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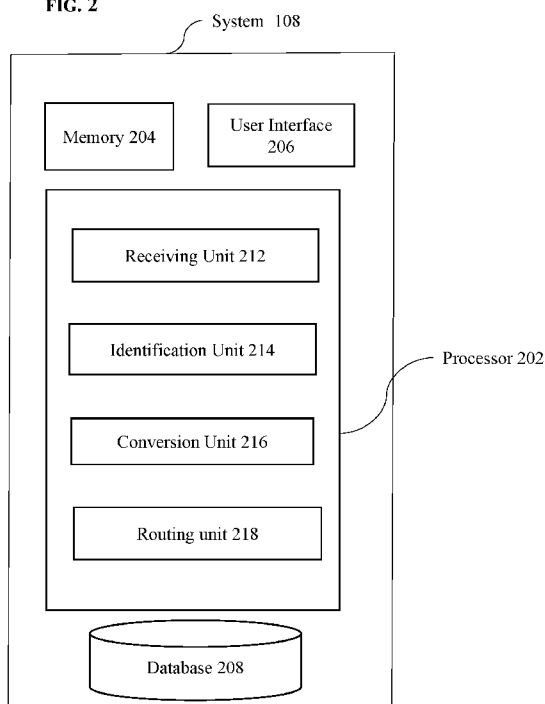
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(54) Title: METHOD AND SYSTEM FOR ROUTING MESSAGES FROM A HOME NETWORK TO A FOREIGN NETWORK

FIG. 2



(57) Abstract: The present disclosure relates to a system (108) and a method (600) for routing one or more messages from a home network (106) to a foreign network (110). The system (108) includes a receiving unit (212) to load a short code to long code map at an application on a server (104) in the foreign network (110) and the one or more messages from a User Equipment (UE) (102). The system (108) includes an identification unit (214) to identify a long code for the corresponding short code. The system (108) includes a conversion unit (216) to convert the short code to the identified long code upon identification of the long code. The system (108) includes a routing unit (218) to route the one or more messages to the application on the server (104) in the foreign network (110) utilizing the long code.

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METHOD AND SYSTEM FOR ROUTING MESSAGES FROM A HOME NETWORK TO A FOREIGN NETWORK

FIELD OF THE INVENTION

[0001] The present invention relates to messaging between networks, more particularly relates to method and system for routing one or more messages from a home network to a foreign network.

BACKGROUND OF THE INVENTION

[0002] Short code messaging has become an integral part of modern communication, allowing users to send concise, standardized messages using abbreviated numeric or alphanumeric codes for various purposes, such as voting, subscribing to services, or receiving information updates. However, the existing systems for sending short code messages to External Short Messaging Entity (ESMEs) are often limited to specific networks or service providers. This creates fragmentation and inconvenience for users and service providers, as they must rely on different mechanisms to send messages to ESMEs across diverse networks.

[0003] Presently, there are several standardized protocols, such as the Short Message Peer-to-Peer (SMPP) protocol, that facilitate the exchange of short messages between Short Message Service Centers (SMSCs) and ESMEs. Short codes are numeric addresses, that are typically 3 to 6 digits long used by wireless carriers to enable access to message based value-added applications and services. A single ESME may have multiple simultaneous short codes for different services for example, “cricket match scores” and “voting”. Typically, short codes of the Short Message Service (SMS) application are hosted by a home network. The home network may forward the SMS message request to the appropriate ESME. The ESME may respond with an appropriate SMS message response containing, for example, cricket score or other information.

[0004] In the case of Peer to Application (P2A) messages, when short codes of the SMS application are hosted by another network other than home network, SMS messages cannot be directly routed from a user's home network. As a result, home network users cannot access or utilize the services provided by other network applications. This limitation occurs due to the inability to establish a direct connection between the home network and the hosting operator, preventing seamless interaction between the user and the application.

[0005] Hence, there exists a need for an improved method and system that enables routing of short code messages to ESMEs hosted in other network for accessing services and applications of other operators. The present invention aims to overcome the abovesaid drawbacks and provide a seamless, efficient interaction of users with services and applications of other network.

SUMMARY OF THE INVENTION

[0006] One or more embodiments of the present disclosure provide a method and a system for routing one or more messages from a home network to a foreign network.

[0007] In one aspect of the present invention, the system for routing the one or more messages from the home network to the foreign network is disclosed. The system includes a receiving unit configured to receive a short code to long code map at an application on a server in the foreign network and receive the one or more messages from a user equipment registered in the home network. The system further includes an identification unit configured to identify a long code for the corresponding short code upon receipt of the one or more messages from the user equipment. The system further includes a conversion unit configured to convert the short code to the identified long code upon identification of the long code. The system further includes a routing unit configured to route the one or more messages to the application on the server in the foreign network utilizing the long code.

[0008] In an embodiment, the routing unit is configured to route the one or more messages to connected content providers upon failure to identify the long code for the corresponding short code by the identification unit.

[0009] In an embodiment, the identification unit is configured to parse the short code to long code map upon receipt of the one or more messages to identify the long code for the corresponding short code.

[0010] In another aspect of the present invention, the method of routing the one or more messages from the home network to the foreign network is disclosed. The method includes the step of receiving a short code to long code map from an application on a server in the foreign network and the one or more messages from a user equipment registered in the home network. The method further includes the step of identifying a long code for the corresponding short code upon receipt of the one or more messages from the user equipment. The method further includes the step of converting the short code to the identified long code upon identification of the long code. The method further includes the step of routing the one or more messages to the application on the server in the foreign network utilizing the long code.

[0011] In another aspect of the invention, a non-transitory computer-readable medium having stored thereon computer-readable instructions is disclosed. The computer-readable instructions are executed by a processor. The processor is configured to receive a short code to long code map at an application on a server in the foreign network and one or more messages from a user equipment registered in the home network. The processor is further configured to identify a long code for the corresponding short code upon receipt of the one or more messages from the user equipment. The processor is further configured to convert the short code to the identified long code upon identification of the long code. The processor is further configured to route the one or more messages to the application on the server in the foreign network utilizing the long code.

[0012] In another aspect of invention, User Equipment (UE) is disclosed. The UE includes one or more primary processors communicatively coupled to one or more processors, the one or more primary processors coupled with a memory. The processor is configured to transmit one or more messages to an application on a server in a foreign network.

