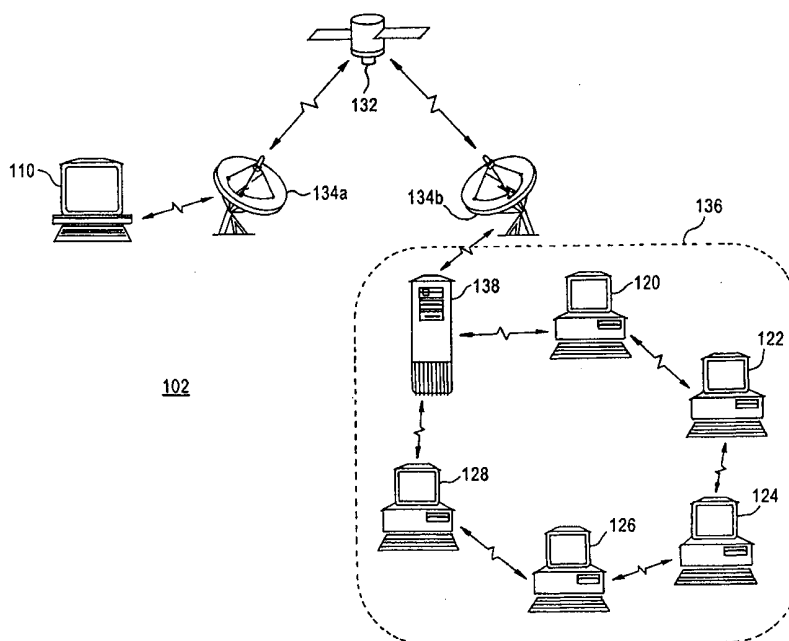




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(54) Title: ENTERPRISE MANAGEMENT SYSTEM



(57) Abstract

An enterprise management system includes a supervisor computer system and one or more user computer systems interconnected within a network. The enterprise management system enables a computer system therein to transmit its computer screen display to one or more other computer systems, the supervisor computer system to take control over any user computer system, quick exchange of messages between computer systems, and fast transmission of full motion video. The supervisor computer system also has full control over all user computer systems rights including control over their input devices.

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ENTERPRISE MANAGEMENT SYSTEM

FIELD OF THE INVENTION

The present invention relates to networked computer systems and, more
5 particularly, to a network management system for use in classrooms, offices, and large organizations.

BACKGROUND OF THE INVENTION

The advent of the personal computer has transformed the way schools,
businesses, governments, and other enterprises perform their daily tasks. The
10 personal computer has become an indispensable tool for students and employees due
its capabilities and multimedia functionality for individual use in word processing,
database management, inventory control, and computer-aided instruction. Although
computers are beginning to be networked together to share files, programs, and
electronic mail, there is a long-felt need for better interworking between personal
15 computers in an enterprise-wide network, possibly in different cities, especially in the
areas of collaboration, monitoring, and communication.

Conventional computer networks have been developed to address some of
these needs; however, these approaches tend to be complicated and expensive,
requiring complex wiring and hardware devices as well as elaborate, inflexible
20 software packages. For example, U.S. Patent No. 4,538,993 discloses a computer
teaching system for use in a networked, classroom setting. The computer teaching
system includes a teacher station coupled to a main switching console, which is
directly wired in parallel to specially designed student controllers, coupled to
respective student computers. The main switching console includes a series of
25 hardware switches for selectively connecting to any of the student computers for
viewing the screen display thereof. The teacher station employs two video monitors,
one to display the output of the teacher station computer and the other to display the
screen of one of the student computers. This system requires complex wiring and
additional controller devices at each station, is expensive to implement, and is
30 geographically limited in extent.

Another conventional teaching system is described in U.S. Patent No. 4,759,717. In this system, the teacher computer and the student computers are serially connected in a closed loop. More specifically, this teaching system requires a specially-designed external hardware controller provided for each student computer.

5 Each hardware controller is responsive to a command from a teacher terminal for displaying an analog video signal from the closed-loop network or transmitting a video signal to another computer on the closed-loop network. This conventional system also requires additional controller devices and is geographically limited in extent.

10 U.S. Patent 5,002,491 describes a electronic classroom system that operates on a local area network and provides a communication protocol for proprietary classroom application software implementing specific functions such as distributed testing taking and student performance evaluation. Since this electronic classroom system requires proprietary application software, this system cannot be used for collaboration and
15 monitoring with off-the-shelf, third-party software, such as most popular word processor, spreadsheet, and multimedia applications, which do not know about the proprietary communications protocol.

SUMMARY OF THE INVENTION

Accordingly, there exists a long-felt need for an enterprise-wide, networking
20 solution that fosters collaboration and communication between users in the enterprise using third-party productivity, multimedia, and instructional applications and implements monitoring functions for a supervisor. There is a need for such a networking solution to be inexpensive and not require special-purpose hardware controllers and switching consoles.

25 These and other needs are addressed by the present invention, which provides a novel enterprise management system including a supervisor computer system and one or more user computer systems. The computer systems in an embodiment of the enterprise management system are configured to capture their respective screen displays and transmit the captured display data to another computer system for
30 viewing. Consequently, users can collaborate with each other because they can view the screens of their fellow students and employees, while a supervisor such as a

teacher or manager can monitor the activities of the students or employees. By capturing the screen display data, the enterprise network system does not require third-party software applications to make proprietary network calls and can, therefore, work with popular software packages useful in classrooms and offices.

5 In addition, embodiments of the enterprise management system can be implemented on existing local area and wide area networks, even with satellite links. In preferred embodiments, support for point-to-point and broadcast communication is provided, especially for sending and receiving text messages, real-time, interactive “chat” sessions, and playing high speed audio/video.

10 One aspect of the invention involves a computer network comprising a supervisor computer system, a user computer system, and a network communications infrastructure for transmitting packets of information between the supervisor computer system and the user computer system. The supervisor computer system is configured to send a view command through the network to the user computer system,
15 requesting display data for the user computer system, to receive the display data from the user computer system, and to display the user display data on a computer display belonging to the supervisor computer system. The user computer system is configured to receive the view command, and, in response to the view command, capture the user display data and transmit the user display data to the supervisor
20 computer system.

Additional objects, advantages, and novel features of the present invention will be set forth in part in the description that follows, and in part, will become apparent upon examination or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the
25 instrumentalities and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

30 FIG. 1(a) depicts an embodiment of a enterprise management system for collaboration, monitoring, and communication.

FIG. 1(b) depicts an alternative embodiment of the enterprise management system including a satellite link.

FIG. 2 is a high-level schematic of a computer system that can be used to implement an embodiment.

5 FIG. 3 is a flowchart illustrating a log on operation.

FIG. 4 is an exemplary screen display of a supervisor computer system according to one embodiment.

FIG. 5 is a flowchart illustrating a view screen operation.

FIG. 6 is a flowchart illustrating a view group operation.

10 DESCRIPTION OF THE PREFERRED EMBODIMENT

A method and apparatus for managing a computer network is described. In the following description, for the purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be apparent, however, to one skilled in the art that the present invention may be
15 practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form in order to avoid unnecessarily obscuring the present invention.

NETWORK OVERVIEW

FIG. 1(a) depicts a network topology **100** of an enterprise management system
20 according to an embodiment. The network topology **100** includes at least one supervisor computer system **110** and one or more user computer systems **120, 122, 124, 126, and 128**. Although one supervisor computer system **110** and five user computer systems **120, 122, 124, 126, and 128** are depicted in FIG. 1(a), it is to be understood that the present invention is not limited to these particular number of
25 computer system, and, in fact, the present invention has been found to be especially useful in computer networks with a large number of user computers, *e.g.* fifty or more.

