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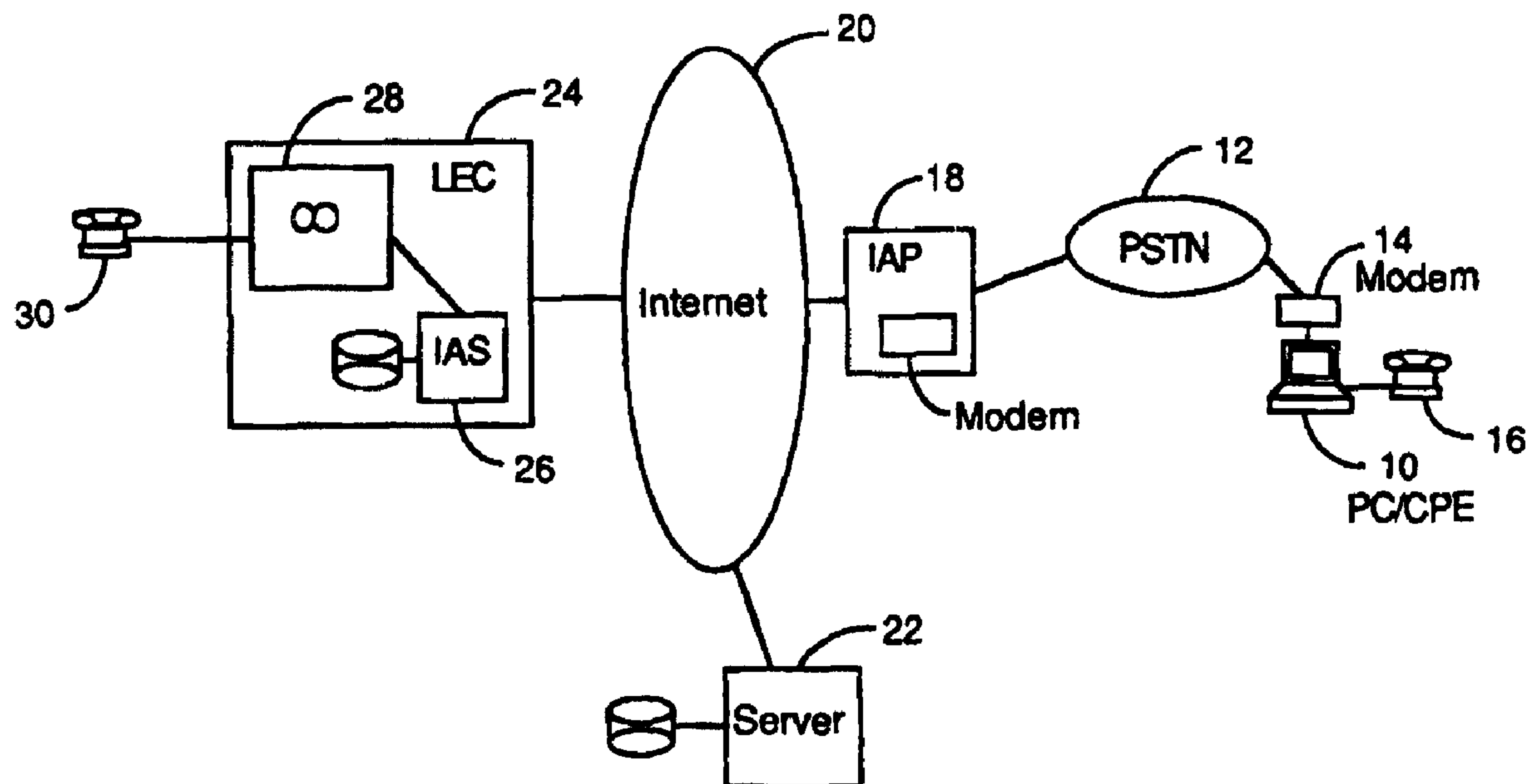
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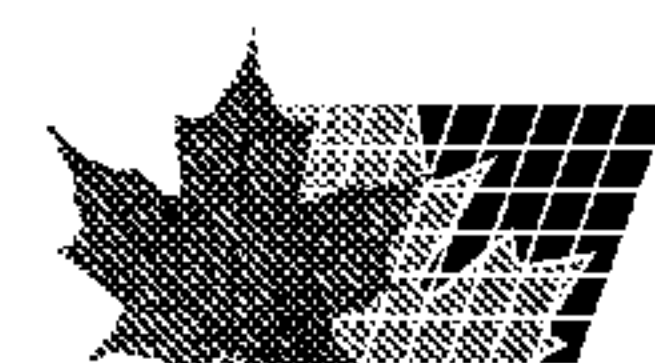
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(54) Title: TERMINATING DATA VOICE CALL ARCHITECTURE



(57) Abrégé/Abstract:

The invention resides in the field of telecommunication network architecture which supports voice connections over data networks and publicly switched networks. In one preferred embodiment, the invention permits a voice connection between a personal computer or CPE device (10) and a plain regular telephone terminal (30), over an Internet or data network (20) and a local exchange carrier or local access provider of the PSTN (24) to which the regular telephone terminal is connected.

