

database 37. Note that the gateway 20 in Figure 4 has the same functionality as the gateway 20 in Figures 1 through 3, but may be implemented differently. For instance, since a GPRS may be deployed in other than GSM networks, a SIM card need not be provided to gateway 20, which instead may simply be outfitted with a cellular transceiver appropriate to the type of cellular network 100 in which the gateway 20 will be transmitting messages.

BSC 50 identifies and routes data messages to a support node 60. BSC 50 identifies data messages in a GPRS system because handshake messages from the gateway 20 inform the base station 52 that the particular transaction is a packet data transaction. Other methods exist for identifying such transactions, including examining identifiers placed in the data message by the user toggling certain functions on the delivery device or by analyzing the message itself. In any event, data messages from gateway 20 are assembled by a PAD into packets per the GPRS protocol specification for delivery to the support node 60. Figure 4 shows Gb and other interfaces that specify header information and such for allowing various network elements to communicate with one another. Support node 60 is a SGSN/GGSN (Server GSM Support Node or Gateway GSM Support Node), such as a Passport carrier grade data platform system available from Nortel Networks or any other platform suitable for use as a router. Figure 4 shows that support node 60 packages data messages that arrive from facility 20's gateway 20 for delivery over one of many types of networks to a central processor 40 (shown in Figures 1 and 2). The delivery network may be an IP network, an X.25 network, or other public land/mobile networks 62. Network 100 may also deliver messages, queries or commands from a central processor 40 (or another terminal) to the facility 12 that couples via an over-the-air interface to the base station 30 shown in Figure 4.

To send a message to a particular gateway 20, a user accesses the network 100 through a mobile station or fixed terminal. The user enters the gateway 20's identifier and formulates a message. The message, whether sent over a public telephone, via a workstation 42 as e-mail, or through a mobile cellular handset 32, is sent by the network 100 to the support node 60. Support node 60 reads the identifier and associates the

identifier with the BSC 50 that is associated with the destination gateway 20 and routes the message to that BSC 50, which then broadcasts the message via BTS 30.

Note that as in the SMS implementation, a common message to multiple gateways 20 may be sent over network 100. This is feature may be used to alert gateways 20 to a particular condition (e.g., weather, etc.) common to the geographical area in which the gateways are deployed or to send instructions to multiple gateways 20 controlled by a single user. Messages may be broadcast, for instance, to all gateways 20 with a common NPN in their identifying phone number. Messages with that NPN may cause the support node 60 may to do a table look-up and determine the particular gateways associated with the NPN; thereafter, the support node 60 will route the same message to each such gateway 20 by instructing each BSC 50 to forward the message to each applicable destination. Of course, skilled persons will recognize other means than a common NPN for specifying a group of gateways 20 to which a common message may be broadcast.

By using GPRS to transport data messages to and from gateway 20, the network 100 is able to transport messages larger than the 160 bytes allowed in an SMS message. Also, GPRS enhances wireless services by emphasizing internet protocol (IP) technology to allow seamless operation with the internet, packet-oriented data services, and interworking with legacy wireless systems. For instance, GPRS provides variable data rates for transmitting messages via the over-the-air interface between wireless device and base station that range from 11.2 to 22.8 kbps for a single slot allocation. Multi-slot configurations provide 22.4 to 182.4 kbps data throughput. Future enhancements to GPRS data rates are expected to provide 69+ kbps bit rate over the air interface, using a different modulation scheme. Data rates in packet mode are expected in the 45-550 kbps range.

Collating and Accessing Data at the Central Processor

As described and shown in Figures 1 and 2, central processor 40 receives data from multiple gateways 20. Central processor 40 has a database for storing information uploaded via SMS messages or the IWF protocol. The stored information may be collated and organized according to customers, facility, etc. Customers may access the database

via the communication gateway. For instance, customers may use a workstation 42 to set up a TCP/IP session via an Internet Protocol ("IP") communication network, such as provided by a local Internet Service Provider ("ISP"). Through the internet connection, customers can easily view data describing the energy usage of devices at facility 12, as well as check on the status of various other activities logged into the database at the central processor 40. Note that customers can set up a TCP/IP session either through a terminal connected to an ISP, such as workstation 35, or via the communicator 34 that connects to the internet via a wireless network.

