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(72) Inventeurs/Inventors:

REBERT, TREBER, US;
ISABELLE, JONATHAN, US;
WEBSTER, JASON K., US

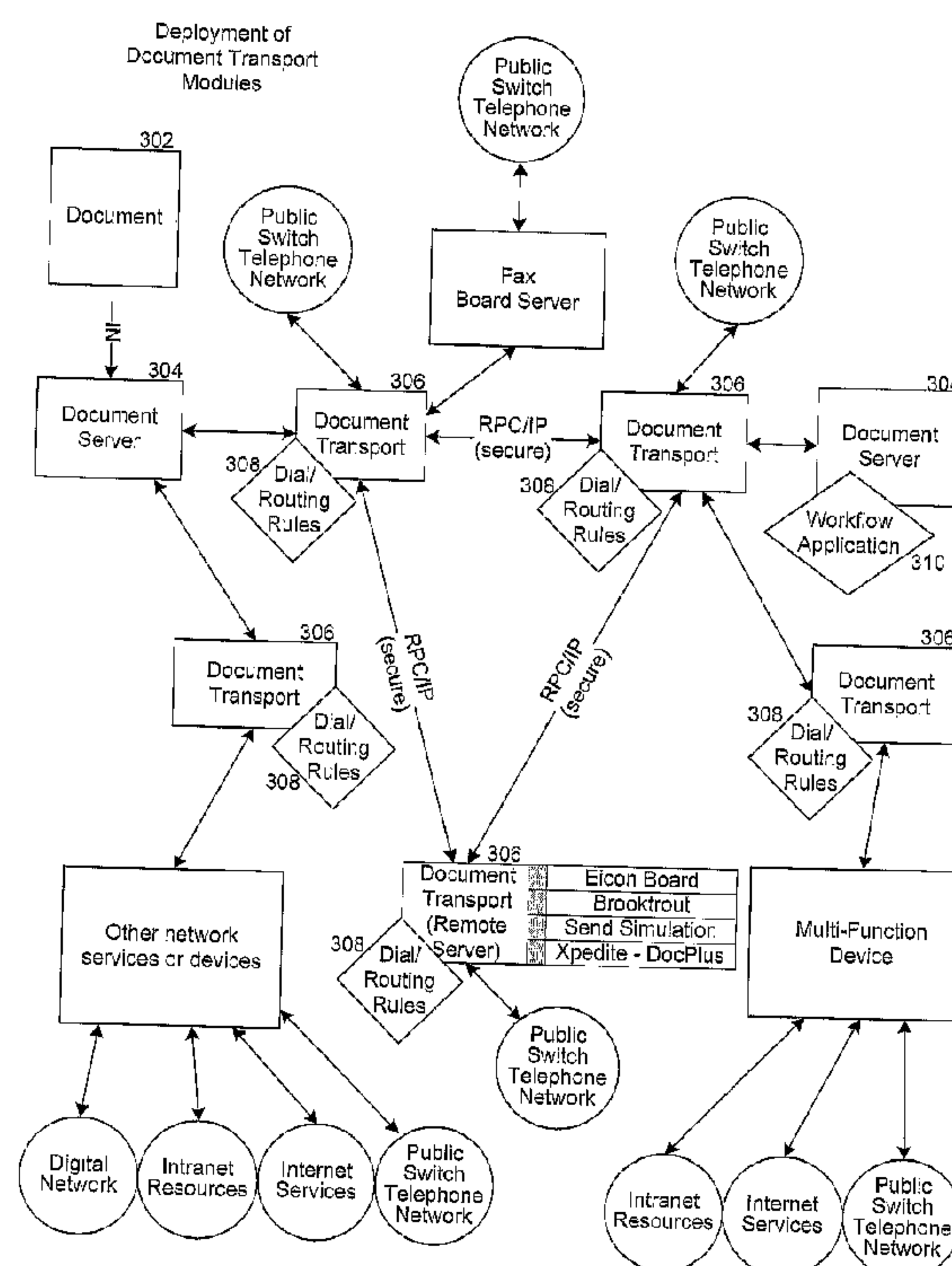
(73) Propriétaire/Owner:

OPEN TEXT INC., US

(74) **Agent:** OYEN WIGGS GREEN & MUTALA LLP

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(54) Title: UNIVERSAL DOCUMENT TRANSPORT



(57) **Abrégé/Abstract:**

A universal document transport facility is described where, in various embodiments, the facility recognizes document requests based on a received document, interacts with document routing rules and workflow requirements with respect to the received document, and manages content flows between network nodes or devices. In various embodiments, the facility includes a document transport module for transporting documents between network devices, such as printers, fax boards, and content servers and across local and wide-area networks; functionality for routing optimization with other communications networks, such as messaging services, telephony, and IP networks; and flexible document transport capabilities to workflow applications and multifunction devices (such as all-in-one print/scan/copy/fax/telephone/answering machine devices) and multifunction devices enhanced with video & video capture, messaging, email, network router & gateway capabilities.



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[Continued on next page]

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UNIVERSAL DOCUMENT TRANSPORT

BACKGROUND

[0002] Computer networks generally enable data communications between computing devices ("network nodes") that are connected to such computer networks. Many such computer networks are interconnected, such as via the Internet, and can have "transports" that transport documents and other computer files between network nodes. A document is a container for any type of digital content, including facsimiles, voice messages, videos, wordprocessing documents, spreadsheets, and any other type of media, including multimedia.

[0003] However, conventional transports have various deficiencies. As an example, conventional transports cannot intelligently select a network from multiple available networks based on the type of document that needs to be communicated between computing devices. Instead, they generally use the same network to transport documents without regard as to whether some networks may be better adapted to transport a particular document type.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Figure 1 is a block diagram illustrating a suitable computing system in which aspects of the invention may be implemented.

[0005] Figure 2 is a flow diagram illustrating a send_document routine invoked by a Document Transport module in some embodiments.

[0006] Figure 3 is a block diagram illustrating use of the Document Transport in some embodiments.

[0007] Figure 4 is a block diagram illustrating a Document Transport with MIME support.

[0008] Figure 5 is a block diagram illustrating rules for least-cost-routing and for store-and-forward document transport in some embodiments.

[0009] Figure 6 is a block diagram illustrating some of the queue management done by separate protocols administered by Document Transport.

[0010] The headings provided herein do not necessarily limit the scope of the invention.

DETAILED DESCRIPTION

[0011] Various embodiments of the invention will now be described. The following description provides specific details for a thorough understanding and enabling description of these embodiments. One skilled in the art will understand, however, that the invention may be practiced without many of these details. Additionally, some well-known structures or functions may not be shown or described in detail, so as to avoid unnecessarily obscuring the relevant description of the various embodiments.

[0012] The terminology used in the description presented below is intended to be interpreted in its broadest reasonable manner, even though it is being used in conjunction with a detailed description of specific embodiments of the invention. Some terms may even be emphasized below. However, any terminology intended to be interpreted in any restricted manner will be overtly and specifically defined as such in this Detailed Description section.

