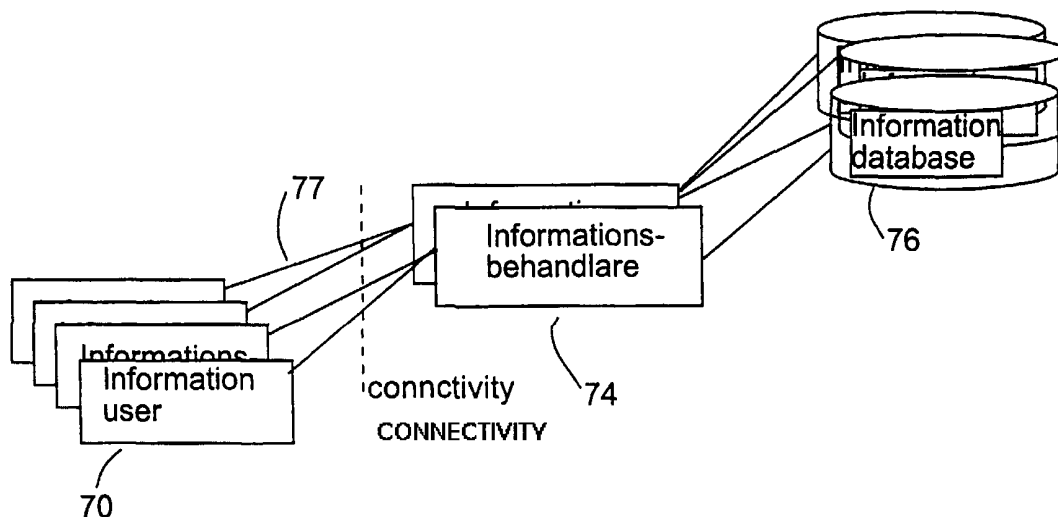




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(54) Title: COMMUNICATION NETWORK SERVICE MANAGEMENT METHOD AND DEVICE

**(57) Abstract**

A device and method for managing services in a communication network that are accessible in different component parts of the communication network, where the services may be requested from one part of the network that does not normally employ a requested service. A service request message is routed to an information processor, that identifies the requested service and consults with an information database that contains an association between network components and services provided by the network components. When network components are identified that provide the requested service, the information processor, initiates a communication session between the party initiating the service request message and the component that can provide the service.

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TITLE OF THE INVENTIONCOMMUNICATION NETWORK SERVICE
MANAGEMENT METHOD AND DEVICE

5

CROSS-REFERENCE TO RELATED APPLICATIONS

The present document contains subject matter related to that disclosed in two
copending, commonly owned patent applications, the first of which being entitled "Device
and Method for Simplified Management of Services in a Communications Network", filed on
the same day as the present application, having common inventorship with the present
10 invention and bearing attorney docket No. 2867-0163-2 PROV, and second application
entitled "Method, System and Device for Establishing Communication Between Different
communication Networks", being commonly owned and filed on the same day as the present
document, having Arwald, J. et al. for inventorship and bearing attorney docket No.
2867-0162-2 PROV, the entire contents of both of which being incorporated herein by
15 reference.

BACKGROUND OF THE INVENTIONField of the Invention:

The present invention is directed to methods and devices for managing services
available in a communication network, that includes network components, where the
20 respective network components each provide services.

Discussion of the Background

During the information age, communication services and the infrastructure for
providing communications has become a commodity. As the information age progresses,
significantly more communication services are offered in various forms, each of which
25 having various attributes and servicing different niche audiences. While in most countries the
communication infrastructure, at least for telephony, has been established at one time or
another by way of a government corporation, or government condoned monopoly, at least at
some basic level telephony-based networks are somewhat compatible. However, as more

services become available, such as cable television, wireless satellite links, proprietary wireless local loop, Internet and other terrestrial-based networks. These are an increasing number of protocols and physical components needed to support those services. To the extent it is possible for the different communication networks to provide and share
5 information between the different networks, perhaps by way of a caller request, or data message sent from one network to the next, the burden is on each of the different networks to provide a customized connection to the other networks. This is illustrated in Figure 1, where it is seen that different networks, such as GSM 1, ISDN 3, public switch telephone network (PSTN) 5, cable-TV 7, electrical service 9, Ethernet, 11, and Internet protocol (IP) 13
10 network each provide individual connections between themselves in a "spaghetti-like" fashion. Consequently, in order to provide connections between the respective networks, the network connections are made directly, thus requiring many translation devices and adapters for each network.

As presently recognized, a limitation with this point-to-point interconnection
15 approach for existing network services, is that every time a connection is required between the different networks, every network must be provided with a new adapter so as to be compatible with the new network. Adding the adapter is a straightforward process from a planning perspective, but implementation is very difficult and cost increases significantly every time a new service is brought on line. Furthermore, such a system provides a barrier-
20 to-entry for smaller proprietary networks that may ultimately bear the burden of funding the expense of updating the adapters for other existing communication systems.

