness in the face of node failure.

Encoding and Transmission of 3D Scenes from Multiple Cameras

The project explores ways to efficiently transmit video data from a set of cameras viewing the same scene. This problem is at the heart of most tele-immersion applications. Our hypothesis is that it is possible to exploit depth information (even if imperfect) derived from stereo correlation between cameras to more efficiently encode the original color information.

Recoverable Video Adaptation

Existing video adaptation techniques generally lead to irreversibly loss of video quality. In this project, we are exploring adaptation techniques that can be used to recover high (or at least higher) quality video from a set of independently constructed lower quality representations.

Funding

CAREER: Enabling Futuristic Distributed Applications with Integrative Multistream Networking

PI's: K. Mayer-Patel
Agency: National Science Foundation (ANI-0238260)
Amount: \$404,387
Duration: 8/15/2003 – 8/14/2008

ITR: Protocol Coordination for Multi-Stream Applications

PI's: K. Mayer-Patel
Agency: National Science Foundation (ANI-0219780)
Amount: \$368,047
Duration: 10/1/2002 – 9/30/2005

RI: Tera-Pixels - Using High-Resolution Pervasive Displays to Transform Collaboration and Teaching

PI's: K. Jeffay, A. Lastra, F.D. Smith, K. Mayer-Patel and L. McMillan
Agency: National Science Foundation (EIA-0303590)
Amount: \$590,986
Duration: 8/15/2003 – 8/14/2008

3D Telepresence for Medical Consultation: Extending Medical Expertise Throughout, Between, and Beyond Hospitals

PI's: H. Fuchs, B. Cairns, K. Mayer-Patel, D. Sonnenwald, G. Welch
Agency: National Library of Medicine
Amount: \$2,549,980
Duration: 09/30/2003-09/29/2006

Video-Based Representation and Rendering of Large Real and Synthetic Environments

PI's: D. Manocha and K. Mayer-Patel
Agency: Office of Naval Research
Amount: \$112,384
Duration: 01/01/2001-12/31/2003

Video Quality Metric Oracle

PI's: K. Mayer-Patel

Agency: North Carolina Networking Initiative Fellowship Program

Amount: \$20,000

Duration: 08/15/2001 – 5/15/2002

SCOUT: An On-Line Network Path Measurement and Characterization Tool

PI's: K. Mayer-Patel

Agency: North Carolina Networking Initiative Fellowship Program

Amount: \$20,000

Duration: 08/15/2000 – 5/15/2001

Professional Activities

Editorships

- Associate Editor, ACM Transactions on Multimedia Communications, Computing, and Applications (TOMCCAP)
- Associate Editor, IEEE Multimedia Magazine

Executive Committees

- Co-Chair, International Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV)

Organizing Committees

- Program Chair, ACM Multimedia Systems 2010
- General Co-Chair, Multimedia Networking and Computing 2009
- Program Co-Chair, Multimedia Modeling (MMM) 2009
- General Co-Chair, NOSSDAV 2005
- Program Co-Chair, ACM Multimedia, 2006
- Open Source Software Competition Chair, ACM Multimedia (2004, 2005)
- Tutorial Program Chair, ACM Multimedia (2003)
- Doctoral Symposium Chair, ACM Multimedia (2000, 2001)

Program Committees

- ACM Multimedia
- NOSSDAV
- Multimedia Computing and Networking (MMCN)
- Multimedia Interactive Protocols and Systems Workshop
- IFIP Networking Conference
- Multimedia Information Systems Conference
- International World Wide Web Conference
- SPIE Conference on Multimedia Computing and Networking
- IEEE International Conference on Distributed Computing Systems
- Interactive Distributed Multimedia Systems Workshop
- Global Internet Symposium

Other Professional Service

- Guest Editor, Special Issue of Multimedia Systems Journal featuring expanded papers from the SPIE Conference on Multimedia Computing and Networking, 2003.
- In 2004, participated in a by invitation-only meeting of leaders within ACM SIGMultimedia. A report of the meeting outlining important directions for multimedia research will appear in Transactions on Multimedia Computing, Communications, and Applications.
- Invited to an international meeting of leading multimedia researchers being organized for Spring 2005 in Dagstuhl, Germany to discuss the future of multimedia research.

Past Ph.D. Students

- David Gotz, *Supporting adaptive scalable access to multiresolutional multidimensional data*, May 2005.
- David Ott, *Coordination mechanisms for distributed multistream applications*, November 2005.
- Sang-Uok Kum, *Encoding and transmission of 3D depth streams*, November 2008.

University Service

University Committees

- Tar Heel Bus Tour Advisory Committee (Fall 2001).

Department Service

- Chair of Undergraduate Curriculum Committee (Fall 2009 – present).
- Chair of Graduate Admissions Committee (Spring 2005 – Fall 2009).
- Member of Graduate Admissions Committee (Spring 2001 – Spring 2005).

Other Service

- Project UPLIFT participant (recruitment of minority high school students)
- Co-coach of the UNC ACM Programming Competition team (Fall 2000 – present).

EXHIBIT 2 TO MAYER-PATEL DECLARATION

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Web Building Security

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You are offering your IP address to the entire world at this very moment.
Make sure you are not offering access to your private data at the same time.

YOUR IP ADDRESS IS PUBLIC

Accessing the Internet is a security risk.

When you are connected to the Internet, an IP address is used to identify your computer. If you don't protect yourself, this IP address can be used to access your computer from the outside world.

A fixed IP address is a larger security risk.

If you're using a modem with a dial-up connection, you will get a new IP address every time you connect to Internet.

With an ADSL or cable connection users sometimes keep the same IP address for several months, this represents an increased security risk.

If you have a fixed IP address, you give Internet hackers all the time they need to search for entrances on your computer, and to store and share (with other hackers) information they find on your computer.

Your Network Shares

Personal computers are often connected to a shared network. Personal computers in large companies are connected to large corporate networks. Personal computers in small companies are connected to a small local network, and computers in private homes often share a network between family members.

Most often networks are used to share resources like printers, files and disk storage.

When you are connected to the Internet, your shared resources can be accessed by the rest of the world.

A Common Windows Security Problem

Unfortunately, many Microsoft Windows users are unaware of a common security leak in their network settings.

This is a common setup for network computers in Microsoft Windows:

- Client for Microsoft Networks
- File and Printer Sharing for Microsoft Networks
- NetBEUI Protocol
- Internet Protocol TCP/IP

If your setup allows NetBIOS over TCP/IP, you have a security problem:

- Your files can be shared all over the Internet
- Your logon-name, computer-name, and workgroup-name are visible to others

If your setup allows File and Printer Sharing over TCP/IP, you also have a problem:

- Your files can be shared all over the Internet

Computers that are not connected to any network can also have unsecure network settings, because the settings were changed when Internet was installed.

Solving the Problem

For Windows 2000 users:

You can solve your security problem by **disabling NetBIOS over TCP/IP**:

- Open Windows Explorer
- Right-click on My Network Places
- Select: Properties
- Right-click on Local Area Network
- Select: Properties

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STATISTICS
Browser Statistics
Browser OS
Browser Display

- Select: Internet Protocol TCP/IP
- Click on Properties
- Click on Advanced
- Select the WINS tab
- Select Disable NetBIOS over TCP/IP
- Click OK

If you get the message: "This connection has an empty.....", ignore the message and click on YES to continue, and click OK to close the other setup windows.

You should restart your computer after the changes.

For Windows 95, 98, or ME users:

You can solve your security problem by **disabling NetBIOS over TCP/IP**:

- Open Windows Explorer
- Right-click on My Network Places
- Select: Properties
- Select: Internet Protocol TCP/IP
- Click on Properties
- Select the NetBIOS tab
- Uncheck: Enable NetBIOS over TCP/IP
- Click OK

You must also **disable the TCP/IP Bindings** to Client for Microsoft Networks and File and Printer Sharing:

- Open Windows Explorer
- Right-click on My Network Places
- Select: Properties
- Select: Internet Protocol TCP/IP
- Click on Properties
- Select the Bindings tab
- Uncheck: Client for Microsoft Networks
- Uncheck: File and Printer Sharing
- Click OK

If you get a message with something like: "You must select a driver.....", ignore the message and click on YES to continue, and click OK to close the other setup windows.

If you still want to **share your Files and Printer** over the network, you must use the NetBEUI protocol instead of the TCP/IP protocol. Make sure you have enabled it for your local network:

- Open Windows Explorer
- Right-click on My Network Places
- Select: Properties
- Select: NetBEUI
- Click on Properties
- Select the Bindings tab
- Check: Client for Microsoft Networks
- Check: File and Printer Sharing
- Click OK

You should restart your computer after the changes.

Protect Your Server

iisPROTECT provides a complete range of password protection, authentication and user management solutions:

iisPROTECTasp: Protect areas of your web site and require username and password. Grant/deny any users/groups on a per resource basis. Extensive Web Interface for user/group admin, use any DB backend, store custom data, set user start/end dates, email users, audit logins.

iisPROTECT: Protect all web site files including images, databases,html,ASP etc. Protect entire directories, users / groups independent from Windows accounts, complete web administration, does not require cookies or any programming. Complete turn key solution.

iisPROTECTquota: All of the features of iisPROTECT plus: prevent concurrent logins and password cracking attempts, set quotas on hits, logins, kb per user.