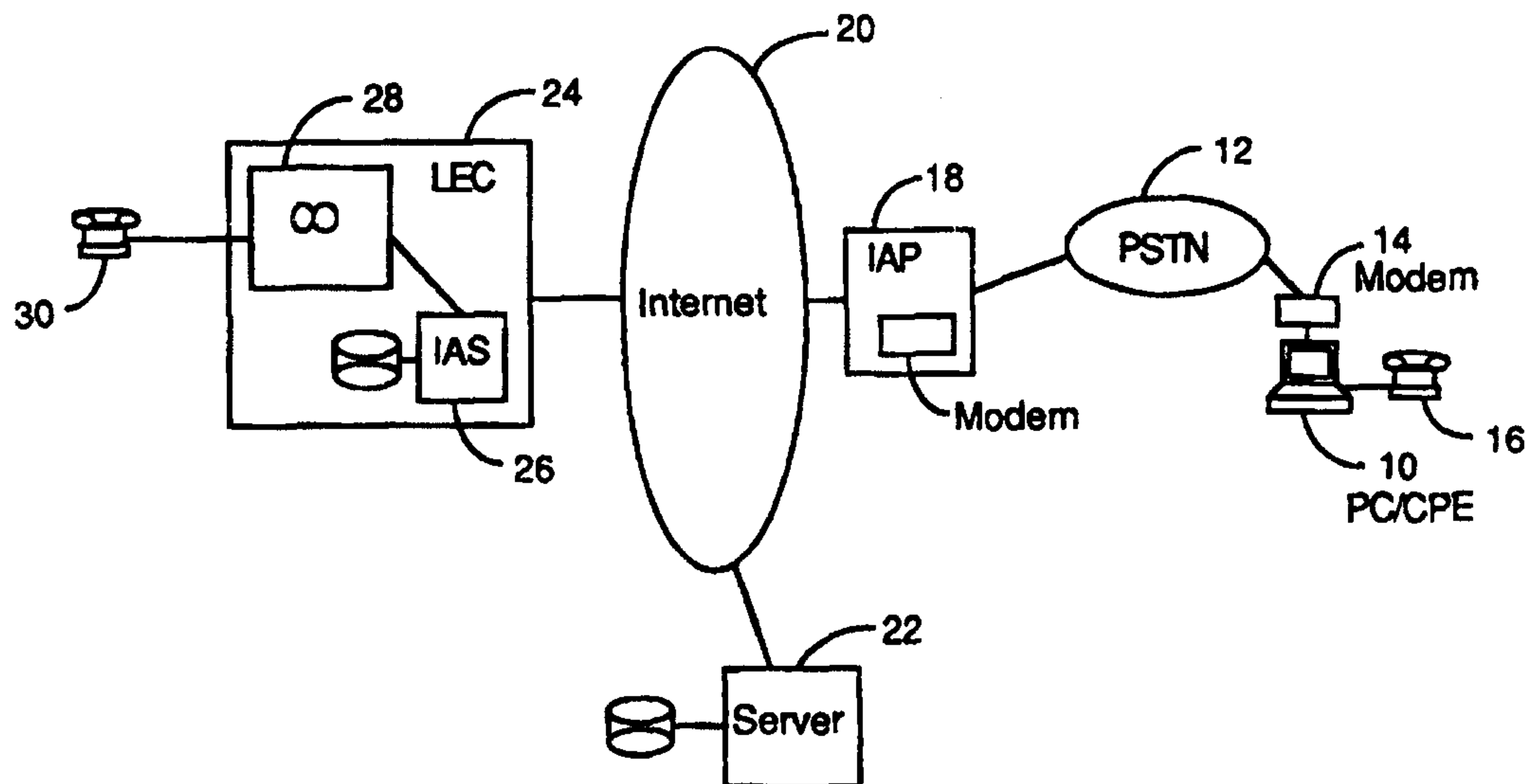


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(21) International Application Number: PCT/CA97/00128 (22) International Filing Date: 26 February 1997 (26.02.97) (30) Priority Data: 08/631,162 12 April 1996 (12.04.96) US (71) Applicant: NORTHERN TELECOM LIMITED [CA/CA]; World Trade Center of Montreal, 8th floor, 380 St. Antoine Street West, Montreal, Quebec H2Y 3Y4 (CA). (72) Inventors: HENRY, Robert, V.; 4016 Crown Hill Drive, Durham, NC 27707 (US). KENEDI, Robert; 11726 Night Heron Drive, Naples, FL 34119-8888 (US). (74) Agent: TOYOOKA, Yoshiharu; Northern Telecom Limited, Patent Dept., P.O. Box 3511, Station "C", Ottawa, Ontario K1Y 4H7 (CA).		(81) Designated States: AU, CA, CN, JP, KR, MX, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>

