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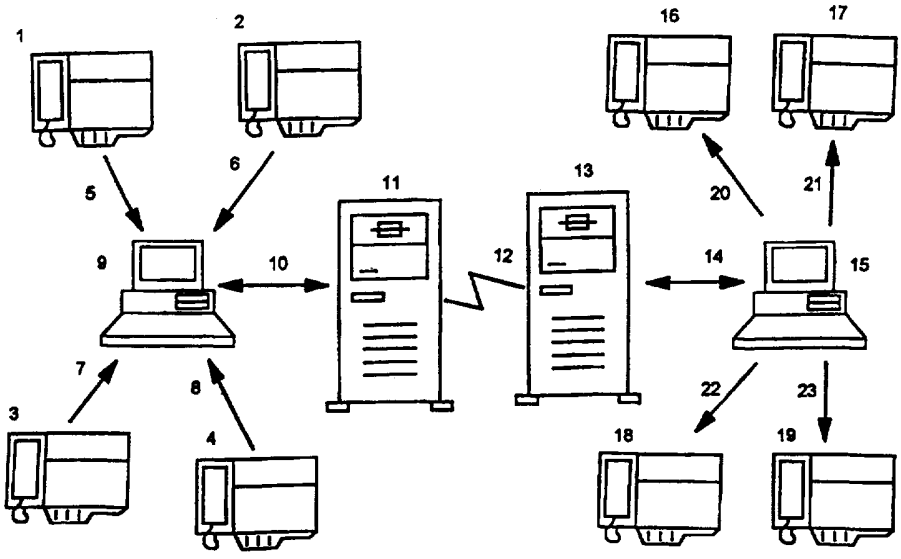

(57) Abstract

In a facsimile transmission method, a facsimile transmission is sent to an encoding unit (9). The encoding unit encodes the facsimile transmission as an electronic message such as an electronic mail message and selects a destination network address to which the message is to be sent. The encoding unit transfers the message to a transmitting server which is part of a digital network such as the internet. The transmitting server sends the message over the network to an access server on the network, where the message is subsequently retrieved by a decoding unit. The decoding unit decodes the facsimile transmission from the electronic message and transmits the facsimile to a facsimile printer, for example over a telephone line. The facsimile transmission may be encrypted by the encoding unit and decrypted by the decoding unit. A destination telephone number may be sent to the encoding unit as a series of DTMF tones. The facsimile is then forwarded by the decoding unit to a facsimile machine at the destination telephone number.

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NETWORK FACSIMILE COMMUNICATION METHOD AND APPARATUS

Background of the Invention

This invention relates to a facsimile communication system. In particular, this invention relates to a system for transmitting fascimile communications at least partially over a digital data network.

The facsimile, or fax machine, has become a prractically indispensible business communications tool. With the use of a fax, documents can be sent in electronic form almost anywhere in the world in much less time and at often at less cost than is required to send an original. One of the greatest advantages of the fax is that it is designed to be transmitted over the telephone network, to which all economic centers have immediate access. This is also one of its greatest disadvantages, however, since the cost of establishing a direct telephone connection between distant fax machines can be high, particularly when a faxed document is large and requires a long period of time to transmit. Costs are further escalated when a long distance fax transmission fails. Repeated long distance telephone calls, each of which adds to phone charges, may be required to complete the fax, and one or more voice calls may be necessary to ensure that a fax has been successfully received. An attempted fax transmission which receives a busy signal, while not increasing the cost of fax transmission, does require the inconvenience of continued attention from the sender to repeat the transmission attempt.

In one system devised to mitigate the costs of long-distance facsimile transmissions, disclosed by Noel M. Herbst in U.S. Patent 4,941,170, facsimile transmissions are sent over telephone lines to a first fax controller, which then transmits the fax as a package over a digital data network to a second fax controller. The second fax controller then sends the fax over telephone lines to a destination fax machine. When long distance transmission of the fax data is performed through the digital data network, and only local telephone calls are used for transmission to an from the communicating fax machines, the basic system of Herbst succeeds in reducing the cost of long distance fax communication.

The Herbst system, however, has several problems. One is that, while the actual communication costs are low, that is, the cost of two local phone calls plus the cost of transmission over the network, the expense of setting up such a system is quite high. Maintaining a permanent network link is expensive and can only be justified where a large number of faxes are sent over the network link. Enterprises which do not generate a sufficient number of fax transmissions find the cost of setting up such a network link prohibitive, and they are forced to continue paying high long-distance telephone rates for fax communications.

Another problem with the system of Herbst is that information encoding the destination of the fax is included on a special "mark sense" cover sheet as a part of the fax sent by the fax machine to the fax controller. Thus, the user of the Herbst system is required to have in his posession a copy of the mark sense cover sheet before initiating a fax transmission and to fill in the data identifying the destination so that the information can be read by the fax controller. Furthermore, since the fax controller must be able to read the fax in order to forward it to the proper destination, it is not possible to send an encrypted fax which is readable only by the sending and receiving fax machines and not by the intermediate fax controller.

Objects of the Invention

An object of the present invention is to provide a method of sending a facsimile transmission which is less expensive than standard facsimile transmission techniques.

An additional object of the present invention is to provide a method of sending a facsimile transmission which is more convenient than standard facsimile transmission techniques.

A further object of the present invention is to provide a method of sending a facsimile transmission which enables

encryption of the transmitted facsimile.

Another object of the present invention is to provide a method of sending a facsimile transmission which can be performed without the use of an encoded cover sheet.

Yet another object of the present invention is to provide a facsimile apparatus achieving one or more of the above objects.

These and other objects of the present invention will be apparent from the drawings and detailed descriptions herein.

Summary of the Invention

In a method of forwarding a facsimile transmission according to the present invention, an electronic message is provided to a transmission server. The electronic message encodes facsimile transmission data and a destination identification. The transmission server is connected to a digital network, such as the internet. The electronic message is sent over the digital network to an access server, which is connected to a telephone line. Upon detection of an incoming telephone call over the telephone line, the access server establishes a data connection and receives login identification over the telephone line. The access server determines whether the login identification data corresponds to the destination identification. Upon a determination by the access server that the login identification data corresponds to the destination identification, the electronic message is sent over the telephone line.

When the digital network is the internet, the access server and the transmission server are internet servers. The login identification data may include a user ID and a user password. The electronic message is preferably electronic mail. In that case, the destination identification corresponds to the user ID.

The electronic message may be sent to the access server as an encrypted message which is decryptable only with decryption key data. The decryption key data may be withheld from the access server.

The electronic message may be provided to the transmission server by providing an encoding unit which is connected to an additional telephone line. The encoding unit includes a memory storing a plurality of network addresses, with each network address corresponding to at least one telephone number. The encoding unit is operated to detect a destination telephone number sent over the additional telephone line. From the network addresses stored in the memory, a destination network address is selected which corresponds to the destination telephone number. The encoding unit receives a facsimile transmission sent over the additional telephone line and converts the facsimile transmission to an electronic message including the destination network address. A data connection is established between the encoding unit and the transmission server, and the electronic message is transmitted over the data connection to the transmission server.

Where the electronic message is an electronic mail message, the network address is an electronic mail address, and the electronic message includes ASCII data encoding the facsimile transmission data.

In another method of forwarding a facsimile transmission according to the present invention, an encoding unit is provided which is connected to a telephone line. The encoding unit includes a memory which stores a plurality of network addresses. Each network address corresponds to at least one telephone number. The encoding unit is operated to detect a destination telephone number sent over the telephone line. A destination network address is selected which corresponds to the destination telephone number. The encoding unit receives a facsimile transmission sent over the first telephone line and converts the facsimile transmission to an electronic message which includes the destination network address. A data connection is established between the encoding unit and a transmission server. The transmission server is connected to a digital network. The electronic message is transmitted over the data connection to the transmission server, and the electronic message is sent over the digital network to an access server. Where the digital network is the internet, the transmission server

and the access server are internet servers.

The facsimile may be received by the encoding unit only after the encoding unit is operated to detect a destination telephone number. Preferably, the destination telephone number is sent over the telephone line as a series of DTMF tones. In order to detecting the destination telephone number, the DTMF tones are decoded.

A data connection is subsequently established between the access server and a decoding unit, which is attached to an additional telephone line. The electronic message is sent to the decoding unit, which is operated to convert the electronic message to facsimile format data. The facsimile format data is transmitted over the additional telephone line to a receiving facsimile apparatus.

Where the electronic message is an electronic mail message, in order to convert the facsimile to an electronic message, the facsimile is stored in the encoding unit as a binary facsimile data file in a directory. The destination telephone number is stored in an additional file in the directory. The directory is compressed to generate a compressed binary file. The compressed binary file is converted to an ASCII file, and an electronic mail message is generated which includes the ASCII file.

The operation of the decoding unit involves converting the ASCII file in the electronic mail message to a compressed binary file. The compressed binary file is decompressed to generate a decompressed directory which includes the binary facsimile data file and the additional file. To transmit the facsimile format data, the decoding unit dials on the additional telephone line the destination telephone number stored in the additional file. The binary facsimile data file is then sent as the facsimile format data over the telephone line.

Where the electronic message is an electronic mail message, the network address is an electronic mail address, and the electronic message includes ASCII data encoding the facsimile transmission data.

Where the access server is connected to a telephone line, upon detection of an incoming telephone call over the additional telephone line, the access server establishes a data connection and receives login identification data over the additional telephone line. If the login identification data corresponds to the destination identification, the digital file is sent over the telephone line.

The electronic message may be an electronic mail message. In that case, the network address is an electronic mail address, and the electronic message includes ASCII data encoding the facsimile transmission data.

The message sent to the access server may be an encrypted message which is decryptable only with decryption key data which is withheld from the access server.

A facsimile apparatus according to the present invention includes a modem, connectable to a telephone line, for sending and receiving digital data over the telephone line. The modem includes componentry for dialing a telephone number to establish a data connection. A memory is provided for storing digital data. The memory stores a list of network addresses, each of which corresponds to at least one telephone number. A scanner is provided for generating outgoing facsimile image data for an outgoing facsimile. A keypad is provided for receiving a destination telephone number for the outgoing facsimile. A router operatively connected to the modem selects a transmission route for the outgoing facsimile, selecting either a network route or a telephone route. Upon selection of the network route, the modem establishes a data connection with a network server such as an internet server at a preselected network telephone number, and upon selection of the telephone route, the modem establishes a data connection with a destination facsimile apparatus at the destination telephone number. A first output for communicates the outgoing facsimile data to the modem upon establishing a data connection with a destination facsimile apparatus, so that the outgoing facsimile data is transmitted to the destination facsimile apparatus. An encoder is provided to generate an outgoing electronic message. A message generated by the encoder includes the outgoing facsimile image data

and a destination network address corresponding to the destination telephone number. A second output communicates the outgoing electronic message to the modem after establishing a data connection with the network server, so that the outgoing message is sent over the network to the destination network address.

The router may includes componentry for distinguishing an international phone number and a domestic phone number. The router selects the telephone route upon receipt of a domestic phone number from the keypad and the network route upon receipt of an international phone number from the keypad.

Where the outgoing electronic message is an electronic mail message, the encoder includes componentry for converting the outgoing facsimile image data from binary data to an ASCII file.

The facsimile apparatus may include a printer for printing incoming facsimile image data. A first input is responsive to an incoming telephone call to communicate facsimile image data received by the modem to the printer, so that the facsimile image data is printed. Timing componentry is provided for periodically instructing the modem to establish a data connection with a network server at a preselected network telephone number. A second input is operatively connected to the modem for receiving an incoming electronic message from the network server over the telephone line and storing the incoming electronic message in the memory. Decoding componentry converts the incoming electronic message in the memory to facsimile image data and communicates the incoming facsimile image data to the printer, so that the facsimile image data is printed.

Update componenery may is provided for determining whether the electronic message is an address update message. Upon a determination that the electronic message is an address update message, the list of addresses is revised according to data encoded in the address update message.

In a facsimile communication method according to the present invention, a facsimile machine is provided which includes a memory, a scanning apparatus, and a modem. The memory stores a list of network addresses, each of which corresponds to at least one telephone number. The modem is connectable to a telephone line for sending digital data over the telephone line. An outgoing facsimile document is scanned to generate outgoing facsimile image data. A destination telephone number is entered for the outgoing facsimile. A transmission route is selected for the outgoing facsimile, the transmission route being either a network route or a telephone route. Upon selection of the telephone route, the destination telephone number is dialed to establish a data connection with a destination facsimile apparatus, and the outgoing facsimile data is communicated to the modem so that the outgoing facsimile data is transmitted to the destination facsimile apparatus. Upon selection of the network route, a destination network address corresponding to the destination telephone number is selected from the memory. An outgoing electronic message is generated, the message including the outgoing facsimile image data and the destination network address. A preselected network telephone number is dialed to establish a data connection with a network server such as an internet server, and the outgoing electronic message is communicated to the modem after establishing a data connection with the network server, so that the outgoing message is sent by the network server to the destination network address.

The selection of a transmission route involves of selecting the telephone route if the destination phone number is a domestic phone number and selecting the network route if the destination phone number is an international phone number.

Where the outgoing electronic message is an electronic mail message, the outgoing message is generated by converting the outgoing facsimile image data from binary data to ASCII data.

A printing apparatus may further be provided. Upon detection of an incoming call on the telephone line, the modem is operated to establish a data connection over the telephone line, and facsimile image data received by the modem from the incoming call is communicated to the printing apparatus to print the facsimile image data. The modem is periodically instructed to establish a data connection with a network server at a preselected network telephone number. Upon establishing

a data connection with the network server, an incoming electronic message is received from the network server over the telephone line and stored in the memory. The incoming electronic message in the memory is converted to facsimile image data and communicated to the printer to print the facsimile image data.

The facsimile apparatus determines whether the incoming electronic message is an address update message. Upon a determination that the incoming electronic message is an address update message, the list of addresses in the memory is revised according to data encoded in the update message.

In a method of providing facsimile communication in accordance with the present invention, a first facsimile machine is provided which includes a first memory, a scanning apparatus, and a first modem. The first memory stores a list of network addresses, each of which corresponds to at least one telephone number. The modem is connectable to a telephone line for sending digital data over the telephone line. An outgoing facsimile document to generate facsimile image data. A destination telephone number for the facsimile is entered. A destination network address is selected from memory corresponding to the destination telephone number. An electronic message is generated including the outgoing facsimile image data and the destination network address. A first data connection is established over the telephone line between the first modem and a transmission server, and the modem is operated to send the electronic message over the data connection to the transmission server. The electronic message is transmittec over a data network to an access server. A second facsimile machine is provided including a second memory, a second modem, and a printing apparatus. A data connection is established between the second modem and the access server. The electronic message is transmitted from the access server to the second memory. The electronic message in the memory is converted to facsimile image data, and the facsimile image data is printed on the printer.

The digital network is preferably the internet, in which case the transmission server and the access server are internet servers. Where the electronic message is an electronic mail message, the message is generated by converting the outgoing facsimile image data from binary data to ASCII data, and the converting of the message to facsimile image data includes converting the incoming electronic message from ASCII data to binary data.

Where encryption key data is stored in the first memory and corresponding decryption key data is stored in the second memory, the facsimile image data is encrypted using the encryption key data prior to transmitting the electronic message to the transmission server. The facsimile image data is decrypted using the decryption key data only after transmitting the electronic message to the second memory. The encryption key may be a public key with the decryption key being a corresponding private key.

Brief Description of the Drawings

Figure 1 is a schematic diagram of a facsimile communication system.

Figure 2 is a flow chart of the operation of an encoding-forwarding unit.

Figure 3 is a flow chart illustrating steps in the operation of a decoding-delivery unit.

Figures 4a and 4b are flow charts illustrating steps for encrypting and decrypting a facsimile to ensure security of the transmission.

Figure 5 is a schematic diagram of a system for sending a fax using DTMF technology.

Figure 6 is a flow chart illustrating steps in the operation of the system of Figure 5.

Figures 7a and 7b are flows charts illustrating software-implemented facsimile transmission.

Figure 8 is a flow chart of an embodiment that analyzes a file to check if it contains a program.

Figure 9 is a flow chart of an embodiment that analyzes a file to check if it contains a program.

Figure 10 is a schematic diagram of a facsimile system illustrating multiple forwarding servers and encoding-forwarding units.

Figure 11 is a flow chart illustrating the assigning of a code to an internet site.

Figure 12 is a schematic diagram illustrating an embodiment employing a combined encoding and decoding unit.

Figure 13 is a flow chart illustrating processing steps for a combined encoding and decoding unit.

Figure 14 is a schematic diagram of a facsimile system employing multiple decoding units.

Figure 15 is a flow chart illustrating steps in processing a destination telephone number.

Figure 16 is a flow chart illustrating the use of DTMF technology in the parsing of telephone numbers.

Figure 17 is a schematic diagram illustrating a network of encoding and decoding units interacting with a master unit.

Figure 18 is a flow chart illustrating steps executed within the master unit.

Figure 19 is a flow chart illustrating a process to enable the decoding and encoding units to communicate their transmissions to the master unit.

Figure 20 is a flow chart illustrating steps in assigning a geographic location to a decoding Unit.

Figure 21 is a schematic diagram illustrating a facsimile machine employed as a combined encoding-decoding unit.

Figure 22 is a flow chart illustrating steps performed by a combined encoding-decoding facsimile unit.

Figure 23 is a flow chart illustrating steps performed in sending a confirmation upon reception of each fax transmission.

Figure 24 is a flow chart further detailing the process of Figure 23.

Figures 25a and 25b are flow charts illustrating programs utilized for deletion of files upon successful transmission or reception thereof.

Figures 26a and 26b are flow charts illustrating steps for billing facsimile customers.

Figure 27 is a schematic diagram illustrating an encoding unit with a scanner.

Figure 28 is a schematic diagram illustrating processing steps initiated by the encoding unit of Figure 27 upon receiving input from a scanner.

Figure 29 is a schematic illustration of another embodiment of the decoding unit which can utilize a printer/monitor for the reception of facsimiles.

Figure 30 is a flow chart illustrating steps in utilizing a printer in facsimile transmission.

Figure 31 is a flow chart illustrating steps for facsimile transmission between incompatible computer architectures.

Detailed Description of the Invention

This invention involves a method for delivering a fax transmission by translating it into a form capable of being routed over internet protocol, routing it over a network of computers communicating under internet protocol, converting it back into a standard fax transmission and delivering it to the intended destination unit. A fax transmission is to be taken broadly to include any transmission sent using a fax transmission protocol.

Figure 1 contains an overall view of the preferred embodiment of the invention. Any machine capable of generating a fax transmission, such as a fax machine or computer, identified by units 1, 2, 3 and 4 interfaces with a computer-controlled Encoding/Forwarding (EF) Unit 9 via either a switched telephone network or other constructs which would allow the connection to occur 5,6,7 and 8. Using a method described below, EF Unit 9 receives a fax transmission from fax machine 1 and stores it as a file. EF Unit 9 then establishes a connection with an internet access point, such as internet provider or

through the portion of the computer directly connected to the internet 11 via either a switched telephone network or other means 10. EF Unit 9 then forwards a file representing the transmission to internet server 11, which sends it along the internet 12 to an internet access server 13 which is affiliated with a Decoding/Delivery (DD) Unit 15.

The Decoding/Delivery Unit 15 is a computer-controlled unit capable of re-creating a fax transmission which has been encoded in a file by EF Unit 9 and forwarding it to its intended destination. DD Unit 15, by either a switched telephone network or other means 14, establishes a connection with internet server 13. The files are transferred via this connection, and the DD Unit, using a switched telephone network or other means 16, 17, 18 or 19 to the destination fax machine or other unit capable of receiving a fax transmission 20, 21, 22 or 23. The specific operations of the DD and EF Units are described below, followed by a section detailing relevant advanced embodiments of the invention, and the modifications necessary in developing these embodiments out of the Preferred DD and EF Unit embodiments.

Overview of Encoding/Forwarding (EF) Unit

In the preferred embodiment, the Encoding/Forwarding (EF) Unit 9 of Figure 1 utilizes a computer controlled method for receiving, storing, compressing, converting to ASCII and forwarding facsimiles; each fax transmission is also accompanied by a file containing its destination. Each fax transmission is stored, upon receipt, in a separate directory. In its initial state, the EF Unit contains an empty directory for receiving a fax, and a file containing the name of this directory. A flowchart describing the logic of the operation of the EF Unit is contained in Figure 2.

Operation of the Encoding/Forwarding Unit

In the preferred embodiment, upon activation 24, the Encoding/Forwarding (EF) Unit reads the name of the empty directory from the file where it is stored 25. The EF Unit establishes this directory as the destination directory for all incoming faxes 26, and then awaits a fax transmission 27. When an incoming call arrives, a connection 5 (of Figure 1) is established between EF Unit 9 (of Figure 1) and fax machine 1 (also of Figure 1).

The EF Unit then receives the fax 28 using the software program ProComm Plus For Windows (version 2.1) -- available from Datastorm Inc. in Columbia, Missouri. Any known method for receiving and storing the fax could also be employed. The fax, as noted above, is stored in the designated directory 29, and then the EF Unit creates a new directory for the next fax transmission 30, stores its name in a file 31 and designates that directory as the destination of the next incoming fax transmission 32. The EF unit then gets the destination fax number as input from the keyboard 33. The destination number is entered in whatever format is required to contact the intended destination from the location of the DD Unit. This number is then stored in its own file within the directory which contains the fax transmission 34.

Packaging the Facsimile for Internet Transmission

In the preferred embodiment, the entire directory -- which contains both the destination telephone number and the fax transmission -- is compressed into a single file 35 using the software program PKZIP. After the compression, the file is converted to 7 bit ASCII 36, the standard internet e-mail protocol. The algorithm known as Radix-64 is implemented to perform this conversion. In the preferred embodiment, Radix-64 is implemented using the software program Pretty Good Privacy (PGP Version 2.7) available from ViaCrypt, 2104 West Peoria Avenue, Phoenix, AZ 85029.

After converting the file to ASCII, the Unit checks to see if the file is too large to be simply one electronic mail message 37, because some mail servers limit the size of messages. If, at the time that the compressed directory is translated to ASCII, the resulting file is larger than the maximum file size allowed by either the EF Unit or the DD Unit's internet

connection, it is subdivided into as many files as necessary to complete the transmission 38. This feature is built in to PGP (version 2.7).

Internet Connection

Once the files have been converted to ASCII, an internet connection is established to transmit them to a DD Unit 39. In the preferred embodiment, the EF Unit 9 (of Figure 1) contacts the internet host 11 (of Figure 1) through a switched telephone network 10 (of Figure 1) and logs on with appropriate user name and password 40. In step 41, the EF Unit 9 (of Figure 1) then transfers the file(s) to the internet host 11 (of Figure 1). In the preferred embodiment, the Kermit file transmission protocol is used. After the file(s) have been transmitted to the internet host, the EF Unit generates a unique subject heading for each electronic mail message, denoting the directory name the fax is stored in, its position in the series of files being transmitted for that directory, and the total number of files corresponding to that directory 42.