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Product Spotlight

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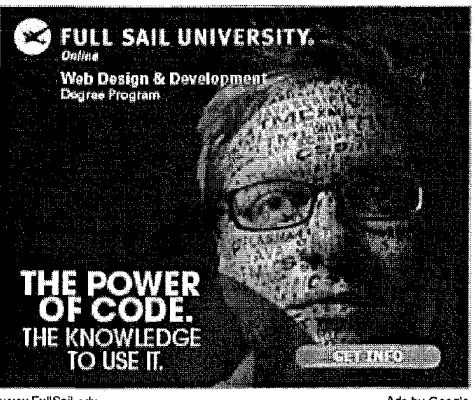
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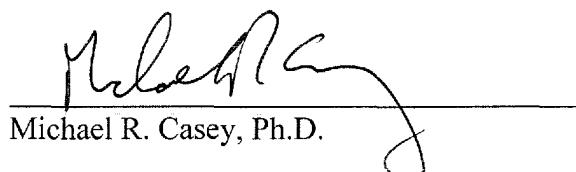
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Re-Examination of Patent No. 6,009,469
Control No.: 90/010,422
Filed: February 24, 2009
Reply to Office Action of August 25, 2009

CERTIFICATE OF SERVICE

The undersigned hereby certifies that, on November 25, 2009, the RESPONSE TO NON-FINAL REJECTION IN A RE-EXAMINATION filed in Re-examination Control No. 90/010,422 was served by U.S. First Class Express Mail on Requestor as follows:

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Michael R. Casey, Ph.D.

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EFS ID:	6531013
Application Number:	90010422
International Application Number:	
Confirmation Number:	6565
Title of Invention:	Graphic User Interface For Internet Telephony Application
First Named Inventor/Applicant Name:	6,009,469
Customer Number:	42624
Filer:	Michael Raymond Casey
Filer Authorized By:	
Attorney Docket Number:	2655-0185
Receipt Date:	25-NOV-2009
Filing Date:	26-FEB-2009
Time Stamp:	21:13:52
Application Type:	Reexam (Third Party)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	20091125_469_Response_As_Filed_cover.pdf	72351 8fe9fc2d0f16545e879c0027271c6947cb1f340f	no	1

Warnings:

Information:

LG v. Straight Path, IPR2015-00209

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2	Claims	20091125_469_Response_As_Filed_Claims.pdf	49052 554cde8b966bd85e925d7e6f40faf802a3d 23e0	no	1
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Warnings:

Information:

3	Applicant Arguments/Remarks Made in an Amendment	20091125_469_Response_As_Filed_Remarks.pdf	275418 db92ee0dcea55c87110254988ab46861f2b 441a5	no	27
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Warnings:

Information:

4	Rule 130, 131 or 132 Affidavits	Exhibit_01_Ketan_132_469.pdf	4434010 a459c47fc34ddb00be1a4673686e809695 90c29	no	32
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Warnings:

Information:

5	NPL Documents	Exhibit_02_Web_Security.pdf	556594 4bd74423389a55af9ac258de7e54aa5b64f8 2a6d	no	4
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Warnings:

Information:

6	NPL Documents	Exhibit_03_ALONCOHEN.pdf	580490 94578c7fd6d923478abb785d39ae17761d0 8296b	no	6
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Warnings:

Information:

7	NPL Documents	Exhibit_04_Alon_Cohen_Interview.pdf	228810 be6d458709bfb99e535798ef246de67d832 430f0	no	6
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Warnings:

Information:

8	NPL Documents	Exhibit_05_Alon_Cohen_Bio.pdf	146074 99bf6aa049b59daabb4e9a5b5d2e50284e6 db580	no	2
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Warnings:

Information:

9	NPL Documents	Exhibit_06_WebPhoneKillerApp.pdf	456394 4848fd08e2b060256d3efd20838c7f3a4b5 dc3d8	no	5
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Warnings:

Information:

10	NPL Documents	Exhibit_07_VocalChatHistory.pdf	556244 1f2972379c1ff1f97726a600fb7cb1acb8b03 767	no	16
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Warnings:

Information:

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11	NPL Documents	Exhibit_08_InternetTelephony_POTYear.pdf	373169 c6f517edf4328aba54c24f7335ac1aeca3d8 52c5	no	9
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Warnings:

Information:

12	NPL Documents	Exhibit_09_Durand_PressRelease.pdf	159588 cadcd5dd535e29b0f018f001bdc3f5f9092 6a5d	no	4
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Warnings:

Information:

13	NPL Documents	Exhibit_10_Computer_Telephony.pdf	67848 73983ba053354169aed612bd4c5c16bedc5 88635	no	2
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Warnings:

Information:

14	NPL Documents	Exhibit_11_NetSpeak_S-1A.pdf	533615 d519038515799365915b09680239d470eb d3dfb7	no	119
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Warnings:

Information:

15	NPL Documents	Exhibit_12_Motorola_PressRelease.pdf	143729 5be5574db711e71e2236ba7fe0266926c8d fe28d	no	3
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Warnings:

Information:

16	NPL Documents	Exhibit_13_Motorola2.pdf	404162 3dadaf91670273b74a64265b6c264a024c3 a89ba	no	4
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Warnings:

Information:

17	NPL Documents	Exhibit_14_NetSpeak_10K.pdf	144246 11cf8d3b11ba77c1aba129d0742ee1ba3e5 653f3	no	37
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Warnings:

Information:

18	NPL Documents	Exhibit_15_Net2Phone_8-K.pdf	170814 0aca9a1a4c1076a5d6763cd2431ec48a3ed 24be	no	40
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Warnings:

Information:

19	NPL Documents	Exhibit_16_MCI.pdf	362841 0a897704787d9f249e440324fb2a62e452b 7cf6	no	3
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Warnings:

Information:

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20	NPL Documents	Exhibit_17_NetSpeak_CS.pdf	1107085 32c9865c4181a0280e3d93db9a48bf545c 33343	no	7
Warnings:					
Information:					
21	NPL Documents	Exhibit_18_How_do_I.pdf	2719628 6d1ba9f24834940fb748db648a9ec88e8bd 26694	no	16
Warnings:					
Information:					
22	NPL Documents	Exhibit_19_Penny.pdf	3498198 41fb5202c9cf9a1e3ccecd93c7d6bfe32ce3 7bc	no	18
Warnings:					
Information:					
23	NPL Documents	Exhibit_20_704_and_family_results.pdf	531202 7616363ed3875788f07fbf116e3afbd8929f 72d8	no	4
Warnings:					
Information:					
24	NPL Documents	Exhibit_21_NetBIOS_Reference_sWith_704.pdf	111308 b48c9c979e6ad1cff00d337072b8ce2e84 48cc	no	2
Warnings:					
Information:					
25	NPL Documents	Exhibit_22_NetBIOS_Reference_s.pdf	425223 36870b9db80692a5b18003d908348732fd 145f6f	no	3
Warnings:					
Information:					
26	Reexam Certificate of Service	20091125_469_COS.pdf	61430 0da9765456598ce8e399e83fb7227cd8aa8d 523f3	no	1
Warnings:					
Information:					
Total Files Size (in bytes):				18169523	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Michael R Casey	:	(For Patent Owner)	MAILED
DAVIDSON BERQUIST JACKSON	:		
& GOWDEY LLP	:		
4300 WILSON BLVD., 7TH FLOOR	:		OCT 23 2009
ARLINGTON VA 22203	:		
CENTRAL REEXAMINATION UNIT			
Edwin H Taylor	:	(For Third Party Requester)	
BLAKELY SOKOLOFF TAYLOR	:		
& ZAFMAN LLP	:		
1279 OAKMEAD PARKWAY	:		
SUNNYVALE, CA 94085-4040	:		
In re: Mattaway <i>et alia</i>	:	DECISION	
<i>Ex Parte</i> Reexamination Proceeding	:	GRANTING	
Control No. 90/010,422	:	PETITION FOR EXTENSION	
Deposited: 26 February 2009	:	OF TIME	
For: US Patent No. 6,009,469	:	[37 CFR §§ 1.550(c) & 1.181]	

This is a decision on the 19 October 2009, "Request for Extension of Time in a Re-Examination" pursuant to 37 CFR § 1.550(c) requesting that the time for responding to the non-final Office action mailed 25 August 2009, be extended by one (1) month extension of time. The petition was timely filed on 19 October 2009. The petition included the required petition fee pursuant to 37 CFR § 1.17(g) and certificate of service.

The petition is before the Director of the Central Reexamination Unit for consideration.

The petition is granted for the reasons set forth below.

DISCUSSION

The Patent Owner requests the period of time to be extended in which to file a response to the non-final Office action mailed 25 August 2009. The petition for extension of time was timely filed on 19 October 2009 with appropriate fee according to 37 CFR § 1.17(g).

The extension of time is granted

37 CFR § 1.550 (c) states:

(c) The time for taking any action by a patent owner in an *ex parte* reexamination proceeding will be extended only for sufficient cause and for a reasonable time specified. Any request for such extension must be filed on or before the day on which action by the patent owner is due, but in no case will the mere filing of a request effect any extension. Any request for such extension must be accompanied by the petition fee set forth in § 1.17(g). See § 1.304(a) for extensions of time for filing a notice of appeal to the U.S. Court of Appeals for the Federal Circuit or for commencing a civil action.

