



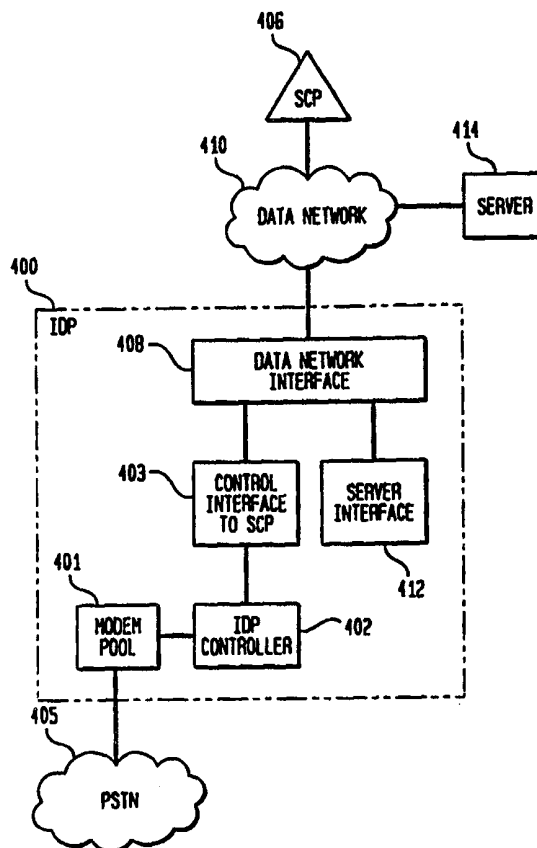
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US98/25675 (22) International Filing Date: 3 December 1998 (03.12.98) (30) Priority Data: 60/067,221 3 December 1997 (03.12.97) US (71) Applicant: BELL COMMUNICATIONS RESEARCH, INC. [US/US]; 445 South Street, Morristown, NJ 07960-6438 (US). (72) Inventor: SMYK, Darek, A.; 15 Zirkel Avenue, Piscataway, NJ 08854 (US). (74) Agents: YEADON, Loria, B. et al.; International Coordinator, Rm. 1G112R, 445 South Street, Morristown, NJ 07960-6438 (US).		(81) Designated States: CA, JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  Published With international search report.

(54) Title: INTELLIGENT DATA PERIPHERAL SYSTEMS AND METHODS

## (57) Abstract

An Intelligent Data Peripheral (400) allows the exchange of data messages between PSTN (405) users and the Intelligent Data Peripheral (400) under the guidance of service logic residing in intelligent network Service Control Point (406) systems. When the PSTN (405) call originator attempts to establish a call, the Service Switching Point (intelligent network capable switch) under the guidance of the Service Control Point (406) system routes the call to an Intelligent Data Peripheral (400). Then, the call originator interacts with the Intelligent Data Peripheral (400). Finally, based on information supplied by the user and user's data application running on user's personal computer, as well as the service logic and service subscriber's data stored on the Service Control Point (406) (or other databases external to Service Control Point (406)), the Service Control Point (406) requests the Service Switching Point to route the call to its final destination.



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## INTELLIGENT DATA PERIPHERAL SYSTEMS AND METHODS

**BACKGROUND OF THE INVENTION**

The present invention relates generally to data communications, and more particularly to intelligent network components supporting intelligent network services for data-based communications between a network and its subscribers.

Intelligent Peripheral and Services Node are well established components of intelligent networks that include the Public Switched Telephone Network (PSTN intelligent networks). These components allow voice-based interaction between subscribers and an intelligent network. Figure 1 illustrates an example of network deployment of these components. The intelligent network (100) includes the PSTN (102), an Intelligent Peripheral (101), a Service Control Point (103), a Services Node (104), and a plurality of end users or subscribers (105). The Intelligent Peripherals (101) are capable of playing voice announcements and collecting DTMF input, performing voice recognition, text to speech synthesis, voice identification, and other voice based interactions. Some Intelligent Peripherals (IP) are also capable of interacting with users through an Analog Display Service Interface ("ADSI") phone, where ADSI phones support the exchange of text messages between users and an Intelligent Peripheral.

Service logic programs residing in SCP (103) control the interactions between the PSTN's end users and Intelligent Peripheral (101). The SCP (103) communicates with the Intelligent Peripheral (101) in one of two ways. The first method involves a direct communication link between the SCP (103) and the IP (101). The second method involves the SCP (103) communicating with the IP (101) through the intelligent network switches (106), i.e. Service Switching Point ("SSP").

Intelligent network services involving the use of Intelligent Peripherals have the following call flows. When a PSTN subscriber unit (102) originates a call, the SSP (#), under the guidance of the SCP (103), routes the call to the Intelligent Peripheral (101). Then, the caller (102) interacts with the Intelligent Peripheral (101) under the control of the SCP (103). Finally, based on information supplied by the caller (102), as well as the service logic and subscriber's data stored on the SCP (103)

or in databases external to the SCP (103), the SCP (103) requests the SSP (#) to route the call to its final destination. Incoming call screening with PIN override is an example of a simple service involving the above described call flow. In this case the Intelligent Peripheral (101) based interactions are used for validating the PIN before the call is routed.

Services Nodes are also well established components that allow voice-based interactions between subscribers and an intelligent network. At a very high level, a conventional Services Node performs all of the functions of an SSP, an SCP, and an IP. Accordingly, the Services Node is capable of performing switching functions like an SSP, voice interaction functions like an IP, and service logic control like an SCP.