The supervisor computer system **110** and the user computer systems **120-128** are interconnected by a networking communications infrastructure **130**, which is
30 preferably a packet-switch network implementation capable of supporting TCP/IP

such as Ethernet and Token-Ring. One aspect of the present invention is directed to a technique for high-speed network communications. Accordingly, network commands are packaged and transmitted in packets of blocked data. Each data packet is no more than a predetermined maximum in size, for example, 30kB. The data packet

5 comprises a header and a string of data. The header is fixed-length and contains the following fields for identifying the data packet as a command as shown in TABLE 1:

TABLE 1

| Field | Function |
|---------------------|---|
| ID | Packet version |
| PacketID | Packet sequence for block transfers (<i>e.g.</i> same for all screen data packets) |
| Packet Type | Packet command |
| Total Packet Length | Size of the packet of blocked data |
| TargetID | Destination ID of command |
| From | Source of command |
| To | Destination of command |

Preferably, only a small percentage of the normal network commands are used. In particular, it has been found that, based on the nature of the data being

10 transmitted, that it is not necessary for network stability to implement all of the normal TCP/IP redundancy checking. It is estimated that this results in a dramatic increase in network speed (for example, a 10%-20% faster network rate), while suffering only a negligible decline in network stability. Therefore, fast transmission of full motion video can be accomplished.

15 Another aspect of the present invention is directed to exploiting idle processors among the computer systems of the network. Idle processing power within the network is detected and then used for sending and receiving network commands. Receiving network commands is given a higher priority than sending network commands. With this priority setting, the incoming network commands and data are

20 reliably captured by the individual processors at high speed. There are various ways to determine how busy or idle the individual computer processors are, but the present invention is not limited to any particular method. For example, each of the computer systems 110, 120-128 may be installed with a resident program that establishes a

regular timer, which is delayed if the processor is too busy. Thus, the resident program automatically detects that the processor is idle and, in response, engage the processor to receive and send network commands, giving higher priority to receiving the network commands.

5 In accordance with one embodiment, the geographical limitations of conventional enterprise management systems are overcome by including a satellite link. Referring to FIG. 1(b) the network includes a satellite 132 coupling supervisor computer system 110 to a local area network 136 of user computer systems 120, 122, 124, 126, and 128 via satellite links 134a and 134b. Satellite links 134a and 134b
10 provide low-level networking functions between supervisor computer system 110 and local area network 136. A server 138 is provided to facilitate the interface between the user computer systems 120-128 and the satellite link 134b, and may include providing connectivity to the satellite link 134b through a wide area network or even the Internet.

15 HARDWARE OVERVIEW

FIG. 2 is a block diagram that illustrates a computer system 200 that can implement the supervisor computer system 110 and user computer systems 120-128 according to one embodiment. Computer system 200 includes a bus 202 or other communication mechanism for communicating information, and a processor 204 coupled with bus 202 for processing information. Computer system 200 also includes a main memory 206, such as a random access memory (RAM) or other dynamic storage device, coupled to bus 202 for storing information and instructions to be executed by processor 204. Main memory 206 also may be used for storing temporary variables or other intermediate information during execution of instructions to be executed by processor 204. Computer system 200 further includes a read only memory (ROM) 208 or other static storage device coupled to bus 202 for storing static information and instructions for processor 204. A storage device 210, such as a magnetic disk or optical disk, is provided and coupled to bus 202 for storing information and instructions.

Computer system **200** may be coupled via bus **202** to a display **212**, such as a cathode ray tube (CRT), for displaying information to a computer user. An input

device **214**, including alphanumeric and other keys, is coupled to bus **202** for communicating information and command selections to processor **204**. Another type of user input device is cursor control **216**, such as a mouse, a trackball, or cursor direction keys for communicating direction information and command selections to processor **204** and for controlling cursor movement on display **212**. This input device typically has two degrees of freedom in two axes, a first axis (e.g., x) and a second axis (e.g., y), that allows the device to specify positions in a plane.

According to one embodiment of the invention, network management functionality, including collaboration, monitoring, and communications, is provided by respective computer systems **200** executing one or more sequences of one or more instructions contained in main memory **206** in response to processor **204**. Such instructions may be read into main memory **206** from another computer-readable medium, such as storage device **210**. Execution of the sequences of instructions contained in main memory **206** causes processor **204** to perform the process steps described herein. One or more processors in a multi-processing arrangement may also be employed to execute the sequences of instructions contained in main memory **206**. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions to implement the invention. Thus, embodiments of the invention are not limited to any specific combination of hardware circuitry and software.

The term "computer-readable medium" as used herein refers to any medium that participates in providing instructions to processor **204** for execution. Such a medium may take many forms, including but not limited to non-volatile media, volatile media, and transmission media. Non-volatile media include, for example, optical or magnetic disks, such as storage device **210**. Volatile media include dynamic memory, such as main memory **206**. Transmission media include coaxial cables, copper wire and fiber optics, including the wires that comprise bus **202**. Transmission media can also take the form of acoustic or light waves, such as those generated during radio frequency (RF) and infrared (IR) data communications. Common forms of computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, any other magnetic medium, a CD-ROM, DVD, any other optical medium, punch cards, paper tape, any other physical medium

with patterns of holes, a RAM, a PROM, and EPROM, a FLASH-EPROM, any other memory chip or cartridge, a carrier wave as described hereinafter, or any other medium from which a computer can read.

Various forms of computer readable media may be involved in carrying one or more sequences of one or more instructions to processor **204** for execution. For example, the instructions may initially be borne on a magnetic disk of a remote computer. The remote computer can load the instructions into its dynamic memory and send the instructions over a telephone line using a modem. A modem local to computer system **200** can receive the data on the telephone line and use an infrared transmitter to convert the data to an infrared signal. An infrared detector coupled to bus **202** can receive the data carried in the infrared signal and place the data on bus **202**. Bus **202** carries the data to main memory **206**, from which processor **204** retrieves and executes the instructions. The instructions received by main memory **206** may optionally be stored on storage device **210** either before or after execution by processor **204**.

Computer system **200** also includes a communication interface **218** coupled to bus **202**. Communication interface **218** provides a two-way data communication coupling to a network link **220** that is connected to a local network **222**. For example, communication interface **218** may be an integrated services digital network (ISDN) card or a modem to provide a data communication connection to a corresponding type of telephone line. As another example, communication interface **218** may be a local area network (LAN) card to provide a data communication connection to a compatible LAN. Wireless links may also be implemented. In any such implementation, communication interface **218** sends and receives electrical, electromagnetic or optical signals that carry digital data streams representing various types of information.

Network link **220** typically provides data communication through one or more networks to other data devices. For example, network link **220** may provide a connection through local network **222** to a host computer **224** or to data equipment operated by an Internet Service Provider (ISP) **226**. ISP **226** in turn provides data communication services through the world wide packet data communication network, now commonly referred to as the "Internet" **228**. Local network **222** and Internet **228** both use electrical, electromagnetic or optical signals that carry digital data streams.

The signals through the various networks and the signals on network link **220** and through communication interface **218**, which carry the digital data to and from computer system **200**, are exemplary forms of carrier waves transporting the information.

5 Computer system **200** can send messages and receive data, including program code, through the network(s), network link **220** and communication interface **218**. In the Internet example, a server **230** might transmit a requested code for an application program through Internet **228**, ISP **226**, local network **222** and communication interface **218**. In accordance with the invention, one such downloaded application
10 provides for network management as described herein. The received code may be executed by processor **204** as it is received, and/or stored in storage device **210**, or other non-volatile storage for later execution. In this manner, computer system **200** may obtain application code in the form of a carrier wave.