Addressing the requirement of 37 CFR § 1.550 (c) to make a showing of “sufficient cause” to grant an extension of time request, MPEP 2265 states, in pertinent part:

Evaluation of whether sufficient cause has been shown for an extension must be made in the context of providing the patent owner with a fair opportunity to present an argument against any attack on the patent, and the requirement of the statute (35 U.S.C. § 305) that the proceedings be conducted with special dispatch. ...

Any request for an extension of time in a reexamination proceeding must fully state the reasons therefor. ...

MPEP 2265 (in-part)

Any request for an extension of time in a reexamination proceeding must fully state the reasons therefor. The reasons must include (A) a statement of what action the patent owner has taken to provide a response, to date as of the date the request for extension is submitted, and (B) why, in spite of the action taken thus far, the requested additional time is needed. The statement of (A) must provide a factual accounting of reasonably diligent behavior by all those responsible for preparing a response to the outstanding Office action within the statutory time period.

ANALYSIS AND FINDINGS

The patent owner’s representative petitions to extend the period for response by adding one (1) month to the period for response. The decision to extend the period for response is evaluated based upon a showing of “sufficient cause.” There is always the consideration to balance the need for the

patent owner to have a fair opportunity to respond to the Office action between the need for special dispatch.

The petitioner has demonstrated "sufficient cause" for granting the extension of time. The petitioner articulates, extensive number of pages made a part of the outstanding rejections of the claims, location of a technical expert and need for declarations to support "sufficient cause" for granting the extension of time.

The petition request to extend the response time is hereby granted.

CONCLUSION

1. The patent owner's petition for extension of time is hereby granted.
2. The time for response is extended by one (1) month.
3. The Patent Owner's response is due 25 November 2009.
4. Response and/or submissions to the Office should be addressed as follows:

By Mail to: Mail Stop *Ex Parte* Reexam
Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P. O. Box 1450
Alexandria, VA 22313-1450

By Fax to: (571) 273-9900
Central Reexamination Unit

By Hand: Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

By EFS: Registered users of EFS-Web may alternatively submit such correspondence via the electronic filing system EFS-Web, at <https://sportal.uspto.gov/authenticate/authenticateuserlocalepf.html>. EFS-Web offers the benefit of quick submission to the particular area of the Office that needs to act on the correspondence. Also, EFS-Web submissions are "soft scanned" (i.e., electronically uploaded) directly into the official file for the reexamination proceeding, which offers parties the opportunity to review the content of their submissions after the "soft scanning" process is complete.

5. Telephone inquiries with regard to this decision should be directed to Mark Reinhart, at (571) 272-1611, in the event that Mark Reinhart is unavailable Eric Keasel at (571) 272-4929, or Jessica Harrison at (571) 272-4449; all are Supervisory Patent Examiners in the Central Reexamination Unit, Art Unit 3992 may also be contacted..

/Mark Reinhart/
for

Gregory Morse
Director,
Central Reexamination Unit 3999

Electronic Patent Application Fee Transmittal

Application Number:	90010422
Filing Date:	26-Feb-2009
Title of Invention:	Graphic User Interface For Internet Telephony Application
First Named Inventor/Applicant Name:	6,009,469
Filer:	Michael Raymond Casey
Attorney Docket Number:	2655-0185

Filed as Large Entity

ex parte reexam Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
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Basic Filing:

Pages:

Claims:

Miscellaneous-Filing:

Petition:

Patent-Appeals-and-Interference:

Post-Allowance-and-Post-Issuance:

Extension-of-Time:

Petition fee- 37 CFR 1.17(g) (Group II)	1463	LG 1. Straight Path ²⁰⁰ , IPR2015-00209 ²⁰⁰	
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Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				200

Electronic Acknowledgement Receipt

EFS ID:	6284260
Application Number:	90010422
International Application Number:	
Confirmation Number:	6565
Title of Invention:	Graphic User Interface For Internet Telephony Application
First Named Inventor/Applicant Name:	6,009,469
Customer Number:	42624
Filer:	Michael Raymond Casey
Filer Authorized By:	
Attorney Docket Number:	2655-0185
Receipt Date:	19-OCT-2009
Filing Date:	26-FEB-2009
Time Stamp:	13:46:24
Application Type:	Reexam (Third Party)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$200
RAM confirmation Number	9
Deposit Account	501860
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees) 209

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/Message Digest	Multi Part /.zip	Pages (if appl.)
1	Reexam Request for Extension of Time	90010422_EOT_Request.pdf	386725 126e63198d7aeed2404a399f3d176874919 16d73	no	3

Warnings:

Information:

2	Reexam Certificate of Service	90010422_COS.pdf	51851 d55820db945b58970d729e0e8f9c6819983 76c0a	no	1
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Warnings:

Information:

3	Fee Worksheet (PTO-875)	fee-info.pdf	29792 5467a9820f88e7745c47eb922e38e9c6f808 254a	no	2
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Warnings:

Information:

Total Files Size (in bytes): 468368

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
FORM PTO-1449 (modified)

Sheet 1 of 1

Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0155
Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	1-1	Civ Action No. 06-2469 Plaintiff Net2Phone, Inc.'s Opening Claim Construction Brief (part 1 of 3) (N2PIDS_02100-2166)	
	1-2	Civ Action No. 06-2469 Plaintiff Net2Phone, Inc.'s Opening Claim Construction Brief (part 2 of 3) (N2PIDS_02166-2262)	
	1-3	Civ Action No. 06-2469 Plaintiff Net2Phone, Inc.'s Opening Claim Construction Brief (part 3 of 3) (N2PIDS_02233-2292)	
	1-4		
	1-5		
	1-6		
	1-7		

Examiner Signature	/Alexander Kosowski/	Date Considered	08/14/2009
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2PIDS_02065

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
FORM PTO-1449 (modified)

Sheet 1 of 5

Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	1-1	Civ Action No. 06-2469 Appendix A (List of Prior Art References) to Defendants' Fourth Amended Responses to Plaintiff's Interrogatory Nos. 17-19 (N2PIDS_01618-1657)	
	1-2	Civ Action No. 06-2469 Appendix B (Invalidity Claim Chart) to Defendants' Fourth Amended Responses to Plaintiff's Interrogatory Nos. 17-19 (N2PIDS_01658-1693)	
	1-3	Civ Action No. 06-2469 Appendix C (Obviousness Combinations Chart) to Defendants' Fourth Amended Responses to Plaintiff's Interrogatory Nos. 17-19 (N2PIDS_01694-01716)	
	1-4	Civ Action No. 06-2469 Declaration of Alan J. Heinrich in Support of Opening Claim Construction Brief of Skype Tech, Skype Inc. and Ebay (part 1 of 5) (N2PIDS_00457-606)	
	1-5	Civ Action No. 06-2469 Declaration of Alan J. Heinrich in Support of Opening Claim Construction Brief of Skype Tech, Skype Inc. and Ebay (part 2 of 5) (N2PIDS_00507-556)	
	1-6	Civ Action No. 06-2469 Declaration of Alan J. Heinrich in Support of Opening Claim Construction Brief of Skype Tech, Skype Inc. and Ebay (part 3 of 5) (N2PIDS_00557-606)	
	1-7	Civ Action No. 06-2469 Declaration of Alan J. Heinrich in Support of Opening Claim Construction Brief of Skype Tech, Skype Inc. and Ebay (part 4 of 5) (N2PIDS_00607-656)	

Examiner Signature	/Alexander Kosowski/	Date Considered	08/12/2009
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2PIDS_02002

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
FORM PTO-1449 (modified)

Sheet 2 of 5

Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	2-1	Civ Action No. 06-2469 Declaration of Alan J. Heinrich in Support of Opening Claim Construction Brief of Skype Tech, Skype Inc. and Ebay (part 5 of 5) (N2PIDS_00657-733)	
	2-2	Civ Action No. 06-2469 Declaration of Alan J. Heinrich in Support of Reply Claim Construction Brief of Skype Tech, Skype Inc. and Ebay (part 1 of 3) (N2PIDS_00734-768)	
	2-3	Civ Action No. 06-2469 Declaration of Alan J. Heinrich in Support of Reply Claim Construction Brief of Skype Tech, Skype Inc. and Ebay (part 2 of 3) (N2PIDS_00769-802)	
	2-4	Civ Action No. 06-2469 Declaration of Alan J. Heinrich in Support of Reply Claim Construction Brief of Skype Tech, Skype Inc. and Ebay (part 3 of 3) (N2PIDS_00803-844)	
	2-5	Civ Action No. 06-2469 Declaration of Alan J. Heinrich in Support of Responsive Claim Construction Brief of Skype Tech, Skype Inc. and Ebay (N2PIDS_00412-456)	
	2-6	Civ Action No. 06-2469 Declaration of David B. Johnson in Support of Skype's Responsive Claim Construction Brief (N2PIDS_00845-913)	
	2-7	Civ Action No. 06-2469 Defendants' Fourth Amended Responses to Plaintiff's Interrogatory Nos. 17-19 Directed to Defendants Ebay Skype Tech and Skype Inc (N2PIDS_00387-411)	

Examiner Signature	/Alexander Kosowski/	Date Considered	08/12/2009
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2PIDS_02003

