(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
14 May 2009 (14.05.2009)

PCT

(10) International Publication Number
WO 2009/059644 A1

(51) International Patent Classification:
H04L 12/64 (2006.01) *H04L 29/08* (2006.01)

(21) International Application Number:
PCT/EP2007/062121

(22) International Filing Date:
9 November 2007 (09.11.2007)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *with information concerning one or more priority claims considered void*

(54) **Title:** SETTING UP CONNECTIONS IN A COMMUNICATION SYSTEM

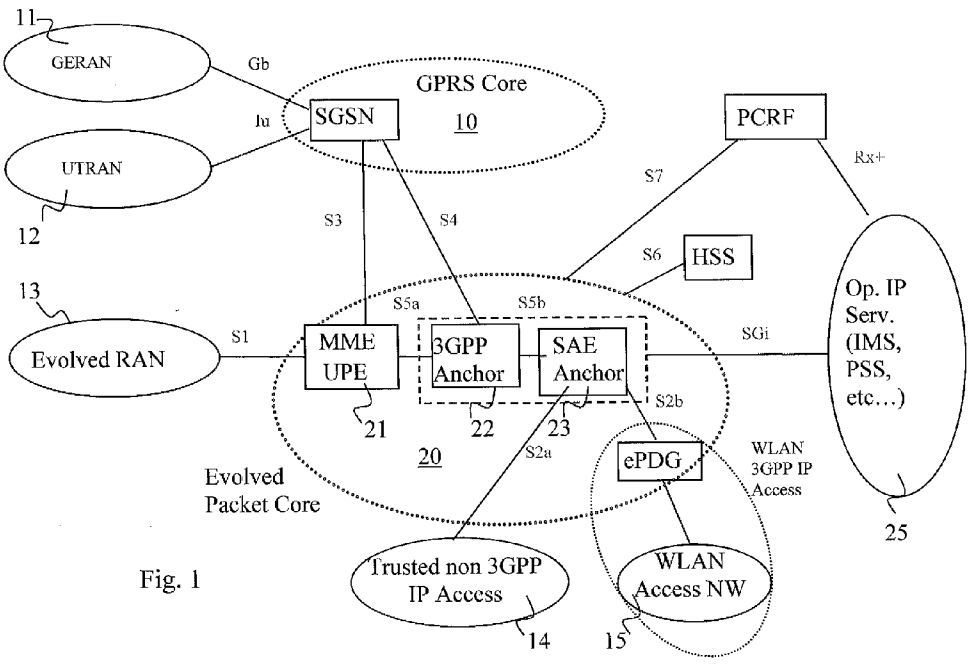

Fig. 1

(57) **Abstract:** There is provided a method and appropriate apparatus for setting up a communications connection for a service provided through a service providing system. In an embodiment information regarding the service is included in a message associated with the service. The message is sent to an access system capable of serving at least one user communication device. Information regarding the service is obtained from the message, and a communications connection can then be set up based on said information.

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SETTING UP CONNECTIONS IN A COMMUNICATION SYSTEM

BACKGROUND

Field of the Invention:

The present invention relates to a communication system, and in particular to connection setup for providing a service for a communication device in a communication system comprising at least one access system and a service providing system.

Description of related art:

A communication device can be understood as a device provided with appropriate communication and control capabilities for enabling use thereof for communication with others parties. The communication may comprise, for example, communication of voice, electronic mail (email), text messages, data, multimedia and so on. A communication device typically enables a user thereof to receive and transmit communication via a communication system. A communication device can thus be used for accessing various service applications.

A communication system is a facility which facilitates communication between two or more entities such as communication devices, network entities and other nodes. A communication system may be provided by one more interconnect networks. One or more gateway nodes may be provided for interconnecting various networks of the system. For example, a gateway node is typically provided between an access network and other communication networks, for example a core network and/or a data network.

An appropriate access system allows the communication device to access to the wider communication system. An access to the communication system may

be provided by means of a fixed line or wireless communication interface, or a combination of these. Communication systems providing wireless access typically enable at least some mobility for the users thereof, hence the name mobile systems. Examples of mobile systems include wireless communications systems where the access is provided by means of an arrangement of cellular access networks. Other examples of wireless access technologies enabling at least a degree of mobility include different wireless local area networks (WLANs), ad-hoc wireless networks and satellite based communication systems.

A wireless access system typically operates in accordance with a wireless standard and/or with a set of specifications which set out what the various elements of the system are permitted to do and how that should be achieved. For example, the standard or specification may define if a user, or more precisely user equipment, is provided with a circuit switched bearer or a packet switched bearer, or both. Communication protocols and/or parameters which should be used for the connection are also typically defined. For example, the manner in which communication should be implemented between the user equipment or another communication device and the elements of the networks and their functions and responsibilities are typically defined by a predefined communication protocol.

In the cellular systems a network entity in the form of a base station provides a node for communication with mobile devices in one or more cells or sectors. It is noted that in certain systems a base station is called 'Node B'. Typically the operation of a base station apparatus and other apparatus of an access system required for the communication is controlled by a particular control entity. The control entity is typically interconnected with other control entities of the particular communication network. Examples of cellular access systems include Universal Terrestrial Radio Access Networks (UTRAN) and GSM (Global System for Mobile) EDGE (Enhanced Data for GSM Evolution) Radio Access Networks (GERAN).