Within the telecommunications world there are operators who have long offered telecommunication services within limited geographical areas. However, there are also new telecommunication operators, and other operators that provide an opportunity to provide
25 telecommunications and other communication services which may be compatible, or even competitors with conventional telecommunication networks. For example, some of the new tele-operators include electrical distributors, cable TV operators, Internet providers, wireless services such as LMDS, etc. Originally, these different "nets" each served different purposes, and were not configured to work with each other since their services were in different topical
30 areas. However, given the significant event of deregulation of the telecommunications markets in the United States and in various other countries, it is presently envisioned that a transformation will occur on a global scale regarding the use of "non-conventional" resources

to provide communication services. It is presently recognized that while these different services may be available, in order to have a commercially viable system that offers the consumer (i.e., subscriber, with commercially valuable service that truly allows the subscriber to have worldwide communication freedom regardless of where the subscriber presently is and plans to be in the future) point-to-point translators or gateways are being viewed as the solution. According to the configuration shown in Figure 1, it is up to the different systems themselves to work out the differences in protocols and communication capacities so as to establish communications between the "unconventional" communication providers, if in fact the communications link can be established at all.

In view of the evolution of communication networks in the present deregulation era, the present inventors have recognized that the conventional point-to-point approach towards connecting different networks, will necessarily provide an economic barrier to new services that wish to enter the communications arena, because as each new service comes on line, additional translation and adapter equipment is required for all of the other systems.

As presently recognized, each of the different nets have one feature in common: each net communicates information from one point to the next. When it comes to communicating between different networks, language barriers (protocol differences) present themselves, which must be overcome in order to share the resources available between the different networks. The communication protocols, are not unlike different European languages. For example, more often than not incompatible "native" languages are not an absolute barrier due to the diversity of language skills held by many people. For example, as presently recognized, while it is possible that when one person approaches another person and begins communicating in language A, the second person will instantly be able to understand and converse in that language so that seamless communication may be had. However, often it is the case that when the first person begins communication with the second person in language A, but the second person recognizes that communication is not possible, and tries to respond with language B, hoping that the original speaker will be able to speak language B. Using this ping-pong approach, the two people eventually reach a determination regarding whether or not there is any common language that may be spoken between the two. When a common language is identified, the two may communicate directly, however, if there is no common language between the two, then it will be necessary to use a translator (a third person) in order to allow for the two to speak with each other. The present invention, to some extent,

leverages on this concept, and provides a central facility that helps facilitate in a fast and efficient manner different communication protocols that may be common between the two different networks so that those networks may operate in a direct communication mode. However, when communication is not possible the central facility provides an infrastructure for converting between the two languages (a translation function). Furthermore, the central facility helps educate both the first network and the second network, for future communication sessions, by efficiently providing to the different communication networks attributes of specific subscribers and networks that are used in the overall communication system.

Different networks, offer different technical solutions that attempt to conform with the different types of services that require a connection to an address list, client profiles and the like. However, usually these solutions are limited to a particular type of service, or groups of services in a specific network environment, such as the public switch telephone network (PSTN), GSM, ATM, Internet, Intranet, etc. However, as presently recognized, as the infrastructure for a global communication network that includes different communication subcomponents (e.g. sub-networks), the issue arises regarding how different services will be administered when crossing between network boundaries of the networks that make up the global network. Ideally, from a user perspective and from an implementation perspective, a request for services that originates in one network, yet is performed using the resources of another network, should occur independent of the environment in which the user/client application exists. Furthermore, the overall global architecture of the network should be free of conceptual limitations regarding a user's ability to register in one of the other different networks that make up the global network. Regarding the ability to register, it would be advantageous for a user to be fully registered across all boundaries that exist in the constituent network components, so as to have access universally to all the services offered by the different networks as part of the global network. Accordingly, an ability to register, would ideally include the adaptability needed to provide object, node and network topology independence, yet still meet the varying requirements for call intensity, quality, price and performance, accessibility, security, functionality and geographic disbursement. Furthermore, the architecture of the global network, made up of constituent networks should provide seamless transitions between the separate components so as to provide a service provider with full freedom to choose suppliers, design concepts, operative system, data

system, carrier net, and geographic placement for individual functional modules. However, in order to tailor a service architecture according to the needs of an individual it is presently recognized that an efficient solution will include user-distinct links and data settings to the functional modules. A problem with conventional systems networks and global networks is that the seamless boundaries between the different constituent parts of the networks, inhibits the free flow of information between the boundaries, including limitations arising from inefficient accessibility of services from users of a different network.

SUMMARY OF THE INVENTION

Consistent with the title of the present section, specific attributes of the present invention are described herein. However, the section entitled Detailed Description of the Preferred Embodiments provides a more complete listing of the attributes of the present invention.

A goal of the present invention is to address the above-identified limitations with conventional systems and devices.