ENTERPRISE MANAGEMENT

15 FIG. 3 is a flowchart illustrating steps taken by a supervisor computer system **110** referred to as “teacher” and a user computer system **120** referred to as “student.” Although FIG. 3 is illustrated with respect to a classroom setting by way of an example, it is to be understood that the following discussion is applicable to enterprise settings generally, for example, to various offices within a company or an agency of a
20 local or national government. At step **300**, preferably at boot-time, the computer systems undergo an initialization process, including memory allocation **302** and network resetting **304**.

 After the supervisor computer system **110** initializes, it checks a local file of user accounts stored in computer-readable medium and periodically transmits an
25 MT_GIVE_YOUR_NAME message in a data packet to the user computer systems **120-128** (step **310**). The user account file contains a list of users of the enterprise management and defined groups of the users. Each user account gives the network name of the user computer system **120** and a list of rights that a user may be assigned for authorization of specific tasks.

30 After the user computer system **120** initializes, it prepares to log on (step **320**) by sending a MT_CAN_I_LOG_IN_NOW message to the supervisor computer system

110. In response, at step 312, the supervisor computer system 110 checks the user account for the user computer system 120, and, if log on is authorized according to the user account information (step 322), sends a

MT_LOGIN_OK_AND_HERE_IS_YOUR_INFORMATION command to the user computer

5 system 120. In response, the user computer system 120 and proceeds to perform its main operations (step 330). On the other hand, if the user computer system 120 is not authorized to log on (step 322), then the supervisor computer system 110 will ignore the log on attempt. In one embodiment, the user computer system 120 will continue to attempt logging on (step 322) until the supervisor add the user computer system
10 120 to the user account.

FIG. 4 is an example of a screen display 400 during operation of an embodiment of an enterprise management system. in which the main user information to the functionality of the embodiment is interfaced through a toolbar 410 labeled "SmartSchool." The toolbar 410 comprises a plurality of buttons 412-428, which are
15 typically activated by a cursor control device 216 when the cursor is positioned over the button 412-428 or through key inputs of input device 214.

In this example, button 412 is configured to perform a "View Screen" command. In response, the computer system presents a display window 440 for eventually displaying the display data for a selected computer system. The display
20 window 440, when activated (e.g. by a right-button mouse click), presents menus and dialog boxes (not shown) for selecting a user computer system 120 or a predefined group of user computer systems 120-128 to the view the screen or screens thereof. As shown in FIG. 4, display window 440 displays, by way of an example, the contents of user computer system 120, including an enterprise management system toolbar 442, a
25 third-party word processing application (e.g. WordPerfect®) window 444, and a chat session 446 in accordance with an embodiment. One sequence of networking commands to implement the view screen functionality is described in more detail hereinafter with reference to FIGS. 5 and 6.

Button 414 is configured for a "Send/Broadcast Message" command, whereby,
30 upon activation, a send message window 430 is displayed. The user or supervisor interacts with the send message window in order to select a user or group of users (including the supervisor) for sending a message. Upon activation of the "Send"

button, the message is transmitted to the destinations, whereupon the destination computer system receives the message and emits an audible sound such as a beep. When a user or supervisor hears the beep, he may activate the "Check Message" button 416 and read the message when it is displayed on the screen. Button 418 is provided for establishing a chat session, whereby users can type messages to one another in an interactive manner, thereby facilitating collaboration and communication. The screen display 440 of user computer system 120 includes a chat session window 446 showing chat messages that have been exchanged.

Button 420 is configured for a "Control Other Terminal" operation. When this control button 420 is activated, the activator is presents with a dialog box for selecting another computer system or group of computer systems. In one embodiment there are four sets of control commands that are invoked: user commands, user rights, toolbar controls, and "risk zone" operations.

User commands relate to locking or unlocking the computer system of another, and enabling or disabling the user input devices (keyboard 214 and cursor control 216). When the user input device is disabled, the supervisor (or user with appropriate permissions) is able to transmit over specific keyboard strokes or mouse movements and clicks as input to the controlled computer system. When the controlled computer system receives the input command in a packet, it places the command in the input buffer for the computer system to execute. By this facility, a supervisor, or suitably empowered user, is able to take control over another computer system and execute commands thereon. Feedback is provided for the supervisor via the displaying the captured screen displays.

The control button 420 also allow user rights to be enabled and disabled. In specific, groups of rights can be granted or revoked and each button of the toolbar 410 or 442 for the user can be disabled or enabled. One of the rights is the ability to reconfigure a user computer system 120 into a supervisor computer system by granting the full rights thereof, such as the ability to take control over another computer system for executing commands thereon. Changing the user rights, including reconfiguring a user computer system 120 into a supervisor computer system 110, can be accomplished by sending a network command from the supervisor computer system 110 to the user computer system 120 for granting specified rights to

the user computer system **120**. When the user computer system **120** receives the network command, it acquires the specified rights, including reconfiguring itself as another supervisor computer system.

Toolbar controls are also provided for controlling the toolbar **410**, with such features as being on top other windows, beeping, hiding or showing, and showing the current time in the title bar. The “risk zone” operations are provided for shutting down, restarting, or logging off the current or another computer system.

Button **422** provides “Supertool” functionality for high performance networked, multimedia applications, for example, audio/video from an file or a camera. Button **424** is provided for customizing various aspects of the enterprise management system, such as the transfer speed of packets, the sensitivity, screen capture parameters (*e.g.* as soon as possible), and the size of the data packets. Button **426** is an “About” button, providing help and vendor information about the enterprise management system, and button **428** is provided for exiting the enterprise management system.

VIEWING SCREENS

FIG. **5** is a flowchart illustrating steps taken in implementing a view screen request, invoked through view screen button **412**, according to one embodiment. At step **500**, the requesting computer system (referred to as “Terminal X”) sends a MT_SCREEN_CAPTURE_START command to the requested computer system (referred to as “Terminal Y”). Terminal Y then receives and processes the view command, captures the display data for the display **212** (most computer systems **200** already store a copy of the screen and the mouse position in main memory **206** and sends packets of display data back to Terminal X in one or more MT_SCREEN_IMAGES commands (step **502**).

If Terminal X sends a refresh command, MT_RESEND YOUR_SCREEN (step **504**), then execution loops back to step **502**, where the screen and the mouse position are captured for another time and transmitted to Terminal X in one or more packets. If Terminal X has not sent a stop command, such as MT_STOP_VIEW_THIS_USER, within a period of time or if Terminal Y is idle (step **506**), then execution also loops back to step **502**, where the screen and the mouse position are captured for another

time and transmitted to Terminal X in one or more packets. On the other hand, if Terminal X did send the stop command, then Terminal Y stops sending display data back to Terminal X (step 508).

A feature of one embodiment is iteratively displaying the screens of a group of users, defined in the user accounts file. Referring to FIG. 6, the supervisor (referred to as "teacher") selects users (referred to as "students") whose screen is to be viewed (step 600). This may be performed by selecting a predefined group of users in a dialog box. In addition, the teacher sets a time interval Z through a control in the dialog box.

In response, the supervisor computer system 110 sends view commands to the selected students (step 602), which is acknowledged by the user computer systems 120-128 until all them has responded (step 604). The first selected user computer system 120 captures and sends the display data back to the supervisor computer system 110 as described hereinabove (step 606). After waiting for time interval Z (step 608), the next user computer system 122 captures and sends the display data back to the supervisor computer system 110, as described hereinabove (step 610). If the supervisor computer system 110 has sent a stop view command (step 612), then the selected user computer systems 120-128 stop capturing and transmitting their respective display data. Otherwise, execution continues back to step 608. In this manner, the supervisor is able to iteratively monitor the screens and activities of the selected users.

Collaboration is fostered with an enterprise management system by capturing display data for a computer system or a group of computer systems, because users can view the progress of fellow users even with third-party applications that were developed without knowledge of the enterprise management system, such as many standard word processors, database management systems, and the like. Monitoring functions are provided by the enterprise management system since a supervisor can select which user screens to view. Better communication is enabled through the display of other screens, as well as, with the text messaging, chat sessions, and high-speed audio/video features.