Each file is forwarded as an electronic mail message to the e-mail address of the DD Unit 43, with the appropriate subject heading attached. The files are then deleted from the internet site 44, and the connection from the EF Unit 9 to the internet site is terminated 45. The EF Unit 9 then deletes all files related to the fax transmission which has just been sent 46. In the preferred embodiment, the EF Unit 9 then waits for an incoming fax transmission 27.

Overview of Decoding/Delivery Unit

In the preferred embodiment, Decoding/Delivery (DD) Unit 15 (of Figure 1) is a computer controlled unit for receiving an ASCII encoded fax transmission forwarded under internet protocol, decoding the fax transmission, and forwarding it to the destination point specified by the sender. A flowchart representing the logic of DD Unit 15 is contained in Figure 3. In the preferred embodiment, DD Unit 15 periodically establishes a remote connection to the internet. The connection is established hourly or, alternatively, at other regular intervals. DD Unit 15 loops until it is time to access the internet 47.

In step 48, DD Unit 15 establishes the remote connection 14 to internet site 13, logs on with its assigned user name and password 49, and searches for new mail 50. If there is no new mail, as shown in step 51, the DD Unit 15 terminates remote connection 14 from the internet site 13 and checks the progress of the send queue in step 68, discussed below. If, however, there is new mail, the mail is then downloaded 52 to DD Unit 15. Upon download, each electronic mail message is saved as a distinct file 53. Once all messages have been downloaded, as shown in step 54, each is deleted from internet site 13. In step 55, DD Unit 15 terminates the remote connection 14 to internet site 13. DD Unit 15 then performs a loop in which mail is sorted and processed. The loop begins with a boolean test to see if there is any unsorted mail 56. When there is no mail, DD Unit 15 breaks out of the loop and moves on to check the progress of the send queue 68, discussed below.

When there is unsorted mail, DD Unit 15 selects an unsorted mail file 57 and analyzes the subject heading of the message to see if there is already a directory for the transmission denoted by the heading 58. If there is no directory, one is created 59. After a directory has been created, or if one exists, the file is placed into the directory 60 and renamed according to the subject heading of the mail message 61. DD Unit 15 then checks to see if all the files necessary to reassemble the fax transmission are present 62. If all files are not present, DD Unit 15 checks to see if there is more unsorted mail 56 and loops or halts as described above. If, however, the directory does contain all the files necessary to reassemble the fax transmission, DD Unit 15 concatenates these files into one file 63, and then translates this file from ASCII to binary 64. These two steps are accomplished simultaneously by the program PGP (version 2.7).

The decompression program PKUNZIP is used to decompress the file 65. The result of this decompression is a

directory identical to that which results from Step 34 of Figure 2 (see Operation of the Encoding/Forwarding Unit above). DD Unit 15 then reads the intended destination fax number 66 from a file within this directory and places the fax transmission in a queue 67 to be sent to the destination fax machine 16 by the program ProComm Plus for Windows (Version 2.1). DD Unit 15 then checks to see if there is any additional unsorted mail, and repeats or halts its loop based in the result of this check 56.

When there are is no more unsorted mail, DD Unit 15 assesses whether or not any faxes have been successfully transmitted 68 by accessing the fax transmission log generated by ProComm Plus for Windows (Version 2.1). For each fax that has been successfully transmitted, the DD Unit deletes all the files and directories associated with the transmitted fax 69. At this point, the DD Unit repeats then repeats its entire operation process beginning at 47 above.

Advanced Embodiments

The embodiments described below perform more intricate functions now possible as a result of the invention. Unless otherwise specifically noted, all of the embodiments listed below are mutually compatible.

Encryption Embodiment

Many facsimile transmissions would subject the sender and the recipient to security risks if transmitted across the internet without being encrypted. Therefore, in the preferred encryption embodiment, the version of Pretty Good Privacy which is located in EF Unit 9 will encrypt the message 70, after the compression of the directory 35 (of Figure 2) and before the ASCII conversion 36 (of Figure 2). This process is diagramed in Figure 4a. In the preferred encryption embodiment, the public key is 1024-bits.

After the transmission has arrived at the DD Unit 15, as displayed in the flowchart of Figure 4b, just after PGP converts the concatenated ASCII file to a binary file 64, PGP decrypts the message using the secret key specified by the sender 71. The decrypted compressed directory is then decompressed as before 65. In other embodiments, other encryption methods -- including private key encryption and multiple applications of encryption -- may be employed without substantively altering the invention.

Touch-Tone Embodiment

There could be instances wherein a person wished to use this system but was not located in the same room as EF Unit 9. The Touch-Tone Embodiment addresses this circumstance. By replacing the keyboard input of the destination number with Touch-Tone (DTMF) input, a user could: call the EF Unit, enter a destination number, and transmit a fax. Using a voice/fax/data modem and existing technology, this embodiment can be easily implemented. The structure laid out in Figure 1 is slightly altered, in this circumstance, and the changes are noted in Figure 5. In Figure 5, telephones 72 and 73 are now able to interact with EF Unit 9. These connections are established through switched telephone connections 74 and 75. The logic diagram of this unit is diagramed in Figure 6.

The steps involved in the process replace steps 27-33 (of Figure 2) in the General Preferred Embodiment. After designating the directory for the next incoming fax 26, EF Unit 9 then reads a passcode into memory from the file 76, and waits for an incoming call 77. When an incoming call is received, EF Unit 9 answers that call and plays a greeting 78. EF Unit 9 then receives a passcode from the caller 79, which is entered by the caller using touch-tones.- The entered passcode is then compared with the passcode loaded from the file 80. There are two possibilities at this point. If the passcode is not correct, EF Unit 9 determines whether or not this is the third incorrect entry of the passcode 81. If it is the third incorrect entry, EF

Unit 9 is disabled 82 until the power to the unit is terminated and reactivated. If it is not the third consecutive incorrect passcode entry, the user is prompted for a passcode again 78.

When the caller enters the proper passcode, EF Unit 9 then prompts the caller for the destination fax number 83, and reads in the destination number through touch-tone inputs 84. In the preferred embodiment, the end of the destination fax number is signaled by dialing the pound sign after entering the number. EF Unit 9 terminates the telephone connection to the caller 85 and stores the destination fax number in a file 86. In autoanswer fax mode, as in the General Preferred Embodiment, EF Unit 9 then awaits a fax transmission 27 (of Figure 2, see Operation of EF Unit, above). The order of operations from Figure 2 is then followed through step 32, designation of the new directory as the destination for the next fax transmission . The Unit then jumps to step 35 of the Preferred EF Unit embodiment, compression of the directory into a single file (See Packaging the Facsimile for Internet Transmission, above) and proceeds according to Figure 2. The remaining change in the Touch-tone embodiment is that, after the files have all been sent are deleted 46 (of Figure 2, see Internet Connection, above), the Unit loops by waiting again for an incoming DTMF call 77.

Software Embodiment

The units may be either dedicated to their tasks, as in the preferred embodiment, or implemented as one of many software applications implemented by a computer. Thus, a computer could run both EF Unit 9 software and DD Unit 15 software without a problem. Also, the method, of either the EF Unit 9 or DD Unit 15's portion of the method, could be implemented within a larger application package, such as a web browser, without substantively altering the invention.

In the Preferred Software Embodiment (see Figure 7a), EF Unit 9, after deleting the files associated with a fax transmission 46, prompts the user to determine whether or not the user would like to exit the program 87, and exits on appropriate user input 88. If the user does not wish to exit, the unit waits for an incoming call 47. In DD Unit 15's portion of the Software Embodiment (Figure 7b), when the software is activated it immediately establishes an internet connection 89 which corresponds to step 48 in the General Preferred Embodiment (Figure 3). DD Unit 15 then operates, as in the General Preferred Embodiment, until step 68 is executed, and if necessary, step 69 also. Then, DD Unit 15 checks to see if the user wishes to exit 90, and if so the program terminates 91. If the user does not wish to exit, the DD Unit waits until the next predetermined time to establish an internet connection 92 (as in step 46), and, at the appropriate time, repeats this operation beginning at step 89 above.

Reprogrammable Embodiment

After a period of time, one or both of the units may need to be reprogrammed. Suppose, for example, the electronic mail address of DD Unit 15 will change at a particular time. If a user at the EF Unit 9's location has access to the code which directs the operation of the EF Unit 9 and has the computer skill to directly alter the code, then the unit could simply be reprogrammed. However, this would often not be the case

The Reprogrammable Embodiment of DD Unit 15 (see Figure 8) decompresses the file, as in General Preferred embodiment step 65, and analyzes the file to determine whether or not the file contains a program 93. If the directory does not contain a program then the directory contains a fax, and the Reprogrammable Embodiment advances to step 66 of the General Preferred Embodiment. If, however, the file does contain a program, the DD Unit confirms the identity of the sender of the program. To do this, the electronic signature of the file is checked against the encryption key(s) which may be used to send out programs 94. PGP has this function built in. If the signature is not valid, the Unit deletes all files associated with the program 96 and returns to sorting mail, Step 56 in the General Preferred Embodiment. If, however, the signature is valid, the

program is executed 95. After executing the program, the program and directories associated with it are deleted 96 and then the Unit returns to sorting mail 56.

In the General Preferred Embodiment the EF Unit never receives mail. However, in the Reprogrammable Embodiment, the EF Unit receives e-mail containing ASCII encoded, encrypted, messages which are executable programs. After erasing the files from the internet site, step 44 in Figure 9, the EF Unit checks to see if there is new mail 97. If there is no new mail, the internet connection is terminated 45 and EF Unit operation continues as described above. If, however, there is new mail, the EF Unit downloads the new mail, saving each piece of mail as a distinct file 98; the internet connection is then terminated 99.

The EF Unit then checks the first piece of mail to see if it is an ASCII encoded binary file 100. If so, the mail is converted from ASCII to binary 101 and then decrypted 102, and the electronic signature is then verified 103. If the signature is correct then the file is executed 104.

After the program is executed, or if the electronic signature is not valid or the mail didn't contain a program, all files associated with the program are deleted 105. The EF Unit checks to see if any additional mail has been downloaded 106, in which case the process is repeated form step 100. When all the mail has been processed, the normal EF Unit functions resume, beginning at step 46.

Multiple EF Units Embodiment

Figure 10 demonstrates how a plurality of EF Units may interact with a single DD Unit. Machines generating fax transmissions 107, 108, 109, 110 and lll interact with EF Units 119, 120 and 121 using means capable of coupling the twos such as a switched telephone network 113, 114, 115, 116 and 117 as in the original design. As noted a telephone 112 or other means for generating touch tone sounds may be coupled to an EF Unit 120 by some sort of means such as a switched telephone line 118 which allows implementation of touch-tone embodiments within the Multiple EF Unit framework. EF Units 119, 120 and 121 have means 122, 123 and 124 coupling them to internet access sites 125 and 126. These internet sites then transmit the files corresponding to the fax transmissions to the DD Units using internet protocol. Operations then proceed as normal.

The plurality of EF Units complicates the design only to the extent that the DD Unit might attempt to combine one or more electronic mail messages from one EF Unit to one or more electronic mail messages from another EF Unit. By elongating the subject heading to include a unique identifier representing a particular EF unit this problem would be eradicated. Thus, after the files are sent to the internet site 41, filename portion of the subject heading is preceded by a unique four letter code associated with the EF Unit 129 (see Figure 11). The mail is then forwarded to the DD Unit as before 42.

Combo EF-DD Units

As mentioned in the Software Embodiment, a single unit could perform both EF Unit and DD Unit tasks. Figure 12 represents one possible implementation, in which a combination DD/EF Unit 138 interacts with fax transmissions devices 130, 131, 132 and 133, and includes means to both transmit to and receive from those machines, using a coupling mechanism such as a switched telephone network 134, 135, 136 and 137. EF-DD Unit 138 also connects with internet access point 11 via some sort of switched telephone connection or other means 139. In the Preferred Combo EF-DD Unit Embodiment, the Unit, upon activation, performs steps 24-26 (figure 2), as in the General Preferred Embodiment. After Step 24, the Unit checks to see if it is time to access the internet site for incoming transmissions 140 (see Figure 13). If it is time to access the internet site, the Combo Unit performs all of the steps of the DD Unit up to and including step 68 and, if necessary, step 69.

When the Combo Unit has completed these steps, it repeats to step 140.

If, however, it is not time to access the internet site, the Combo Unit checks to see if there is an incoming call 141. If there is an incoming call, the Combo Unit proceeds with step 28 as in the General Preferred Embodiment, and executes the steps in normal sequence until completion of Step 46. At that point, the Combo Unit repeats the process, not at 27 as in the General Preferred Embodiment, but instead at Step 140. If there is no incoming call, the Combo Unit immediately repeats its operation starting at Step 140. A Reprogrammable Combo DD-EF Embodiment would only include the DD modifications of the Reprogrammable Embodiment.

Multiple DD Units Embodiment

An EF Unit could store a list of several possible destination addresses (and encryption keys, in Encryption Embodiments), and the DD Unit could then be selected based on the intended destination of the fax transmission. This would change Figure 1 to resemble Figure 14. Note that elements 1 through 11 have remained the same. Internet access points 144 and 145 receive transmissions along the internet 142 and 143. These transmissions are then passed along to DD Units 149, 150 and 151 along identical means as discussed in the description of Figure 1 (146, 147 and 148). These are then delivered to fax machines 158, 159, 160, 161, 162 and 163, usually via a switched telephone network 152, 153, 154, 155, 156 and 157. The actual operation of the EF Unit is described below.

After designating the new directory for incoming faxes 32 (of Figure 2) in the General Preferred Embodiment of the EF Unit, the destination number would be entered in international format 164 (see Figure 15). The EF Unit would then parse the telephone number and obtain the country code of the destination 165. The EF Unit, in this embodiment, would contain a file consisting of a list of all DD Unit electronic mail addresses, organized by country and possibly city code. The EF unit checks to see if there is only one DD unit for the country code 166. If there is only one possible DD Unit e-mail address, that address is selected as the e-mail address of the destination DD Unit 168. If there is more than one possible destination DD Unit, the destination telephone number is parsed again to obtain the city/region or area code 167. The EF Unit then compares the regional code to the list and obtains the e-mail address of the destination DD Unit 168. If this embodiment is combined with the Encryption Embodiment, the encryption key is also selected at this time. In the preferred embodiment, there would be no more than one DD Unit for a given area code.

Having obtained the destination number, the EF Unit converts the number from international format to the format required to complete the transmission from the selected DD Unit's location 169. The algorithm for performing this conversion is located within the file containing the list of possible DD Unit e-mail addresses. The telephone number is then saved in a unique file within the fax directory 86, and the EF Unit continues its normal operation at step 35, by compressing the directory containing the transmission into a single file. When the Touch-Tone Embodiment is integrated into the Multiple DD Units embodiment (see Figure 16), the order of operations described above is altered because the Touch-Tone embodiment reads in the destination fax number prior to receiving the fax transmission. Therefore, step 83 replaces step 32 in this embodiment. Step 170 now reads the number in touch-tone format, and step 85 terminates the telephone connection.

Expandable Network Embodiment

Using the Reprogrammable Embodiment in conjunction with the Multi DD Embodiment and the Multi EF embodiment, a network of units interacting with one another could be constructed. All DD or EF Units, or both, could be simultaneously reprogrammed when new DD Units are added. This embodiment, called the Expandable Network

Embodiment, would require a unit or units to maintain a directory of all units which need to be notified of a change. This could be implemented in several ways, but in the preferred embodiment, one unit performs these tasks. This unit is referred to as the Master Unit, 171 of Figure 17. Master Unit 171 access internet access point 173 via a switched telephone network or other means. Internet transmissions are then made to other internet access points 178, 179, 180 and 180 via standard internet routing 174, 175, 176 and 177. Figure 18 is a flowchart of the operation of the Master Unit. Periodically, a connection to the internet is established 182. When it is time to connect to the internet, the Master Unit establishes this internet connection 183 and checks for new mail 184. If there is no new mail, the Master Unit disconnects from the internet 186 and waits for the next scheduled access time 182. In the preferred embodiment, the Master Unit accesses the internet every half-hour.

If there is new mail, the Master Unit downloads the new mail 185 and disconnects from the internet 186. The Master Unit then looks at the first piece of mail 187. The piece of mail will be an instruction to the master unit to either add or remove an EF or a DD Unit 188, 189, 190 or 191. If it is not a request for any of these, it deletes the mail 215 and proceeds from there (see below). Based on the instruction in the incoming mail, the Master Unit adds or removes an EF or a DD Unit from its Master list 192, 193, 194, or 195. The Master Unit then creates a program to be executed by a DD Unit (if the request was to add or remove an EF Unit) or an EF Unit (if the request was to add or remove a DD Unit). The particular function of the program is to add or remove the EF or DD Unit according to the instruction received by the Master Unit 196, 197, 198, or 199. The Master Unit selects the destination address for the program as all EF Units or all DD Units in its master list 200, 201, 202, or 203. If the program has been written for DD Units, the program is stored in a unique directory 204, which is then compressed 205. The compressed directory is sub-divided into units small enough to travel across the internet (if necessary 206) 207, and unique subject headings are created for each file (denoting that the files are a program, not a fax) 208. If the program has been written for EF Units, the program is converted to ASCII 209. In either case, once this has been done, the file(s) containing the program are signed with the key of the Master Unit (encrypting them is optional, and could be done only for embodiments which encrypt) 210 which then and accesses the internet 211. The file(s) are then mailed to the selected mailing list 212.

Once the file(s) have been mailed, the connection to the internet is terminated 213 and any file(s) which have been mailed are deleted 214. Finally, the original mail message itself is deleted 215. If there is more mail 216, the process repeats beginning at 187; otherwise, the process repeats beginning at 182.

Clearly, the DD and EF Units must each be redesigned to send communications to the Master Unit (see Figure 19). The first time a new EF Unit is activated, it accesses the internet site as in the General Preferred Embodiment 217, however, as soon as it is logged in, the new EF Unit sends an add EF Unit instruction to the Master Unit 218. The new EF Unit then logs off the internet 219 and waits four hours before accessing the internet again 220. After four hours the internet is accessed again 221 and the new mail is downloaded 222. The EF Unit then logs off the internet 223, and the newly downloaded mail is converted from ASCII to binary 224. The DD Unit then checks the electronic signature associated with this mail for authenticity 225. If the electronic signature is authentic, the EF Unit executes the program 226. The EF Unit deletes all the mail it has just executed 227 and assesses whether or not there is any more new mail 228. If there is more new mail the EF Unit repeats the process at step 224. If there is no more new mail, the unit begins its function as a standard EF Unit in the General Preferred Embodiment 25.

The operation of the EF Unit is also altered at step 229, where, when no incoming call arrives, the EF Unit checks to see if the Escape key has been pressed 230. If the escape key has not been pressed, the Unit repeats step 229 and loops until a call is received or the Escape key is pressed. If the Escape key is pressed, the unit establishes an internet connection 231,

sends a remove EF Unit command to the Master Unit 232, and disconnects from the internet 233. The EF Unit then deactivates 234 and, the next time it is activated, restarts the process at the initialization step 217.

When a DD Unit is activated for the first time in the Expandable Network Embodiment, the user enters in the geographic region(s) for which the DD Unit will be responsible, 235 of figure 20. The DD Unit then establishes an internet connection 236 and sends the Master Unit an Add DD Unit command 237. After logging off from the internet access point 238, the DD Unit alternates between checking to see if the escape key has been pressed 239 and checking for an incoming call 240. If the escape key is pressed, the DD Unit establishes an internet connection 241, sends a Remove DD Unit command to the Master Unit 242 and logs off 243. The DD Unit then deactivates 244, and at the time of its next activation, begins at step 235.

When the DD Unit processes incoming messages, in the General Preferred Embodiment, it returns to step 27 after completing step 46. In the Expandable Network Embodiment, the DD Unit returns to step 239 after completing these steps.

Fax Machine Embodiment

It would also be possible to combine the invention with a fax machine into one complete unit. The preferred method for doing this will be defined in relation to the Combo EF-DD Unit, the Muli DD Unit, the Touch-Tone Embodiment, the DD Unit, and the EF Unit. Other combinations, of course, could exist. As shown in Figure 21, a Unit resembling a fax machine 244 could then act as a combo DD-EF Unit and couple with internet access point 246 via a switched telephone network 245. It could also interface with other machines capable of generating and receiving fax transmissions 251, 252, 253 and 254 via a switched telephone network 247, 248, 249 and 250 or other means. The Unit can receive and send faxes as well as function as a DD/EF Unit.

In the Preferred Embodiment, after designating the directory for the next incoming fax transmission 26 (of figure 2), the Preferred Fax Machine Embodiment loops between checking if it is time to access the internet 255, whether there is an incoming fax 256, and whether there is a fax ready to be sent 257 . If it is time to access the internet, the Unit completes the standard DD Unit access steps (outlined above) from establishing a remote connection to the internet 48 to terminating the internet connection 55. Step 259 is a modified form of step 56, so that if there is no new mail, the Unit proceeds to step 255, which doesn't exist in the original embodiment.

The disconnect step 51, performed only if there is no new mail upon accessing the internet, is still performed in this embodiment, prior to return to Step 255. In this embodiment, step 51 is renumbered as step 258. The order of operations of the DD Unit is maintained after completion of Step 60 up to and including decompression of the directory 65. Once the directory containing a fax transmission has been decompressed, the fax is printed on the fax machine 260 and all files and directories related to it are deleted 261, upon which the unit then returns to Step 255.

If there is an incoming call 256, the Unit answers the call and receives the transmission as a fax machine normally receives a transmission in the prior art 262. This fax transmission is placed in the output tray, in the preferred embodiment, but other embodiments could store it in memory and print it later, without substantively altering the invention. If there is no incoming call, the Unit then checks to see if there is an outgoing fax transmission 257, and if there is not one, the Unit loops back to step 255.

In the event that there is an outgoing fax, the destination number is read using DTMF technology 263. The Unit then determines whether the fax is to be sent via internet or via standard fax transmission protocol 264. In the preferred embodiment, all international transmissions are routed via the internet and all domestic transmissions are routed via switched telephone networks. More advanced algorithms for determining routing, possibly including user overrides, could be developed.

If the fax is a domestic transmission, it is sent as a fax is normally transmitted over switched telephone lines 265. If the fax is to be routed over internet protocol, the destination DD Unit is selected using steps 165 through 169 and then Step 86 (as in the multi-DD unit touch tone embodiment, described above and in figure 16), followed by steps 30 through 46 of the Preferred EF Unit Embodiment. After completion of Step 46, the Unit repeats its operation in a loop, beginning at Step 255.

