

ELECTRONIC MESSAGING IN A WIDE AREA NETWORK**TECHNICAL FIELD**

This invention relates to a method and apparatus for providing electronic communications.

5 BACKGROUND OF THE INVENTION

Messaging can be defined as time-delayed communication or communication in which the origination of the communication occurs asynchronously from its reception. For example, letters and public notices are traditional form
10 of messaging. Messaging also includes traditional forms of publishing, whether text/image-based (e.g. memoranda, books and periodicals), audio-based (e.g. tapes and compact discs) or audio/visually-based (e.g. movies). Other forms of messaging include voice mail, including multi-user systems
15 and answering machines, and electronic counterparts of traditional messaging, for example telegrams, cablegrams, faxes, telex, electronic mail, asynchronous computer-based conferencing (i.e. bulletin-boards) and electronic publishing.

20 Because messaging is communication across time, messaging requires storage of the message content. The way in which the message is stored can be used to distinguish types of messaging.

 "Store-and-forward" messaging is one type of
25 electronic messaging system. In store-and-forward messaging, a message is transmitted from its sender to its recipient through at least one "message transfer agent" (MTA). The message can be relayed through as many successive MTAs as are needed for the message to reach its final
30 destination. Each MTA independently chooses the next MTA to which to route the message, based on information carried along with the message, such as its intended recipient, together with information held by the MTA, such as routing

tables. If a message is directed to more than one recipient, an MTA can multicast the message by sending copies of the message to separate MTAs for forwarding to each intended recipient. When the message reaches an MTA
5 that has direct access to the recipient's mailbox, the message is deposited in local area network (LAN) storage associated with the recipient's mailbox. The LAN storage associated with recipient's mailbox is comprised of message stores for storing messages deposited therein.

10 During the messaging transmission process, each MTA temporarily stores the message, until the message is transferred to another MTA or deposited in the LAN storage associated with the recipient's mailbox. Thus, the MTAs constitute a succession of storage locations and the message
15 is forwarded from MTA to MTA until ultimately reaching the recipient's mailbox.

Referring to Fig. 1, the general structure of store and forward messaging as applied to LAN messaging and wide area network (WAN) messaging is shown. With respect to
20 LAN messaging, a message can be sent from a sender at a sender station 1 to a recipient at a recipient station 2 through a LAN 3. The message is transmitted from the sender station 2 through an MTA 6 in LAN 3. MTA 6 has a message store 12 that stores the message temporarily until the MTA,
25 acting on information carried along with the message, routes the message. Because MTA 6 has direct access to the recipient's mailbox 4, MTA 6 deposits the message into LAN 3 storage associated with the recipient's mailbox 4. The recipient can then access the message in his mailbox 4 from
30 the recipient station 2.

With respect to WAN messaging, a series of LAN systems may be connected together (not shown) or LAN systems may be connected through an intermediate WAN (shown in Fig. 1) to permit WAN messaging. As shown in Fig. 1, a message can be
35 sent from the sender at sender station 1 to a recipient at

a recipient station 11 through MTA 6 in LAN 3, MTA's 7, 8 and 9 in a WAN 17 and an MTA 10 in a LAN 5. MTA's 6, 7, 8, 9 and 10 have message stores 12, 13, 14, 15 and 16, respectively, that store the message temporarily until the MTA, acting on information carried along with the message, routes the message. The message is transmitted from sender station 1 to MTA 6 in LAN 3. MTA 6 routes the message to MTA 7 in WAN 17. MTA 7 in turn routes the message to MTA 8 in WAN 17 and MTA 8 in turn routes the message to MTA 9 in WAN 17. MTA 9 routes the message to MTA 10 in LAN 5. MTA 10 has direct access to the recipient's mailbox 18 and deposits the message into the LAN 5 storage associated with the recipient's mailbox 18. The recipient can access the message in his mailbox 18 from the recipient station 11.

Because store-and-forward messaging is an application specific overlay on a network, it has limitations. For example, the costs involved are spread only among the users of the store-and-forward messaging application. Moreover, the scope of messaging is limited to users of that application. Finally, diverse message formats and conversion from one format to another them are not readily accommodated.