The above-identified problems associated with conventional devices and methods, is overcome with the device and method according to the present invention. The present invention takes advantage of the features of the inventions corresponding with the previously-mentioned copending applications which help to establish seamless and efficient communication between different communication networks as part of an overall comprehensive global communication network. Thus, once the barriers between different communication networks are part of the global communication networks are dissolved, the present invention provides a mechanism by which user information is processed within resources of the different communication networks so as to employ the various services and attributes associated with the different constituent communication networks that make up the overall network. To this end, information from the information users are transmitted to an information processor that extracts relevant information and uses the extracted information to search an information database associated with that information processor or other information processors so as to identify services that can be accessed and satisfy the service requested by the user. The information transmitted by the user may be in the form of a "wired" connection, or a radio-based connection as both types of connections and networks that support the same are constituent components of networks according to the present

invention. The information processor also collects information regarding specific services via one or several of the information databases, services that can be implemented in the calling network (i.e., the network in which the user initiates the service request). The informational databases also store additional information such as telephone numbers, addresses, services available, customer unique information, users, etc.

By implementing the present invention, services that are located in different environments that otherwise would be generally unavailable for general use with sister-networks, become generally accessible to users of any of the networks. The present invention is implementable without regard to the transmission technology employed by the user, but rather enables services in all parts of the global network to be accessible to the user, even though the protocols employed within the different constituent networks may be otherwise incompatible. By enabling efficient communication between the different constituent networks, each individual information processor need only manage a limited number of functional areas, as user requests and service requests are routed to the relevant information processor that could support that service.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

Figure 1 is a diagram showing a conventional, evolutionary approach towards establishing communication links between existing services;

Figure 2 is a block diagram of constituent components included as part of the present invention;

Figure 3 is a block diagram showing an interconnection between information processors and databases as employed according to the present invention;

Figure 4 is a block diagram of an information processor according to the present invention;

Figures 5A and 5B are data structures of entries included in the respective databases associated with the information processors; and

Figure 6 is a flowchart of a method employed according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As previously discussed, the present invention includes the infrastructure for establishing communication between different constituent networks as part of a comprehensive network, where features and mechanisms that establish the mechanisms for allowing seamless communication between the networks, is described in the corresponding, co-pending U.S. applications previously described. Thus, turning to Figure 2, the information users 20 may include customer applications for e-mail, IP-telephony, and electrical services information, address monitoring functions, number analysis functions employed in telenets, etc. These different users may thus be included in parts of different networks, that may otherwise use incompatible protocols. However, when particular service requests are generated from information user 20, a question arises regarding where such services can be located. According to the present invention, a communication link is established from the information user 20, through connectivity mechanism 22, which may be a wireless link or a wired link, to an information processor 24. The information processor 24 then extracts a service request information from the message and consults with an information database 26 so as to identify different networks that offer the requested service. Once the identification of the network that can support the service request is identified, the information processor 24 optionally informs the information user 20 through the connectivity mechanism 22, or alternatively establishes the connection through the connectivity mechanism 22, directly with the network that can perform the service.

Regarding the connectivity mechanism 22, the present invention is not limited to any one type of protocol, but rather can support various protocol types including SIP, HTTP, HTTPS, INAP, MAP, etc. These various protocols are in turn supported by an underlying transport protocol, such as IP and SS7, on various types of physical connections, including wireless links as well as wired links. The information processors 24 are hosted on hardware platforms that are able to collect and process applications from the information database 26. According to the present invention, exemplary information processors include mobile servers, SIP-servers, mail servers, web servers and the like. Thus separate discrete information processors 24, are not required to be used exclusively according to the present invention, but rather may have a primary purpose, such as to provide a mail server function, where an ancillary service is to serve as the information processor 24 discussed herein.

The information databases 26, while including a computer readable medium, need not

be located in a single geographically unique location, but rather may be distributed if necessary amongst a variety of different computer readable media. This computer readable media in the information database 26 will include information such as the telephone numbers of subscribers, addresses of subscribers, services offered by different networks, customer identifications, users, etc. Number catalogues such as DNS, ILS, etc., are also examples of such databases.

When a service request is launched by an information user 20, the service request will be transmitted to an information processor 24 which may attempt to handle the question by itself if the information processor deems it has the adequate information. However, it is also a feature of the present invention, that one information processor, such as information processor 24A in Figure 3, will consult with a second information processor, information processor 24B which may specialize in another functional area. The conditions for when and where an interaction with multiple information processors arises, may be unique to specific customers or users, particularly if the service request offered by that particular user is customized to provide such a request. When the information processor, e.g., information processor 24A, consults its database 24B, so as to determine whether or not the database 24B includes the identification of resources which may perform the service, the information processor 24A, may then consult with the information processor 24B in the form of a service request message so as to retrieve information from its database 26B, and so as to identify the resources available for performing the requested service.