A non-limiting example of another type of access architectures is a concept known as the Evolved Universal Terrestrial Radio Access (E-UTRA). An Evolved Universal Terrestrial Radio Access Network (E-UTRAN) consists of E-UTRAN Node Bs (eNBs) which are configured to provide base station and control functionalities of the radio access network. The eNBs may provide E-UTRA features such as user plane radio link control/medium access control/physical layer protocol (RLC/MAC/PHY) and control plane radio resource control (RRC) protocol terminations towards the mobile devices.

In system providing packet switched connections the access networks are connected to a packet switched core network via appropriate gateways. For example, the eNBs are connected to a packet data core network via an E-UTRAN access gateway (aGW).

The current the access system are not necessarily aware of the traffic carried there through. Instead, any intelligence is provided in a packet data system, or as it may widely be understood in a service providing system. This may be problematic since, for example, during connection set-up phase, there is no mechanism for providing specific information regarding a service, for example the type of a requested service. In addition, the content of service information associated with a requested service may not yet be available. In Internet Protocol (IP) focused architectures the use of the currently used service type information of a typical mobile communication system cannot be provided to the access systems. However, this information might be useful in certain occasions.

SUMMARY

In accordance with an embodiment there is provided a method and appropriate apparatus for setting up a communications connection for a service provided through a service providing system. In the embodiment information regarding the service is included in a message associated with the service. The message is sent to an access system capable of serving at least one user

communication device. Information regarding the service is obtained from the message, and a communications connection can then be set up based on said information.

In accordance with an embodiment, there is provided a method in an access system for providing communication connections for a service provided through a service system. The method comprises receiving a message providing access for at least one communication device, the message associating with the service, obtaining information regarding the service from the message at the access system, and setting up a connection based on said information.

In accordance with an embodiment, there is provided an apparatus for an access system, the apparatus comprising an interface configured to receive a message associated with a service provided through a service system, and a controller configured to obtain information regarding the service from the message and to set up a connection based on said information.

In accordance with another embodiment, there is provided a communication system comprising a service system for providing services to users, at least one access system providing access for at least one communication device, the access system being configured to receive messages associated with the services provided through the service system, to obtain information regarding a service from a message associated with a particular service and to set up a connection for the use of the particular service based on said information.

An embodiment provides a computer program comprising program code means adapted to perform a method in accordance with the present invention.

In accordance with a more specific embodiment an entity in the access system is configured to select an access technology for the connection based on said information. The entity in the access system may be configured to redirect a service connection based on said information regarding the service. The

processor may be for a communication device or an access system of a mobile communication system.

An access technology for the connection may be selected based on said information. For example, a radio access technology that is based on one of a Global System for Mobile (GSM), Universal Mobile Telecommunication System (UMTS) and long-term evolution (LTE) may be selected.

At least one characteristic of the service may be determined by an entity in the radio access system based on the message,

A message including service information may be responded by rejecting a requested connection, the requested connection being provided by a first communication link. The requested connection may then be redirected to a second communication link based on the information regarding the service.

The message may comprise one of a service request message, a connection request message and a paging message. A mobile communication device may include into a connection request message said information regarding the service. A network element may include into a paging request message said information regarding the service.

BRIEF DESCRIPTIONS OF THE DRAWINGS

For a better understanding of various examples of the present invention and how the same may be carried into effect, reference will now be made by way of example only to the accompanying drawings in which:

Figure 1 shows a schematic presentation of a communication architecture wherein the invention may be embodied;

Figure 2 shows a partially sectioned view of a mobile device; and

Figures 3 and 4 show signalling flow charts in accordance with two specific embodiments.

DESCRIPTION OF EXEMPLIFYING EMBODIMENTS

In following certain non-limiting specific embodiments are explained with reference to standards such as Global System for Mobile (GSM) Phase 2, Code Division Multiple Access (CDMA) Universal Mobile Telecommunication System (UMTS) and long-term evolution (LTE). These and other standards may be used to provide a concept known as a system architecture evolution (SAE) architecture. An overall schematic presentation of the system architecture evolution (SAE) architecture is shown in Figure 1.

More particularly, Figure 1 shows an example of how second generation (2G) access networks, third generation (3G) access networks and future access networks, for example as long-term evolution (LTE) access networks can be attached to a single data anchor. In the example the anchor is provided by an anchor devised in accordance with the standard set by the third generation partnership project (3GPP). The 3GPP anchor is used to provide an anchoring node for user data originating from networks 3GPP and non-3GPP networks. This enables adaptation of the herein described mechanism not only for all 3GPP network access but also for non-3GPP networks.

In Figure 1 two different types of radio access networks 11 and 12 are connected to a general packet radio service (GPRS) core network 10. The access network 11 is provided by a GSM (Global System for Mobile) EDGE (Enhanced Data for GSM Evolution) Radio Access Networks (GERAN) system and the access network 12 is provided by a UMTS terrestrial radio access (UTRAN) system. The core network 10 is further connected to a packet data system 20.

An evolved radio access system 13 is also shown to be connected to the packet data system 20. Access system 13 may be provided, for example, based on architecture that is known from the E-UTRA and based on use of the E-UTRAN Node Bs (eNodeBs or eNBs).

Access system 11, 12 and 13 may be connected to a mobile management entity 21 of the packet data system 20. These systems may also be connected to a 3GPP anchor node 22 which connects them further to another anchor node, designated as a SAE anchor 23 in Figure 1.

Figure 1 shows further two access systems, that is a trusted non-3GPP IP (internet protocol) access system 14 and a wireless local areas network (WLAN) access system 15. The access systems 14 and 15 are connected directly to the SAE anchor 23.