[0013] A universal Document Transport ("DocTrans") module is described. The DocTrans module can function with a document server (e.g., a RightFax server) to recognize document requests, interact with document routing rules and workflow requirements, and manage document flows between network nodes or devices. The DocTrans module provides to its operator multiple benefits over conventional transports. Examples include providing a common processing architecture for all message transports rather than requiring individual processing engines for multiple transport types; having common scheduling and queuing support for each transport type; and selecting document- or hardware- specific processing tasks by reference to the type of protocol. This is applicable to multifunction devices such as all-in-one print/scan/copy/fax/telephone/answering machine devices, which may be enhanced with audio & video capture, messaging, email, network router & gateway capabilities. DocTrans modules can also integrate messaging and workflow operations when using standalone machines that perform these functions on a network.

[0014] The DocTrans module provides methods for transporting documents between network devices, such as printers, fax boards, and document servers (e.g., RightFax 9.0 facsimile server by Captaris, Inc. of Bellevue, Washington) across local and wide-area networks, and permits document transport and routing optimization with other types of communications networks (e.g., messaging services, telephony, and Internet Protocol ("IP") networks). Document servers can handle faxes and other documents, such as for routing purposes. The module can route documents instead of, or in addition to, a board server, such as a fax board server. The DocTrans module routes documents in a manner that is similar to how a board server routes documents, except that the DocTrans module can route documents based on a document type or a transport's type in addition to just phone number, user, group, and so forth. In addition, the DocTrans module exposes an interface that permits other types of document transport mechanisms (e.g., multi-function devices, email, and SMS servers) to operate with various networks systems, and to be extended so that routing operations (such operations as StartTransmission, SendDocument, ReceiveDocument, EndTransmission, or StatusCheck) can be readily used with other network services.

[0015] The DocTrans module can be implemented as an independently configurable software module that transports content and related metadata across

computer networks. It can function as a communication layer between various computer networks and network servers that perform discrete document creation, storage and transmission tasks. The DocTrans module can operate independently of the originating message service or source of a document to perform operations on documents, such as send, receive, or cache documents and messages, once a task is loaded, and can operate independently to receive items (such as facsimile tasks) for forwarding later. It permits flexible, programmable, and optimized rules-based routing of documents in various message formats and on multiple network types.

[0016] Conventional fax products did not provide board servers with loading balancing capabilities or analysis of cost, time, or security rules for routing across multiple types of document and messaging protocols (e.g., MIME, SMS, T.37 fax, T.38 fax). By contrast, the DocTrans module is extensible to perform document transport and load equalization on virtually all document types and network types using those messaging protocols. This feature is prevalent now given the wide use of multifunction devices such as all-in-one print/scan/copy/fax/telephone/answering machine devices, which may be enhanced with audio & video capture, messaging, email, network router & gateway capabilities. DocTrans modules can also integrate messaging and workflow operations when using standalone machines that perform these functions on a network.

[0017] Turning now to the figures, Figure 1 and the following discussion provide a brief, general description of a suitable computing environment in which aspects of the invention can be implemented. Although not required, aspects and embodiments of the invention will be described in the general context of computer-executable instructions, such as routines executed by a general-purpose computer, e.g., a server or personal computer. Those skilled in the relevant art will appreciate that the invention can be practiced with other computer system configurations, including Internet appliances, hand-held devices, wearable computers, cellular or mobile phones, multi-processor systems, microprocessor-based or programmable consumer electronics, set-top boxes, network PCs, mini-computers, wireless network devices, mainframe computers and the like. The invention can be embodied in a special purpose computer or data processor that is specifically programmed, configured or constructed to perform one or more of the computer-executable instructions explained in detail below. Indeed, the term "computer", as

used generally herein, refers to any of the above devices, as well as any data processor.

[0018] The invention can also be practiced in distributed computing environments, where tasks or modules are performed by remote processing devices, which are linked through a communications network, such as a Local Area Network ("LAN"), Wide Area Network ("WAN") or the Internet. In a distributed computing environment, program modules or sub-routines may be located in both local and remote memory storage devices. Aspects of the invention described below may be stored or distributed on computer-readable media, including magnetic and optically readable and removable computer discs, stored as firmware in chips (e.g., EEPROM chips), as well as distributed electronically over the Internet or over other networks (including wireless networks). Those skilled in the relevant art will recognize that portions of the invention may reside on a server computer, while corresponding portions reside on a client computer. Data structures and transmission of data particular to aspects of the invention are also encompassed within the scope of the invention.

[0019] Referring to Figure 1, one embodiment of the invention employs a computer 100, such as a personal computer or workstation, having one or more processors 101 coupled to one or more user input devices 102 and data storage devices 104. The computer is also coupled to at least one output device such as a display device 106 and one or more optional additional output devices 108 (e.g., printer, plotter, speakers, tactile or olfactory output devices, etc.). The computer may be coupled to external computers, such as via an optional network connection 110, a wireless transceiver 112, or both.

[0020] The input devices 102 may include a keyboard and/or a pointing device such as a mouse. Other input devices are possible such as a microphone, joystick, pen, game pad, scanner, digital camera, video camera, and the like. The data storage devices 104 may include any type of computer-readable media that can store data accessible by the computer 100, such as magnetic hard and floppy disk drives, optical disk drives, magnetic cassettes, tape drives, flash memory cards, digital video disks (DVDs), Bernoulli cartridges, RAMs, ROMs, smart cards, etc. Indeed, any medium for storing or transmitting computer-readable instructions and data may be employed, including a connection port to or node on a network such as

a local area network (LAN), wide area network (WAN) or the Internet (not shown in Figure 1).

[0021] Figure 2 is a flow diagram illustrating a send_document routine invoked by the DocTrans module in some embodiments. The routine may be employed by the facility to send a document, such as a fax document. The routine begins at block 202 where it receives an indication of a document as a parameter.

[0022] At block 204, the routine applies dialing or routing rules to the indicated document. The dialing or routing rules determine how the facility is to transport or route a document. As an example, dialing or routing rules may indicate that a document that is to be sent at a specific time or is from a particular user is to be sent using a specific document transport.

[0023] At block 206, the routine selects a target based on the applied dialing or routing rules. As examples, the routine may select a public service telephone network ("PSTN"), another RightFax server, a board server containing one or more communications devices, and so forth. As examples, the DocTrans may select a target based on metadata, type of document, or other attributes relating to the document.

[0024] At block 208, the routine routes the document to the selected target. The selected target may perform additional analyses on the document and route the document to another DocTrans so that the document can be routed appropriately.

[0025] At block 210, the routine returns.