As an example, suppose a person who is the intended recipient of a telephone call has assigned thereto a telephone number, but depending on the time of day, the day of the week, etc., different telephone numbers are used for different times of the day. The database 26B will handle this information, as part of a user profile so that the telephone call may be routed most efficiently directly to that particular called party. Upon calling that party the information processor assigned to that particular party will be invoked so as to ascertain the user's profile. The information processor then retrieves the necessary information and provides this information back to the network terminal from which the information user initiates the call. In the event that an information processor fails to return an answer within a predetermined timeframe, the calling information processor may opt to use the information that presently available and arrange a connection to the telephone number that was originally indicated or to an address that is indicated, without having the full amount of information

available from the user's profile.

In other cases the calling subscriber may request a service that is specified by a different indication in the message sent to its own information processor. At this time, the requested service can be to arrange a conference connection between various ingoing parties.

5 The information processor will then communicate with the other processors so as to identify another one of the information processors that will be able to handle the query and accurately determine how the connection can occur so as to implement the requested service. Once identified, the connection may be established automatically by way of the processors, or alternatively, through signaling proxy mechanism so as to handle protocol translations
10 between the different networks.

Another example is that various individuals may communicate with each other and the information from different databases or an individual database may be passed to the different participants in different versions, depending on the affiliation of the particular individuals with the networks on which they are presently communicating. The individual
15 responsible for initiating the communication will provide the information processor with the necessary information regarding which components in the information may be communicated to which participants, for privacy reasons. Likewise, each of the other participants may also indicate restrictions regarding the information that is provided to the other participants.

Figure 4 is a block diagram of the information processor 24. A system bus 410
20 interconnects a central processing unit (CPU) 401, which provides the processing infrastructure for a primarily software driven information processor 24. The CPU 401 communicates over the system bus 410 with ROM 403, and RAM 402 which provide permanent and read/write memory capacity respectively. The ROM 403 holds the application software for implementing the functions of receiving and interpreting service request
25 messages, coordinating communications between other information processors, and managing information contained in a local database 26. While respective mechanisms shown in Figure 4 are primarily carried out in software, portions of the processing may be performed in hardware, using application specific integrated circuit 404 and field programmable gate array 405. An input/output controller 408 provides communications between other
30 components of the network, so as to receive and send service request messages, and coordination messages between other information processors. A local I/O controller 409, provides a communication link with the database 26 so as to control read/write and data

query operations. Expansion room 411 is contained within the information processor 24 so that as additional resources become available on the global network, additional hardware may be included to support future processing demands.

Figure 5A shows one data structure for a particular user profile stored in the database 26 (Figure 2). The data structure includes three data fields (which may be stored in separate entries in the database, but are nonetheless associated with one another). Data field 501 includes information regarding the particular user's identification. Included with the user ID is billing information, personal information regarding name and the like. In addition, the user ID will include the subscriber-specific information such as the subscriber number which is uniquely associated with that particular subscriber. Field 503 includes an updated net number, which is a specific number at which the subscriber may be located at a particular time, either as identified by the user profile also saved in the database (in field 505 as will be discussed), or also by way of subscriber-specific registration, when the subscriber knows the subscriber will be deviating from the normal pre-programmed schedule previously stored in the database. The updated net number, is quickly identified in the database, as being the location at which the particular subscriber will be located when establishing a communication session. Data field 505 includes particular affiliations associated with a given object for that particular subscriber. In other words, the data field 505 (which may be more than one word in the database entry) includes a schedule for a particular subscriber including associations with the different net numbers for the subscriber according to those particular time frames, as well as protocol attributes associated with the different objects with which the subscriber is associated.

Figure 5B shows another data structure for hosting information regarding the different services that are available from different network and network resources as part of the global communication network. A first data field 507 identifies particular networks. Data field 509 identifies different available services that are associated with that particular network identified in data field 507. Data field 511 includes various management data regarding the attributes and service demands associated with providing services for the different available services identified in data field 509.

Figure 6 is a flowchart of a process employed according to the present invention. The process begins in step S1, where a user initiates a service request message sent to an information processor. The process then proceeds to step S2, where the service request

message is routed to the information processor associated with the user, or perhaps in a second step to another information processor associated with the first information processor. Once the appropriate information processor is identified, the process proceeds to step S3, where a database associated with the active information processor, is searched for components in the network that could perform the requested services. The process then proceeds to step S4, where user-unique information and service-unique information is optionally stored in the database so as to update the database records. The process then proceeds to step S5, where access to the requested service in the network is executed.

The mechanism and processes set forth in the present description may be implemented using a conventional general purpose microprocessor(s) programmed according to the teachings in the present specification, as will be appreciated to those skilled in the relevant arts. Appropriate software coding can readily be prepared by skilled programmers based on the teachings in the present disclosure, as will also be apparent to those skilled in the relevant arts.

