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(54) **Electronic document delivery system**

(57) A document, preferably in a portable format, is forwarded to a remote server (e.g. using HTTP to "push" the document to the server). The server sends a generic notification of the document to an intended recipient, and the recipient can download the document from the server using local protocols. A method and system is also provided that sends documents from a desktop computer inside an intranet through a series of firewalls and/or proxy servers to a server residing on the Internet. A computer in an intranet system protected by a firewall or proxy server uses a software application to access the Internet. The software also encodes binary data to be sent as text. This binary data may be subdivided into smaller text packets. The text packets are sent, using HTTP, to a server outside the firewall, which has been configured to accept such text packets. The server converts the text packets back to the original binary data representation. The binary data, once resident on the internet server, can then be forwarded directly to other internet servers, internet desktop computers, printers, or fax machines. A document delivery server is also provided that dynamically customizes the format of a document to be delivered, based on the capabilities of the recipient and the type of document to be delivered. The server attempts to maintain the information contained in the document in a high level representation and defers the decision of when to convert to a lower level representation, thereby maximizing the potential set of options and function at each step in the delivery process.

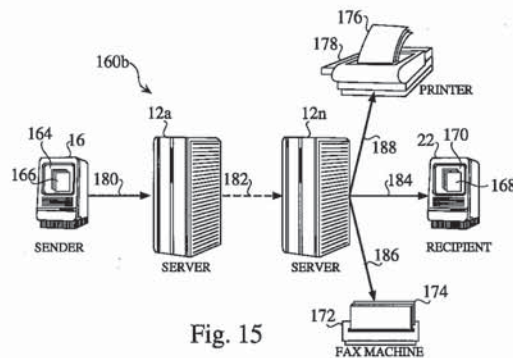


Fig. 15

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Description

The invention relates to the field of computer networks. More particularly, the invention relates to techniques for the delivery of electronic documents to users over the Internet.

5 The development of computerized information sources, such as those provided through the Internet or other on-line sources, has led to a proliferation of electronically available information. Currently, a user who subscribes to the Internet manually navigates through the Internet to visit sites which may or may not be of interest.

An inherent problem in this Internet system is that the available information is distributed through a "pull" type infrastructure, where the user who wants to receive information must manually search sites of interest, or use a finder application, to search and download appropriate information. For a user who wishes to publish and distribute information or documents, either an individual or a larger entity that has information that is desired to be distributed, the present "pull" system doesn't allow the freedom to send and distribute to a recipient or group of recipients, in a "push" fashion.

Facsimile technology is widely used at the present time for the distribution of simple documents, but has numerous drawbacks, including lower quality printed documents, costly and bulky paper copies (particularly if the recipient doesn't care to have a paper copy), loss of content (e.g. text and graphics can't be edited or manipulated), and time requirements for transmission, particularly for long or complex documents.

Electronic Mail (E-mail) provides a means for sending electronic messages from computer user to another. E-mail has advantages of convenience, format and storage of messages for later retrieval. As such, E-mail has been accepted and widely used for basic communication. E-mail is typically an ASCII based format, however, and proves to be very limiting for the communication of long or formatted documents. As well, E-mail is not the medium of choice for the distribution of complex documents, such as reports, articles, advertisements and art which can include page layout grids, postscript-formatted objects, multiple fonts with tracking and kerning, graphics, imbedded tables and spreadsheets, and other complicated information. Some E-mail systems provide a means for appending an ASCII based E-mail message with an associated file, to be downloaded along with the E-mail message. Most systems that allow the appending of an associated file are designed to allow a single user to send unsecured files to an associate or friend, and neither allow for controlled automated distribution to multiple recipients, nor do they provide advanced accounting, billing or other such features (e.g., receipt notification). E-mail gateways also limit the applicability of attachments, and do not solve the problems of security and receipt notation or acknowledgment.

C. Baudoin, *Interenterprise Electronic Mail Hub*, U.S. Patent No. 5,406,557 (11 April 1995) discloses an interenterprise communications center, which has a computer hub comprising a common core and a plurality of input and output modules. The input modules connect to a first end user, and convert a message sent by the first end user into a universal format. The hub core queues the message and forwards it to the output module for conversion into the format of the destination user. While the disclosed hub discloses techniques to relay simple e-mail messages, it is designed to convert the e-mail message formats, thus losing the integrity of the original text-based file.