While this invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within
5 the spirit and scope of the appended claims.

CLAIMS

WHAT IS CLAIMED IS:

- 1 1. A computer network, comprising:
2 a supervisor computer system;
3 a user computer system; and
4 a network communications infrastructure for transmitting packets of information
5 between the supervisor computer system and the user computer system;
6 wherein the supervisor computer system is configured to:
7 send a view command through the network to the user computer system, said
8 view command requesting user display data for a user computer display of
9 the user computer system;
10 receive the user display data from the user computer system; and
11 display the user display data on a supervisor computer display belonging to the
12 supervisor computer system; and
13 wherein the user computer system is configured to:
14 receive the view command, and
15 in response to the view command, capture the user display data and transmit
16 the user display data to the supervisor computer system.
- 1 2. The network of claim 1, wherein the network communications infrastructure
2 includes a satellite link.
- 1 3. The network of claim 1, wherein:
2 the supervisor computer system is further configured to capture and transmit
3 supervisor screen data to the user computer system; and
4 the user computer system is further configured to receive and display the
5 supervisor screen data.
- 1 4. The network of claim 1, wherein:

2 the supervisor computer system is further configured to transmit a text message to
3 the user computer system; and
4 the user computer system is further configured to receive and display the text
5 message.

1 5. The network of claim 4, wherein:
2 the user computer system is further configured to transmit a second text message
3 to the supervisor computer system; and
4 the supervisor computer system is further configured to receive and display the
5 second text message.

1 6. The network of claim 1, wherein:
2 the supervisor computer system is further configured to transmit an input
3 command to the user computer system; and
4 the user computer system is further configured to receive and execute the input
5 command.

1 7. The network of claim 1, wherein:
2 the supervisor computer system is further configured to transmit audio or video to
3 the user computer system; and
4 the user computer system is further configured to receive and play the audio or
5 video.

1 8. The network of claim 1, wherein:
2 the user computer system is further configured to detect whether a processor
3 thereof is idle and, in response, engage the processor thereof to receive or send
4 network commands; and
5 the supervisor computer system is further configured to detect whether a processor
6 thereof is idle and, in response, engage the processor thereof to receive or send
7 network commands.

1 9. The network of claim 1, wherein the supervisor computer system is configured
2 for assigning rights to the user computer system.

1 10. The network of claim 1, wherein:
2 the supervisor computer system is configured to send a network command to the
3 user computer system for granting rights of the supervisor computer system to
4 the user computer system; and
5 the user computer system is configured to receive the network command for
6 granting the rights of the supervisor computer system to the user computer
7 system and, in response, acquire the rights of the supervisor computer system.

1 11. A supervisor computer system coupled to a plurality of user computer
2 systems within a network, comprising:
3 means for sending a view command through the network a selected group of the
4 user computer systems, said view command requesting user display data for a
5 user computer display respectively of the group of the user computer systems;
6 means for receiving the user display data from the selected group the user
7 computer systems; and
8 means for displaying the user display data on a supervisor computer display
9 belonging to the supervisor computer system.

1 12. The supervisor computer system of claim 11, further comprising:
2 means for defining the selected group of the user computer systems; and
3 means for displaying the user display data for respective user computer systems of
4 the selected group of computer systems for a common period of time.

1 13. The supervisor computer system of claim 11, further comprising means for
2 sending supervisor display data of the supervisor computer display to one or more of
3 the user computer systems.

1 14. The supervisor computer system of claim 11, further comprising means for
2 sending a text message to one or more of the user computer systems for display on the
3 user computer display.

1 15. The supervisor computer system of claim 14, further means for receiving a
2 user text message from one or more of the user computer systems for display on the
3 supervisor computer display.

1 16. The supervisor computer system of claim 11, further comprising means for
2 sending a command to insert input commands in an input buffer of one or more of the
3 user computer systems.

1 17. The supervisor computer system of claim 11, further comprising means for
2 transmitting audio or video to one or more of the user computer systems.

1 18. The supervisor computer system of claim 11, further comprising means for
2 detecting whether a processor thereof is idle and, in response, engaging the processor
3 thereof to receive or send network commands.

1 19. The supervisor computer system of claim 11, further comprising means for
2 assigning rights respectively to the user computer systems.

1 20. The supervisor computer system of claim 11, further comprising means for
2 sending a network command to the user computer system for granting rights of the
3 supervisor computer system to the user computer system.

1 21. A user computer system in network of computer systems including a
2 supervisor computer system and at least one other user computer systems, comprising:
3 means for receiving a view command from one of the computer systems, said
4 view command requesting display data for a display of the user computer
5 system; and

6 means capturing the display data for a display belonging to the user computer
7 system and transmitting the display data to said one of the computer systems,
8 in response to the view command.

1 22. The user computer system of claim 21, further comprising:
2 capturing second display data for the display; and
3 transmitting the display data to one or more of the computer systems.

1 23. The user computer system of claim 21, further comprising means for receiving
2 and executing input commands from one or more of the computer systems.

1 24. The user computer system of claim 21, further comprising means for
2 receiving the network command for granting the rights of the supervisor computer
3 system to the user computer system and, in response, acquiring the rights of the
4 supervisor computer system.

1 25. A method of managing a network at a supervisor computer system coupled to
2 a plurality of user computer systems within the network, said method comprising the
3 steps of:
4 sending a view command through the network to one of the user computer
5 systems, said view command requesting user display data for a user computer
6 display of said one of the user computer systems;
7 receiving the user display data from the user computer system; and
8 displaying the user display data on a supervisor computer display belonging to the
9 supervisor computer system.

1 26. The method of claim 25, further comprising the steps of:
2 defining a group of the user computer systems; and
3 performing the steps of sending, receiving, and displaying successively for each of
4 the user computer systems in the group of the user computer systems.

1 27. The method of claim 25, further comprising the step of sending supervisor
2 display data of the supervisor computer display to one or more of the user computer
3 systems.

1 28. The method of claim 25, further comprising the step of sending a text
2 message to one or more of the user computer systems for display on the user computer
3 display.

1 29. The method of claim 28, further comprising the step of receiving a user text
2 message from one or more of the user computer systems for display on the supervisor
3 computer display.

1 30. The method of claim 25, further comprising the step of sending a command to
2 insert input commands in an input buffer of one or more of the user computer
3 systems.

1 31. The method of claim 30, wherein the input commands include a keyboard
2 command.

1 32. The method of claim 30, wherein the input commands include a cursor
2 control command.

1 33. The method of claim 25, further comprising the step of transmitting audio
2 data or video data to one or more of the user computer systems.

1 34. The method of claim 25, further comprising the steps of detecting whether a
2 processor thereof is idle and, in response, engaging the processor thereof to receive or
3 send network commands.

1 35. The method of claim 25, further comprising the step of sending a network
2 command to the user computer system for granting rights of the supervisor computer
3 system to the user computer system.

1 36. A method of controlling a user computer system in network of computer
2 systems including a supervisor computer system and at least one other user computer
3 systems, said method comprising the steps of:
4 receiving a view command from one of the computer systems, said view
5 command requesting display data for a display of the user computer system;
6 in response to receiving the view command, performing the steps of:
7 capturing the display data for a display belonging to the user computer system;
8 transmitting the display data to said one of the computer systems.

1 37. The method of claim 36, further comprising the steps of:
2 capturing second display data for the display; and
3 transmitting the display data to one or more of the computer systems.

1 38. The method of claim 36, further comprising the steps of receiving and
2 executing input commands from one or more of the computer systems.

1 39. The method of claim 38, wherein the input commands include a keyboard
2 command.

1 40. The method of claim 38, wherein the input commands include a cursor
2 control command.