When a Fax Machine Embodiment is added to an Expandable Network, in the preferred embodiment, the unit forwards its actual telephone number to the Master Unit. In this way, all transmissions destined from any EF Unit to a particular Fax Machine Embodiment of the invention are now directly routed to the e-mail address of the Fax Machine. Similarly, an encryption key may be included, and the unit receives list updates, as is the case for all EF units. When the unit is removed from the network, in the preferred embodiment, a keystroke equivalent to the 'escape' key removes it from the Master list (and therefore all lists).

Confirmation Embodiment

Arguably the greatest advantage of fax transmission over switched telephone networks is confirmation of fax arrival at the destination point. The Confirmation Embodiment therefore provides confirmation of fax receipt at point of destination. The preferred Confirmation Embodiment is defined between a DD Unit of the General Preferred Embodiment and a Reprogrammable Combination DD/EF Unit, as outlined above. A system for providing confirmations could, however, be developed in relation to any DD and EF Units.

The DD Unit operates as normal, up to and including the saving of each e-mail message as a distinct file 53. The computer then sends an ASCII encoded copy of Program A (described below) as a reply to each ASCII fax transmission file received as mail 268 of figure 23. The DD Unit then deletes the mail from CompuServe 54 as before, and continues its normal operation up to the point where the DD Unit checks to see if any faxes have been successfully transmitted 68. If a fax has not successfully been transmitted, the Unit returns to 272, as in the previous embodiments. If, however, a fax has been successfully transmitted, the DD Unit logs on to the internet 269, sends a copy of Program B to the Origin EF Unit 270, disconnects from the internet 271, deletes all files associated with the transmission 69, and returns to check if there has been another successful fax transmission 68.

There is a flowchart for Program A in Figure 25a. The program deletes the file corresponding to the e-mail to which the program is a reply 287 and then ends 288. Thus, when all replies have been received confirming receipt of transmissions, all ASCII files associated with the transmission are deleted upon execution of the Program. There is a flowchart for Program B in Figure 25b. When this program is executed, the Unit sends a confirmation, via fax, to the sender confirming that the transmission was successful 289. The Unit then deletes all directories and files associated with the transmission 290, 291. Finally, the program ends 292. As mentioned, the EF Unit, where the transmission has come from, is actually a Reprogrammable Combination DD/EF Unit. This is for two reasons: first, the reprogramming aspect allows us to send programs which perform the confirmations, simplifying the explanation and design of the embodiment, and second, the Combination DD/EF Unit guarantees regular access to the internet. The advantage of this will become clear after the explanation of the Unit's design.

As in the preferred embodiment of the Combination DD/EF Unit, the Unit checks to see if it is time to access the internet 272, and proceeds as normal if it is time (see Figure 24). If it is not time, the Unit checks for an incoming call 273. If there is an incoming call, the Unit proceeds as usual, except that Step 69, delete all files and directories associated with the transmission, is omitted. After completion of step 285, therefore, the Unit returns to Step 269. The Unit proceeds as before through step 69 and then loops back to step 272. If, however, there is no incoming call, the Unit then checks to see if any of

the directories containing fax transmissions are more than four hours old 274. If there are no such directories, the Unit returns to Step 272. If there are any directories more than four hours old, the Unit then checks to see if there is a directory more than eight hours old 275. If there is no directory more than eight hours old, the Unit checks to see if the directory contains any ASCII files 276. If there are no ASCII files, the Unit returns to step 272. If, on the other hand, there are ASCII files in the directory, the Unit then establishes an internet connection 277, sends the ASCII files to the appropriate DD Unit 278, disconnects from the internet 279, and returns to step 272.

If there is a directory that is more than 8 hours old, the Unit puts the fax in a queue to the destination over the switched telephone network 280. The Unit then waits to see if the fax is successfully sent 281, and faxes the sender either a confirmation 283 if the transmission is a success or an "inability to complete fax transmission" notice 282 if the fax was not successfully transmitted. All files associated with the transmission are then deleted 284. The unit then returns to see if there are more directories over eight hours old 275 and proceeds based on the result of that boolean test.

Billing

A billing system can also be implemented as part of the invention. In the preferred embodiment of the Billing Unit, the design of the preferred embodiment of the Confirmation Unit is assumed. To develop a billing unit from this unit is not a difficult task. In the course of confirming the fax delivery, the Confirmation Embodiment employs Program B of figure 25b. In the preferred embodiment of the billing unit, Program B is altered such that its function is also to generate the bill (see figure 26a). After the step sending a confirmation of the fax transmittal 289, the unit then checks to see if a billing file for the sender exists 291. If there is no billing file, one is created 292. Then, after the file is created or if one already exists, the transmission is logged in the "bill file" along with the associated charge for the transmission 293. The Unit then returns to the steps detailed in the previous embodiment, beginning with the deletion of all directories and files associated with the transmission 290.

The Programmable Combination EF/DD Unit designed in the Confirmation Embodiment is then redesigned to include billing as a new option. The Unit, as before, checks to see if it is time to access the internet (272 of Figure 24), and if not checks to see if there is an incoming call 273. In this embodiment, however, if there is no incoming call, the Unit then checks to see if it is time to send out bills 294 of Figure 26b. In the preferred embodiment, bills are sent out weekly. If it is not time to bill, the Unit proceeds to check if there are any directories over four hours old 274 and follows the procedures outlined in the Confirmation Embodiment.

If it is time to send out a bill, however, the Unit checks to see if there is a billing file within the billing directory 295. If there is a file, the Unit then places a copy of the file in the fax queue to be sent to the customer to whom the bill corresponds 296. The Unit then places a copy of the file in the fax queue to be sent to the Central Billing Office 297, so the company doing the billing has a copy of all bills sent out. Once the faxes have been sent, the Unit deletes the billing file 298. The Unit then returns to check for billing files within the billing directory 295, and repeats the process until no files exist. In which case, the Unit then checks to see if any fax directories are more than 4 hours old 274 and continues from that point in the previous embodiment's description.

Cross-Platform Embodiment

It is possible that the invention could be developed in various embodiments on computers with incompatible operating systems and architectures. For example, a DD Unit could be designed on the Macintosh and an EF Unit could be designed on an IBM. The embodiments herein have assumed compatible architectures, but this need not be the case. To

transmit a fax under the multiple DD Unit architecture, once the DD Unit destination address has been assigned 168 of Figure 31, a file containing the architecture of each DD Unit could be checked against he destination Unit's 315. If the architecture is compatible to that of the EF Unit, the Unit could then proceed as normal, beginning at step 169. If the architectures are not compatible, the fax files could then be converted to the format necessary for the DD Unit 316, and then the normal operation of the Multiple DD Unit could continue at step 169. In other embodiments, such as Confirmation Embodiments, where the files are not deleted after transmission, the ASCII files on the DD Unit, which are usable only under the destination EF Unit's architecture, should still be deleted 69. The implementation of these should not substantively alter the invention.

Scanner Embodiment

It is also possible to alter the EF Unit to receive input from a scanner as well as a fax transmission. Figure 27 demonstrates EF Unit 9 receiving scanner input from scanner 299 via a serial port interface 300. Other interfaces could exist without substantively altering the invention. As in the General Preferred Embodiment, the EF Unit could then use a switched telephone network 10 to proceed in accessing the internet according to that embodiment. In the Preferred Scanner Embodiment (see figure 28), the EF Unit designates the destination directory 26 as in the Preferred General Embodiment, and then waits for input from the Scanner 301. In the preferred embodiment, we will assume the scanner has a feeder.

The images are saved as they are scanned in 302, and then converted to fax format 303, which are then saved in the directory designated for incoming faxes 304, and the scanned images are deleted 305. The Unit then returns to the normal operation of the General Preferred Embodiment of the EF Unit by waiting for the destination number to be input 30. The Unit operates as a General EF Unit until deletion of all associated files 46, at which point the Unit loops to wait for input from the Scanner 301.

Printer/Monitor Destination

If the destination point of a fax transmission is a DD Unit, the unit may display or print the fax transmission. Figure 29 demonstrates a DD Unit 206 which interfaces with the internet 14, as well as destination fax machines 20, 21, 22 and 23 as in the General preferred embodiment. EF Unit 306 also has means for connecting directly to printer 308 via parallel port connection 307. Other means, such as network connection or serial port connection could connect the printer to the DD Unit without substantively altering the invention. In the Preferred Printer/Monitor Destination Embodiment (see Figure 30), a DD Unit operates as in the General Preferred Embodiment until decompression of a directory 65, at which point the DD Unit checks to see if the destination of the transmission is the DD Unit 309. If not, the DD Unit proceeds to obtain the destination number of the fax, as in the preferred embodiment 66. If the destination of the transmission is the DD Unit, the Unit then checks to see if a printer is attached to the Unit 310. If a printer is not attached, the Unit displays the transmission to the screen 312. This is done with the Fax Viewer in ProComm Plus For Windows 2.1. If, however, there is a printer, the fax is printed to the printer 311.

In either case, the file(s) associated with the fax are then saved to a special User Directory 313, and the subdirectory in the incoming mail file corresponding to the transmission is deleted 314. The Unit then returns to the General Preferred Embodiment operation, beginning at Step 56, where a check is performed to see if there is additional mail in the incoming mail directory.

Various modification may be made to the disclosed facsimile transmission system. The type of connection between the E/F Unit and the machine generating the fax transmission can be modified so that the connection does not occur through a switched telephone network. A list can be stored of frequently used destination numbers and selecting a destination number

from it. Telnet protocol may be used instead of e-mail to effect live transfer of files. A DD or EF Unit which maintains a continuous internet connection or has a hard IP address may be used. More information may be added to the file storing the destination number or the destination number may be stored differently. A method other than Radix-64 may be used to convert files to ASCII format. The E/F and/or DD Unit may be integrated into the internet access unit. The method may be modified to function over an e-mail system or systems allowing file transfer The EF and DD Units may be modified to function according to the operation of different internet access providers. Frequency of internet access establishment by either E/F or DD Unit can be varied. Broadcast faxing can be integrated into the method.

Although the invention has been described in terms of particular embodiments and applications, one of ordinary skill in the art, in light of this teaching, can generate additional embodiments and modifications without departing from the spirit of or exceeding the scope of the claimed invention. Accordingly, it is to be understood that the drawings and descriptions herein are proffered by way of example to facilitate comprehension of the invention and should not be construed to limit the scope thereof.

WHAT IS CLAIMED IS:

1. A method of forwarding a facsimile transmission, comprising:

providing an electronic message to a transmission server, said electronic message encoding facsimile image data and a destination identification, said transmission server being connected to a digital network;

sending said electronic message over said digital network to an access server, said access server being connected to a telephone line;

upon detection of an incoming telephone call over said telephone line, establishing a data connection over said telephone line;

receiving log-in identification data over said telephone line;

determining whether said log-in identification data corresponds to said destination identification; and

upon a determination that said log-in identification data corresponds to said destination identification, sending said electronic message over said telephone line.

2. The method of claim 1 wherein said message sent to said access server is an encrypted message, said message being decryptable only with decryption key data, said decryption key data being withheld from said access server.

3. The method of claim 1 wherein said digital network is the internet, said transmission server and said access server being internet servers.

4. The method of claim 1 wherein said step of providing includes:

providing an encoding unit connected to an additional telephone line, said encoding unit including a memory storing a plurality of network addresses, each network address corresponding to at least one telephone number;

operating said encoding unit to detect a destination telephone number sent over said telephone line; and

selecting, from said plurality of network addresses, a destination network address corresponding to said destination telephone number;

receiving at said encoding unit a facsimile transmission sent over said first telephone line;

encoding binary facsimile image data received from said facsimile transmission into encoded facsimile data;

generating an electronic message including said encoded facsimile data and said destination network address;

establishing a data connection between said encoding unit and said transmission server; and

transmitting said electronic message over said data connection to said transmission server.

5. The method of claim 4 wherein said electronic message is an electronic mail message, said network address being an electronic mail address, said step of encoding including the step of converting said binary facsimile image data to ASCII encoded facsimile data.

6. A method of forwarding a facsimile transmission, comprising:

providing an encoding unit connected to a telephone line, said encoding unit including a memory storing a plurality of network addresses, each network address corresponding to at least one telephone number;

operating said encoding unit to detect a destination telephone number sent over said telephone line;

selecting, from said plurality of network addresses, a destination network address corresponding to said destination

telephone number;

receiving at said encoding unit a facsimile transmission sent over said first telephone line;

encoding binary facsimile image data received from said facsimile transmission into encoded facsimile data;

generating an electronic message including said encoded facsimile data and said destination network address;

establishing a data connection between said encoding unit and a transmission server, said transmission server being connected to a digital network;

transmitting said electronic message over said data connection to said transmission server; and

sending said electronic message over said digital network to an access server.

7. The method of claim 6 wherein said step of receiving a facsimile is performed only after said step of operating said encoding unit to detect a destination telephone number.

8. The method of claim 6 wherein said digital network is the internet, said transmission server and said access server being internet servers.

9. The method of claim 6 further comprising the steps of:

establishing a data connection between said access server and a decoding unit, said decoding unit being attached to an additional telephone line;

sending said electronic message to said decoding unit;

operating said decoding unit to convert said electronic message to binary facsimile image data;

transmitting said binary facsimile image data over said additional telephone line to a receiving facsimile apparatus.

10. The method of claim 6 wherein said electronic message is an electronic mail message, said network address being an electronic mail address, said step of encoding including the step of converting binary facsimile image data to ASCII encoded facsimile data.

11. The method of claim 10 wherein said step of converting binary binary facsimile image data to ASCII encoded facsimile data includes the steps of:

storing said binary facsimile image data as a binary file in a directory;

storing said destination telephone number in an additional file in said directory;

compressing said directory to generate a compressed binary file; and

converting said compressed binary file to an ASCII file.

12. The method of claim 11 wherein said step of operating said decoding unit includes the steps of:

converting said ASCII file in said electronic mail message to a compressed binary file;

decompressing said compressed binary file to generate a decompressed directory including said binary facsimile image file and said additional file, said step of transmitting said binary facsimile image data including the steps of dialing on said additional telephone line said destination telephone number stored in said additional file and sending said binary facsimile image data over said telephone line.

13. The method of claim 6 wherein said destination telephone number is sent over said telephone line as a series of DTMF tones, said step of detecting said destination telephone number including the step of decoding said DTMF tones.

14. The method of claim 13 wherein said electronic message is an electronic mail message, said network address being an electronic mail address, said encoded facsimile data including ASCII data encoding said binary facsimile image data.

15. The method of claim 13 wherein said access server is connected to an additional telephone line, further comprising:

upon detection of an incoming telephone call over said additional telephone line, establishing a data connection over said additional telephone line;

receiving log-in identification data over said additional telephone line;

determining whether said log-in identification data corresponds to said destination identification; and

upon a determination that said log-in identification data corresponds to said destination identification, sending said electronic message over said additional telephone line.

16. The method of claim 15 wherein said electronic message is an electronic mail message, said network address being an electronic mail address, said encoded facsimile data in said electronic mail message including ASCII data encoding said binary facsimile image data.

17. The method of claim 15 wherein said message sent to said access server is an encrypted message, said message being decryptable only with decryption key data, said decryption key data being withheld from said access server.

18. A facsimile apparatus comprising:

a modem, connectable to a telephone line, for sending and receiving digital data over said telephone line, said modem including means for dialing a telephone number to establish a data connection;

scanning means for generating outgoing binary facsimile image data for an outgoing facsimile;

keypad means for receiving a destination telephone number for said outgoing facsimile;

routing means for selecting a transmission route for said outgoing facsimile from the group consisting of a network route and a telephone route, said means for selecting being operatively connected to said modem, such that upon selection of said network route, said modem establishes a data connection with a network server at a preselected network telephone number, and such that upon selection of said telephone route, said modem establishes a data connection with a destination facsimile apparatus at said destination telephone number;

first output means for communicating said outgoing binary facsimile image data to said modem upon establishing a data connection with a destination facsimile apparatus, so that said outgoing binary facsimile image data is transmitted to said destination facsimile apparatus;

encoding means for generating an outgoing electronic message encoding said outgoing binary facsimile image data as encoded facsimile data and including a destination network address corresponding to said destination telephone number; and

second output means for communicating said outgoing electronic message to said modem after establishing a data

connection with said network server, so that said outgoing message is sent over said network to said destination network address.

19. The apparatus of claim 18 further including a memory for storing digital data, said memory storing a list of network addresses, each of said network addresses corresponding to at least one telephone number, said encoding means including means for selecting said network address from said list of network addresses, said network address corresponding to said destination telephone number.

20. The apparatus of claim 18 wherein said routing means includes means for distinguishing an international phone number and a domestic phone number, said routing means selecting said telephone route upon receipt of a domestic phone number from said keypad means and said network route upon receipt of an international phone number from said keypad means.

21. The apparatus of claim 18 wherein said outgoing electronic message is an electronic mail message, said encoding means including means for converting binary facsimile image data to ASCII data encoded facsimile data.

22. The apparatus of claim 18 wherein said network server is an internet server.

23. The apparatus of claim 18 further comprising encryption means for encrypting said outgoing electronic message.

24. The apparatus of claim 18, further comprising:

printer means for printing incoming binary facsimile image data;

first input means responsive to an incoming telephone call for communicating binary facsimile image data received by said modem to said printing means, so that said facsimile image data is printed;

timing means for periodically instructing said modem to establish a data connection with a network server at a preselected network telephone number;

second input means operatively connected to said modem for receiving an incoming electronic message from said network server over said telephone line and storing said incoming electronic message in said memory; and

decoding means for converting said incoming electronic message in said memory to binary facsimile image data and communicating said incoming facsimile image data to said printing means, so that said facsimile image data is printed.

25. The apparatus of claim 24 wherein said routing means includes means for distinguishing an international phone number and a domestic phone number, said routing means selecting said telephone route upon receipt of a domestic phone number from said keypad means and said network route upon receipt of an international phone number from said keypad means.

26. The apparatus of claim 24 wherein said outgoing electronic message is an electronic mail message, said encoding means including means for converting binary facsimile image data to ASCII data encoded facsimile data.

27. The apparatus of claim 24, further comprising update means for determining whether said electronic message

is an address update message and for revising, upon a determination that said electronic message is an address update message, said list of addresses according to data encoded in said address update message.

28. The apparatus of claim 24, further including a memory for storing digital data, said memory storing a list of network addresses, each of said network addresses corresponding to at least one telephone number, said encoding means including means for selecting said network address from said list of network addresses, said network address corresponding to said destination telephone number.

29. The apparatus of claim 24, further comprising decryption means for decrypting said incoming electronic message.

30. A facsimile communication method comprising:

providing a facsimile machine including, a scanning apparatus, and a modem, said memory storing a list of network addresses, each of said network addresses corresponding to at least one telephone number, said modem being connectable to a telephone line for sending digital data over said telephone line;

scanning an outgoing facsimile document to generate outgoing binary facsimile image data;

entering a destination telephone number for said outgoing facsimile;

selecting a transmission route for said outgoing facsimile from the group consisting of a network route and a telephone route;

upon selection of said telephone route, dialing said destination telephone number to establish a data connection with a destination facsimile apparatus and communicating said outgoing facsimile data to said modem so that said outgoing facsimile data is transmitted to said destination facsimile apparatus; and

upon selection of said network route, selecting a destination network address corresponding to said destination telephone number, encoding said binary facsimile image data into outgoing encoded facsimile data, generating an outgoing electronic message including said outgoing encoded facsimile data and said destination network address, dialing a preselected network telephone number to establish a data connection with a network server, and communicating said outgoing electronic message to said modem after establishing a data connection with said network server, so that said outgoing message is sent by said network server to said destination network address.

31. The method of claim 30 wherein said facsimile machine includes a memory for storing digital data, said memory storing a list of network addresses, each of said network addresses corresponding to at least one telephone number, said step of selecting said destination network address including the step of selecting said destination network address from said list of network addresses, said destination network address corresponding to said destination telephone number.

32. The method of claim 30 wherein said step of selecting a transmission route includes the steps of selecting said telephone route if said destination phone number is a domestic phone number and selecting said network route if said destination phone number is an international phone number.

33. The method of claim 30 wherein said outgoing electronic message is an electronic mail message, said step of encoding including the step of converting said outgoing binary facsimile image data to ASCII encoded facsimile data.

34. The method of claim 30 wherein said network server is an internet server.

35. The method of claim 30 further comprising the step of encrypting said outgoing electronic message.

36. The method of claim 30, further comprising:

providing a printing apparatus;

upon detection of an incoming call on said telephone line, operating said modem to establish a data connection over said telephone line;

communicating facsimile image data received by said modem from said incoming call to said printing apparatus to print said facsimile image data;

periodically instructing said modem to establish a data connection with a network server at a preselected network telephone number;

upon establishing a data connection with said network server, receiving an incoming electronic message from said network server over said telephone line and storing said incoming electronic message in a memory;

converting said incoming electronic message in said memory to binary facsimile image data; and

communicating said binary facsimile image data to said printing means to print said binary facsimile image data.

37. The method of claim 36 wherein said memory stores a list of network addresses, each of said network addresses corresponding to at least one telephone number, said step of selecting said destination network address including the step of selecting said destination network address from said list of network addresses, said destination network address corresponding to said destination telephone number.

38. The method of claim 36 wherein said step of selecting a transmission route includes the steps of selecting said telephone route if said destination phone number is a domestic phone number and selecting said network route if said destination phone number is an international phone number.

39. The method of claim 36 wherein said outgoing electronic message is an electronic mail message, said step of encoding including the step of converting said outgoing binary facsimile image data to ASCII encoded facsimile data.

40. The method of claim 36, further comprising the steps of determining whether said incoming electronic message is an address update message and, upon a determination that said incoming electronic message is an address update message, revising said list of addresses according to data encoded in said update message.

41. A facsimile apparatus comprising:

a modem, connectable to a telephone line, for sending and receiving digital data over said telephone line, said modem including means for dialing a telephone number to establish a data connection;

a memory for storing digital data;

printer means for printing incoming facsimile image data;

first input means responsive to an incoming telephone call for communicating binary facsimile image data received by said modem to said printing means, so that said binary facsimile image data is printed;

timing means for periodically instructing said modem to establish a data connection with a network server at a preselected network telephone number;

second input means operatively connected to said modem for receiving an incoming electronic message from said network server over said telephone line and storing said incoming electronic message in said memory;

decoding means for converting said incoming electronic message in said memory to incoming binary facsimile image data and communicating said incoming binary facsimile image data to said printing means. so that said incoming binary facsimile image data is printed.

42. The apparatus of claim 41 wherein said incoming electronic message is an electronic mail message, said decoding means including means for converting ASCII encoded facsimile data in said incoming electronic message to binary facsimile image data.