35 The disclosed prior art systems and methodologies thus provide some methods for the delivery of documents, but fail to provide an economical, fast document delivery system that operates in a push-fashion, while conserving the integrity of the original electronic file. The development of such an electronic document delivery system would constitute a major technological advance. In addition, the ability to distribute electronic portable high-quality documents to many recipients in a controlled, economical and accountable fashion would constitute a further technological advance.

40 The Internet is increasingly being used for communications. It is now possible on the Internet for a sender to direct a document to a specific recipient, regardless of platform, operating system, or email system. Such communication is possible even when the recipient is not a computer but, rather, a fax machine or printer connected to the Internet.

In many instances, the sender of a document will reside on a local area network, referred to as an intranet. The sender's computer may be connected to the Internet directly, or through the intranet's server. An intranet is frequently protected and insulated from the Internet by a firewall or proxy server. A firewall is software and/or hardware which limits access to an intranet or a desktop computer. A proxy server is dedicated software and/or hardware which intercepts requests between machines running inside an intranet and machines outside the intranet.

45 Such firewall provides one or more of a few basic services. First, a firewall prevents intranet users from accessing specific information on the Internet. Thus, an office worker is restricted from accessing non-work-related Internet sites. Second, a firewall restricts outside access to the information available on the intranet. Third, a firewall prevents intranet users from sending confidential information from the intranet to the Internet. Typically, blocking unsolicited outside access to the intranet also blocks information transfer from intranet to Internet.

55 Various methods have been used to transfer data on the Internet between intranets protected by firewalls. One such method is the key management scheme described in *Aziz, Method and Apparatus for Key-Management Scheme for Use With Internet Protocols at Site Firewalls*, U.S. Patent No. 5,416,842 (16 May 1995). In this method, intersite traffic is encrypted at the Internet Protocol (IP) layer by using a Skip scheme to prevent detection of a source and destination address of a communicating node.

IP packets are encrypted only from site firewall to site firewall, such that only firewall servers need to participate in

the Skip scheme. When a firewall receives from an interior site node an IP packet intended for a remote firewall, it encrypts the IP packet and sends it encapsulated in another IP packet destined for the remote firewall. The remote firewall decrypts the encapsulated packet and sends it in the clear to the destination node on the interior side of the remote firewall.

5 Such method, however, requires the encrypted IP packet to be received by a remote firewall server that is configured to decrypt the packet. The encrypted information cannot be directly sent to a computer or intranet system that does not use such firewall server, or to a device such as a fax machine or printer.

A security system for connecting computer networks is described in *Gelb*, Security System for Preventing Unauthorized Communications Between Networks by Translating Communications Received in IP Protocol to Non-IP Protocol to Remove Address and Routing Services Information, U.S. Patent No. 5,550,984 (27 August 1996). However, *Gelb* does not address how documents may be sent through a firewall or proxy server.

10 It would therefore be an advantage to provide a method and system for sending documents through a series of firewalls and/or proxy servers. It would be a further advantage if such method and system permitted the documents to be transmitted to a device such as a fax machine or a printer. It would be yet another advantage if such method and system did not require the receiving computer or device to be served by a decrypting firewall.

15 One of the many complexities associated with delivering information between two disparate systems stems from basic incompatibilities between those systems including, for example, differences in capabilities. A printer has a very different set of capabilities than a personal computer, and a commensurate set of data formats which the printer might accept. A personal computer, for example, might be capable of processing a WordPerfect document, a portable document (e.g. Adobe Acrobat or Novell Envoy), or an HTML document. A printer, by contrast, might only be capable of accepting a PCL file or a Postscript file. A fax machine, as with a printer, may only accept a Group 3 compressed black and white raster representation of a document. Thus, various devices have various capabilities in terms of the types of data they may accept.

25 Similarly, different data types offer different levels of flexibility and function. For example, an Envoy or PDF file can be scaled to any resolution, can support millions of colors, and can include text and fonts. A Group 3 compressed fax image, on the other hand, is limited in resolution, only supports black and white colors, and includes no text or fonts, thereby limiting the ability of a recipient of a Group 3 compressed image to perform any operations, except for rudimentary operations.

30 The extended flexibility of a more robust data representation, such as a portable document, enables such documents to be converted to less robust representations. By illustration, a portable document might be converted to a Postscript file or even a Group 3 compressed image. One might therefore suggest that a portable document is a high level data representation and a Group 3 compressed image is a low level data representation.

