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(57) Abstract: A communication apparatus adapted to be located at or next to an entranceway is provided, which is operable to communicate with a cellular telephone user, and comprises an outdoor unit that includes a triggering means adapted to ascertain presence of a person in the vicinity of the outdoor unit and be activated by such presence; a cellular transmission means responsive to the triggering means and operative to transmit a request to establish a communication session with a cellular telephone user; and to send audio and/or video signal following the establishing of that communication session; a receiving means, adapted to receive cellular transmissions from the cellular telephone user via a public cellular network; and control means operative to enable opening of a door located at said entranceway in response to the receipt of a pre-defined code at the receiving means, a code which was initiated by said cellular telephone user.
METHOD AND DEVICE FOR USE IN A CELLULAR NETWORK

FIELD OF THE INVENTION

The present invention relates in general to cellular communications field, and in particularly to new ways of incorporating cellular devices in business environment.

BACKGROUND OF THE INVENTION

Numerous door intercoms for dwellings and/or small enterprises are known, in which sound and images are conveyed between the street unit and an indoor unit operated by a person present at the vicinity of that indoor unit.

In typical systems, an occupant of a structure such as an apartment building or private residence would like to communicate with a visitor who has rung a doorbell located at the entrance to the structure. Having identified the person, the occupant can decide whether he or she wishes to admit the person to the building and/or to communicate further with the person. Thus, some apartment buildings are equipped at their entrances with an intercom system comprising an array of doorbell buttons, and a microphone and loudspeaker allowing two-way voice communication between a visitor and the occupant of an apartment selected by the visitor. Such systems often include an electromechanical door release mechanism operable remotely by the apartment occupant, to let authorized individuals into the apartment building. Some intercom systems also include a closed circuit television system including a camera viewing the building entranceway, the camera being connected to a television monitor viewable by occupants of the building. Intercom systems permitting two-way voice communications and one-way remote viewing usually can add
considerable expense and inconvenience to the installation of such intercom systems.

To eliminate the requirement for extensive cable installation procedures, some devices disclosed in the prior art utilize a radio-frequency (RF) link to carry two-way voice signals between a building entranceway and a monitoring station within the building. Some prior art intercom systems possess a video as well as audio signal transmission capability, but require the use of cables connected between an intercom station and a monitor station.

US 5,428,388 describes a video doorbell system for monitoring sounds and images at a remote location, such as the entranceway of a dwelling or other building. The system includes a sensor station located at the entranceway, and a monitor station located within the building. A microphone and television camera in the sensor station modulate signals emitted by a wireless transmitter in the sensor station, while the monitor station includes a transmitter and demodulator for reproducing voice and visual images received by the sensor station. The monitor station contains a microphone and transmitter for transmitting voice signals from the monitor station to the sensor station, and the sensor station contains a receiver and loudspeaker for reproducing these voice signals, to allow conversation between the two persons.

A somewhat more advanced solution is described in US 5,995,139, which teaches a system for identifying visitors using CCTV camera and home computer. The system described in this publication is operative to identify visitors while using a closed-circuit television camera to generate image data by reading images of visitors and a microphone to convert the sound (speech) signals
generated by the visitors into electric form. A door-bell button has a call-bell function available for when a visitor calls and as well as a switch function for operating a computer while the computer is in a hibernation state. The computer system controls and stores the signals and image data from the CCTV camera, the microphone and the call-bell button, while a monitor displays the image data. This system identifies visitors by storing the visitor's image sensed by the camera when the user is not present thereat.

US 5,598,456 describes an integrated telephone, intercom, security and control system for a multi-unit building utilizing a plurality of telephone lines located throughout the building and connected at one end to telecommunications equipment located in these units of the building. A digital switching device is connected to the other end each of the telephone lines and arranged to connect one of the telephone lines to another of the telephone lines or to an outside telephone line at the option of the telephone user.

Other prior art intercom systems describe wireless systems wherein the information transmitted by radio is one-way and very simple as all that is required, is, to trigger the doorbell under remote control, whereas with a door intercom information must travel in both directions, and the information concerned is more complex since it must not only enable dialog to be established between the visitor and the occupier, but it must also enable the latch to be remotely controlled when the occupier seeks to let the visitor in.

US 6,256,479 describes a wireless door intercom for a dwelling, the intercom comprising a street panel and an indoor set. The street panel is provided with a call button and connected to an electric latch fitted to a
door of the dwelling. That street panel includes a radio transmitter and receiver, means for recognizing a latch-opening code received by the receiver, a stand-alone electrical power supply, and means for activating the electric circuit of the latch. The street panel also includes means for controlling electricity consumption, first to put the street panel in a standby state in which its electricity consumption is practically zero while waiting for the call button to be pressed, and then to put it in an active state so as to enable a voice link to be established with the indoor set, and enabling the electric circuit of the latch to be activated when the latch-opening code is recognized.