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(57) Abstract

The invention resides in the field of telecommunication network architecture which supports voice connections over data networks and publicly switched networks. In one preferred embodiment, the invention permits a voice connection between a personal computer or CPE device (10) and a plain regular telephone terminal (30), over an Internet or data network (20) and a local exchange carrier or local access provider of the PSTN (24) to which the regular telephone terminal is connected.

TERMINATING DATA VOICE CALL ARCHITECTURE

Technical Field and Industrial Applications

The invention generally relates to voice services over computer and/or data networks. In particular, it is directed to a service architecture by which a duplex voice call connection can be established between a computer or CPE (customer premise equipment) device and a regular telephone over wide area data networks, such as Internet, which are mainly designed for connection among computers.

Background of Invention

Software packages for voice communications over the Internet are now generally available for PCs (personal computers). For example, an article entitled "Dial 1-800-Internet" in BYTE, vol. 21, no. 2, Feb. 1996, pp 83-84, 86 and 88, and another entitled "Communications" in IEEE Spectrum, vol. 33, no. 1, Jan. 1996, pp30-41 describe technologies which permit voice communication over the Internet, particularly between two PC over the Internet. Widespread use of the Internet voice communications packages are severely inhibited because terminating access at any point in time is only available to users who happen to be actively on the "Network" (Internet) at the time of the call, and are also equipped with compatible software. Alternatively, the call may be pre-arranged via Internet mail or regular telephone communications. A product has also been introduced which allows the caller to leave Internet voice messages through a PBX or key system, making it as easy to retrieve messages as using a plain telephone. Users can leave voice messages and retrieve messages using the Internet and associated PBX device. The previously mentioned Internet voice messaging product uses a store and forward process unlike the present invention being presented here, which uses a live network architecture connection. The present invention allows an Internet voice call or other data voice call to be terminated at a LEC (local exchange carrier) or LAP (local access provider) so that a live voice connection can be established between a PC and a plain regular telephone. Due to lack of an accepted term, this service is hereinafter called Terminating Internet Voice Call Service, or TIVC. While this specification prominently mentions "Internet", the architecture according to the invention is equally

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applicable to any data network. It should also be noted that in the field of telephony, "terminating a call" involves several consequential steps which are performed at a terminating LEC or LAP, such as generating a ring signal, generating a busy signal, responding to a receiver going off-hook, etc., so that a proper telephone connection is established between two parties.

There are a few problems which hinder widespread use of the TIVC service. These include terminating access ("reach") limited to those who are compatibly equipped with hardware and software and are ready to receive the call; there is also no alerting mechanism for those who are inactive/disconnected from the Internet or data network (even though equipped); and there is no way to place an Internet voice call to someone with POTS (plain old telephone service) anywhere in the world.

The TIVC service would be a significant growth enabler for voice traffic on Internet or other data networks in that it eliminates the three major growth inhibiting problems stated above. At the same time, the TIVC service also offers a new terminating access service opportunity to LEC's and LAPs, consequently increasing network traffic and service revenues. As a result of the TIVC invention the number of reachable parties for a caller expands from the current limitation of only those who are equipped and active on the Internet or data network at the time the call is being placed, to all global telephone subscribers (or their answering system) at any time.

Objects of Invention

It is therefore an object of the invention to provide a network architecture which supports the termination of data voice traffic at a LEC or LAP of the PSTN (public switched telephone network).

It is another object of the invention to provide a method of terminating data voice traffic emerging from a data network at a local exchange carrier of the PSTN.

It is yet a further object of the invention to provide a network architecture in which a telephone number is converted to the data address of a serving data access system such as the IAS (Internet Access System) using a data addressing system and a telephone number conversion process.

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Disclosure of Invention

A novel method of establishing a duplex voice connection between an originating CPE on the data network and a called telephone terminal on the PSTN is described. The originating CPE is a data terminal having voice capability. The method comprises steps of sending a call set up request from the originating CPE to the data network, requesting the duplex voice connection, responding to the call set up request at a translation server connected to the data network and translating the telephone number of the called telephone terminal to the data address of a data network access system connected to the PSTN. The method includes further steps of routing the call set up request to the data network access system, responding at the data network access system to the originating CPE by permitting a termination of the call set up request at a local exchange carrier or local access provider of the PSTN and converting between data voice call traffic in the data network and telephone voice traffic in the PSTN thereby establishing duplex communication between the originating CPE and the called telephone terminal.