SUMMARY OF THE INVENTION

The above problems are solved in accordance with the principles of the invention by providing a method and apparatus for WAN messaging using WAN storage and signalling capabilities. The invention generally includes three aspects: message origination, message storage and message reception.

Message origination includes the sender's deposit of a message into at least one message store on the WAN, identification of the addresses of the intended recipients and notification of each of the intended recipients of the availability and address of the message on the WAN.

Message storage refers to the characteristics of storage in the WAN. The message stores and the messages stored have a logical identity in the WAN independent of their physical realization such that uniform accessibility
5 is provided throughout the WAN.

Message reception refers to the recipient's processing of the message. Message reception is provided via "virtual mailboxes" that reside in storage elements on the WAN. The recipient's virtual mailbox does not contain
10 his messages. Instead, it serves as an aggregation and storage point for the signaling information that notifies the recipient of the availability and address of his messages on the WAN. The recipient's station uses the signaling data to alert the recipient of the existence of
15 his messages and to retrieve the messages under the recipient's direction.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing the structure of store-and-forward messaging.

20 Fig. 2 is a block diagram showing the structure of an embodiment of the invention.

Fig. 3 is a flow diagram illustrating the processing of messaging in accordance with an embodiment of the invention.

25 DETAILED DESCRIPTION

Referring to Fig. 2, the structure of an embodiment of the invention is shown. The sender's station
20 is connected to a LAN 21 which is connected to a WAN 24 and the recipient's station 23 is connected to a LAN 22
30 which is connected to WAN 24. LAN 21 and LAN 22 do not require message stores because the WAN 24 includes message stores, such as message stores 25, 26 and 27, for storing messages. WAN 24 also includes virtual mailboxes, such as

the recipient's virtual mailbox 28, for storing information regarding the availability and address of the recipient's messages.

To deposit a message into message stores in the WAN, the sender at a sender station allocates storage from the WAN by selecting at least one message store from those residing in storage elements integrated into the WAN and fills that message store with the contents of the message.

The storage location of a message may be chosen by the sender's station. For example, if all messages for a given recipient are stored in one location, the sender's station directly deposits the message into those message stores and, if there are multiple recipients, the sender's station deposits the message to the message stores associated with each of the recipients. Alternatively, if the recipients do not have locations dedicated to storage of their messages, the message is deposited in message stores in the WAN selected by the sender and accessible to all of the intended recipients through multiplexed access to the message stores, effectively consolidating the storage required. Consolidated storage is especially advantageous because it provides for administrative simplicity, more efficient use of storage resources and, as explained more fully below, open-ended sets of recipient to facilitate group communications and electronic publishing.

To signal the intended recipients, the recipients are notified of the message's availability and its address on the WAN. The signaling process begins with the determination of the addresses of the recipients. The sender may know the addresses of the intended recipients or may need to refer to network-based interactive directories. Once the recipients' addresses are determined, the sender at a sender station instructs the WAN to notify the recipients of the availability and address of the message via the

signaling mechanisms of the WAN.

In addition, the sender may store access authorization information for the message with the message in the message store. The access authorization information
5 may be the list of intended recipients, unlimited in the case of publically available information or specified by identifiable characteristics of a group, for example security clearance, organizational affiliation or subscribers to a service. The access authorization
10 information for a message can be different than the persons signaled of the availability of message. For example, a group may be authorized to access a message, such as any employee of a company, but only certain members of that group being signaled of its availability, such as the
15 members of a particular project.

The sender need not signal all of the recipients at the same time. For instance, if the sender were to think of an additional recipient a day after sending the message, resending it would require only signaling the additional
20 recipient and, perhaps, notifying the message store to add the additional recipient to the list of persons authorized to access the message.