[0013] Other features and aspects of this invention will be apparent from the following description and the accompanying drawings. The features and advantages described in this summary and in the following detailed description are not all-inclusive, and particularly, many additional features and advantages will be apparent to one of ordinary skill in the relevant art, in view of the drawings, specification, and claims hereof. Moreover, it should be noted that the language used in the specification has been principally selected for readability and instructional purposes and may not have been selected to delineate or circumscribe the inventive subject matter, resort to the claims being necessary to determine such inventive subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The accompanying drawings, which are incorporated herein, and constitute a part of this disclosure, illustrate exemplary embodiments of the disclosed methods and systems in which like reference numerals refer to the same parts throughout the different drawings. Components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present disclosure. Some drawings may indicate the components using block diagrams and may not represent the internal circuitry of each component. It will be appreciated by those skilled in the art that disclosure of such drawings includes disclosure of electrical components, electronic components or circuitry commonly used to implement such components.

[0015] **FIG. 1** is an exemplary block diagram of an environment for routing one or more messages from a home network to a foreign network, according to one or more embodiments of the present invention;

[0016] **FIG. 2** is an exemplary block diagram of a system for routing the one or more messages from the home network to the foreign network, according to one or more embodiments of the present invention;

[0017] **FIG. 3** is a schematic representation of a workflow of the system of **FIG. 1**, according to the one or more embodiments of the present invention;

[0018] **FIG. 4** is an exemplary block diagram of an architecture of the system of the **FIG. 2**, according to one or more embodiments of the present invention;

[0019] **FIG. 5** is a signal flow diagram for routing the one or more messages from the home network to the foreign network, according to one or more embodiments of the present invention; and

[0020] **FIG. 6** is a schematic representation of a method of routing the one or more messages from the home network to the foreign network, according to one or more embodiments of the present invention.

[0021] The foregoing shall be more apparent from the following detailed description of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0022] Some embodiments of the present disclosure, illustrating all its features, will now be discussed in detail. It must also be noted that as used herein and in the appended claims, the singular forms "a", "an" and "the" include plural references unless the context clearly dictates otherwise.

[0023] Various modifications to the embodiment will be readily apparent to those skilled in the art and the generic principles herein may be applied to other embodiments. However, one of ordinary skill in the art will readily recognize that the present disclosure including the definitions listed here below are not intended to be limited to the embodiments illustrated but is to be accorded the widest scope consistent with the principles and features described herein.

[0024] A person of ordinary skill in the art will readily ascertain that the illustrated steps detailed in the figures and here below are set out to explain the exemplary embodiments shown, and it should be anticipated that ongoing technological development will change the manner in which particular functions are performed. These examples are presented herein for purposes of illustration, and not limitation. Further, the boundaries of the functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternative boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Alternatives (including equivalents, extensions, variations, deviations, etc., of those described herein) will be apparent to persons skilled in the relevant art(s) based on the teachings contained herein. Such alternatives fall within the scope and spirit of the disclosed embodiments.

[0025] The present invention provides a system and method of 3GPP standard that fills the gap of its procedures and specifications. The solution provided herein ensures the robust functioning of the network and seamless experience of the user to access both home network and foreign network. Since the Person-to Application (P2A) Short Message Service (SMS) can be sent by user through short code and the same is quite easier to remember and to use even when the recipient SMS application is hosted by foreign network operators. Further, with the use of the present invention, recipient application need not to be hosted in every operator's network to use the short code.

[0026] FIG. 1 illustrates an exemplary block diagram of an environment 100 for routing one or more messages from a home network 106 to a foreign network 110, according to one or more embodiments of the present disclosure. In this regard, the environment 100 includes a User Equipment (UE) 102 connected to the home network 106, a server 104, and a system 108 communicably coupled to each other for routing the one or more messages from the home network 106 to the foreign network 110. The first UE 102 aids a user to interact with the system 108 for transmitting one or more messages to the server 104 in the foreign network 110.

[0027] As per the illustrated embodiment and for the purpose of description and illustration, the UE **102** connected to the home network **106** includes, but not limited to, a first UE **102a**, a second UE **102b**, and a third UE **102c**, and should nowhere be construed as limiting the scope of the present disclosure. In alternate embodiments, the UE **102** connected to the home network **106** may include a plurality of UEs as per the requirement. For ease of reference, each of the first UE **102a**, the second UE **102b**, and the third UE **102c** connected to the home network **106**, will hereinafter be collectively and individually referred to as the “User Equipment (UE) **102**”.

[0028] In an embodiment, the UE **102** is one of, but not limited to, any electrical, electronic, electro-mechanical or an equipment and a combination of one or more of the above devices such as virtual reality (VR) devices, augmented reality (AR) devices, laptop, a general-purpose computer, desktop, personal digital assistant, tablet computer, mainframe computer, or any other computing device.

[0029] The environment **100** includes the server **104** accessible via the home network **106** and the foreign network **110**. The server **104** may include, by way of example but not limitation, one or more of a standalone server, a server blade, a server rack, a bank of servers, a server farm, hardware supporting a part of a cloud service or system, a home server, hardware running a virtualized server, one or more processors executing code to function as a server, one or more machines performing server-side functionality as described herein, at least a portion of any of the above, some combination thereof. In an embodiment, the entity may include, but is not limited to, a vendor, a network operator, a company, an organization, a university, a lab facility, a business enterprise side, a defense facility side, or any other facility that provides service.

[0030] The home network **106** and the foreign network **110** includes, by way of example but not limitation, one or more of a wireless network, a wired network, an internet, an intranet, a public network, a private network, a packet-switched network, a circuit-switched network, an ad hoc network, an infrastructure network, a Public-

Switched Telephone Network (PSTN), a cable network, a cellular network, a satellite network, a fiber optic network, or some combination thereof. The home network **106** and the foreign network **110** may include, but is not limited to, a Third Generation (3G), a Fourth Generation (4G), a Fifth Generation (5G), a Sixth Generation (6G), a New Radio (NR), a Narrow Band Internet of Things (NB-IoT), an Open Radio Access Network (O-RAN), and the like.

[0031] The home network **106** and the foreign network **110** may also include, by way of example but not limitation, at least a portion of one or more networks having one or more nodes that transmit, receive, forward, generate, buffer, store, route, switch, process, or a combination thereof, etc. one or more messages, packets, signals, waves, voltage or current levels, some combination thereof, or so forth. The home network **106** and the foreign network **110** may also include, by way of example but not limitation, one or more of a wireless network, a wired network, an internet, an intranet, a public network, a private network, a packet-switched network, a circuit-switched network, an ad hoc network, an infrastructure network, a Public-Switched Telephone Network (PSTN), a cable network, a cellular network, a satellite network, a fiber optic network, a VOIP or some combination thereof.

