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(54) Title: METHODS FOR FACILITATING COMMUNICATION BETWEEN INTERNET PROTOCOL MULTIMEDIA SUBSYSTEM (IMS) DEVICES AND NON-IMS DEVICES AND BETWEEN IMS DEVICES ON DIFFERENT IMS NETWORKS AND RELATED ELECTRONIC DEVICES AND COMPUTER PROGRAM PRODUCTS

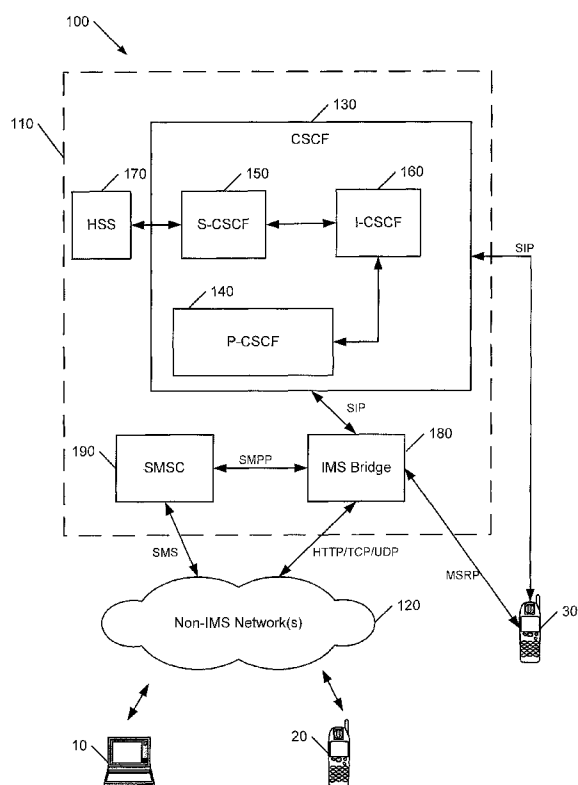


FIG. 1

(57) Abstract: A bridge device is used to setup communication sessions between Internet Protocol (IP) Multimedia Subsystem (IMS) devices and non-IMS devices or between non-IMS devices over an IMS network. Once a communication session is established, the IMS Bridge device may translate messages received from the respective endpoint devices between IMS and non-IMS formats.



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METHODS FOR FACILITATING COMMUNICATION BETWEEN INTERNET
PROTOCOL MULTIMEDIA SUBSYSTEM (IMS) DEVICES AND NON-IMS
DEVICES AND BETWEEN IMS DEVICES ON DIFFERENT IMS NETWORKS
10 AND RELATED ELECTRONIC DEVICES AND COMPUTER PROGRAM
PRODUCTS

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of and priority to U. S. Provisional Patent
15 Application No. 61/018,142, filed December 31, 2007, the disclosure of which is
hereby incorporated herein by reference as if set forth in its entirety.

BACKGROUND OF THE INVENTION

The present invention relates to communication networks, and, more
20 particularly, to methods, electronic devices, and computer program products for
communicating using an Internet Protocol (IP) Multimedia Subsystem (IMS) network.

The Internet Protocol (IP) Multimedia Subsystem (IMS) is a standard that has
been developed to define the control and integration of multimedia services in a core,
packet-switched network. In particular, the IMS architecture defines a set of logical
25 functions that use a signaling protocol known as the Session Initiation Protocol (SIP)
to establish communication sessions in an IP network. A "session" may be, for
example, a one-to-one voice call or a more complex interaction, such as a one-to-
many conference call involving multimedia services. SIP may also be used to
facilitate voice over IP (VoIP) services, in which voice is transported in IP data
30 packets that are re-assembled and converted into an audio signal for the recipient.
IMS may be characterized as a standardized way to connect IP devices and networks
using SIP.

Unfortunately, as IMS is deployed in various communication networks, many consumers may not yet have upgraded to IMS enabled phones and devices to subscribe to the services provided in the IMS network. Moreover, many consumers may use services that allow special types of communication with friends, such as chat
5 and/or file-sharing, that may not work properly or at all if the various participants are on different networks that have not all evolved to using IMS.

SUMMARY OF THE INVENTION

According to some embodiments of the present invention, a method of
10 operating a bridge device to establish communication between an Internet Protocol (IP) Multimedia Subsystem (IMS) device and a non-IMS device, includes receiving a request to instantiate as a proxy for the non-IMS device with an IMS network from a Call Session Control Function (CSCF) in the IMS network, registering as the proxy for the non-IMS device with the CSCF, establishing a network layer level connection
15 between the IMS device and the non-IMS device, receiving an IMS format request to establish a transport layer level or above connection with the non-IMS device from the IMS device, sending a non-IMS format request to establish the transport layer level or above connection to the non-IMS device responsive to receiving the IMS format request to establish the transport layer level or above connection, and translating
20 messages received from the IMS device from an IMS format to a non-IMS format for transmission to the non-IMS device and messages received from the non-IMS device from the non-IMS format to the IMS format for transmission to the IMS device responsive to establishing the transport layer level or above connection between the IMS device and the non-IMS device.

25 In other embodiments, receiving the request to instantiate the non-IMS device includes receiving the request to instantiate the non-IMS device responsive to the CSCF receiving a Session Initiation Protocol (SIP) invite message for the non-IMS device from the IMS device.

In still other embodiments, establishing the network layer level connection
30 between the IMS device and the non-IMS device comprises sending a Short Message Service (SMS) message to launch an IMS service application on the non-IMS device, receiving an IP connect message from the non-IMS device responsive to the SMS

connection request message, and establishing an IP level connection between the IMS device and the non-IMS device.

In still other embodiments, the SMS message comprises a Uniform Resource Indicator (URI) that identifies a location for downloading the IMS service application.

5 In still other embodiments, the method further includes using the Session Description Protocol (SDP) protocol messaging to negotiate a media type and/or format for communication with the non-IMS device responsive to establishing the network layer level connection.

10 In still other embodiments, the IMS format is a Message Session Relay Protocol (MSRP) format.

In still other embodiments, the non-IMS format request is a Hypertext Transfer Protocol (HTTP) format, Transmission Control Protocol (TCP) format, and/or User Datagram Protocol (UDP) format.

15 In still other embodiments, the IMS device and the non-IMS device are mobile terminals.

In further embodiments of the present invention, a method of operating a bridge device to establish communication between an Internet Protocol (IP) Multimedia Subsystem (IMS) device and a non-IMS device, includes receiving a request to instantiate as a proxy for the IMS device with an IMS network from the non-IMS device, registering as the proxy for the IMS device with a Call Session Control Function (CSCF) in the IMS network, receiving a non-IMS format invite message for the IMS device from the non-IMS device, sending an IMS format invite message to the IMS device responsive to receiving the non-IMS format invite message, establishing a network layer level connection between the IMS device and the non-IMS device, sending an IMS format request to establish a transport layer level or above connection with the non-IMS device to the IMS device, sending a non-IMS format request to establish the transport layer level or above connection to the non-IMS device, and translating messages received from the non-IMS device from a non-IMS format to an IMS format for transmission to the IMS device and messages received from the IMS device from the IMS format to the non-IMS format for transmission to the non-IMS device responsive to establishing the transport layer level or above connection between the non-IMS device and the IMS device.

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In still further embodiments, receiving the request to instantiate the non-IMS device includes sending a Session Initiation Protocol (SIP) registration message for the non-IMS device to the CSCF.

5 In still further embodiments, establishing the network layer level connection between the IMS device and the non-IMS device includes establishing an IP level connection between the IMS device and the non-IMS device.

In still further embodiments, the method further includes the using Session Description Protocol (SDP) protocol messaging to negotiate a media type and/or format for communication with the non-IMS device responsive to establishing the
10 network layer level connection.

In still further embodiments, the IMS format is a Session Initiation Protocol (SIP) format and/or a Message Session Relay Protocol (MSRP) format.

In still further embodiments, the non-IMS format is a Hypertext Transfer Protocol (HTTP) format, Transmission Control Protocol (TCP) format, and/or User
15 Datagram Protocol (UDP) format.

In still further embodiments, the IMS device and the non-IMS device are mobile terminals.

In other embodiments of the present invention, a method of operating a bridge device to establish communication between a first non-Internet Protocol (IP)
20 Multimedia Subsystem (IMS) device and a second non-IMS device using an IMS network includes receiving a request to instantiate as a proxy for the second non-IMS device with the IMS network from the first non-IMS device, registering as the proxy for the second non-IMS device with a Call Session Control Function (CSCF) in the IMS network, receiving a request to instantiate as a proxy for the first non-IMS device
25 with the IMS network from the second non-IMS device, registering as the proxy for the first non-IMS device with the Call Session Control Function (CSCF) in the IMS network, receiving a non-IMS format invite message for the second non-IMS device from the first non-IMS device, establishing a network layer level connection between the first and second non-IMS devices, sending a non-IMS format request to establish a
30 transport layer level or above connection to the first non-IMS device, sending a non-IMS format request to establish the transport layer level or above connection to the second non-IMS device, and forwarding messages received from the first non-IMS device to the second non-IMS device and messages received from the second non-

IMS device to the first non-IMS device responsive to establishing the transport layer level or above connection between the first and second non-IMS devices.

In still other embodiments, receiving the request to instantiate the first non-IMS device includes sending a Session Initiation Protocol (SIP) registration message
5 for the first non-IMS device to the CSCF, and receiving the request to instantiate the second non-IMS device includes sending a Session Initiation Protocol (SIP) registration message for the second non-IMS device to the CSCF.

In still other embodiments, establishing the network layer level connection between the first and second non-IMS devices includes sending a Short Message
10 Service (SMS) message to launch an IMS service application on the second non-IMS device, receiving an IP connect message from the second non-IMS device responsive to the SMS connection request message, and establishing an IP level connection between the first and second non-IMS devices.

In still other embodiments, the SMS message comprises a Uniform Resource
15 Indicator (URI) that identifies a location for downloading the IMS service application.

In still other embodiments, the method further includes using the Session Description Protocol (SDP) protocol messaging to negotiate a media type and/or format for communication with the second non-IMS device responsive to establishing the network layer level connection.

20 In still other embodiments, the non-IMS format is a Hypertext Transfer Protocol (HTTP) format, Transmission Control Protocol (TCP) format, and/or User Datagram Protocol (UDP) format.

In still other embodiments, the first and second non-IMS devices are mobile terminals.

25 In further embodiments of the present invention, a method of operating an Internet Protocol (IP) Multimedia Subsystem (IMS) includes using IMS format messaging to communicate with an IMS Bridge device to establish a communication session with a non-IMS device over an IMS network.

In still further embodiments, the IMS device is a mobile terminal.

30 In still further embodiments, an IMS device is configured to carry out the above-described methods.

In other embodiments of the present invention, a method of operating a non-Internet Protocol (IP) Multimedia Subsystem (IMS) device includes using non-IMS

format messaging to communicate with an IMS Bridge device to establish a communication session with another device over an IMS network.

In still other embodiments, the another device is an IMS device.

In still other embodiments, the another device is a non-IMS device.

5 In still other embodiments, the non-IMS device is a mobile terminal.

In still other embodiments, a non-IMS device is configured to carry out the above-described methods.

In further embodiments of the present invention, a communication network is operated by registering a first Call Session Control Function (CSCF) in a first Internet
10 Protocol (IP) Multimedia Subsystem (IMS) network with a CSCF Domain Name Service (DNS), registering a second CSCF in a second IMS network with the CSCF Domain Name Service (DNS), receiving a session invitation message originating from a first IMS device on the first IMS network and intended for a second IMS device on the second IMS network at a bridge device, obtaining the IP address of the second
15 CSCF from the CSCF DNS at the bridge device, and forwarding the session invitation message from the bridge device to the second IMS device via the second CSCF to initiate a communication session between the first IMS device on the first IMS network and the second IMS device on the second IMS network.