43. The apparatus of claim 41 wherein said network server is an internet server.

44. The apparatus of claim 41, further comprising decryption means for decrypting said incoming electronic message.

45. A facsimile communication method, comprising:

providing a facsimile machine including a memory, a printing apparatus, and a modem, said modem being connectable to a telephone line for sending and receiving digital data over said telephone line;

upon detection of an incoming call on said telephone line, operating said modem to establish a data connection over said telephone line;

communicating binary facsimile image data received by said modem from said incoming call to said printing apparatus to print said binary facsimile image data;

periodically instructing said modem to establish a data connection with a network server at a preselected network telephone number;

upon establishing a data connection with said network server, receiving an incoming electronic message from said network server over said telephone line and storing said incoming electronic message in said memory;

converting said incoming electronic message in said memory to binary facsimile image data;

communicating said binary facsimile image data to said printing means to print said facsimile image data.

46. The method of claim 45 wherein said incoming electronic message is an electronic mail message, said step of converting said incoming message including the step of converting ASCII encoded facsimile data in said incoming electronic message to binary facsimile image data.

47. The method of claim 45 wherein said network server is an internet server.

48. The method of claim 45, further comprising the step of dencrypting said incoming electronic message.

49. A facsimile communication method, comprising:

providing a first facsimile machine including a first memory, a scanning apparatus, and a first modem, said first memory storing a list of network addresses, each of said network addresses corresponding to at least one telephone number, said first modem being connected to a first telephone line for sending digital data over said first telephone line;

scanning an outgoing facsimile document to generate outgoing binary facsimile image data;

entering a destination telephone number for said facsimile;

selecting from said memory a destination network address corresponding to said destination telephone number;

generating an electronic message including said outgoing binary facsimile image data and said destination network address;

establishing a first data connection between said first modem and a transmission server,

operating said modem to send said electronic message over said data connection to said transmission server;

transmitting said electronic message over a data network to an access server;

providing a second facsimile machine including a second memory, a second modem, and a printing apparatus, said second modem being connected to a second telephone line;

establishing a data connection between said second modem and said access server over said second telephone line;

transmitting said electronic message from said access server to said second modem;

storing said electronic message in said second memory;

converting said encoded facsimile data from said electronic message in said memory to binary facsimile image data; and

printing said binary facsimile image data on said printing apparatus.

50. The method of claim 49 wherein said electronic message is an electronic mail message, said step of generating said message including the step of converting said outgoing binary facsimile image data to ASCII encoded facsimile data.

51. The method of claim 49 wherein said electronic message is an electronic mail message, said step of converting said encoded facsimile data including the step of converting said encoded facsimile data from ASCII encoded facsimile data to binary facsimile image data.

52. The method of claim 49 wherein said digital network is the internet, said transmitting server and said access server being internet servers.

53. The method of claim 49 wherein encryption key data is stored in said first memory and corresponding decryption key data is stored in said second memory, further comprising the steps of encrypting said encoded facsimile data using said encryption key data prior to transmitting said electronic message to said transmission server, and decrypting said encoded facsimile data using said decryption key data only after transmitting said electronic message to said second memory.

54. The method of claim 53 wherein said encryption key is a public key and said decryption key is a corresponding private key.

55. The method of claim 49 wherein encryption key data is stored in said first memory and corresponding decryption key data is stored in said second memory, further comprising the steps of encrypting said binary facsimile image

data using said encryption key data prior to transmitting said electronic message to said transmission server, and decrypting said binary facsimile image data using said decryption key data only after transmitting said electronic message to said second memory.

56. The method of claim 55 wherein said encryption key is a public key and said decryption key is a corresponding private key.

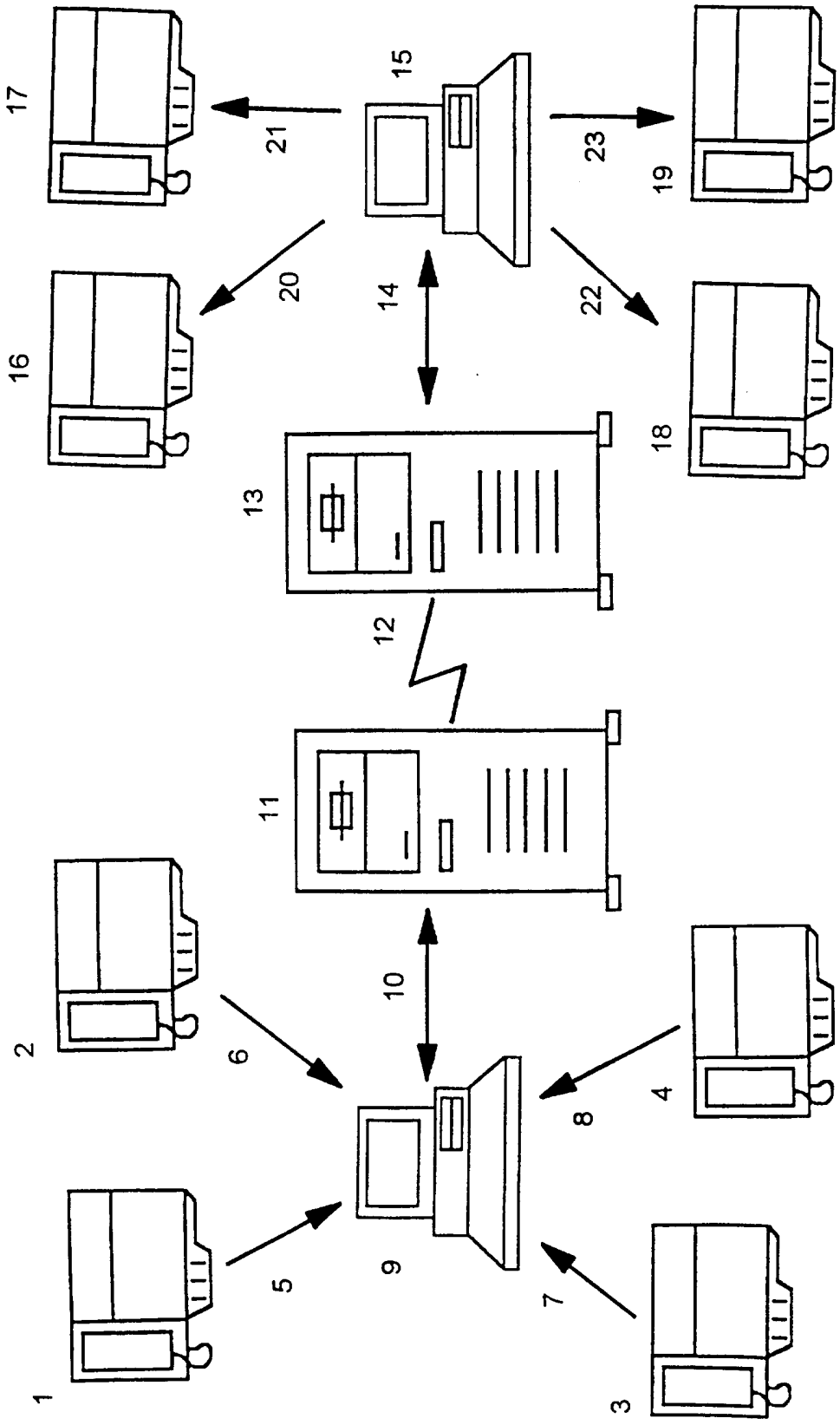

Figure 1

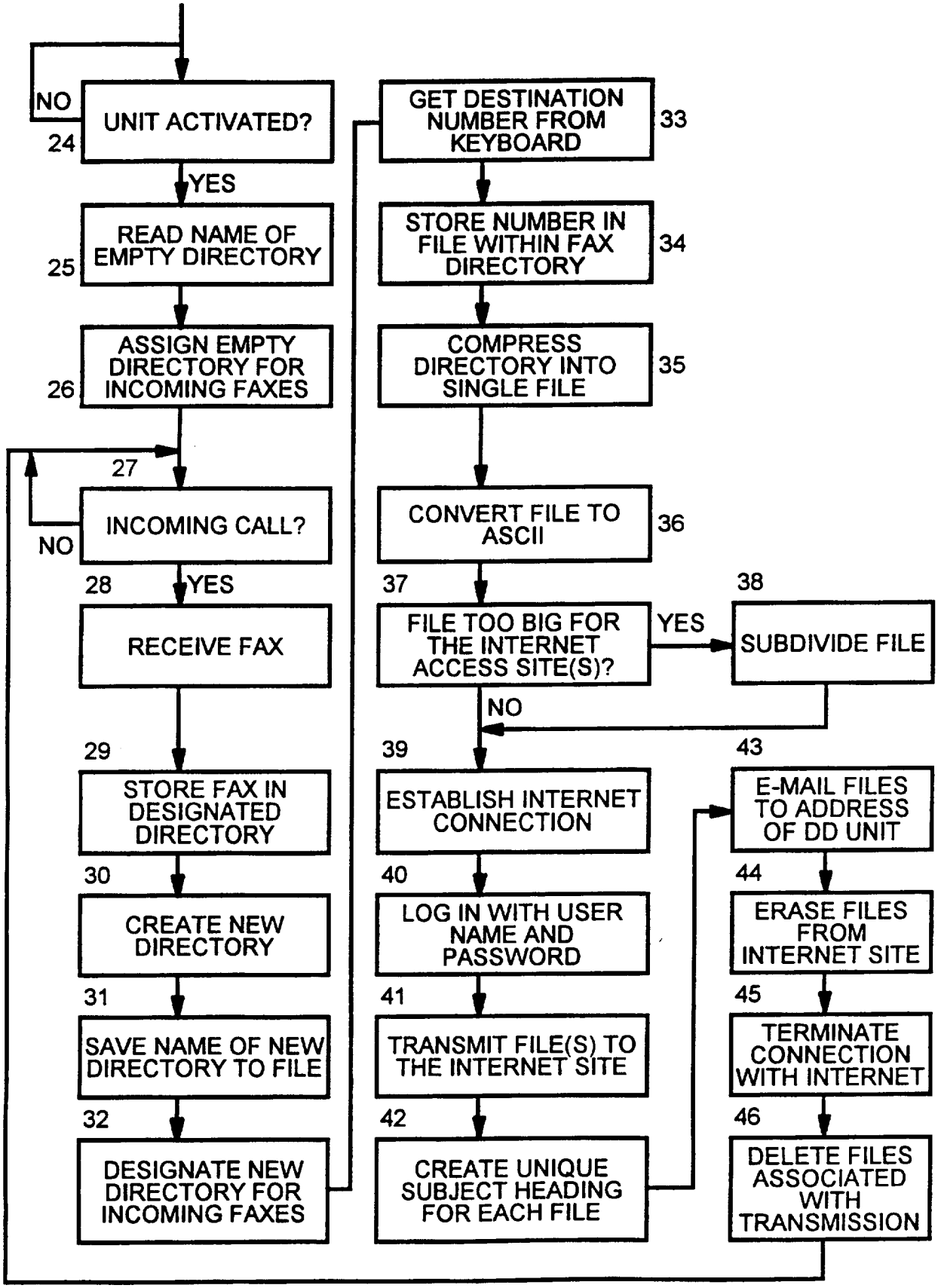
NO
UNIT ACTIVATED?
24
YES
READ NAME OF EMPTY DIRECTORY
25
ASSIGN EMPTY DIRECTORY FOR INCOMING FAXES
26
27
INCOMING CALL?
NO
28
YES
RECEIVE FAX
29
STORE FAX IN DESIGNATED DIRECTORY
30
CREATE NEW DIRECTORY
31
SAVE NAME OF NEW DIRECTORY TO FILE
32
DESIGNATE NEW DIRECTORY FOR INCOMING FAXES
GET DESTINATION NUMBER FROM KEYBOARD
33
STORE NUMBER IN FILE WITHIN FAX DIRECTORY
34
COMPRESS DIRECTORY INTO SINGLE FILE
35
CONVERT FILE TO ASCII
36
37
FILE TOO BIG FOR THE INTERNET ACCESS SITE(S)?
YES
38
SUBDIVIDE FILE
NO
39
ESTABLISH INTERNET CONNECTION
40
LOG IN WITH USER NAME AND PASSWORD
41
TRANSMIT FILE(S) TO THE INTERNET SITE
42
CREATE UNIQUE SUBJECT HEADING FOR EACH FILE
43
E-MAIL FILES TO ADDRESS OF DD UNIT
44
ERASE FILES FROM INTERNET SITE
45
TERMINATE CONNECTION WITH INTERNET
46
DELETE FILES ASSOCIATED WITH TRANSMISSION

Figure 2

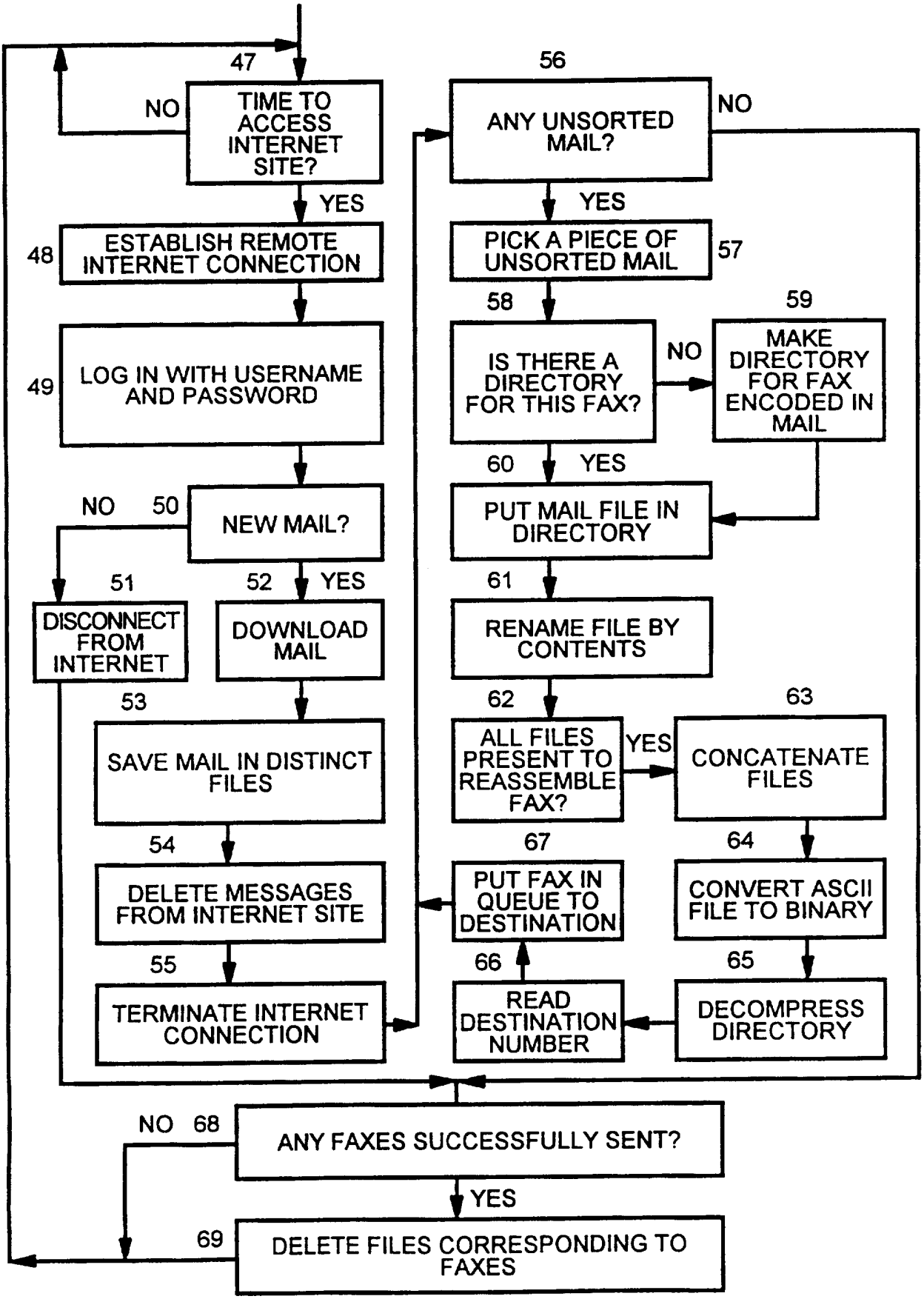
47
TIME TO ACCESS INTERNET SITE?
NO
YES
48
ESTABLISH REMOTE INTERNET CONNECTION
49
LOG IN WITH USERNAME AND PASSWORD
NO
50
NEW MAIL?
YES
51
DISCONNECT FROM INTERNET
52
DOWNLOAD MAIL
53
SAVE MAIL IN DISTINCT FILES
54
DELETE MESSAGES FROM INTERNET SITE
55
TERMINATE INTERNET CONNECTION
56
ANY UNSORTED MAIL?
NO
YES
57
PICK A PIECE OF UNSORTED MAIL
58
IS THERE A DIRECTORY FOR THIS FAX?
NO
59
MAKE DIRECTORY FOR FAX ENCODED IN MAIL
60
YES
PUT MAIL FILE IN DIRECTORY
61
RENAME FILE BY CONTENTS
62
ALL FILES PRESENT TO REASSEMBLE FAX?
YES
63
CONCATENATE FILES
64
CONVERT ASCII FILE TO BINARY
65
DECOMPRESS DIRECTORY
66
READ DESTINATION NUMBER
67
PUT FAX IN QUEUE TO DESTINATION
NO
68
ANY FAXES SUCCESSFULLY SENT?
YES
69
DELETE FILES CORRESPONDING TO FAXES

Figure 3

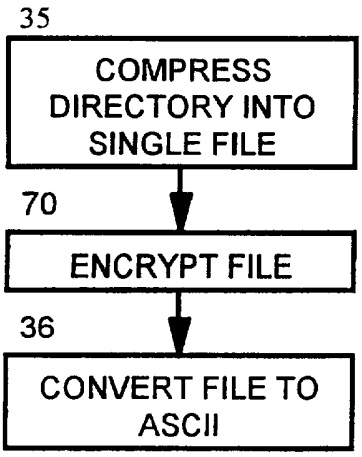

Figure 4a

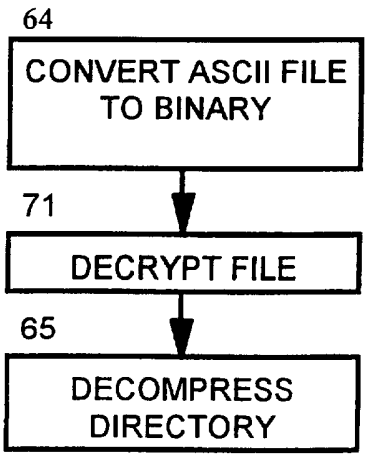

Figure 4b

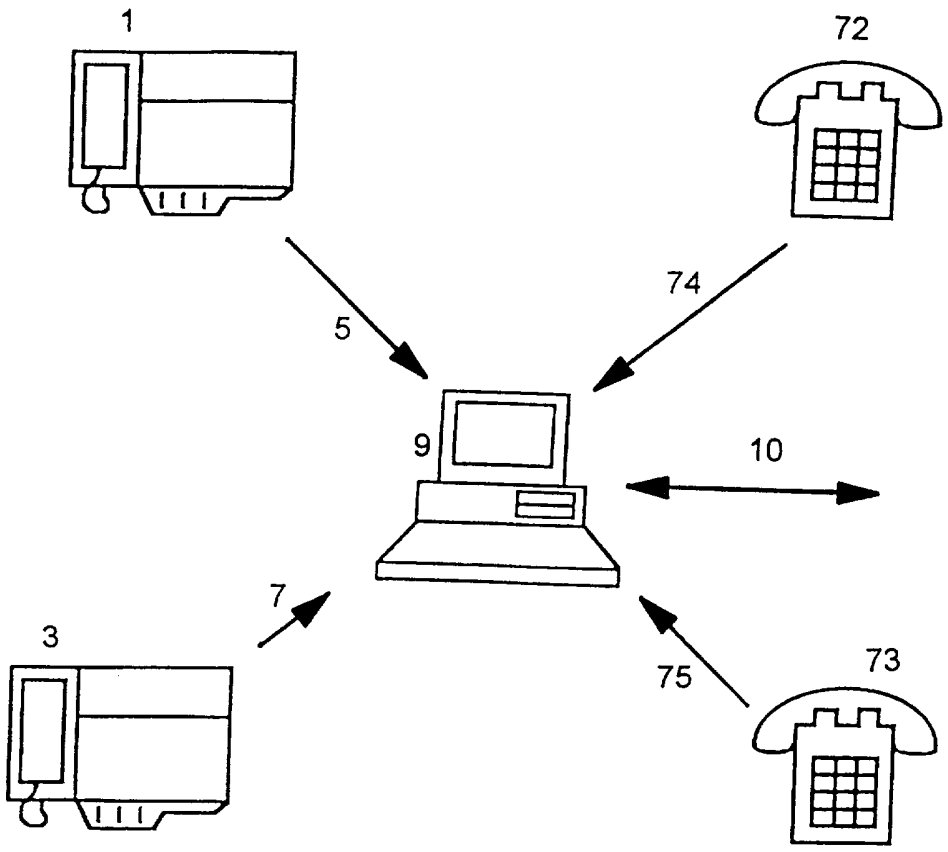

Figure 5

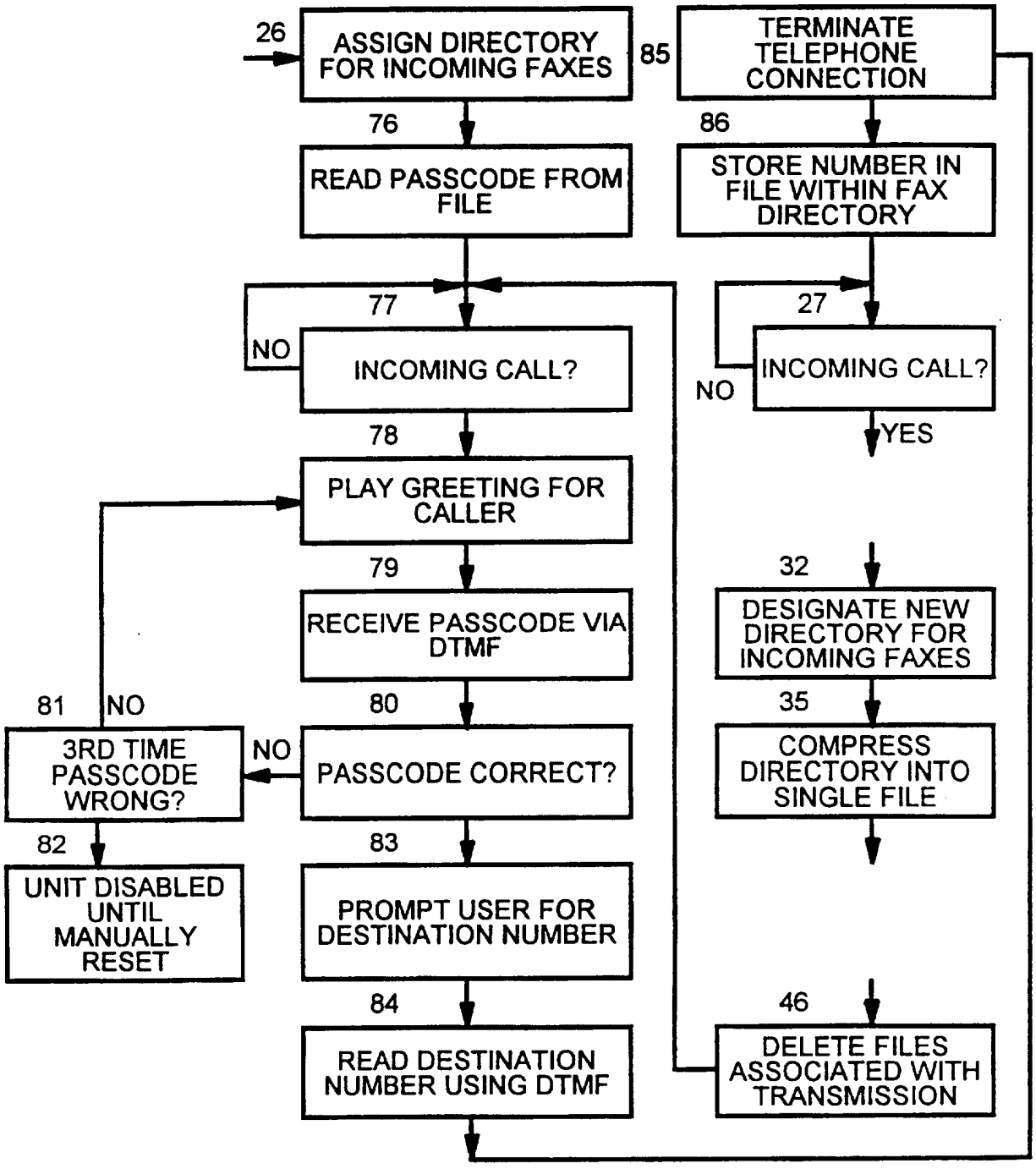
26
ASSIGN DIRECTORY FOR INCOMING FAXES
76
READ PASSCODE FROM FILE
77
NO
INCOMING CALL?
78
PLAY GREETING FOR CALLER
79
RECEIVE PASSCODE VIA DTMF
80
PASSCODE CORRECT?
NO
81
NO
3RD TIME PASSCODE WRONG?
82
UNIT DISABLED UNTIL MANUALLY RESET
83
PROMPT USER FOR DESTINATION NUMBER
84
READ DESTINATION NUMBER USING DTMF
85
TERMINATE TELEPHONE CONNECTION
86
STORE NUMBER IN FILE WITHIN FAX DIRECTORY
27
NO
INCOMING CALL?
YES
32
DESIGNATE NEW DIRECTORY FOR INCOMING FAXES
35
COMPRESS DIRECTORY INTO SINGLE FILE
46
DELETE FILES ASSOCIATED WITH TRANSMISSION