[0032] The environment **100** further includes the system **108** communicably coupled to the server **104** and the UE **102** via the home network **106**. Further, the system **108** is also communicably coupled to the server **104** via the foreign network **110**. The system **108** is configured for routing the one or more messages from the home network **106** to the foreign network **110**. As per one or more embodiments, the system **108** is adapted to be embedded within the server **104** or embedded as an individual entity.

[0033] Operational and construction features of the system **108** will be explained in detail with respect to the following figures.

[0034] **FIG. 2** is an exemplary block diagram of the system **108** for routing one or more messages from the home network **106** (as shown in **FIG. 1**) to the foreign network **110** (as shown in **FIG. 1**), according to one or more embodiments of the present invention.

[0035] As per the illustrated embodiment, the system **108** includes one or more processors **202**, a memory **204**, a user interface **206**, and a database **208**. For the purpose of description and explanation, the description will be explained with respect to one processor **202** and should nowhere be construed as limiting the scope of the present disclosure. In alternate embodiments, the system **108** may include more than one processors **202** as per the requirement of the home network **106** and the foreign network **110**. The one or more processors **202**, hereinafter referred to as the processor **202** may be implemented as one or more microprocessors, microcomputers, microcontrollers, digital signal processors, central processing units, state machines, logic circuitries, single board computers, and/or any devices that manipulate signals based on operational instructions.

[0036] As per the illustrated embodiment, the processor **202** is configured to fetch and execute computer-readable instructions stored in the memory **204**. The memory **204** may be configured to store one or more computer-readable instructions or routines in a non-transitory computer-readable storage medium, which may be fetched and executed to create or share data packets over a network service. The memory **204** may include any non-transitory storage device including, for example, volatile memory such as RAM, or non-volatile memory such as disk memory, EPROMs, FLASH memory, unalterable memory, and the like.

[0037] In an embodiment, the user interface **206** includes a variety of interfaces, for example, interfaces for a graphical user interface, a web user interface, a Command Line Interface (CLI), and the like. The user interface **206** facilitates communication of the system **108**. In one embodiment, the user interface **206** provides a communication

pathway for one or more components of the system **108**. Examples of such components include, but are not limited to, the UE **102**, (as shown in **FIG. 1**) and the database **208**.

[0038] The database **208** is one of, but not limited to, a centralized database, a cloud-based database, a commercial database, an open-source database, a distributed database, an end-user database, a graphical database, a No-Structured Query Language (NoSQL) database, an object-oriented database, a personal database, an in-memory database, a document-based database, a time series database, a wide column database, a key value database, a search database, a cache databases, and so forth. The foregoing examples of database **208** types are non-limiting and may not be mutually exclusive e.g., a database can be both commercial and cloud-based, or both relational and open-source, etc.

[0039] In order for the system **108** to route the one or more messages from the home network **106** to the foreign network **110**, the processor **202** includes one or more modules. In one embodiment, the one or more modules includes, but not limited to, a receiving unit **212**, an identification unit **214**, a conversion unit **216** and a routing unit **218** communicably coupled to each other for routing the one or more messages from the home network **106** to the foreign network **110**.

[0040] The receiving unit **212**, the identification unit **214**, the conversion unit **216** and the routing unit **218** in an embodiment, may be implemented as a combination of hardware and programming (for example, programmable instructions) to implement one or more functionalities of the processor **202**. In the examples described herein, such combinations of hardware and programming may be implemented in several different ways. For example, the programming for the processor **202** may be processor-executable instructions stored on a non-transitory machine-readable storage medium and the hardware for the processor may comprise a processing resource (for example, one or more processors), to execute such instructions. In the present examples, the memory **204** may store instructions that, when executed by the processing resource, implement the processor. In such examples, the system **108** may

comprise the memory **204** storing the instructions and the processing resource to execute the instructions, or the memory **204** may be separate but accessible to the system **108** and the processing resource. In other examples, the processor **202** may be implemented by electronic circuitry.

[0041] In one embodiment, the receiving unit **212** is configured to receive a short code to long code map from an application on the server **104** in the foreign network **110**. The short code is a specialized five to six-digit phone number used to address messages in the Multimedia Messaging System (MMS) and short message service (SMS) systems of mobile network operators. For example, the short code five to six-digit phone number may look like “620039”, “620045”. The long code is a standard phone number used to send and receive voice calls and SMS messages. The application refers to software that is installed and run on the server **104**. The application includes, but is not limited to, web server, database server, file server, email server, Content Management System (CMS), media streaming server, game server, remote access and VPN server, IoT server, virtualization server.

[0042] Further, the receiving unit **212** is also configured to receive the one or more messages from the short code associated with the UE **102** registered in the home network **106**. Upon receiving the one or more messages from the UE **102**, the identification unit **214** is configured to identify the long code for the corresponding short code upon receipt of the one or more messages from the UE **102** based on the short code to the long code map. Accordingly, for identifying the long code for the corresponding short code, the identification unit **214** is configured to parse the short code to long code map. The short code to long code map is parsed upon receipt of the one or more messages to identify the long code for the corresponding short code.

[0043] Upon identifying the long code for the corresponding short code, the conversion unit **216** is configured to convert the short code to the identified long code. More specifically the short code is converted to the long code. Upon conversion, the

long code is used for further message flow between the home network **106** and the foreign network **110**.

[0044] Accordingly, the routing unit **218** is configured to route the one or more messages to the application on the server **104** in the foreign network **110**. In one embodiment, if the identification unit **214** fails to identify the long code for the corresponding short code, the routing unit **218** is configured to route the one or more messages to content providers. The content providers refer to an entity which supplies content in the form of streaming media or non-real-time (NRT) files to be delivered to UE **102** over the 3GPP network, via Multimedia Broadcast/Multicast Service (MBMS) bearer and/or unicast bearer services. The content provider may reside either inside or outside the operator's network.

[0045] In one embodiment, the system **108** determines whether mapping of long code exists against the short code. Further CRUD operations at the database **208** for retrieving the mapping and may be supported both at runtime and startup of the operations. CRUD is the acronym for Create, Read, Update and Delete. The four functions Create, Read, Update and Delete describe the four essential operations for implementing a persistent storage application. In an embodiment, several applications are transmitted to IPSMGW with their short code to long code mapping, and IPSMGW stores the short code to long code map at the database **208** by using CRUD operations.