Additionally, while viewing data describing activities at facility 12, the customer may also input commands to be forwarded to various devices at the facility 12. Central processor 40 packages those commands as an SMS message and downloads them to a particular gateway 20 through the SMSC 38. Although Figures 1 and 2 show central processor 40 coupled to MSC 36 and SMSC 38 via a PSTN connection, central processor 40 could be co-located with those platforms or communicate with them via a different communications link. Alternatively, central processor 40 may be provided as part of, or couple to, a support node 60 so that messages or commands entered by customers may be formatted as a GPRS packet for transmission over the network 100 that operates a GPRS, as shown in Figure 4.

An example use of the methods and systems of the present invention is described as follows. Gateway 20 is programmed to poll each device coupled to it to determine the device's energy use. For instance, gateway 20 can be connected to the thermostat, refrigerator, water heater, and washer/dryer in a particular residential facility as well as to the general meter for that facility. Gateway 20 polls those devices every hour to determine their energy use. Gateway 20 then forwards the poll results to the SIM card, which generates a SMS message containing the poll results as well as the date, time and location of gateway 20. The SMS message is then transferred from gateway 20 to central processor 40 via the MSC 36 and SMSC 38. Central processor 40 collates each hourly message from gateway 20 to form a visual graph depicting overall and individual device energy usage at facility 12. This allows a customer to access the database coupled to the

central processor 40 via the internet and determine the overall energy usage at a particular facility 12. The customer can then, based on the energy usage trends, input commands to adjust the thermostat, or turn off one of the devices (such as the washer/dryer or water heater) coupled to the gateway 20 in order to save energy. Likewise, the user can input other commands for delivery to the gateway 20. For instance, the user could instruct the gateway 20 to enable or disable an alarm system at a particular facility 12 at a particular time and for a particular time period. The present invention also allows the gateway 20 to be programmed to copy messages on energy uses or alarm triggers at a particular facility 12 directly to a handset 32 associated with the owner of facility 12. Likewise, gateway 20 can have its normal routine interrupted by a priority data message. For instance, if gateway 20 couples to alarm sensors at the facility 12 and one sensor alerts to an intruder, gateway 20 can be programmed to send a message both to the handset 32 in order to alert the owner of the facility 12 and to the central processor 40, which processes the message in order to alert the authorities to the security breach. These are, of course, just two of many applications for which gateway 20 and the present invention can be used.

The foregoing is provided for purposes of explanation and disclosure of preferred embodiments of the present invention. For instance, a preferred embodiment of this invention involves using a GSM network with a short messaging service capability or a GPRS capable wireless system. It is expected that such capabilities or their equivalent will be provided in other standard types of wireless networks, in which case the preferred embodiment of this invention may be easily adapted for use in such networks. Further modifications and adaptations to the described embodiments will be apparent to those skilled in the art -- such as upgrades or modifications to the GSM or GPRS protocols -- and may be made without departing from the scope or spirit of the invention and the following claims.

What is claimed is:

1. A method for remotely monitoring or controlling activities within multiple facilities geographically dispersed within at least one wireless network adapted to transmit
5 GSM short messages to allow the facilities to communicate with other terminals without making a wireless telephone call, the method comprising:
- (a) providing the selected facility with a gateway comprising a processor, a transceiver and a SIM card adapted to transmit short messaging service messages;
 - (b) periodically causing the gateway to formulate a short message reporting on
10 activities within the selected facility at which the gateway is located;
 - (c) transmitting the message over the GSM network via a Short Messaging Center coupled to a Mobile Switching Center within the GSM network; and
 - (d) receiving the message at a terminal selected from a group of devices consisting of a mobile station, a workstation and a central processor.
15
2. A method according to claim 1 further comprising the step of controlling devices located at a selected facility by formulating a control message and forwarding it via the GSM network to the selected facility, wherein the gateway at the facility processes the control message in order to control one or more devices coupled to the gateway.
20
3. A method according to claims 1 or 2 further comprising the step of collecting multiple messages from the selected facility, storing those messages in a database associated with a central processor and processing the stored messages at the central processor to display information concerning activities at the selected facility.
25
4. A method according to claim 2 in which the control message is formulated by a user on a communication device selected from the group consisting of a pager, a cellular handset, an internet wireless communicator or a workstation.