US 6,549,130, US 6,542,076 and US 6,542,077 seek to solve the problem of provisioning remote-controlled monitoring anti-theft functions for residential premises and/or commercial premises. These publications disclose control apparatus which includes a first control device, located at a premises and is capable of activating, de-activating, disabling, and re-enabling, one or more of a plurality devices at the premises, with a first signal. This first signal is generated by a first control device in response to a second signal, generated by a second control device located remote from the premises, and automatically received by the first control device. The second control device is responsive to a third signal, generated by a third control device located remote from the premises and remote from the second control device, and automatically received by the second control device.

US 5,594,740 and US 6,285,868 relate to a method and apparatus which utilize and exploit control channel communication pathways for directly sending and receiving data messages, and which directly communicates by radio link over a cellular network for the purpose of
commercially operating specific services that are
directly controlled and communicated with on control
channels that do not require any voice channel
operations.

Each of the patents mentioned hereinbefore is hereby
incorporated by reference as if fully set forth herein.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention
to allow a more flexible working environment, by
providing novel methods and apparatus that enable users
that belong to organization telephony network, to operate
more efficiently.

It is another object of the invention to provide
novel methods and apparatus that enable rerouting of
telephone calls and provide a more suitable solution at
the organization level.

Additional objects and advantages of the invention
will be set forth in the description which follows, and
in part will be obvious from the description, or may be
learned by practice of the invention. The objects and
advantages of the invention may be realized and obtained
by means of the instrumentality and combinations
particularly pointed out in the appended claims.

According to an embodiment of the present invention,
there is provided a cellular device operative to allow a
user of a cellular telephone, irrespective of his/her
current location, to control from his/her cellular
telephone the opening of a door, next to which an outdoor
unit of the invention is located. In the alternative or
in addition, that user may receive signals, e.g. video
signals at his/her cellular telephone presenting the
current status of the outdoor unit surrounding, e.g. to
view a visitor at or approaching the door. In the
alternative, the invention described herein with the various embodiments can be carried out through the use of a web interface, mutates mutandis.

Thus, according to a first aspect of the present invention there is provided a communication apparatus adapted to be located at or next to an entranceway, (e.g. at an entrance of a premise, near a secured door inside a building, etc.) and operative to communicate with a cellular telephone user (e.g. one that is present at a remote location). The apparatus comprising an outdoor unit, which comprises:

(i) a triggering means adapted to ascertain presence of a person in the vicinity of said outdoor unit and be activated by such presence;

(ii) a cellular transmission means responsive to said triggering means and operative to transmit a request to establish a communication session with at least one cellular telephone user, and to send audio and/or video signal following the establishment of said communication session;

(iii) a receiving means, adapted to receive cellular transmissions from said cellular telephone user via a public cellular network; and

(iv) control means operative to enable opening of a door located at said entranceway, in response to receiving at said receiving means a pre-defined code initiated by said cellular telephone user.

The term "outdoor unit" as will be used herein, should be understood to encompass any unit located somewhere at the vicinity of an entrance door, externally to the space enclosed behind that door. It may be a door to one’s premises, a door of a secured room within an enterprise, etc.
The pre-defined code initiated by the remotely located user may either be a code that will eventually be received by the receiving means of the communication apparatus of the invention, or a code transmitted from the cellular network center in response to receiving another code sent by such a user and verifying the authenticity of that code sent. Thus, a number of users may be provided each with its own code, whenever one of these codes received at the cellular network center it will be checked and if confirmed, irrespective of the user currently in communication and irrespective of that user code, one single code will be sent by the cellular network to the receiving means of the communication apparatus of the invention.

In accordance with one embodiment of the invention, the triggering means are being operatively interconnected to a doorbell button, whereby touching (or pressing) the doorbell button causes activating the cellular transmission means.

By another embodiment of the invention, the apparatus provided further comprises sensing means operative to sense presence of a visitor at the vicinity of the outdoor unit, and wherein the triggering means are operative to respond to sensing the visitor’s presence, and in return activate the cellular transmission means. Preferably, the sensing means comprise at least one member of the group consisting of: optical sensor, radiation sensing means, audio sensor and video sensor, and any combination thereof.

Still preferably, the radiation sensing means is at least one member of the group consisting of: an infrared sensor, an ultrasonic sensor, or a microwave sensor.

According to yet another embodiment, the outdoor unit further comprises a sensor microphone connected to
the cellular transmitter, and wherein the transmitter is adapted to send a cellular signal modulated with audio information received by the sensor microphone. Preferably, the triggering means being operatively interconnected to the cellular transmitter so as to modulate the cellular signal emitted by the cellular transmitter with a signal signifying the presence of a person.

In accordance with still another embodiment of the invention, the outdoor unit further comprises a loudspeaker operatively interconnected to the receiving means, whereby voice signals modulating a cellular signal received by the receiving means are converted to intelligible sounds and emitted by the loudspeaker.

By yet another embodiment of the invention, at least one of the transmitting means and the receiving means comprises components of a cellular telephone.

According to another embodiment of the invention, the apparatus further comprises demodulation means operatively connected to the receiving means.