[0046] Therefore, the user using the UE **102** in the home network **106** can send the one or more messages to the server **104** in the foreign network **110**. More specifically, Person-to-Application (P2A) Short Message Service (SMS) can be sent by user through short code which is quite easier to remember to use even though the actual recipient of the SMS is resided in the foreign network. Further, the recipient application will not have to reside in every operator's network to use the short code.

[0047] FIG. 3 describes a preferred embodiment of the system **108** of FIG. 2, according to various embodiments of the present invention. It is to be noted that the

embodiment with respect to **FIG. 3** will be explained with respect to the first UE **102a** and the system **108** for the purpose of description and illustration and should nowhere be construed as limited to the scope of the present disclosure.

[0048] As mentioned earlier in **FIG. 1**, each of the first UE **102a**, the second UE **102b**, and the third UE **102c** may include an external storage device, a bus, a main memory, a read-only memory, a mass storage device, communication port(s), and a processor. The exemplary embodiment as illustrated in **FIG. 3** will be explained with respect to the first UE **102a** without deviating from the scope of the present disclosure and the limiting the scope of the present disclosure. The first UE **102a** includes one or more primary processors **302** communicably coupled to the one or more processors **202** of the system **108**.

[0049] The one or more primary processors **302** are coupled with a memory unit **304** storing instructions which are executed by the one or more primary processors **302**. Execution of the stored instructions by the one or more primary processors **302** enables the first UE **102a** to transmit one or more messages to the server **104** in the foreign network **110**.

[0050] As mentioned earlier in **FIG. 2**, the one or more processors **202** of the system **108** is configured for routing the one or more messages from the home network **106** to the foreign network **110**. As per the illustrated embodiment, the system **108** includes the one or more processors **202**, the memory **204**, the user interface **206**, and the database **208**. The operations and functions of the one or more processors **202**, the memory **204**, the user interface **206**, and the database **208** are already explained in **FIG. 2**. For the sake of brevity, a similar description related to the working and operation of the system **108** as illustrated in **FIG. 2** has been omitted to avoid repetition.

[0051] Further, the processor **202** includes the receiving unit **212**, the identification unit **214**, the conversion unit **216** and the routing unit **218**. The operations and

functions of the receiving unit **212**, the identification unit **214**, the conversion unit **216** and the routing unit **218** are already explained in **FIG. 2**. Hence, for the sake of brevity, a similar description related to the working and operation of the system **108** as illustrated in **FIG. 2** has been omitted to avoid repetition. The limited description provided for the system **108** in **FIG. 3**, should be read with the description as provided for the system **108** in the **FIG. 2** above, and should not be construed as limiting the scope of the present disclosure.

[0052] **FIG. 4** is an exemplary block diagram of an architecture **400** of the system **108** of the **FIG. 2**, according to one or more embodiments of the present invention.

[0053] The architecture **400** includes an IP Short Message Gateway (IP-SM-GW) **402**, a Home Subscriber Service (HSS) **404**, a Short Message Service Gateway Mobile Switching Center / Short Message Service Interworking Mobile Switching Center (SMS-GMSC / SMS-IW MSC) **406**, a Service Centre (SC) **408**, a Short Message Entity (SME) **410**, a Serving – Call Session Control Function (S-CSCF) **412**, a Proxy – Call Session Control Function (P-CSCF) **414**, a Charging Gateway Function / Charging Data Function (CGF/CDF) **416**, an Online Charging System (OCS) **418**, and the UE **102**.

[0054] As per the illustrated embodiment, the IP-SM-GW **402** shall provide the protocol interworking for delivery of the short message between an IP-based UE and a Short Message Service - Service Center (SMS-SC). The message is routed to the SMS-SC for delivery to the SMS-based user or the message is received from the SMS-SC of an SMS-based UE for delivery to the IP-based UE.

[0055] The E/Gd/Gdd/SGd interface allows the IP-SM-GW **402** to connect to the SMS-GMSC **406**, appearing to the SMS-GMSC **406** as a Mobile switching center (MSC), Serving GPRS Support Node (SGSN) or Mobility Management Entity (MME).

[0056] The SMS-GMSC **406** function of the MSC capable of receiving a short message from the SC **408**, interrogating a Home Location Register (HLR) for routing information and SMS info, and delivering the short message to the Visited Mobile Switching Centre (VMSC) or the SGSN of the recipient Mobile Station (MS). The MSC exchange performs switching functions for mobile stations located in a geographical area designated as the MSC area.

[0057] The SMS-IWMSC **406** acts as an interface between the IP-SM-GW **402** and a Short Message Service Centre (SMSC) to help short messages to be transferred from Mobile Stations to the SC **408**.

[0058] The SC **408** responsible for the relaying and store-and-forwarding of a short message between a Small and Medium Enterprises (SME) **410** and the MS. The SME **410** is an entity which may send or receive short messages.

[0059] The HSS **404** functions as the central database for subscriber-related information and plays a key role in managing user authentication, authorization, and mobility.

[0060] The SMS-GMSC / SMS-IWMSC **406** is connected to the HSS **404** via the C/S6c interface. The C/S6c interface allows the SMS-GMSC **406**, using Mobile Application Part (MAP) or a Diameter based protocol, to obtain the address of the IP-Message-GW.

[0061] The HSS **404** is connected to IP-SM-GW **402** through Sh and J/S6c interface. The Sh interface connects the HSS **404** to application servers within an IP Multimedia Subsystem (IMS) network. The J interface is used for communication between the Home Location Register (HLR) and the Authentication Centre (AuC). The J interface is primarily responsible for managing authentication data and generating authentication vectors. The S6c interface facilitates communication between the Mobility Management Entity (MME) and the HSS **404**. The S6c interface is used for subscription management, authentication, and mobility-related functions.

[0062] The IP-SM-GW **402** is connected to S-CSCF **412** through ISC interface. The ISC interface allows the IP-SM-GW to forward the receiving message to a Session Initiation Protocol (SIP) based the UE **102** via IMS core

[0063] The S-CSCF **412** is the primary node in the IMS responsible for session control. Subscribers will be allocated a S-CSCF **412** for the duration of their IMS registration in order to facilitate routing of SIP messages as part of service establishment procedures.

[0064] The S-CSCF **412** and the P-CSCF **414** are connected through Mw interface. The Mw interface enables communication between the different CSCF nodes within the IMS network. The Mw interface is used for the SIP signaling, which is essential for establishing, modifying, and terminating multimedia sessions.