In most cases, if the recipient system is capable of receiving a high level data representation, such representation is the data representation of choice due to the increased capabilities such representation provides. Thus, such representation offers a preferred common format, especially if such representation includes a mechanism that can convert the high level representation to a lower level representation as necessary.

35 M. Williams, R. Yun, *Method and Apparatus For Enhanced Electronic Mail Distribution*, U.S. Patent No. 5,424,724 (13 June 1995) disclose a method and apparatus for enhanced electronic mail distribution which permits distribution of electronic mail documents to multiple host systems and/or external networks via a single host agent. A host agent reference table is established at selected host agents within a local network. Each host agent reference table includes an identification of selected destination nodes associated with an identified host agent for those nodes. A referral to the host agent reference table is used to determine the appropriate host agent for an electronic document destined for a selected node. No provision is made within this method and apparatus for dynamic data conversion. Thus, documents are delivered with its level of representation unaltered and without regard for processing capability at a destination node.

40 T. Schultz, A. Gross, B. Pappas, G. Shifrin, L. Mack, *Apparatus and Method of Distributing Documents To Remote Terminals With Different Formats*, U.S. Patent No. 4,754,428 (28 June 1988) and T. Schultz, A. Gross, B. Pappas, G. Shifrin, L. Mack, *Electronic Mail*, U.S. Patent No. 4,713,780 (15 December 1987) disclose a method and apparatus for delivering a document originated at a local site by a source having a printer output that is normally connected to a printer, to one or more remote locations having printers or display devices that may differ from the printer normally connected to the printer output of the document generating source. Printer command signals which are normally provided at the printer output are converted to character and position data which represent the respective characters and their horizontal and vertical positions on each page of the document. The character and position data are transmitted to a remote location and reconverted to a form for driving a printer or other display device to produce a line-for-line conforming copy of the original.

55 The '428 and '780 patents disclose the use of upstream data conversion, but do not provide downstream data conversion. That is, the '428 and '780 patents disclose a method and apparatus that allows text to be sent to a printer and converted to a printer specific format. However, such method and apparatus lacks the ability to start with a high-level

representation of the data, and only convert to a lower level representation if such conversion is determined to be necessary. Thus, such approach is not satisfactory where printer format is not known or established prior to document origination, or where a heterogeneous network, such as the Internet, is used to deliver data.

5 L. Harkins, K. Hayward, T. Herceg, J. Levine, D. Parsons, *Network Having Selectively Accessible Recipient Prioritized Communication Channel Profiles*, U.S. Patent No. 5,513,126 (30 April 1996) discloses a method for a sender to automatically distribute information to a receiver on a network using devices and communications channels defined in a receiver profile. The receiver profile establishes the properties and mode for receipt of information for receivers on the network and the profile is published in a network repository for all network users or is accessible for selected groups or individuals on the network. The disclosed network does not provide for data conversion, but rather involves sending pre-
10 determined data based on the capabilities of the recipient which are communicated through channels. Thus, each recipient must first establish a format before data are exchanged.

M. Bloomfield, *Sender-Based Facsimile Store and Forward Facility*, I.S. Patent No. 5,404,231 (4 April 1995) discloses a system that provides sender-based store and forward services for delivering facsimile based information. The system is solely concerned with the delivery of facsimile bitmap images, and not with data conversion.

15 In view of the limitations attendant with the state of the art, it would be advantageous to provide a system in which the ability to descend to a lower level representation is preserved to allow the flexibility to do so at a future point in time, but that also enables a richer set of functions as appropriate.

The present invention intends to overcome the above problems. The object is solved by the apparatus according to independent claims 1, 13 and 36, the method according to independent claims 7, 15, 57 and 66 and the system of
20 binary data delivery according to independent claim 69.

Further advantages, features, aspects and details of the invention are evident from the dependent claims, the description and the accompanying drawings. The claims are intended to be understood as a first, non-limiting, approach of defining the invention in general terms.

25 The present invention generally relates to the field of computer networks. In particular it relates to techniques for the delivery of electronic document to users over the internet.

It is an object of the invention to provide an electronic document delivery system and methods of its use.

A document, preferably in a portable format, is forwarded to a remote server (*e.g.* using HTTP to "push" the document to the server). The server sends a generic notification of the document to an intended recipient, and the recipient can download the document from the server using local protocols. In preferred embodiments, the invention is used for
30 the controlled delivery of portable documents, from a sender to a large number of recipients, using a network of servers that route the documents and notifications in a store and forward manner, while providing routing and accounting information back to the sender.