In many messaging applications, the recipients are not explicitly enumerated by the sender, but are determined
25 instead through processes such as self-selection, third-party reference or guided searching. In such cases, the signaling process may be absent. For example, a recipient can select a message by browsing through accessible message stores, by receiving a reference to it from a friend, co-
30 worker or from another message or by searching through messages on the basis of keywords or other identifier provided by the sender. In such situations the new recipient must be authorized to access the message. The access authorization information may be broad enough to
35 already include the new recipient or a recipient may be

allowed to extend the access authorization to include a new recipient.

The message stores have the following characteristics. The message stores are located in storage elements integrated into the WAN. This functional integration is independent from questions of ownership or physical location.

The message stores and the messages stored therein have a logical identity in the WAN, independent of their physical realization at any given moment. This enables greater reliability and efficiency by, for example, distributing the storage of a given message across multiple message stores.

The message stores are uniformly accessible from throughout the WAN. This means that they offer the same functionality independent of their physical location or that of the person accessing the message. As different recipients access a given message store from arbitrary locations, the functionality available to each recipient from the message store varies only with the characteristics of the recipient station used by the recipient to access the message store and its connection to the WAN (e.g. bandwidth).

Access to message stores can be multiplexed, allowing concurrent access by multiple senders and recipients. Thus, the senders and recipients are unlikely to be blocked when sending or receiving messages as can be the case with storage elements having more limited connectivity to the WAN.

The message stores control access to the messages they contain in accordance with the access authorization information provided by the sender.

Message reception is provided for via "virtual mailboxes." A virtual mailbox resides in storage elements in the WAN, but does not store the content of the

recipient's messages. Instead, a virtual mailbox serves as an aggregation and storage point for signaling information that notifies a recipient of the availability and address of a message on the WAN. The recipient's station makes use of
5 this signaling information to alert the recipient of the existence and availability of the message and to retrieve the message under the recipient's direction.

Because a recipient's messages can reside in multiple message stores spread throughout the network, the
10 essence of the signaling information contained in the virtual mailbox is the reference to messages available to the recipient. Because of uniform accessibility to the message stores, the recipient's station can make use of those references to retrieve the recipient's messages.
15 Through the use of the information stored in the virtual mailbox, the recipient can access his messages residing in multiple message stores in the WAN as if all of his messages were stored in a single mailbox.

The messages referenced in the virtual mailbox may
20 include any type of information, from any medium. For example, a virtual mailbox could hold references to a text message on one LAN server, an audio message on another LAN server, another audio message on a voice-mail adjunct to a PBX or an audio/video message in another LAN server.

25 Referring to Fig. 3, a flow diagram illustrating the process of messaging in accordance with an embodiment of the invention is shown. To send a message, the sender instructs his sender station 20 to initiate WAN messaging (step 100). LAN 21 connects sender station 20 to WAN 24
30 (step 101). The sender station 20 allocates storage from WAN 24 by selecting message stores, e.g. message stores 25, 26 and 27, from available message stores in WAN 24 (step 102). The sender station deposits the message into the selected message stores in the WAN and the message is stored
35 in the selected message stores (step 104).

The sender identifies the intended recipients of the message (step 106). If the sender would like to provide access to additional persons of a specified class, the sender may provide message access authorization information
5 such that additional persons falling within the specified class of authorized persons can access to the message (steps 108, 110).

In response to deposit of the message and identification of intended recipients by the sender,
10 sender's station 20 is disconnected from WAN 24 and the WAN signals the intended recipient of the availability and address of the message in the message stores in the WAN by placing a reference to the message in the recipient's virtual mailbox 28 (step 112).

15 To receive the message, the recipient instructs the recipient station 23 to access his virtual mailbox 28 (step 116). LAN 22 connects recipient station 23 to WAN 24 (step 117). The virtual mailbox 28 contains a reference notifying the recipient of the availability and address of
20 the message (step 118). The recipient instructs the recipient station 23 to access the message (step 120). Using the message address stored in virtual mailbox, the recipient station accesses and provides the recipient with interactive access to the message stored in message stores
25 in the WAN (step 121). After access to the message is complete the recipient station is disconnected from the WAN 24 (step 122).

If the sender has made the message accessible to additional persons of a specified class, the WAN also makes
30 the message available to persons satisfying the access authorization information (steps 123, 124). Once such a person identifies the address of the message through, for example, the means referred above (step 125) using the address information, he can instruct his user station to
35 access the message (step 126).