A novel access system for bridging between data voice call traffic from a CPE calling application in a data network and telephone voice output traffic intended for a destination telephone in a PSTN is also described. The access system comprises a server connected to the data network for receiving a connection request from the calling application and for launching a terminating voice call number identification translation and a router for routing the connection request to a terminating module connected to the PSTN using a terminating call identifier obtained in the translation. The terminating module generates a standard voice call termination to the terminating office equipment identified by the terminating call identifier and conversion module converts the data voice call traffic to telephone voice output traffic to be routed to the terminating office equipment, thereby establishing duplex communication between the application and the destination telephone equipment.

Brief Description of the Drawings

Figure 1 shows schematically a network architecture according to one embodiment of the invention; and

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Figures 2-4 show schematically various steps to carry out a method according to embodiments of the invention.

Mode(s) of Carrying Out the Invention

5 The Terminating Internet Voice Call Service, hereinafter called TIVC, is a new service which would be offered by LEC's and LAP's, enabling their customers to receive voice calls which were originated from the Internet or data network users using a computer or CPE Internet voice communication package. In one embodiment it involves
10 Internet because it is the most widely accepted data network^a but it should be emphasized that the invention can be implemented using any data network.

 The invention defines a new service, new method, and new architecture, which will allow an Internet or data voice caller to
15 originate and establish a two-way voice connection using the Internet or data network, and the PSTN from a PC (personal computer) or other CPE device, terminating to a plain telephone anywhere in the world. This terminating service will generate new revenue for the LEC/LAP service providers.

20 The TIVC service will allow LEC/LAP to minimize lost revenue from pure Internet PC to PC voice calling, and expand the terminating reach for Internet voice callers to existing plain telephone subscribers around the world.

 Figure 1 shows a network architecture according to one
25 embodiment of the invention. In the figure, a PC/CPE 10 is connected to the PSTN 12 via a modem 14. The computer is equipped with a voice card or such capability so that a telephone set or microphone and speaker configuration (multi-media package) 16 or any other CPE device can be connected for voice call. An IAP (Internet access
30 provider) 18 provides access to the PSTN connection and to the Internet 20. According to this embodiment, a server called a TIVC server 22 provides database services of address tables containing telephone numbers, data routing information, TCP/IP addresses, etc. At a local exchange carrier 24 of the PSTN near the called party telephone set, an
35 entity called IAS 26 enables the bridging between data voice call traffic from the Internet and ordinary telephone voice call traffic in the local

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exchange carrier containing CO equipment 28 and a POTS or other telephone set 30 of a standard telephone subscriber connected to it.

5 The accompanying Figures 2-4 schematically illustrate some typical steps of establishing voice call traffic between a PC/CPE device and an ordinary telephone set connected to a CO of a local exchange carrier in the embodiment described above in connection with Figure 1.

10 In Figure 2, a data voice call to a POTS is initiated at the PC/CPE by dialing or inputting a called party's PSTN telephone number. The PC/CPE is equipped with a voice card for digitizing voice. As shown by 40, through application software, the PC or CPE device launches a translation query into the Internet by way of the IAP for conversion of the PSTN telephone number to data or the IP address of an IAS using a TIVC number identifier translation. The TIVC server receives the query and checks its database at 42 for conversion of the PSTN telephone
15 number to the Internet address of the IAS, which has the capability of terminating voice call, and routing it to the called party's CO. At 44, the TIVC server responds back to the originating PC/CPE with the terminating telephone number data or IP IAS address for terminating the TIVC call.

20 In Figure 3, the PC/CPE device receives a response from the TIVC server concerning the data or TCP/IP address at 50, and launches a connection request 52 to the terminating IAS with the telephone number to be connected at the CO. The terminating IAS receives the connection request at 54 and the PC/CPE application sets up the
25 Internet data/voice connection to the terminating office destination IAS data or IP address with an enclosed terminating call identifier. The terminating IAS generates a standard outgoing call to CO equipment at 56 using a trunk or local line so that a two-way voice connection is made between the CO equipment and the originating PC/CPE device.
30 The central office system would then ring the standard POTS telephone through normal switching technologies. When the answering party answers the call, the complete two-way (duplex) voice path would be established to the originating PC /CPE device.

35 In Figure 4, end-to-end two-way voice connection is established between the originating PC/CPE device on the Internet and a POTS telephone on the PSTN. The terminating IAS receives the incoming call

from the Internet as a data call and converts it to voice output to be routed to a standard trunk or local line of the CO equipment.