In still further embodiments, a Short Message Service (SMS) message is sent
20 from the bridge device to the second IMS device to launch an IMS service application on the second IMS device before forwarding the session invitation message from the bridge device to the second IMS device.

In other embodiments of the present invention, a communication network is operated by registering a first bridge device in a first Internet Protocol (IP) Multimedia
25 Subsystem (IMS) network with a bridge Domain Name Service (DNS), registering a second bridge device in a second IMS network with the bridge Domain Name Service (DNS), receiving a session invitation message originating from a first IMS device on the first IMS network and intended for a second IMS device on the second IMS network at the first bridge device, obtaining the IP address of the second bridge device
30 from the bridge DNS at the first bridge device, and forwarding the session invitation message from the first bridge device to the second IMS device via the second bridge device to initiate a communication session between the first IMS device on the first IMS network and the second IMS device on the second IMS network.

In still other embodiments, a Short Message Service (SMS) message is sent from the first bridge device to the second IMS device to launch an IMS service application on the second IMS device before forwarding the session invitation message from the first bridge device to the second IMS device.

5 In still other embodiments, a computer program product includes computer-readable program code embodied on a computer-readable medium, the computer readable program code being configured to carry out the above-described methods.

BRIEF DESCRIPTION OF THE DRAWINGS

10 Other features of the present invention will be more readily understood from the following detailed description of specific embodiments thereof when read in conjunction with the accompanying drawings, in which:

FIG. 1 is a block diagram that illustrates an Internet Protocol (IP) Multimedia Subsystem (IMS) network architecture, in accordance with some embodiments of the
15 present invention;

FIG. 2 is a block diagram that illustrates an IMS electronic device/mobile terminal in accordance with some embodiments of the present invention;

FIG. 3 is a block diagram that illustrates a non-IMS electronic device/mobile terminal in accordance with some embodiments of the present invention;

20 FIGS. 4 - 6 are message flow diagrams that illustrate operations for facilitating communication with non-IMS devices over an IMS network, in accordance with some embodiments of the present invention;

FIG. 7 is a block diagram that illustrates an IMS network architecture in accordance with further embodiments of the present invention;

25 FIG. 8 is a message flow diagram that illustrates operations for facilitating communication between IMS devices associated with different IMS networks in accordance with some embodiments of the present invention;

FIG. 9 is a block diagram that illustrates an IMS network architecture in accordance with still further embodiments of the present invention; and

30 FIG. 10 is a message flow diagram that illustrates operations for facilitating communication between IMS devices associated with different IMS networks in accordance with further embodiments of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that there is
5 no intent to limit the invention to the particular forms disclosed, but on the contrary, the invention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the claims. Like reference numbers signify like elements throughout the description of the figures.

As used herein, the singular forms "a," "an," and "the" are intended to include
10 the plural forms as well, unless expressly stated otherwise. It should be further understood that the terms "comprises" and/or "comprising" when used in this specification is taken to specify the presence of stated features, integers, steps, operations, elements, and/or components, but does not preclude the presence or addition of one or more other features, integers, steps, operations, elements,
15 components, and/or groups thereof. It will be understood that when an element is referred to as being "connected" or "coupled" to another element, it can be directly connected or coupled to the other element or intervening elements may be present. Furthermore, "connected" or "coupled" as used herein may include wirelessly connected or coupled. As used herein, the term "and/or" includes any and all
20 combinations of one or more of the associated listed items.

Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having
25 a meaning that is consistent with their meaning in the context of the relevant art and this specification and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

The present invention may be embodied as methods, electronic devices, and/or computer program products. Accordingly, the present invention may be embodied in
30 hardware and/or in software (including firmware, resident software, micro-code, *etc.*). Furthermore, the present invention may take the form of a computer program product on a computer-usable or computer-readable storage medium having computer-usable or computer-readable program code embodied in the medium for use by or in

connection with an instruction execution system. In the context of this document, a computer-usable or computer-readable medium may be any medium that can contain, store or transport the program for use by or in connection with the instruction execution system, apparatus, or device.

5 The computer-usable or computer-readable medium may be, for example but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device. More specific examples (a nonexhaustive list) of the computer-readable medium would include the following: a portable computer diskette, a random access memory (RAM), a read-only memory
10 (ROM), an erasable programmable read-only memory (EPROM or Flash memory), and a compact disc read-only memory (CD-ROM).

As used herein, the term "mobile terminal" may include a satellite or cellular radiotelephone with or without a multi-line display; a Personal Communications System (PCS) terminal that may combine a cellular radiotelephone with data
15 processing, facsimile and data communications capabilities; a PDA that can include a radiotelephone, pager, Internet/intranet access, Web browser, organizer, calendar and/or a global positioning system (GPS) receiver; and a conventional laptop and/or palmtop receiver or other appliance that includes a radiotelephone transceiver. Mobile terminals may also be referred to as "pervasive computing" devices.

20 For purposes of illustration, embodiments of the present invention are described herein in the context of a mobile terminal. It will be understood, however, that the present invention is not limited to such embodiments and may be embodied generally as an electronic device that can be configured to communicate with one or more other electronic devices over an Internet Protocol (IP) Multimedia Subsystem
25 (IMS) network

As used herein, the term "IMS terminal or device" refers to a terminal or device that may communicate using the Session Initiation Protocol (SIP). It will be understood that an IMS terminal or device may also refer to devices that communicate using SIP via a media gateway, which translates communications, for example,
30 between an IP network and another network, such as the public switched telephone network or a circuit switched wireless network. As used herein, the term "message" means a unit of information and/or a block of data that may be transmitted electronically as a whole or via segments from one device to another. Accordingly, as

used herein, the term "message" may encompass such terms of art as "frame" and/or "packet," which may also be used to refer to a unit of transmission.

Some embodiments of the present invention arise from the use of an IMS Bridge device that can be used to setup communication sessions between IMS devices
5 and non-IMS devices or between non-IMS devices over an IMS network. Once a communication session is established, the IMS Bridge device may translate messages received from the respective endpoint devices between IMS and non-IMS formats.

Referring now to FIG. 1, an exemplary communication network 100, in accordance with some embodiments of the present invention, includes an IMS
10 network 110 that is coupled to non-IMS network(s) 120, which may provide connectivity to the IMS network 110 for devices 10, 20, such as mobile terminals, WiFi-equipped computing devices, modems, and other devices. A device may connect to the IMS network 110 using any of a number of different interfaces, generally depending on the nature of the device. The devices 10, 20 may include IP
15 devices that are capable of communicating via the Hypertext Transfer Protocol (HTTP), Transmission Control Protocol (TCP), and/or the User Datagram Protocol (UDP) format in accordance with various embodiments of the present invention.

The IMS network 110, in accordance with some embodiments of the present invention, includes apparatus configured to provide a variety of different functions
20 linked by standardized interfaces. Generally, functions of the IMS network 110 include a bundle of functions of SIP servers or proxies, collectively referred to as a Call Session Control Function (CSCF) 130, which are used to process (Session Initiation Protocol) SIP signaling packets in the IMS network 110. It will be appreciated that the CSCF 130 may be implemented as a single server, separate
25 servers, or a network of servers either co-located in a server farm, for example, or located in different geographic regions. Functions of the CSCF 130 may include: registration of devices with the IMS network 110; routing and inspection of signaling messages; authentication of users and establishment of security associations; compression, decompression and other signal processing functions; authorization of
30 resources; policy enforcement; bandwidth management; and generation of charging records. It will be understood that, in accordance with some embodiments of the present invention, these functions may be apportioned among several call session control function proxies or servers, such as a Proxy-CSCF (P-CSCF) 140,

Interrogating-CSCF (I-CSCF) 160, Serving-CSCF (S-CSCF) 150, and various other functions, gateways and the like.

The P-CSCF 140 may be configured as a SIP proxy to function as an interface to the IMS network 110 for IMS terminals/devices 30. The P-CSCF 140 may enable
5 the registration of IMS terminals/devices and the routing of SIP and/or HyperText Transfer Protocol (HTTP) signaling messages between the devices 10, 20, 30 and service providers. The P-CSCF 140 may communicate with devices 10, 20 via the packet network(s) 110 and may communicate with devices coupled to a circuit-switched network via a Media Gateway Control Function (not shown).

10 The S-CSCF 150 performs session control and communicates with a Home Subscriber Server (HSS) database 170, which maintains a service profile and other information for each end-user and associated IMS terminal/device that has registered with the IMS network 110. The profile and other information may include, but is not limited to, IP address information, roaming information, and/or telephony services
15 information. The S-CSCF 150 handles SIP registrations, which allows it to bind the IP address of an IMS terminal with a SIP address. The S-CSCF 150 inspects all signaling messages and determines which application server(s) a SIP message should be routed to. The I-CSCF 160 defines the edge of an administrative domain. The IP address for the I-CSCF 160 is publicly accessible via DNS so that remote servers can
20 find it and use it as an entry point for SIP packets/messages into this domain.

The IMS network 110 further includes an IMS Bridge 180 that provides a gateway between the SIP based IMS network 110 and the non-IMS HTTP/TCP/UDP based network 120. The IMS Bridge 180 is configured to facilitate communication sessions between IMS enabled devices, such as device 130 and non-IMS enabled
25 devices, such as devices 10, 20. In some embodiments, the IMS Bridge 180 may be configured to facilitate communication sessions between two non-IMS enabled devices over the IMS network 110. In addition to participating in the setup of these communication sessions, the IMS Bridge 180 may translate messages between an IMS format, such as SIP and/or Message Session Relay Protocol (MSRP), and a non-IMS
30 format, such as HTTP, TCP, and/or UDP. The IMS Bridge 180 may communicate with a Short Message Service Center (SMSC) 190 using the Short Message Peer-to-Peer protocol (SMPP) to receive and deliver Short Message Service (SMS) messages to non-IMS enabled devices 10, 20. In particular, SMS messaging may be used to

launch an IMS service application stored on a non-IMS enabled device. In some embodiments, the SMS message may include a Uniform Resource Indicator (URI) that identifies a location where the application may be downloaded from. In further embodiments, even if the application is already installed, an updated or different
5 version of the application may be downloaded and installed before it is launched.

The various elements of the communication network 100 may be connected by a global network, such as the Internet or other publicly accessible network. Various elements of the network may be interconnected by a wide area network, a local area network, an Intranet, and/or other private network, which may not be accessible by the
10 general public. Thus, the communication network 100 may represent a combination of public and private networks or a virtual private network (VPN). Although FIG. 1 illustrates an exemplary communication network, it will be understood that the present invention is not limited to such configurations, but is intended to encompass any configuration capable of carrying out the operations described herein.

Referring now to FIG. 2, an exemplary mobile terminal 200 that may be used to implement IMS device/terminal 30 of FIG. 1, in accordance with some embodiments of the present invention, includes a video recorder 202, a camera 205, a microphone 210, a keyboard/keypad 215, a speaker 220, a display 225, a transceiver 230, and a memory 235 that communicate with a processor 240. The transceiver 230
20 comprises a transmitter circuit 245 and a receiver circuit 250, which respectively transmit outgoing radio frequency signals to base station transceivers and receive incoming radio frequency signals from the base station transceivers via an antenna 255. The radio frequency signals transmitted between the mobile terminal 200 and the base station transceivers may comprise both traffic and control signals (*e.g.*,
25 paging signals/messages for incoming calls), which are used to establish and maintain communication with another party or destination. The radio frequency signals may also comprise packet data information, such as, for example, cellular digital packet data (CDPD) information. The foregoing components of the mobile terminal 200 may be included in many conventional mobile terminals and their functionality is generally
30 known to those skilled in the art.

The processor 240 communicates with the memory 235 via an address/data bus. The processor 240 may be, for example, a commercially available or custom microprocessor. The memory 235 is representative of the one or more memory

devices containing the software and data used to provide a phone-based Web server with a private IP address, in accordance with some embodiments of the present invention. The memory 235 may include, but is not limited to, the following types of devices: cache, ROM, PROM, EPROM, EEPROM, flash, SRAM, and DRAM.