Figure 2 presents a network architecture supporting the conventional method of providing Internet/intranet dial-up access. An access server (201) acts as an interface between the PSTN (202) and a data network (203). The Authorization-Authentication-Accounting ("AAA") Server (204) includes one or more servers that perform authentication, authorization, and accounting functions. The explosive growth of the Internet, however, creates problems for the PSTN (202), which for the foreseeable future will provide the majority of users with Internet access via dialup modems. Also, today, many mobile business users remotely accessing corporate data networks (intranets) via the PSTN (202). Based on current growth rates, the volume of Internet/intranet related traffic on the PSTN (202) is forecasted to rival or overtake "regular" telephone or fax traffic in the next few years. The current method of accessing the Internet causes resource problems for the PSTN. Long holding times for Internet access calls tie up both switch resources and interoffice trunks causing congestion that affects all PSTN users. Additional PSTN resources are wasted on ineffective call attempts made by Internet users repeatedly trying to connect to overloaded Internet Service Provider facilities.

One solution to the PSTN congestion problems caused by Internet/intranet access involves off-loading the Internet/intranet access traffic onto a separate data network. Figure 3 presents a conventional high level off-load architecture. A key element of this off-load architecture is to move modem functionality away from ISPs/Enterprises (302) and closer to end users (304) so that Internet/intranet calls can

be converted to packet format as early as possible to take advantage of multiplexing gains. This means that the access router (301) of Figure 3 would include modem emulation capabilities, as well as support authentication and authorization functions. However, the ISPs/Enterprises (302) are reluctant to give up control over authenticating and authorizing their users.

In the architecture presented in Figure 3 the Intelligent Network, i.e. SCP (303), can perform the following functions/services:

- a) Identify Internet/intranet access calls and route them to data network access routers (301);
- b) Implement enhanced PSTN routing services such as:
  - Single number service routing calls to the nearest ISP/Enterprise point of presence;
  - Traffic distribution service distributing access calls between multiple ISP/Enterprise points of presence;
- c) Perform throttling of idle call attempts.

In the architecture presented in Figure 3, however, the SCP (303) cannot exchange data with a subscriber (304) to determine the identity of the subscriber and his/her service preferences. The SCP (303) has access only to the ANI of the caller's phone line. By the time the user is authenticated by the access server (302), the SCP (303) involvement in the call setup is over. This imposes certain limitations and prevents the intelligent network from offering a multitude of beneficial services.

Therefore, it is desirable to have a method and system for overcoming the disadvantages of the prior art.

### **SUMMARY OF THE INVENTION**

Accordingly, the present invention is directed to intelligent network components, systems, and methods that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

In accordance with one embodiment, the invention includes a device for voice-based and data-based interaction with a caller in a telecommunications network.

In another embodiment, the invention corresponds to a network element including one or more data modems for processing data from a caller according to a data-based protocol, a control interface to be connected to a service control point, and an intelligent data peripheral controller to control the exchange of data between the service control point and the data modems.

In another embodiment, the invention corresponds to a telecommunications network, the invention including a service control point to control routing of the call, an intelligent data peripheral which allows communication between the service control point and the subscribers, a telephone network connected to the service control point and the intelligent data peripheral, an access router which communicates with a server that provides one or more of authentication, authorization, and accounting services, the access router connected to the telephone network and one or more data networks which are connected to the access router, and the intelligent data peripheral is connected to at least one of the data networks.

In another embodiment, the invention corresponds to a method of routing data-based calls in a network including the steps of routing a call to an intelligent data peripheral, the intelligent data peripheral communicating with the subscriber to allow one or more of authentication-authorization-accounting services, communicating the results from the authentication-authorization-accounting from the intelligent data peripheral to the service control point, determining the caller's final destination at the service control point, and instructing the service switching point to route the call to said final destination.

In another network element embodiment, the invention includes means for performing all switching functions of a service switching point on a data-based call, means for performing all data interaction functions of an intelligent data peripheral, and means for performing all service logic control of a service control point.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and are intended to provide further explanation of the invention as claimed.

The accompanying drawings are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate several embodiments of the invention and together with the description serve to explain the principles of the invention.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 illustrates network deployment of an Intelligent Peripheral and Services Node in a PSTN intelligent network;

Figure 2 presents a prior art architecture for providing Internet/intranet dial-up access;

Figure 3 present a prior art solution for off-loading Internet/intranet access traffic onto a separate data network;

Figure 4 is a block diagram of an Intelligent Data Peripheral in accordance with one embodiment of the invention;

Figure 5 illustrates network architecture of a telecommunications system that includes an Intelligent Data Peripheral in accordance with one embodiment of the invention;

Figure 6 illustrates network architecture of an Intelligent Data Peripheral in accordance with another embodiment of the invention;

Figure 7 is a call flow diagram of a telecommunications system that includes an Intelligent Data Peripheral in accordance with one embodiment of the invention; and,

Figure 8 illustrates architecture of a telecommunications system that includes an Intelligent Data Services Node in accordance with one embodiment of the invention.

### **BEST MODE FOR CARRYING OUT THE INVENTION**

Reference will now be made in detail to the preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts. The description for carrying out the best mode of the invention should not restrict the scope of the claimed invention. It provides examples and explanations to enable others to practice the invention. The

accompanying drawings, which form part of the description for carrying out the best mode of the invention, show several embodiments of the invention, and together with the description, explain the principles of the invention.