In accordance with another aspect of the invention there is provided a method for establishing communication session via a public cellular network between a communication apparatus comprising an outdoor unit located at or next to an entranceway, and at least one user of a cellular telephone. The method comprises the steps of:

establishing a pre-defined list of telephone numbers comprising at least one cellular telephone number associated with said at least one user of a cellular telephone;

receiving a signal transmitted from said communication apparatus, identifying a request to establish said communication session;
routing said request towards the cellular telephone of said at least one user; and
establishing a communication session whereby said at least one user receives signals transmitted from said communication apparatus via at least one center of the public cellular network.

Preferably, the communication session is a bi-directional communication session.

By another embodiment, the signals transmitted are preferably voice and/or video signals.

According to another preferred embodiment, the method provided further comprises a step of providing an indication at the cellular telephone, specifying that the request for communication session that is about to be established was originated at the communication apparatus, and the indication is displayed before establishing the communication session. Preferably, the indication is transmitted to the cellular telephone by using ANI of the door telephone.

By yet another embodiment, the pre-defined list of telephone numbers comprises a plurality of cellular telephone numbers, and wherein the step of establishing a pre-defined list of telephone numbers further comprises defining at least one management rule for establishing communication sessions originating from the communication apparatus with at least one of the plurality of cellular telephone numbers, and wherein the step of routing a request is carried out in accordance with that at least one management rule.

The at least one management rule preferably comprises at least one member selected from a group consisting of: time of the day, day of the week and national holidays, and the like.
Preferably, if a request for establishing a communication session has not been answered within a pre-defined period of time by a first user of that pre-defined list and according to the at least one management rule, the request is re-routed towards a user of a second cellular telephone in accordance with the pre-defined list and that (or another) management rule.

According to still another embodiment, the request to establish a communication session originated at the communication apparatus is broadcasted to a plurality of cellular telephones listed in the pre-defined list.

By yet another embodiment of the invention, the plurality of telephone numbers is divided into a plurality of groups, and wherein the request for establishing a communication session with each of said groups is transmitted in accordance with at least one management rule. An example of implementing this embodiment could be the following. During working hours all groups will be authorized to open the door, and the request will be forwarded according to one or more management rules. After hours, or during weekend, holidays, etc. different groups may be defined as the group(s) to which the request shall be transmitted, whether to all the users included in the respective group(s) or to a specific user, according to the order by which the group was listed in the pre-defined list. In some cases, an additional code may be required to open the door, in order to increase the security of the system described by ensuring that not every person who holds the cellular phone and receives the call will be able to open the door, but only a person authorized to do so will indeed be the one who may actually send the command to open the door. Such codes can be varied from a simple e.g. one character (digit) code, to a more complicated
one, e.g. a multiple character code. Also, the management rule may be set as such to that during certain hours, only persons who are not in the vicinity of the outdoor unit (e.g. based on the current location of their cellular phones) be allowed to open the door.

According to another aspect of the invention, there is provided a cellular network communication device operative to allow establishing a communication session via a public cellular network between a communication apparatus comprising an outdoor unit located at or next to an entranceway, e.g. at the entrance to a premise, and a user of a cellular telephone. The cellular network communication device comprising:

means for establishing a pre-defined list of telephone numbers comprising at least one cellular telephone number;

means for receiving a signal transmitted from said communication device identifying a request to establish said communication session;

means for routing said request towards said at least one cellular telephone number; and

means for establishing a communication session whereby signals transmitted from said communication apparatus are relayed via said cellular network communication device, to said user associated with said at least one cellular telephone number.

Preferably, the signals transmitted via the cellular network communication device are voice and/or video signals.

By yet another embodiment of the invention, the cellular network communication device further comprising means for providing an indication at the cellular telephone specifying that the origin of said request for communication session is the communication apparatus.
According to yet another embodiment of the invention, the cellular network communication device further comprising a buffer operative to store at least one selected telephone number, means operative to prevent establishing communication sessions with the at least one selected telephone number, and control means operative to determine whether a request to establish a communication session originated from the communication device should be transmitted to the at least one selected telephone number, and in the affirmative, re-routing the request in accordance with a pre-defined management rule.

In accordance with yet another aspect of the invention, there is provided a cellular mobile device, operative to allow establishing a communication session via a public cellular network with a communication apparatus comprising an outdoor unit located at or next to an entranceway, e.g. at the entrance to a premises. The cellular mobile device is adapted to receive signals from the communication apparatus and to send at least one type of operating command to the communication apparatus (e.g. to open the door). Preferably, the cellular mobile device is operative to receive voice and video type of signals.

By still another preferred embodiment the cellular mobile device is adapted to conduct a two way communication session with the communication apparatus, to allow for example conducting a conversation with the visitor at the door.

By yet another preferred embodiment, the mobile device user may be the entity to initiate the communication session, e.g. by dialing the DBS telephone number, and will be able to view (or listen) the surrounding of the DBS, when the latter is provided with
an appropriate camera. Preferably, this communication session can be established only with numbers included in the pre-defined list, and more preferably, only after dialing a pre-defined code. Thereafter, if the subscriber sees for example someone at the vicinity of the door, a two way communication session may be established.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of an outdoor unit of a communication apparatus, constructed according to a preferred embodiment of the invention;

FIG. 2 is a schematic view of a system configured in accordance with a preferred embodiment of the invention;

FIG. 3 is a schematic view of a system configured in accordance with another preferred embodiment of the invention; and

FIG. 4 is a flow chart illustrating the implementation of a method in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention will be understood and appreciated more fully from the following non-limiting detailed description.