[0065] The P-CSCF **414** is a SIP proxy that is the first point of contact for the IMS terminal. The P-CSCF **414** can be located either in the foreign network **110** (in full IMS networks) or in the home network **106** (when the visited network is not IMS compliant yet).

[0066] The P-CSCF **414** and the UE **102** are connected through Gm interface. The Gm interface plays a significant role in managing SIP signaling for initiating, maintaining, and terminating multimedia communication sessions.

[0067] The IMS core network consists of several key interfaces that facilitate communication between various functional entities, enabling multimedia services over IP networks. The key interfaces include, but not limited to, Mw interface, Gm interface, Rx interface, ISC interface.

[0068] The CGF **416** acts as a gateway between the 3GPP network and a Billing Domain (BD). It uses the Bx reference point for the transfer of Charging Data Record (CDR) files to the BD. The CDF **416** receives charging events from a Charging Trigger

Function (CTF) via the Rf reference point. The CDF then uses the information contained in the charging events to construct CDRs.

[0069] The CGF/CDF **416** is connected to IP-SM-GW **402** through RF interface. The Rf interface connects various network elements to the CDF **416**, enabling the collection and forwarding of charging data for post-processing and billing.

[0070] The OCS **418** is responsible for real-time charging and billing for various services. The OCS **418** is connected to IP-SM-GW **402** through Ro interface. The Ro interface is used for IMS and other service platforms. The Ro interface supports online charging for voice, video, and multimedia services provided over IMS.

[0071] **FIG. 5** is an exemplary signal flow diagram for routing one or more messages from the home network **106** to the foreign network **110**, according to one or more embodiments of the present invention; For the purpose of description, the signal flow diagram is described with the embodiments as illustrated in **FIG. 2** and should nowhere be construed as limiting the scope of the present disclosure.

[0072] At step **502**, the short code to long code map is received at the A2P-IPSMGW **402** from an application running on the server **104** of the foreign network **110**.

[0073] At step **504**, the UE **102** registered in the home network **106** transmits the one or more messages to the A2P-IPSMGW **402**.

[0074] At step **506**, upon receiving the one or more messages from the UE **102**, the A2P-IPSMGW **402** is configured to identify the long code for the corresponding short code. Further, the A2P-IPSMGW **402** is configured to parse the short code to long code map upon receipt of the one or more messages to identify the long code for the corresponding short code.

[0075] At step **508**, after identifying the long code for the corresponding short code, the short code is converted to the identified long code by the conversion unit **216** at the A2P-IPSMGW **402**.

[0076] At step **510**, upon conversion, the A2P-IPSMGW **402** is configured to route the one or more messages to the application running on the server **104** in the foreign network **110** utilizing the long code.

[0077] At step **512**, the A2P-IPSMGW **402** is further configured to route the one or more messages to connected content providers. The one or more messages are routed to the connected content providers upon failure to identify the long code for the corresponding short code at the A2P-IPSMGW **402**.

[0078] **FIG. 6** is a flow diagram of a method **600** for routing the one or more messages from the home network **106** (as shown in **FIG. 1**) to the foreign network **110** (as shown in **FIG. 1**), according to one or more embodiments of the present invention. For the purpose of description, the method **600** is described with the embodiments as illustrated in **FIG. 2** and should nowhere be construed as limiting the scope of the present disclosure.

[0079] At step **602**, the method **600** includes the step of receiving the short code to long code map from the application on the server **104** (as shown in **FIG. 1**) in the foreign network **110** by the receiving unit **212**.

[0080] At step **604**, the method **600** includes the step of receiving the one or more messages from the UE **102** (as shown in **FIG. 1**) registered in the home network **106** by the receiving unit **212**.

[0081] At step **606**, the method **600** includes the step of identifying the long code for the corresponding short code upon receipt of the one or more messages from the UE **102** by the identifying unit **214**. For identifying the long code for the corresponding short code, the method **600** comprises the step of parsing the short code to long code map upon receipt of the one or more messages.

[0082] At step **608**, the method **600** includes the step of converting the short code to the identified long code upon identification of the long code by the converting unit **216**.

[0083] At step **610**, the method **600** includes the step of routing the one or more messages to the application on the server **104** (as shown in **FIG. 1**) in the foreign network **110** utilizing the long code by the routing unit **218**. Further, the routing unit **218** routes the one or more messages to connected content provider upon failure to identify the long code for the corresponding short code.

[0084] The present invention further discloses a non-transitory computer-readable medium having stored thereon computer-readable instructions. The computer-readable instructions are executed by the processor **202**. The processor **202** is configured to receive the short code to long code map at the application on the server **104** in the foreign network **110** and the one or more messages from the UE **102** registered in the home network **106**. The processor **202** is further configured to identify the long code for the corresponding short code upon receipt of the one or more messages from the UE **102**. The processor **202** is further configured to convert the short code to the identified long code upon identification of the long code. The processor **202** is further configured to route the one or more messages to the application on the server **104** in the foreign network **110** utilizing the long code.

[0085] A person of ordinary skill in the art will readily ascertain that the illustrated embodiments and steps in description and drawings (FIG.1-6) are set out to explain the exemplary embodiments shown, and it should be anticipated that ongoing technological development will change the manner in which particular functions are performed. These examples are presented herein for purposes of illustration, and not limitation. Further, the boundaries of the functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternative boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Alternatives (including equivalents, extensions,

variations, deviations, etc., of those described herein) will be apparent to persons skilled in the relevant art(s) based on the teachings contained herein. Such alternatives fall within the scope and spirit of the disclosed embodiments.

[0086] The present disclosure incorporates technical advancement of seamless routing of the short code messages to the user using the UE across any network, regardless of the network operator or service provider. Further, the P2A SMS can be sent by user through short code which is quite easier to remember to use even though the actual recipient of the SMS is resided in the other operators' network. Furthermore, the recipient application will not have to reside in every operators network to use the short code.

[0087] The present invention offers multiple advantages over the prior art and the above listed are a few examples to emphasize on some of the advantageous features. The listed advantages are to be read in a non-limiting manner.