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
FORM PTO-1449 (modified)

Sheet 3 of 5

Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	3-1	Civ Action No. 06-2469 Joint Final Pretrial Order (part 1 of 8) (N2PIDS_00914-963)	
	3-2	Civ Action No. 06-2469 Joint Final Pretrial Order (part 2 of 8) (N2PIDS_00964-1013)	
	3-3	Civ Action No. 06-2469 Joint Final Pretrial Order (part 3 of 8) (N2PIDS_01014-1063)	
	3-4	Civ Action No. 06-2469 Joint Final Pretrial Order (part 4 of 8) (N2PIDS_01064-1113)	
	3-5	Civ Action No. 06-2469 Joint Final Pretrial Order (part 5 of 8) (N2PIDS_01114-1163)	
	3-6	Civ Action No. 06-2469 Joint Final Pretrial Order (part 6 of 8) (N2PIDS_01164-1213)	
	3-7	Civ Action No. 06-2469 Joint Final Pretrial Order (part 7 of 8) (N2PIDS_01214-1263)	

Examiner Signature	/Alexander Kosowski/	Date Considered	08/12/2009
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2PIDS_02004

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
FORM PTO-1449 (modified)

Sheet 4 of 5

Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	4-1	Civ Action No. 06-2469 Joint Final Pretrial Order (part 8 of 8) (N2PIDS_01264-1310)	
	4-2	Civ Action No. 06-2469 Opening Claim Construction Brief of Skype Tech Skype Inc. and Ebay (N2PIDS_01741-1790)	
	4-3	Civ Action No. 06-2469 Plaintiff Net2Phone's Reply Brief on Claim Construction (part 1 of 3) (N2PIDS_01311-1393)	
	4-4	Civ Action No. 06-2469 Plaintiff Net2Phone's Reply Brief on Claim Construction (part 2 of 3) (N2PIDS_01394-1451)	
	4-5	Civ Action No. 06-2469 Plaintiff Net2Phone's Reply Brief on Claim Construction (part 3 of 3) (N2PIDS_01452-1490)	
	4-6	Civ Action No. 06-2469 Plaintiff Net2Phone's Response Brief on Claim Construction (part 1 of 2) (N2PIDS_01491-1546)	
	4-7	Civ Action No. 06-2469 Plaintiff Net2Phone's Response Brief on Claim Construction (part 2 of 2) (N2PIDS_01547-1617)	

Examiner Signature	/Alexander Kosowski/	Date Considered	08/12/2009
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2PIDS_02005

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
FORM PTO-1449 (modified)

Sheet 5 of 5

Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	5-1	Civ Action No. 06-2469 Reply Claim Construction Brief of Skype Tech, Skype Inc. and Ebay (N2PIDS_01717-1740)	
	5-2	Civ Action No. 06-2469 Responsive Claim Construction Brief of Skype Tech Skype Inc. and Ebay (N2PIDS_01791-1825)	
	5-3	U.S. Control No. 90/010,423 - 2009-08-05 PTO Office Action	
	5-4		
	5-5		
	5-6		
	5-7		

Examiner Signature	/Alexander Kosowski/	Date Considered	08/12/2009
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2PIDS_02006

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
FORM PTO-1449 (modified)

Sheet 1 of 67

Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document No.	Publication/ Issue Date	Name of Patentee or Applicant of Cited Document
1-1	US-4313035	1982/01/26	Jordan et al.	
1-2	US-4423414	1983/12/27	Bryant et al.	
1-3	US-4491693	1985/01/01	Sano et al.	
1-4	US-4602132	1986/07/22	Nagatomi et al.	
1-5	US-4653090	1987/03/24	Hayden, C.	
1-6	US-4658093	1987/14/04	Hellman	
1-7	US-4706274	1987/11/10	Baker et al.	
1-8	US-4754479	1988/06/28	Bicknell et al.	
1-9	US-4755985	1988/07/05	Jayapalan et al.	
1-10	US-4756020	1988/07/05	Fodale	
1-11	US-4759056	1988/07/19	Akiyama	
1-12	US-4800488	1989/24/01	Agrawal et al.	
1-13	US-4823374	1989/04/18	Verlohr	
1-14	US-4827411	1989/05/02	Arrowood	
1-15	US-4899333	1990/06/02	Roediger	
1-16	US-4899373	1990/02/06	Lee et al.	
1-17	US-4914571	1990/04/03	Baratz et al.	
1-18	US-4928306	1990/05/22	Biswas et al.	
1-19	US-4953159	1990/08/28	Hayden, C.	
1-20	US-4962449	1990/10	Schlesinger	
1-21	US-5109403	1992/04/28	Sutphin	
1-22	US-5113499	1992/05	Ankney et al.	
1-23	US-5127001	1992/30/06	Steagall, et al.	
1-24	US-5134648	1992/07/28	Hochfield et al.	

Examiner Signature	/Alexander Kosowski/	Date Considered	08/12/2009
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant.

N2P-IDS00026
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
FORM PTO-1449 (modified)

Sheet 2 of 67

Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document No.	Publication/ Issue Date	Name of Patentee or Applicant of Cited Document
	2-1	US-5136716	1992/08/04	Harvey et al.
	2-2	US-5153908	1992/10/06	Kakizawa et al.
	2-3	US-5159592	1992/10	Perkins
	2-4	US-5164988	1992/11/17	Matyas et al.
	2-5	US-5185860	1993/02/09	Wu
	2-6	US-5195086	1993/03/16	Baumgartner et al.
	2-7	US-5301324	1994/04	Dewey et al.
	2-8	US-5315705	1994/24/05	Iwami Naoko et al
	2-9	US-5319705	1994/07/06	Halter et al.
	2-10	US-5325524	1994/06/28	Black et al.
	2-11	US-5329619	1994/07/12	Page et al.
	2-12	US-5388213	1995/02/07	Oppenheimer et al.
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant.

N2P-TDS00027
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Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

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3-2	US-5502727	1996/03/26	Catanzaro et al.	
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N2 P-IDS00028
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Attorney Docket No.	2655-0185
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
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Examiner Initials*	Cite No.	Document No.	Publication Date	Name of Patentee or Applicant of Cited Document	Notes
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N2P-IDS00030
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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N2 P-IDS00031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
		Issue Date	1999/12/28
		Group Art Unit	3992
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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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N2 P-IDS00032
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
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N2 P-TDS00033

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Reexam number	90/010,422
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Attorney Docket No.	2655-0185
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N2P-IDS00034
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
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NON-PATENT REFERENCES				
Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available		Notes
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N2 P-IDS00035
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
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NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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N2P-IDS00036
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

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Reexam number	90/010,422
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Attorney Docket No.	2655-0185
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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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N2 P-IDS00037
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Reexam number	90/010,422
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Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
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N2 P-IDS00038
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available		Notes
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N2P-IDS00039
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
	Issue Date	1999/12/28
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	Examiner Name	KOSOWSKI, ALEXANDER J
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	Confirmation No.	6565

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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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N2P-IDS00040
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	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
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Attorney Docket No.	2655-0185
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N2 P-IDS00042
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
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N2 P-IDS00050
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
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N2 P-IDS00051
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
	Issue Date	1999/12/28
	Group Art Unit	3992
	Examiner Name	KOSOWSKI, ALEXANDER J
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	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
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	Group Art Unit	3992
	Examiner Name	KOSOWSKI, ALEXANDER J
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	First Named Inventor	Mattaway et al.
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
	Issue Date	1999/12/28
	Group Art Unit	3992
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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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N2P-IDS00061
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	First Named Inventor	Mattaway et al.
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N2 P-IDS00062
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
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		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
		Issue Date	1999/12/28
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	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
	Issue Date	1999/12/28
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	First Named Inventor	Mattaway et al.
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		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
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		Examiner Name	KOSOWSKI, ALEXANDER J
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N2P-IDS00068
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		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
		Issue Date	1999/12/28
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		Examiner Name	KOSOWSKI, ALEXANDER J
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N2P-IDS00070
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	Issue Date	1999/12/28
	Group Art Unit	3992
	Examiner Name	KOSOWSKI, ALEXANDER J
	Attorney Docket No.	2655-0185
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2P-IDS00071
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
	Issue Date	1999/12/28
	Group Art Unit	3992
	Examiner Name	KOSOWSKI, ALEXANDER J
	Attorney Docket No.	2655-0185
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2P-IDS00072
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
	Issue Date	1999/12/28
	Group Art Unit	3992
	Examiner Name	KOSOWSKI, ALEXANDER J
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N2 P-IDS00073
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
		Issue Date	1999/12/28
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		Examiner Name	KOSOWSKI, ALEXANDER J
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2 P-IDS00074
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2P-IDS00075
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
		Issue Date	1999/12/28
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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2P-IDS00076
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
	Issue Date	1999/12/28
	Group Art Unit	3992
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N2P-IDS00077
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2P-IDS00078
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
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N2 P- IDS00079
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified) Sheet 55 of 67		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
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N2P-IDS00080
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

**INFORMATION DISCLOSURE
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Reexam number	90/010,422
First Named Inventor	Mattaway et al.
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Attorney Docket No.	2655-0185
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2P-IDS00081
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