The present invention involves two new intelligent network components to accommodate the use of the PSTN for data communications: an Intelligent Data Peripheral (IDP) and an Intelligent Data Services Node ("IDSN"). These components support deployment of new intelligent network services leading to new revenues for intelligent network operators. The Intelligent Data Peripheral can perform the functions of traditional Intelligent Peripherals but it also can support different types of PSTN users. While the traditional Intelligent Peripheral generally assumes that the PSTN user is equipped with a voice capable device, i.e. telephone, the Intelligent Data Peripheral of the present invention supports PSTN users equipped with data communications devices such as personal computers (PCs) with modems. Accordingly, interactions that occur between the PSTN user and the Intelligent Data Peripheral are exchanges of data messages performed under the guidance of service logic residing in intelligent network SCP systems.

The Intelligent Data Peripheral (400) shown in Figure 4 includes a modem pool (401) comprising one or more modems for connecting to the PSTN (405), a control interface to the SCP (403), an IDP controller (402) to control communications between the SCP (406) and the caller, and a data network interface 408 for interfacing with a data network (410) between it and the SCP (406). The IDP controller (402) preferably resides between the modem pool (401) and the control interface to the SCP (403). Optionally, the Intelligent Data Peripheral (400) performs conventional voice based interactions and preferably includes conventional hardware and software for performance of these operations (not shown). Intelligent Data Peripheral (400) may also include a server interface (412) to interface with a server (414) connected to data network (410).

The SCP (403) can communicate with the Intelligent Data Peripheral (400) using conventional methods of interactions between an SCP and an Intelligent Peripheral, i.e. direct interface (e.g. SR-3511) or indirect interface through an SSP (e.g. GR-1129). In general, the intelligent network services involving the use of an

Intelligent Data Peripheral have similar call flows to services involving the use of a traditional Intelligent Peripheral.

Figure 7 shows a call flow diagram for one embodiment of the invention. When the PSTN call originator attempts to establish a call (step 701), the SSP requests call processing instructions from SCP (steps 702 and 703). As instructed by the SCP, the SSP routes the call to an Intelligent Data Peripheral (step 704). The Intelligent Data Peripheral then requests instructions from the SCP (steps 705 and 706). Then, the call originator interacts with the Intelligent Data Peripheral (step 707). The Intelligent Data Peripheral reports the results of the interaction to the SCP (step 708). Finally, based on information supplied by the user and the user's data application running on user's PC, as well as the service logic and service subscriber's data stored on the SCP (or other databases external to SCP), the SCP instructs the SSP (step 709) to route the call to its final destination (step 710).

Analogously, the Intelligent Data Services Node functionality according to the invention is capable of performing switching functions (like an SSP), data interaction functions (like an IDP), and service logic control (like an SCP) for data-based communications with subscribers.

Figure 5 presents an Intelligent Data Peripheral based network architecture that allows PSTN callers with PC's to access the Internet via dialup modems according to one embodiment of the invention. In this architecture, the Intelligent Data Peripheral (501) authenticates and authorizes the caller before the call is routed to the appropriate destination, i.e. the appropriate port on the appropriate access router. When the caller attempts to make an Internet/intranet access call from a PC (502), the SSP queries the SCP (503) for instructions. In response, the SCP (503) requests the SSP to temporarily route the call to the Intelligent Data Peripheral (501). After the call between the caller's PC (502) and the IDP (501) is established, the IDP (501) authenticates and authorizes the user. Note, in the scenario presented in Figure 4, the IDP (501) acts as an AAA proxy querying the AAA server (504) operated by an ISP/Enterprise to assist it in performing AAA functions. After the IDP (501) completes the authentication and authorization operations it reports the outcome to the

SCP (503). Based on this information, the SCP (503) instructs the SSP to route the call to the appropriate destination.

Figure 6 presents another embodiment of a network with an Intelligent Data Peripheral. In this embodiment the SCP (601) is the platform for creation and deployment of AAA services (602) and the IDP (603) acts as a proxy to these services. The flexible SCP's (601) service creation environment allows for customization of AAA services (602). In addition, the ease of programming the SCP (601) services reduce the time to market for new versions of AAA services (602). It also supports flexible deployment configuration, for example in situations where the ISP/Enterprise insists on controlling AAA databases (604), the SCP (601) service logic could query these databases in the process of offering the AAA services (602).

In the embodiment presented in Figure 6, the SCP (601) is preferably programmed and equipped to perform the following functions/services:

- a) Identify Internet/intranet access calls and route them to data network access routers (605);
- b) Implement enhanced PSTN routing services, which include routing, based on customer identity such as:
  - Routing caller to ISP/Enterprise point of presence providing level of Internet/intranet access service matching customer profile;
  - Single number service routing calls to the nearest ISP/Enterprise point of presence;
  - Traffic distribution service distributing access calls between multiple ISP/Enterprise points of presence;;
- c) Perform AAA functions;
- d) Support graphic, data, or audio "hold" services for Internet/intranet access calls by temporarily parking the access calls on the IDP before the ISP/Enterprise access resources are available;
- e) Support roaming users;;
- f) Perform throttling of idle call attempts.

Figure 8 presents the architecture for an intelligent network with an Intelligent Data Services Node (801) according to one embodiment of the invention. In this architecture, the IDSN (801) replaces and performs all the

functions that were performed by the IDP (501) and SCP (503) in Figure 5. The deployment of an IDSN may be appropriate in smaller scale operations or in a network where SCP components are not deployed.

While it has been illustrated and described what are at present considered to be preferred embodiments and methods of the present invention, it will be understood by those skilled in the art that various changes and modifications may be made, and equivalents may be substituted for elements thereof without departing from the true scope of the invention.