When such a person attempts to access the message, the message store 26 verifies that the person satisfies the access authorization information (step 128). If the access authorization information is satisfied, interactive access
5 to the message is provided (step 130). If the access authorization information is not satisfied, access to the message is denied (step 132). Thereafter, the recipient's station is disconnected from the WAN 24 (step 133).

After the message has been accessed by the
10 recipient and/or additional persons of the specified class, the message remains stored in the message stores in the WAN for access by additional intended recipients and other persons satisfying the access authorization information (step 134).

15 It is to be understood that the above description is only of one preferred embodiment of the invention. Numerous other arrangements may be devised by one skilled in the art without departing from the scope of the invention. The invention is thus limited only as defined in the
20 accompanying claims.

CLAIMS:

1. A method for electronic messaging using wide area network (WAN) signalling and storage capabilities, comprising:
 - 5 allocating storage in a WAN having an address in the WAN;
 - depositing a message into the allocated storage;
 - identifying persons authorized to have access
 - 10 to the message; and
 - instructing the WAN to signal persons authorized to have access to the message of an available message and the address of the message in the allocated storage in the WAN.
- 15 2. The method of claim 1 wherein allocating storage in a WAN comprises selecting a message store from available message stores in the WAN.
3. The method of claim 1 wherein identifying persons authorized to have access to the message comprises
- 20 identifying at least one intended recipient of the message.
4. The method of claim 1 wherein identifying persons authorized to have access to the message comprises identifying characteristics of a class authorized to have access to the message.
- 25 5. An apparatus for electronic messaging using wide area network (WAN) signalling and storage capabilities, comprising:
 - a means for allocating storage in a WAN having an address in the WAN;
 - 30 a means for depositing a message into the allocated storage;



a means for identifying persons authorized to have access to the message; and

5 a means for instructing the WAN to signal persons authorized to have access to the message of an available message and the address of the message in the allocated storage in the WAN.

6. The apparatus of claim 5 wherein the means for allocating storage in a WAN comprises a means for selecting a message store from available message stores in
10 the WAN.

7. The apparatus of claim 5 wherein the means for identifying persons authorized to have access to the message comprises a means for identifying at least one intended recipient of the message.

15 8. The apparatus of claim 5 wherein the means for identifying persons authorized to have access to the message comprises a means for identifying characteristics of a class authorized to have access to the message.

9. A method for electronic messaging using wide
20 area network (WAN) signalling and storage capabilities, comprising:

identifying an available message and an address of the message in allocated storage in a WAN;
and

25 using the address of the message in allocated storage in the WAN to interactively access the message in allocated storage in the WAN.

10. The method of claim 9 wherein identifying an available message and an address of the message in allocated
30 storage in a WAN comprises accessing a virtual mailbox



comprised of storage elements in the WAN for storing a notification of the availability of the message and the address of the message in allocated storage in the WAN.

11. The method of claim 9 wherein the allocated
5 storage on the WAN comprises a message store.

12. An apparatus for electronic messaging using wide area network (WAN) signalling and storage capabilities, comprising:

10 a means for identifying an available message and an address of the message in allocated storage a WAN; and

a means for using the address of the message in allocated storage in the WAN to interactively access the message in allocated storage in the WAN.

15 13. The apparatus of claim 12 wherein the means for identifying an available message and an address of the message in allocated storage in a WAN comprises a means for accessing a virtual mailbox comprised of storage elements in the WAN for storing a notification of the availability of
20 the message and the address of the message in allocated storage in the WAN.

14. The apparatus of claim 12 wherein the allocated storage on the WAN comprises a message store.

15. A method for electronic messaging using wide
25 area network (WAN) signalling and storage capabilities, comprising:

providing storage in a WAN for receiving a message and for receiving an identification of persons authorized to have access to the message;

30 signalling the persons authorized to have



access to the message of an available message and an address of the message in the storage in the WAN; and providing interactive access to the message in the storage in the WAN through the use of the address of the message.