5 As shown in FIG. 2, the memory 235 may contain up to three or more categories of software and/or data: the operating system 265, a communication module 270, and an application module 275. The operating system 265 generally controls the operation of the mobile terminal 200. In particular, the operating system 265 may manage the mobile terminal's software and/or hardware resources and may
10 coordinate execution of programs by the processor 240. The communication module 270 may be configured implement SIP functionality to allow the mobile terminal 200 to use SIP to establish communication sessions. Moreover, the communication module 270 may be configured to communicate with the IMS network 110 of FIG. 1 to register the mobile terminal 200 in the HSS 170, for example. The communication
15 module 270 may further include an IP stack to carry out communications using IP. The application module 275 may be configured to support one or more services that may be provided over the IMS network 110.

Referring now to FIG. 3, an exemplary mobile terminal 200 that may be used to implement non-IMS devices/terminals 10, 20 of FIG. 1, in accordance with some
20 embodiments of the present invention, includes a video recorder 302, a camera 305, a microphone 310, a keyboard/keypad 315, a speaker 320, a display 325, a transceiver 330, and a memory 335 that communicate with a processor 340. The transceiver 330 comprises a transmitter circuit 345 and a receiver circuit 350, which respectively
25 transmit outgoing radio frequency signals to base station transceivers and receive incoming radio frequency signals from the base station transceivers via an antenna 355. The radio frequency signals transmitted between the mobile terminal 300 and the base station transceivers may comprise both traffic and control signals (*e.g.*, paging signals/messages for incoming calls), which are used to establish and maintain communication with another party or destination. The radio frequency signals may
30 also comprise packet data information, such as, for example, cellular digital packet data (CDPD) information. The foregoing components of the mobile terminal 300 may be included in many conventional mobile terminals and their functionality is generally known to those skilled in the art.

The processor 340 communicates with the memory 335 via an address/data bus. The processor 340 may be, for example, a commercially available or custom microprocessor. The memory 335 is representative of the one or more memory devices containing the software and data used to provide a phone-based Web server
5 with a private IP address, in accordance with some embodiments of the present invention. The memory 335 may include, but is not limited to, the following types of devices: cache, ROM, PROM, EPROM, EEPROM, flash, SRAM, and DRAM.

As shown in FIG. 3, the memory 335 may contain up to three or more categories of software and/or data: the operating system 365, a communication
10 module 370, and an application module 375. The operating system 365 generally controls the operation of the mobile terminal 300. In particular, the operating system 365 may manage the mobile terminal's software and/or hardware resources and may coordinate execution of programs by the processor 340. The communication module
15 370 may be configured implement HTTP/TCP/UDP functionality to allow the mobile terminal 300 to establish communication sessions. The communication module 370 may further include an IP stack to carry out communications using IP. The application module 375 may be configured to support one or more services that may be provided over the IMS network 110.

Although FIGS. 2 and 3 illustrate an exemplary software and hardware
20 architecture that may be used to provide IMS and non-IMS mobile terminals that may communicate over an IMS network equipped with an IMS Bridge 180 as shown in FIG. 1, it will be understood that the present invention is not limited to such a configuration, but is intended to encompass any configuration capable of carrying out the operations described herein.

25 Computer program code for carrying out operations of devices and/or systems discussed above with respect to FIGS. 1 - 3 may be written in a high-level programming language, such as Java, C, and/or C++, for development convenience. In addition, computer program code for carrying out operations of embodiments of the present invention may also be written in other programming languages, such as, but
30 not limited to, interpreted languages. Some modules or routines may be written in assembly language or even micro-code to enhance performance and/or memory usage. It will be further appreciated that the functionality of any or all of the program modules may also be implemented using discrete hardware components, one or more

application specific integrated circuits (ASICs), or a programmed digital signal processor or microcontroller.

The present invention is described hereinafter with reference to message flow, flowchart and/or block diagram illustrations of methods, mobile terminals, electronic devices, communication networks, and/or computer program products in accordance with some embodiments of the invention. These message flow, flowchart and/or block diagrams further illustrate exemplary operations of IMS and non-IMS devices communicating over an IMS network. It will be understood that each message/block of the message flow, flowchart and/or block diagram illustrations, and combinations of messages/blocks in the message flow, flowchart and/or block diagram illustrations, may be implemented by computer program instructions and/or hardware operations. These computer program instructions may be provided to a processor of a general purpose computer, a special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions specified in the message flow, flowchart and/or block diagram block or blocks.

These computer program instructions may also be stored in a computer usable or computer-readable memory that may direct a computer or other programmable data processing apparatus to function in a particular manner, such that the instructions stored in the computer usable or computer-readable memory produce an article of manufacture including instructions that implement the function specified in the message flow, flowchart and/or block diagram block or blocks.

The computer program instructions may also be loaded onto a computer or other programmable data processing apparatus to cause a series of operational steps to be performed on the computer or other programmable apparatus to produce a computer implemented process such that the instructions that execute on the computer or other programmable apparatus provide steps for implementing the functions specified in the message flow, flowchart and/or block diagram block or blocks.

FIG. 4 is a message flow diagram that illustrates operations for facilitating a communication session between an IMS device and a non-IMS device in which the IMS device initiates the call to the non-IMS device, in accordance with some embodiments of the present invention. Referring to FIGS. 4 and 1, an IMS device,

such as an IMS phone, initiates the communication session by sending a SIP Invite message to the CSCF 130, which recognizes that the called device is a non-IMS device, such as a non-IMS phone, or an IMS device that is part of a different IMS network (i.e., different domain) and, therefore, is not registered. The CSCF 130 communicates with the IMS Bridge 180 to instantiate a registration procedure for the IMS Bridge 180 with the IMS network as a proxy for the called non-IMS device. The CSCF 130 also informs the calling IMS device that the call attempt is in progress with a SIP 100 trying message.

The IMS Bridge 180 registers itself with the IMS network 110 via the CSCF 130 and sends a call request message to the SMSC 190. The IMS Bridge 180 initiates a SIP 180 ringing message, which is sent to the originating IMS device via the CSCF 130.

The SMSC 190 forwards an SMS call request message to the non-IMS device, which causes the application 375 installed thereon to launch. In some embodiments, if the application 375 is not currently installed, then the SMS request message may include a Uniform Resource Indicator (URI) that identifies a location where the application may be downloaded from. In some embodiments, even if the application 375 is already installed, an updated or different version of the application may be downloaded and installed before it is launched. The non-IMS device may then communicate with the IMS Bridge 180 to establish a network level, e.g. IP level connection, between the IMS device and the non-IMS device. The IMS Bridge 180 may then use a protocol called Session Description Protocol (SDP) to convey the details of the description of the communication session to the non-IMS device. SDP provides a standard representation for describing communication session metadata to participants. In general, SDP is used to convey sufficient information to enable an application to join a session and to announce the resources to be used to any non-participants that may have a need to know. In accordance with some embodiments of the present invention, the IMS Bridge 180 may use SDP to negotiate a media type and/or communication format with the non-IMS device.

After negotiating any SDP parameters with the non-IMS device, the IMS Bridge 180 may inform the IMS device via the CSCF 130 that the call setup has been successful using the SIP 200 OK message. The IMS device may send a SIP ACK message to the IMS Bridge 180 and may follow the acknowledgement by sending an

IMS format transport layer or above connection request message, such as a MSRP connect message, to the IMS Bridge 180. The IMS bridge 180 responds to the MSRP connect message by sending a non-IMS format transport layer or above connection request message, such as an HTTP/TCP/UDP connect message, to the non-IMS
5 device. Now that the communication session has been established, the IMS Bridge 180 may translate messages between the IMS format used by the IMS device and IMS network 110 and a non-IMS format used by the non-IMS device.

FIG. 5 is a message flow diagram that illustrates operations for facilitating a communication session between an IMS device and a non-IMS device in which the
10 non-IMS device initiates the call to the IMS device, in accordance with some embodiments of the present invention. Referring to FIGS. 5 and 1, an IMS device registers with the IMS network 110 via the CSCF 130. A non-IMS device communicates with the IMS Bridge 180 to instantiate a registration procedure for the IMS Bridge 180 with the IMS network 110 as a proxy for the IMS device. The IMS
15 Bridge 180 registers itself with the IMS network 110 via the CSCF 130 and informs the non-IMS device that the registration was successful via an HTTP/TCP/UDP OK message.

The non-IMS device initiates a call to an IMS device via an HTTP/TCP/UDP invite message to the IMS Bridge 180. The IMS Bridge 180 translates the
20 HTTP/TCP/UDP invite message to a SIP invite message, which is forwarded to the IMS device via the CSCF 130. The CSCF 130 informs the IMS Bridge 180 that the call attempt is in progress with a SIP 100 trying message.

The IMS device notifies the IMS Bridge 180 that the connection is successfully established with a SIP 180 ringing message along with a SIP 200 OK
25 message, which causes the IMS Bridge 180 to establish a network level, e.g. IP level connection, between the IMS device and the non-IMS device. The IMS Bridge 180 may then use SDP to convey the details of the description of the communication session to the non-IMS device. In accordance with some embodiments of the present invention, the IMS Bridge 180 may use SDP to negotiate a media type and/or
30 communication format with the non-IMS device.

After negotiating any SDP parameters with the non-IMS device, the IMS Bridge 180 may inform the IMS device via the CSCF 130 that the call setup has been successful using the SIP ACK message. The IMS Bridge 180 may send an IMS

format transport layer or above connection request message, such as a MSRP connect message, to the IMS device and a non-IMS format transport layer or above connection request message, such as an HTTP/TCP/UDP connect message, to the non-IMS device to establish a communication session. Now that the communication session
5 has been established, the IMS Bridge 180 may translate messages between the IMS format used by the IMS device and IMS network 110 and a non-IMS format used by the non-IMS device.

FIG. 6 is a message flow diagram that illustrates operations for facilitating a communication session between two non-IMS devices over an IMS network, in
10 accordance with some embodiments of the present invention. Referring to FIGS. 6 and 1, a first non-IMS device communicates with the IMS Bridge 180 to instantiate a registration procedure for the IMS Bridge 180 with the IMS network 110 as a proxy for a second non-IMS device. The IMS Bridge 180 registers itself with the IMS network 110 via the CSCF 130 and informs the first non-IMS device that the
15 registration was successful via an HTTP/TCP/UDP OK message. Similarly, a second non-IMS device communicates with the IMS Bridge 180 to instantiate a registration procedure for the IMS Bridge 180 with the IMS network 110 as a proxy for a first non-IMS device. The IMS Bridge 180 registers itself with the IMS network 110 via the CSCF 130 and informs the second non-IMS device that the registration was
20 successful via an HTTP/TCP/UDP OK message.

The first non-IMS device initiates a call to the second non-IMS device via an HTTP/TCP/UDP invite message to the IMS Bridge 180. The IMS Bridge 180 sends an SMS call request message to the SMSC, which forwards the SMS call request message to the second non-IMS device and causes the application 375 installed
25 thereon to launch. In some embodiments, if the application 375 is not currently installed, then the SMS request message may include a Uniform Resource Indicator (URI) that identifies a location where the application may be downloaded from. In some embodiments, even if the application 375 is already installed, an updated or different version of the application may be downloaded and installed before it is
30 launched.. The second non-IMS device may then communicate with the IMS Bridge 180 to establish a network level, e.g. IP level connection, between the first and second non-IMS devices. The IMS Bridge 180 may then use SDP to convey the details of the description of the communication session to the second non-IMS device. In

accordance with some embodiments of the present invention, the IMS Bridge 180 may use SDP to negotiate a media type and/or communication format with the second non-IMS device.