Figure 6

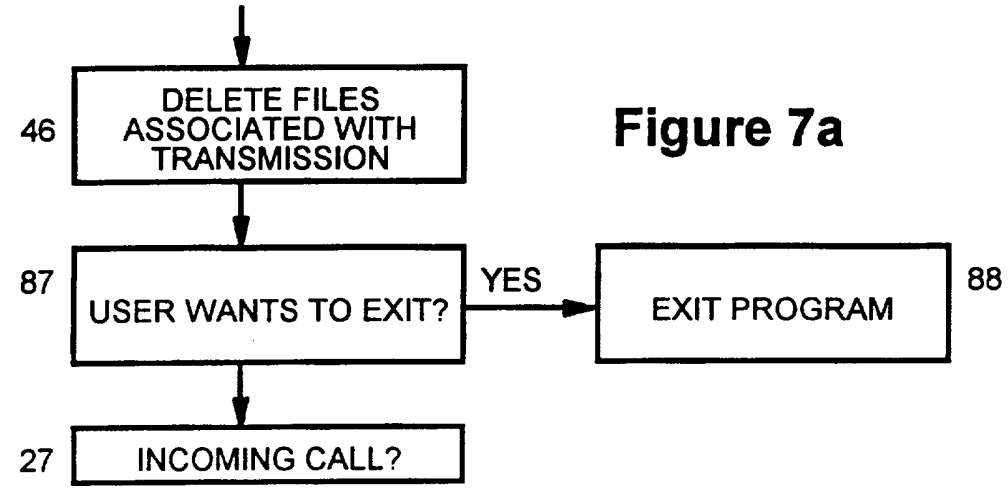

Figure 7a

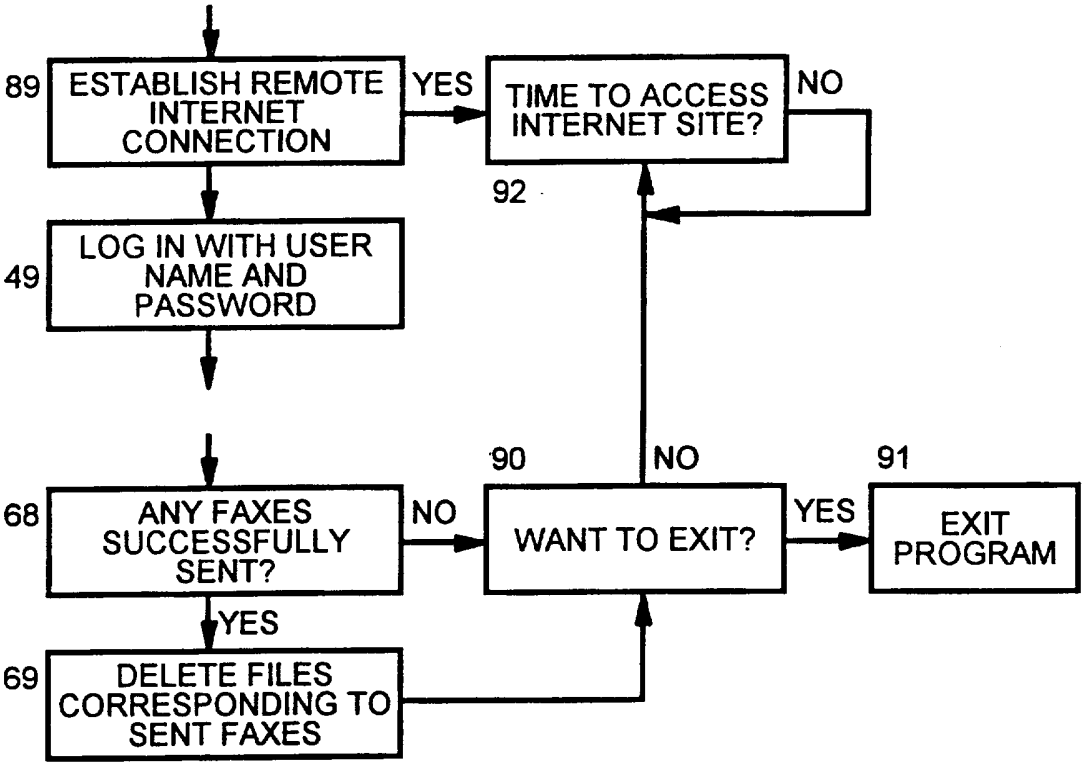

Figure 7b

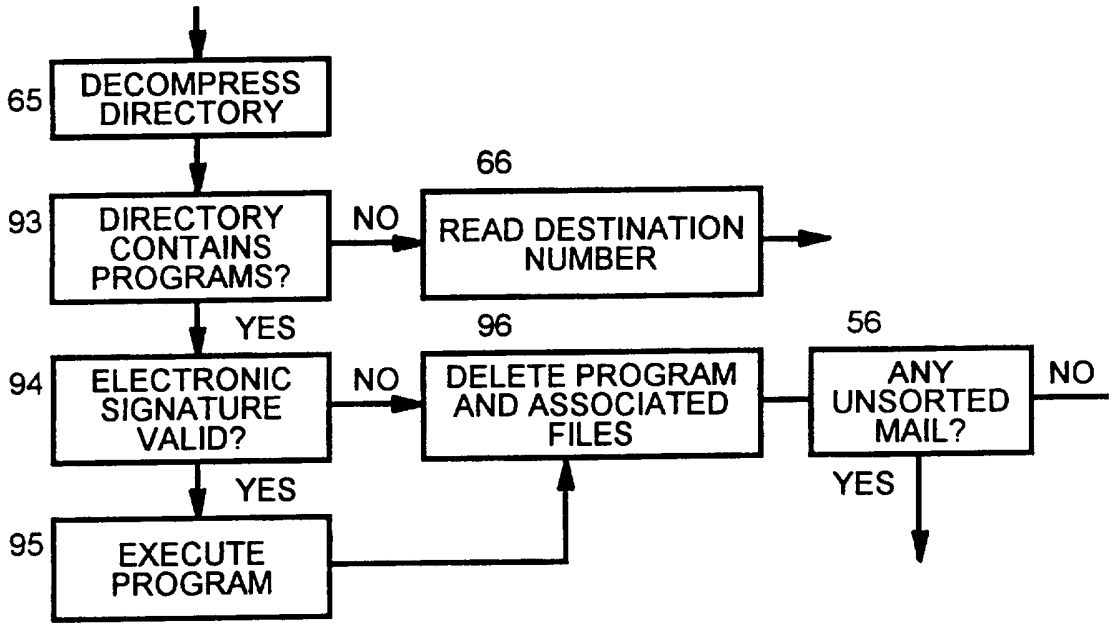
65
DECOMPRESS DIRECTORY
93
DIRECTORY CONTAINS PROGRAMS?
NO
66
READ DESTINATION NUMBER
YES
94
ELECTRONIC SIGNATURE VALID?
NO
96
DELETE PROGRAM AND ASSOCIATED FILES
56
ANY UNSORTED MAIL?
NO
YES
YES
95
EXECUTE PROGRAM

Figure 8

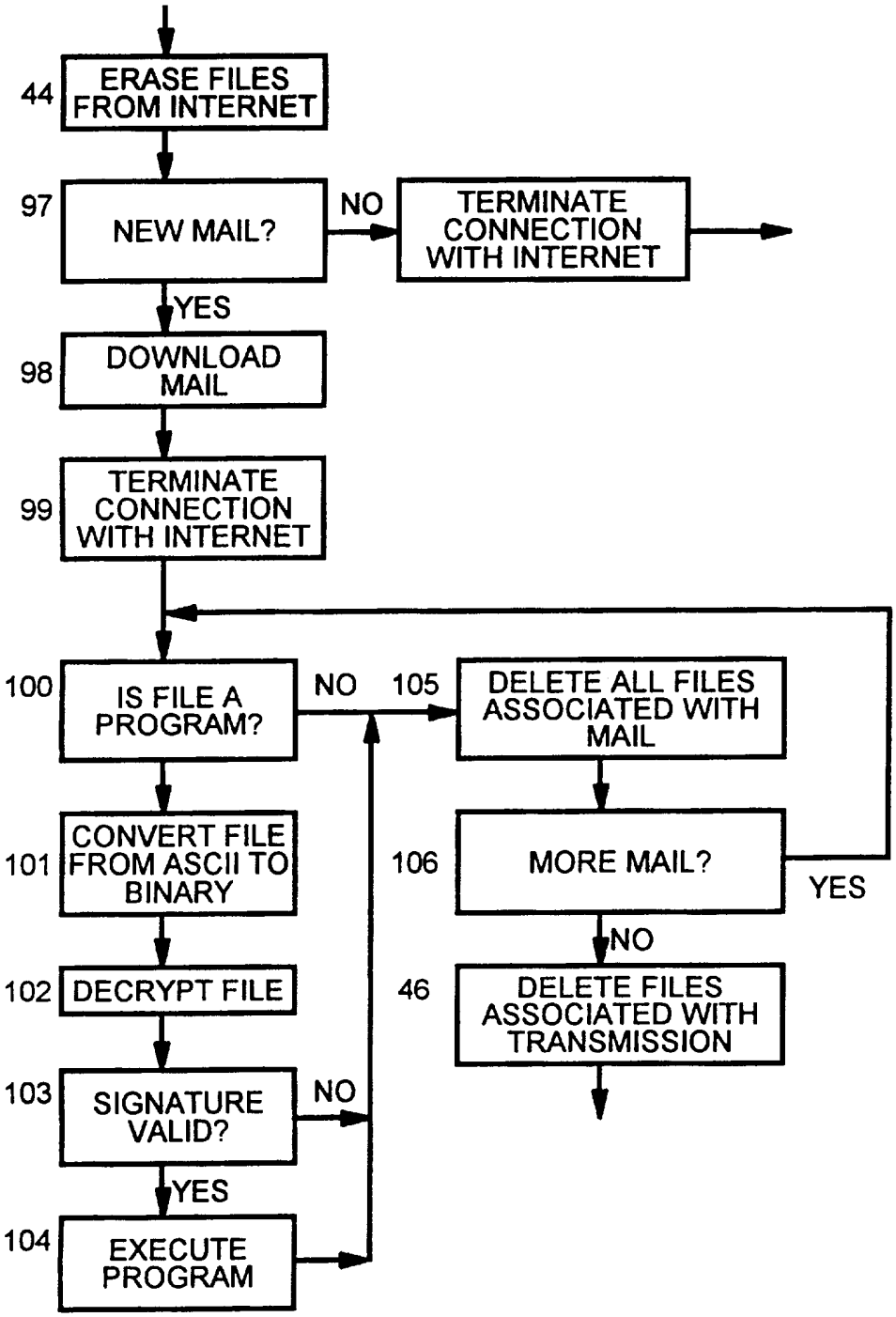
44
ERASE FILES FROM INTERNET
97
NEW MAIL?
NO
TERMINATE CONNECTION WITH INTERNET
YES
98
DOWNLOAD MAIL
99
TERMINATE CONNECTION WITH INTERNET
100
IS FILE A PROGRAM?
NO
105
DELETE ALL FILES ASSOCIATED WITH MAIL
101
CONVERT FILE FROM ASCII TO BINARY
106
MORE MAIL?
YES
NO
102
DECRYPT FILE
46
DELETE FILES ASSOCIATED WITH TRANSMISSION
103
SIGNATURE VALID?
NO
YES
104
EXECUTE PROGRAM

Figure 9

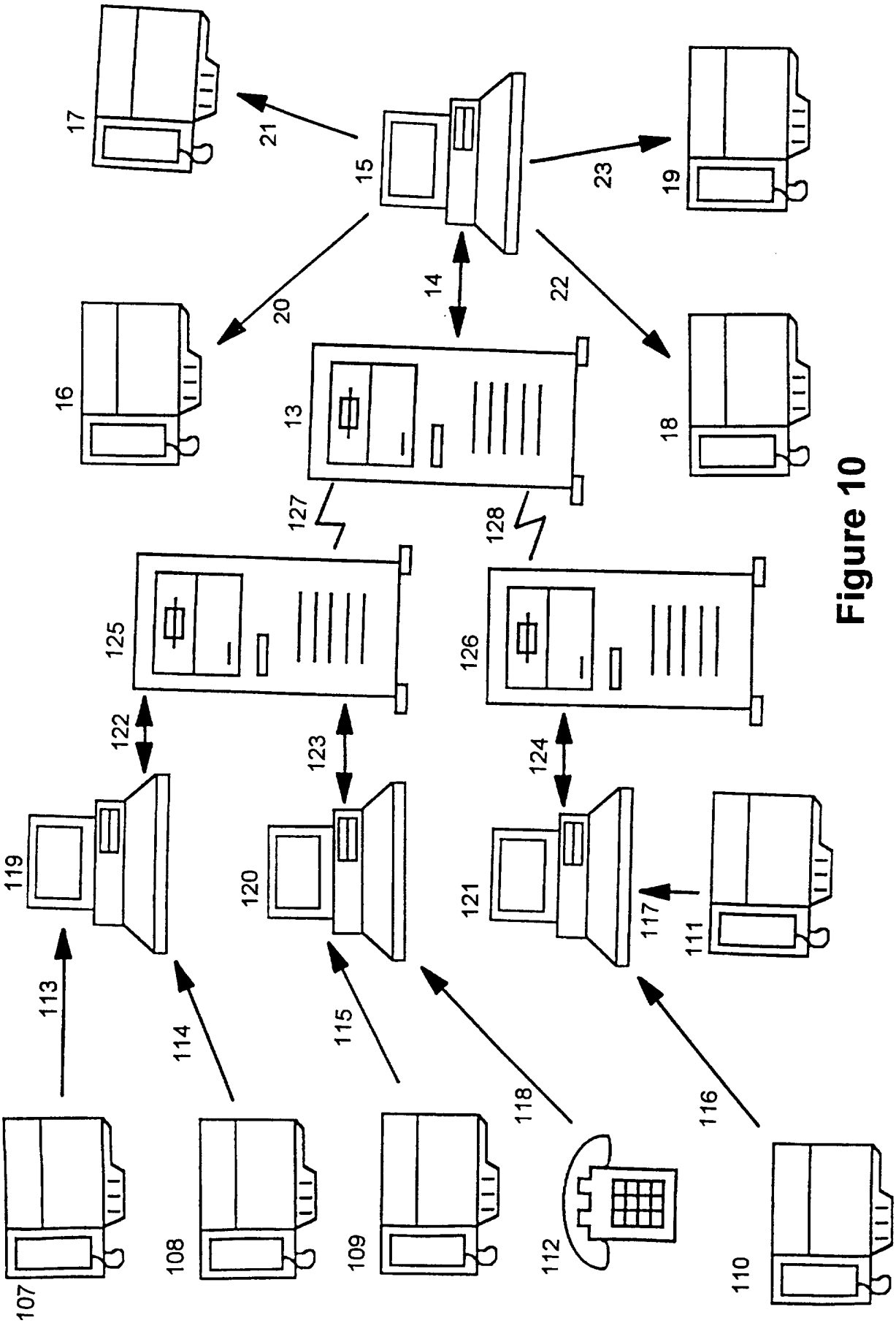
17
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Figure 10

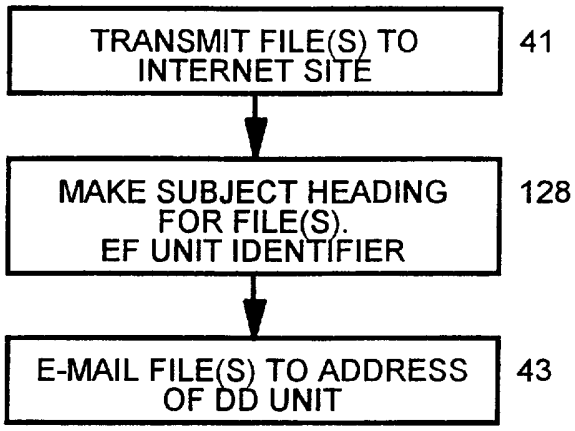
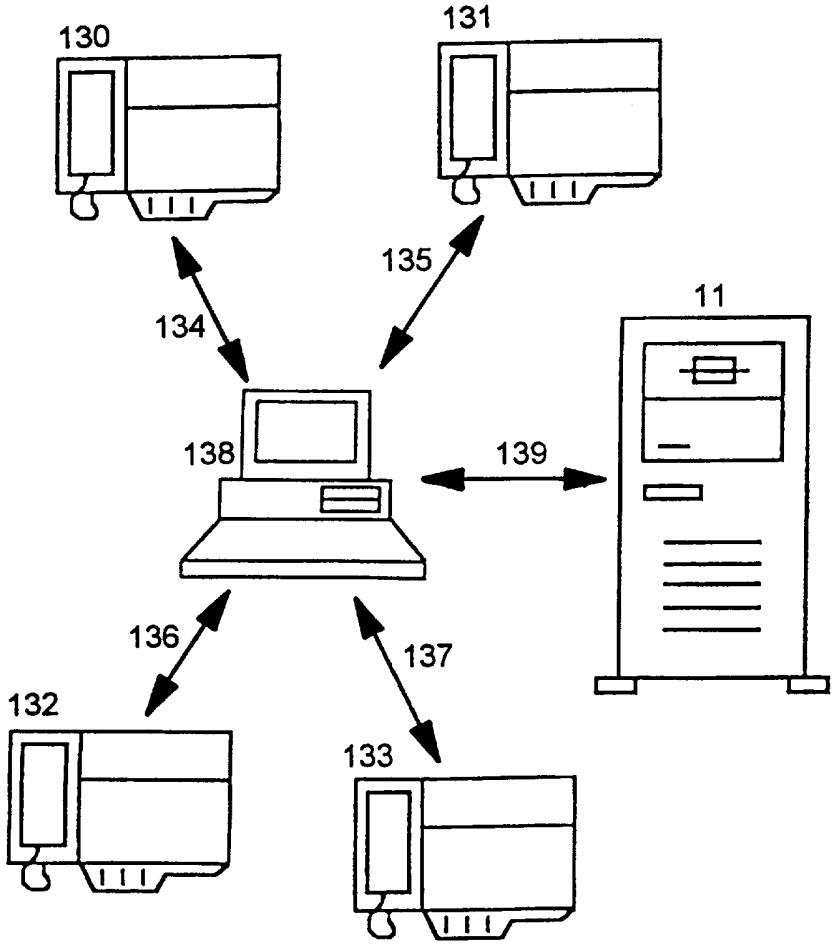

TRANSMIT FILE(S) TO INTERNET SITE
41
MAKE SUBJECT HEADING FOR FILE(S). EF UNIT IDENTIFIER
128
E-MAIL FILE(S) TO ADDRESS OF DD UNIT
43