1 41. The method of claim 36, further including the step of detecting whether a
2 processor thereof is idle and, in response, engaging the processor thereof to receive or
3 send network commands.

1 42. The method of claim 36, further including the steps of receiving the network
2 command for granting the rights of the supervisor computer system to the user
3 computer system and, in response, acquiring the rights of the supervisor computer
4 system.

1 43. A computer-readable medium bearing instructions for managing a network at
2 a supervisor computer system coupled to a plurality of user computer systems within
3 the network, said instructions being arranged, when executed, to cause one or more
4 processors to perform the steps:
5 sending a view command through the network to one of the user computer
6 systems, said view command requesting user display data for a user computer
7 display of said one of the user computer systems;
8 receiving the user display data from the user computer system; and
9 displaying the user display data on a supervisor computer display belonging to the
10 supervisor computer system.

1 44. The computer-readable medium of claim 43, wherein the instructions are
2 further arranged to cause said one or more processors to perform the steps of:
3 defining a group of the user computer systems; and
4 performing the steps of sending, receiving, and displaying successively for each of
5 the user computer systems in the group of the user computer systems.

1 45. The computer-readable medium of claim 43, wherein the instructions are
2 further arranged to cause said one or more processors to perform the step of sending
3 supervisor display data of the supervisor computer display to one or more of the user
4 computer systems.

1 46. The computer-readable medium of claim 43, wherein the instructions are
2 further arranged to cause said one or more processors to perform the step of sending a
3 text message to one or more of the user computer systems for display on the user
4 computer display.

1 47. The computer-readable medium of claim 46, wherein the instructions are
2 further arranged to cause said one or more processors to perform the step of receiving
3 a user text message from one or more of the user computer systems for display on the
4 supervisor computer display.

1 48. The computer-readable medium of claim 43, wherein the instructions are
2 further arranged to cause said one or more processors to perform the step of sending a
3 command to insert input commands in an input buffer of one or more of the user
4 computer systems.

1 49. The computer-readable medium of claim 48, wherein the input commands
2 include a keyboard command.

1 50. The computer-readable medium of claim 48, wherein the input commands
2 include a cursor control command.

1 51. The computer-readable medium of claim 43, wherein the instructions are
2 further arranged to cause said one or more processors to perform the step of
3 transmitting audio data or video data to one or more of the user computer systems.

1 52. The computer-readable medium of claim 43, wherein the instructions are
2 further arranged to cause said one or more processors to perform the steps of detecting
3 whether a processor thereof is idle and, in response, engaging the processor thereof to
4 receive or send network commands.

1 53. The computer-readable medium of claim 43, wherein the instructions are
2 further arranged to cause said one or more processors to perform the step of send a
3 network command to the user computer system for granting rights of the supervisor
4 computer system to the user computer system.

1 54. A computer-readable medium bearing instructions for controlling a user
2 computer system in network of computer systems including a supervisor computer
3 system and at least one other user computer systems, said instructions being arranged,
4 when executed, to cause one or more processors to perform the steps of:
5 receiving a view command from one of the computer systems, said view
6 command requesting display data for a display of the user computer system;
7 in response to receiving the view command, performing the steps of:

8 capturing the display data for a display belonging to the user computer system;
9 transmitting the display data to said one of the computer systems.

1 55. The computer-readable medium of claim 54, wherein the instructions are
2 further arranged to cause said one or more processors to perform the steps of:
3 capturing second display data for the display; and
4 transmitting the display data to one or more of the computer systems.

1 56. The computer-readable medium of claim 54, wherein the instructions are
2 further arranged to cause said one or more processors to perform the step of receiving
3 and executing input commands from one or more of the computer systems.

1 57. The computer-readable medium of claim 56, wherein the input commands
2 include a keyboard command.

1 58. The computer-readable medium of claim 56, wherein the input commands
2 include a cursor control command.

1 59. The computer-readable medium of claim 54, wherein the instructions are
2 further arranged to cause said one or more processors to perform the steps of detecting
3 whether a processor thereof is idle and, in response, engaging the processor thereof to
4 receive or send network commands.

1 60. The computer-readable medium of claim 54, wherein the instructions are
2 further arranged to cause said one or more processors to perform the steps of
3 receiving the network command for granting the rights of the supervisor computer
4 system to the user computer system and, in response, acquiring the rights of the
5 supervisor computer system.

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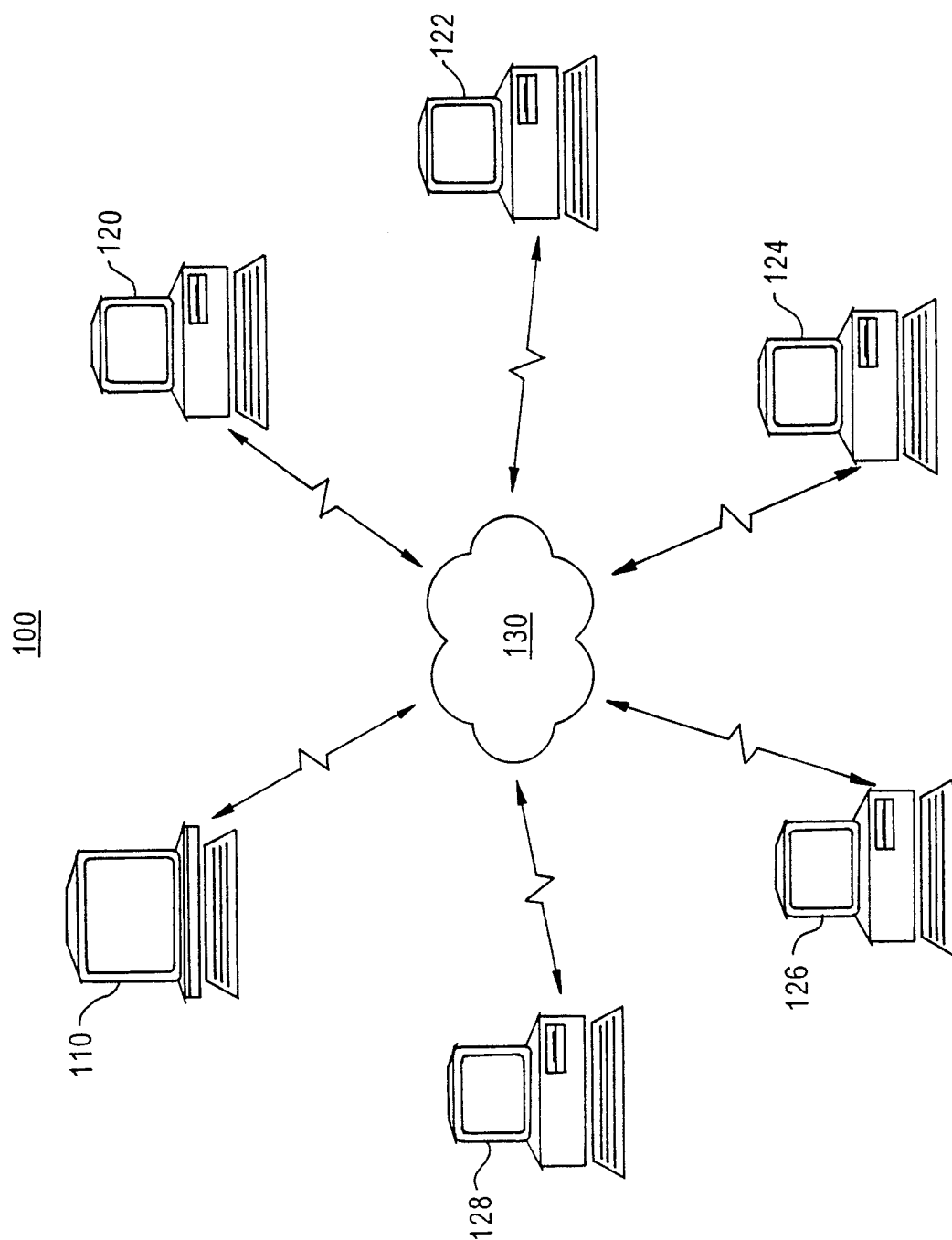