**INFORMATION DISCLOSURE
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Reexam number	90/010,422
First Named Inventor	Mattaway et al.
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Attorney Docket No.	2655-0185
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N2P-IDS00082
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
	Issue Date	1999/12/28
	Group Art Unit	3992
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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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N2 P-IDS00083
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
		Issue Date	1999/12/28
		Group Art Unit	3992
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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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N2 P-IDS00084
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)	Reexam number	90/010,422
	First Named Inventor	Mattaway et al.
	Patent Under Re-Exam	6009469
	Issue Date	1999/12/28
	Group Art Unit	3992
	Examiner Name	KOSOWSKI, ALEXANDER J
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Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
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N2P-IDS00085
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
		Issue Date	1999/12/28
		Group Art Unit	3992
		Examiner Name	KOSOWSKI, ALEXANDER J
		Attorney Docket No.	2655-0185
Sheet 61 of 67		Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	61-1	TIMOP: DCE Time Operations Sample Application. (undated)	
	61-2	Timothy J. O'Malley, Analysis of the Zephyr Communication Paradigm, Bachelor of Science in Computer Science and Engineering, Thesis, Massachusetts Institute of Technology (May 1993).	
	61-3	Todd Copilevitz, Heard on the Internet, THE STAR-LEDGER (March 7, 1995).	
	61-4	Tom Lyons, Network Computing System Tutorial, Prentice Hall (1991).	
	61-5	Tony Pompili, VocalTec: The Internet Phone Number?, PC MAGAZINE (May 16, 1995).	
	61-6	Translation of Japanese Patent Application No. Sho 63[1988]-131637 (Original dated June 3, 1988)	
	61-7	Transparencies: Walter Tuvell, DCE 1.0 Security Technology--Detailed Architectural Overview (Feb. 1997).	

Examiner Signature		Date Considered	
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2 P-IDS00086
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
FORM PTO-1449 (modified)

Sheet 62 of 67

Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	62-1	V. Jacobson, et al., RFC 1185: TCP Extension for High-Speed Paths (Oct. 1990).	
	62-2	VocalChat 1.01 Network Information (undated)	
	62-3	VocalChat Early Beta Release 1.02B Information (undated)	
	62-4	VocalChat GTI 2.12 Beta Retrieval Instructions and Information (undated)	
	62-5	VocalChat Version 1.0, README.TXT, November, 1993.	
	62-6	VocalChat Version 1.01, README.TXT, March, 1994.	
	62-7	VocalChat Version 2.01 and Wan 2.01, README.TXT. May 1994.	

Examiner Signature		Date Considered	
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2P-IDS00087
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
FORM PTO-1449 (modified)

Sheet 63 of 67

Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	63-1	VocalTec Annual Report, 1996	
	63-2	VocalTec Cross-Reference Sheet, Pursuant to Item 501 of Reg. S-K (dated January, 1996)	
	63-3	VocalTec Internet Phone Information Sheet, 2 pages. (dated June 1995)	
	63-4	VocalTec Internet Phone Version 3.0 Build 17, README.TXT, August 11, 1995.	
	63-5	VocalTec Internet Phone Version 3.2 Build 21, README.TXT, March 25, 1996.	
	63-6	VocalTec SEC 20-F Filing, 1996	
	63-7	VocalTec SEC F-1 Filing, December 22, 1995	

Examiner Signature		Date Considered	
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2 P-IDS00088
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
		Issue Date	1999/12/28
		Group Art Unit	3992
		Examiner Name	KOSOWSKI, ALEXANDER J
		Attorney Docket No.	2655-0185
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NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	64-1	VocalTec SEC F-1 Filing, January 5, 1996	
	64-2	Voice Over the Internet, BOARDWATCH MAGAZINE, vol. IX, no. 1 (Jan. 1995).	
	64-3	W. David Albrecht, CPA Firms on the World Wide Web, OHIO CPA JOURNAL (June 1996).	
	64-4	W. Simpson, RFC 1661: The Point-to-Point Protocol (PPP) (July 1994).	
	64-5	W. Yeong, et al., RFC 1777. Lightweight Directory Access Protocol (Mar. 1995).	
	64-6	Walt and mactcp's ip addresses and code (undated)	
	64-7	Walter Tuvell, DCE 1.0 Security Technology- Detailed Architectural Overview (Feb. 1997).	

Examiner Signature		Date Considered	
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2P-IDS00089
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
		Issue Date	1999/12/28
		Group Art Unit	3992
		Examiner Name	KOSOWSKI, ALEXANDER J
		Attorney Docket No.	2655-0185
Sheet 65 of 67		Confirmation No.	6565

NON-PATENT REFERENCES			
Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	65-1	Walter Tuvell, DCE 1.0 Security Technology Detailed Architectural Overview, Draft (Feb. 1997).	
	65-2	Walter Tuvell, DCE 1.0 Security Technology: Detailed Architectural Overview (Feb. 1997).	
	65-3	Walter Tuvell, DCE 1.0 Security Technology: Detailed Architectural Overview (May 1994).	
	65-4	Walter Tuvell, DCE Multi-Crypto Support—Proposal to NSA for Funding and Exportability of Multiple Cryptographic Mechanisms in OSF's Distributed Computing Environment (Sept. 12, 1995).	
	65-5	Walter Tuvell, Distribution & The Infobahn (1996).	
	65-6	Walter Tuvell, Exportability of DCE Multi-Crypto Feature (March 5, 1996).	
	65-7	Walter Tuvell, RFC 98.0: Challenges Concerning Public-Key in DCE (Dec. 1996).	

Examiner Signature		Date Considered	
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2P-IDS00090
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
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Reexam number	90/010,422
First Named Inventor	Mattaway et al.
Patent Under Re-Exam	6009469
Issue Date	1999/12/28
Group Art Unit	3992
Examiner Name	KOSOWSKI, ALEXANDER J
Attorney Docket No.	2655-0185
Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	66-1	Walter Tuvell, System V/ONC Comparison to AIX/NCS (Oct. 3, 1988).	
	66-2	Walter Tuvell, The DCE Dance: Application Development in 29 Easy Steps (Sept. 1991).	
	66-3	Walter Tuvell, The OSF Distributed Computing Environment (DE). (undated)	
	66-4	Web Phone, from Q1.11 of Section 1 of the comp.speech FAQ Home Page (dated March 19, 1996)	
	66-5	WebSTAR Technical Reference (formerly MacHTTP), StarNine Technologies, 1995.	
	66-6	Wei Hu, DCE Security Programming, O'Reilly & Associates (July 1995).	
	66-7	Welch, Nathalie "Vendors Ring in New Telephony Options" MacWeek, April 10, 1995, pg 18.	

Examiner Signature		Date Considered	
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2P-IDS00091
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT FORM PTO-1449 (modified)		Reexam number	90/010,422
		First Named Inventor	Mattaway et al.
		Patent Under Re-Exam	6009469
		Issue Date	1999/12/28
		Group Art Unit	3992
		Examiner Name	KOSOWSKI, ALEXANDER J
		Attorney Docket No.	2655-0185
Sheet 67 of 67		Confirmation No.	6565

NON-PATENT REFERENCES

Examiner Initials*	Cite No.	Non-patent Reference bibliographic information, where available	Notes
	67-1	Wendy Woods, Newsbytes Daily Summary, NEWSBYTES (June 10, 1994).	
	67-2	William M. Bulkeley, On-line: Hello, world. Audible Chats on the Internet, WALL STREET JOURNAL (Feb. 10, 1995).	
	67-3	Winther, Mark. "The World Wide Web Phones Home: Internet Telephony Market Assessment, 1996-1999", International Data Corporation White Paper (dated 1996)	
	67-4	Xerox System Integration Standard Clearinghouse Protocol (April 1984).	
	67-5	Yakov Rekhter, et al., Dynamic Updates in the Domain Name System (DNS):Architecture and Mechanism, Internet-Draft, DNSIND Working Group (July 15, 1994).	
	67-6		
	67-7		

Examiner Signature	/Alexander Kosowski/	Date Considered	08/12/2009
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*Examiner: Initial if reference was considered, whether or not citation is in conformance with MPEP 609. Draw a line through citation if not in conformance and not considered. Include a copy of this form with next communication to applicant. Notes: If identified, the following is provided: EA = English Abstract, T = Translation, PF = Patent Family.

N2 P-IDS00092
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AK/

Reexamination	Application/Control No. 90010422	Applicant(s)/Patent Under Reexamination 6,009,469
	Certificate Date	Certificate Number

Requester Correspondence Address:	<input type="checkbox"/> Patent Owner	<input checked="" type="checkbox"/> Third Party
BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP 1279 OAKMEAD PARKWAY SUNNYVALE, CA 94085-4040		

LITIGATION REVIEW <input checked="" type="checkbox"/>	AJK (examiner initials)	08/17/2009 (date)
Case Name	Director Initials	
OPEN: 2:06cv2469 Net2phone v. Ebay	<i>Eric Traasel for GM</i>	

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	NUMBER
1. no copending proceedings	

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90010422	6,009,469
	Examiner ALEXANDER J KOSOWSKI	Art Unit 3992

SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES

Search Notes	Date	Examiner
Reviewed proposed prior art and prosecution history	8/17/09	AJK

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/010,422	02/26/2009	6,009,469	2655-0185	6565
42624	7590	08/25/2009	EXAMINER	
DAVIDSON BERQUIST JACKSON & GOWDEY LLP 4300 WILSON BLVD., 7TH FLOOR ARLINGTON, VA 22203		ART UNIT		PAPER NUMBER

DATE MAILED: 08/25/2009

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



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BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

MAILED

AUG 25 2009

CENTRAL REEXAMINATION UNIT

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. 90/010,422

PATENT NO. 6,009,469.