In Figure 1 the service providers are connected to a service provider network system 25 connected to the anchor node system. The services may be provided in various manners, for example based on IP multimedia subsystem (IMS) and so forth. These do not form a part of the invention, and therefore are not explained in any detail other than that different service applications may set different requirements for the connection provided to the communication devices.

Figure 2 shows a schematic partially sectioned view of a possible user communication device. More particularly, a mobile device 1 is shown that can be used for accessing a communication system via a wireless interface provided via at least one of the access systems of Figure 1. The mobile device of Figure 2 can be used for various tasks such as making and receiving phone calls, for receiving and sending data from and to a data network and for experiencing, for example, multimedia or other content. An appropriate mobile device may be provided by any device capable of at least sending or receiving radio signals. Non-limiting examples include a mobile station (MS), a portable computer provided with a wireless interface card or other wireless interface facility, personal data assistant (PDA) provided with wireless communication capabilities, or any combinations of these or the like. The mobile device may communicate via an appropriate radio interface arrangement of the mobile device. The interface arrangement may be provided for example by means of a

radio part 7 and associated antenna arrangement. The antenna arrangement may be arranged internally or externally to the mobile device.

A mobile device is typically provided with at least one data processing entity 3 and at least one memory 4 for use in tasks it is designed to perform. The data processing and storage entities can be provided on an appropriate circuit board and/or in chipsets. This feature is denoted by reference 6.

A user may control the operation of the mobile device by means of a suitable user interface such as key pad 2, voice commands, touch sensitive screen or pad, combinations thereof or the like. A display 5, a speaker and a microphone are also typically provided. Furthermore, a mobile device may comprise appropriate connectors (either wired or wireless) to other devices and/or for connecting external accessories, for example hands-free equipment, thereto.

The mobile device 1 may be enabled to communicate with a number of access nodes, for example when it is located in the coverage areas of the two access system stations 11 and 12 of Figure 1. This capability is illustrated in Figure 2 by the two wireless interfaces.

In an embodiment a mechanism is provided for sending information regarding a service to a radio access system during a call connection setup. The call may be setup for a mobile terminated call (MTC) or a mobile originated call (MOC). In accordance with a more specific embodiment an entity at a core network (CN) includes a service indicator or another service information element in a message requesting for paging of a particular mobile communication device. This paging requesting message may then be sent from the core network to a radio access network. In the access network the message may be received by any appropriate access network element and/or a user communication device. For example, the message may be sent to a radio network controller (RNC), base station controller (BSC) or eNodeB of a long term evolution (LTE) access network or to a controller of an Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access network when an attempt is made for a call. In

some embodiments the message is sent to the user communication device located in the access system rather than an element of the access system itself.

The access system may then obtain the service information from the message. The information can be obtained by the element of the access system or a communication device located in the access system. The access system may utilise the information in various manners. For example, the access system may redirect mobile terminated calls (MTC) to a specific target system/frequency carrier according to the service requested by the MTC call. This may allow the network to offer an integral solution for service redirection during connection setup, for example for a mobile originated call (MOC) and mobile terminated call (MTC).

According to a possibility the access system uses the service information in connection set-up for selection of an appropriate radio access technology, for example for selection of one of Global System for Mobile (GSM), Universal Mobile Telecommunication System (UMTS) and long-term evolution (LTE) technologies.

In accordance with an embodiment service information included in a message is used by an access system in service redirection. Service direction may be needed in mobile systems in order to redirect a terminal, for example a mobile device such as user equipment (UE), to a target system or carrier frequency. The purpose of this redirection is efficient usage of network capacity and to improve or keep the quality of the call in acceptable levels. For example, a voice call in a UMTS system may be redirected to a GSM system so enough that UMTS load is available for other connections demanding more resources for the network. Another example is redirection of video streaming in a general packet radio service (GPRS) to the UMTS in order to provide better user experience.

Service redirection may also be provided in a dedicated mode. It is noted, though, that redirection in the dedicated mode typically requires handovers and may also require inter-RAT and inter-frequency measurements. These may have an impact on the power consumption at the communication device and downlink (DL) power consumption and/or extra procedures in the network side. Because of this it might be preferred in certain circumstances to provide a simpler mechanism for redirection of calls during connection setup, in particular before resources are allocated to the connection. To enable this, the communication device may need to provide information regarding the service during a mobile originated call (MOC). Similarly, the network may need to provide such information during a mobile terminated call (MTC).

No appropriate mechanism is currently available for providing appropriate service information during connection setup. In addition, the content of service information associated with the requested service may not be available either in the present systems. In IP focused architectures this may mean that any of the currently used service type information of the typical mobile communication systems cannot be included in a service message. For example, although third generation partnership project (3GPP) standard release 6 proposes that paging request from a serving gateway support node (SGSN) to radio network controller / base station controller (RNC/BSC) can include a quality of service (QoS) field, this covers only some traffic classes. For example, only classes such as originating/terminating streaming class, originating/terminating conversational class and so on may be indicated.

In below various examples for a mechanism capable of providing a service indication in the SAE architecture example of Figure 1 are described. An appropriate service indication can be provided in a service request sent from the packet data network to the radio access network and/or a communication device referred to as user equipment (UE). This mechanism allows service based redirection during connection setup in IP based systems.

In accordance with an embodiment a mechanism is provided for the delivery of a service information type by a user communication device and/or a core network (CN) to an element of a radio access network. The user device and/or an appropriate entity of the core network can include a service type information in an appropriate message during the connection setup.

In accordance with an embodiment the service information is communicated from the core network to the user communication device in an access system. In this embodiment the information is received in the access system when the communication receives it. The communication device can then control the set up of an appropriate connection based on this information. According to a possibility the communication devices forward the service information to an appropriate element of the access network.