FIG. 1(a)

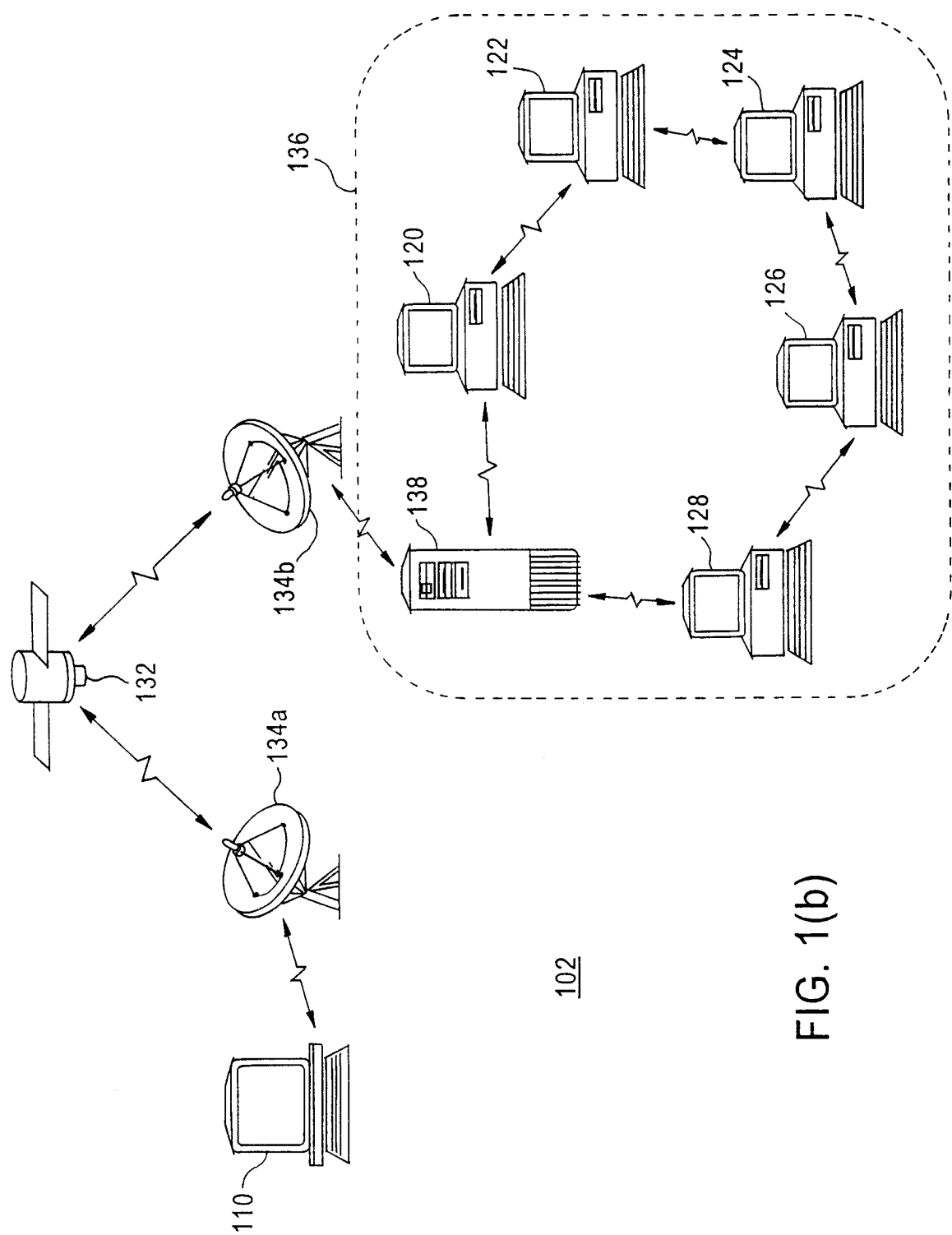


FIG. 1(b)