In addition, many modifications may be made to adapt a particular element, technique or implementation to the teachings of the present invention without departing from the central scope of the invention. Therefore, it is intended that this invention not be limited to the particular embodiments and methods disclosed herein, but that the invention include all embodiments falling within the scope of the appended claims.

## CLAIMS

What is claimed is:

1. A network element for connection to a service control point in a telecommunications network, comprising:
  - means for voice-based interaction with a caller in said telecommunications network; and,
  - means for data-based interaction with a caller in said telecommunications network.
2. A network element for connection to a service control point in a telecommunications network, comprising:
  - one or more data modems for processing data from a caller according to a data-based protocol;
  - a control interface to be connected to a service control point;
  - an intelligent data peripheral controller to control the exchange of data between said service control point and said data modems.
3. A telecommunications network capable of handling data-based calls placed by subscribers, comprising:
  - a service control point to control routing of said call;
  - an intelligent data peripheral which allows communication between said service control point and said subscribers;
  - a telephone network connected to said service control point and said intelligent data peripheral;
  - an access router which communicates with a server that provides one or more of authentication, authorization, and accounting services, said access router connected to said telephone network; and,
  - one or more data networks, wherein said data networks are connected to said access router, and said intelligent data peripheral is connected to at least one of said data networks.

4. The telecommunications network of claim 3, wherein the service control point communicates with the intelligent data peripheral through a service switching point.

5. The telecommunications network of claim 3, wherein said service control point enables creation and deployment of said authentication, authorization, and accounting services, and said intelligent data peripheral acts as a proxy for said authentication, authorization, and accounting services.

6. A method for routing data-based calls in a network including a telephone network, an access router, an intelligent data peripheral, a service control point, a service switch point, and one or more data networks connected to said access router, the method comprising the steps of:

routing the call to said intelligent data peripheral;

the intelligent data peripheral communicating with the subscriber to allow one or more of authentication, authorization, and accounting operations;

communicating the results from the authentication, authorization, and accounting operations from the intelligent data peripheral to said service control point;

determining the callers final destination at the service control point and instructing the service switching point to route the call to said final destination.

7. The method of claim 6 wherein the intelligent data peripheral acts as a proxy querying a server to assist in one or more of authentication, authorization, and accounting services.

8. The method of claim 6 wherein the service control point communicates with the intelligent data peripheral through a service switching point.

9. A method for controlling data-based calls between a subscriber and a service control point, in a network element including a control interface to the

service control point, an intelligent data peripheral controller, and one or more modems, the method comprising the steps of:

    routing the calls from the modems to the intelligent data peripheral controller;  
    controlling the data-based call between the subscriber and the service control point at the intelligent data peripheral control interface; and,  
    the control interface to the service control point providing connectivity to the service control point.

10. The method of claim 6, wherein an intelligent data services node performs all the steps performed by the intelligent data peripheral, the service control point, and the service switch point.

11. The telecommunications network of claim 3 wherein an intelligent data services node performs the functions of said service control point and said intelligent data peripheral.

12. The telecommunications network of claim 4 wherein an intelligent data services node performs the functions of said service control point, said intelligent data peripheral, and said service switching point.