A protocol that can be used for signalling is the session initiation protocol (SIP). The packet data network may thus base its signalling on the session initiation protocol (SIP) signalling. The SIP messaging can be handled in Internet Protocol Multimedia subsystem (IMS). This enables optimisation of the service information content by taking into account the SIP control information. It is noted, however, that similar principles can be applied for any other session protocol.

A mobile device or user equipment (UE) can include for mobile originated calls the service type information in a field inside the connection request message that is then delivered to network. In network originated, or mobile terminated, calls a paging request message delivered to the radio network can include a service type information. This information can be obtained based on the session signalling (e.g. SIP) send from the packet data network. The network element on charge of reading the session signalling can be the SAE anchor, a 3GPP anchor or any other appropriate anchor in a packet data network. If the paging is to be sent to a LTE system, then the service information can be sent from the SAE anchor to a user plane entity (UPE) wherefrom the paging request may then be sent to the eNodeB of the LTE system. If the paging is to

be sent to 2G/3G based access systems the service information can be sent from the SAE anchor to 2G/3G serving gateway support node (SGSN) which forwards it to the RNC/BSC of the access system. The service type information delivered to eNodeB or RNC/BSC can also be sent to a communication device via a paging request message in the air interface so that the communication device can include this information in a connection request radio resource control (RRC) message.

In accordance with an embodiment the service type information can include information sent in an SIP INVITE message. This can be based on use of a particular field of an INVITE message. For example, it is possible to use SIP INVITE field called Session Description Protocol (SDP) for providing information of the media type being requested, as described in RFC 2327. In this regard it is noted that there already exist products that utilize the SDP signalling for different purposes. A typical example of these is the session border controllers.

For example, the following information can be included in the SDP field as part of the service type information: Type of media: video, audio and so on; Bandwidth; Transport protocol: RTP/UDP/IP. H.320 and so on; format of the media: e.g. H.261 video/MPEG video and so on. It is noted that any other field included in SDP or any modified SIP version specifically made for SIP over SAE system may also be used. For example, information may be provided regarding the requirement to receive the media such as information about the appropriate addresses, ports, formats and so on.

In accordance with an embodiment service based redirection is provided during connection setup in a SAE system such that a radio access network can utilise the service information described above in redirection of calls to a specific target system/frequency carrier. For example, a user equipment (UE) camping on a LTE can be redirected to a 3G system when a MTC call request for a video streaming of 256kbps is being requested. If the video streaming is for 70kbps, the user equipment can be redirected to 2G (EDGE). Also, a user

equipment camping on a LTE and requesting a conversational call (Voice over IMS; VoIMS) can be redirected to a 2G network during connection setup. It is possible for eNodeB to find if a VoIMS is being requested by means of the SDP fields mentioned above.

It is noted that the above examples are also applicable for redirection in applications other that simply from a LTE system to 2G or 3G system. For example, these can be applied to redirection from a 2G to 3G system or a LTE system and so on. Although some changes in the radio access network and user equipment may be needed, these are within the capabilities of the skilled person. Also, the solution is described with reference to SIP but it can be extended to other protocols providing those protocols also include some details of the desired media in the initial request.

In the following an example is given with reference to Figure 3 of an end-to-end procedure for providing a radio access with service information. In the example a mobile terminated call is requested from an IMS. The IMS can be employed to provide multimedia services for users, for example voice and data services. However, it is noted that the solution is not limited to IMS. It can also be applicable to any service enabler element connected via SIP or other signalling protocol to the core network (CN).

More particularly, a service enabler such as the IMS or similar element, connected to the core network via SIP or another signalling protocol requests a mobile terminated call to a communication device under the coverage of the core network. The core network receives the request. If SIP protocol is used, the INVITE message is delivered to the core network. The core network checks the details of the INVITE message. Based on the field content of this message, the core network can detect the kind of service being requested. The core network may then include this information in the paging message delivered to the radio access controller (RNC/BSC or eNodeB). An example of a part of the signalling is shown in Figure 3.

The following signalling steps may make use of legacy procedures. For example, the radio access controller can forward the paging message to a communication device. This paging message does not necessarily include the service information, i.e., the paging from the radio access to the communication device can be the same as in normal legacy procedures. The communication device may then answer with a RRC Connection setup message.

The radio access system may then respond with a connection reject message to redirect the communication device (UE) to the target network according to the service being requested. The rules about which target system the communication device will be redirected can be operator configurable and may be triggered always or only in response to a predefined condition, for example due to load reasons etc. The communication device may then enter to the target system and send a paging response message informing the target system about the new route to deliver the data. The target the core network may contact the source the core network to inform that the communication device is reachable through the target network. An alternative for the paging response is a "service request message".

The MTC call may then proceed in the target network and data transferred between the communicating entities.

Another example is shown in Figure 4 with reference to the E-UTRAN architecture where support for different kinds of services is provided. For example, the system may support real-time video and/or push services while at the same time provide signalling optimisation in signalling layers 2 and/or 3. As above, the network may be provided with information of the type of the service being requested to enable a service based redirection during connection setup. The communication device (UE) may be configured to be capable of reporting the service requested, for example in the "establishment cause" field of a RRC connection request message. For MTC call attempts, it is required that an access gateway (aGW) includes when possible the service type information on the paging request sent to eNodeB, as shown in Figure 4.

More particularly, Figure 4 shows handling of a paging request from aGW including service information. The aGW includes the service type information into the paging request message. In certain applications the eNodeB may need to send the service type information to the communication device (UE), which on return may then include this information in the connection request message. The association between a paging request and a subsequent connection request sent by the communication device may also be made otherwise.