[0026] Figure 3 is a block diagram illustrating use of the DocTrans in some embodiments. According to the illustrated embodiment, a document 302 enters a RightFax server 304, such as after the document is scanned. A workflow application 310 may take various workflow steps, such as when the document is scanned, received, sent, etc. This document is routed to a DocTrans module 306. This DocTrans could reside in the same computing device as the RightFax server or in a different computing device, in which case it is referred to as a "Remote DocTrans." The DocTrans may invoke the "send_document" routine described above in relation to Figure 2 to route the document to another DocTrans module. Once the document has been transferred to one of the DocTrans modules, dialing or routing rules 308 may be applied to this document. Dialing or routing rules can be applied based on

information pertaining to the document, such as phone number, DocTrans, group, users, etc. A dialing rule may cause the document to be routed to another DocTrans, or to a specific type of transport. Transports include, e.g., fax boards (e.g., from Brooktrout, Eicon, Intel, etc.), SMS devices, routers (e.g., from Cisco) for T.38 fax, email, T.37 (Store and Forward) fax, a DocPlus (e.g., Xpedit) provider, virtual implementation of the above, including document transmission simulations (e.g., evaluating cost, schedule, destination, and security for transmission), and so forth.

Extensibility and Routing Priorities

[0027] Since the DocTrans operates independently of network connections, content servers, or network resources providing the document, it can readily be configured to handle multiple document types and route documents to multiple types of network connections. As an example, the addition of email MIME types provides a secure and reliable transport for email from any point on the network. Moreover, the facility can confirm deliverability of the email, verify or certify receipt of contents and attachments; confirm results of operations performed by the DocTrans in routing the document to various network nodes for storage, transmission, and notifications; and so forth. By using rules that employ a TCP/IP transport between RightFax servers with encryption and secure session protocols (e.g., contrasted with open transmission on telephone lines), the DocTrans can provide secure routing of documents, such as facsimile ("fax") documents. To secure email messages and attachments, the fax server could provide certified delivery for documents or messages encrypted by the source server. As an example, the fax server could employ independent sender and recipient verifications and notifications for certified delivery.

[0028] Figure 4 illustrates a DocTrans with MIME support, such as for using email with a DocTrans module in some embodiments. While the figure illustrates a MIME-type document, other document types are also possible. Flexible routing based on DocTrans permits simple mail transport protocol ("SMTP") services for email operating with the RightFax server to transmit an email document 402 between DocTrans modules associated with RightFax servers directly, then into a client inbox (e.g., Microsoft® Outlook®) 408 on a RightFax client machine via an Intranet 406 and an email server 404. The illustrated embodiment identifies several

advantages over the prior art. Because there are redundant links between DocTrans modules, "failsafe" transmission becomes possible. As an example, when one DocTrans node is unavailable, the facility can employ another DocTrans module to ensure that the document is delivered. Content services on a RightFax server can archive, search & retrieve, and store native documents, such as emails and their attachments. The system can apply workflow by using, for example, Captaris' RightFax EDC API or Captaris' WorkFlow product, such as to accomplish multiple tasks with the same transmission (e.g., storing, logging, notifying, printing, and archiving). Metadata regarding the document, its routing to known DocTrans modules, and the network and communication resources available can be stored and applied as well. For example, this information could be requested and bound to the fax server document or task log for each task for later retrieval.

[0029] Because the system has access to the intranet and Internet, it can verify and certify that emails and any related documents were delivered or that web links contained therein can be accessed. The system can deliver documents via alternate transport mechanisms. For example, if an email with MIME attachments could not be delivered, the system could alternately route the email text as an SMS message and provide the attachments as file pathnames or URL links. Alternatively, the DocTrans system can convert an SMS message into a facsimile, or a facsimile into a Fax-Over-IP (FOIP) document, and send it using one of several facsimile transports (e.g., telephone line, or T.37 / T.38 fax over IP, etc.). The DocTrans system can also confirm the origin, validity, delivery and source of the document as required by using an independent, secure notification and document validation method.

[0030] In this manner, the system enables receiving and employing extensions for connecting to various transports, configuring dialing and routing rules for these transports, and handling the routing of message protocols, such as for MIME, SMS, T37 Fax, T38 Fax, and RightFax server. The system also enables extensions for specific facsimile hardware, such as Eicon and Brooktrout. Third party vendors that use RightFax ("RF") server for their document transport can enhance their capabilities by using DocTrans.

SOME OTHER BENEFITS AND FEATURES OF THE DOCUMENT TRANSPORT AND ASSOCIATED CONFIGURATIONS

Least-cost Routing

[0031] Least-cost routing rules enable transmission of facsimile documents over TCP/IP connections to other RightFax servers or to local multifunction printer devices, where the document may be printed, sent at local telephone rates rather than long distance rates, or transmitted over an available TCP/IP connection. In particular, using server-to-server IP network transmission of faxes enables managing the long-distance calling costs of sending faxes on telephone networks. Moreover, the facility can then employ local storage to replicate documents. The ability to store-and-forward documents in local networks (e.g., in RightFax servers or client inboxes) with logging for verification of receipt and retention of copies, enables re-transmission to be accomplished locally should the printed document or original email attachment be lost or inadvertently deleted. Figure 5 is a block diagram illustrating rules for least-cost-routing and for store-and-forward document transport in some embodiments. According to the illustrated embodiment, rules for least-cost-routing and for store-and-forward document transport on the network can be applied by the queuing and routing system. The correct routing for a document can be determined with reference to the document type, transport protocol, availability of communications channels, availability of and load on network resources, and so forth.

[0032] A document 502 with metadata (e.g., metadata that contains information pertaining to a sender) enters a server queue 503 of a DocTrans. After routing rules 504 are applied to the document (e.g., based on the metadata) the document is scheduled on one of DocTrans's queues 506. These queues allow the DocTrans to treat all document types in a similar fashion. As an example, all Transport Mechanisms ("transports") 508 can implement the same or a similar application program interface (API) to interact with these queues and receive documents for transmission. DocTrans is also able to identify documents based on document type (e.g., SMS, email, or RightFax) or transmission type (e.g., fax board transmission, T.37 transmission, or T.38 transmission). The transports act as plug-ins to the DocTrans (e.g., all have identical or similar interfaces, such as for various operations

including StartTransmission, SendDocument, ReceiveDocument, EndTransmission, etc.) and new libraries supporting these operations can extend transmission capabilities in the DocTrans to add a new protocol. Also, in some embodiments, a queue will be serviced if a transport that services that type of queue has been configured on the DocTrans. In some embodiments, the document may be enqueued when (510) a transport associated with a queue is available.

[0033] Figure 6 illustrates aspects of queue management performed by protocols administered by DocTrans in some embodiments. The illustrated embodiment indicates how queue management can be separated from each transport type. In some embodiments, each queue is managed by a DocTrans module. Multiple transport types can be plugged-in and can service a corresponding queue. The DocTrans module performs queue management, maintenance, and scheduling of sending/receiving documents. According to the illustrated embodiment, a RightFax server 602 sends a request 604 to a DocTrans module 606. Based upon dialing or routing rules, the DocTrans module determines whether to use a RightFax queue 608, SMS queue 610, or global queue 612. The RightFax queue 608 may be configured to transport documents between other RightFax servers. The SMS queue 610 may be configured to communicate with an SMS service provider. The global queue 612 handles board-level communications, such as by checking transports that are configured for use with the system, to determine whether one of these transports can handle the request 604. If one of the configured transports can handle the request, the global queue routes the request to that transport.