16. The method of claim 15 wherein the storage in a WAN network for receiving a message and for receiving an identification of the persons authorized to have access to the message comprises a message store.

17. The method of claim 15 wherein the identification of the persons having access to the message comprises the identity of at least one intended recipient of the message.

18. The method of claim 15 wherein the identification of the persons having access to the message comprises identifying characteristics of a class authorized to have access to the message.

19. The method of claim 15 wherein signalling the intended recipients of an available message and an address of the message comprises storing in a virtual mailbox comprised of storage elements in the WAN a notification of the availability and address of the message.

20. An apparatus for electronic messaging using wide area network (WAN) signalling and storage capabilities, comprising:

a means for providing storage in a WAN for receiving a message and for receiving an identification of persons authorized to have access to the message;

a means for signalling the persons authorized to have access to the message of an available message



and an address of the message in the storage in the WAN; and

5 a means for providing interactive access to the message in the storage in the WAN through the use of the address of the message.

21. The apparatus of claim 20 wherein the means for providing storage in a WAN for receiving a message and for receiving an identification of persons authorized to have access to the message comprises a message store.

10 22. The apparatus of claim 20 wherein the means for receiving an identification of the persons having access to the message comprises a means for identifying of at least one intended recipient of the message.

15 23. The apparatus of claim 20 wherein the means for identification of the persons having access to the message comprises a means for identifying characteristics of a class authorized to have access to the message.

20 24. The apparatus of claim 15 wherein the means for signalling the intended recipients of an available message and an address of the message comprises a means for storing in a virtual mailbox comprised of storage elements in the WAN a notification of the availability and address of the message.

25 25. A method of electronic messaging using wide area network (WAN) storage and signalling capabilities, comprising instructing a WAN to signal a virtual mailbox comprised of storage elements in the WAN.

26. The method of claim 25 wherein instructing the WAN to signal a virtual mailbox comprised of storage



elements in the WAN comprises instructing the WAN to signal the virtual mailbox of an available message and an address of the message.

27. An apparatus or electronic messaging using
5 wide area (WAN) network storage and signalling capabilities, comprising a means for instructing a WAN to signal a virtual mailbox comprised of storage elements in the WAN.

28. The apparatus of claim 27 wherein the means
10 for instructing a WAN to signal a virtual mailbox comprised of storage elements in the WAN comprises a means for instructing the WAN to signal the virtual mailbox of an available message and an address of the message.

29. A method of electronic messaging using wide
15 area network (WAN) storage and signalling capabilities, comprising signalling a virtual mailbox comprised of storage elements in a WAN.

30. The method of claim 29 wherein signalling a
20 virtual mailbox comprised of storage elements in a WAN comprises signalling the virtual mailbox of an available message and an address of the message.

31. An apparatus for electronic messaging using
wide area network (WAN) storage and signalling capabilities, comprising a means for signalling a virtual mailbox comprised of storage elements in a WAN.

25 32. The apparatus of claim 31 wherein the means for signalling a virtual mailbox comprised of storage elements in a WAN comprises a means for signalling the virtual mailbox of an available message and an address of the message.



33. A method for electronic messaging using wide area (WAN) network storage and signalling capabilities, comprising retrieving information stored in a virtual mailbox comprised of storage elements in a WAN.

5 34. The method of claim 33 wherein retrieving information stored in a virtual mailbox comprised of storage elements in a WAN comprises retrieving information regarding an available message and an address of the message stored in the WAN.

10 35. An apparatus for electronic messaging using wide area network (WAN) storage and signalling capabilities, comprising a means for retrieving information stored in a virtual mailbox comprised of storage elements in a WAN.

15 36. The apparatus of claim 35 wherein the means for retrieving information stored in a virtual mailbox comprised of storage elements in a WAN comprises a means for retrieving information regarding an available message and an address of the message stored in the WAN.

20 37. A virtual mailbox comprising storage elements in a wide area network (WAN).

38. The virtual mailbox of claim 37 wherein the signalling information stored comprises information regarding an available message and an address of the message stored in the WAN.