As shown diagrammatically in FIG. 1, a basic embodiment of the Cellular Video Doorbell System (CVDS) includes a remote station module 12 referred to as a Doorbell Station (DBS) that is adapted to be mounted to a building at a near an entranceway of the building, e.g. a small enterprise. Doorbell station 12 further includes a first transmitter 14, operative to communicate with remote one or more users, via a public cellular network. In response to actuating doorbell button of DBS 12, or to actuating a sensor, such as a detector responsive to the
presence of a person in the vicinity of the DBS, as will be explained in detail below, a signal would be generated by transmitter 14.

In the preferred embodiment of system 10, generation of that signal, triggers initiation of a call to a cellular network. Let us now assume that DBS 12 is mounted at the entranceway of a small enterprise employing a number of persons, among which one or some are defined as persons who should be allowed to communicate with the DBS. Each of these persons is provided with a cellular telephone, where these cellular telephones are associated with the private network, either as they all constitute that private network, or as a group out of that private network, e.g. all the enterprise telephones. This private network is preferably handled and managed by the public cellular network.

When the request to initiate a call with one or more authorized persons who communicate with the DBS, that request arrives at a center of the cellular network, and is routed according to a pre-defined routing scheme to one of the authorized persons' telephones. This scheme provides for the selection of a number in accordance with at least one criterion such as time of the day, day of the week, national holidays, etc. Another scheme could comprise a list of telephone numbers of the authorized persons in a certain order, so that the call may be re-routed to the next number, if the person called does not answer within a pre-defined period of time.

According to an embodiment of the invention, the method provided comprises a step of providing an indication, at the mobile station of the authorized person, which allows him or her to identify that the call is received from the DBS. This embodiment is particularly useful when several telephone numbers are associated with
a single mobile station, enabling the user to identify that call was originated at the DBS. Preferably, the indication provided shall be in the form of at least one member of the group consisting of ANI, SMS, MMS, e-mail, and USSD. In case the indication is of the MMS type, a picture shall preferably be attached to the MMS, enabling the user to see who is at the door.

In addition or in the alternative, for at least one of the telephone numbers included in the pre-defined list, there is more than one corresponding address included in the public cellular network addresses’ list, so that a call can be transferred simultaneously to more than one address, in accordance with a pre-defined routing scheme. By the present invention, the various Direct Inward Dialing (“DID”) and groups are managed within the private network and based on the logic rings the telephone, the called number is sent to the user via Unstructured Supplementary Service Data (“USSD”) or via a real time data message transmitted via a data communication channel, or via SMS generated from the HLR when no USSD exists, or any other methods known in the art per se). Once the user views the message, he/she may see the regular calling message together with the DBS’ ANI, e.g. by pressing any, or alternatively certain, key of the mobile station. Such mechanism may be used for example by an external watching company having its people watch several different companies at the same time. By this embodiment, they may receive a call with an indication specifying which company and which of the company’s doors is calling.

The term Automatic Number Identification (ANI) as will be used herein should be understood to encompass all means and methods known in the art for the identification
of the caller, as the case may be, such as ANI, callerID, MSISDN, etc.

In accordance with still another embodiment of the invention, the method provided further comprising a step of preventing the routing step to one or more of the authorized persons. Preferably, this preventing step further comprises pre-defining a priority list comprising at least one telephone number, so that when a call is initiated at the DBS, it will not be routed to that telephone number.

In addition or in the alternative, the method provided further comprises a step of diverting a call received at the mobile terminal of the authorized person to another station associated with the private network, which can be another mobile terminal, a PC, a wireline telephone, etc.

The mobile station may send message to a communication platform (e.g. the wireless centrex) which takes control of the transfer request, manages the process, while instructions such as re-routing schemes etc., are stored at the network's center and are assigned by that communication platform, e.g. to the transfer destination.

By still another embodiment of the invention, the path along which the communication session is conducted, further comprises at least one of the following networks: WLAN network WiMax network, IP network and the like. By one alternative of implementing this embodiment, the voice part of the communication session is transmitted along the public cellular network while the other constituents of the communication session (e.g. data, signaling, etc.) is conveyed via one of the other additional networks. According to another alternative, the whole session (voice and data and signaling, etc.) is
conveyed via a path which comprises both the public cellular network and the at least one additional network described above.

In accordance with another embodiment of the invention, the method further comprises a step of providing a pre-defined auto reply that will be played or displayed at the DBS, e.g. "Unfortunately we are currently unavailable, please try us at different time", etc. Such pre-defined auto reply can be an SMS, a voice message, a video message and the like. The type of the pre-defined auto reply is typically selected based on the functionality provided with the DBS.

In addition, the method of the present invention may further comprise a step of transmitting from the public cellular network center, audio signals and/or video signals while the call with the mobile station is being established or the call is being kept on hold. Preferably, the audio signals and/or video signals are selected in response to identifying the type of the DBS.