[0034] Upon receiving a document, the DocTrans module delivers the document 614 to the RightFax Server. The DocTrans module may also send notifications to the RightFax Server upon receipt of a document 616.

Load Balancing

[0035] Load balancing is a factor that DocTrans modules use to determine whether a document is to be processed or forwarded to another DocTrans module. All DocTrans modules can perform load equalization based on a comparison of its load with other DocTrans modules in the network. Rules based on such formulae may be applied using cost parameters, transmission times, schedule times, security

or priority parameters, and routing and destination information. Similarly, a DocTrans module can be used in conjunction with a workflow application or simulation engine to estimate and to optimize such rules before or during their application to a document transmission task. As an example, DocTrans modules may perform load balancing based on the following formula: (total of X pages from Y Documents) / (number of send channels).

[0036] Another method varies the load calculation by channel and content type, such as by using the following formula:

(Waiting Pages Of This Type * Expected Transport Time Per
Page Of This Document Type) / Number # of Channels Sending
This Document Type.

[0037] These formulae may be evaluated for each document type. For example, if e-mail can be sent in 3 seconds and a fax can be sent 1 minute, there are 60 one "page" e-mails queued, 50 one page faxes queued, and there are 2 e-mail channels, and 24 fax channels, the e-mail load would be:

$$60 * 3 / 2 = 90$$

and the fax load would be:

$$50 * 60 / 24 = 125$$

Managing Network Connections

[0038] If a resource is unavailable, such as because of a server outage, it may not be considered for load balancing for a period of time (e.g., 40 minutes) to permit the resource to be restored or reconfigured. This applies to DocTrans, PSTN, Board Servers, and RightFax servers. In some cases, the system may use the local DocTrans to PSTN connection to transmit documents, even if that is not the preferred configuration or least-cost routing for the document, such as when other network resources are unavailable.

Grouping Using DocTrans

[0039] Conventional facsimile transmission has costs associated relating to connections, such as call initiation and duration. The process of grouping avoids contention for connection resources or accrual of connection initiation charges when

multiple documents are directed to the same destination. Grouping can prevent tasks from waiting on a "busy" line while other tasks to the same destination are sending documents.

[0040] The grouping process can be implemented as follows: set the number of pages or length of the transmission (to prevent unlimited send time on the channel), identify and cache queued documents with the same destination identifier, open connections on the transport, and send the documents with the same destination identifier over the open connection.

[0041] The group send feature may update its cache of queued documents with documents that enter the queue during transmission of a group, so long as the new documents share the same destination identifier.

Implementation in Various Embodiments:

[0042] In various embodiments, a framework for accepting a plug-in style implementation DLL for each transport type (or group of types) is provided. Each DLL implements a predefined set of entry points that enable support of various transport types.

[0043] Each entry point takes a resizable context structure that supports all information transferred between the DocTrans and the DLL. The document transports tolerate changes in the context structures' sizes, and each document transport independently supports operations such as store & forward, task scheduling, sender or recipient intervention, least-cost routing rules, document or task lifespan, and deliver-or-delete options without breaking the document task.

Conclusion

[0044] Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise," "comprising," and the like are to be construed in an inclusive sense, as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to." As used herein, the terms "connected," "coupled," or any variant thereof, means any connection or coupling, either direct or indirect, between two or more elements; the coupling of connection between the elements can be physical, logical, or a combination thereof. Additionally, the words "herein," "above," "below," and words of similar import, when

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used in this application, shall refer to this application as a whole and not to any particular portions of this application. Where the context permits, words in the above Detailed Description using the singular or plural number may also include the plural or singular number respectively. The word "or," in reference to a list of two or more items, covers all of the following interpretations of the word: any of the items in the list, all of the items in the list, and any combination of the items in the list. Although the terms "dialing rules" or "routing rules" may be used together or individually, the terms can refer to either or both types of rules.

[0045] The above detailed description of embodiments of the invention is not intended to be exhaustive or to limit the invention to the precise form disclosed above. While specific embodiments of, and examples for, the invention are described above for illustrative purposes, various equivalent modifications are possible within the scope of the invention, as those skilled in the relevant art will recognize. For example, while processes or blocks are presented in a given order, alternative embodiments may perform routines having steps, or employ systems having blocks, in a different order, and some processes or blocks may be deleted, moved, added, subdivided, combined, and/or modified to provide alternative or subcombinations. Each of these processes or blocks may be implemented in a variety of different ways. Also, while processes or blocks are at times shown as being performed in series, these processes or blocks may instead be performed in parallel, or may be performed at different times.

[0046] The teachings of the invention provided herein can be applied to other systems, not necessarily the system described above. The elements and acts of the various embodiments described above can be combined to provide further embodiments.

[0047]

Aspects of the invention can be modified, if necessary, to employ the systems, functions, and concepts of the various references described above to provide yet further embodiments of the invention.

[0048] These and other changes can be made to the invention in light of the above Detailed Description. While the above description describes certain

embodiments of the invention, and describes the best mode contemplated, no matter how detailed the above appears in text, the invention can be practiced in many ways. Details of the document transport layer may vary considerably in its implementation details, while still being encompassed by the invention disclosed herein. As noted above, particular terminology used when describing certain features or aspects of the invention should not be taken to imply that the terminology is being redefined herein to be restricted to any specific characteristics, features, or aspects of the invention with which that terminology is associated. In general, the terms used in the following claims should not be construed to limit the invention to the specific embodiments disclosed in the specification, unless the above Detailed Description section explicitly defines such terms. Accordingly, the actual scope of the invention encompasses not only the disclosed embodiments, but also all equivalent ways of practicing or implementing the invention under the claims.

[0049] While certain aspects of the invention are presented below in certain claim forms, the inventors contemplate the various aspects of the invention in any number of claim forms. For example, while only one aspect of the invention is recited as embodied in a computer-readable medium, other aspects may likewise be embodied in a computer-readable medium. Accordingly, the inventors reserve the right to add additional claims after filing the application to pursue such additional claim forms for other aspects of the invention.

WHAT IS CLAIMED IS:

1. A method for handling documents, the method comprising:
 receiving a document at a fax server;
 5 associating metadata with the document;
 forwarding the document and related metadata to one of multiple
 document transport modules;
 assessing dialing or routing rules based on the metadata for the docu-
 ment;
 10 routing the document by the document transport module via one of
 multiple communication methods, including without limitation a
 Public Service Telephone Network ("PSTN"), another document
 transport module, Internet, mobile device network, wireless
 device network, document server, another fax server, or a board
 15 server containing one or more communications hardware de-
 vices, wherein the routing is based on at least one dialing or
 routing rule; and
 repeating the associating, forwarding, assessing and routing for any
 subsequent document transport module that receives the docu-
 20 ment, wherein the dialing or routing rules are applied independ-
 ently at each document transport module encountered by the
 document during processing of the document.
2. The method of claim 1 wherein the document is input in text or image
 25 format from a scanner bed.
3. The method of claim 1 wherein the document is input in a T.30 image
 format from a PSTN inbound fax, as an SMS message from a wireless
 network system, as an email message from the Internet, or as a docu-
 30 ment task from another document transport module.