In addition, the service type information delivered by the UE/aGW to the eNodeB includes, in addition to the traffic class or media being requested (e.g. conversational call, streaming call), also other relevant indication such as the bandwidth required. The IMS/SIP may be a default multimedia service deliverer, ands thus the service type information element can be optimised for IMS. The detailed information of the service type will support eNodeB to decide the most suitable target system\frequency for the redirected terminal.

The required data processing functions may be provided by means of one or more data processors. All data processing may be provided in a processing unit provided in an access system, or distributed across several data processing modules. The above described data processing functions of a mobile device and/or the data network and/or the core network may also be provided by separate processors or by an integrated processor. An appropriately adapted computer program code product or products may be used for implementing the embodiments, when loaded on an appropriate processor, for example in a processor of the mobile device and/or an access system controller. The program code means may, for example, perform the generation and/interpretation of the service information and control set-up of communications connections based on the information. The program code product for providing the operation may be stored on and provided by means of a carrier medium such as a carrier disc, card or tape. A possibility is to download the program code product to the mobile device via a data network.

The embodiments may assist the network to offer a integral solution for service redirection during connection setup. Service redirection during connection setup may be preferred by the networks operators to avoid handover process and inter-RAT measurements which may not be efficient in terms of signalling load and power consumption. Service redirection during connection setup may save network resources, i.e., a dedicated bearer is not provided to the new connection in the source target. For service redirection in a dedicated mode, network may need to provide detailed information of the target cell. This means that the network needs to command a communication device to do inter-rat measurements first in order to know the best target cell. Alternatively network applies blind handovers to a visited cell. However, for service redirection during connection setup, network does not need to provide detailed information of the target cell, i.e.., network can just tell the communication device to which carrier frequency or system (GSM, 3G) the communication device should move. If used together with load control mechanism, the service redirection during connection setup can be used to add more intelligent decision for handling congestion.

It is noted that whilst embodiments have been described in relation to mobile communication devices such as mobile user equipment / terminals, embodiments of the present invention are applicable to any other suitable type of apparatus suitable for communication via access systems. A mobile device may be configured to enable use of different access technologies, for example, based on an appropriate multi-radio implementation.

It is also noted that although certain embodiments were described above by way of example with reference to the exemplifying architectures of certain mobile networks and a wireless local area network, embodiments may be applied to any other suitable forms of communication systems than those illustrated and described herein. It is also noted that the term access system is understood to refer to any access system configured for enabling wireless communication for user accessing applications.

It is also noted herein that while the above describes exemplifying embodiments of the invention, there are several variations and modifications which may be made to the disclosed solution without departing from the scope of the present invention.

Claims

1. A method for providing communication connections for a service provided through a service system, comprising:

receiving a message in an access system providing access for at least one communication device, the message associating with the service;

obtaining information regarding the service from the message at the access system; and

setting up a connection based on said information.

2. A method as claimed in claim 1, comprising selecting an access technology for the connection based on said information.

3. A method as claimed in claim 2, wherein the selecting comprises selecting a radio access technology that is based on one of a Global System for Mobile (GSM), Universal Mobile Telecommunication System (UMTS) and long-term evolution (LTE).

4. A method as claimed in any preceding claim, wherein the setting up of the connection comprises a service redirection by the access system based on said information regarding the service.

5. A method as claimed in any preceding claim, comprising determining at least one characteristic of the service by the radio access system based on the message.

6. A method as claimed in claim 5, wherein the at least one characteristic comprises at least one requirement of the service.

7. A method as claimed in claim 5 or 6, wherein the characteristic comprises at least one of type of media, bandwidth requirement, quality of service requirement, transport protocol, address information, port information, format information, type of the service, and traffic class.

8. A method as claimed in any preceding claim, comprising:

responding the message with a further message rejecting a requested connection, the requested connection being provided by a first communication link; and

redirecting the requested connection to a second communication link based on the information regarding the service.

9. A method as claimed in claim 8, wherein the service redirection comprises redirecting the connection to one of a selected communication system and a frequency carrier.

10. A method as claimed in any preceding claim, wherein the message comprises one of a service request message, a connection request message and a paging message.

11. A method as claimed in any preceding claim, comprising receiving the message from one of a packet data network, a core network and a communication device.

12. A method as claimed in any preceding claim, wherein the message includes a service information field.

13. A method as claimed in any preceding claim, comprising communication of messages in accordance with a session initiation protocol (SIP), wherein the setting up of the connection comprises taking into account session initiation protocol control information.

14. A method as claimed in claim 13, comprising obtaining the information regarding the service from a predefined field of an SIP INVITE message.

15. A method as claimed in any preceding claim, comprising including by a mobile communication device into a connection request message information regarding the service.

16. A method as claimed in any preceding claim, comprising including by a network element into a paging request message information regarding the service.

17. A method as claimed in any preceding claim, comprising communicating at least a part of the information regarding the service on a user plane.

18. A method as claimed in any preceding claim, comprising obtaining the information in one of a user communication device and an access network controller.

19. An apparatus for an access system, the apparatus comprising:

an interface configured to receive a message associated with a service provided through a service system; and

a controller configured to obtain information regarding the service from the message and to set up a connection based on said information.

20. An apparatus as claimed in claim 19, wherein the controller is configured to select an access technology for the connection based on said information.

21. An apparatus as claimed in claim 19 or 20, wherein the controller is configured to redirect a service connection based on said information regarding the service.

