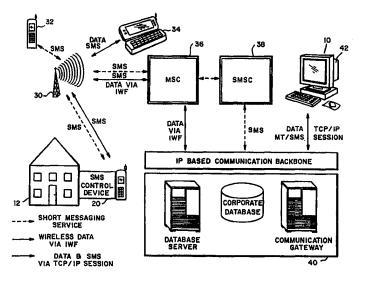| (51) International Patent Classification ^{6} : **H04Q 7/22, G08C 17/02, H04M 11/00**	**A1**	(11) International Publication Number: **WO 99/49680** (43) International Publication Date: 30 September 1999 (30.09.99)

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(54) **Title:** WIRELESS TELEMETRY METHODS AND SYSTEMS FOR COMMUNICATING WITH OR CONTROLLING INTELLIGENT DEVICES

(57) **Abstract**

Methods and apparatus are disclosed for remotely monitoring and controlling via a wireless network various devices deployed in homes and businesses. The present invention allows for monitoring and control of various gateways distributed to remotely located facilities to be monitored and the devices coupled to those gateways to be controlled via a wireless communications network. Preferably, the network is a GSM network adapted to provide short messaging services or any type of wireless network adapted to operate a General Packet Radio System for delivering data over the network. Messages are packaged at each gateway for delivery via the network to a destination terminal, whether a fixed terminal or a mobile station. Likewise, customers may forward data and commands to a particular gateway either from a mobile station or by accessing a fixed terminal, such as through an Internet connection. Transporting messages or commands via the short messaging service of the GSM network or via the GPRS protocol avoids the prohibitive cost of setting up a call for each message and avoids the significant capital costs needed to set up a separate communication network for data delivery.

WIRELESS TELEMETRY METHODS AND SYSTEMS FOR
COMMUNICATING WITH OR CONTROLLING INTELLIGENT DEVICES

The present invention relates to methods and apparatus for remotely monitoring
5   and controlling via a wireless network various devices deployed in homes and businesses.

RELATED APPLICATIONS

This application claims priority under U.S. law to United States provisional patent
application 60/079,215, filed March 24, 1998, which application is hereby incorporated in
10   its entirety by this reference.

BACKGROUND OF THE INVENTION

Numerous systems exist for automated, remote monitoring of various appliances,
including electric utility meters and the like. For instance, systems exist that couple
15   utility meters to remotely located databases via the wired Public Switched Telephone
Network ("PSTN") so that the meters can be more efficiently and cheaply read remotely.
Typically, such meter reading systems couple a database to a gateway that interfaces with
the meter and, in many cases, other devices in a particular facility or portion thereof.
These systems, however, are generally one way, sending data from the meter to the
20   central processor.

Moreover, even when the system provides for two-way or duplex data
communication that allows commands and other data to be down or up loaded to or from
the gateway, a complete call must be made between the central processor and the
gateway. Such calls are expensive, since they involve the full architecture of the PSTN in
25   delivering the data, even when the amount of data delivered is relatively small. Also, the
data or commands must be sent to or from a relatively intelligent central processor to
which few persons will have access. This means, for instance, that customers at whose
premises gateways are located cannot themselves send data (including commands for
devices within the premises) to the gateway via the PSTN.

Systems exist that use short bursts of radio transmission to control and receive data from remote power distribution control terminals. For instance, a company called ITRON owns a U.S. Patent No. 5,475,867 to Blum on such a system, albeit a system that uses supplemental controllers for expanding the fairly limited geographical range of the basic

5   system. This system, however, would be expensive to deploy and operate since an essentially new architecture would need to be deployed.

Several companies, such as CellNet Data, Greenland and possibly ITRON, are trialing meter reading systems that use two-way paging, which provides broader geographic coverage. While such a system eliminates the trouble and expense of setting

10   up a separate call each time data must be up or downloaded, paging messages provide limited payload for data, thereby limiting the potential for controlling and updating the gateway. Also, it is unclear whether such systems will allow users to send data and commands to or receive data from the gateway directly and without the need to go through a central processor or control center, which limits the flexibility of the system for

15   users wishing to receive data about their facilities and remotely control various devices at the facility.

SUMMARY OF THE INVENTION

The present invention overcomes the above problems by providing a system and

20   method for gathering and sending data over an existing wireless network remotely to control and monitor various gateways and the devices coupled to those gateways. A system according to the present invention uses multiple gateways that communicate over a wireless communications network capable of carrying digital data. The wireless communications network allows the gateway to send data and receive commands directly

25   from the customer, which could own or manage the facility in which the gateway is located. The customer can send and receive such data via a mobile station or a fixed terminal. Simultaneously or independently, data and commands may be up and down loaded to or from a control center coupled to the wireless network. Thus, the present invention provides a system and methods for providing customers a virtual direct

connection for routing messages to a gateway from a mobile station or fixed terminal, or vice versa.

The present invention uses multiple control and reporting gateways that are deployed in homes, businesses and other facilities. These gateways are configured to

5   collect data, such as data describing use of electric power or other utilities by the particular facility at which they are located or data describing the status of various sensors after arming of a security system. Also, gateways may be coupled to various devices within the facility in order to control the devices. For instance, gateways may control the lights within a facility according to a pre-programmed pattern that the user may change by

10   communicating new commands via the present invention. Or, gateways may be configured remotely to receive commands and data, which allows remote control over the devices (e.g., home appliances or electronics) with which the gateway may communicate. Each uniquely addressable gateway includes a transceiver capable of communicating over a wireless network.

15   In one embodiment of the present invention, a monitoring and control system may be provided that receives data from gateways on an essentially real time basis and can send data (including commands) to such gateways at any time over a wireless network. This allows for essentially real time monitoring of the facility at which the gateway is located. Preferably, the wireless network will be a GSM ("Global System for Mobile")

20   communications network capable of providing Short Messaging Services ("SMS"). SMS messages allow users of the network and the gateways to send and receive packets of data (about 160 characters) without setting up an actual call connection. Receiving terminals, whether mobile stations, such as handsets or pagers, or fixed terminals, like computer workstations, reassemble one or multiple related SMS message packets into readable

25   messages, such as an e-mail or page.

In another embodiment, the present invention provides a method for uploading a large data file via the wireless network. For such larger files, an actual circuit-switched call is made from the gateway to a central processor coupled to the wireless network's switch or MSC. The central processor includes a controller with a communications

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