5. A method according to claim 4 further comprising the step of coupling the central processor to an internet protocol network to allow users to view the displayed information concerning activities at the selected facility.

5 6. A method according to claims 1 to 5 further comprising the step of monitoring energy uses within the selected facility by periodically polling at least one device therein.

7. A method according to claim 6 further comprising the step of aggregating
10 the periodic polls and uploading the aggregated information to a user's terminal.

8. A system for transmitting data to and from multiple gateways deployed in homes or businesses and capable of collecting data concerning usage or operation of various devices located in the homes or businesses, the system comprising:

15 a) multiple gateways, each adapted to formulate or accept a wireless packet data transmission;

b) a base station controller adapted to route data forwarded to the base station controller via wireless transmission to a support node for formatting the message into a format selected from the group consisting of internet protocol, X.25 protocol and a data
20 protocol for transmission over public land or mobile networks; and

c) a terminal for receiving the formatted messages.

9. A system according to claim 8 wherein the terminal is a central processor that collates the formatted messages to describe the conditions within the facility
25 associated with a selected one of the multiple gateways.

10. A system according to claim 9 further comprising a workstation for accessing the formatted messages collated by the central processor.

11. A system according to claim 10 wherein the workstation allows entry of commands to be delivered via the support node to one or groups of the multiple gateways.

5 12. A system according to claims 8 to 10 further comprising a mobile station or a fixed terminal from which a user may formulate and send a message directly to one or groups of the multiple gateways.

13. A method for using a wireless network to deliver messages from or to each
10 of multiple gateways that are deployed in geographically-dispersed facilities comprising:

a) formulating a message for wireless transmission according to an SMS or GPRS format;

b) transmitting the message to a network element for identifying that message;
and

15 c) transferring the message from the network element to a central processor for collating the transferred messages with other messages or data related to a selected gateway.

14. A method according to claim 13 in which the network element is a Short
20 Messaging Service Center ("SMSC").

15. A method according to claim 14 further comprising the step of communicating to the selected gateway by formulating a message and delivering it to the SMSC and causing the SMSC to forward the message to the selected gateway.
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16. A method according to claim 13 in which the network element is a base station controller that determines that the message is a GPRS data transmission and routes the message to a second network element comprising a support node.