After negotiating any SDP parameters with the second non-IMS device, the
5 IMS Bridge 180 may send a non-IMS format transport layer or above connection request message, such as an HTTP/TCP/UDP connect message, to both the first and second non-IMS devices to establish a communication session. Now that the communication session has been established, the IMS Bridge 180 may forward messages between the first and second non-IMS devices without the need for
10 translation as both devices use a non-IMS format, such as HTTP/TCP/UDP.

In some embodiments described above with respect to FIGS. 4 – 6, the CSCF 130 may provide the IMS Bridge 180 with temporary credentials to register a non-IMS device with the IMS network 110 to increase the likelihood that the IMS Bridge 180 is not misappropriated by other devices to establish communication sessions over
15 the IMS network 110.

Referring now to FIG. 7, an exemplary communication network, in accordance with further embodiments of the present invention, includes a first IMS network 710 that comprises a CSCF 715 and an IMS enabled device 720, which are connected as shown, and a second IMS network 725 that comprises a CSCF 730 and an IMS
20 enabled device 735, which are connected as shown. As discussed above, certain IMS features or services may not work properly when the parties involved are on separate IMS networks associated with different domains. As shown in FIG. 7, the two IMS networks 710 and 725 are connected by an SMSC 740, an IMS Bridge 750, and a CSCF Domain Name Service (DNS) 760 that is configured to translate domain names
25 for the CSCFs 715 and 730 into IP addresses.

FIG. 8 is a message flow diagram that illustrates operations for facilitating a communication session between IMS devices on different IMS networks, in accordance with some embodiments of the present invention. Referring to FIGS. 8 and 7, the first CSCF 715 registers its IP address with the CSCF DNS 760 and the
30 second CSCF 730 registers its IP address with the CSCF DNS 760. The first IMS device 720 registers with the IMS network 710 via the CSCF 715 and the second IMS device 735 registers with the IMS network 725 via the CSCF 730. The first IMS device 720 initiates the communication session by sending an SIP Invite message to

the first CSCF 715, which recognizes that the called device is not in the IMS network 710 and, therefore, is not registered.

5 The first CSCF 715 forwards the SIP Invite message to the IMS Bridge 750, which performs a lookup of the IP address associated with the second CSCF 730. The IMS Bridge 750 by way of the first CSCF 715 informs the first IMS device 720 that the call attempt is in progress with a SIP 100 trying message. The IMS Bridge 750 sends a call request message to the SMSC 740. The IMS Bridge 750 initiates a SIP 180 ringing message, which is sent to the originating IMS device 720 via the CSCF 715.

10 The SMSC 740 forwards an SMS call request message to the second IMS device 735, which causes the application 275 installed thereon to launch. In some embodiments, if the application 275 is not currently installed, then the SMS request message may include a Uniform Resource Indicator (URI) that identifies a location where the application may be downloaded from. In some embodiments, even if the application 275 is already installed, an updated or different version of the application
15 may be downloaded and installed before it is launched.

The second IMS device 735 notifies the IMS Bridge 750 that the application has launched and, in response, the IMS Bridge 750 forwards the SIP Invite message to the second IMS device 735 via the second CSCF 730. The second IMS device 735
20 then sends a SIP 200 OK message back to the first IMS device 720 by way of the second CSCF 730, the IMS Bridge 750, and the first CSCF 715 to inform the first IMS device 720 that the call setup has been successful. In response, the first IMS device 720 sends a SIP ACK message to acknowledge the establishment of the communication session via the same network path.

25 Following the acknowledgement, the first IMS device 720 sends a connection request message, such as an MSRP connect message, to the second IMS device 735 by way of the IMS Bridge 750 and the second CSCF 730. Now that the communication session has been established, the first IMS device 720 may send messages to the second IMS device 735 by way of the IMS Bridge 750 and the second CSCF 730.
30 Likewise, the second IMS device 735 may send messages to the first IMS device 720 by way of the IMS Bridge 750 and the first CSCF 715.

Referring now to FIG. 9, an exemplary communication network, in accordance with further embodiments of the present invention, includes a first IMS network 910

that comprises a CSCF 915, an SMSC 920, an IMS Bridge 930, and an IMS enabled device 920, which are connected as shown, and a second IMS network 940 that comprises a CSCF 945, an SMSC 950, an IMS Bridge 960, and an IMS enabled device 965, which are connected as shown. As discussed above, certain IMS features or services may not work properly when the parties involved are on separate IMS networks associated with different domains. As shown in FIG. 9, the two IMS networks 910 and 940 are connected by a Bridge Domain Name Service (DNS) 970 that is configured to translate domain names for the IMS Bridges 930 and 960 into IP addresses.

FIG. 10 is a message flow diagram that illustrates operations for facilitating a communication session between IMS devices on different IMS networks, in accordance with some embodiments of the present invention. Referring to FIGS. 10 and 9, the first IMS Bridge 930 registers its IP address with the Bridge DNS 970 and the second IMS Bridge 960 registers its IP address with the Bridge DNS 970. The first IMS device 935 registers with the IMS network 910 via the CSCF 915 and the second IMS device 965 registers with the IMS network 940 via the CSCF 945. The first IMS device 935 initiates the communication session by sending an SIP Invite message to the first CSCF 915, which recognizes that the called device is not in the IMS network 910 and, therefore, is not registered.

The first CSCF 915 forwards the SIP Invite message to the first IMS Bridge 930, which performs a lookup of the IP address associated with the second IMS Bridge 960. The first IMS Bridge 930 by way of the first CSCF 915 informs the first IMS device 935 that the call attempt is in progress with a SIP 100 trying message. The first IMS Bridge 930 sends a call request message to the first SMSC 920. The first IMS Bridge 930 initiates a SIP 180 ringing message, which is sent to the originating IMS device 935 via the first CSCF 915.

The first SMSC 920 forwards an SMS call request message to the second IMS device 965, which causes the application 275 installed thereon to launch. In some embodiments, if the application 275 is not currently installed, then the SMS request message may include a Uniform Resource Indicator (URI) that identifies a location where the application may be downloaded from. In some embodiments, even if the application 275 is already installed, an updated or different version of the application may be downloaded and installed before it is launched.

The second IMS device 765 notifies the second IMS Bridge 960 that the application has launched and, in response, the second IMS Bridge 960 forwards the SIP Invite message to the second IMS device 965 via the second CSCF 945. The second IMS device 965 then sends a SIP 200 OK message back to the first IMS device 935 by way of the second CSCF 945, the second IMS Bridge 960, the first IMS Bridge 930, and the first CSCF 915 to inform the first IMS device 935 that the call setup has been successful. In response, the first IMS device 935 sends a SIP ACK message to acknowledge the establishment of the communication session via the same network path.

Following the acknowledgement, the first IMS device 935 sends a connection request message, such as an MSRP connect message, to the second IMS device 965 by way of the first IMS Bridge 930, the second IMS Bridge 960, and the second CSCF 945. Now that the communication session has been established, the first IMS device 935 may send messages to the second IMS device 965 by way of the first IMS Bridge 930, the second IMS Bridge 960, and the second CSCF 945. Likewise, the second IMS device 965 may send messages to the first IMS device 935 by way of the second IMS Bridge 960, the first IMS Bridge 930, and the first CSCF 915.

The message flow diagrams of FIG. 4 - 6, 8, and 10 illustrate the architecture, functionality, and operations of embodiments of methods, electronic devices, communication networks and/or computer program products for communication between IMS and non-IMS devices over an IMS network. In this regard, each message represents a module, segment, or portion of code, which comprises one or more executable instructions for implementing the specified logical function(s). It should also be noted that in other implementations, the function(s) noted in the messages may occur out of the order noted in FIG. 4 - 6, 8, and 10. For example, two messages shown in succession may, in fact, be executed substantially concurrently or the messages may sometimes be executed in the reverse order, depending on the functionality involved.

Many variations and modifications can be made to the embodiments without substantially departing from the principles of the present invention. All such variations and modifications are intended to be included herein within the scope of the present invention, as set forth in the following claims.

CLAIMS

1. A method of operating a bridge device to establish communication between an Internet Protocol (IP) Multimedia Subsystem (IMS) device and a non-IMS device, comprising:
- 5 receiving a request to instantiate as a proxy for the non-IMS device with an IMS network from a Call Session Control Function (CSCF) in the IMS network;
- registering as the proxy for the non-IMS device with the CSCF;
- establishing a network layer level connection between the IMS device and the
- 10 non-IMS device;
- receiving an IMS format request to establish a transport layer level or above connection with the non-IMS device from the IMS device;
- sending a non-IMS format request to establish the transport layer level or above connection to the non-IMS device responsive to receiving the IMS format
- 15 request to establish the transport layer level or above connection; and
- translating messages received from the IMS device from an IMS format to a non-IMS format for transmission to the non-IMS device and messages received from the non-IMS device from the non-IMS format to the IMS format for transmission to the IMS device responsive to establishing the transport layer level or above
- 20 connection between the IMS device and the non-IMS device.
2. The method according to claim 1, wherein receiving the request to instantiate the non-IMS device comprises:
- receiving the request to instantiate the non-IMS device responsive to the CSCF
- 25 receiving a Session Initiation Protocol (SIP) invite message for the non-IMS device from the IMS device.
3. The method according to any of the claims 1-2, wherein establishing the network layer level connection between the IMS device and the non-IMS device
- 30 comprises:
- sending a Short Message Service (SMS) message to launch an IMS service application on the non-IMS device;

receiving an IP connect message from the non-IMS device responsive to the SMS connection request message; and

establishing an IP level connection between the IMS device and the non-IMS device.

5

4. The method according to claim 3, wherein the SMS message comprises a Uniform Resource Indicator (URI) that identifies a location for downloading the IMS service application.

10

5. The method according to any of the claims 1-4, further comprising: using Session Description Protocol (SDP) protocol messaging to negotiate a media type and/or format for communication with the non-IMS device responsive to establishing the network layer level connection.

15

6. The method of according to any of the claims 1-5, wherein the IMS format is a Message Session Relay Protocol (MSRP) format.

7. The method according to any of the claims 1-6, wherein the non-IMS format request is a Hypertext Transfer Protocol (HTTP) format, Transmission Control Protocol (TCP) format, and/or User Datagram Protocol (UDP) format.

20

8. The method according to any of the claims 1-7, wherein the IMS device and the non-IMS device are mobile terminals.

9. A computer program product comprising computer-readable program code embodied on a computer-readable medium, the computer readable program code being configured to carry out the method according to any of the claims 1-8.

25

10. A method of operating a bridge device to establish communication between an Internet Protocol (IP) Multimedia Subsystem (IMS) device and a non-IMS device, comprising:

30

receiving a request to instantiate as a proxy for the IMS device with an IMS network from the non-IMS device;

registering as the proxy for the IMS device with a Call Session Control Function (CSCF) in the IMS network;

receiving a non-IMS format invite message for the IMS device from the non-IMS device;

5 sending an IMS format invite message to the IMS device responsive to receiving the non-IMS format invite message;

 establishing a network layer level connection between the IMS device and the non-IMS device;

 sending an IMS format request to establish a transport layer level or above connection with the non-IMS device to the IMS device;

 sending a non-IMS format request to establish the transport layer level or above connection to the non-IMS device; and

 translating messages received from the non-IMS device from a non-IMS format to an IMS format for transmission to the IMS device and messages received
15 from the IMS device from the IMS format to the non-IMS format for transmission to the non-IMS device responsive to establishing the transport layer level or above connection between the non-IMS device and the IMS device.

11. The method according to claim 10, wherein receiving the request to
20 instantiate the non-IMS device comprises:

 sending a Session Initiation Protocol (SIP) registration message for the non-IMS device to the CSCF.

12. The method according to any of the claims 10-11, wherein establishing
25 the network layer level connection between the IMS device and the non-IMS device comprises:

 establishing an IP level connection between the IMS device and the non-IMS device.