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FIG. 1

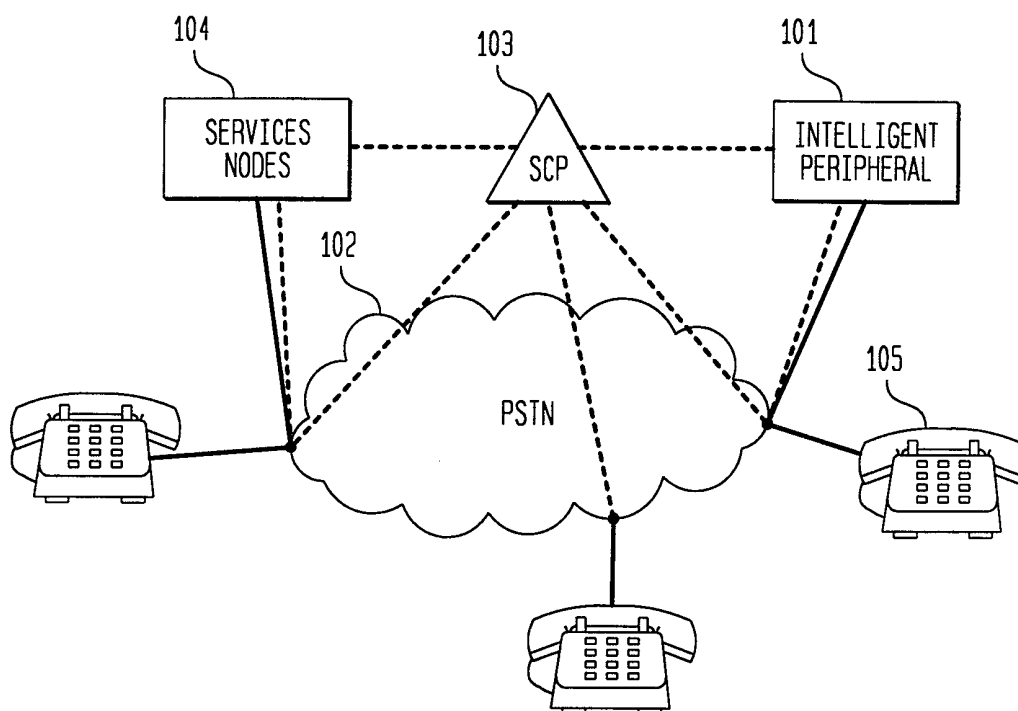
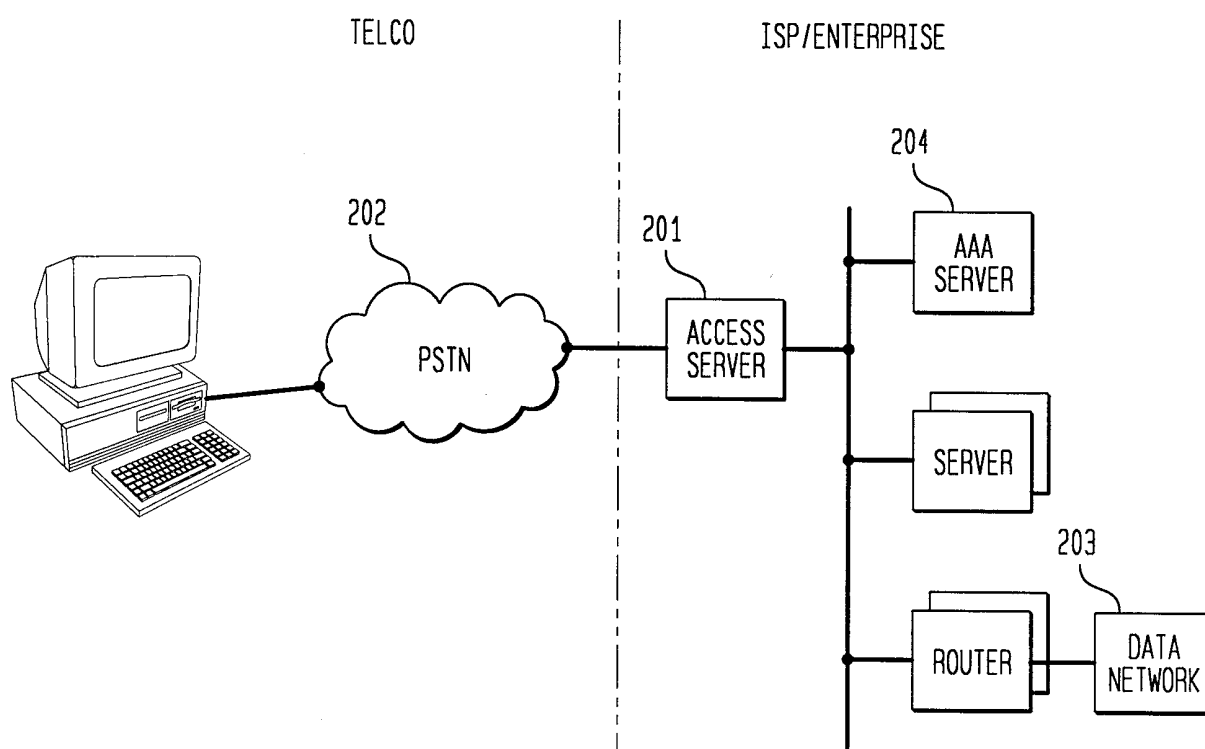
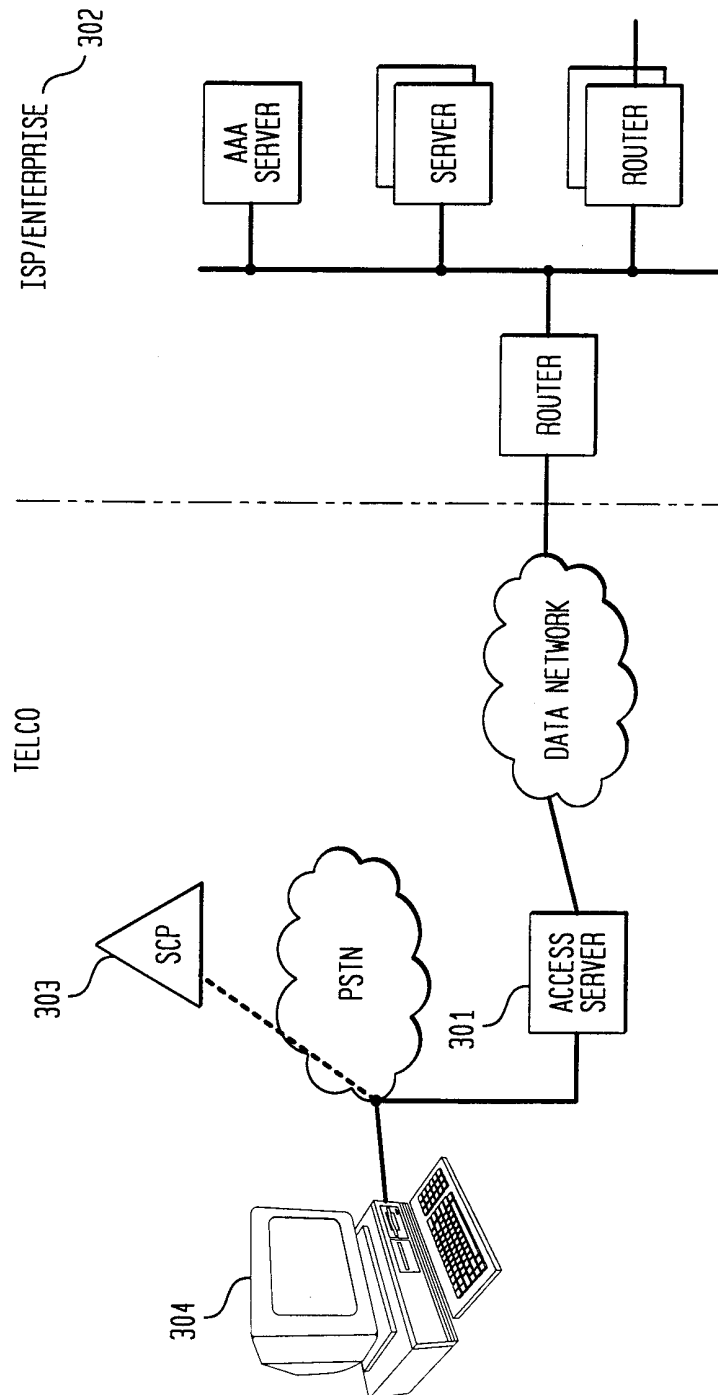