4. The method of claim 1 wherein the metadata for the document includes one or more from the set of a user identification, group membership, task priority, document type, transmission rule, or workflow information.
5. The method of claim 4 wherein a document transport module modified the metadata for the document by application of rules or by association of additional status information.
- 10 6. The method of claim 1 wherein the routing includes placing the document in a queue that is associated with the document transport module.
7. The method of claim 1 including delivery of the document when the document can be routed without employing a subsequent document transport module.
- 15 8. A computer-readable medium whose contents cause at least one data processing platform to process a document under a document processing method, the method comprising:
20 recognizing at least one document request based on a received document;
interacting with one or more document routing rules and one or more workflow requirements with respect to the received document;
and
25 managing content flows between network nodes or devices, wherein a same document transport module processing architecture is employed for document handling or transporting at each node or device, wherein a common scheduling and a common queue support multiple transport types, and wherein the managing of
30 content flows includes selecting document- or hardware-specific processing tasks by reference to a type of protocol associated

with the document or a desired handling of the document,
 wherein dialing or routing rules are applied independently at
 each document transport module encountered by the document
 during processing of the document.

5

9. The computer-readable medium of claim 8 wherein the com-
 puter-readable medium is a memory of a facsimile server.

10

10. The computer-readable medium of claim 8 wherein the com-
 puter-readable medium comprises a memory of a document server or a
 board server.

15

11. The computer-readable medium of claim 8 wherein the com-
 puter-readable medium comprises a logical node in a computer network
 receiving the contents, a network service receiving the contents, a
 network storage system, a database server, a computer-readable disk,
 or a memory of a computer system.

20

12. An apparatus for handling various documents, the apparatus compris-
 ing:

document transport means for transporting documents between network
 devices, wherein the network devices include printers, fax
 boards, multifunction devices, and content servers and across
 local and wide-area networks; and

25

means for routing optimization with other communications networks,
 wherein the network devices include messaging services, tele-
 phony, Internet, mobile and wireless networks, IP networks, or
 other document transport modules wherein each document trans-
 port module is configured to apply dialing or routing rules inde-
 pendently the documents encounter during processing.

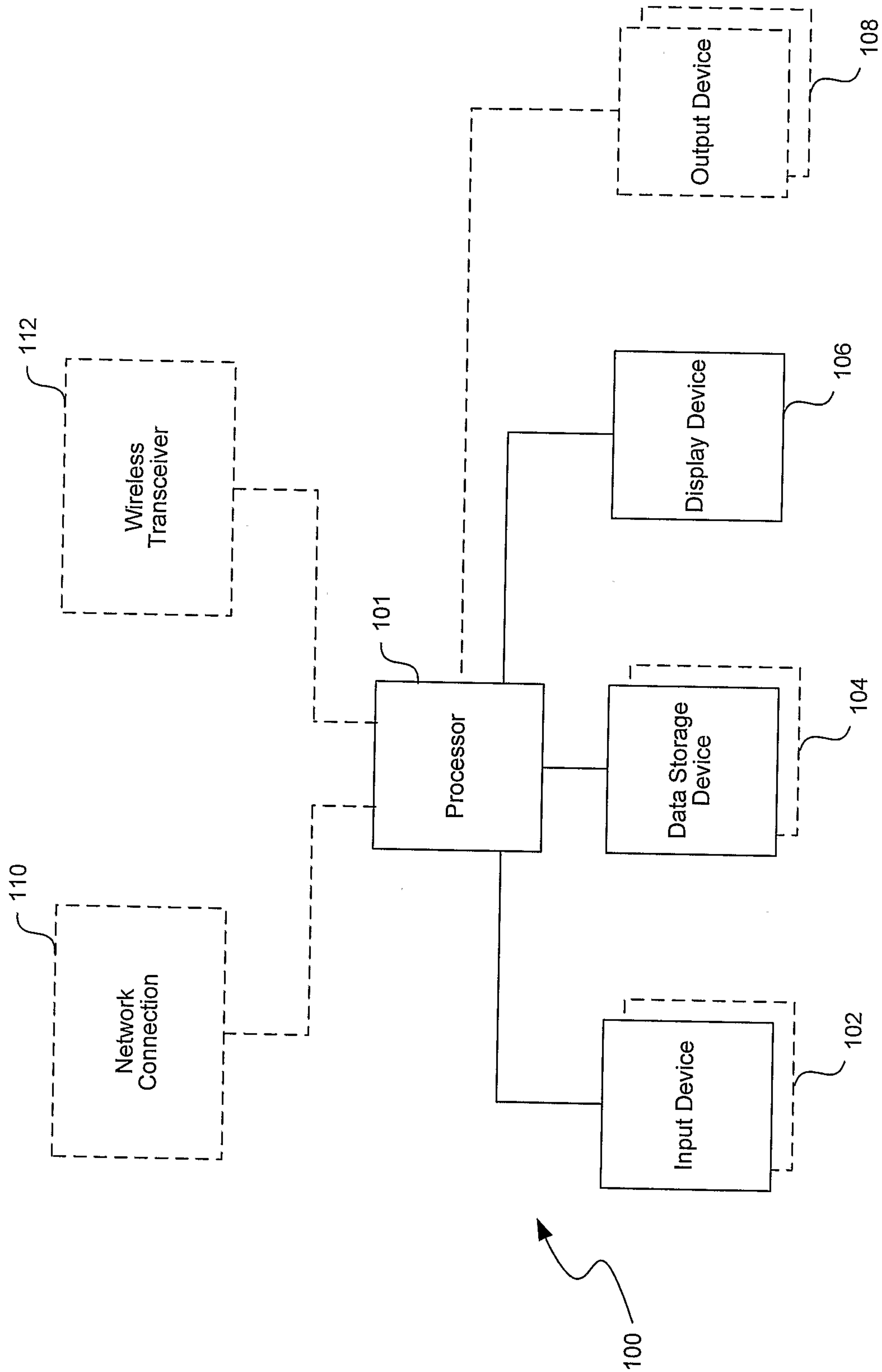
30

13. The apparatus of claim 12 wherein the means for routing optimization employs dialing or routing rules to determine whether to forward a document to another document transport means.
- 5 14. The apparatus of claim 12, wherein the document transport means comprises a document conversion means.
15. The apparatus of claim 12 wherein the document conversion means is triggered by a change in a document delivery protocol or a change in a
10 network service receiving the document.
16. The apparatus of claim 12, wherein the document transport means interacts with rules when a human answers a facsimile transmission.
- 15 17. The apparatus of claim 12, wherein the document transport means comprises:
communication means for performing discrete document creation,
storage and transmission tasks between various communication
networks and network servers;
20 means for providing flexible, programmable communication of documents in various message formats and on various network types;
and
means for routing the document communications via optimization
routing rules.
- 25 18. The apparatus of claim 17 wherein the document transport means communicates with another document transport means that is configured for use with a server.