The present invention thus also includes a computer-based product that may be hosted on a storage medium and include instructions that can be used to program a computer to perform a process in accordance with the present invention. The storage medium may include, but is not limited to, any type of disk including floppy disk, optical disks, CD-ROMs, magneto-optical disks, ROMs, RAMs, EPROMs, EEPROMs, flash memory, magnetic or optical cards, or any type of media suitable for storing electronic instructions.

Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.

The present document contains subject matter related to Swedish patent application no. 9901820-2, filed in Sweden on May 19, 1999, the contents of which being incorporated herein by reference.

CLAIMS:

1. A device in a communication network having multiple sub-networks, where each of the sub-networks includes services that may be different from that of other sub-networks, comprising:

5 an information processor configured to receive a service request message from a first sub-network, said service-request message indicate in a service to be executed, said information processor being configured to identify the service; and

 an information database connected to said information processor, said information database identifying the different services associated with the sub-networks that are
10 accessible as part of the network, wherein

 said information processors, retrieving sub-networks available to provide the service, and initiating a message to establish a communication link with at least one of the identified services that are capable of providing the service.

2. The device of Claim 1, wherein:

15 said information processor is configured to receive said service request message from at least one of a wireless communication link and a wired-link.

3. The device according to Claim 1, further comprising:

 another information processor that is connected with said information processor, said another information processor configured to retrieve information from another database, so as
20 to identify sub-networks that perform the requested service.

4. The device according to Claim 1, wherein:

 said information processor being configured to gather information regarding services via said information database and other information databases.

5. The device according to Claim 1, wherein:

25 said information processor being configured to receive said service request message from a telephone network that includes at least one of a mobile telephone network and a data network.

6. The device according to Claim 1, wherein:

said information database includes a data record associated with a user that includes at least one of a telephone number, an address, a service, customer, or a user.

7. The device according to Claim 1, wherein:

5 said information processor, identifying a service, and establishing a connection with another sub-network that is different from a sub-network from which the service request message is initiated.

8. The device according to Claim 7, wherein:

10 said information processor initiates a communication session with a sub-network in which the service identified by the information processor is to be executed.

9. The device according to Claim 1, wherein:

15 said information processor, being configured to communicate at least a portion of said service request message to another information processor, and said information processor being configured to perform a predetermined operation, if said another information processor does not respond within a predetermined period of time.

10. The device according to Claim 9, wherein:

said predetermined operation being establishing a connection with a predetermined telephone number when at least two telephone numbers are associated with a called party.

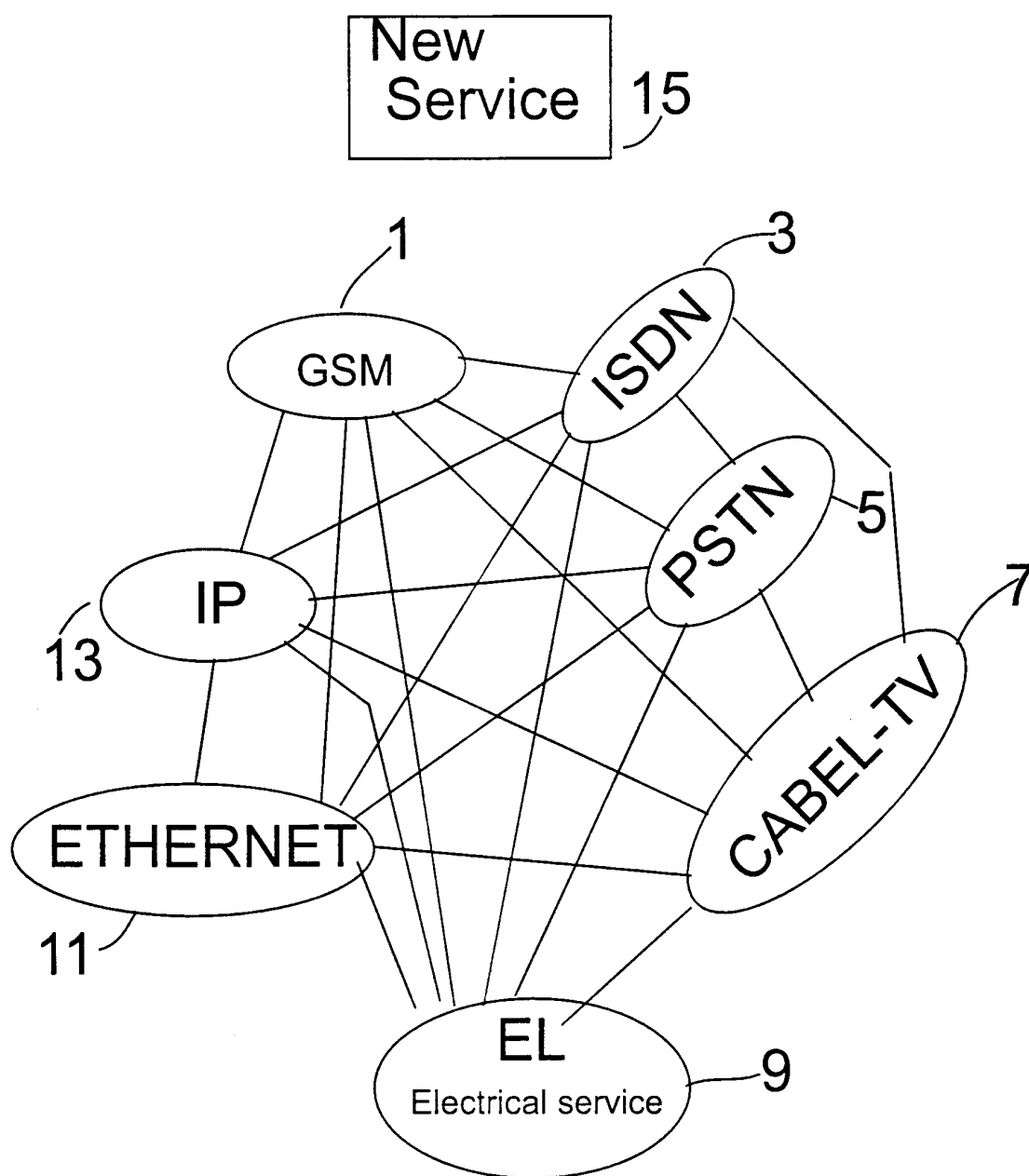
20 11. A method for identifying a sub-network, within a network having multiple sub-networks, that is able to provide a requested service, comprising steps of initiating a service request message;