22. An apparatus as claimed in any of claims 19 to 21, wherein the controller is configured to determine at least one characteristic of the service based on the message,

23. An apparatus as claimed in any of claims 19 to 22, wherein the controller is configured to reject a requested connection based on the information regarding the service, the requested connection being provided by a first communication link, and to redirect the requested connection to a second communication link based on the information regarding the service.

24. An apparatus as claimed in any of claims 19 to 23, wherein the controller is configured to redirect the connection to one of a selected communication system and a frequency carrier.

25. An apparatus as claimed in any of claims 19 to 24, wherein the controller is configured to obtain the information from at least one of a service request message, a connection request message and a paging message.

26. A communication device comprising the apparatus of any of claims 19 to 25.

27. An access network controller comprising the apparatus of any of claims 19 to 25.

28. A communication system comprising

a service system for providing services to users;

at least one access system providing access for at least one communication device, the access system being configured to receive messages associated with the services provided through the service system, to obtain information regarding a service from a message associated with a particular service, and to set up a connection for the use of the particular service based on said information.

29. A communication system as claimed in claim 28, wherein an entity in the access system is configured to select an access technology for the connection based on said information.

30. A communication system as claimed in claim 28 or 29, wherein an entity in the access system is configured to redirect a service connection based on said information regarding the service.

31. A computer program comprising program code means adapted to perform any of steps of any of claims 1 to 18 when the program is run on a processor.

32. A computer program as claimed in claim 31, wherein the processor is for one of a communication device and an access system of a mobile communication system.

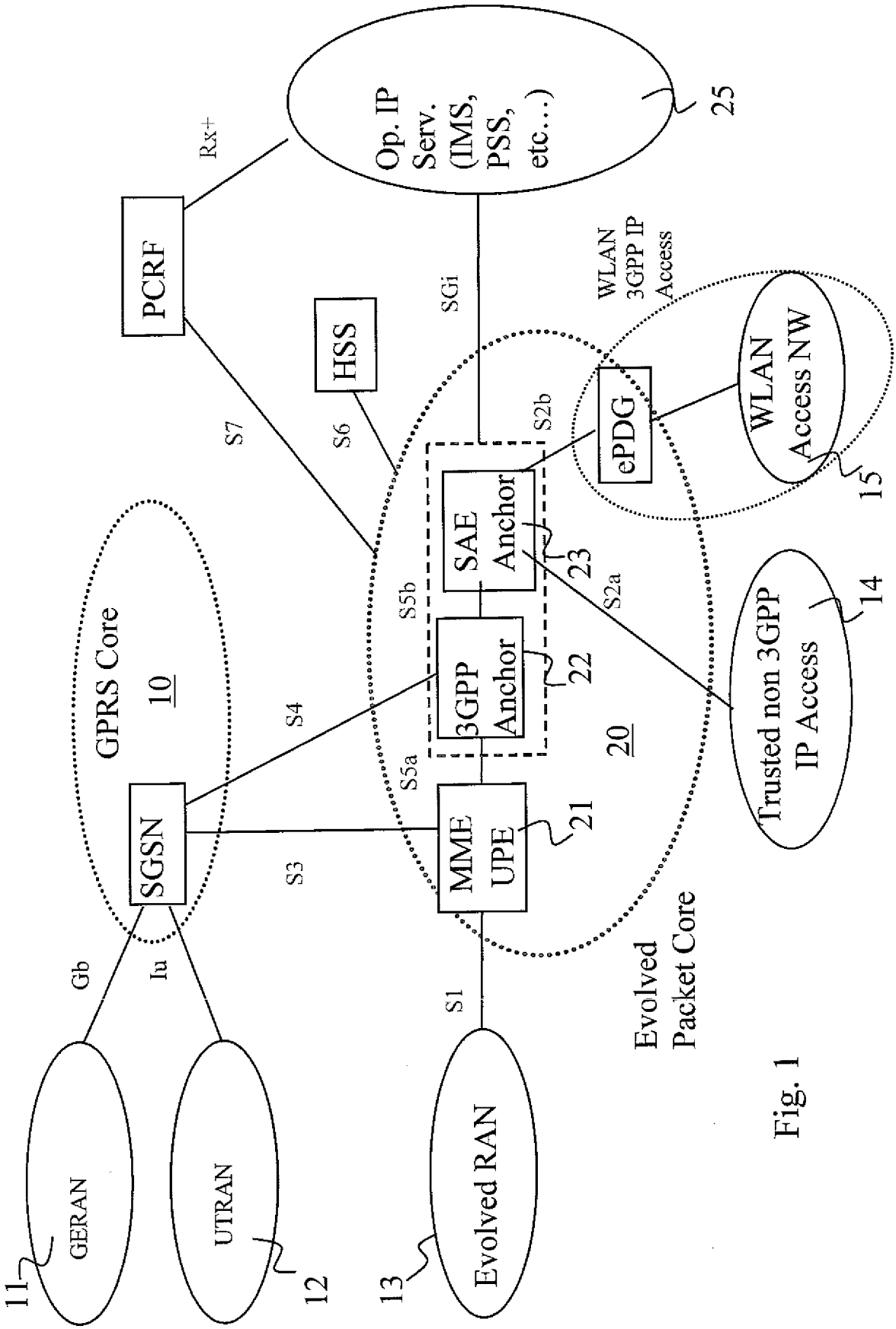
Op. IP Serv. (IMS, PSS, etc...)
25
Rx+
PCRF
HSS
SGi
S7
S6
S2b
WLAN 3GPP IP Access
ePDG
WLAN Access NW
15
SAE Anchor
23
S5b
S2a
3GPP Anchor
22
GPRS Core
10
S4
S5a
20
SGSN
MME UPE
21
S3
Trusted non 3GPP IP Access
14
Gb
Iu
S1
GERAN
UTRAN
Evolved RAN
11
12
13
Evolved Packet Core