13. The method according to any of the claims 10-12, further comprising:
30 using Session Description Protocol (SDP) protocol messaging to negotiate a media type and/or format for communication with the non-IMS device responsive to establishing the network layer level connection.

14. The method according to any of the claims 10-13, wherein the IMS format is a Session Initiation Protocol (SIP) format and/or a Message Session Relay Protocol (MSRP) format.

5

15. The method according to any of the claims 10-14, wherein the non-IMS format is a Hypertext Transfer Protocol (HTTP) format, Transmission Control Protocol (TCP) format, and/or User Datagram Protocol (UDP) format.

10

16. The method according to any of the claims 10-15, wherein the IMS device and the non-IMS device are mobile terminals.

15

17. A computer program product comprising computer-readable program code embodied on a computer-readable medium, the computer readable program code being configured to carry out the method according to any of the claims 10-16.

20

18. A method of operating a bridge device to establish communication between a first non-Internet Protocol (IP) Multimedia Subsystem (IMS) device and a second non-IMS device using an IMS network, comprising:

receiving a request to instantiate as a proxy for the second non-IMS device with the IMS network from the first non-IMS device;

registering as the proxy for the second non-IMS device with the Call Session Control Function (CSCF) in the IMS network;

25

receiving a request to instantiate as a proxy for the first non-IMS device with the IMS network from the second non-IMS device;

registering as the proxy for the first non-IMS device with the Call Session Control Function (CSCF) in the IMS network;

receiving a non-IMS format invite message for the second non-IMS device from the first non-IMS device;

30

establishing a network layer level connection between the first and second non-IMS devices;

sending a non-IMS format request to establish a transport layer level or above connection to the first non-IMS device;

sending a non-IMS format request to establish the transport layer level or above connection to the second non-IMS device; and

forwarding messages received from the first non-IMS device to the second non-IMS device and messages received from the second non-IMS device to the first non-IMS device responsive to establishing the transport layer level or above connection between the first and second non-IMS devices.

19. The method according to claim 18, wherein receiving the request to instantiate the first non-IMS device comprises:

10 sending a Session Initiation Protocol (SIP) registration message for the first non-IMS device to the CSCF; and

wherein receiving the request to instantiate the second non-IMS device comprises:

15 sending a Session Initiation Protocol (SIP) registration message for the second non-IMS device to the CSCF.

20. The method according to any of the claims 18-19, wherein establishing the network layer level connection between the first and second non-IMS devices comprises:

20 sending a Short Message Service (SMS) message to launch an IMS service application on the second non-IMS device;

receiving an IP connect message from the second non-IMS device responsive to the SMS connection request message; and

25 establishing an IP level connection between the first and second non-IMS devices.

21. The method according to claim 20, wherein the SMS message comprises a Uniform Resource Indicator (URI) that identifies a location for downloading the IMS service application.

30

22. The method according to any of the claims 18-21, further comprising:

using Session Description Protocol (SDP) protocol messaging to negotiate a media type and/or format for communication with the second non-IMS device responsive to establishing the network layer level connection.

5 23. The method of according to any of the claims 18-22, wherein the non-IMS format is a Hypertext Transfer Protocol (HTTP) format, Transmission Control Protocol (TCP) format, and/or User Datagram Protocol (UDP) format.

10 24. The method according to any of the claims 18-23, wherein the first and second non-IMS devices are mobile terminals.

15 25. A computer program product comprising computer-readable program code embodied on a computer-readable medium, the computer readable program code being configured to carry out the method according to any of the claims 18-24.

 26. A method of operating an Internet Protocol (IP) Multimedia Subsystem (IMS) device, comprising:

 using IMS format messaging to communicate with an IMS bridge device to establish a communication session with a non-IMS device over an IMS network.

20

 27. The method according to claim 26, wherein the IMS device is a mobile terminal.

 28. An IMS device configured to carry out the method according to any of the claims 26-27.

25

 29. A method of operating a non-Internet Protocol (IP) Multimedia Subsystem (IMS) device, comprising:

 using non-IMS format messaging to communicate with an IMS bridge device to establish a communication session with another device over an IMS network.

30

 30. The method according to claim 29, wherein the another device is an IMS device.

31. The method according to any of the claims 29-30, wherein the another device is a non-IMS device.

5 32. The method according to any of the claims 29-31, wherein the non-IMS device is a mobile terminal.

33. A non-IMS device configured to carry out the method according to any of the claims 29-32.

10

34. A method of operating a communication network, comprising
registering a first Call Session Control Function (CSCF) in a first Internet
Protocol (IP) Multimedia Subsystem (IMS) network with a CSCF Domain Name
Service (DNS);

15 registering a second CSCF in a second IMS network with the CSCF Domain
Name Service (DNS);

receiving a session invitation message originating from a first IMS device on
the first IMS network and intended for a second IMS device on the second IMS
network at a bridge device;

20 obtaining the IP address of the second CSCF from the CSCF DNS at the
bridge device; and

forwarding the session invitation message from the bridge device to the second
IMS device via the second CSCF to initiate a communication session between the first
IMS device on the first IMS network and the second IMS device on the second IMS

25 network.

35. The method according claim 34, further comprising:

sending a Short Message Service (SMS) message from the bridge device to the
second IMS device to launch an IMS service application on the second IMS device

30 before forwarding the session invitation message from the bridge device to the second
IMS device.

36. A computer program product comprising computer-readable program code embodied on a computer-readable medium, the computer readable program code being configured to carry out the method according to any of the claims 34-35.

5 37. A method of operating a communication network, comprising
 registering a first bridge device in a first Internet Protocol (IP) Multimedia
 Subsystem (IMS) network with a bridge Domain Name Service (DNS);
 registering a second bridge device in a second IMS network with the bridge
 Domain Name Service (DNS);
10 receiving a session invitation message originating from a first IMS device on
 the first IMS network and intended for a second IMS device on the second IMS
 network at the first bridge device;
 obtaining the IP address of the second bridge device from the bridge DNS at
 the first bridge device; and
15 forwarding the session invitation message from the first bridge device to the
 second IMS device via the second bridge device to initiate a communication session
 between the first IMS device on the first IMS network and the second IMS device on
 the second IMS network.

20 38. The method according to claim 37, further comprising:
 sending a Short Message Service (SMS) message from the first bridge device
 to the second IMS device to launch an IMS service application on the second IMS
 device before forwarding the session invitation message from the first bridge device to
 the second IMS device.

25 39. A computer program product comprising computer-readable program
 code embodied on a computer-readable medium, the computer readable program code
 being configured to carry out the method according to any of the claims 37-38.