In addition, these audio or video signals may selected from among a plurality of audio or video recordings/applications, where the selection is based on one or more selection criteria such as type of the DBS, time of the day, physical location of the called authorized person, and the like.

By this embodiment, short audio or video recordings/applications may be presented to the person at the front door, enable a company to promote its own business (e.g., marketing data, video of a product).

According to still another embodiment of the invention, if a request for establishing a communication session has not been answered within a pre-defined period of time by a user associated with the first telephone number listed in the list stored at the cellular network
center, the call may be re-routed towards a new communication address (e.g. voice answering service, another telephone number, etc.) in accordance with a pre-defined management rule.

In accordance with yet another embodiment of the invention, the method provided may further comprise a step of forwarding a call to an answering service associated with the public cellular network center and thereafter a communication session may be established between that answering service and the person at the neighborhood of the DBS. Alternatively, a message may be left thereat by the visitor. The message will be forwarded to the mobile station, either automatically, or in response to the mobile station request to pull the messages received. Preferably, the mobile station is selected by the answering service center from among a plurality of mobile stations in accordance with a list of addresses provided to the provider of that answering service, not necessarily the authorized persons’ address(es).

In accordance with still another embodiment of the invention, incoming calls to a subscriber of this service can be routed based on the subscriber’s location, e.g. create different routing tables while the subscriber is in the office, at home or out of office, where the routing may be effected automatically, based on the location of the subscriber.

In addition or in the alternative, the enterprise management administrator may configure and define routing rules for all the company’s employees. For example, the administrator may enable selected people to control and define selected groups, e.g. a secretary may thus define his/her boss calls’ routing scheme, sales manager can control the respective sales group, etc. Furthermore, the
administrator may be provided with the ability to carry out selected functionalities such as, add, delete, or freeze employee line, define groups, configure routing schemes per DBS configure groups of employees which can open the company door during the day and configure a group of employees which can open door after hours.

Let us now revert to Fig. 1. Once the DBS is triggered either by a visitor who, for example, pressed the doorbell button, or by a sensor such as a camera and the like installed at the DBS or in its vicinity, a request is generated and sent by transmitter 14 towards the cellular network center, to establish a communication session. In response to that transmission, the cellular network system manager checks at the pre-defined list of addresses associated with this transmitter (e.g. according to the cellular telephone number associated with CVDS 10), and determines the cellular telephone numbers which should be notified of that request. The ANI of the DBS is then preferably sent to the first number appearing in that list in one of the ways described above, indicating to the user of that telephone that somebody is at the office door.

Once the user receives the ANI of the DBS, and allows the establishing of the communication session, a normal conversation is conducted between the user, using his/her cellular phone and the visitor, using the microphone and loudspeaker installed in the DBS. In addition, if a camera is installed at the DBS or its vicinity, the output of the camera may be transmitted, preferably in a compressed form, to the cellular user, for example in the same or similar way to the method of sending and receiving pictures while using 3G type of cellular phones. At one point or another, when the user decides to open the door, he/she will send a pre-defined
code via his/her cellular device. Once the code is received at the DBS receiving means 20, it is forwarded to processor 25, which confirms the authenticity of the code. Once it has been confirmed that this code received from the user is authorized to open the door, processor 25 will activate relay 30 (where the relay may be any type of relay, known in the art per se for such type of operation), and the door shall be opened. Some or all of the authentication process may be done on the network level (i.e. SIM card identification, code etc.)

According to an embodiment of the invention, the call may be established as a conference call, where the signals transmitted from the DBS are received by more than one communication device, e.g. two or more cellular phones, and/or also by at a computer used for example to log and/or store all calls involving the DBS.

The signal transmitted by transmitter 14 may be modulated by audio signals detected by a microphone 16 in DBS 12, thus permitting voice communications to be transmitted from the DBS. Also in the preferred embodiment of system 10, transmitter 14 of DBS 12 is part of a transceiver 18 which also includes a receiver 20 for receiving voice communications transmitted by the cellular phone user with whom the communication session was established. Receiver 20 may also be connected so as to allow voice communications to be transmitted from a person either outside the building or within the building, to a visitor. Thus, the preferred embodiment of system 10 affords a capability for two-way voice communications between a visitor in the vicinity of Doorbell Station 12 and a person having a cellular telephone, irrespective of where that person is currently present.
As explained above, DBS 12 may preferably also include a camera 26. Preferably, camera 26 is a 3G telephone camera, or any other compatible device, or a device of the type employing a solid state, Charge Coupled Device (CCD) as an imaging transducer. Video output signals from CCD camera 26 are connected to a second radio frequency transmitter 28, where the video signals are used to modulate a signal transmitted by the second transmitter. One option is that the second transmitter 28 operates at a different frequency from that of first transmitter 14. However, by a preferred embodiment of the invention, the DBS comprises a 3G cellular telephone preferably a model that includes a loudspeaker, either as a unit or by incorporating the cellular telephone components/modules as required, so that basically the communication is held between two cellular telephones. The camera’s signal may either be transmitted as a picture or as a video recording, so that the user of the mobile telephone is presented with the view of the neighborhood of the DBS.