REFERENCE NUMERALS

- [0088] Environment- 100
- [0089] User Equipment (UE)- 102
- [0090] Server- 104
- [0091] Home Network- 106
- [0092] System -108
- [0093] Foreign Network -110
- [0094] Processor- 202
- [0095] Memory- 204
- [0096] User Interface- 206
- [0097] Database- 208

- [0098] Receiving Unit- 212
- [0099] Identification Unit- 214
- [00100] Conversion Unit- 216
- [00101] Routing Unit -218
- [00102] Primary processor- 302
- [00103] Memory- 304
- [00104] IP Short Message Gateway (IP-SM-GW) – 402
- [00105] Home Subscriber Service (HSS) – 404
- [00106] Short Message Service Gateway Mobile Switching Center / Short Message Service Interworking Mobile Switching Center (SMS-GMSC / SMS-IWMSC) – 406
- [00107] Service Centre (SC) - 408
- [00108] Short Message Entity (SME) 410
- [00109] Serving- Call Session Control Function (S-CSCF) - 412
- [00110] Proxy -Call Session Control Function (P-CSCF)- 414
- [00111] Charging Gateway Function / Charging Data Function (CGF/CDF) – 416
- [00112] Online Charging System (OCS) - 418

We Claim:

1. A method (600) of routing one or more messages from a home network (106) to a foreign network (110), the method (600) comprising the steps of:
 - receiving, by one or more processors (202), a short code to long code map from an application on a server in the foreign network (110);
 - receiving, by the one or more processors (202), the one or more messages from a User Equipment (UE) (102) registered in the home network (106);
 - identifying, by the one or more processors (202), a long code for the corresponding short code upon receipt of the one or more messages from the UE (102);
 - converting, by the one or more processors (202), the short code to the identified long code upon identification of the long code; and
 - routing, by the one or more processors (202), the one or more messages to the application on the server (104) in the foreign network (110) utilizing the long code.
2. The method (600) as claimed in claim 1, wherein method (600) comprises the step of routing, by the one or more processors (202), the one or more messages to connected content providers upon failure to identify the long code for the corresponding short code.
3. The method (600) as claimed in claim 1, wherein for identifying the long code for the corresponding short code, the method (600) comprises the step of parsing, by the one or more processors (202), the short code to long code map upon receipt of the one or more messages.
4. A system (108) for routing one or more messages from a home network (106) to a foreign network (110), the system (108) comprising:
 - a receiving unit (212) configured to

receive, a short code to long code map from an application on a server (104) in the foreign network (110); and

receive, the one or more messages from a User Equipment (UE) (102) registered in the home network (106);

an identification unit (214) configured to identify, a long code for the corresponding short code upon receipt of the one or more messages from the UE (102);

a conversion unit (216) configured to convert, the short code to the identified long code upon identification of the long code; and

a routing unit (218) configured to route, the one or more messages to the application on the server (104) in the foreign network (110) utilizing the long code.

5. The system (108) as claimed in claim 4, wherein the routing unit (218) is configured to route, the one or more messages to connected content providers upon failure to identify the long code for the corresponding short code by the identification unit.
6. The system (108) as claimed in claim 1, wherein the identification unit (214) is configured to parse, the short code to long code map upon receipt of the one or more messages to identify the long code for the corresponding short code.
7. A non-transitory computer-readable medium having stored thereon computer-readable instructions that, when executed by a processor (202), cause the processor (202) to:
 - receive, a short code to long code map from an application on a server in the foreign network (110);
 - receive, one or more messages from a User Equipment (UE) (102) registered in the home network (106);

identify, a long code for the corresponding short code upon receipt of the one or more messages from the UE (102);

convert, the short code to the identified long code upon identification of the long code; and

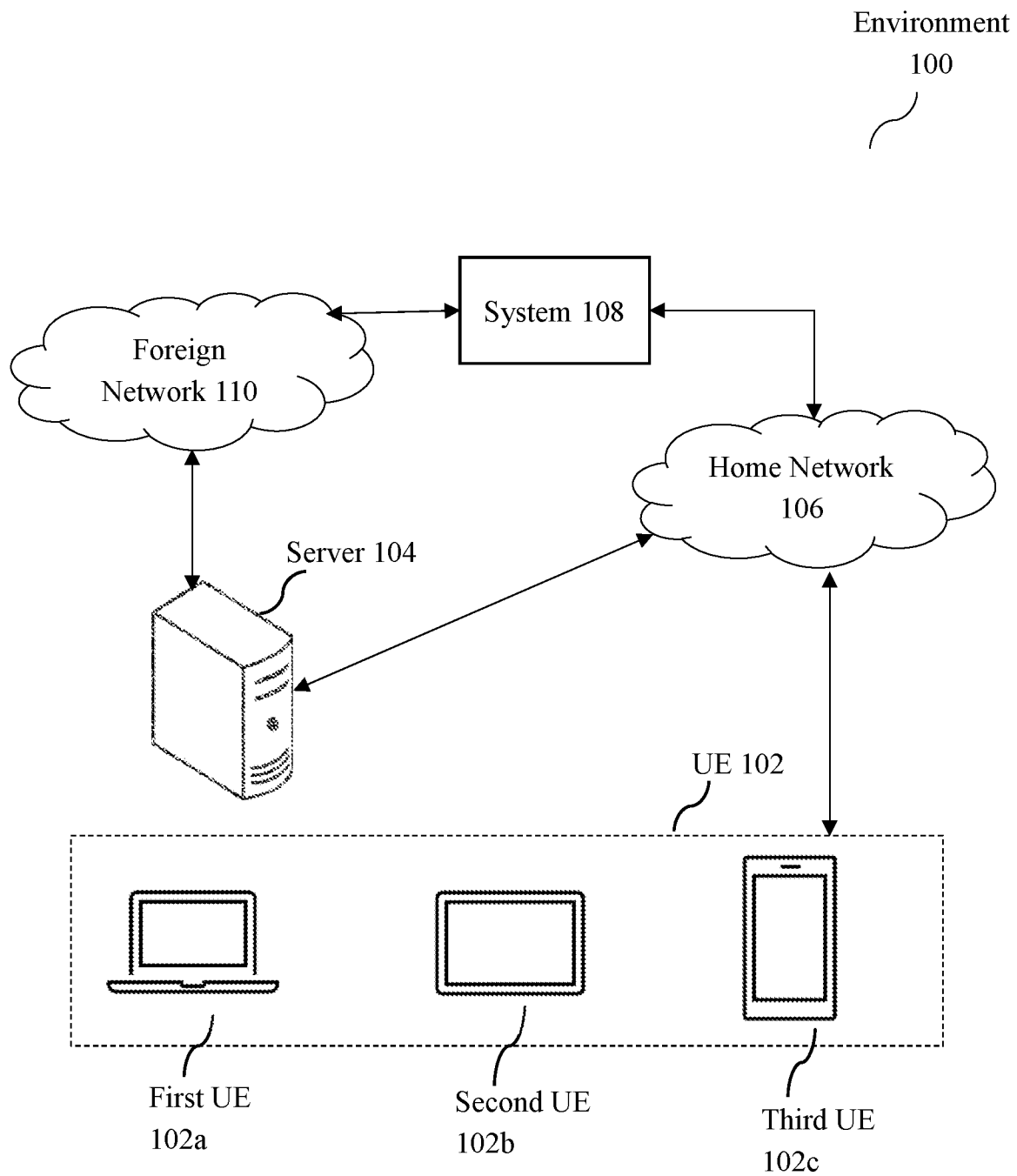
route, the one or more messages to the application on the server (104) in the foreign network (110) utilizing the long code.