Fig. 1

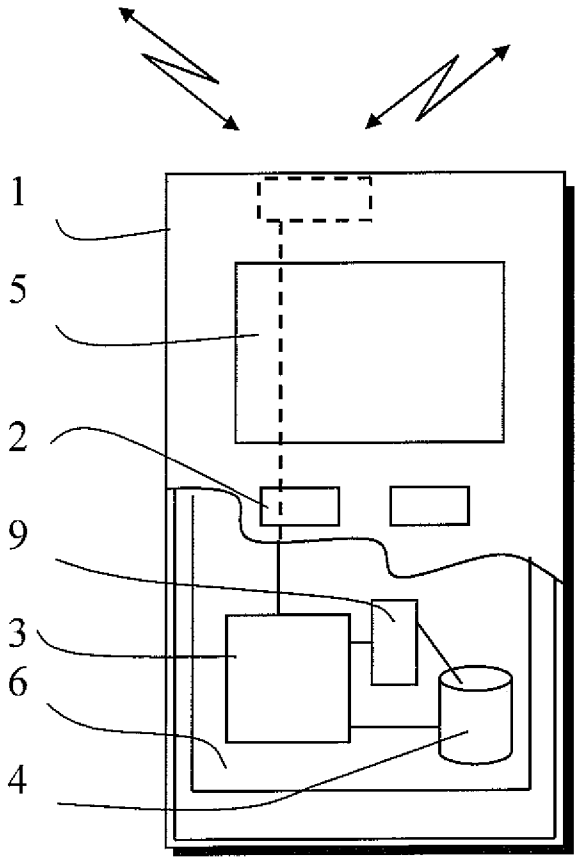

Fig. 2

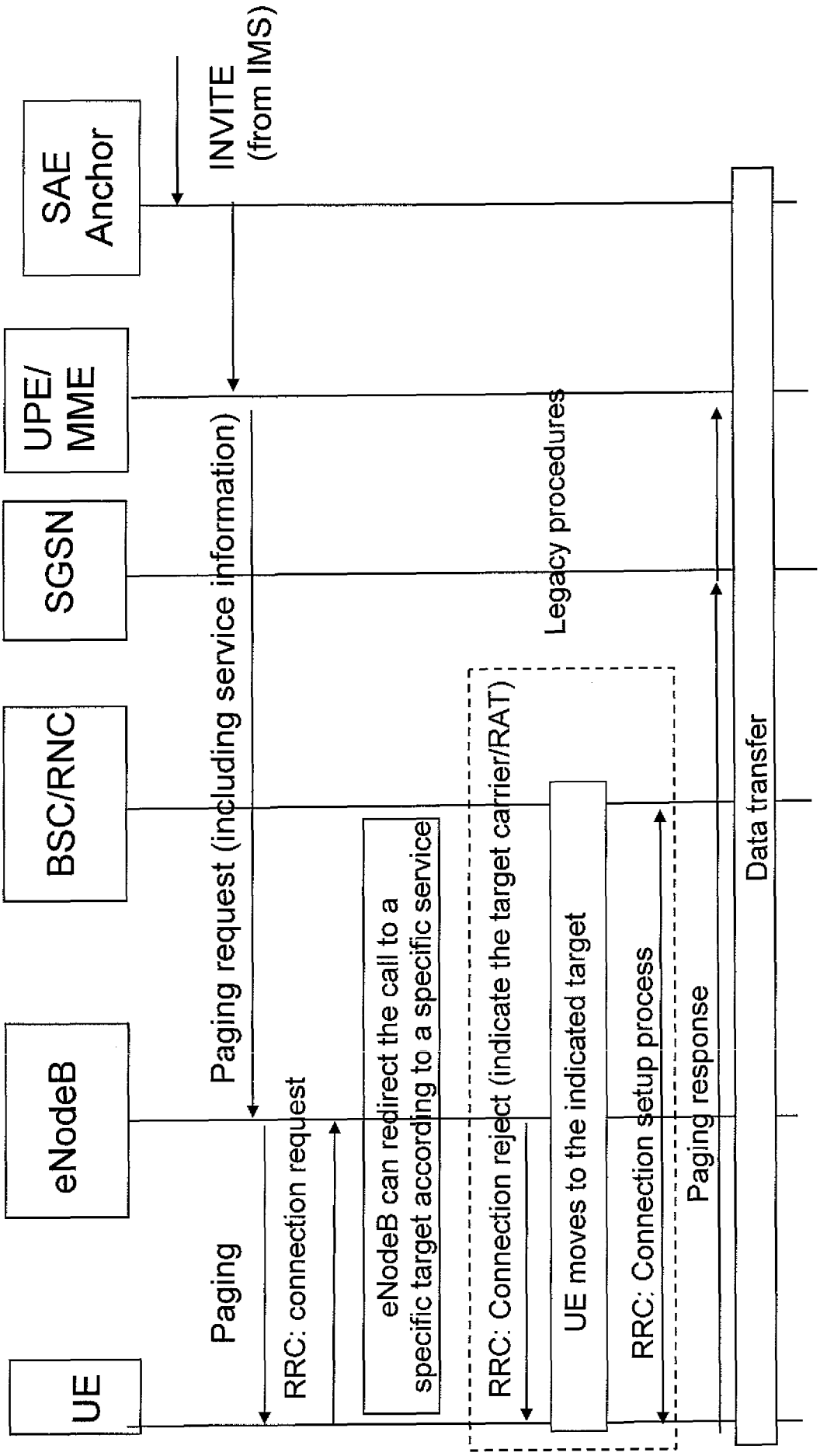
UE
eNodeB
BSC/RNC
SGSN
UPE/ MME
SAE Anchor
INVITE (from IMS)
Paging request (including service information)
Paging
RRC: connection request
eNodeB can redirect the call to a specific target according to a specific service
RRC: Connection reject (indicate the target carrier/RAT)
UE moves to the indicated target
RRC: Connection setup process
Legacy procedures
Paging response
Data transfer