30

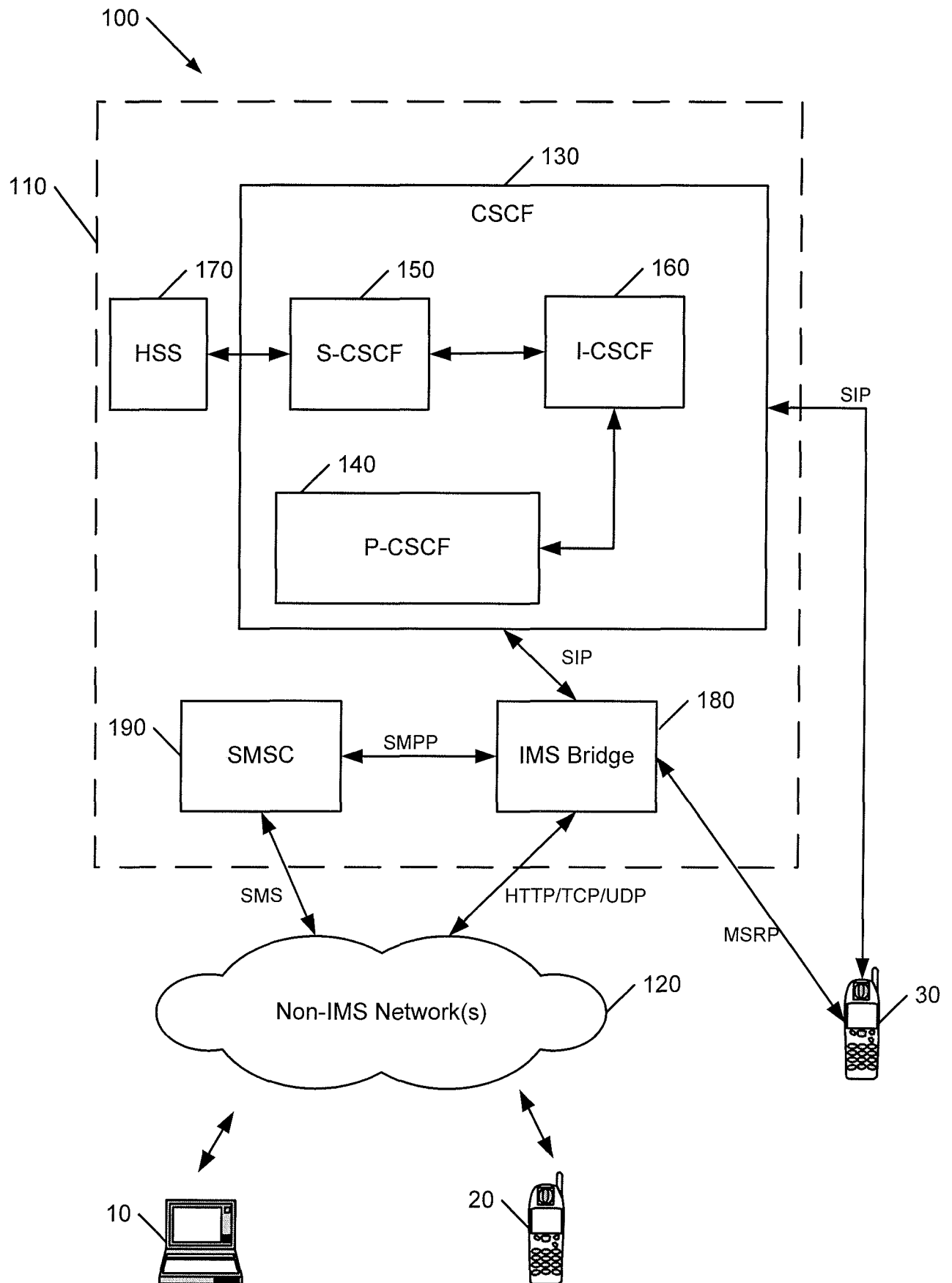


FIG. 1

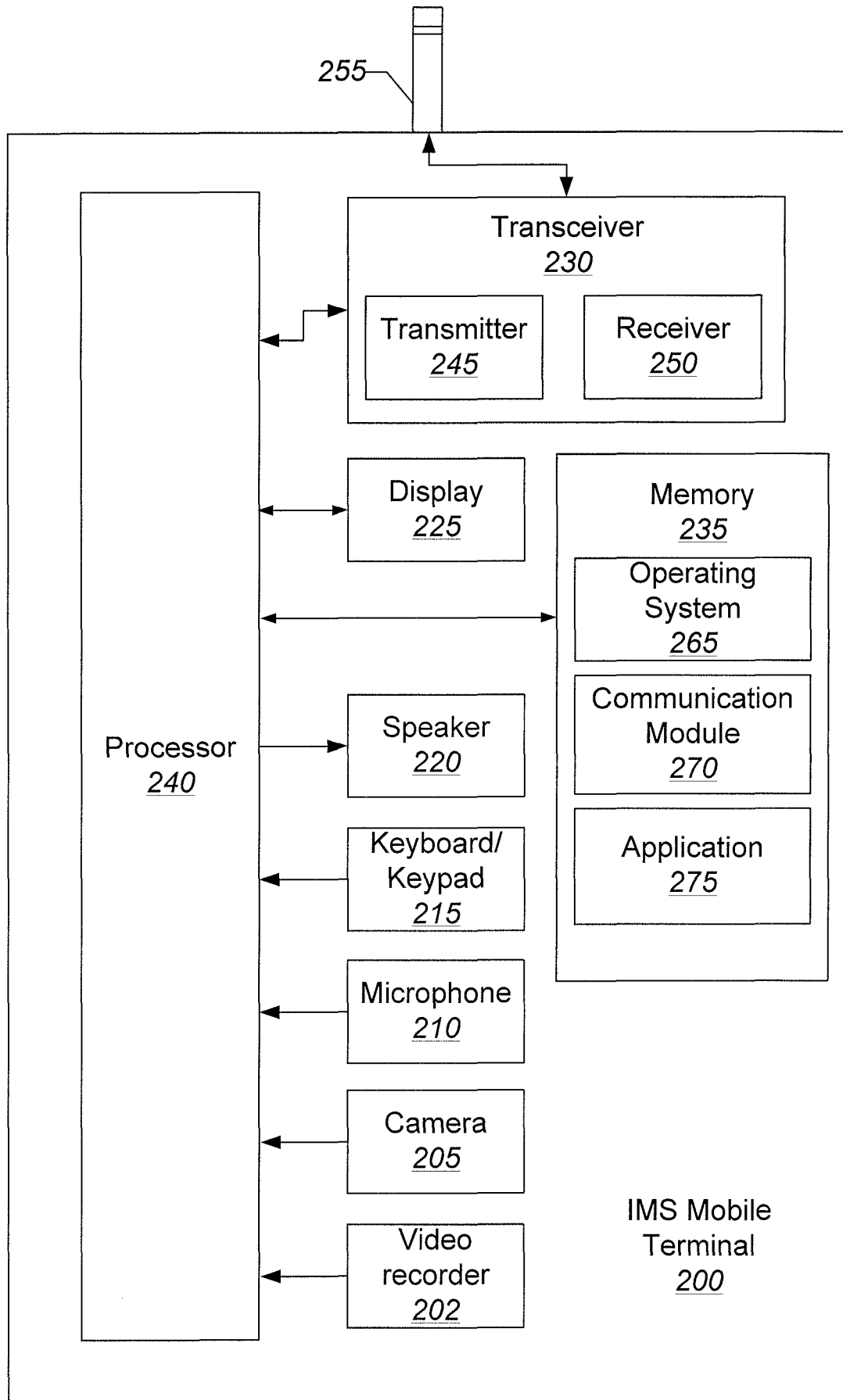


FIG. 2

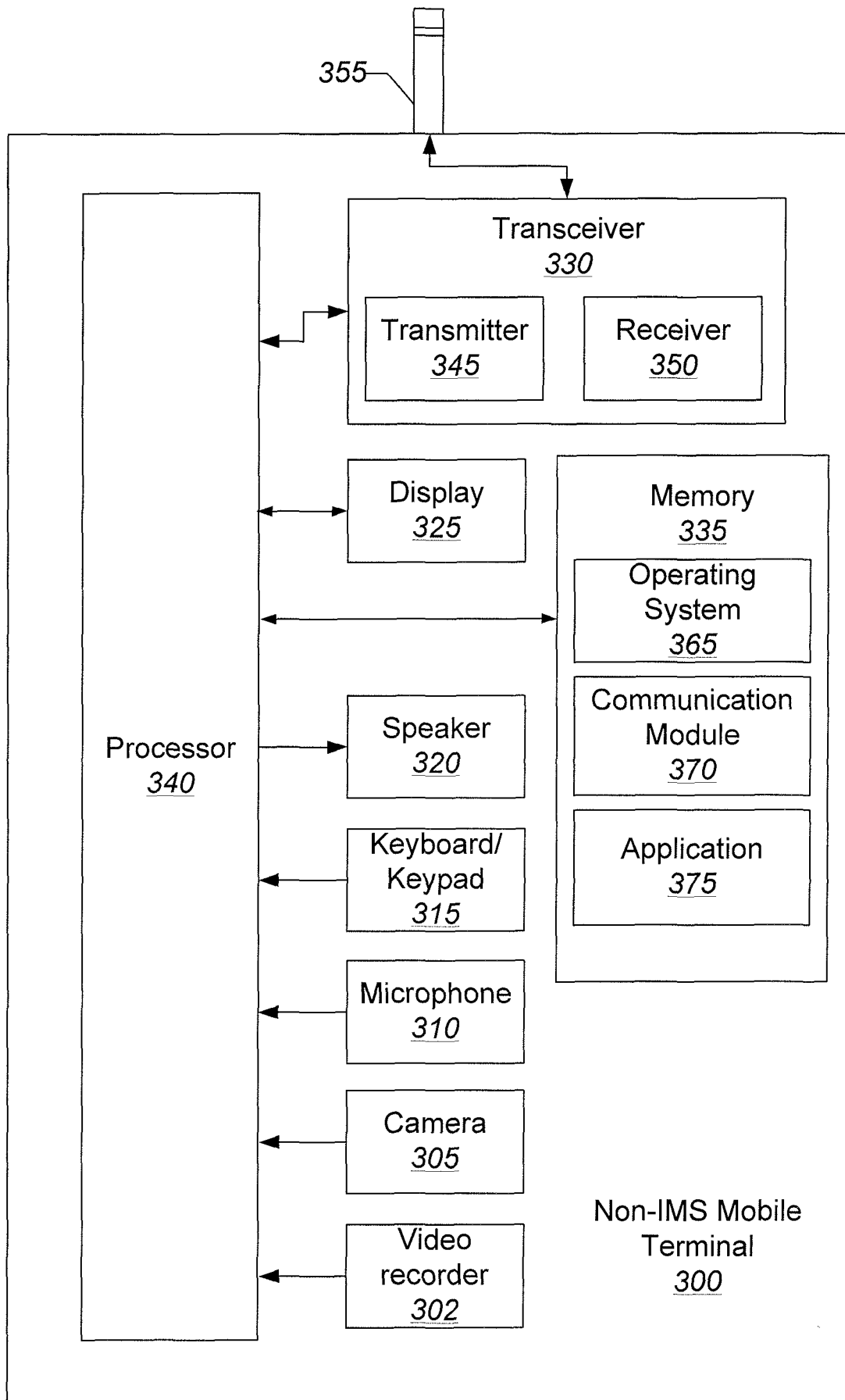


FIG. 3

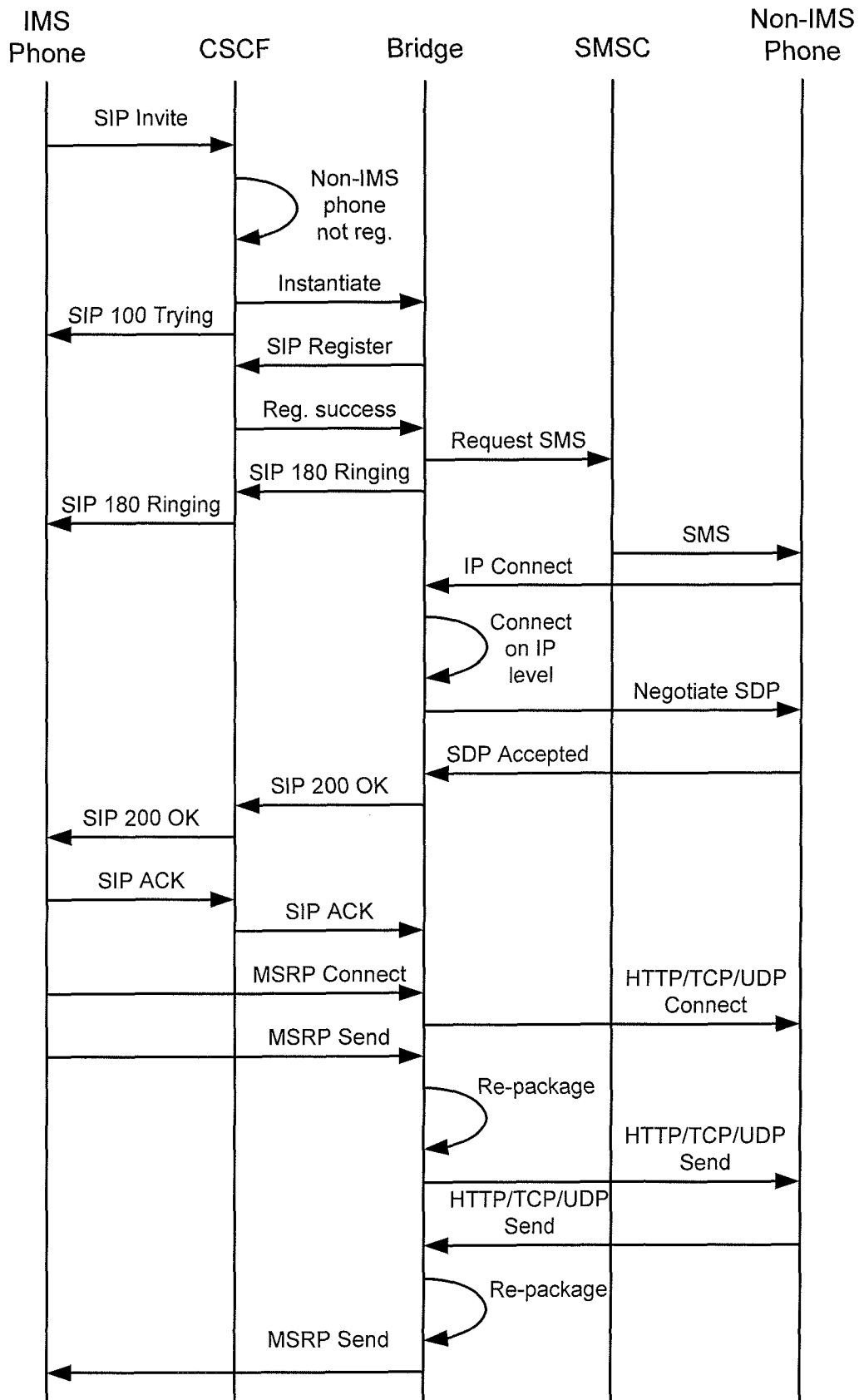


FIG. 4

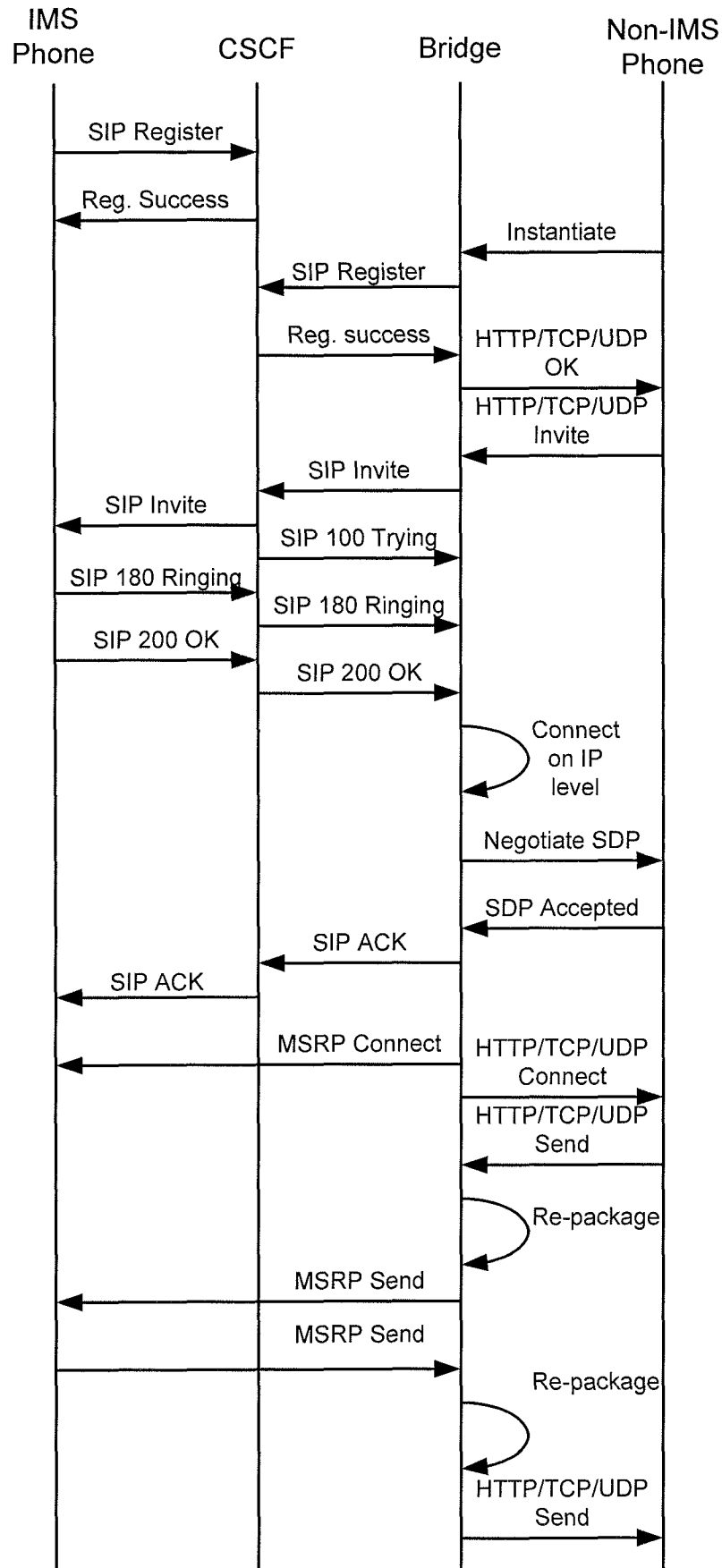


FIG. 5

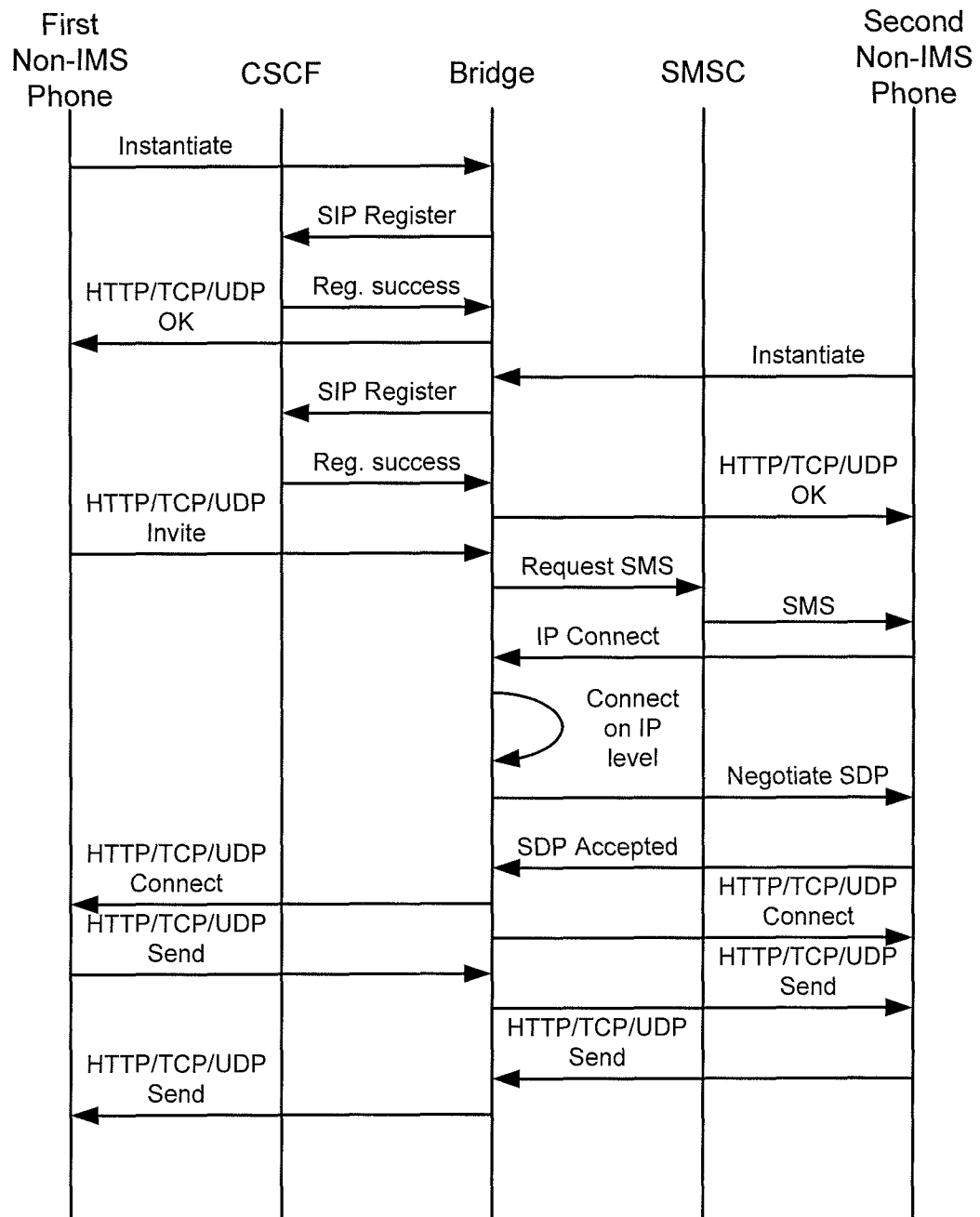


FIG. 6

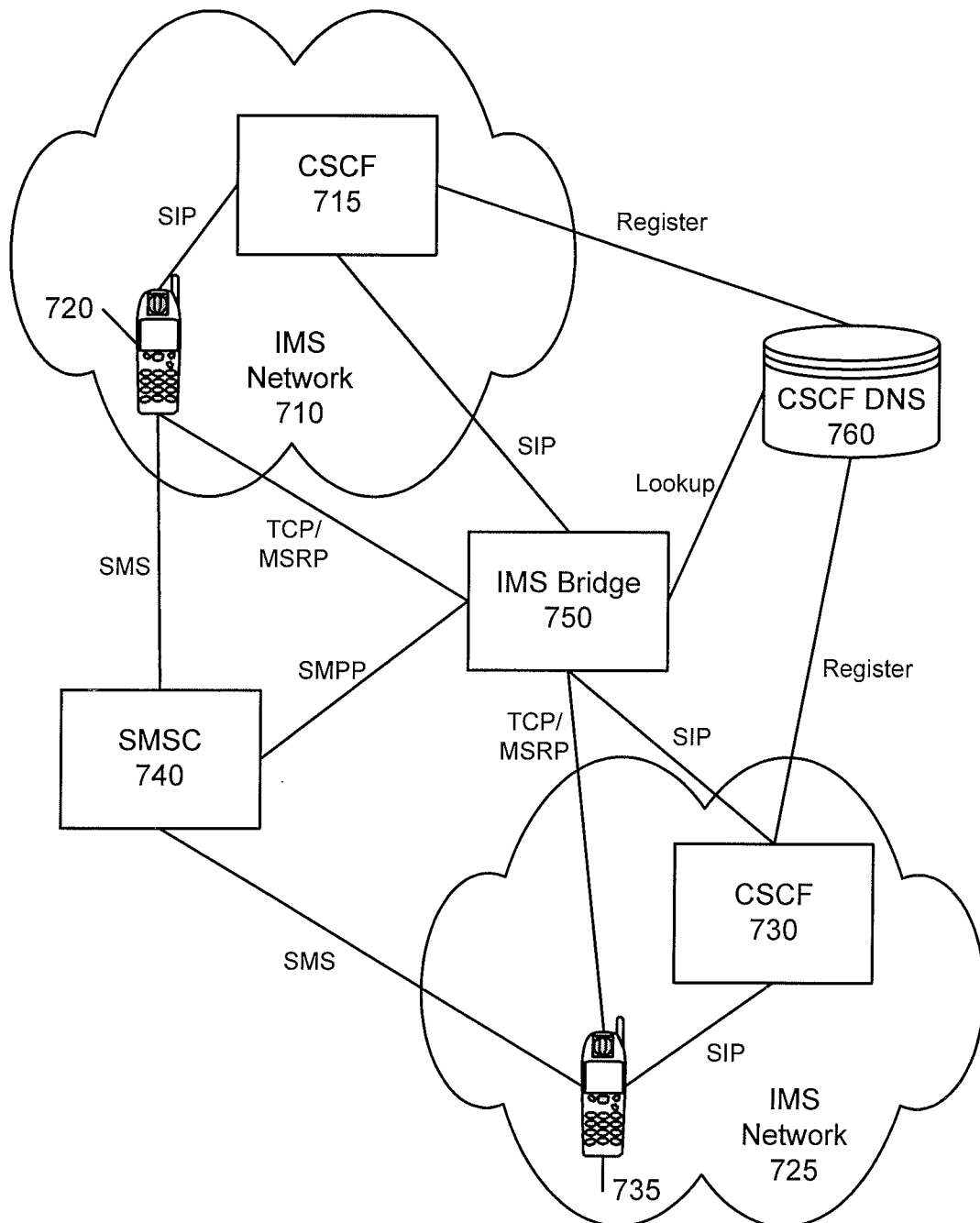


FIG. 7

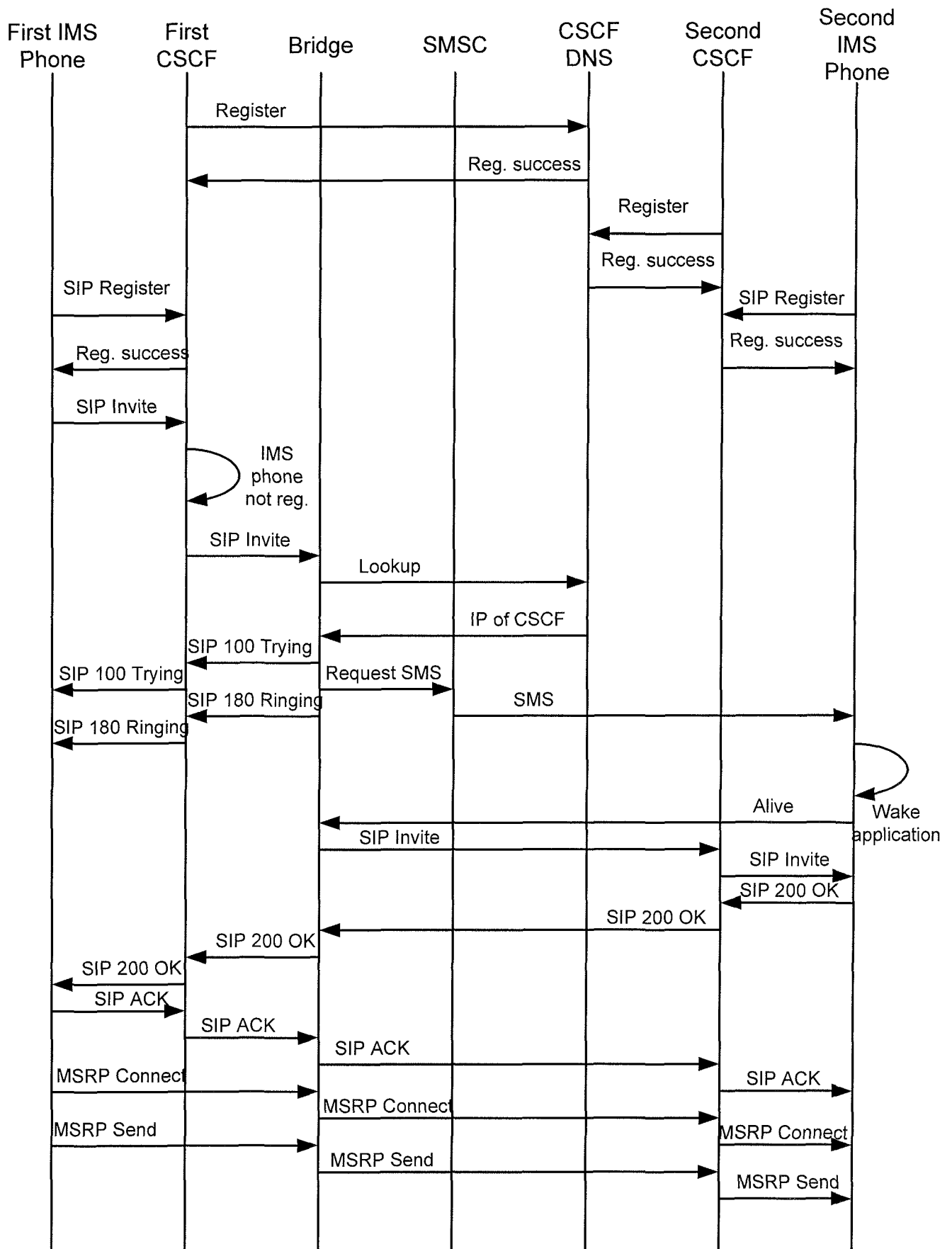


FIG. 8

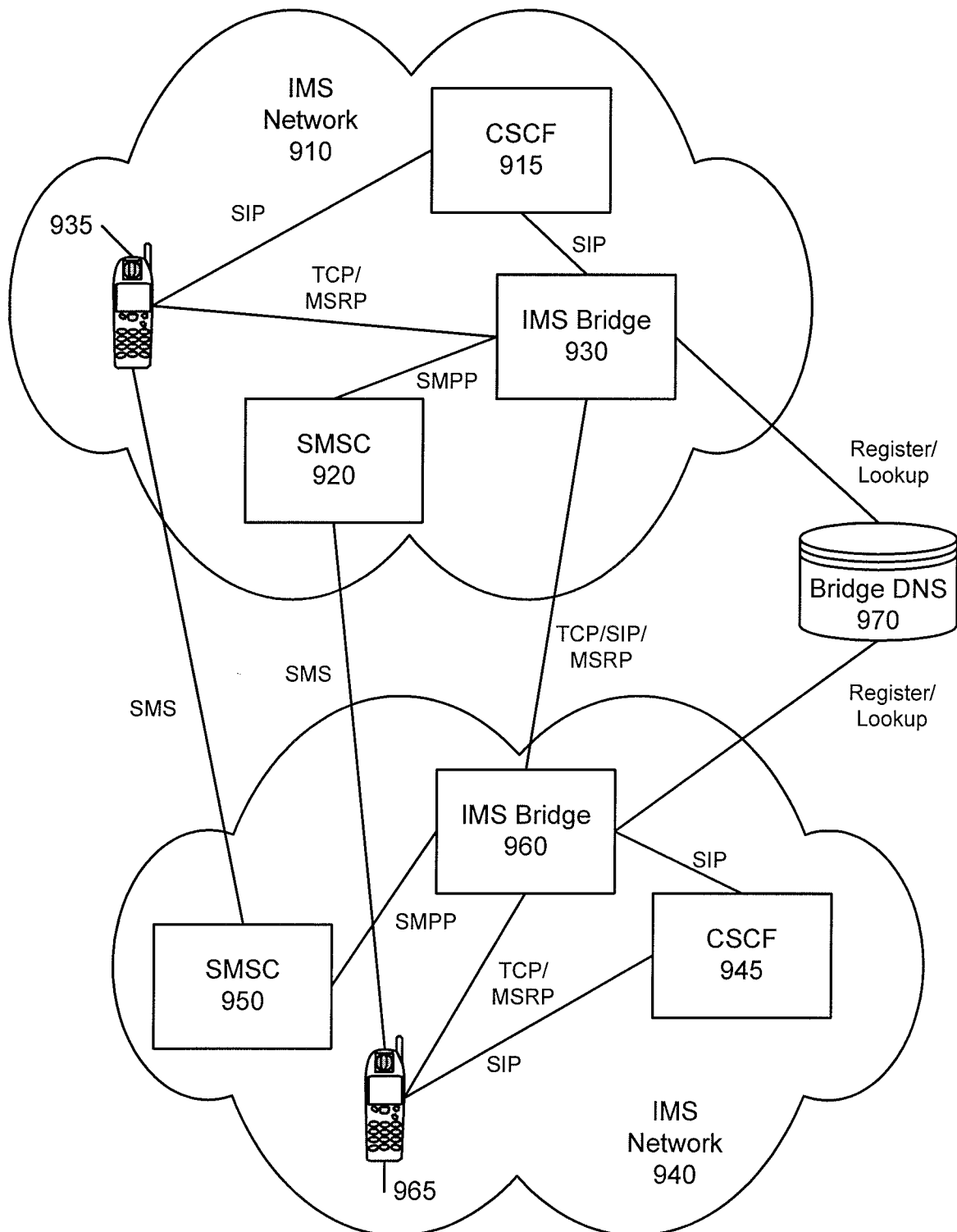


FIG. 9

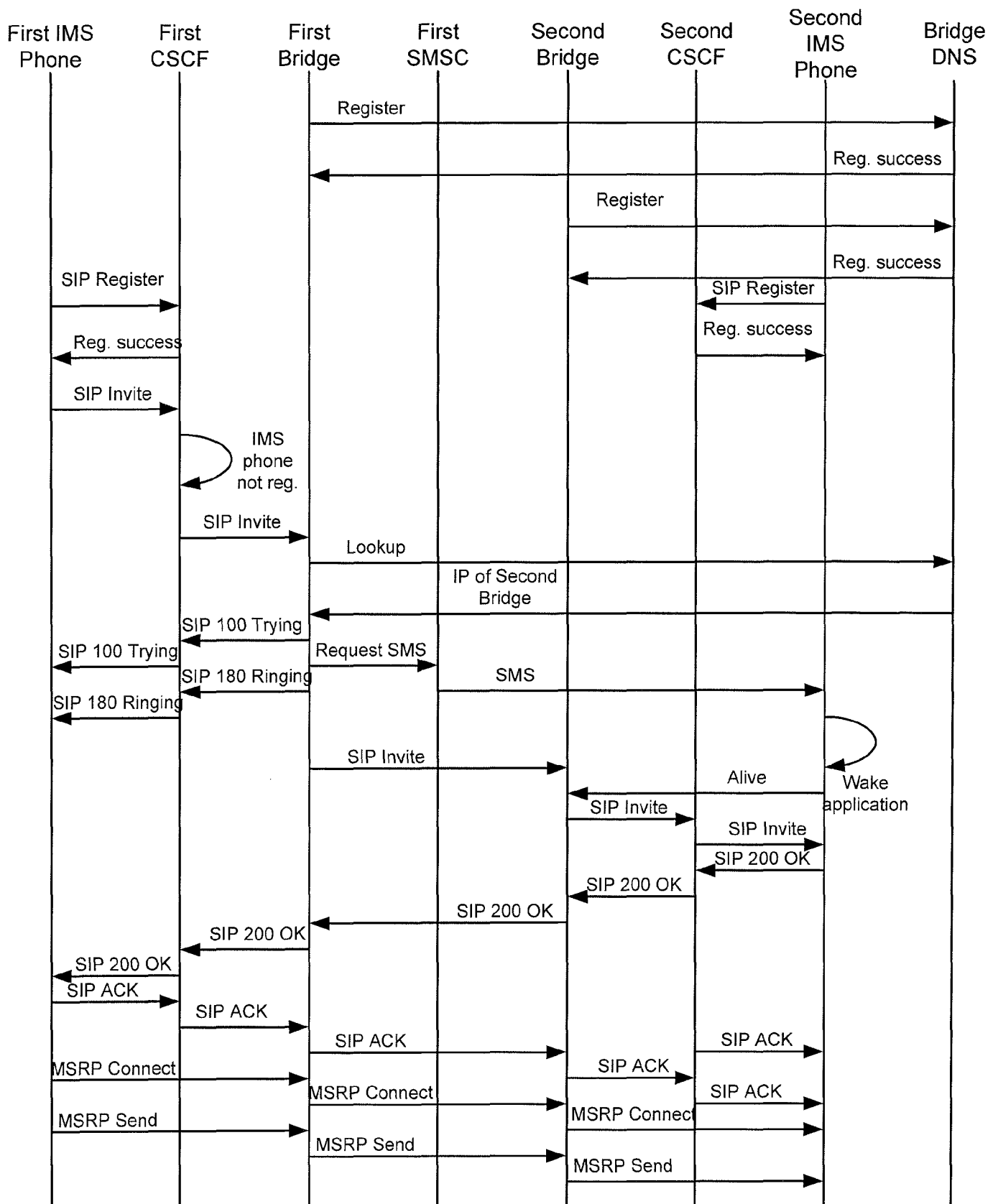


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2008/057227

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04L29/06 H04L29/12

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)

H04L H04W

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 770 949 A (HUAWEI TECH CO LTD [CN]) 4 April 2007 (2007-04-04) abstract paragraph [0032] - paragraph [0088] figures 1-3,6,7	1,2, 5-17, 26-30, 32,33
Y		3,4
Y	US 2007/004391 A1 (MAFFEIS SILVANO [CH]) 4 January 2007 (2007-01-04) abstract paragraph [0018] - paragraph [0039] paragraph [0046] - paragraph [0052] figures 1-3 ----- -/--	3,4,20, 21,35,38