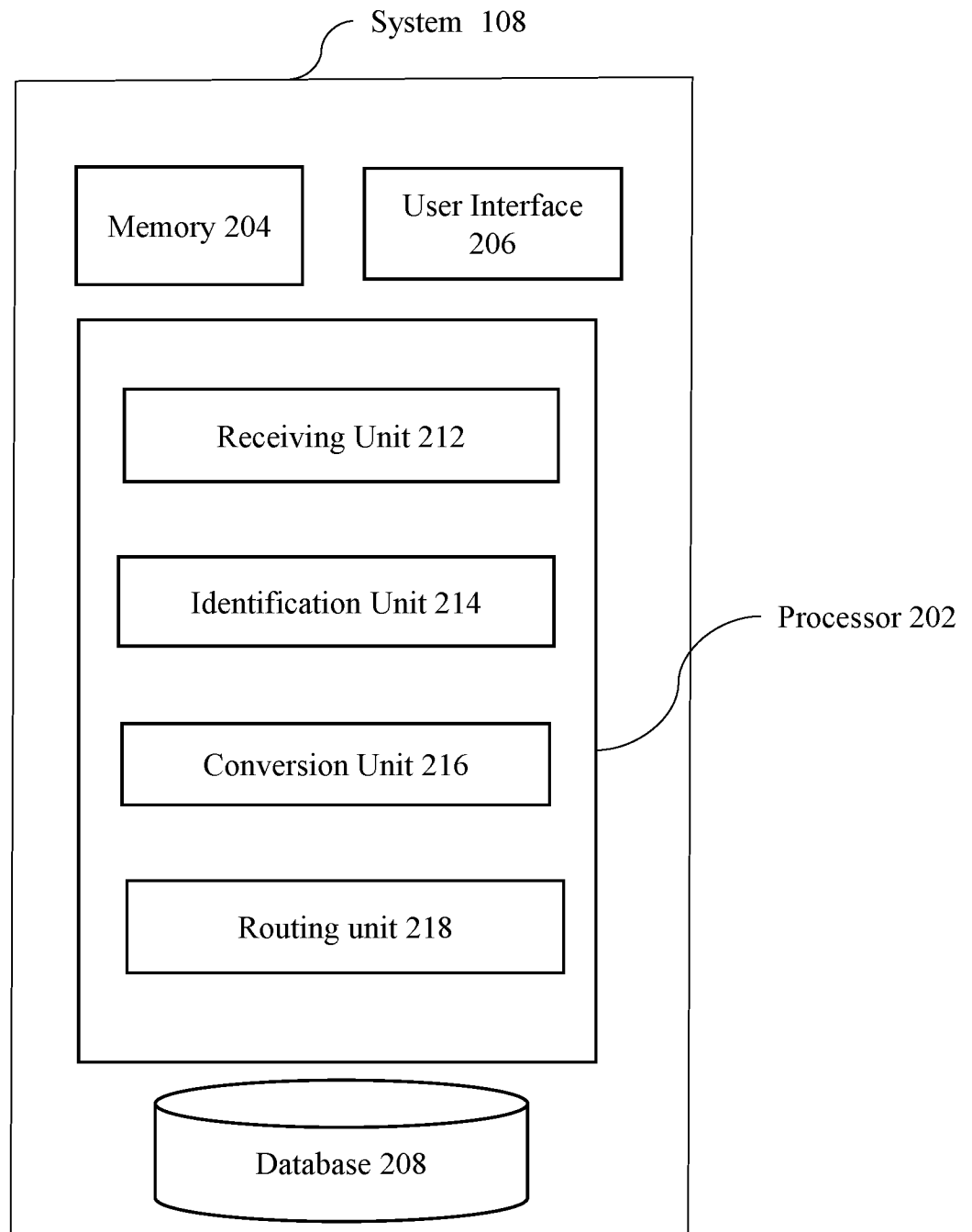
8. A User Equipment (UE) (102), comprising:

one or more primary processors (302) communicatively coupled to one or more processors (202), the one or more primary processors (302) coupled with a memory (304), wherein said memory (304) stores instructions which when executed by the one or more primary processors (302) causes the UE (102) to:

transmit, one or more messages to an application on a server (104) in a foreign network (110); and

wherein the one or more processors (202) is configured to perform the steps as claimed in claim 1.