ART UNIT 3992.

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Office Action in Ex Parte Reexamination	Control No. 90/010,422	Patent Under Reexamination 6,009,469
	Examiner ALEXANDER J. KOSOWSKI	Art Unit 3992

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

- a Responsive to the communication(s) filed on 26 February 2009. b This action is made FINAL.
 c A statement under 37 CFR 1.530 has not been received from the patent owner.

A shortened statutory period for response to this action is set to expire 2 month(s) from the mailing date of this letter. Failure to respond within the period for response will result in termination of the proceeding and issuance of an *ex parte* reexamination certificate in accordance with this action. 37 CFR 1.550(d). EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c). If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. Notice of References Cited by Examiner, PTO-892.
2. Information Disclosure Statement, PTO/SB/08.
3. Interview Summary, PTO-474.
4. _____

Part II SUMMARY OF ACTION

- 1a. Claims 1-3,5,6,8,9 and 14-18 are subject to reexamination.
- 1b. Claims 4,7 and 10-13 are not subject to reexamination.
2. Claims _____ have been canceled in the present reexamination proceeding.
3. Claims _____ are patentable and/or confirmed.
4. Claims 1-3, 5-6, 8-9, 14-18 are rejected.
5. Claims _____ are objected to.
6. The drawings, filed on _____ are acceptable.
7. The proposed drawing correction, filed on _____ has been (7a) approved (7b) disapproved.
8. Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some* c) None of the certified copies have

- 1 been received.
- 2 not been received.
- 3 been filed in Application No. _____
- 4 been filed in reexamination Control No. _____
- 5 been received by the International Bureau in PCT application No. _____

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

9. Since the proceeding appears to be in condition for issuance of an *ex parte* reexamination certificate except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.
10. Other: _____

cc: Requester (if third party requester)

U.S. Patent and Trademark Office
PTOL-466 (Rev. 08-06)

Office Action in Ex Parte Reexamination

LG v. Straight Path, IPR2015-00209
Straight Path - Ex. 2015 - Page 944

Part of Paper No. 20090812

DETAILED ACTION

1) This Office action addresses claims 1-3, 5-6, 8-9, 14-18 of United States Patent Number 6,009,469 (Mattaway et al), for which it has been determined in the Order Granting Ex Parte Reexamination (hereafter the "Order") mailed 3/13/09 that a substantial new question of patentability was raised in the Request for *Ex Parte* reexamination filed on 2/26/09 (hereafter the "Request"). Claims 4, 7, 10-13 are not subject to reexamination.

IDS

2) With regard to the IDS filed 6/11/09:

Where the IDS citations are submitted but not described, the examiner is only responsible for cursorily reviewing the references. The initials of the examiner on the PTO-1449 indicate only that degree of review unless the reference is either applied against the claims, or discussed by the examiner as pertinent art of interest, in a subsequent office action. See Guidelines for Reexamination of Cases in View of *In re Portola Packaging, Inc.*, 110 F.3d 786, 42 USPQ2d 1295 (Fed. Cir. 1997), 64 FR at 15347, 1223 Off. Gaz. Pat. Office at 125 (response to comment 6).

Consideration by the examiner of the information submitted in an IDS means that the examiner will consider the documents in the same manner as other documents in Office search files are considered by the examiner while conducting a search of the prior art in a proper field of search. The initials of the examiner placed adjacent to the citations on the PTO-1449 or PTO/SB/08A and 08B or its equivalent mean that the information has been considered by the examiner to the extent noted above. MPEP § 609 (Eighth Edition, Rev. 5, August 2006).

Regarding IDS submissions MPEP 2256 recites the following: "Where patents, publications, and other such items of information are submitted by a party (patent owner or requester) in compliance with the requirements of the rules, the requisite degree of consideration to be given to such information will be normally limited by the degree to which the party filing the information citation has explained the content and relevance of the information."

Accordingly, the IDS submissions have been considered by the Examiner only with the scope required by MPEP 2256.

With regard to the IDS's filed 8/11/09 and 8/12/09:

These IDS's have been given due consideration. However, that which are not either prior art patents or prior art printed publications have been crossed out so as not to appear reprinted on the front page of the patent.

Rejections

Art Unit: 3992

- 3) The following three rejections are utilized by the examiner below, referencing the proposed prior art listed on pages 4-6 of the Request:

Issue 1: Claims 1-3, 5-6, 8-9, 14-18 in view of NetBIOS, RFC 1531, Pinard and VocalChat User's Guide.

Issue 2: Claims 1-3, 5-6, 8-9, 14-18 in view of Etherphone, Vin, RFC 1531, Pinard and VocalChat User's Guide.

Issue 3: Claims 1-3, 5-6, 8-9, 14-18 in view of VocalChat, RFC 1531 and Pinard.

Claim Rejection Paragraphs

- 4) ***Claim Rejections - 35 USC § 103***

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

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

Issue 1

- 5) Claims 1-3 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable by NetBIOS, further in view of RFC 1531.

Referring to (**Claim 1**), NetBIOS teaches a computer program product for use with a computer system having a display, the computer system capable of executing a first process and connecting to other processes and a server process over a computer network (NetBIOS, pg. 356,

Art Unit: 3992

357, whereby the system is run on personal computers over TCP/IP networks, personal computers inherently containing a display), the computer program product comprising a computer usable medium having computer readable code means embodied in the medium comprising:

a. program code for generating a user-interface enabling control a first process executing on the computer system (NetBIOS, pg. 356, 359, whereby computers executing NetBIOS may contain DOS operating systems or may operate on other operating systems, which examiner notes inherently contain at least text-based user interfaces);

c. program code responsive to the currently assigned network protocol address of the first process, for establishing a communication connection with the server process and for forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process (NetBIOS, pg. 358, 431, 367, 388, 480-482, whereby network nodes forward IP addresses and unique names to NetBIOS Name Server); and

d. program code, responsive to user input commands, for establishing a point-to-point communications with another process over the computer network (NetBIOS, pg. 397-400, whereby point-to-point communication is established upon initiation between nodes once target names and addresses have been found).

In addition, NetBIOS teaches the use of TCP/IP (NetBIOS, pg. 356-357). However, NetBIOS does not explicitly teach b. program code for determining the currently assigned network protocol address of the first process upon connection to the computer network.

RFC 1531 teaches dynamically assigning IP addresses on a TCP/IP network by an Internet access server (RFC 1531, Section 2.2).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to determine the currently assigned network protocol address of the first process upon connection to the computer network in the invention taught by NetBIOS above since this allows for automatic reuse of an address that is no longer needed by the host to which it was assigned (RFC 1531, Pg. 2), and since examiner notes the use of dynamic IP address assignment in a TCP/IP network are old and well known in the art, and are useful to eliminate the burdensome task of manually assigning IP addresses for all networked computers.

Referring to **(Claim 2)**, NetBIOS teaches the computer program product of claim 1 wherein the program code for establishing a point-to-point communication link further comprises program code, responsive to the network protocol address of a second process, for establishing a point-to-point communication link between the first process and the second process over the computer network (NetBIOS, pg. 397-401, whereby point-to-point communication is established once the IP address of the node is found).

Referring to **(Claim 3)**, NetBIOS teaches the computer program product of claim 2 wherein the program code for establishing a point-to-point communication link further comprise: program code for transmitting, from the first process to the server process, a query as to whether the second process is connected to the computer network (NetBIOS, pg. 377, 388-389, 446, 393-394, whereby name queries are used to discover if a node is connected and active); and program

code for receiving a network protocol address of the second process from the server process, when the second process is connected to the computer network (NetBIOS, pg. 389, 440, 464-465, whereby the NBNS answers queries with a list of IP addresses of connected nodes).

Referring to **(Claim 5)**, NetBIOS teaches in a computer system having a display, the computer system capable of executing a first process and communicating with other processes and a server process over a computer network (NetBIOS, pg. 356, 357, whereby the system is run on personal computers over TCP/IP networks, personal computers inherently containing a display), a method for establishing point-to-point communications with other processes comprising: B. establishing a communication connection with the server process once the assigned network protocol of the first process is known and C. forwarding the assigned network protocol address of the first process to the server process upon establishing a communication connection with the server process (NetBIOS, pg. 358, 431, 367, 388, 480-482, whereby network nodes forward IP addresses and unique names to NetBIOS Name Server); and D. establishing a point-to-point communication with another process over the computer network (NetBIOS, pg. 397-400, whereby point-to-point communication is established upon initiation between nodes once target names and addresses have been found).

In addition, NetBIOS teaches the use of TCP/IP (NetBIOS, pg. 356-357). However, NetBIOS does not explicitly teach A. determining the currently assigned network protocol address of the first process upon connection to the computer network.