Figure 11

Figure 12



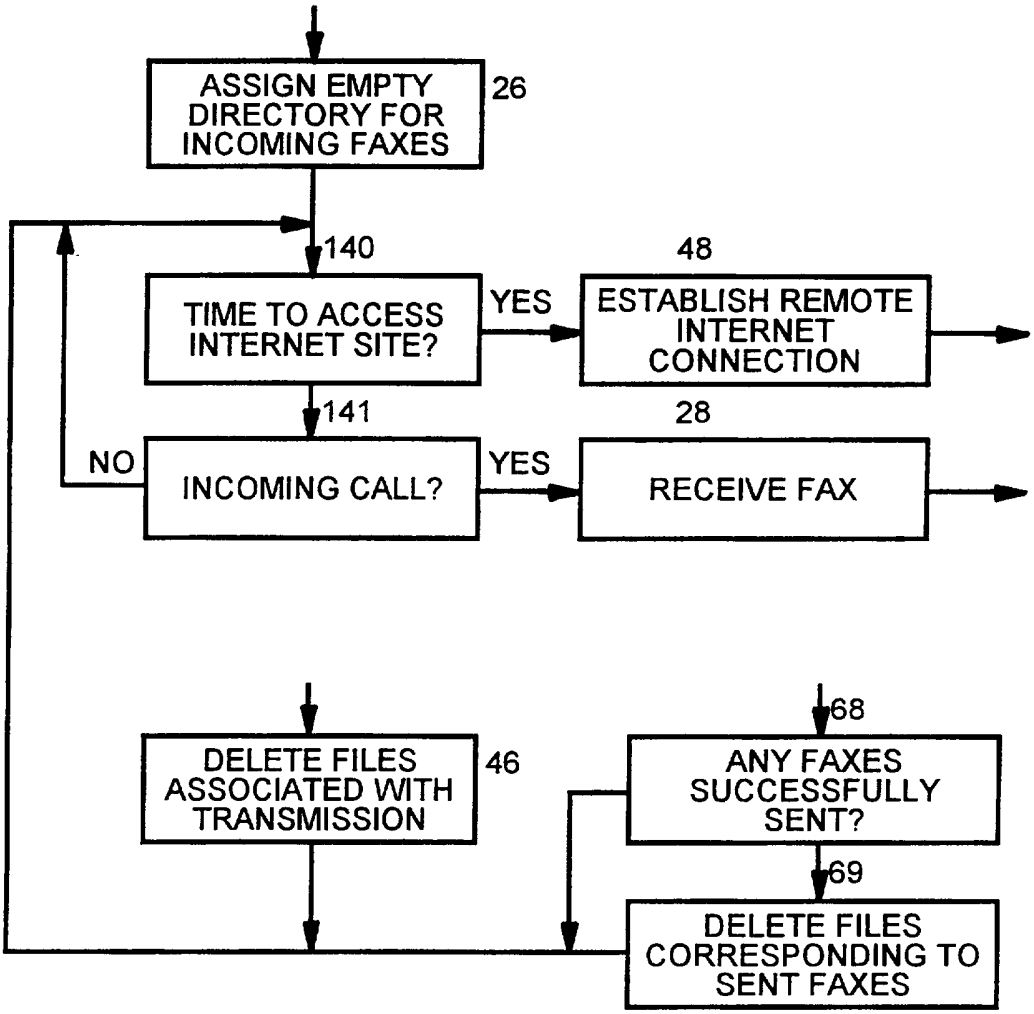
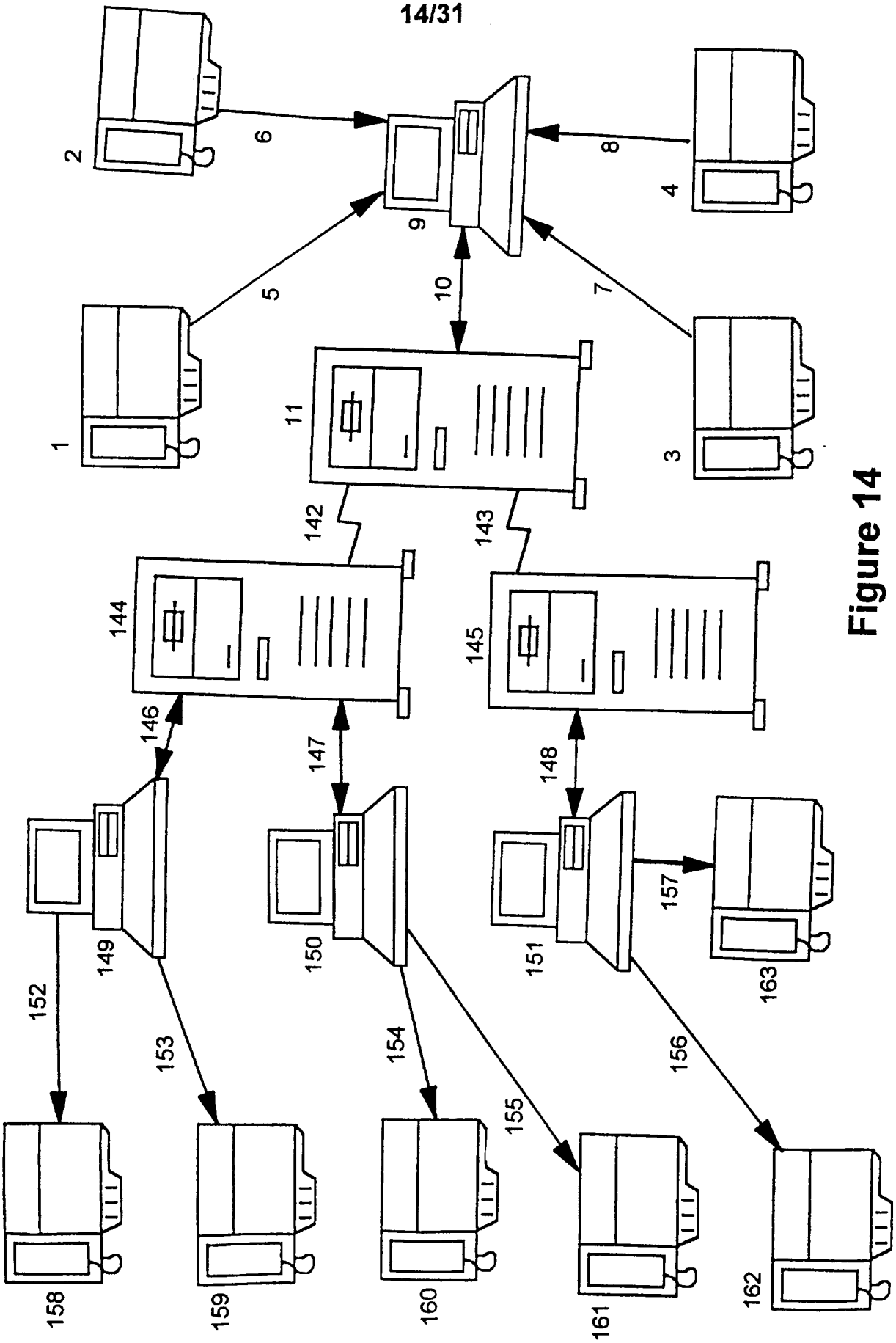

ASSIGN EMPTY DIRECTORY FOR INCOMING FAXES
26
140
TIME TO ACCESS INTERNET SITE?
YES
48
ESTABLISH REMOTE INTERNET CONNECTION
141
NO
INCOMING CALL?
YES
28
RECEIVE FAX
DELETE FILES ASSOCIATED WITH TRANSMISSION
46
68
ANY FAXES SUCCESSFULLY SENT?
69
DELETE FILES CORRESPONDING TO SENT FAXES

Figure 13


1
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163

Figure 14

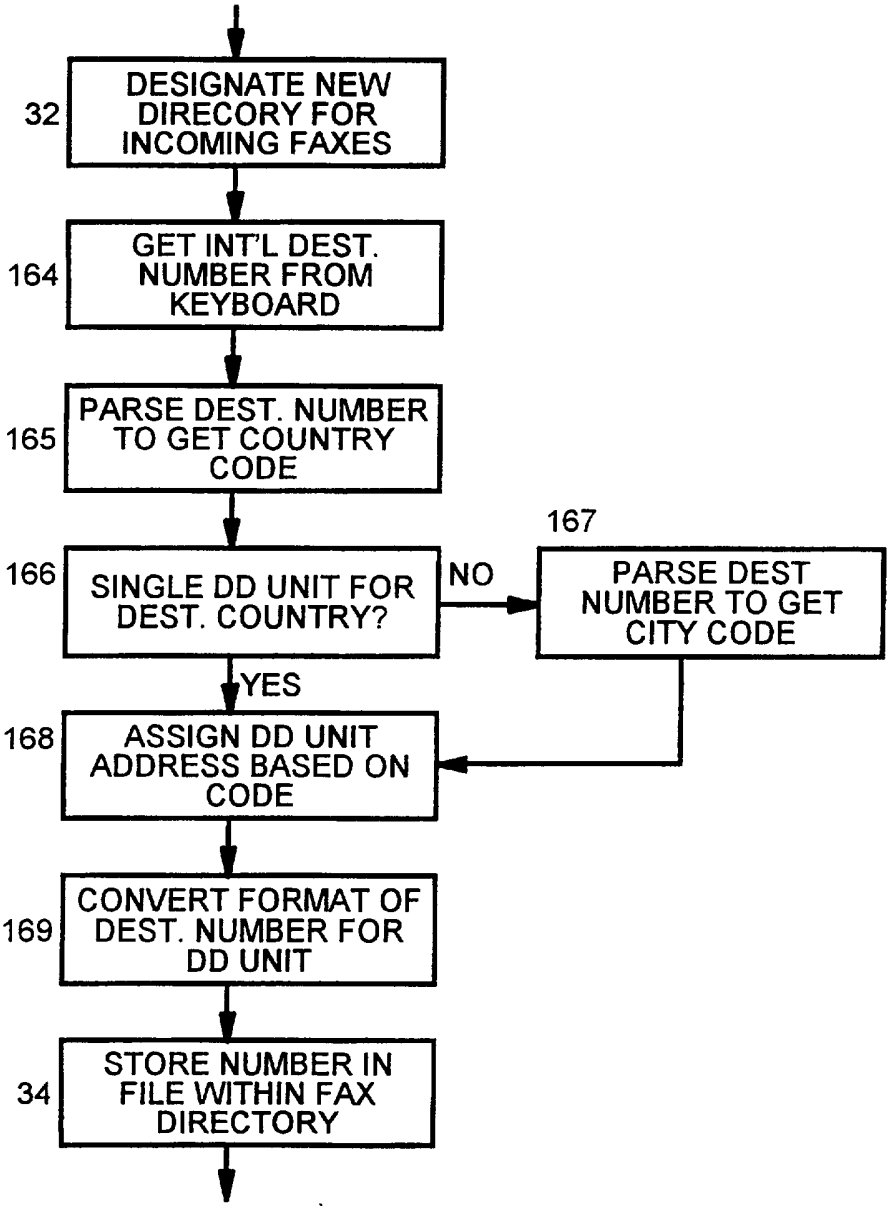

32
DESIGNATE NEW DIRECORY FOR INCOMING FAXES
164
GET INT'L DEST. NUMBER FROM KEYBOARD
165
PARSE DEST. NUMBER TO GET COUNTRY CODE
166
SINGLE DD UNIT FOR DEST. COUNTRY?
NO
167
PARSE DEST NUMBER TO GET CITY CODE
YES
168
ASSIGN DD UNIT ADDRESS BASED ON CODE
169
CONVERT FORMAT OF DEST. NUMBER FOR DD UNIT
34
STORE NUMBER IN FILE WITHIN FAX DIRECTORY

Figure 15

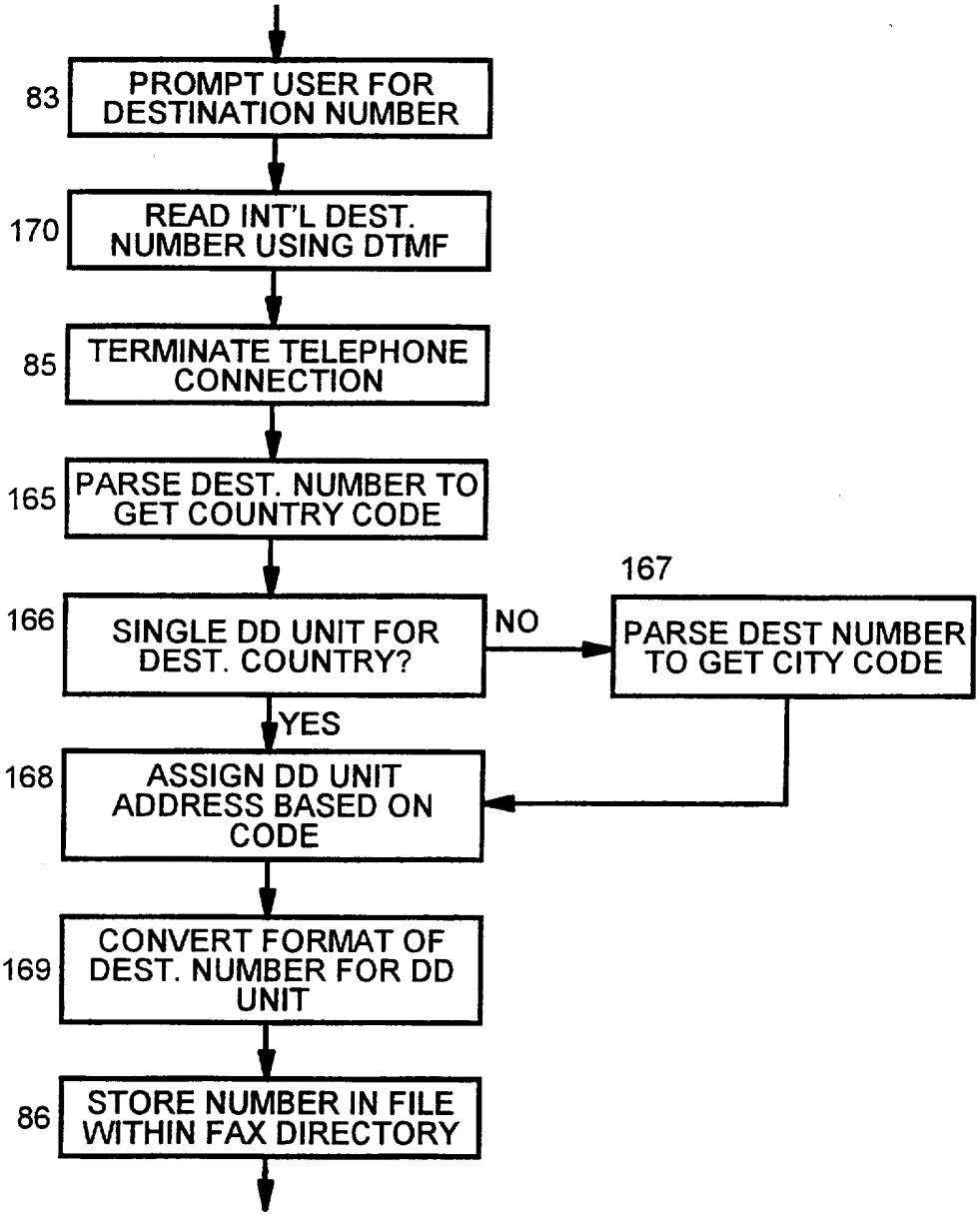

83
PROMPT USER FOR DESTINATION NUMBER
170
READ INT'L DEST. NUMBER USING DTMF
85
TERMINATE TELEPHONE CONNECTION
165
PARSE DEST. NUMBER TO GET COUNTRY CODE
166
SINGLE DD UNIT FOR DEST. COUNTRY?
NO
167
PARSE DEST NUMBER TO GET CITY CODE
YES
168
ASSIGN DD UNIT ADDRESS BASED ON CODE
169
CONVERT FORMAT OF DEST. NUMBER FOR DD UNIT
86
STORE NUMBER IN FILE WITHIN FAX DIRECTORY

Figure 16

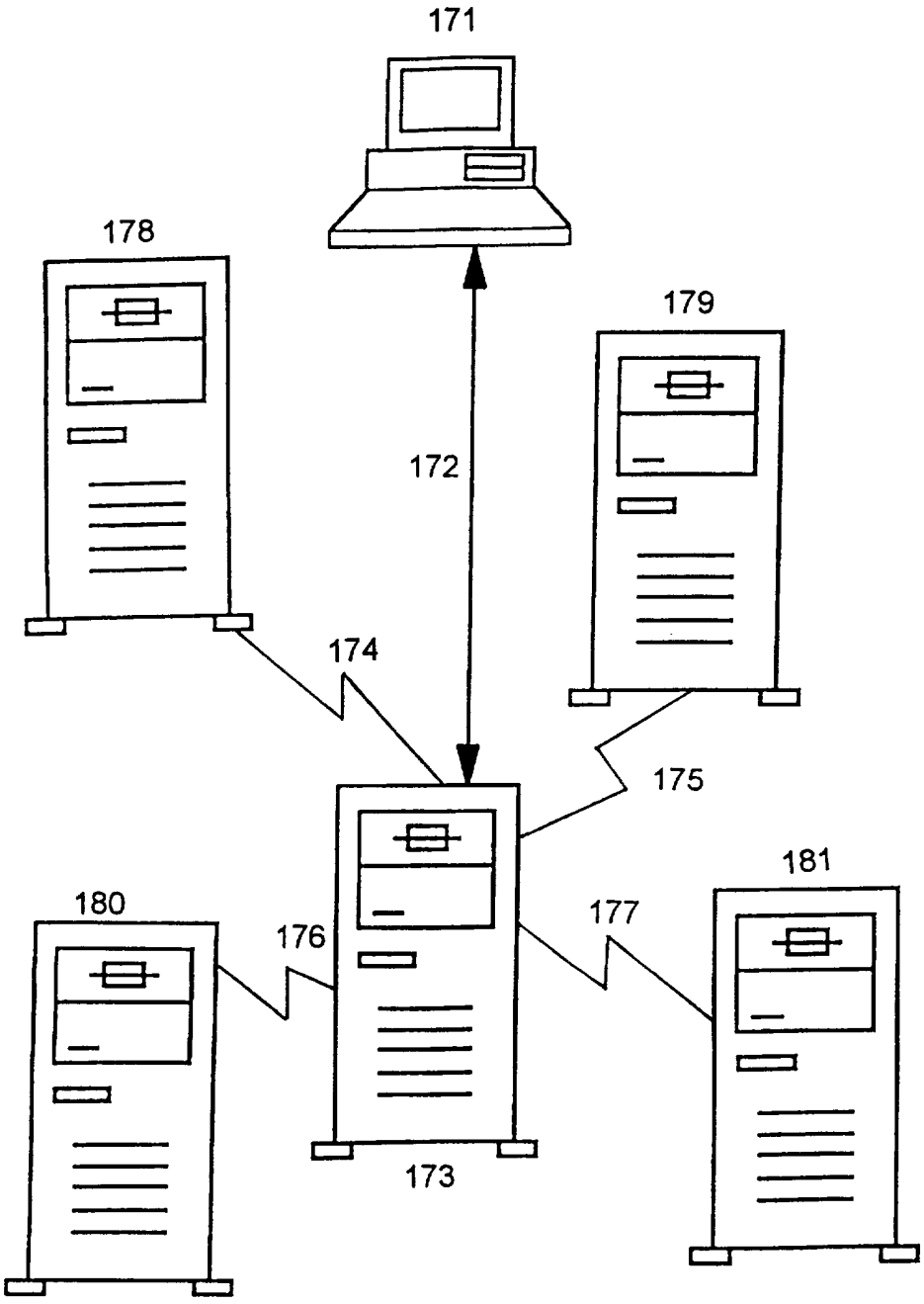


Figure 17

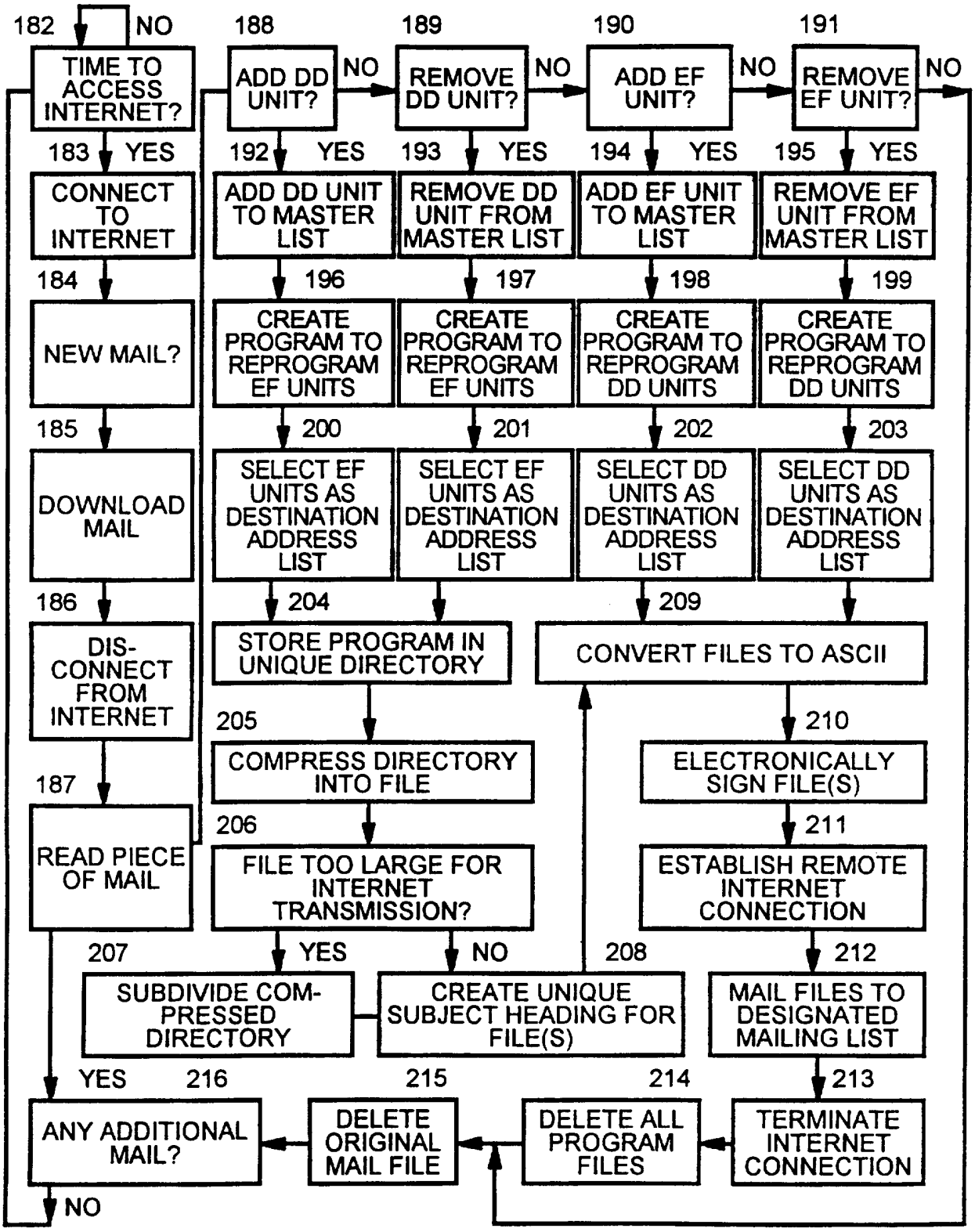

182
NO
TIME TO ACCESS INTERNET?
183
YES
CONNECT TO INTERNET
184
NEW MAIL?
185
DOWNLOAD MAIL
186
DIS-CONNECT FROM INTERNET
187
READ PIECE OF MAIL
188
ADD DD UNIT?
NO
189
REMOVE DD UNIT?
NO
190
ADD EF UNIT?
NO
191
REMOVE EF UNIT?
NO
192
YES
ADD DD UNIT TO MASTER LIST
193
YES
REMOVE DD UNIT FROM MASTER LIST
194
YES
ADD EF UNIT TO MASTER LIST
195
YES
REMOVE EF UNIT FROM MASTER LIST
196
CREATE PROGRAM TO REPROGRAM EF UNITS
197
CREATE PROGRAM TO REPROGRAM EF UNITS
198
CREATE PROGRAM TO REPROGRAM DD UNITS
199
CREATE PROGRAM TO REPROGRAM DD UNITS
200
SELECT EF UNITS AS DESTINATION ADDRESS LIST
201
SELECT EF UNITS AS DESTINATION ADDRESS LIST
202
SELECT DD UNITS AS DESTINATION ADDRESS LIST
203
SELECT DD UNITS AS DESTINATION ADDRESS LIST
204
STORE PROGRAM IN UNIQUE DIRECTORY
205
COMPRESS DIRECTORY INTO FILE
206
FILE TOO LARGE FOR INTERNET TRANSMISSION?
207
YES
SUBDIVIDE COM-PRESSED DIRECTORY
NO
CREATE UNIQUE SUBJECT HEADING FOR FILE(S)
208
209
CONVERT FILES TO ASCII
210
ELECTRONICALLY SIGN FILE(S)
211
ESTABLISH REMOTE INTERNET CONNECTION
212
MAIL FILES TO DESIGNATED MAILING LIST
213
TERMINATE INTERNET CONNECTION
214
DELETE ALL PROGRAM FILES
215
DELETE ORIGINAL MAIL FILE
216
YES
ANY ADDITIONAL MAIL?
NO