routing said service request message to an information processor;

searching a database for components in the network that can perform a service requested in the service request message;

25 and accessing the sub-network identified in said searching step.

1/5



Background art

Fig 1

2/5

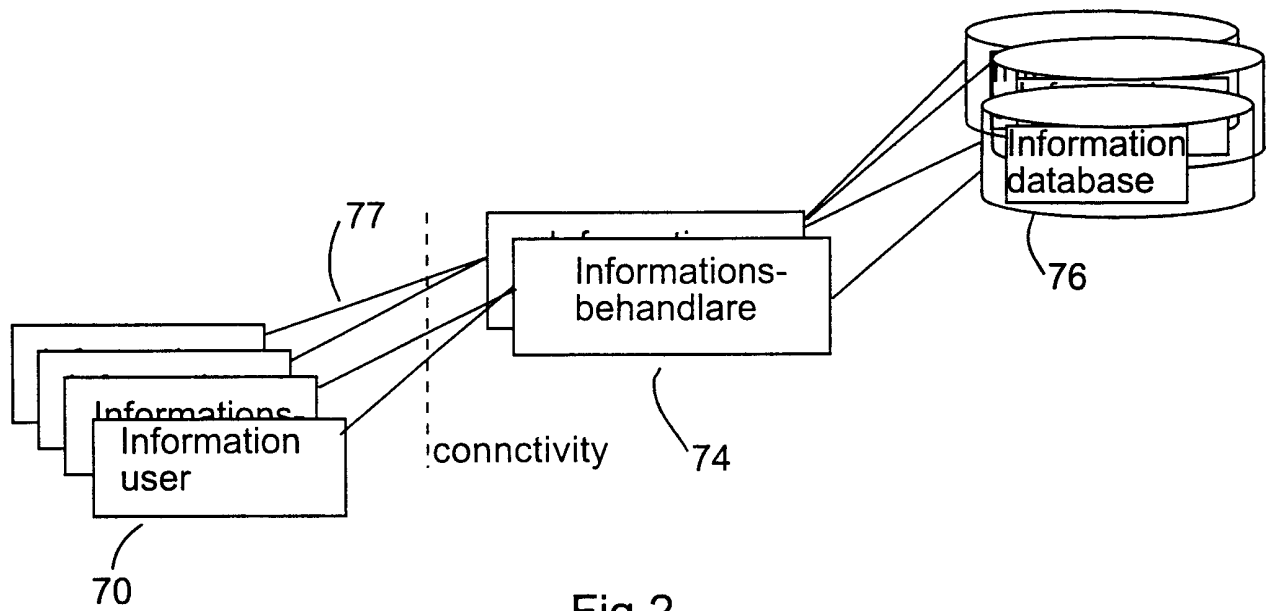


Fig 2

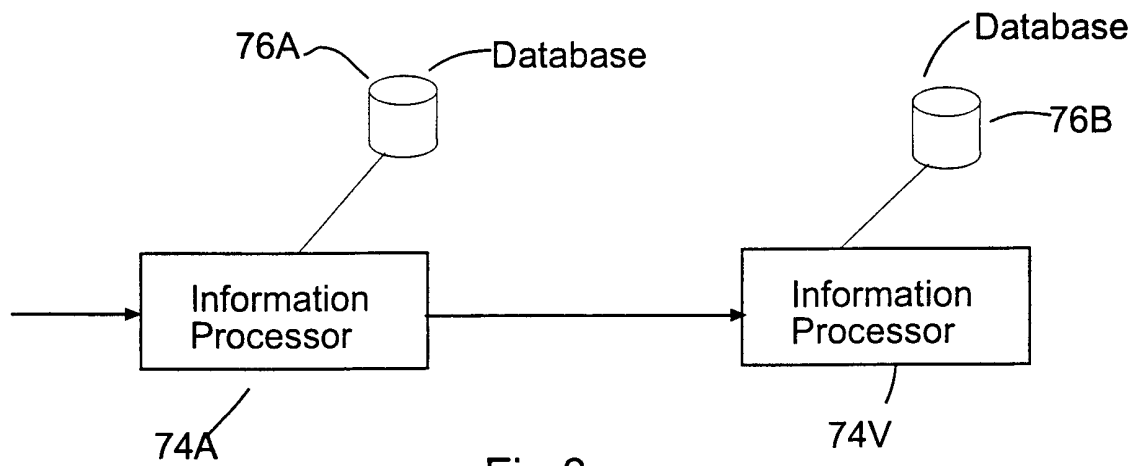


Fig 3

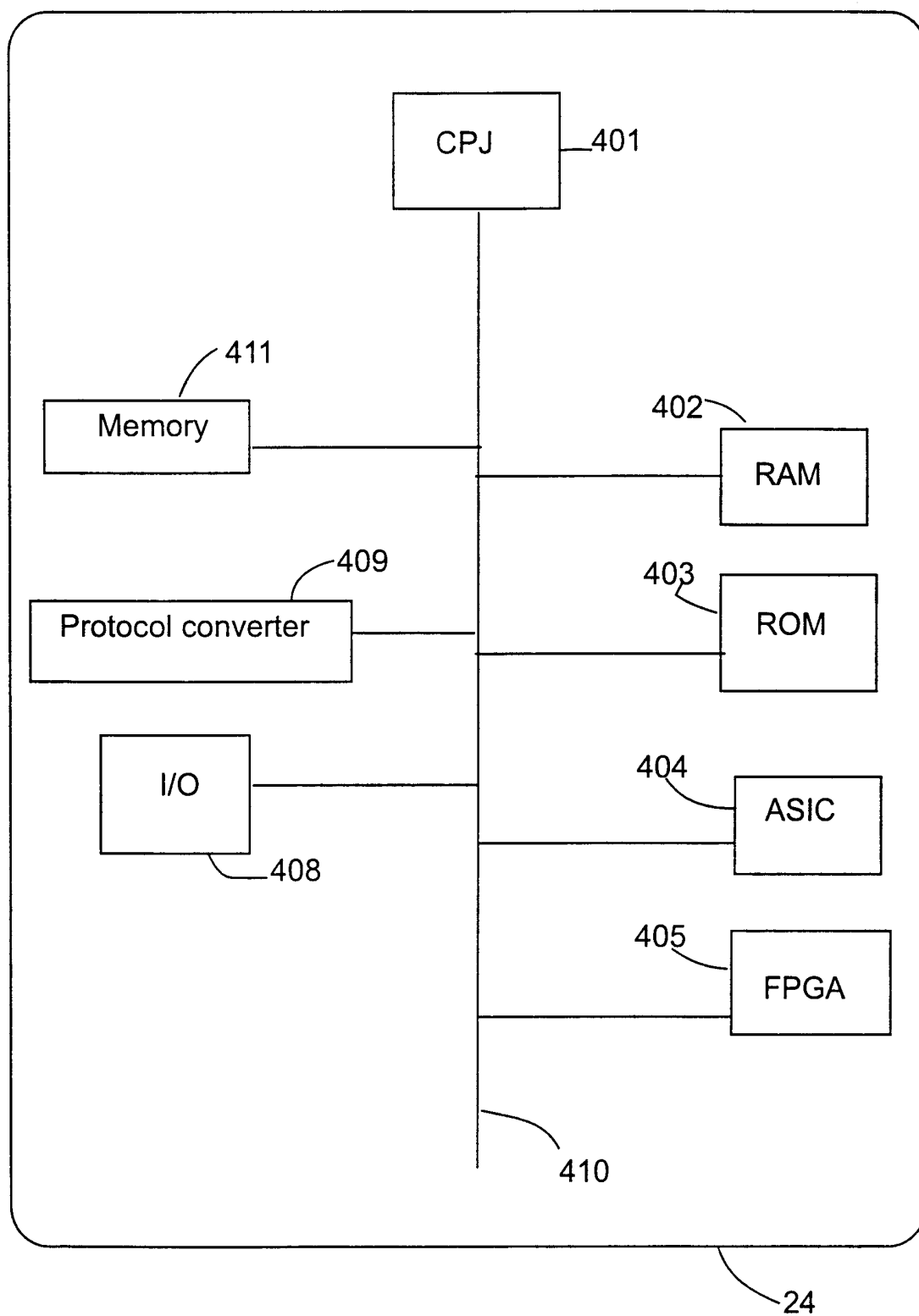


Figure 4

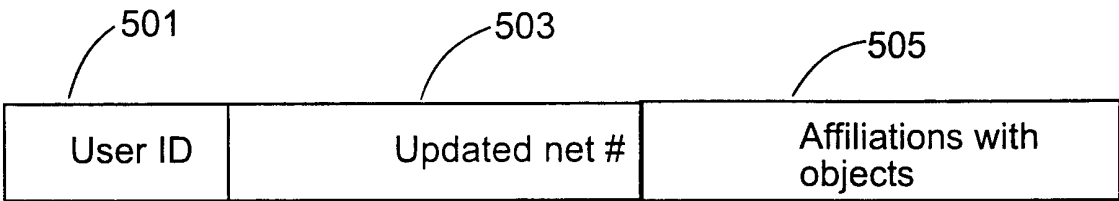