Let us now turn to Fig. 2, which illustrates wireless network 32 that comprises base station controller (“BSC”) 36, mobile switching center (“MSC”) 44, HLR 42, and BTS 38 and 38’, as well as a plurality of mobile stations, such as cellular phone 40.

When in response to the triggering of the DBS 12, the request made to establish this call reaches wireless network 32, it would be processed and the address associated with that request be identified as one that belongs to the doorbell application service. Following this identification, the request is routed to doorbell application server (“DAS”) 34 for further handling, where it is identified as a call originated at company’s A doorbell. At DAS 34, there is a pre-defined list of
telephone numbers, preferably arranged by a priority order, with which the communication session should be established. Doorbell application server 34 receives the input of the number requested, and determine that the call should be established with subscriber 40. The DAS communicates with HLR and/or MSC 44 which will determine through which of the BTSs associated with wireless network 32, should this call be routed. BTS 38 is selected based on the presence of subscriber 40, and the session shall preferably be continued as a session between two cellular devices.

Let us now turn to Fig. 3, which illustrates another embodiment of the present invention. Here again, wireless network 32 comprises similarly to the network described in Fig. 3 above, a base station controller ("BSC") 36, mobile switching center ("MSC") 44, HLR 42, and BTS 38, as well as a plurality of mobile stations, such as cellular phone 40. In addition, network 32 further comprises a wireless centrex platform ("WX") 46, which according to this example, comprises doorbell application server 34, and is operative to manage the pre-defined rules associated with this application, as part of the various rules it is adapted to manage.

According to this example, wireless network 32 is in communication with IP network 52 through UMA network controller 50. IP network 52 may be associated with a number of access points ("AP"), one of which is shown here as 54, and typically each of these access points is operative as a gateway connecting a corresponding wireless local area network (WLAN) (not shown specifically in this Fig.) with IP network 52. The DBS is connected via the AP to WLAN and via the UMA to the Cellular network. As will be appreciated by those skilled in the art, many other arrangements may be used e.g. a
WiMax network instead of the WLAN, other mechanisms other than the UMA network controller, etc.

In response to the triggering of DBS 12, a request to establish this call reaches wireless network 32. It is then processed and the address associated with that request is identified as one that belongs to the doorbell application service. Following this identification, the request is routed to doorbell application server ("DAS") 34 for further handling. At doorbell application server 34 it is identified as a call from company A doorbell, and handled similarly to the way described above in the embodiment illustrated in Fig. 2, *mutatis mutandis*. However, by this embodiment, the WX is then communicates with HLR and/or MSC 44 which will determine through which of the BTS's associated with wireless network 32, should this call be routed. BTS 38 is selected based on the location of subscriber 40.

Fig. 4 illustrates a flow chart demonstrating an example of implementing the solution provided by the present invention.

By this example, a visitor arrives at the entranceway where an outdoor unit is installed. Once the visitor presence has been noted, a request is initiated to establish a communication session, e.g. a telephone call, with a certain subscriber of a mobile network (step 100).

The request enters the mobile network (step 110) via a Gateway Mobile Switching Center (GMSC).

The MSC/GMSC then interrogates the HLR (step 120), in order to get the called subscriber service profile. According to the HLR's Terminate IN Key, the IN signaling of the call is routed toward a doorbell application server node ("DAS").
The DAS receives details that the doorbell system was triggered (step 130), and the number associated with the doorbell system sending the request for establishing the communication session is matched against the pre-defined list, so as to enable connecting the doorbell system with the appropriate number. Based on the information available, e.g. routing tables, rules and other information, returns to the MSC with routing instructions for that call (step 140). In some cases, in which the mobile network has limited IN capabilities, or additional resources are needed, the doorbell application server may request to route the call to the DAS Service Node, which will physically control and route the call.

A request for establishing a communication session is then sent to the subscriber’s cellular device preferably with information regarding that this call is from a visitor at the doorbell system, e.g. the ANI of the DBS cellular number (step 150).

The Subscriber views the regular incoming call screen, and can accept or reject the call (step 160).

As an alternative, the subscriber may receive in step 160 an SMS message before the telephone is ringing, alerting him that there is someone at the vicinity of the outdoor unit. Then the subscriber may select an appropriate action to be taken. The selection will be transferred to the doorbell application server, and be acted upon. For example, a communication session may be established with the DBS, the call may be further routed (based on subscriber selection and/or other parameters that are stored at the management of the doorbell application server), etc.

The MSC will route the call based on the instructions it received from the doorbell application server, while the latter will continue to manage the call
and receive updates regarding the call status (e.g. once the call is disconnected the MSC will send the information to the doorbell application server via signaling) (step 150). Based on the call information, the doorbell application server routing tables and rules and other parameters, the doorbell application server will decide if and when to make changes in respect of this call.