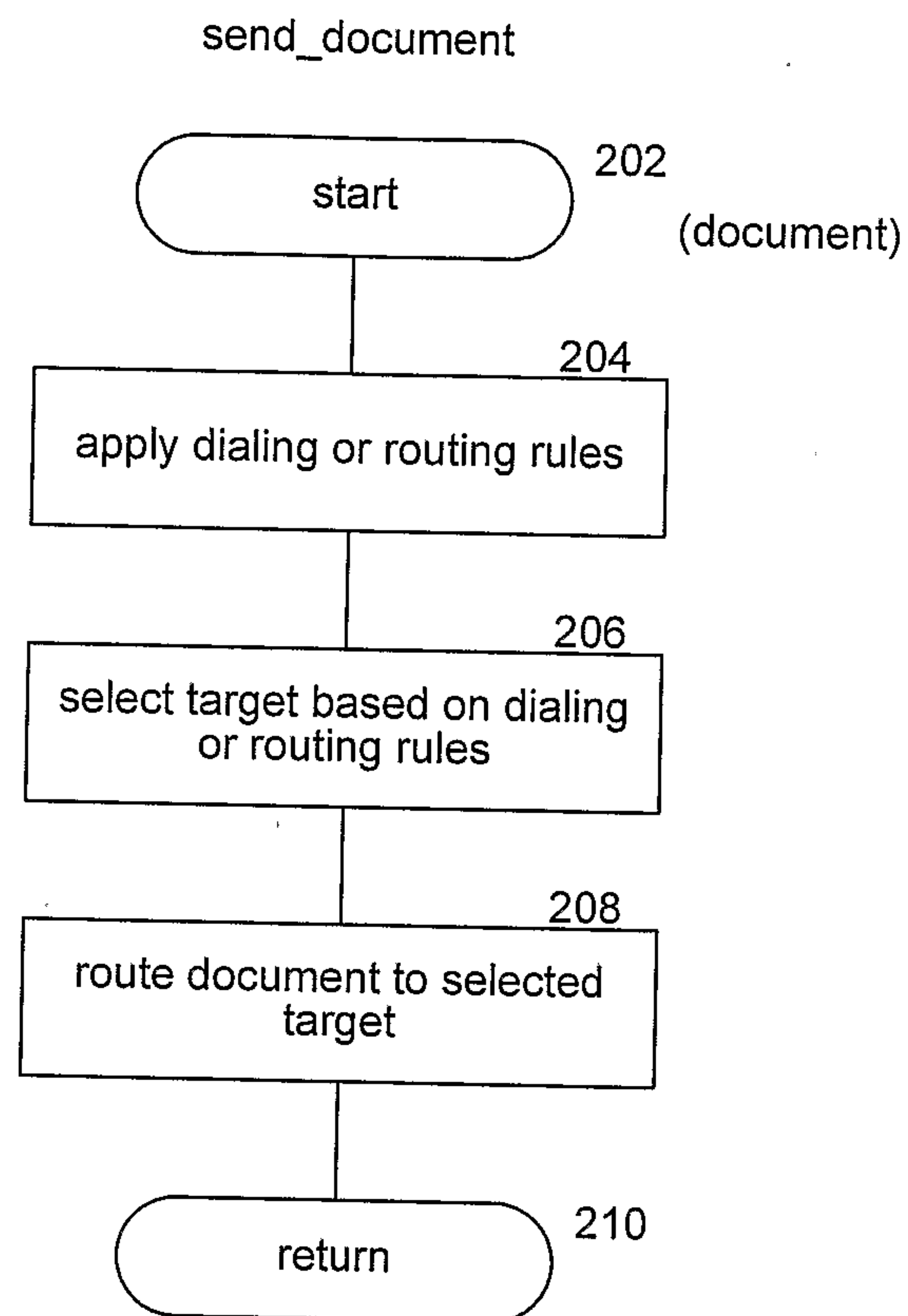
19. The apparatus of claim 17 wherein the document transport means communicates with another document transport means via a secure connection.
- 5 20. The apparatus of claim 17 wherein the document transport means communicates with a public switched telephone network.
21. The apparatus of claim 17 wherein the document transport means communicates with another document transport means.
- 10 22. The apparatus of claim 17 wherein the document transport means communicates with an Internet, an intranet, or an IP network connection.
- 15 23. The apparatus of claim 17 wherein the document transport means communicates with a mobile device network or wireless network connection.
- 20 24. The apparatus of claim 17 further comprising a workflow integration module for integrating transported documents into a workflow application.
- 25 25. The apparatus of claim 17 wherein the means for routing optimization employs dialing or routing rules to determine whether to forward a document to another document transport means.
26. The apparatus of claim 17, wherein the document transport means comprises:
a document conversation means associated with a change in a document
30 delivery protocol or a change in the network service receiving the document.

27. The apparatus of claim 17, wherein the document transport means interacts with rules when a human answers a facsimile transmission.