Figure 5A

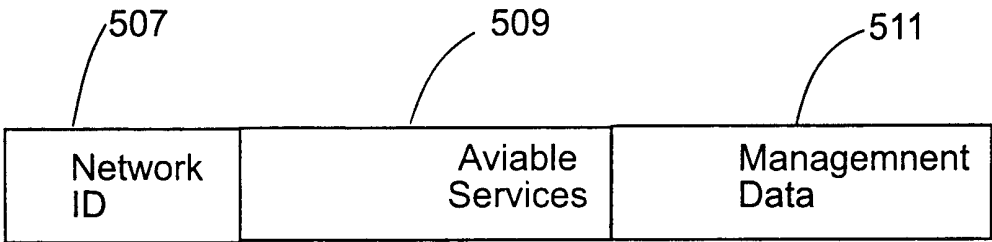


Figure 5B

5/5

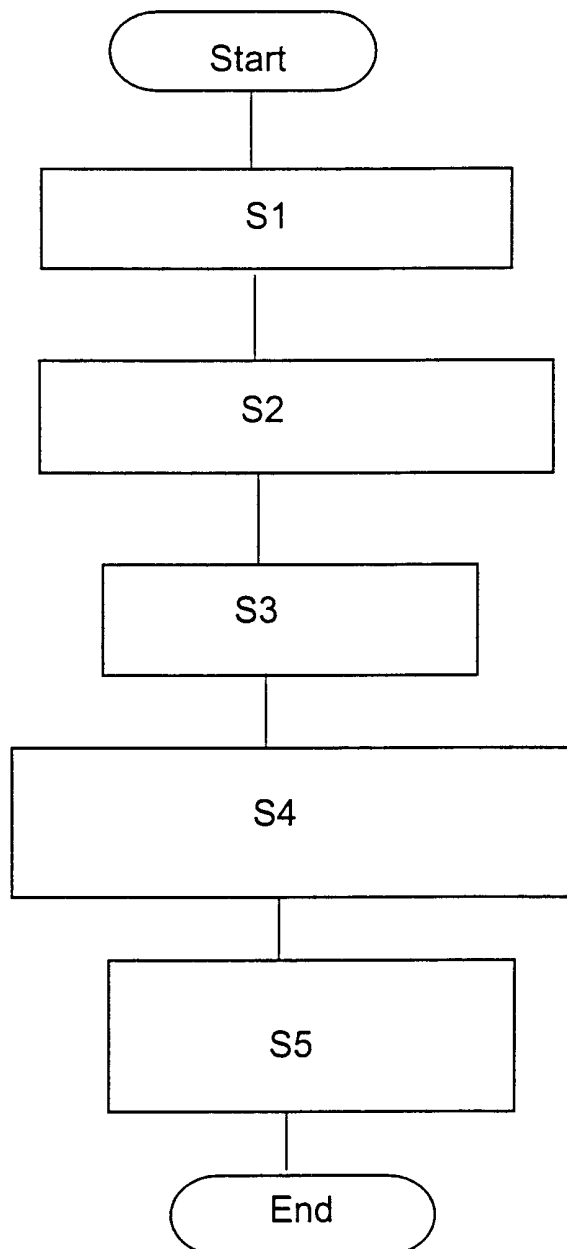


Figure 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/00996

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04H 1/08, G06F 17/30

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)

IPC7: H04H

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

SE,DK,FI,NO classes as above

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5848415 A (RANDAL LEE GUCK), 8 December 1998 (08.12.98), column 2, line 23 - column 3, line 67, figure 1 --	1-11
X	US 5905777 A (MARK JEFFREY FOLADARE ET AL), 18 May 1999 (18.05.99), column 3, line 63 - column 4, line 15; column 4, line 55 - column 5, line 14 --	1-11
X	EP 0213277 A2 (INTERNATIONAL BUSINESS MACHINES CORPORATION), 11 March 1987 (11.03.87), column 26, line 3 - line 19, abstract --	1-11

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/00996

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