The user then accepts the call (or alternatively, the call is established without actively involving the user) (170). Thereafter, the user presses a pre-defined key (e.g. a code, a physical key, DTMF, or any other mechanism known in the art per se) (step 180) to allow opening of the door. This key is interpreted as a command that will be sent to the doorbell system, and once received at the receiver, it will be forwarded to a control device adapted to open the door, as done in the intercom systems known in the art per se.

According to another example the request to establish the call with the DBS, arrives simultaneously to a number of subscribers, and first of these subscribers that will accept the call will proceed with the call as described above. In addition or in the alternative, the call may be established as a conference call, whereby each of the group of pre-defined subscribers who receives the simultaneous call, may join the call as a participant of a conference call. Handling of such groups of subscribers will be done in a similar way to the one described above, including the step of defining appropriate management rules, etc., mutandis.

It will be appreciated that although various aspects of the invention have been described with respect to specific embodiments, alternatives and modifications will
be apparent from the present disclosure, which are within the spirit and scope of the present invention as set forth in the following claims.
CLAIMS:

1. A communication apparatus adapted to be located at or next to an entranceway and to communicate with a cellular telephone user, said apparatus comprising an outdoor unit, which comprises:

   (i) a triggering means adapted to ascertain presence of a person in the vicinity of said outdoor unit and be activated by such presence;

   (ii) a cellular transmission means responsive to said triggering means and operative to transmit a request to establish a communication session with at least one cellular telephone user, and to send audio and/or video signal following the establishment of said communication session;

   (iii) a receiving means, adapted to receive cellular transmissions from said cellular telephone user via a public cellular network; and

   (iv) control means operative to enable opening of a door located at said entranceway, in response to receiving at said receiving means a pre-defined code initiated by said cellular telephone user.

2. Apparatus according to claim 1, wherein said triggering means are being operatively interconnected to a doorbell button, whereby touching said doorbell button causes activating said cellular transmission means.

3. Apparatus according to claim 1, further comprising sensing means operative to sense presence of a visitor at the vicinity of said outdoor unit, and wherein said triggering means are operative to respond to said sensing of a visitor's presence by activating said cellular transmission means.
4. Apparatus according to claim 3, wherein said sensing means comprise at least one member of the group consisting of: optical sensor, radiation sensing means, audio sensor, video sensor, and any combination thereof.

5. Apparatus according to claim 4, wherein said radiation sensing means is at least one member of the group consisting of: an infrared sensor, an ultrasonic sensor, or a microwave sensor.

6. An apparatus according to claim 1, wherein said outdoor unit further comprises a microphone connected to said cellular transmitter, and wherein said transmitter is adapted to send a cellular signal modulated with audio information received by said microphone.

7. An apparatus according to claim 6, wherein said triggering means being operatively interconnected to said cellular transmitter so as to modulate said cellular signal emitted by said cellular transmitter with a signal signifying said presence of a person.

8. An apparatus according to claim 1, wherein said outdoor unit further comprises a loudspeaker operatively interconnected to said receiving means, whereby voice signals modulating a cellular signal received by said receiving means are converted into intelligible sounds and emitted by said loudspeaker.

9. An apparatus according to any of the preceding claims, wherein at least one of said transmitting means and said receiving means comprises components of a cellular telephone.
10. An apparatus according to any one of the preceding claims, further comprising demodulation means operatively connected to said receiving means.

11. An apparatus according to any one of the preceding claims, further provided with display means operative to play pre-defined audio signals and/or display pre-defined video signals, during a period extending from after said triggering means were activated till before said communication session has been established.

12. A method for establishing communication session via a public cellular network between a communication apparatus comprising an outdoor unit located at or next to an entranceway, and at least one user of a cellular telephone, which method comprises the steps of:

   establishing a pre-defined list of telephone numbers comprising at least one cellular telephone number associated with said at least one user of a cellular telephone;

   receiving a signal transmitted from said communication apparatus, identifying a request to establish said communication session;

   routing said request towards the cellular telephone of said at least one user; and

   establishing a communication session whereby said at least one user receives signals transmitted from said communication apparatus via at least one center of the public cellular network.

13. A method according to claim 12, wherein said communication session is a bi-directional communication session.
14. A method according to claim 12 or 13, wherein said signals are voice and/or video signals.

15. A method according to any one of claims 12 to 14, further comprising a step of providing an indication at said cellular telephone specifying that said request for establishing the communication session, was originated at said communication apparatus, and wherein said indication is displayed before establishing said communication session.

16. A method according to claim 15, wherein said indication is provided in the form of at least one member of the group consisting of ANI, SMS, MMS, e-mail, and USSD.

17. A method according to any one of claims 12 to 16, wherein said pre-defined list of telephone numbers comprises a plurality of cellular telephone numbers, and wherein said step of establishing a pre-defined list of telephone numbers further comprises defining at least one management rule for establishing communication sessions originating from said communication apparatus, with at least one device associated with at least one of said plurality of cellular telephone numbers, and wherein said step of routing a request is carried out in accordance with said at least one management rule.

18. A method according to claim 17, wherein if a request for establishing a communication session has not resulted in establishing said communication session within a pre-defined period of time in accordance with said at least one management rule, the request is re-routed towards another address associated with another cellular
telephone in accordance with said pre-defined list and said at least one management rule.