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**FIG. 1**

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**FIG. 2**

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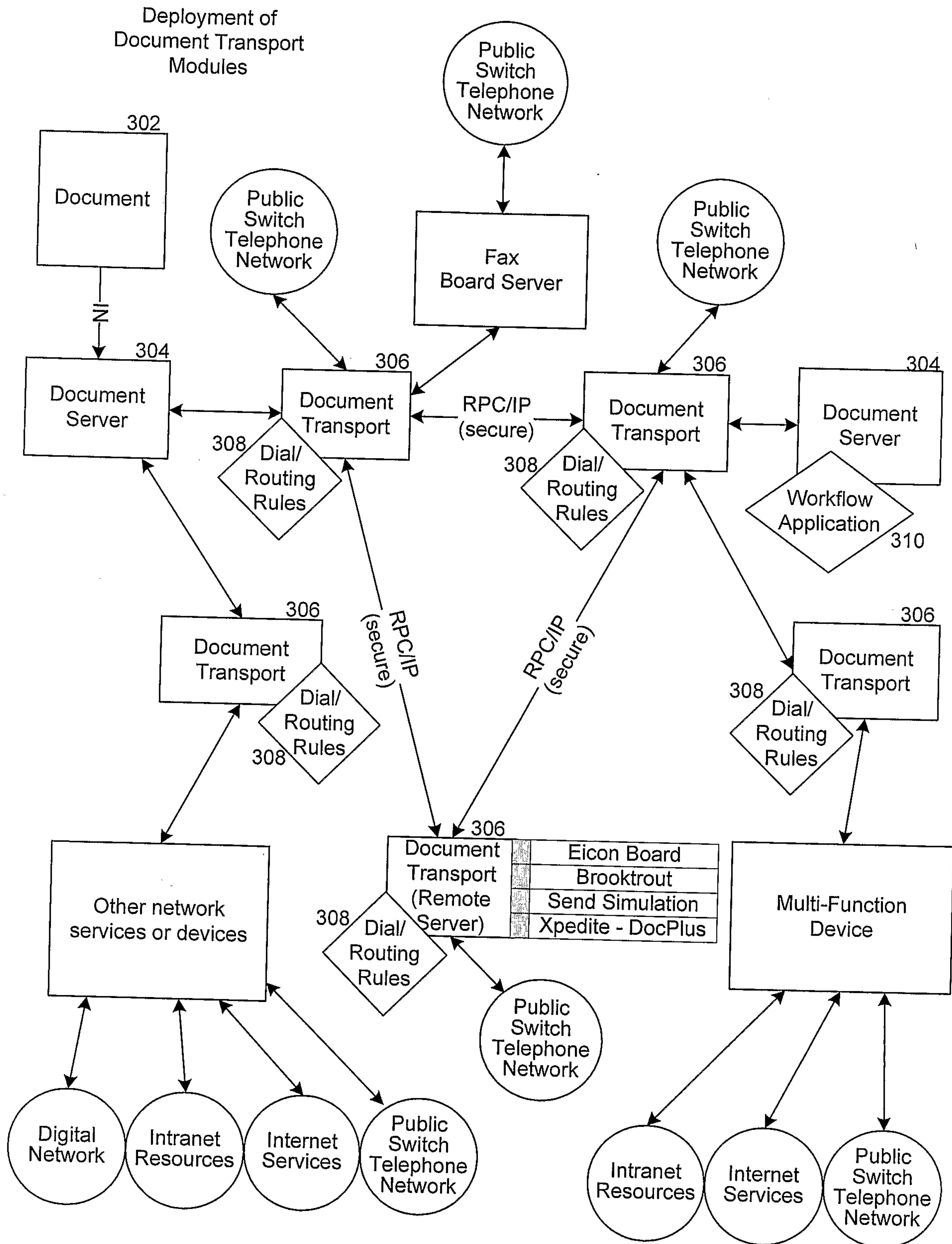
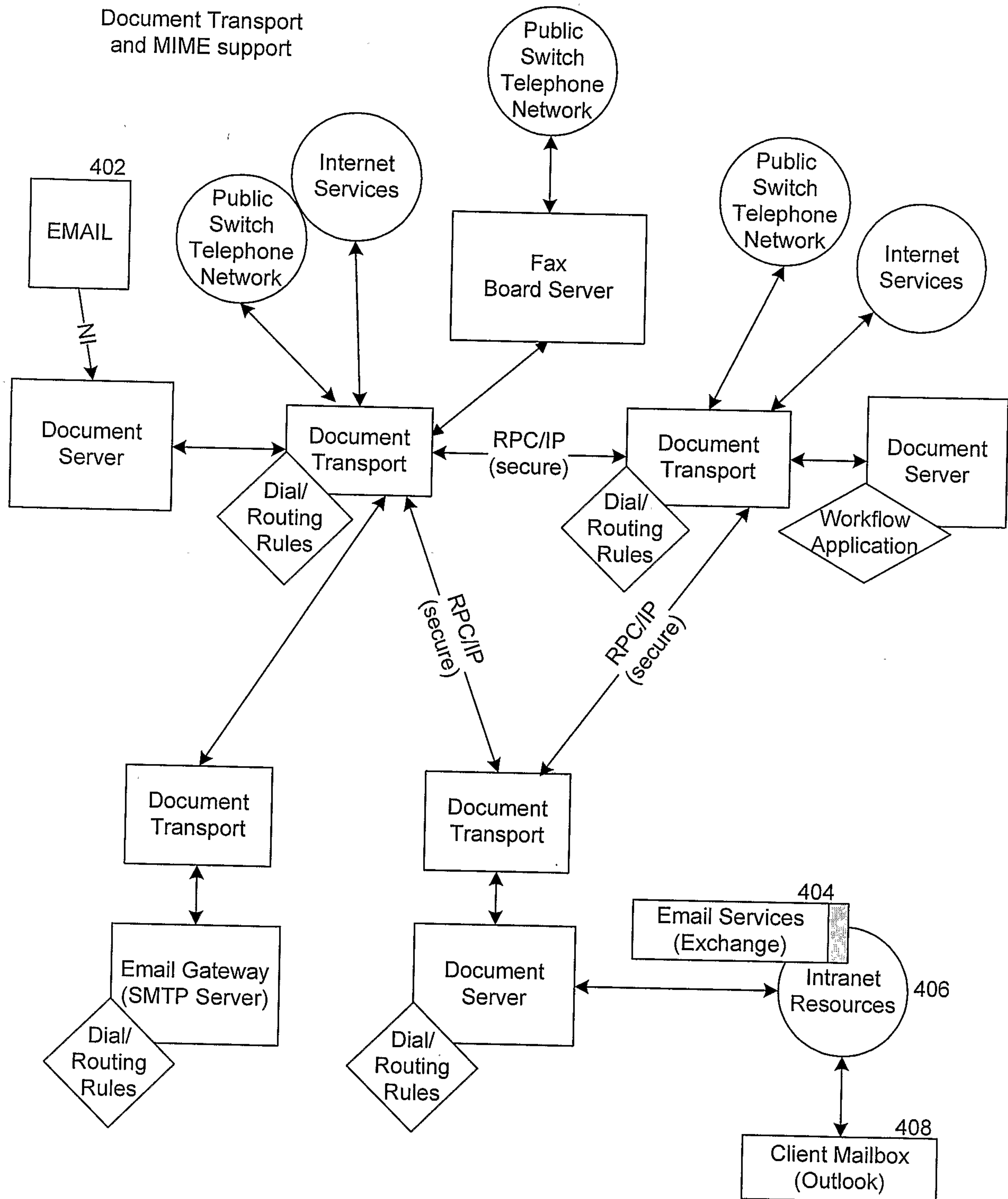


FIG. 3

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**FIG. 4**

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Queues and Transport Mechanisms