RFC 1531 teaches dynamically assigning IP addresses on a TCP/IP network by an Internet access server (RFC 1531, Section 2.2).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to determine the currently assigned network protocol address of the first process upon connection to the computer network in the invention taught by NetBIOS above since this allows for automatic reuse of an address that is no longer needed by the host to which it was assigned (RFC 1531, Pg. 2), and since examiner notes the use of dynamic IP address assignment in a TCP/IP network are old and well known in the art, and are useful to eliminate the burdensome task of manually assigning IP addresses for all networked computers.

Referring to (**Claim 6**), NetBIOS teaches the method of claim 5 wherein the program step D comprises transmitting, from the first process to the server process, a query as to whether a second process is connected to the computer network (NetBIOS, pg. 377, 388-389, 446, 393-394, whereby name queries are used to discover if a node is connected and active); and receiving a network protocol address of the second process from the server process, when the second process is connected to the computer network (NetBIOS, pg. 389, 440, 464-465, whereby the NBNS answers queries with a list of IP addresses of connected nodes).

- 6) Claims 8-9, 14-15, and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable by NetBIOS, further in view of Pinard.

Referring to (**Claim 8**), NetBIOS teaches in a computer system having a display and capable of executing a process, a method for establishing a point-to-point communication from a caller process to a callee process over a computer network, the caller process capable of generating a user interface and being operatively connected to the callee process and a server

Art Unit: 3992

process over the computer network (NetBIOS, pg. 356, 357, whereby the system is run on personal computers over TCP/IP networks, personal computers inherently containing a display), the method comprising the steps of: querying the server process to determine if the first callee process is accessible (NetBIOS, pg. 377, 388-389, 446, whereby a query is sent to the NBNS to determine if another node is logged in and discover the nodes IP address); and establishing a point-to-point communication link from the caller process to the first callee process (NetBIOS, pg. 397-400, whereby a point-point communication link is established between end nodes).

However, NetBIOS does not explicitly teach generating a user-interface element representing a first communication line, generating a user interface element representing a first callee process, and establishing the link in response to a user associating the element representing the first callee process with the element representing the first communication line

Pinard teaches a human machine interface for telephone feature invocation which is utilized on a personal computer and allows a user to make telephone calls by moving graphics around a screen. Pinard teaches a user interface element representing a first communication line and callee process (Pinard, Figure 6 and col. 5 lines 23-30), and also teaches clicking and dragging an icon representing a callee from a directory into a call setup icon to establish a call link (Pinard, Figure 3, col. 4 lines 38-51, Figure 6, col. 5 lines 36-37).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilizing the user-interface elements and interactions taught by Pinard in the invention taught by NetBIOS since Pinard teaches that the invention can be used with any system in which a personal computer in conjunction with a server operates (Pinard, col. 2 lines 43-46), since NetBIOS teaches that it can be implemented using different operating systems

(NetBIOS, pg. 359), and since examiner notes that both NetBIOS and Pinard relate to communications between at least two users implemented in a computerized environment.

Referring to **(Claim 9)**, NetBIOS teaches the method of claim 8 wherein step C further comprises the steps of: querying the server process as to the on-line status of the first callee process (NetBIOS, pg. 377, 388-389, 446, 393-394, whereby name queries are used to discover if a node is connected and active); and receiving a network protocol address of the first callee process over the computer network from the server process (NetBIOS, pg. 389, 440, 464-465, whereby the NBNS answers queries with a list of IP addresses of connected nodes).

Referring to **(Claims 14-15 and 17-18)**, NetBIOS teaches the above. However, NetBIOS does not explicitly teach generating a user interface element representing a communication line having a temporarily disabled status; and temporarily disabling the point-to-point communication between the caller process and the first callee process, in response to the user associating the element representing the first callee process with the element representing the communication line having a temporarily disabled status, wherein the element generated represents a communication line on hold status, wherein the display further comprises a visual display, and wherein the user interface is a graphic user interface and the user-interface elements generated in steps A and B are graphic elements.

Pinard teaches a “hard hold” icon to which saller/callees may be dragged to be put on hold status (Pinard, Figure 12, col. 6 lines 36-53), teaches a visual display (Pinard, col. 4 lines

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10-11, Figure 2), and teaches a graphical user interface in which the elements are graphic elements (Pinard, Figures 2-16).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilizing the user-interface elements and interactions taught by Pinard in the invention taught by NetBIOS since Pinard teaches that the invention can be used with any system in which a personal computer in conjunction with a server operates (Pinard, col. 2 lines 43-46), since NetBIOS teaches that it can be implemented using different operating systems (NetBIOS, pg. 359), and since examiner notes that both NetBIOS and Pinard relate to communications between at least two users implemented in a computerized environment.

7) Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable by NetBIOS, further in view of Pinard, further in view of VocalChat User's Guide.

Referring to (**Claim 16**), NetBIOS teaches the above. However, NetBIOS does not explicitly teach wherein the element generated represents a communication line on mute status.

VocalChat User's Guide teaches the use of a MUTE option on a phone so that a user can talk without being heard by the other user's system (VocalChat User's Guide, pg. 57).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize an element representing a communication line on MUTE status in the invention taught by NetBIOS and Pinard above since all three references relate to the field of communications over a computer network, since VocalChat and Pinard utilize a computer system for telephony features specifically, and since examiner notes that the use of a MUTE feature in telephone conversations is old and well known in the art.

Issue 2

- 8) Examiner notes the following will represent the Etherphone references utilized for the rejection below (All considered a single reference as published together):

"Zellweger": An Overview of the Etherphone System and its Applications

"Swinehart": Telephone Management in the Etherphone System

"Terry": Managing Stored Voice in the Etherphone System

- 9) Claims 1-3 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable by Etherphone, further in view of Vin, further in view of RFC 1531.

Referring to (**Claim 1**), Etherphone teaches a computer program product for use with a computer system having a display, the computer system capable of executing a first process and connecting to other processes and a server process over a computer network (Zellweger, pg. 1, 3, Terry, pg. 4, whereby a computer program product connects first and second processes over a network using a server), the computer program product comprising a computer usable medium having computer readable code means embodied in the medium comprising:

- a. program code for generating a user-interface enabling control a first process executing on the computer system (Swinehart Figures –10, Zellweger Figures 3-4, whereby workstations include GUI's);
- c. program code responsive to the currently assigned network protocol address of the first process, for establishing a communication connection with the server process and for forwarding

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the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process (Swinehart, pg. 2, 4, Zelleger, pg. 5, whereby user identity and workstation address are transmitted to the Voice Control Server when connected); and

d. program code, responsive to user input commands, for establishing a point-to-point communications with another process over the computer network (Swinehart, pg. 4, whereby after acquiring the network address of a callee, voice datagrams are transmitted directly among the participants, bypassing the control server).

However, Etherphone does not explicitly teach that the network protocol address is received by said one of the processes from an Internet access server.

Vin teaches an Etherphone implementation whereby Internet communications and IP addresses are used (Vin, page 77 and Figure 5).

RFC 1531 teaches dynamically assigning IP addresses on a TCP/IP network by an Internet access server (RFC 1531, Section 2.2).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize the computer program product taught by Etherphone above in an Internet based system utilizing dynamically assigned IP addresses from Internet access servers as taught by Vin and RFC 1531 since Etherphone was intended for use in multiple networks and communication protocols (Terry, page 3), since Vin and Etherphone both describe the same Etherphone system, since examiner notes that Internet and IP address-based networks are old and well known in the art and would be a natural extension from an ethernet-based system, since dynamic allocation of IP addresses allows for automatic reuse of an address that is no longer

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needed by the host to which it was assigned (RFC 1531, Pg. 2), and since examiner notes the use of dynamic IP address assignment in a TCP/IP network are old and well known in the art, and are useful to eliminate the burdensome task of manually assigning IP addresses for all networked computers.

Referring to (**Claim 2**), Etherphone teaches the computer program product of claim 1 wherein the program code for establishing a point-to-point communication link further comprises program code, responsive to the network protocol address of a second process, for establishing a point-to-point communication link between the first process and the second process over the computer network (Swinehart, pg. 4, whereby voice datagram are transmitted directly among participants once network addresses of both processes have been received).

Referring to (**Claim 3**), Etherphone teaches the computer program product of claim 2 wherein the program code for establishing a point-to-point communication link further comprise: program code for transmitting, from the first process to the server process, a query as to whether the second process is connected to the computer network (Swinehart, pg. 2, 4, Zellweger, pg. 5, whereby queries are transmitted to Voice Control Server); and program code for receiving a network protocol address of the second process from the server process, when the second process is connected to the computer network (Swinehart, pg. 2, whereby the server sends the network protocol address of the logged in user to caller process on request).

Referring to (Claim 5), Etherphone teaches in a computer system having a display, the computer system capable of executing a first process and communicating with other processes and a server process over a computer network (Zellweger, pg. 1, 3, Terry, pg. 4, whereby a computer program product connects first and second processes over a network using a server), a method for establishing point-to-point communications with other processes comprising: B. establishing a communication connection with the server process once the assigned network protocol of the first process is known and C. forwarding the assigned network protocol address of the first process to the server process upon establishing a communication connection with the server process (Swinehart, pg. 2, 4, Zelleger, pg. 5, whereby user identity and workstation address are transmitted to the Voice Control Server when connected); and D. establishing a point-to-point communication with another process over the computer network (Swinehart, pg. 4, whereby after acquiring the network address of a callee, voice datagrams are transmitted directly among the participants, bypassing the control server).