In one implementation, billing can be handled by the receiving IAS system using Internet, an industry accepted cash system, as
5 required for terminating LD (Long Distance) charges, if required by the TIVC call originator.

It should be noted that the implementation architecture described above is one of many possible embodiments. For example, the invention can be implemented in various different ways^a as follows:

- 10 a) Use of AIN (Advanced Intelligent Network) capability, whereby the IAS could interface with an AIN database to perform the telephone number to terminating data/IP address conversion and respond to the originating caller system with the terminating calling information. This implementation would be
15 an alternative to having the conversion database co-located with the IAS system.
- b) The IAS system would not have to be a separate system from the Central Office switch, but this functionality could be built into the actual Central Office switching system. The software and
20 CPU (Central Processing Unit) could be built into the CO switch. Again, the conversion of telephone number to terminating data/IP address could be accomplished with a built-in database, or AIN capabilities could be used to perform the translation.
- c) In addition to scenarios (a) and (b) described above for the
25 telephone number to data or IP system translation, the Central Office switch could have built-in capability to actually "route" the TIVC call to the appropriate telephone line or trunk for termination.

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WHAT IS CLAIMED IS:

1. A method of establishing a duplex voice connection between an originating CPE (10) on a data network (12, 20) and a called telephone terminal (30) on a PSTN (24, 28), the originating CPE being a data terminal having voice capability, comprising steps of:
 - 5 sending a call set up request from the originating CPE to the data network, requesting the duplex voice connection;
 - responding to the call set up request at a translation server (22) connected to the data network;
 - 10 translating the telephone number of the called telephone terminal to the data address of a data network access system (26) connected to the PSTN;
 - routing the call set up request to the data network access system;
 - 15 responding at the data network access system to the originating CPE by permitting a termination of the call set up request at a local exchange carrier (24) or local access provider of the PSTN; and
 - converting between data voice call traffic in the data network and telephone voice traffic in the PSTN thereby establishing duplex communication between the originating CPE and the called telephone terminal.
2. The method according to claim 1, wherein the step of the data network sending the originating CPE a data or IP address of a data access system comprises a further step of a server connected to the data network searching a database.
- 25 3. The method according to either claim 1 or 2 wherein the call set up request is based on a telephone number of the called telephone terminal
- 30 4. An access system for bridging between data voice call traffic from a CPE calling application (10) in a data network (12, 20) and telephone voice output traffic intended for a destination telephone (30) in a PSTN (24, 28), the access system comprising:
- 35

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a server (22) connected to the data network for receiving a connection request from the calling application and for launching a terminating voice call number identification translation;

5 a router (22) for routing the connection request to a terminating module connected to the PSTN using a terminating call identifier obtained in the translation;

the terminating module (26) for generating a standard voice call termination to the terminating office equipment identified by the terminating call identifier; and

10 a conversion module (26) for converting the data voice call traffic to telephone voice output traffic to be routed to the terminating office equipment, thereby establishing duplex communication between the application and the destination telephone equipment.