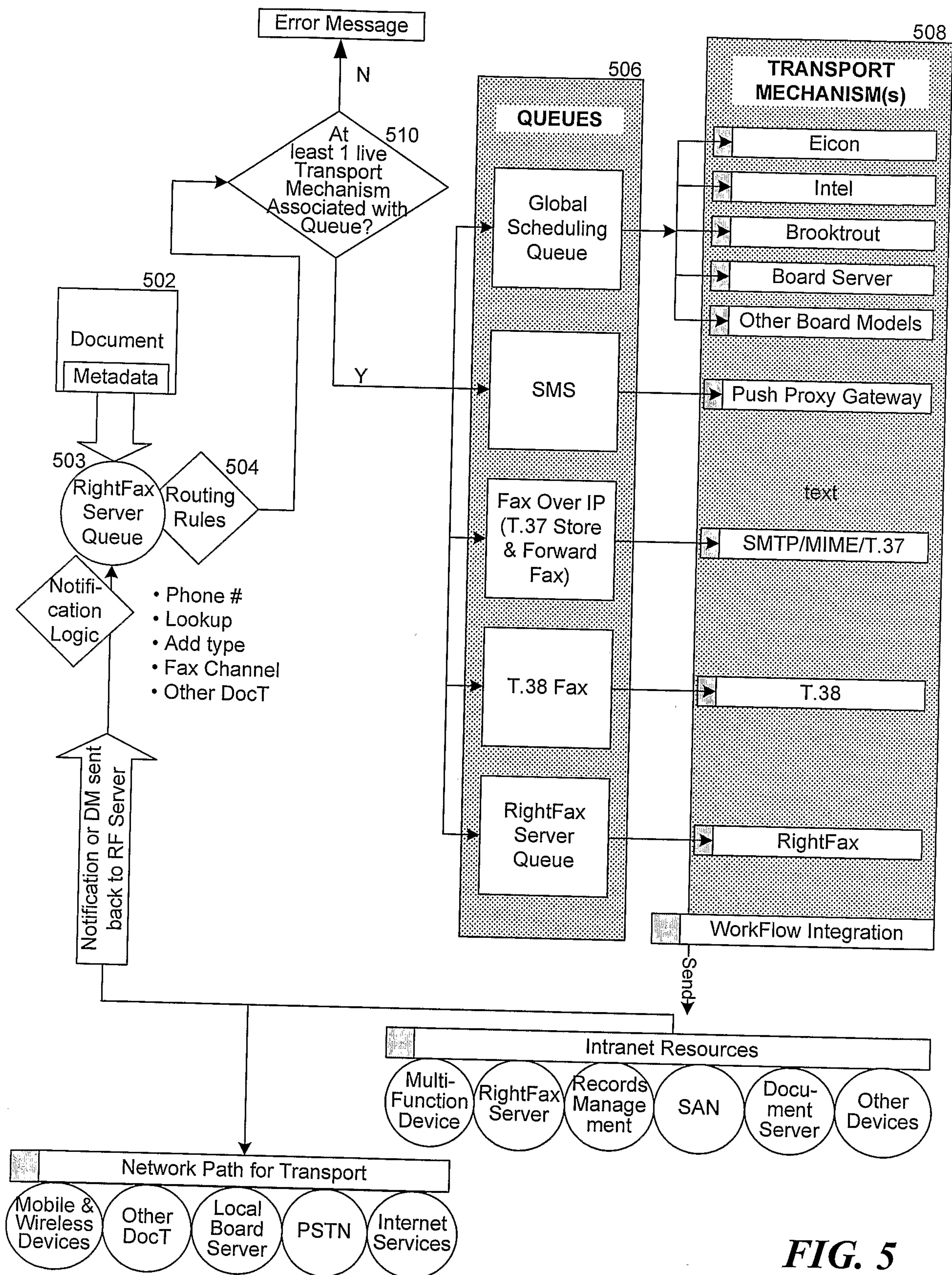
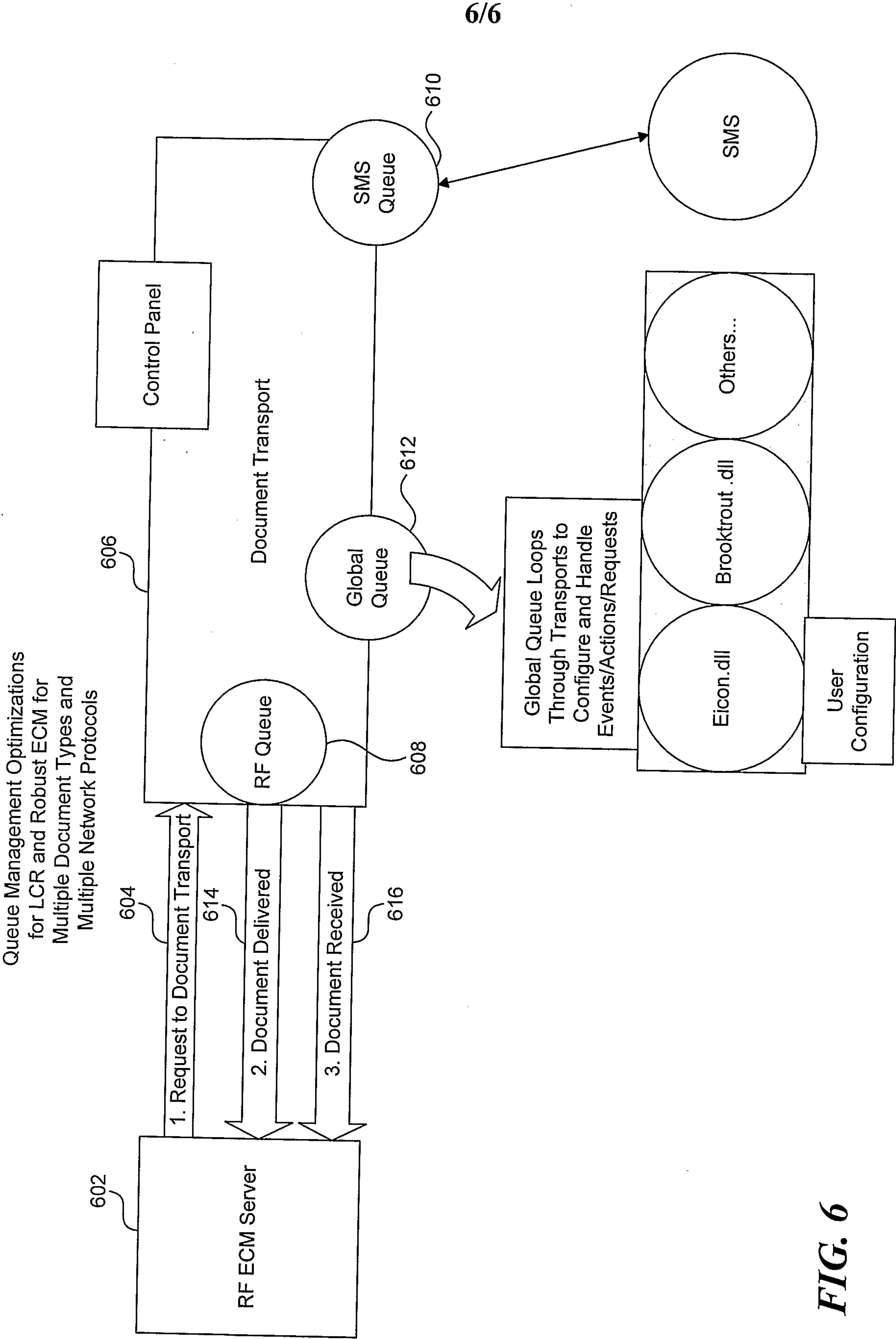


FIG. 5



Deployment of Document Transport Modules