19. A method according to claim 17, wherein said request to establish a communication session originated at said communication apparatus is broadcasted to a plurality of addresses associated with respective cellular telephones and listed in said pre-defined list.

20. A method according to claim 17, wherein said at least one management rule comprises at least one member selected from a group consisting of: time of the day, day of the week and national holidays.

21. A method according to any one of claims 17 to 20, wherein said plurality of telephone numbers is divided into a plurality of groups, and wherein said request for establishing a communication session with each of said groups is transmitted in accordance with at least one management rule.

22. A cellular network communication device operative to allow establishing a communication session via a public cellular network between a communication apparatus comprising an outdoor unit located at or next to an entranceway, and a user of a cellular telephone, which comprises:

means for establishing a pre-defined list of telephone numbers comprising at least one cellular telephone number;

means for receiving a signal transmitted from said communication device identifying a request to establish said communication session;
means for routing said request towards said at least one cellular telephone number; and
means for establishing a communication session whereby signals transmitted from said communication apparatus are relayed via said cellular network communication device, to said user associated with said at least one cellular telephone number.

23. A cellular network communication device according to claim 22, wherein said signals are voice and/or video signals.

24. A cellular network communication device according to claim 22, further comprising means for providing an indication at said cellular telephone specifying that the origin of said request for communication session is the communication apparatus.

25. A cellular network communication device according to any one of claims 22 to 24, wherein said pre-defined list of telephone numbers comprises a plurality of cellular telephone numbers, further comprising means for defining at least one management rule for establishing communication sessions originating from said communication apparatus with at least one of said plurality of cellular telephone numbers, and wherein said routing means are operative in accordance with said at least one management rule.

26. A cellular network communication device according to claim 25, wherein if a request for establishing a communication session has not been answered within a pre-defined period of time by a first cellular telephone user in accordance with said pre-defined list and said at
least one management rule, said routing means are adapted to re-route the request to a user of a second cellular telephone, in accordance with said pre-defined list and said at least one management rule.

27. A cellular network communication device according to claim 25, wherein said routing means are further adapted to route said request to establish a communication session originated at said communication apparatus, to a plurality of cellular telephones listed in said pre-defined list.

28. A cellular network communication device according to claim 25, wherein said at least one management rule comprises at least one member selected from a group consisting of: time of the day, day of the week and national holidays.

29. A cellular network communication device according to claim 22, further comprising a user buffer operative to store at least one selected telephone number, means operative to prevent establishing communication sessions with said at least one selected telephone number, and control means operative to determine whether a request to establish a communication session originated from the communication device should be transmitted to said at least one selected telephone number, and in the affirmative, re-routing said request in accordance with pre-defined management rule.

30. A cellular network communication device according to any one of claims 22 to 29, further comprising means to receive a subscriber’s request to establish a communication call with said communication apparatus,
determining whether a cellular number from which said subscriber's request has been initiated, is included in said pre-defined list of telephone numbers, and if in the affirmative, allowing the establishing of the requested communication session.

31. A cellular network communication device according to claim 30, further comprising means to determine whether said subscriber's request meets one or more pre-defined management rules, prior to allowing the establishing of said communication session.

32. A cellular network communication device according to claim 31, further comprising means to receive a code sent from said cellular telephone number following the subscriber's request to establish said communication, and to determine the type of information that will be provided to said subscriber based on said code.

33. A cellular mobile device, operative to allow establishing a communication session via a public cellular network with a communication apparatus comprising an outdoor unit located at or next to an entranceway, and wherein said cellular mobile device is adapted to receive signals from said communication apparatus and to send at least one type of operating command to said communication apparatus.

34. A cellular mobile device according to claim 33, operative to receive voice and video type of signals.

35. A method according to any one of claims 12 to 21, wherein the path along which said communication session is conducted, further comprises at least one of the
following networks: WLAN network, WiMax network, and IP network.
INITIATING A REQUEST FOR COMMUNICATION SESSION

RECEIVING THE REQUEST AT THE MOBILE NETWORK

MSC INTERROGATES THE HLR IN ORDER TO GET THE CALLED SUBSCRIBER SERVICE PROFILE

CALL IS ROUTED TO DAS NODE

DAS IDENTIFIES THE SUBSCRIBER THAT THE CALL IS ASSOCIATED WITH AND PROVIDES ROUTING INSTRUCTIONS TO THE MSC

TELEPHONY DEVICE RECEIVES DATA REGARDING CALL AND PRESENTS IT TO USER

ACCEPT THE REQUEST FOR ESTABLISHING THE CALL

YES

ESTABLISH THE CALL

USER PRESSES A PRE-DEFINED KEY/CODE TO OPEN DOOR

NO

END

FIG. 4
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
G07C9/00 H04M11/00 H04N7/00

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)
G07C H04M

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)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<td>Y</td>
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<td>page 2, line 26 - page 6, line 26 page 10, line 21 - page 15, line 19 page 11 figures</td>
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Date of actual completion of the international search
22 February 2006

Date of mailing of the international search report
07/03/2006

Authorized officer
Miltgen, E
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