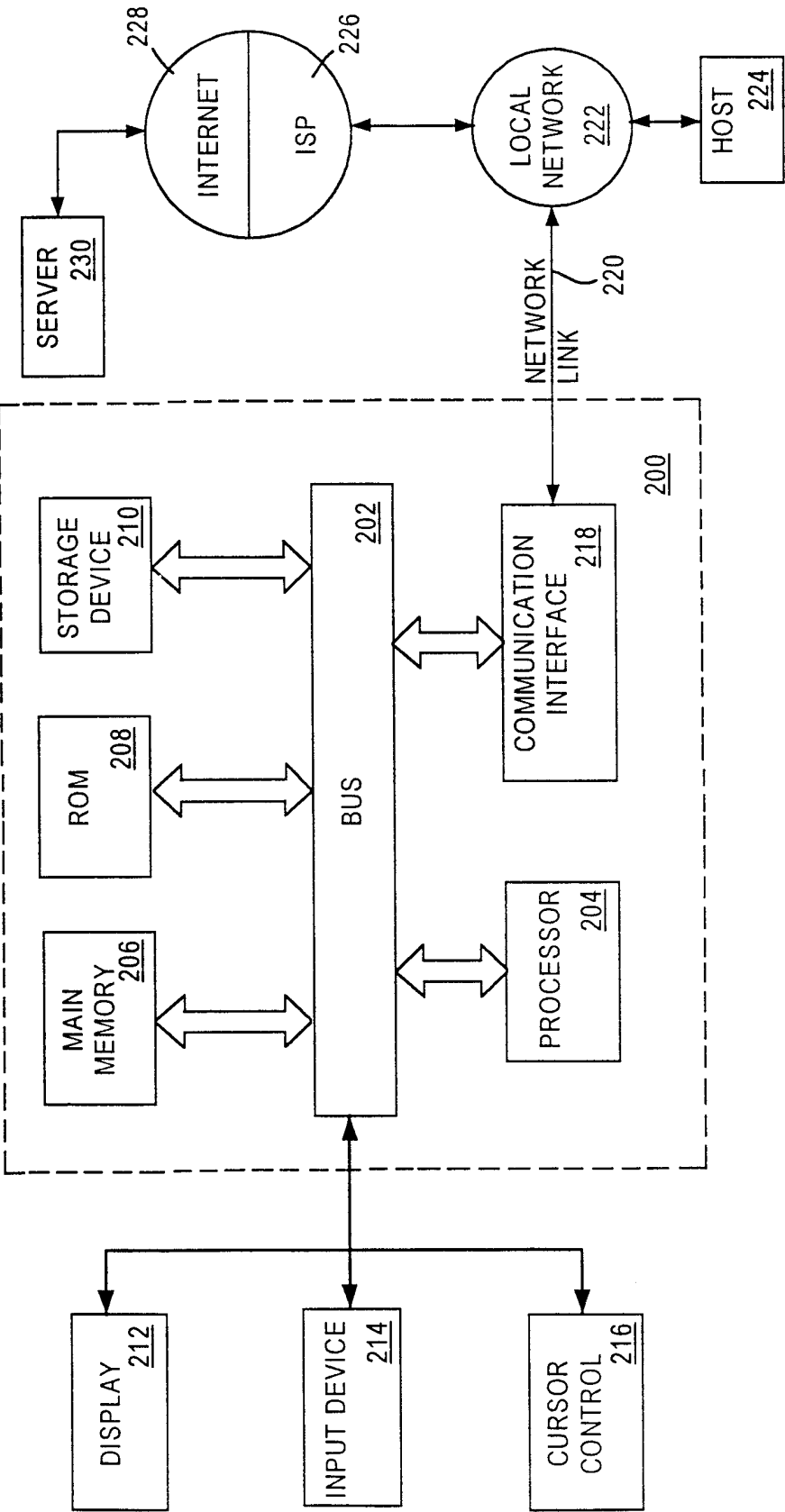


FIG. 2

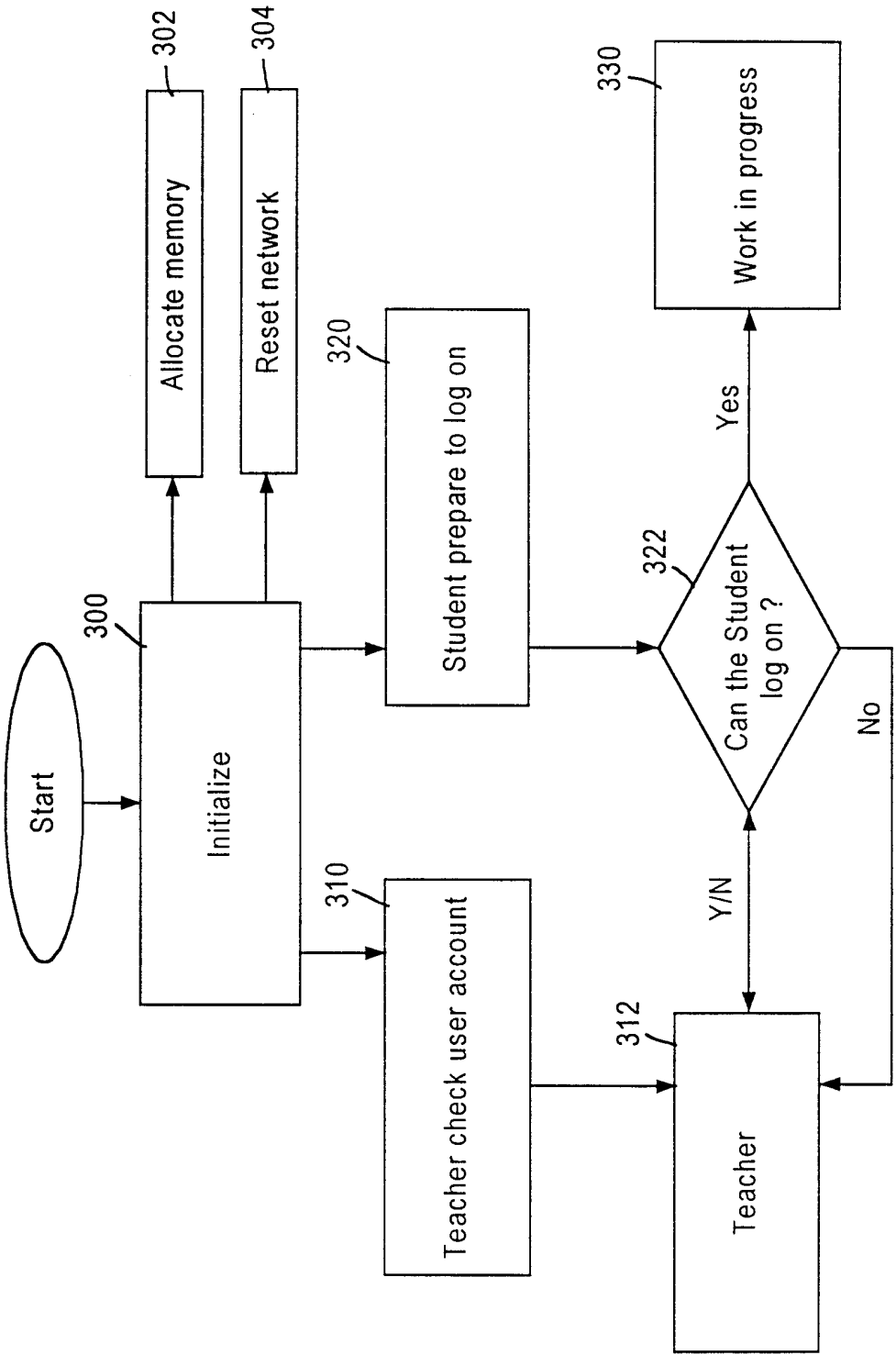
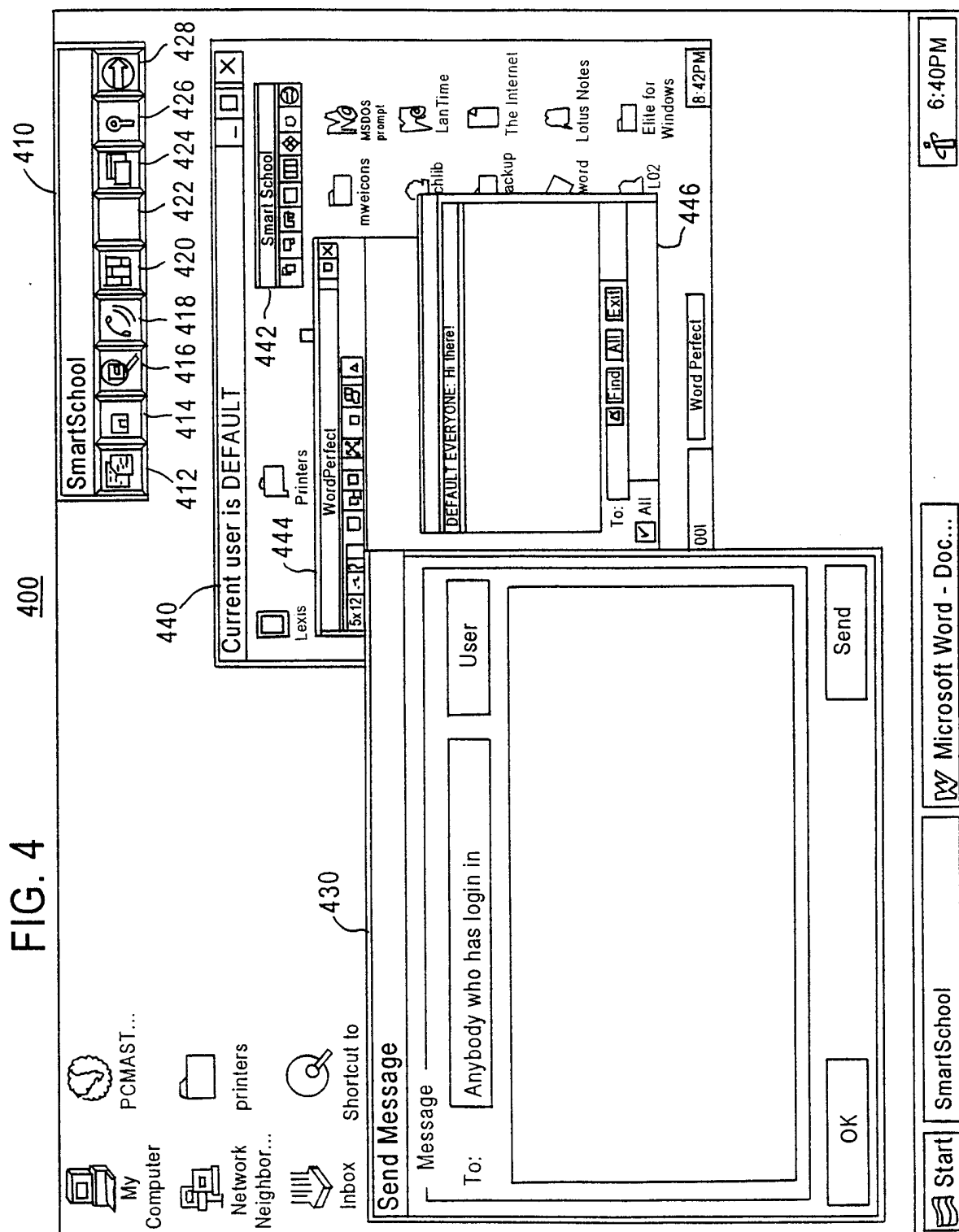