FIG. 2



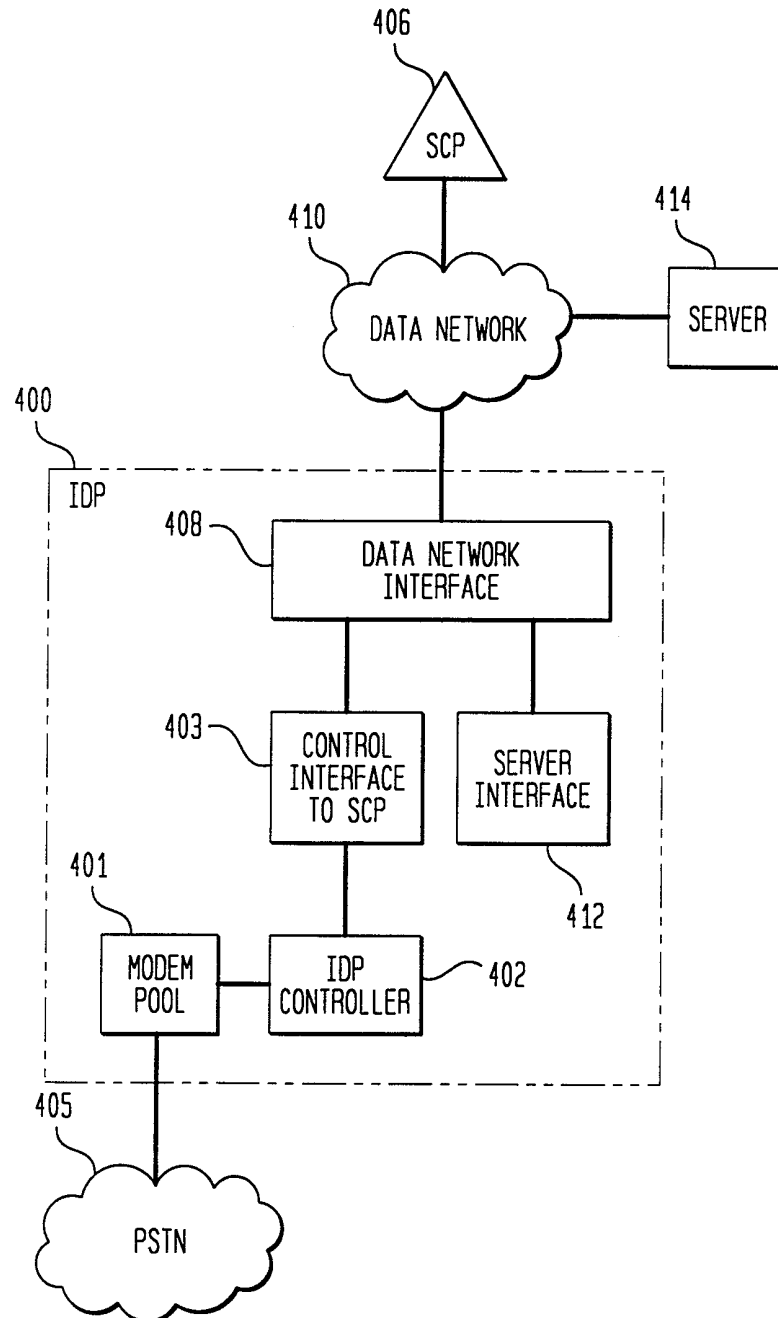
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FIG. 3