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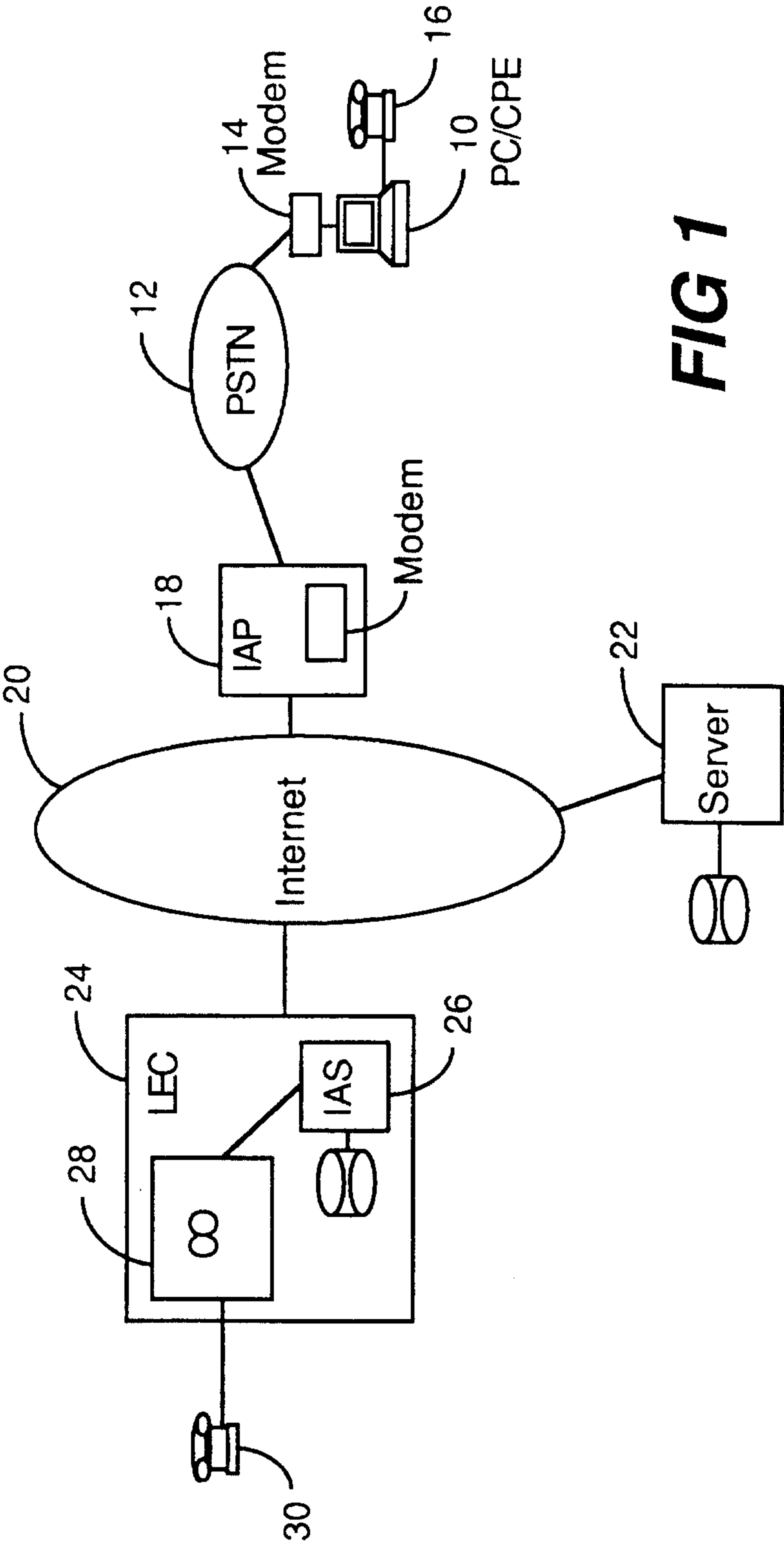