FIG. 3



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View Command

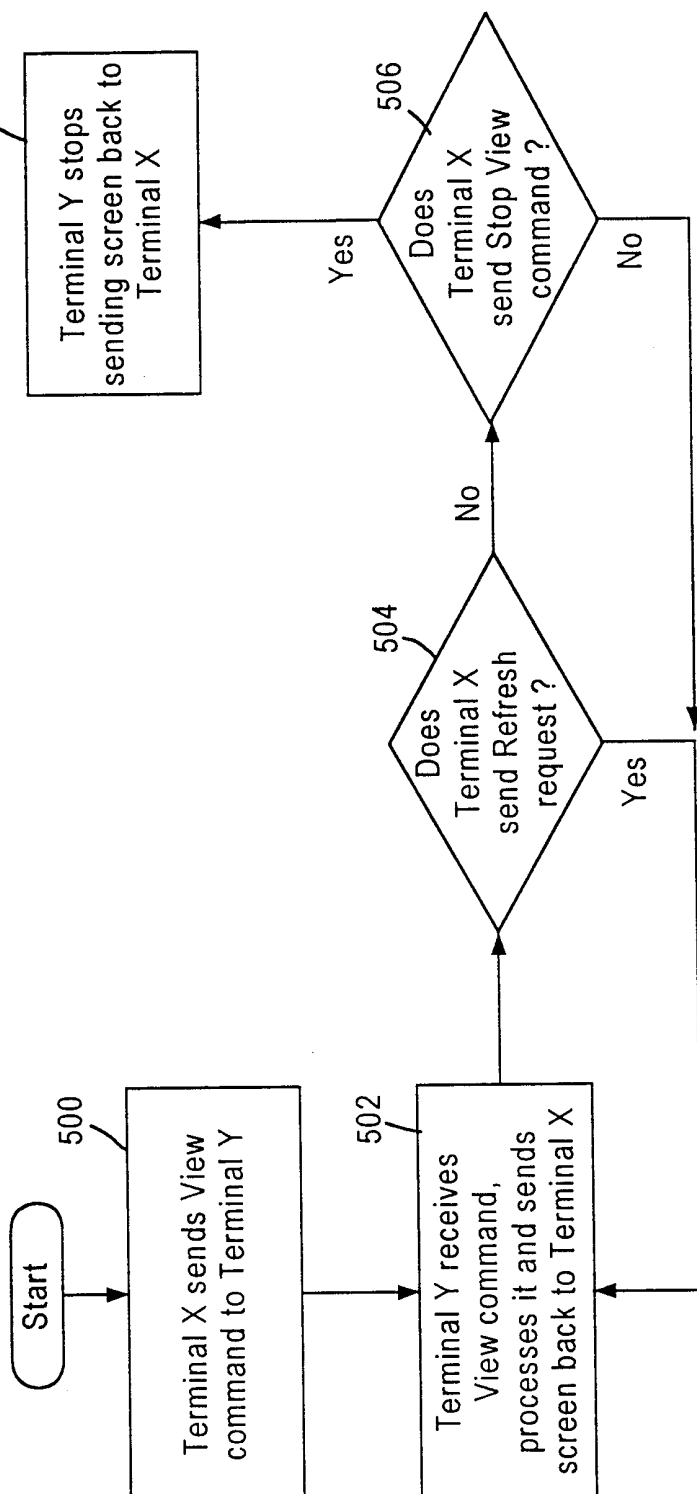


FIG. 5

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View Group Command

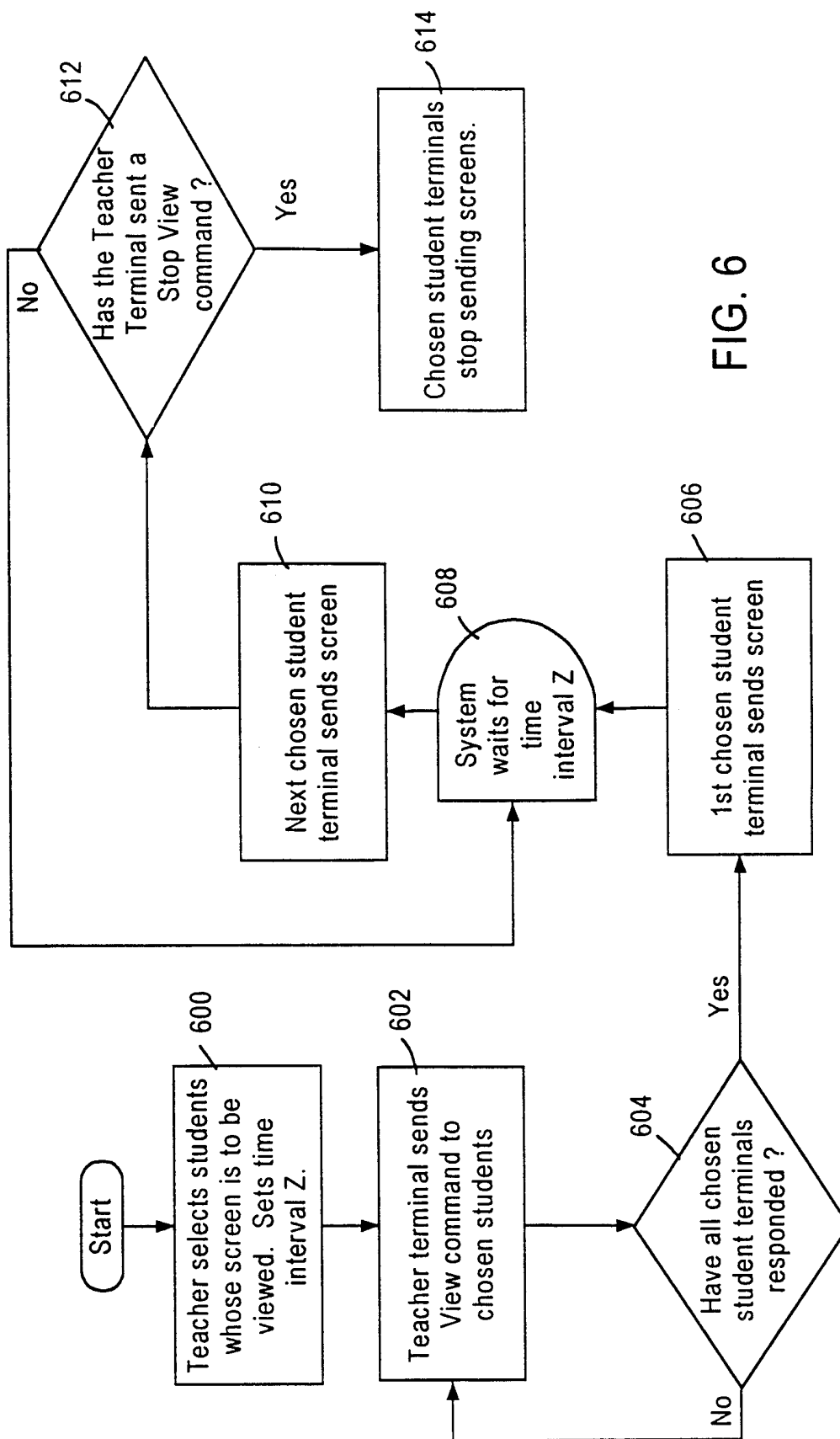


FIG. 6

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 99/01501

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G09B5/14 H04L12/24 H04N7/173

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G09B H04L H04N

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

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

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

3 December 1999

Date of mailing of the international search report

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Gorun, M

INTERNATIONAL SEARCH REPORT

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