Figure 18

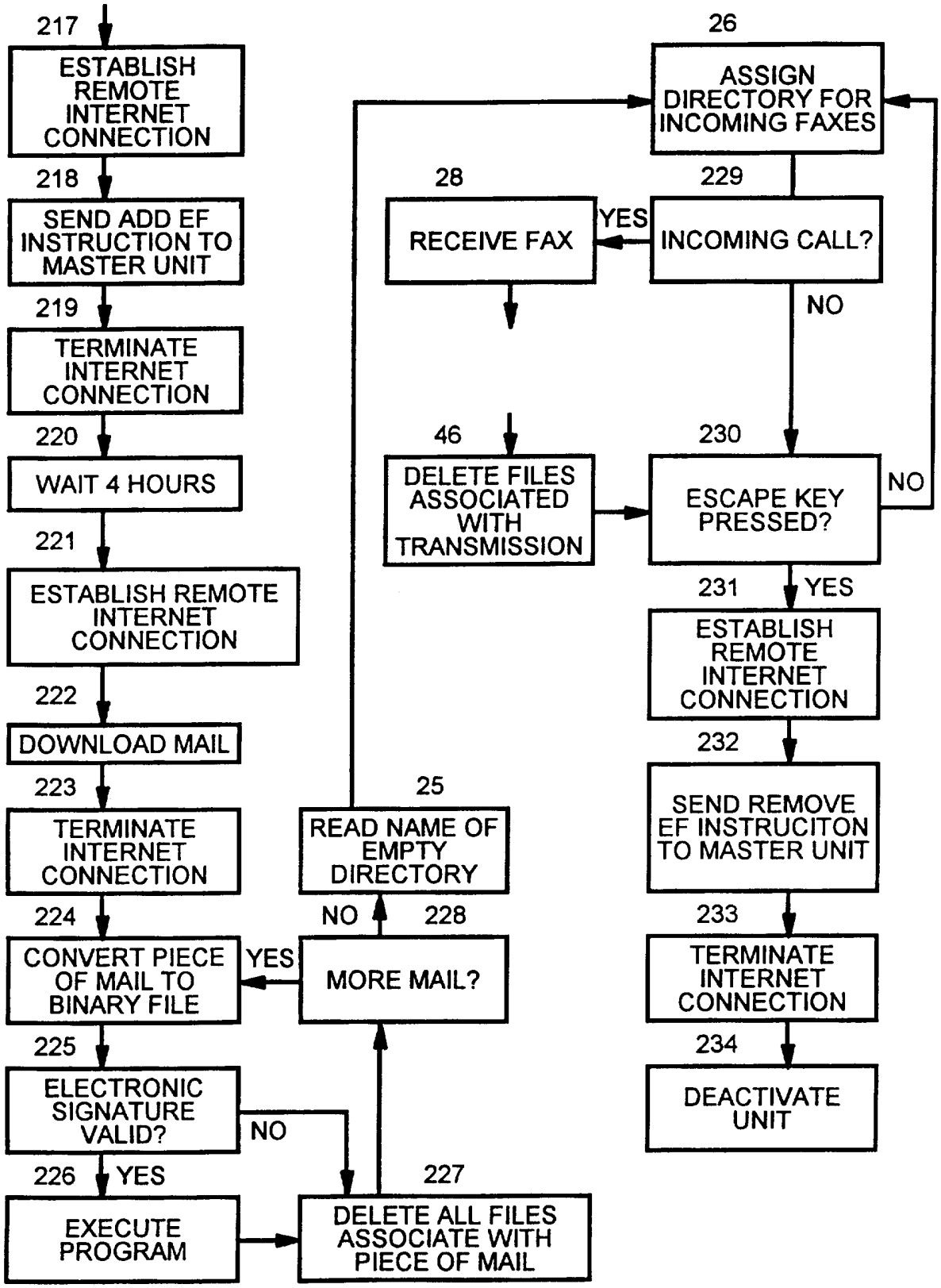

217
ESTABLISH REMOTE INTERNET CONNECTION
218
SEND ADD EF INSTRUCTION TO MASTER UNIT
219
TERMINATE INTERNET CONNECTION
220
WAIT 4 HOURS
221
ESTABLISH REMOTE INTERNET CONNECTION
222
DOWNLOAD MAIL
223
TERMINATE INTERNET CONNECTION
224
CONVERT PIECE OF MAIL TO BINARY FILE
225
ELECTRONIC SIGNATURE VALID?
226
YES
EXECUTE PROGRAM
NO
227
DELETE ALL FILES ASSOCIATE WITH PIECE OF MAIL
YES
NO
228
MORE MAIL?
25
READ NAME OF EMPTY DIRECTORY
26
ASSIGN DIRECTORY FOR INCOMING FAXES
229
INCOMING CALL?
YES
28
RECEIVE FAX
NO
46
DELETE FILES ASSOCIATED WITH TRANSMISSION
230
ESCAPE KEY PRESSED?
NO
231
YES
ESTABLISH REMOTE INTERNET CONNECTION
232
SEND REMOVE EF INSTRUCITON TO MASTER UNIT
233
TERMINATE INTERNET CONNECTION
234
DEACTIVATE UNIT

Figure 19

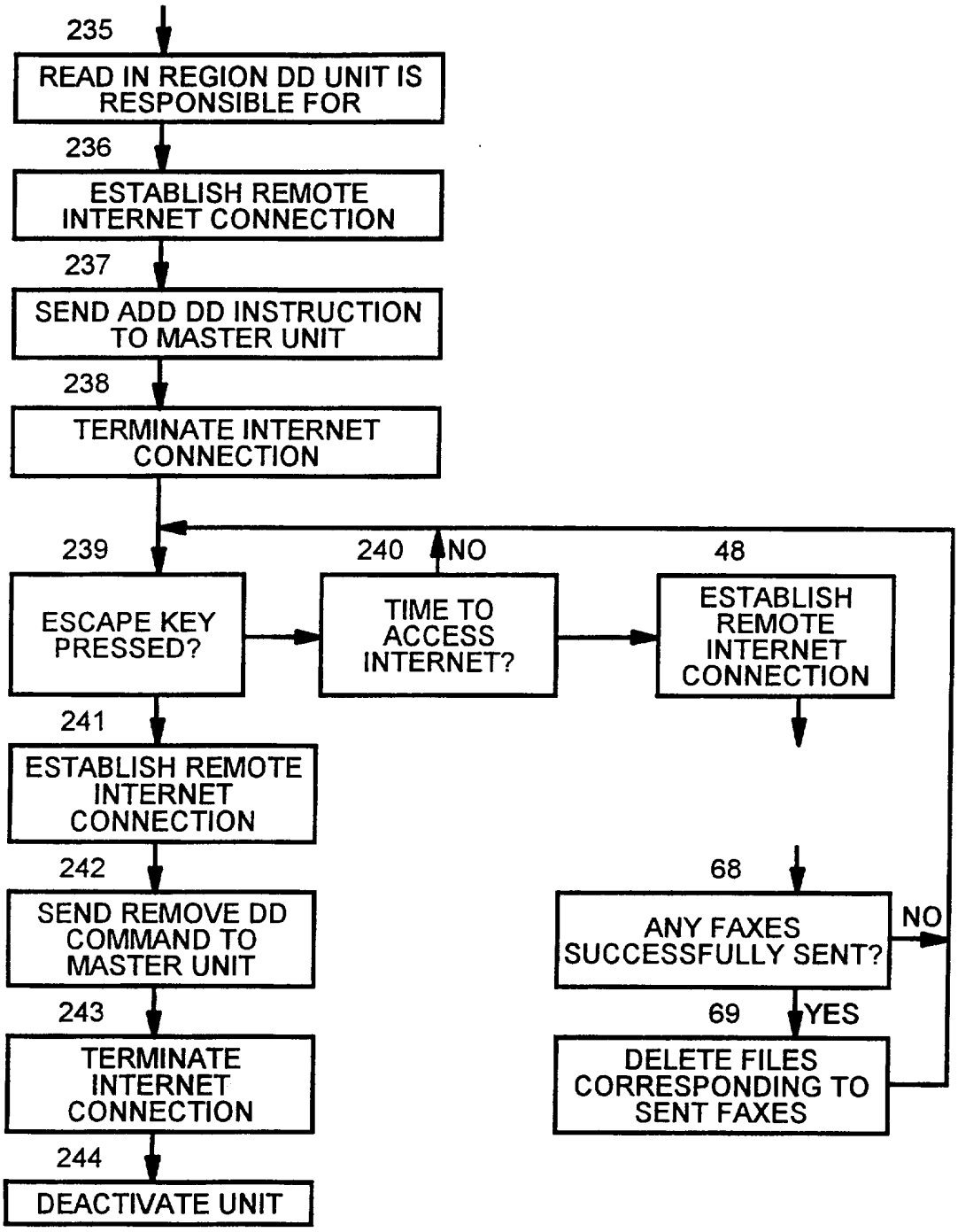
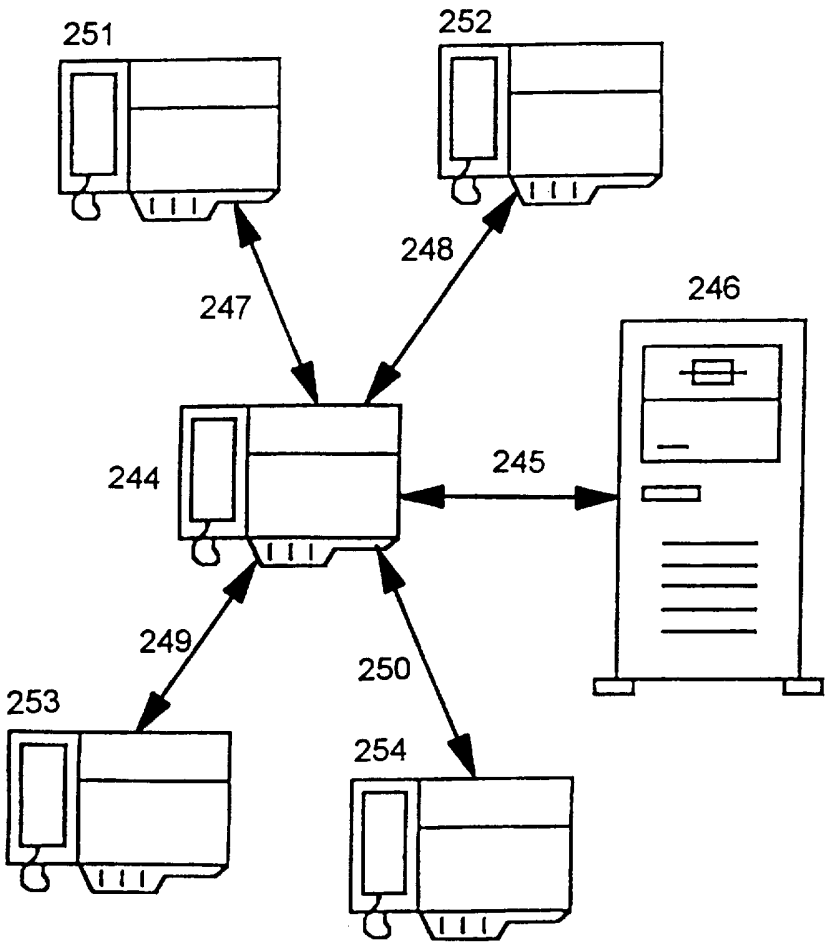

235
READ IN REGION DD UNIT IS RESPONSIBLE FOR
236
ESTABLISH REMOTE INTERNET CONNECTION
237
SEND ADD DD INSTRUCTION TO MASTER UNIT
238
TERMINATE INTERNET CONNECTION
239
ESCAPE KEY PRESSED?
240
NO
TIME TO ACCESS INTERNET?
48
ESTABLISH REMOTE INTERNET CONNECTION
241
ESTABLISH REMOTE INTERNET CONNECTION
242
SEND REMOVE DD COMMAND TO MASTER UNIT
243
TERMINATE INTERNET CONNECTION
244
DEACTIVATE UNIT
68
ANY FAXES SUCCESSFULLY SENT?
NO
69
YES
DELETE FILES CORRESPONDING TO SENT FAXES

Figure 20

Figure 21



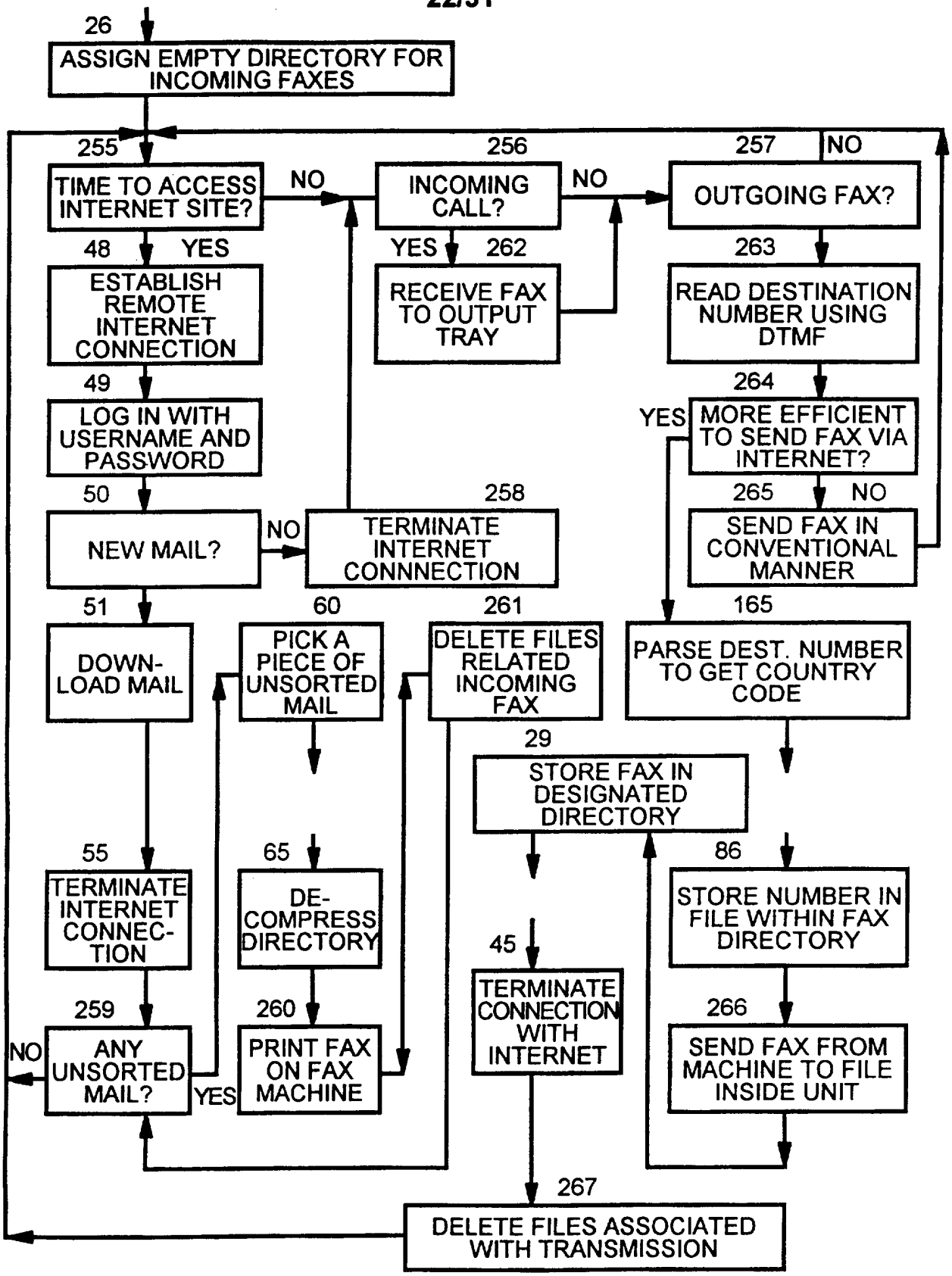

26
ASSIGN EMPTY DIRECTORY FOR INCOMING FAXES
255
TIME TO ACCESS INTERNET SITE?
NO
256
INCOMING CALL?
NO
257
OUTGOING FAX?
NO
48
YES
ESTABLISH REMOTE INTERNET CONNECTION
YES
262
RECEIVE FAX TO OUTPUT TRAY
263
READ DESTINATION NUMBER USING DTMF
49
LOG IN WITH USERNAME AND PASSWORD
264
YES
MORE EFFICIENT TO SEND FAX VIA INTERNET?
50
NEW MAIL?
NO
258
TERMINATE INTERNET CONNNECTION
265
NO
SEND FAX IN CONVENTIONAL MANNER
51
DOWN-LOAD MAIL
60
PICK A PIECE OF UNSORTED MAIL
261
DELETE FILES RELATED INCOMING FAX
165
PARSE DEST. NUMBER TO GET COUNTRY CODE
29
STORE FAX IN DESIGNATED DIRECTORY
55
TERMINATE INTERNET CONNEC-TION
65
DE-COMPRESS DIRECTORY
45
TERMINATE CONNECTION WITH INTERNET
86
STORE NUMBER IN FILE WITHIN FAX DIRECTORY
259
NO
ANY UNSORTED MAIL?
YES
260
PRINT FAX ON FAX MACHINE
266
SEND FAX FROM MACHINE TO FILE INSIDE UNIT
267
DELETE FILES ASSOCIATED WITH TRANSMISSION

Figure 22

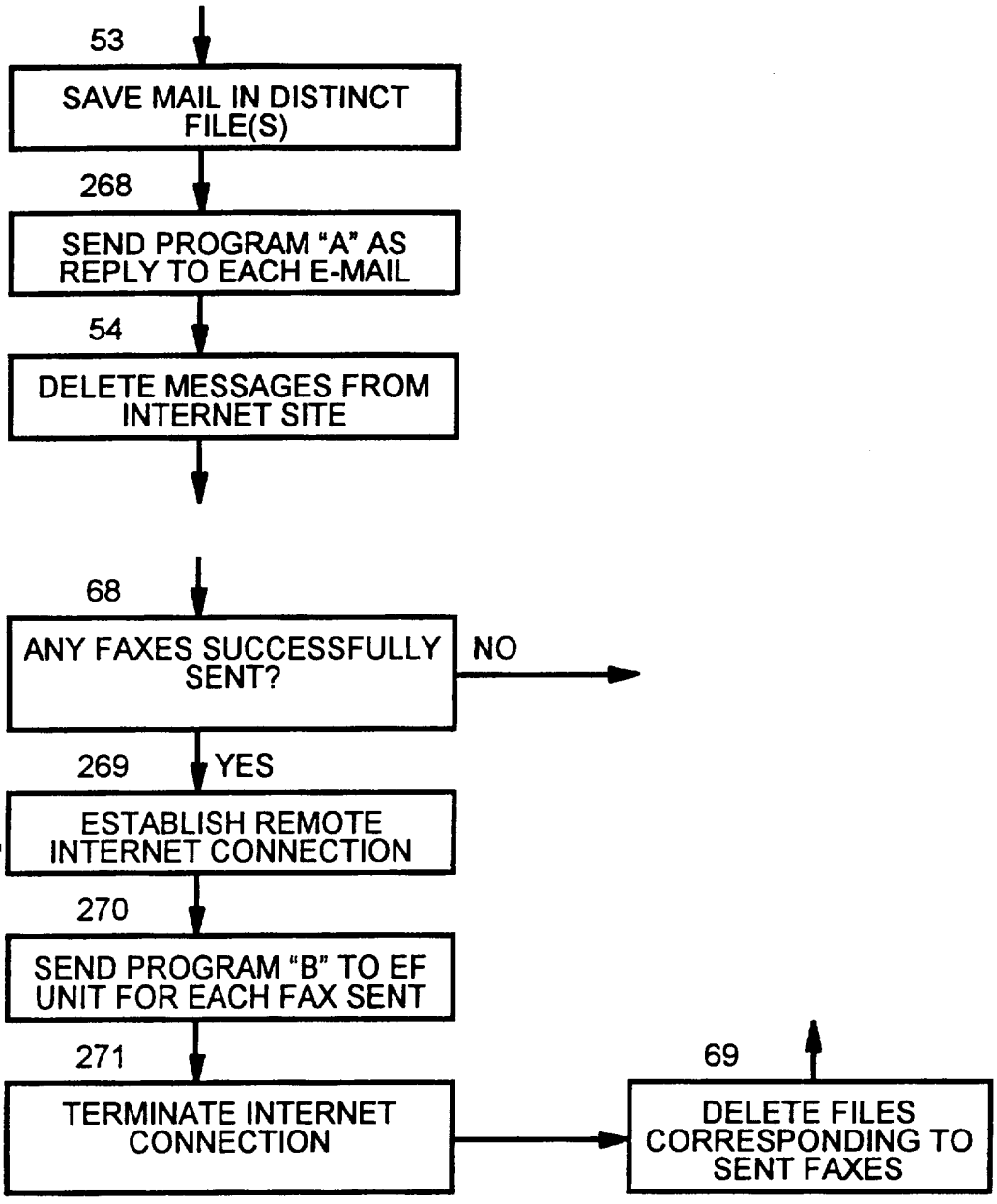

53
SAVE MAIL IN DISTINCT FILE(S)
268
SEND PROGRAM "A" AS REPLY TO EACH E-MAIL
54
DELETE MESSAGES FROM INTERNET SITE
68
ANY FAXES SUCCESSFULLY SENT?
NO
269
YES
ESTABLISH REMOTE INTERNET CONNECTION
270
SEND PROGRAM "B" TO EF UNIT FOR EACH FAX SENT
271
TERMINATE INTERNET CONNECTION
69
DELETE FILES CORRESPONDING TO SENT FAXES