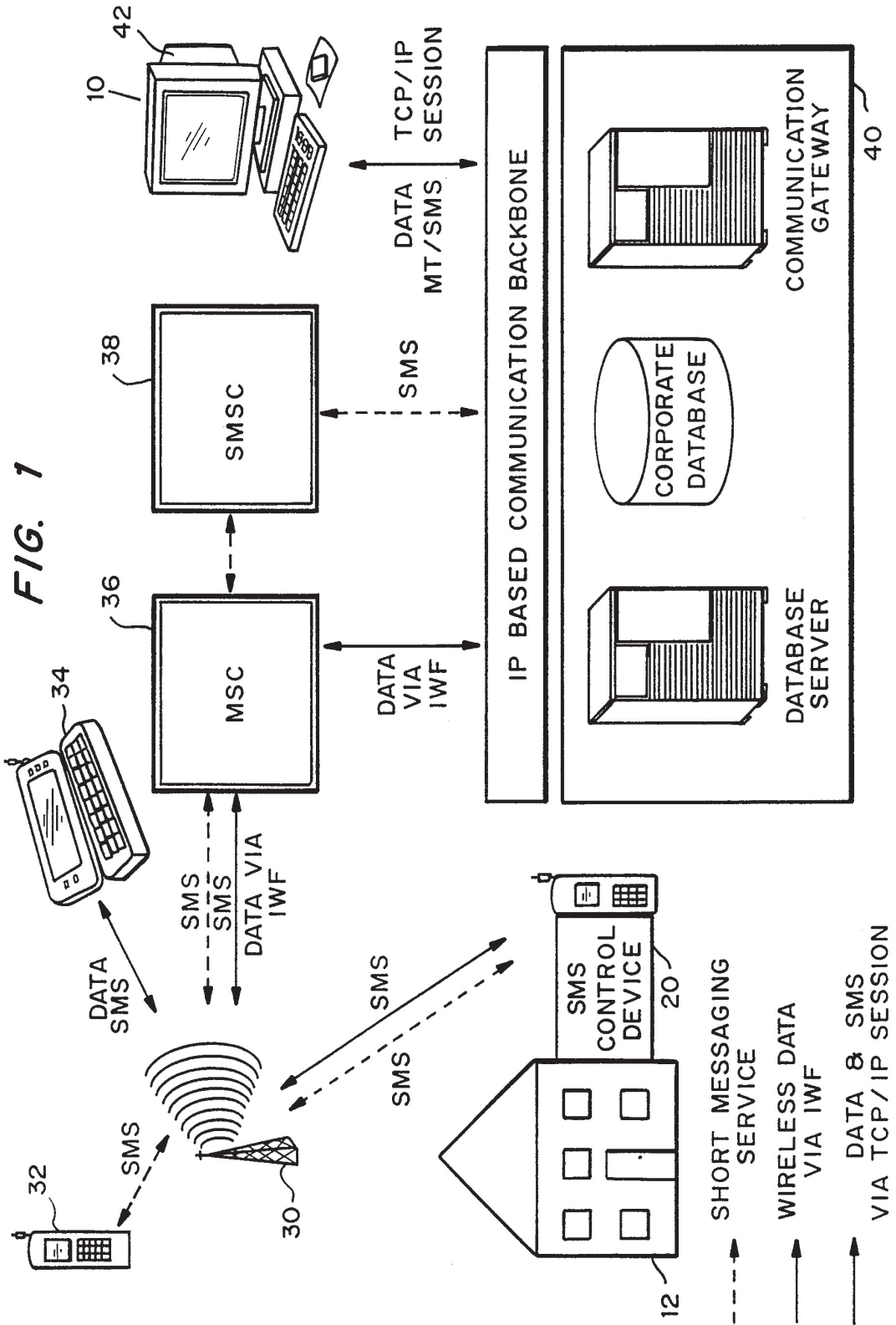
17. A method according to claim 16 further comprising the step of communicating to the selected gateway by formulating a message and delivering it to the support node and causing the support node to forward the message to the selected gateway.

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18. A method according to any of claims 13 through 17 in which the transmitting step comprises the step of coupling the network element to an Internet Protocol network for forwarding the message to the central processor.

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19. A method according to any of claims 13 through 18 in which the formulating step occurs when a user formulates the message from a mobile station.