FIG 1

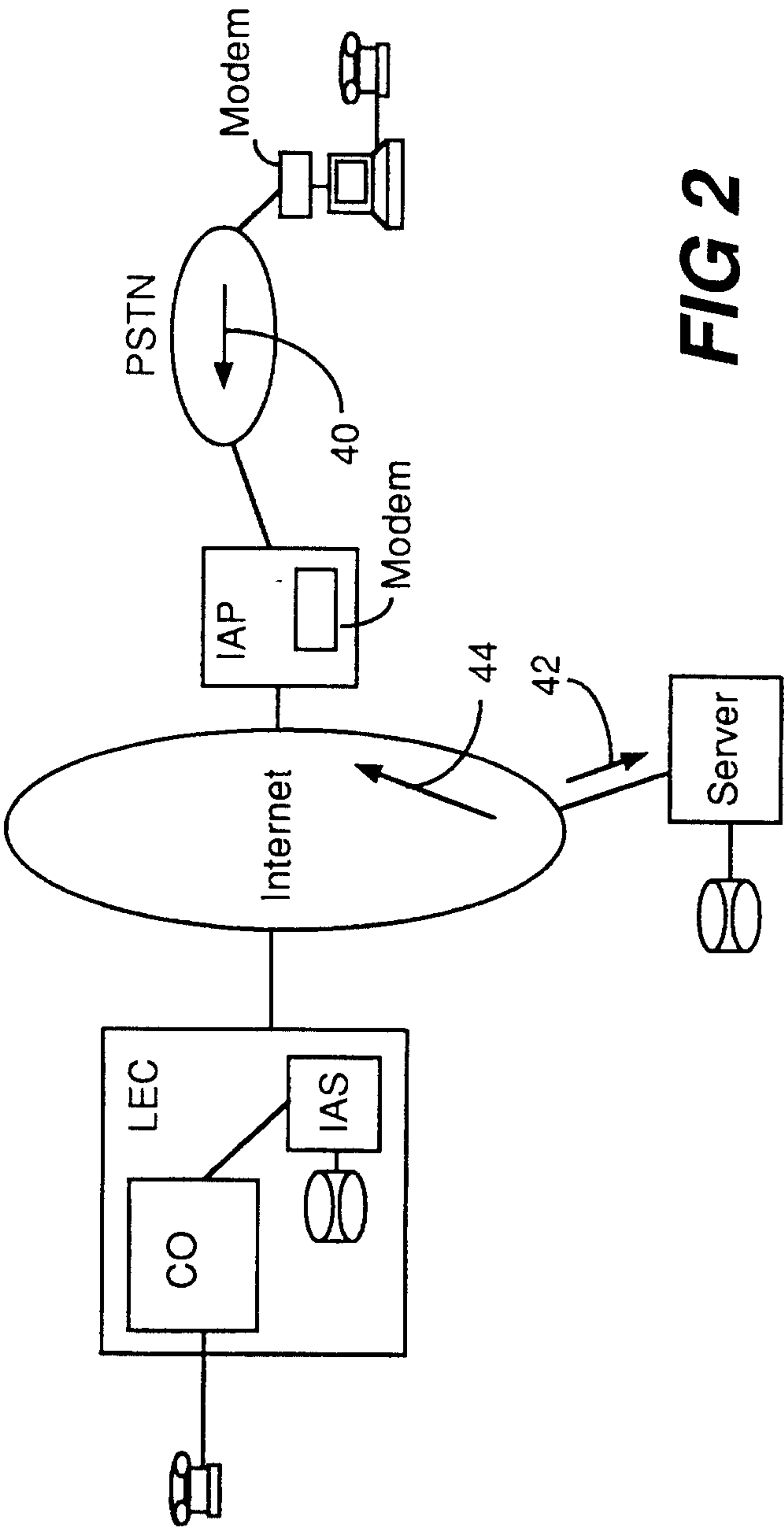


FIG 2

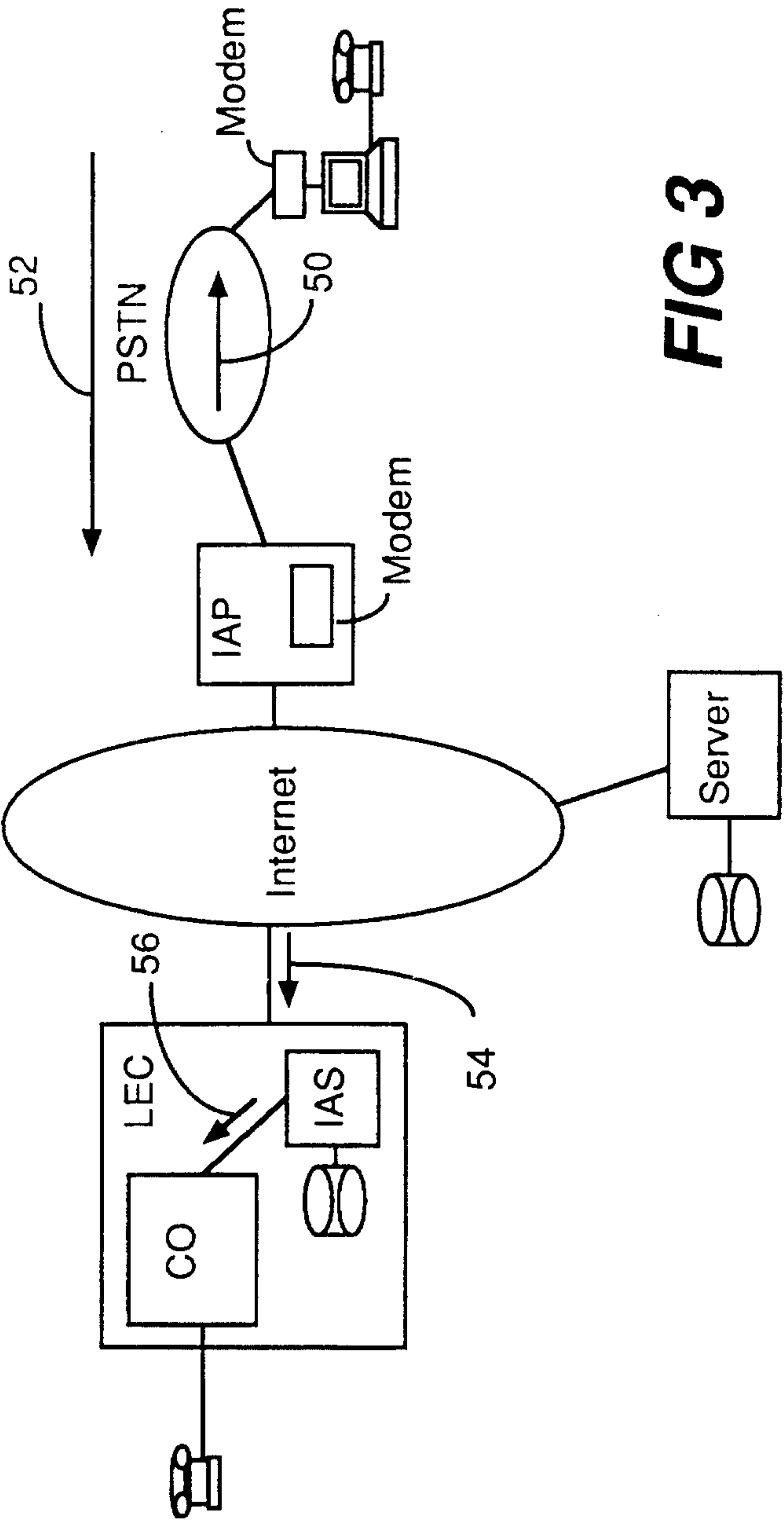