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FIG. 4



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FIG. 5

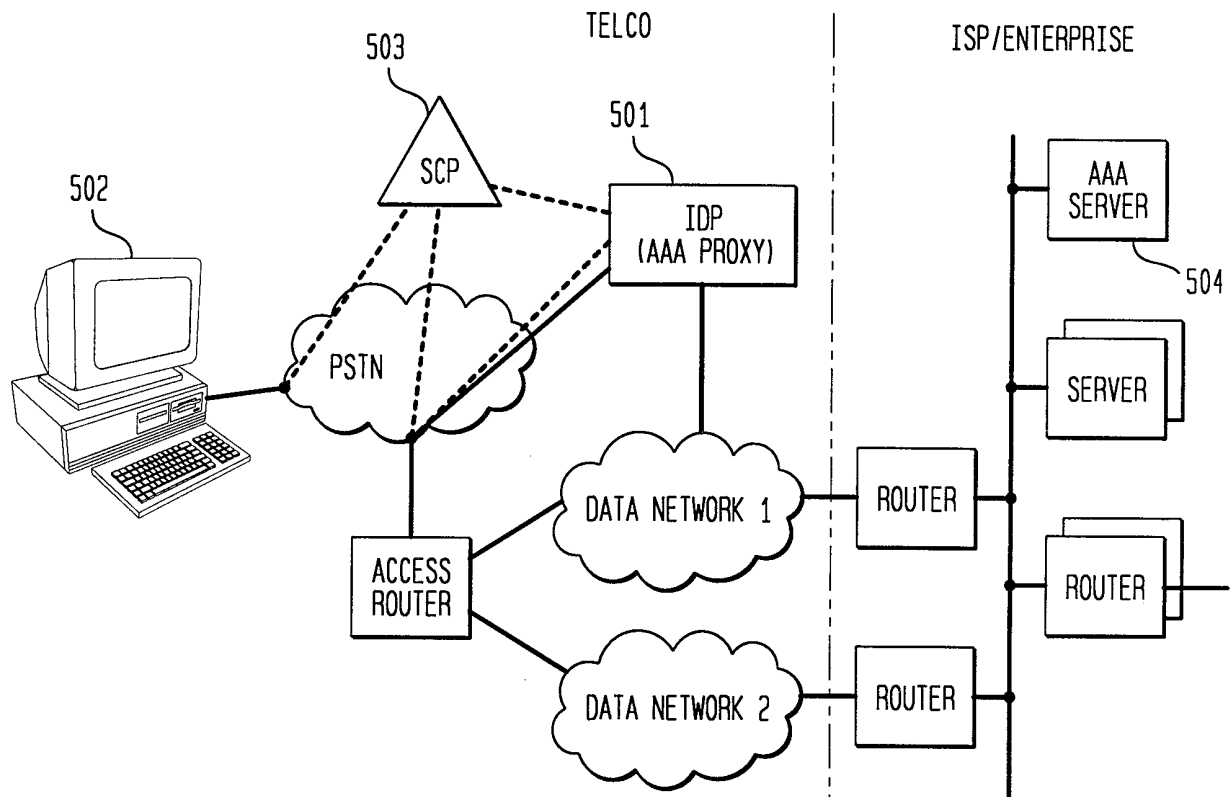
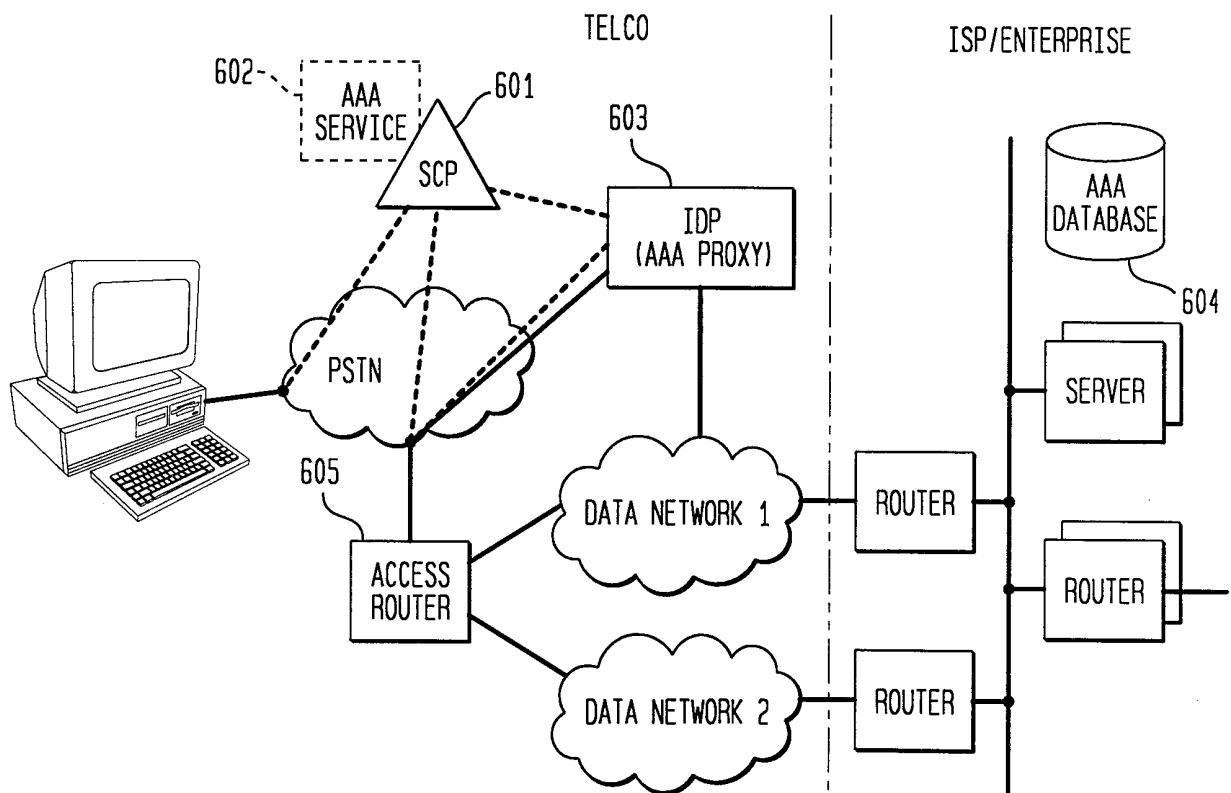