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

17 April 2009

Date of mailing of the international search report

23/04/2009

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Authorized officer

Manthey, Axel

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2008/057227

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002/110104 A1 (SURDILA SORIN [CA] ET AL) 15 August 2002 (2002-08-15) abstract paragraph [0017] - paragraph [0035] figures 1-3	1-17, 26-30, 32,33
X	WO 2007/120875 A (TEKELEC US [US]; BANTUKUL APINIX [US]) 25 October 2007 (2007-10-25) abstract page 5, line 18 - page 16, line 3 figures 1-8	18,19, 22-25,31
Y		20,21
X	WO 2005/094022 A (TELIASONERA FINLAND OYJ [FI]; KORHONEN JOUNI [FI]; JALKANEN TERO [FI];) 6 October 2005 (2005-10-06) abstract page 1, line 24 - page 6, line 23 figure 1	34,36, 37,39
Y		35,38
X	US 2004/148416 A1 (AARNOS JRYKI [FI] ET AL) 29 July 2004 (2004-07-29) abstract paragraph [0019] - paragraph [0051] figures 1-5	34,36, 37,39

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2008/057227

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search reportcovers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1 - 17, 26 - 30, 32, 33

A method, a computer program product and devices to establish a session involving the sending of an SMS.

2. claims: 18 - 25, 31

A method and a computer program product for connecting two non-IMS devices using an IMS Network.

3. claims: 34 - 39

A method and a computer program product for registering an entity with a Domain Name Service (DNS).

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2008/057227

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1770949	A	04-04-2007	WO 2007036123 A1	05-04-2007
			CN 1941933 A	04-04-2007
			CN 101160881 A	09-04-2008
			US 2007086581 A1	19-04-2007
US 2007004391	A1	04-01-2007	NONE	
US 2002110104	A1	15-08-2002	NONE	
WO 2007120875	A	25-10-2007	EP 2011346 A2	07-01-2009
			EP 2011347 A2	07-01-2009
			US 2007282911 A1	06-12-2007
			WO 2007120876 A2	25-10-2007
WO 2005094022	A	06-10-2005	AT 408949 T	15-10-2008
			DK 1728370 T3	05-01-2009
			EP 1728370 A1	06-12-2006
			ES 2314637 T3	16-03-2009
			FI 116444 B1	15-11-2005
			US 2008021980 A1	24-01-2008
US 2004148416	A1	29-07-2004	NONE	