However, Etherphone does not explicitly teach A. determining the currently assigned network protocol address of the first process upon connection to the computer network.

Vin teaches an Etherphone implementation whereby Internet communications and IP addresses are used (Vin, page 77 and Figure 5).

RFC 1531 teaches dynamically assigning IP addresses on a TCP/IP network by an Internet access server (RFC 1531, Section 2.2).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize the computer program product taught by Etherphone above in an Internet based system utilizing dynamically assigned IP addresses from Internet access servers as taught

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by Vin and RFC 1531 since Etherphone was intended for use in multiple networks and communication protocols (Terry, page 3), since Vin and Etherphone both describe the same Etherphone system, since examiner notes that Internet and IP address-based networks are old and well known in the art and would be a natural extension from an ethernet-based system, since dynamic allocation of IP addresses allows for automatic reuse of an address that is no longer needed by the host to which it was assigned (RFC 1531, Pg. 2), and since examiner notes the use of dynamic IP address assignment in a TCP/IP network are old and well known in the art, and are useful to eliminate the burdensome task of manually assigning IP addresses for all networked computers.

Referring to (**Claim 6**), Etherphone teaches the method of claim 5 wherein the program step D comprises transmitting, from the first process to the server process, a query as to whether a second process is connected to the computer network (Swinehart, pg. 2, 4, Zellweger, pg. 5, whereby queries are transmitted to Voice Control Server); and receiving a network protocol address of the second process from the server process, when the second process is connected to the computer network (Swinehart, pg. 2, whereby the server sends the network protocol address of the logged in user to caller process on request).

10) Claims 8-9, 14-15, and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable by Etherphone, further in view of Pinard.

Referring to (**Claim 8**), Etherphone teaches in a computer system having a display and capable of executing a process, a method for establishing a point-to-point communication from a

caller process to a callee process over a computer network, the caller process capable of generating a user interface and being operatively connected to the callee process and a server process over the computer network (Zellweger, pg. 1, 3, Figure 1, Swinehart Figures 1-10), the method comprising the steps of: querying the server process to determine if the first callee process is accessible (Swinehart, pg. 2, 4, Zellweger, pg. 5, whereby a query is transmitted to determine the location of a second Etherphone by contacting a server); and establishing a point-to-point communication link from the caller process to the first callee process (Swinehart, pg. 2, Zellweger, Figure 4, whereby voice datagrams are transmitted directly among participants).

However, Etherphone does not explicitly teach generating a user-interface element representing a first communication line, generating a user interface element representing a first callee process, and establishing the link in response to a user associating the element representing the first callee process with the element representing the first communication line

Pinard teaches a human machine interface for telephone feature invocation which is utilized on a personal computer and allows a user to make telephone calls by moving graphics around a screen. Pinard teaches a user interface element representing a first communication line and callee process (Pinard, Figure 6 and col. 5 lines 23-30), and also teaches clicking and dragging an icon representing a callee from a directory into a call setup icon to establish a call link (Pinard, Figure 3, col. 4 lines 38-51, Figure 6, col. 5 lines 36-37).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilizing the user-interface elements and interactions taught by Pinard in the invention taught by Etherphone since Pinard teaches that the invention can be used with any system in which a personal computer in conjunction with a server operates (Pinard, col. 2 lines

43-46), and since examiner notes that both Etherphone and Pinard relate to communications between at least two users implemented in a computerized environment.

Referring to (**Claim 9**), Etherphone teaches the method of claim 8 wherein step C further comprises the steps of: querying the server process as to the on-line status of the first callee process (Swinehart, pg. 2, 4, Zellweger, pg. 5, whereby queries are transmitted to Voice Control Server); and receiving a network protocol address of the first callee process over the computer network from the server process (Swinehart, pg. 2, whereby the server sends the network protocol address of the logged in user to caller process on request).

Referring to (**Claims 14-15**), Etherphone teaches the above. However, Etherphone does not explicitly teach generating a user interface element representing a communication line having a temporarily disabled status; and temporarily disabling the point-to-point communication between the caller process and the first callee process, in response to the user associating the element representing the first callee process with the element representing the communication line having a temporarily disabled status, and wherein the element generated represents a communication line on hold status.

Pinard teaches a “hard hold” icon to which saller/callees may be dragged to be put on hold status (Pinard, Figure 12, col. 6 lines 36-53).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilizing the user-interface elements and interactions taught by Pinard in the invention taught by Etherphone since Pinard teaches that the invention can be used with any

system in which a personal computer in conjunction with a server operates (Pinard, col. 2 lines 43-46), and since examiner notes that both Etherphone and Pinard relate to communications between at least two users implemented in a computerized environment.

Referring to (**Claims 17-18**), Etherphone teaches wherein the display further comprises a visual display (Swinehart, Fig. 1-10, Zellweger, Fig. 3-4, whereby computer displays are considered visual displays), and wherein the user interface is a graphic user interface and the user-interface elements generated in steps A and B are graphic elements (Swinehart, Fig. 1-10, Zellweger, Fig. 3-4, whereby a GUI is used showing graphic elements of call display).

11) Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable by Etherphone, further in view of Pinard, further in view of VocalChat User's Guide.

Referring to (**Claim 16**), Etherphone teaches the above. However, Etherphone does not explicitly teach wherein the element generated represents a communication line on mute status.

VocalChat User's Guide teaches the use of a MUTE option on a phone so that a user can talk without being heard by the other user's system (VocalChat User's Guide, pg. 57).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize an element representing a communication line on MUTE status in the invention taught by Etherphone and Pinard above since all three references relate to the field of communications over a computer network, since VocalChat and Pinard utilize a computer system for telephony features specifically, and since examiner notes that the use of a MUTE feature in telephone conversations is old and well known in the art.

Issue 3

12) Examiner notes the following will represent the VocalChat references utilized for the rejection below:

“User’s Guide”: VocalChat User’s Guide, Version 2.0

“Readme”: VocalChat Readme File, Version 2.02

“Networking Information”: VocalChat 1.01 Networking Information

“Help File”: VocalChat Information, Version 2.02

“Troubleshooting Help File”: VocalChat Troubleshooting Help File, Version 2.02

13) Claims 1-3 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable by the combination of all five VocalChat references listed above (hereafter “VocalChat References”), further in view of RFC 1531.

Referring to (**Claim 1**), VocalChat teaches a computer program product for use with a computer system having a display, the computer system capable of executing a first process and connecting to other processes and a server process over a computer network (User’s Guide, pg. 8, 11, Network Information, pg. 10, whereby users connect via a network through data received from a server), the computer program product comprising a computer usable medium having computer readable code means embodied in the medium comprising:

a. program code for generating a user-interface enabling control a first process executing on the computer system (User’s Guide, pg. 11, whereby a GUI is used);

c. program code responsive to the currently assigned network protocol address of the first process, for establishing a communication connection with the server process and for forwarding the assigned network protocol address of the first process and a unique identifier of the first process to the server process upon establishing a communication connection with the server process (Network Information, pg. 10, Troubleshooting Help File, pg. 28, Help File, pg. 2, Readme File, pg. 2, whereby clients transmit name and address to be stored on a server Post Office); and

d. program code, responsive to user input commands, for establishing a point-to-point communications with another process over the computer network (Help File, pg. 17, User Guide, pg. 2, whereby communication between users is established).

In addition, VocalChat teaches the use of TCP/IP (Troubleshooting Help File, pg. 28).

However, VocalChat does not explicitly teach b. program code for determining the currently assigned network protocol address of the first process upon connection to the computer network.

RFC 1531 teaches dynamically assigning IP addresses on a TCP/IP network by an Internet access server (RFC 1531, Section 2.2).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine all five VocalChat References utilized above since they all describe a VocalChat system which shares numerous common features including a central server to store addresses and VocalChat client software and which all interoperate in the same basic manner. In addition it would have been obvious to utilize dynamically assigned IP addresses from Internet access servers in the invention taught by VocalChat above since this allows for automatic reuse of an address that is no longer needed by the host to which it was assigned (RFC 1531, Pg. 2),

and since examiner notes the use of dynamic IP address assignment in a TCP/IP network are old and well known in the art, and are useful to eliminate the burdensome task of manually assigning IP addresses for all networked computers.

Referring to (**Claim 2**), VocalChat teaches the computer program product of claim 1 wherein the program code for establishing a point-to-point communication link further comprises program code, responsive to the network protocol address of a second process, for establishing a point-to-point communication link between the first process and the second process over the computer network (Help File, Pg. 17, User Guide, pg. 2, whereby users connected to each other over a network utilizing addresses received from a server).

Referring to (**Claim 3**), VocalChat teaches the computer program product of claim 2 wherein the program code for establishing a point-to-point communication link further comprise: program code for transmitting, from the first process to the server process, a query as to whether the second process is connected to the computer network (Help File, pg. 8, 22, whereby an IP address is provided in response to a query if a callee is connected); and program code for receiving a network protocol address of the second process from the server process, when the second process is connected to the computer network (Help File, pg. 22, whereby network addresses are received in response to queries).

Referring to (**Claim 5**), VocalChat teaches in a computer system having a display, the computer system capable of executing a first process and communicating with other processes