Figure 23

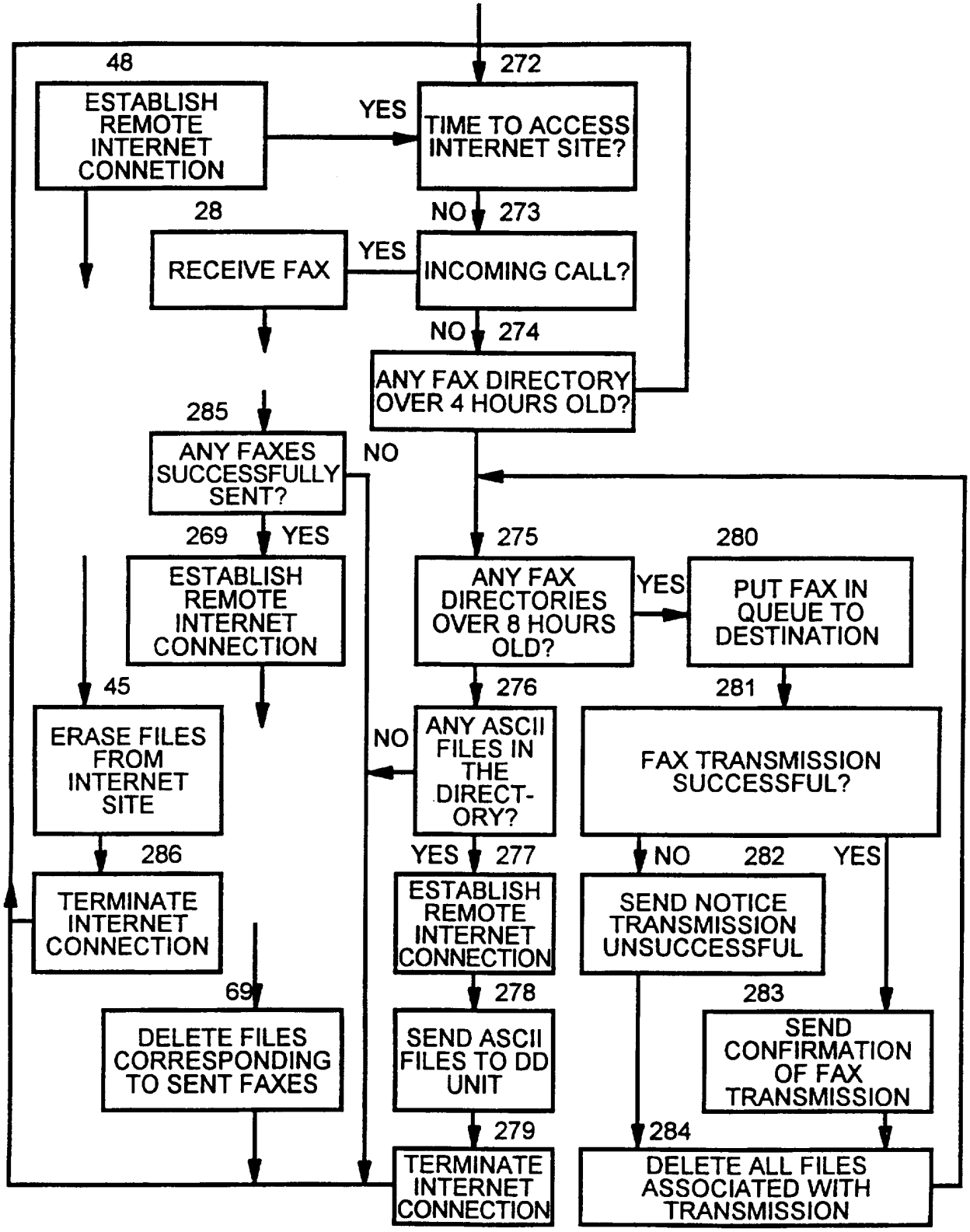

48
ESTABLISH REMOTE INTERNET CONNETION
YES
272
TIME TO ACCESS INTERNET SITE?
NO
273
28
RECEIVE FAX
YES
INCOMING CALL?
NO
274
ANY FAX DIRECTORY OVER 4 HOURS OLD?
285
ANY FAXES SUCCESSFULLY SENT?
NO
269
YES
ESTABLISH REMOTE INTERNET CONNECTION
275
ANY FAX DIRECTORIES OVER 8 HOURS OLD?
YES
280
PUT FAX IN QUEUE TO DESTINATION
45
ERASE FILES FROM INTERNET SITE
276
ANY ASCII FILES IN THE DIRECT-ORY?
NO
281
FAX TRANSMISSION SUCCESSFUL?
286
TERMINATE INTERNET CONNECTION
YES
277
ESTABLISH REMOTE INTERNET CONNECTION
NO
282
YES
SEND NOTICE TRANSMISSION UNSUCCESSFUL
69
DELETE FILES CORRESPONDING TO SENT FAXES
278
SEND ASCII FILES TO DD UNIT
283
SEND CONFIRMATION OF FAX TRANSMISSION
279
TERMINATE INTERNET CONNECTION
284
DELETE ALL FILES ASSOCIATED WITH TRANSMISSION

Figure 24

Figure 25a

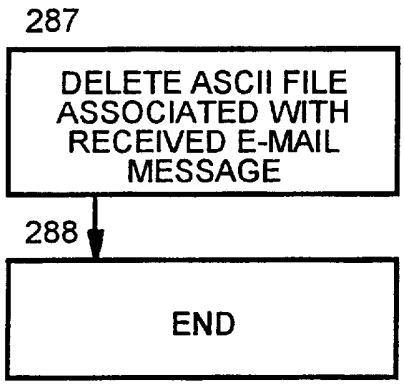
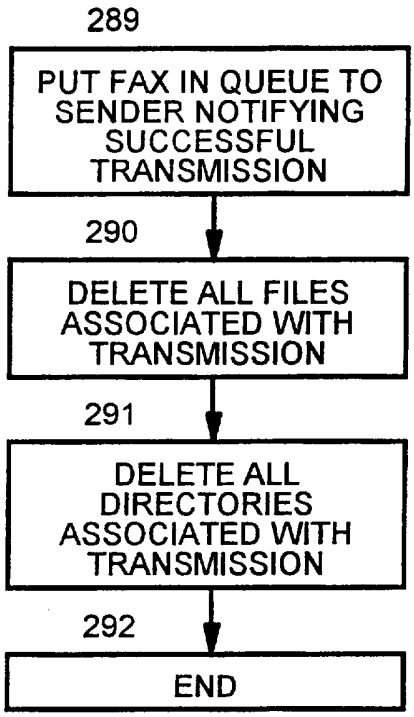


Figure 25b



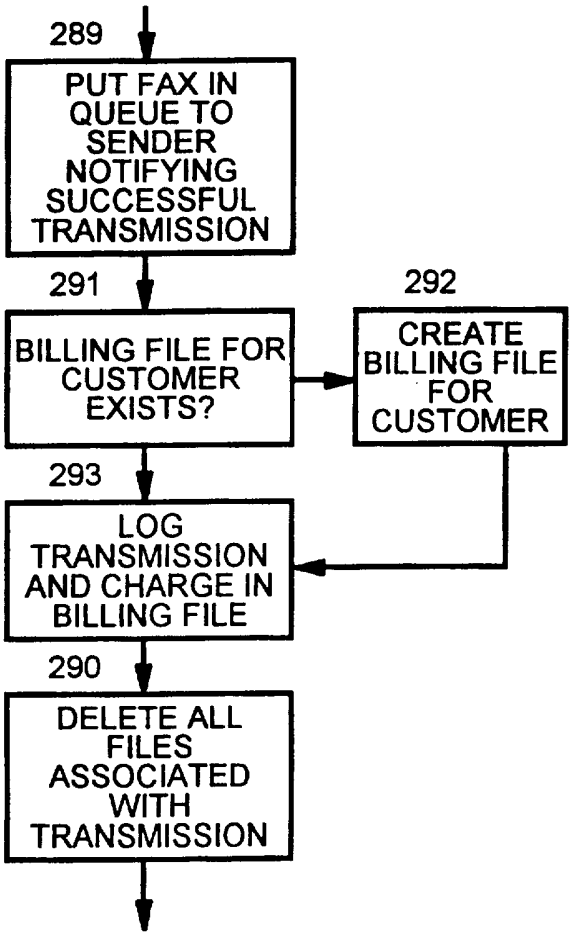


Figure 26a

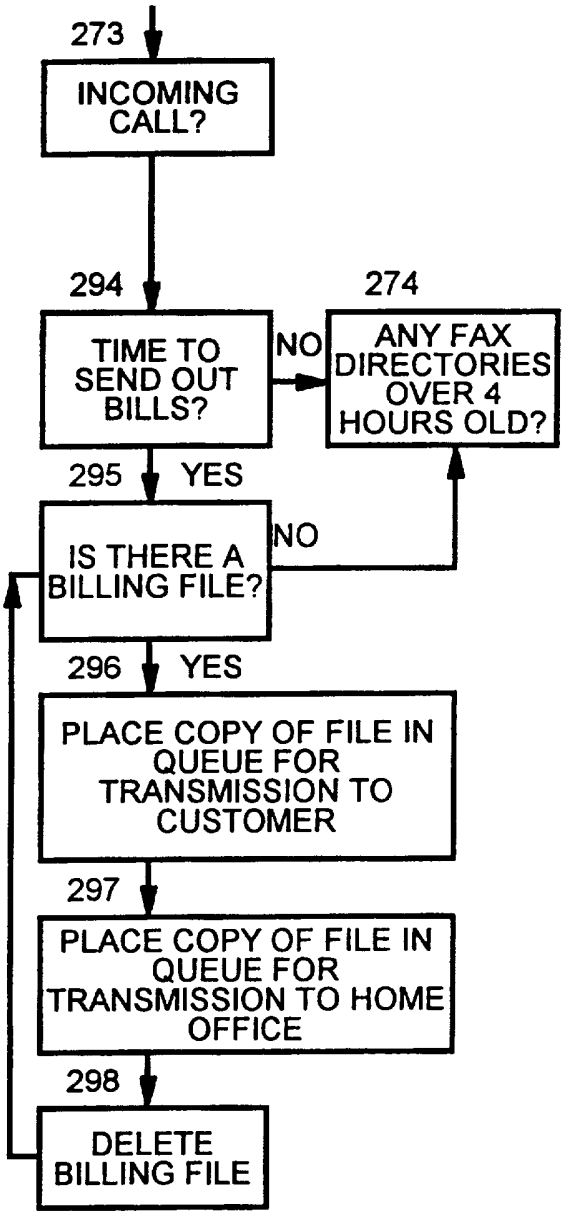


Figure 26b

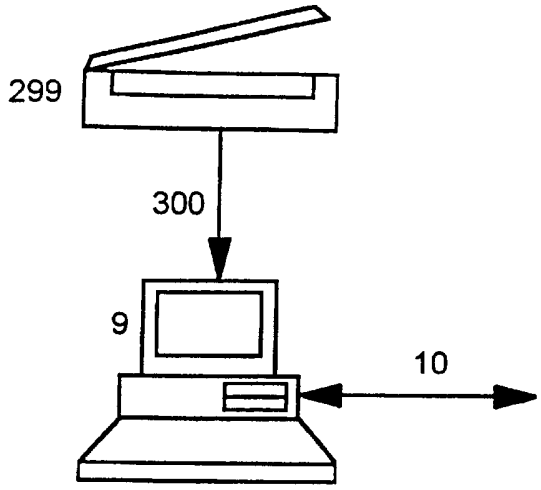


Figure 27

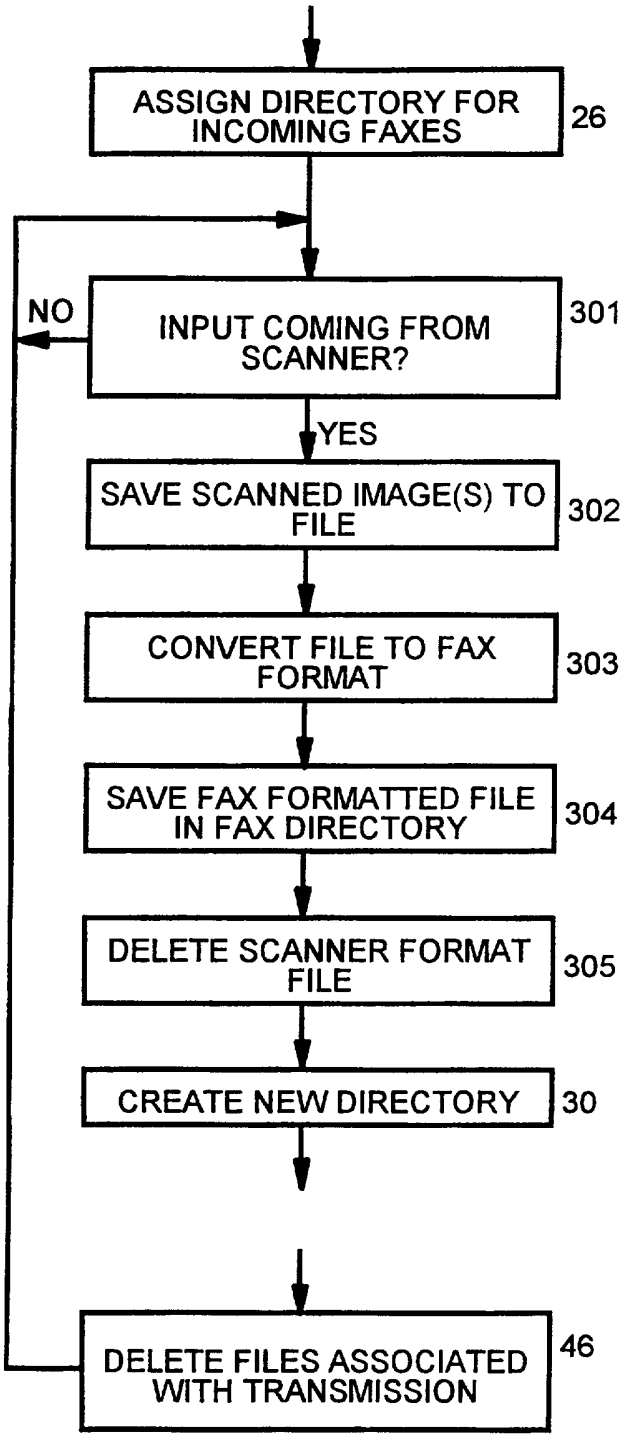

ASSIGN DIRECTORY FOR INCOMING FAXES
26
NO
INPUT COMING FROM SCANNER?
301
YES
SAVE SCANNED IMAGE(S) TO FILE
302
CONVERT FILE TO FAX FORMAT
303
SAVE FAX FORMATTED FILE IN FAX DIRECTORY
304
DELETE SCANNER FORMAT FILE
305
CREATE NEW DIRECTORY
30
DELETE FILES ASSOCIATED WITH TRANSMISSION
46

Figure 28

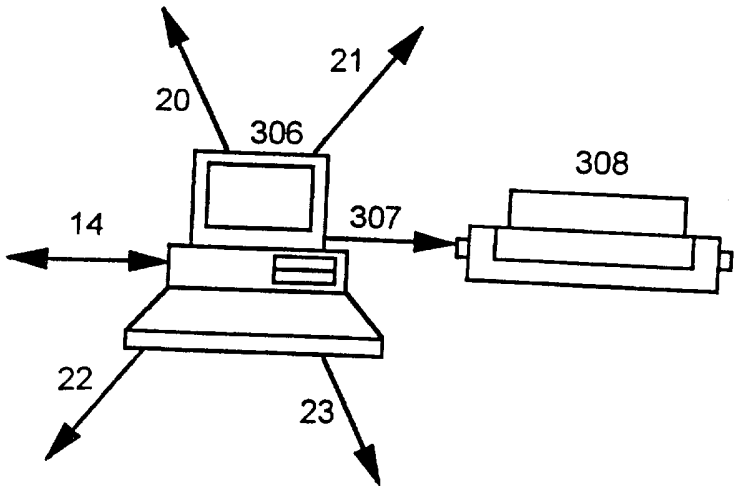


Figure 29

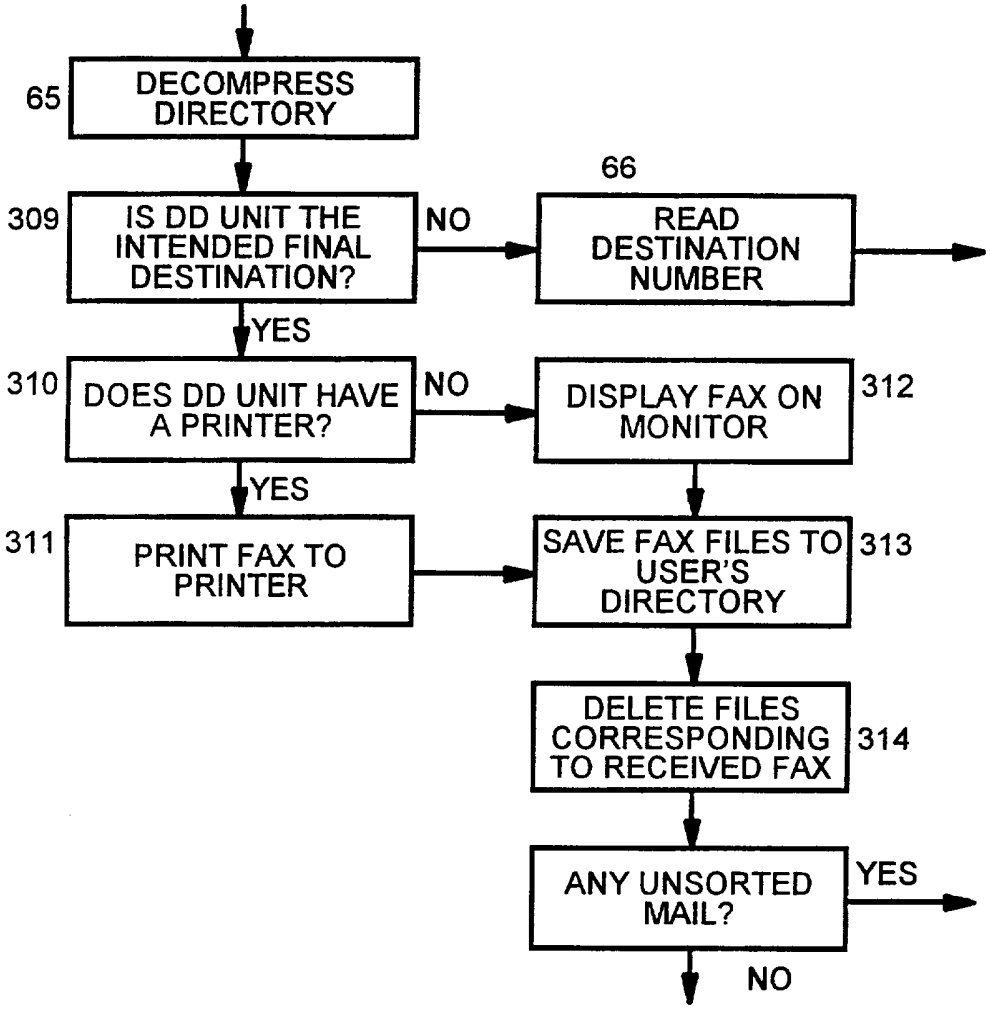

65
DECOMPRESS DIRECTORY
309
IS DD UNIT THE INTENDED FINAL DESTINATION?
NO
66
READ DESTINATION NUMBER
YES
310
DOES DD UNIT HAVE A PRINTER?
NO
DISPLAY FAX ON MONITOR
312
YES
311
PRINT FAX TO PRINTER
SAVE FAX FILES TO USER'S DIRECTORY
313
DELETE FILES CORRESPONDING TO RECEIVED FAX
314
ANY UNSORTED MAIL?
YES
NO

Figure 30

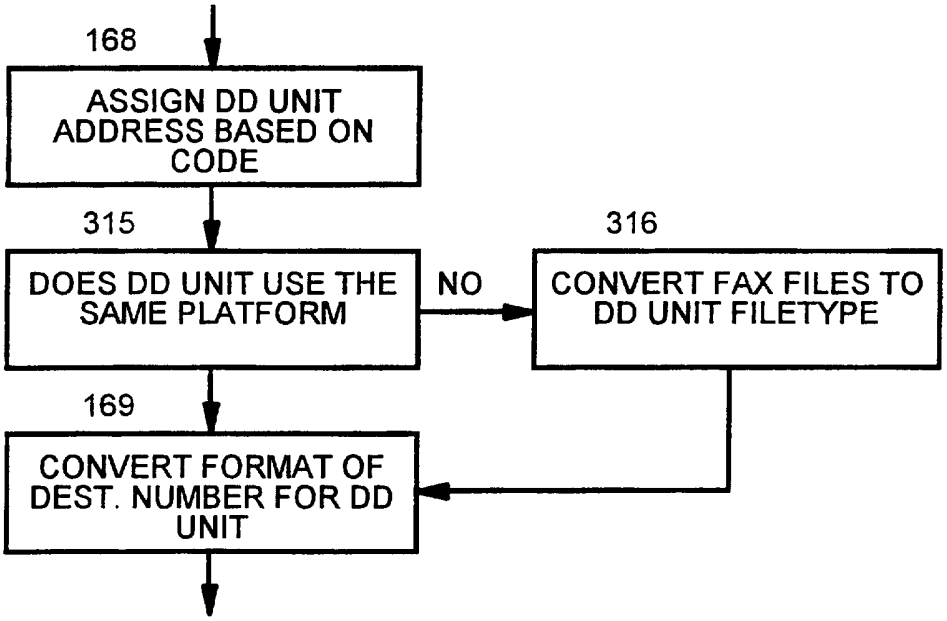

168
ASSIGN DD UNIT ADDRESS BASED ON CODE
315
DOES DD UNIT USE THE SAME PLATFORM
NO
316
CONVERT FAX FILES TO DD UNIT FILETYPE
169
CONVERT FORMAT OF DEST. NUMBER FOR DD UNIT

Figure 31

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/20294

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04N 1/00
US CL :358/401

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. : 358/400-403, 407, 440; 380/9, 41

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)

APS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,994,926 A (GORDON et al) 19 February 1991, Abstract, col. 2, line 44 - col. 4, line 29.	1, 3-16, 18-22, 24-28, 30-34, 36-43, 45-47, 48-52 --- 2, 17, 23, 29, 35, 44, 48, 53-56
Y	US 5,191,611 A (LANG) 02 March 1993, Abstract, col. 9, lines 29-63.	2, 17, 23, 29, 35, 44, 48, 53-56
Y	US 5,392,357 A (BULFER et al) 21 February 1995, Abstract, col. 14, line 63 - col. 15, line 6.	2, 17, 23, 29, 35, 44, 48, 53-56

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

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"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 22 APRIL 1997	Date of mailing of the international search report 14 MAY 1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer STEPHEN BRINICH Telephone No. (703) 305 4390

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