According to a further aspect, the invention also provides a method and system for sending documents from a desktop computer inside an intranet through a series of firewalls and/or proxy servers to a server residing on the Internet. Firewalls presume that HTTP for textual data is a valid operation that allows users to fill in HTML forms. Thus, fire-
35 walls do not block HTTP for textual data. The invention circumvents the security provided by firewalls by using this feature of HTTP to move a document through the firewall.

A computer in an intranet system protected by a firewall or proxy server uses a software application to access the Internet. The software also encodes binary data to be sent as text. This binary data may be subdivided into smaller text
40 packets. The text packets are sent, using HTTP, to a server outside the firewall, which has been configured to accept such text packets. The server converts the text packets back to the original binary data representation. The binary data, once resident on the internet server, can then be forwarded directly to other internet servers, internet desktop computers, printers, or fax machines.

The invention provides in a further aspect a document delivery server which dynamically customizes the format of
45 a document to be delivered, based on the capabilities of the recipient and the type of document to be delivered. The server thereby enables the transparent delivery of formatted documents, regardless of the capabilities of the recipient. For example, the recipient platform could be a desktop computer, a network computer, a printer, a fax machine, or a personal digital assistant. The server attempts to maintain the information contained in the document in a high level representation and defers the decision of when to convert to a lower level representation, thereby maximizing the potential
50 set of options and function at each step in the delivery process. Accordingly, the invention starts with a high-level representation of data, and only converts to a lower level representation if necessary.

According to still another aspect a method and apparatus is provided in which a document preferably in a portable format, is forwarded to a remote server (*e.g.* using HTTP to "push" the document to the server). The server sends a generic notification of the document to an intended recipient, and the recipient can download the document from the
55 server using local protocols.

A method and system is also provided that sends documents from a desktop computer inside an intranet through a series of firewalls and/or proxy servers to a server residing on the Internet. A computer in an intranet system protected by a firewall or proxy server uses a software application to access the Internet. The software also encodes binary data

to be sent as text. This binary data may be subdivided into smaller text packets. The text packets are sent, using HTTP, to a server outside the firewall, which has been configured to accept such text packets. The server converts the text packets back to the original binary data representation. The binary data, once resident on the internet server, can then be forwarded directly to other internet servers, internet desktop computers, printers, or fax machines.

5 A document delivery server is also provided that dynamically customizes the format of a document to be delivered, based on the capabilities of the recipient and the type of document to be delivered. The server attempts to maintain the information contained in the document in a high level representation and defers the decision of when to convert to a lower level representation, thereby maximizing the potential set of options and function at each step in the delivery process.

10 The invention will be better understood by reference to the following description of embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a block diagram which depicts a binary file delivery system using one binary file server;

15 Figure 2 is a block diagram which depicts a binary file delivery system using two binary file servers;

Figure 3 is a block diagram which illustrates key elements of a store item;

Figure 4 is a schematic depiction of the binary file delivery server;

20

Figure 5 provides an example of the architecture of one embodiment of the binary file server;

Figure 6 illustrates different types of store events employed by the binary file delivery server;

25 Figure 7 is a block diagram of the specific components within the binary file delivery server architecture;

Figure 8 provides a block diagram illustrating of the architecture of the store;

Figure 9 illustrates how the user session organizes internet clients into three layers, including sessions, transactions, and transports;

30

Figure 10 illustrates the non-interactive tasks of a delivery, once the send session has created a store item or another server is forwarding a store item;

35 Figure 11 provides details of the account manager architecture;

Figure 12 provides details of the logger architecture;

Figure 13 provides details of the server connector architecture;

40

Figure 14 provides a functional block diagram which depicts a portable document delivery system using one portable document delivery server;

45 Figure 15 provides a functional block diagram which depicts a portable document delivery system using two portable document delivery servers;

Figure 16 illustrates how a portable document send client application and a portable document receive client application are used in the invention;

50 Figure 17 illustrates how a server configuration user interface application is used in the invention;

Figure 18 illustrates how a document can be sent by the fax gateway of a server to a printer;

55 Figure 19 illustrates how a document can be sent by the department gateway of a dedicated corporate server through a LAN to a department printer;

Fig. 20 is a schematic diagram of the system for transmission of data across a firewall and/or proxy server, according to the invention;

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