Fig. 3

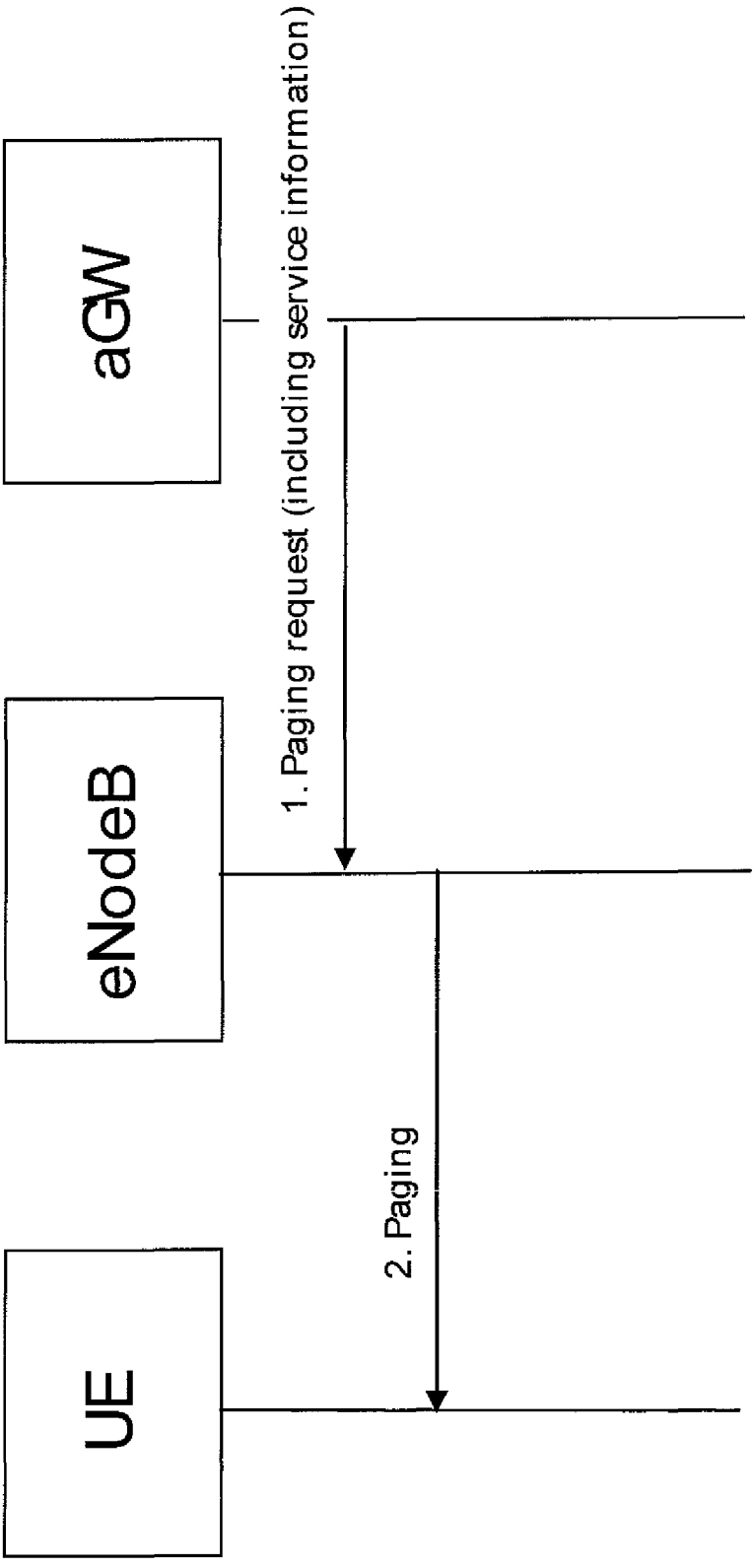
aGW
eNodeB
UE
1. Paging request (including service information)
2. Paging

Fig. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2007/062121

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L12/64 H04L29/08

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

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, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/047399 A1 (LEE SANG-DO [KR] ET AL) 3 March 2005 (2005-03-03) paragraphs [0013] - [0016], [0028], [0029], [0045] - [0051], [0062] - [0066]; figures 1,2	1-32
X	WO 01/01712 A (DOMIRAS OY [FI]; MAEKIPAEAE RISTO [FI]) 4 January 2001 (2001-01-04) page 2, line 24 - page 3, line 20 page 3, line 30 - page 4, line 4 page 4, lines 28-36 page 7, line 1 - page 8, line 4 page 11, line 1 - page 12, line 13	1-32
A	EP 1 347 665 A (SONERA OYJ [FI] TELIASONERA FINLAND OYJ [FI]) 24 September 2003 (2003-09-24) abstract; claim 1; figure 1	1-32

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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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	Date of mailing of the international search report
12 February 2008	21/02/2008

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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