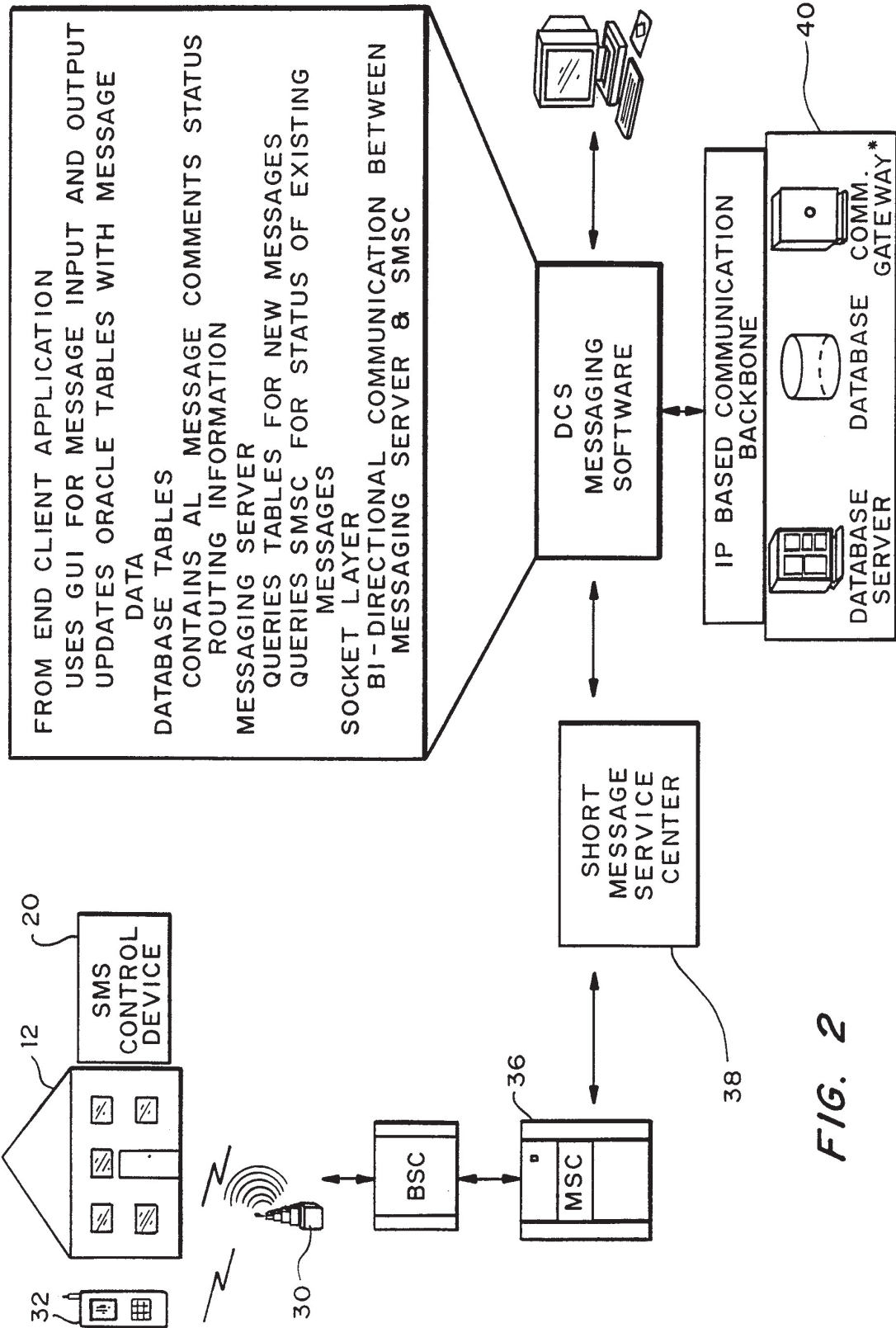


FIG. 2

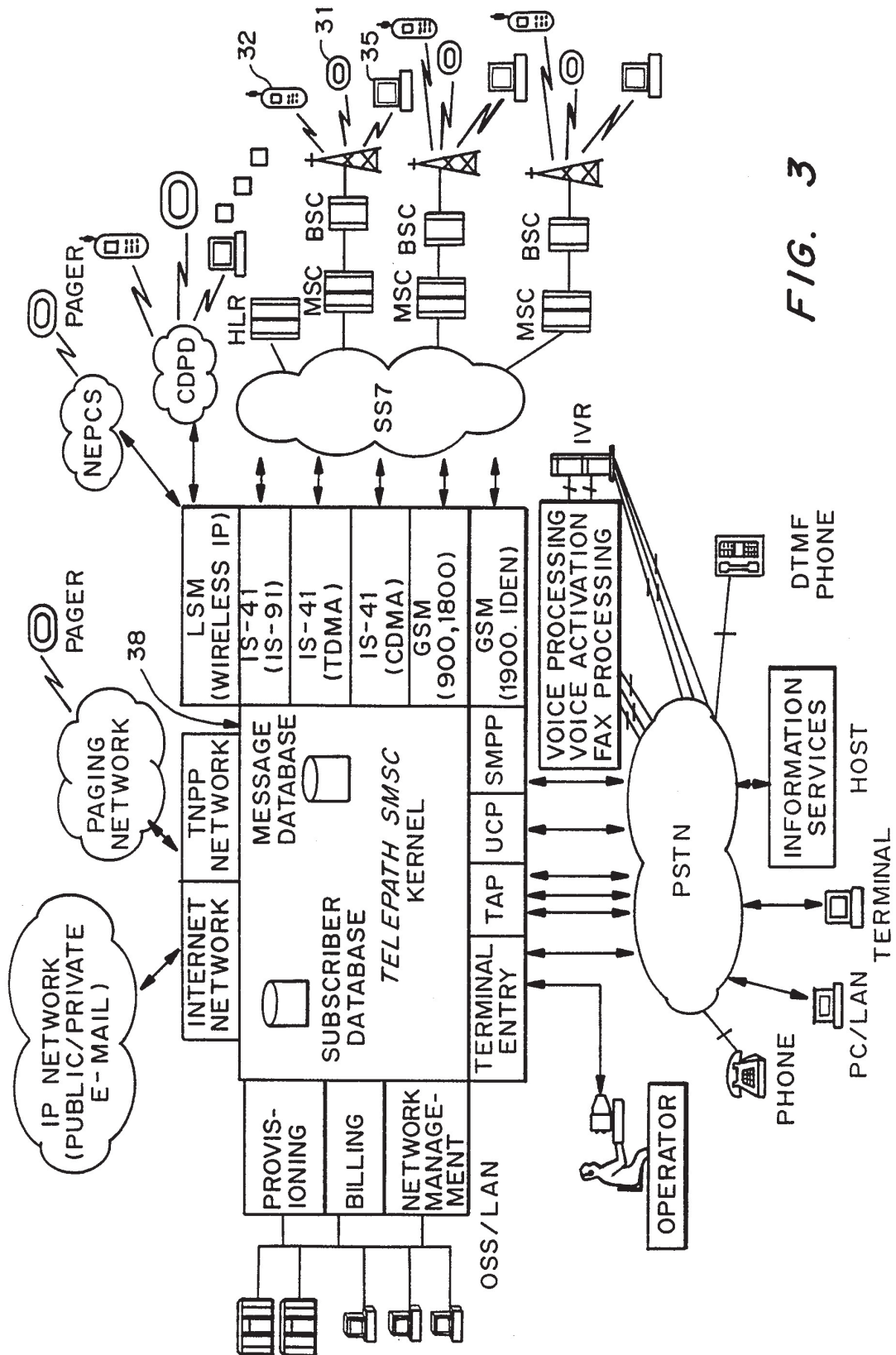


FIG. 3

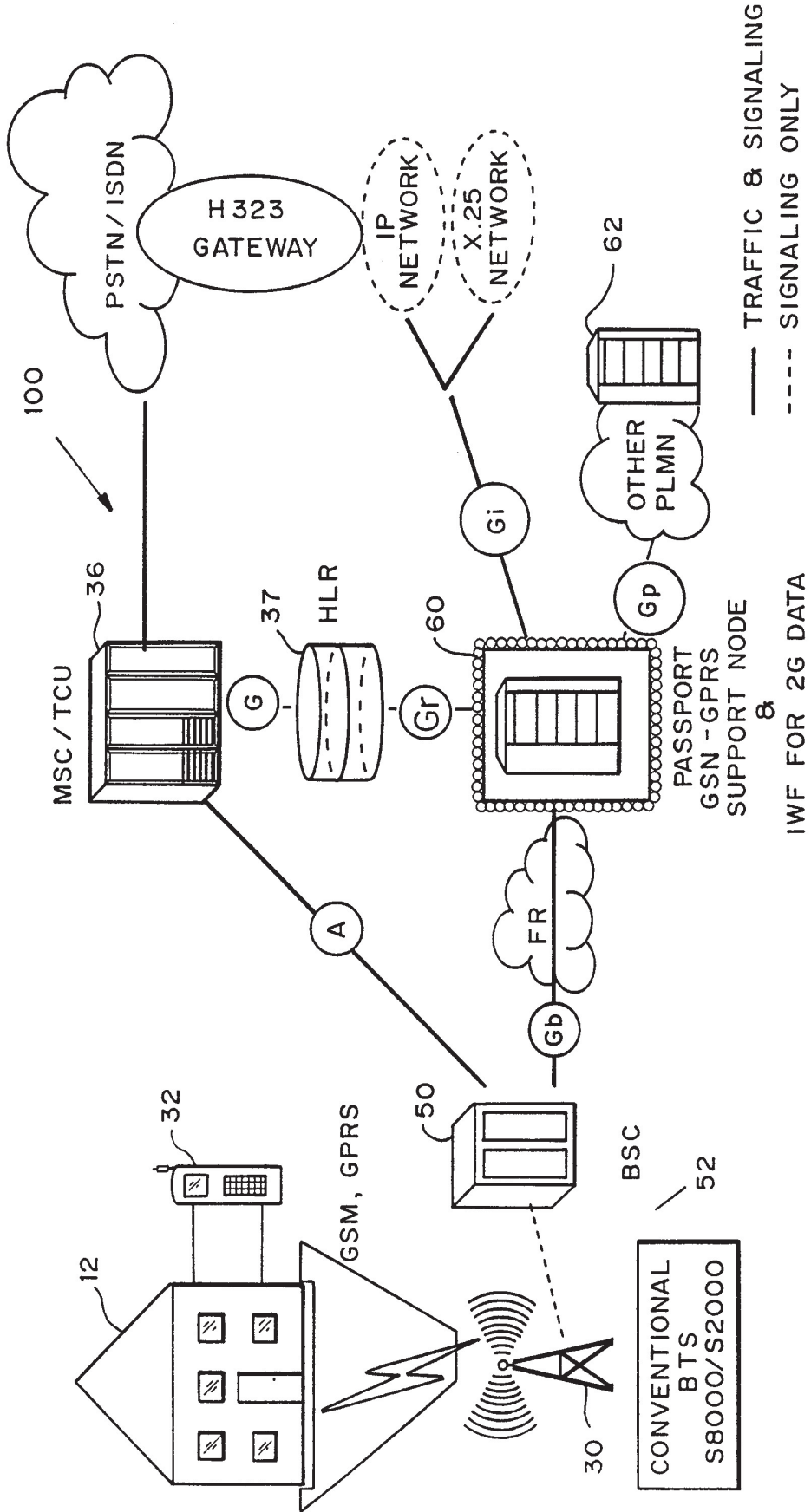


FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/06429

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04Q7/22 G08C17/02 H04M11/00

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)
IPC 6 H04Q H04M G08C

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 practical, 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 5 719 918 A (SERBETCIOUGLU BEKIR ET AL) 17 February 1998 (1998-02-17) column 5, line 57 - column 6, line 67 column 14, line 59 - column 15, line 48 ---	1-19
X A	DE 297 17 504 U (HELICOM ENTWICKLUNGSGES) 11 December 1997 (1997-12-11) page 1, line 19 - page 2, line 39 ---	1-4, 13-15 6,8-12, 19
A	EP 0 645 941 A (SEL ALCATEL AG ;ALCATEL NV (NL)) 29 March 1995 (1995-03-29) column 3, line 50 - column 5, line 56 --- -/--	1-4, 8-17,19

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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