FIG 3

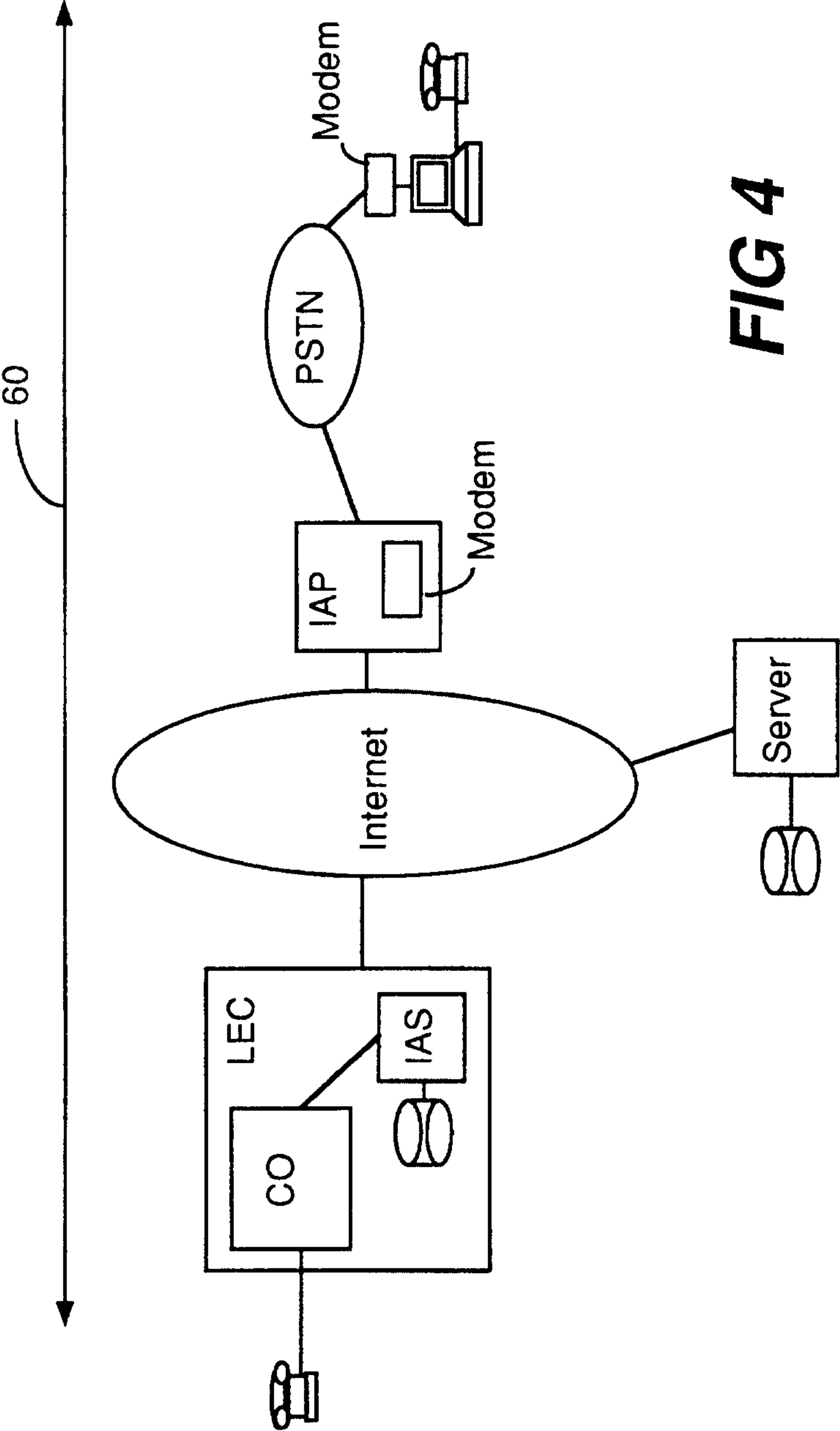


FIG 4