FIG. 6



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FIG. 7

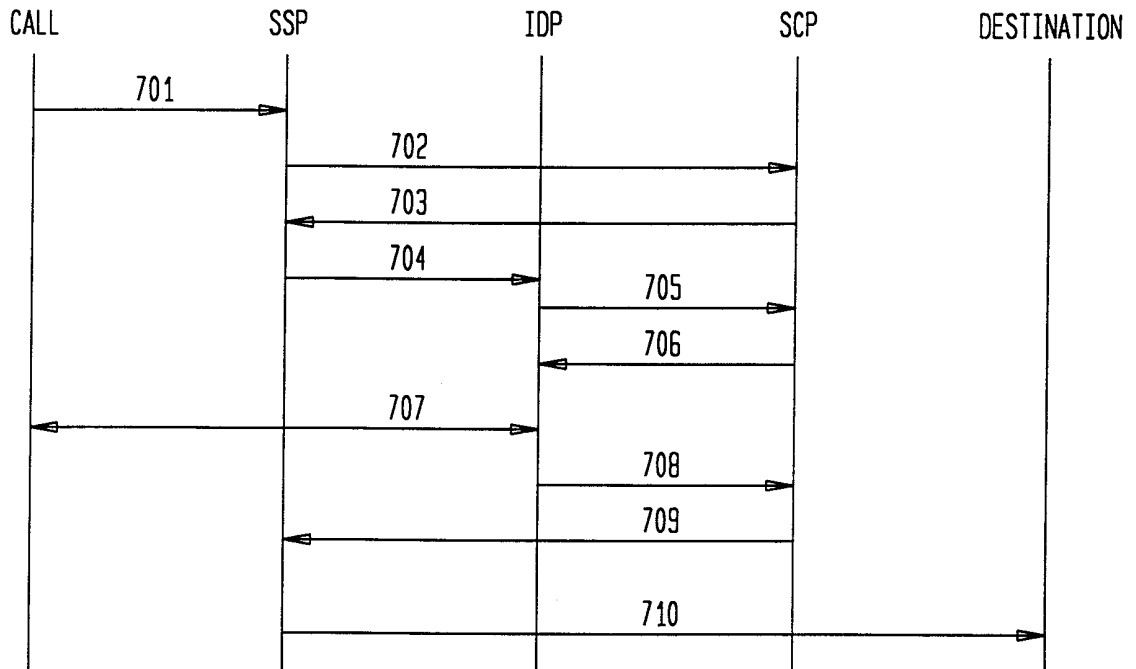
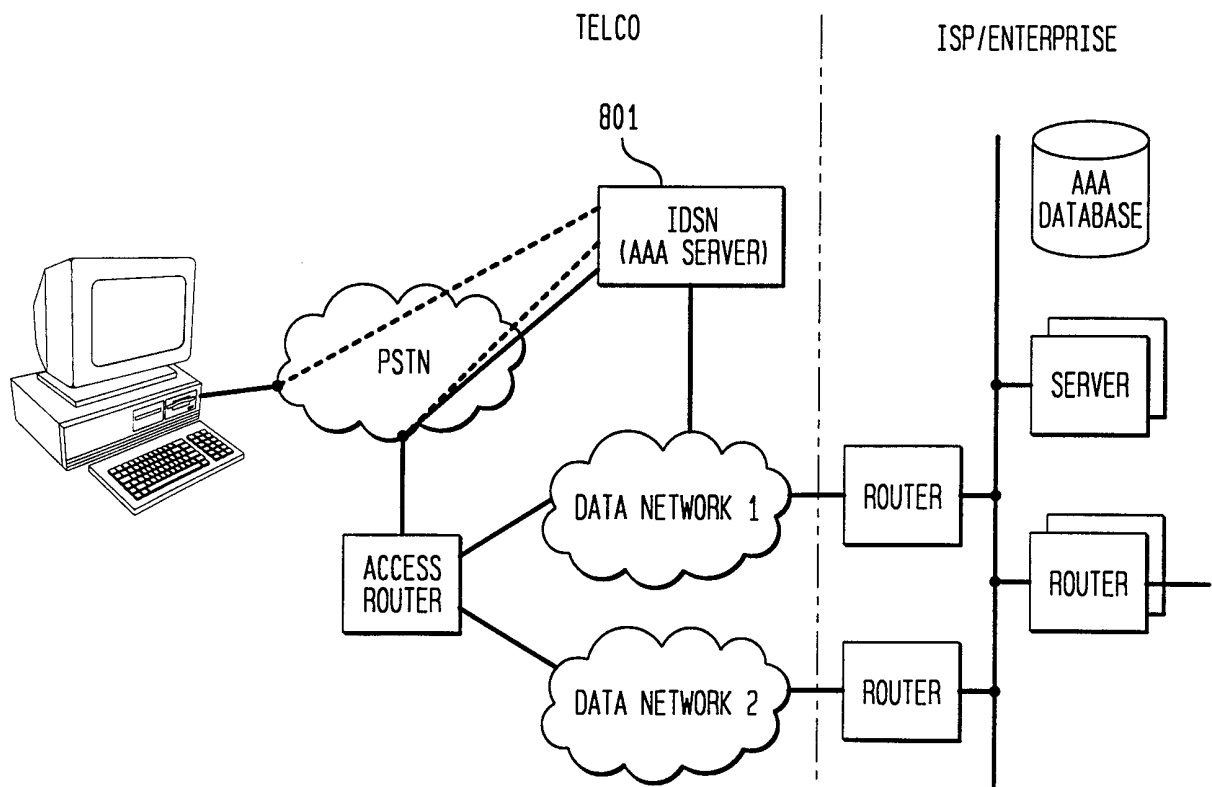


FIG. 8



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US98/25675

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) : H04M 11/00, 3/42, 7/00

US CL : 379/93.01, 207, 230

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/93.01, 207, 219, 220, 229, 230

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

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,594,789 A (SEAZHOLTZ et al) 14 January 1997, Abstract; FIGs 1A, 1B, and 6; col. 39, lines 10-26.	1-12
X,P	US 5,712,903 A (BARTHOLOMEW et al) 27 January 1998, Abstract; and FIGs 3, 5-7, and 9.	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

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