**FIG. 1**

**FIG. 2**

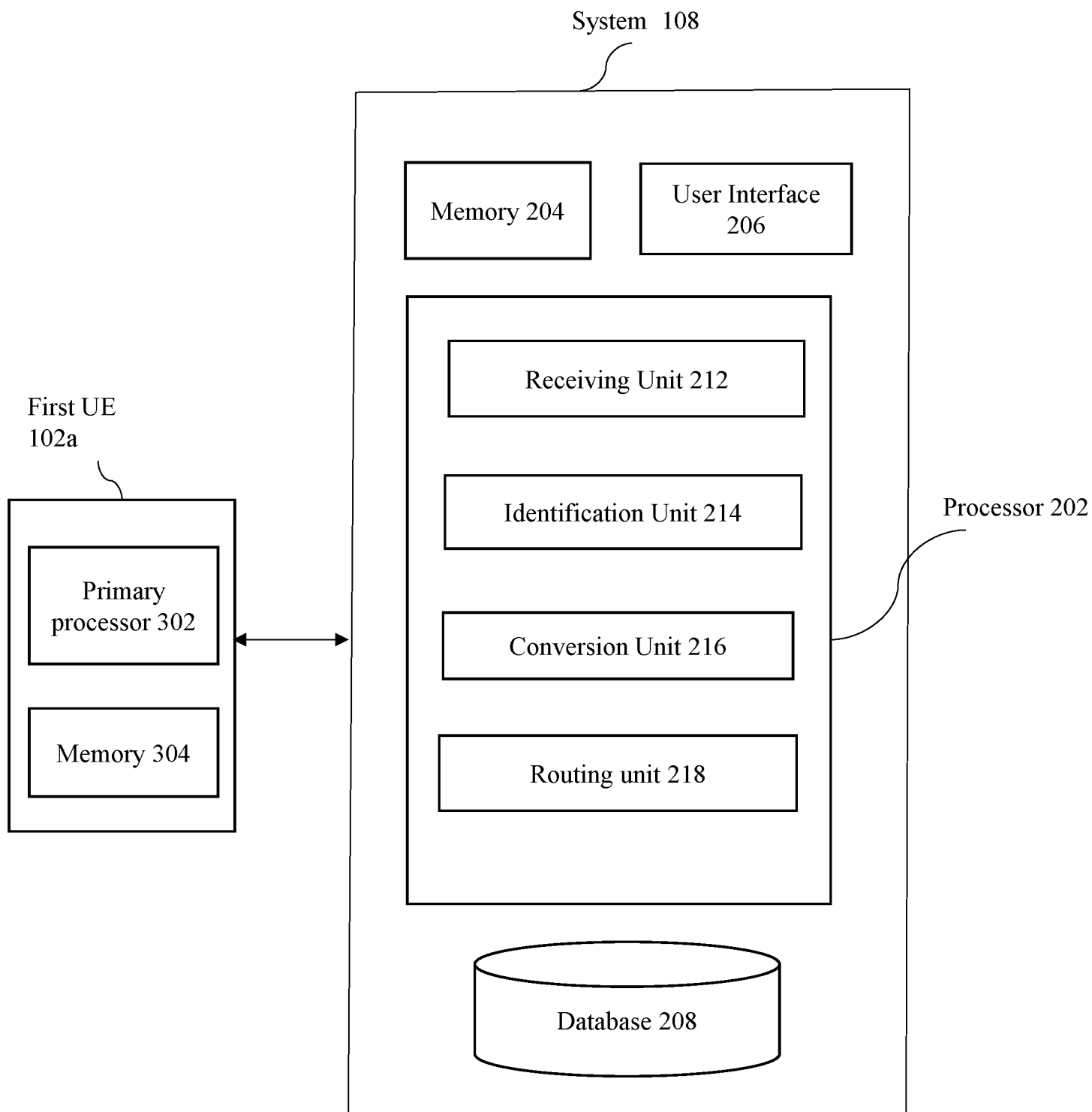


FIG. 3

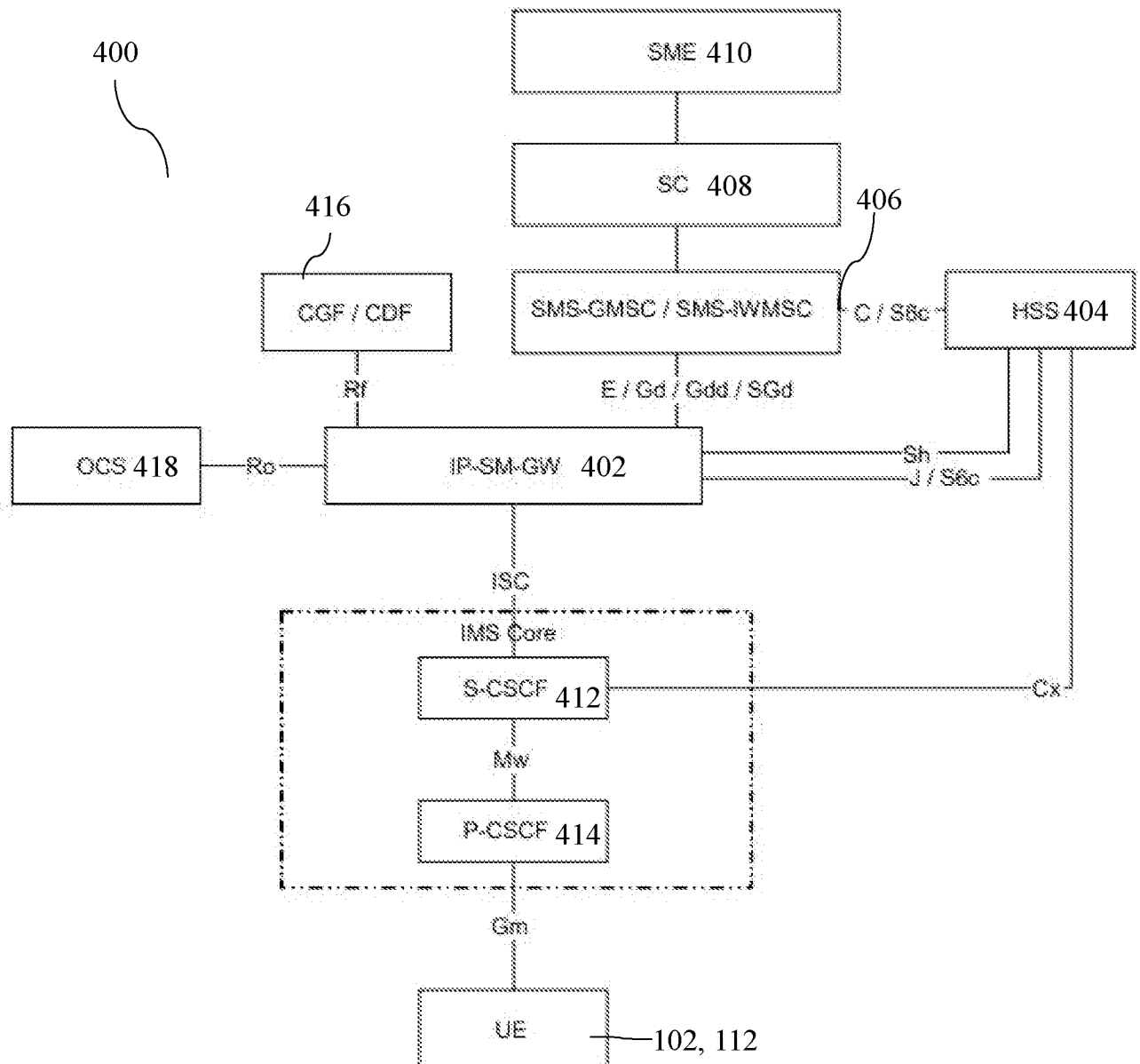


FIG. 4

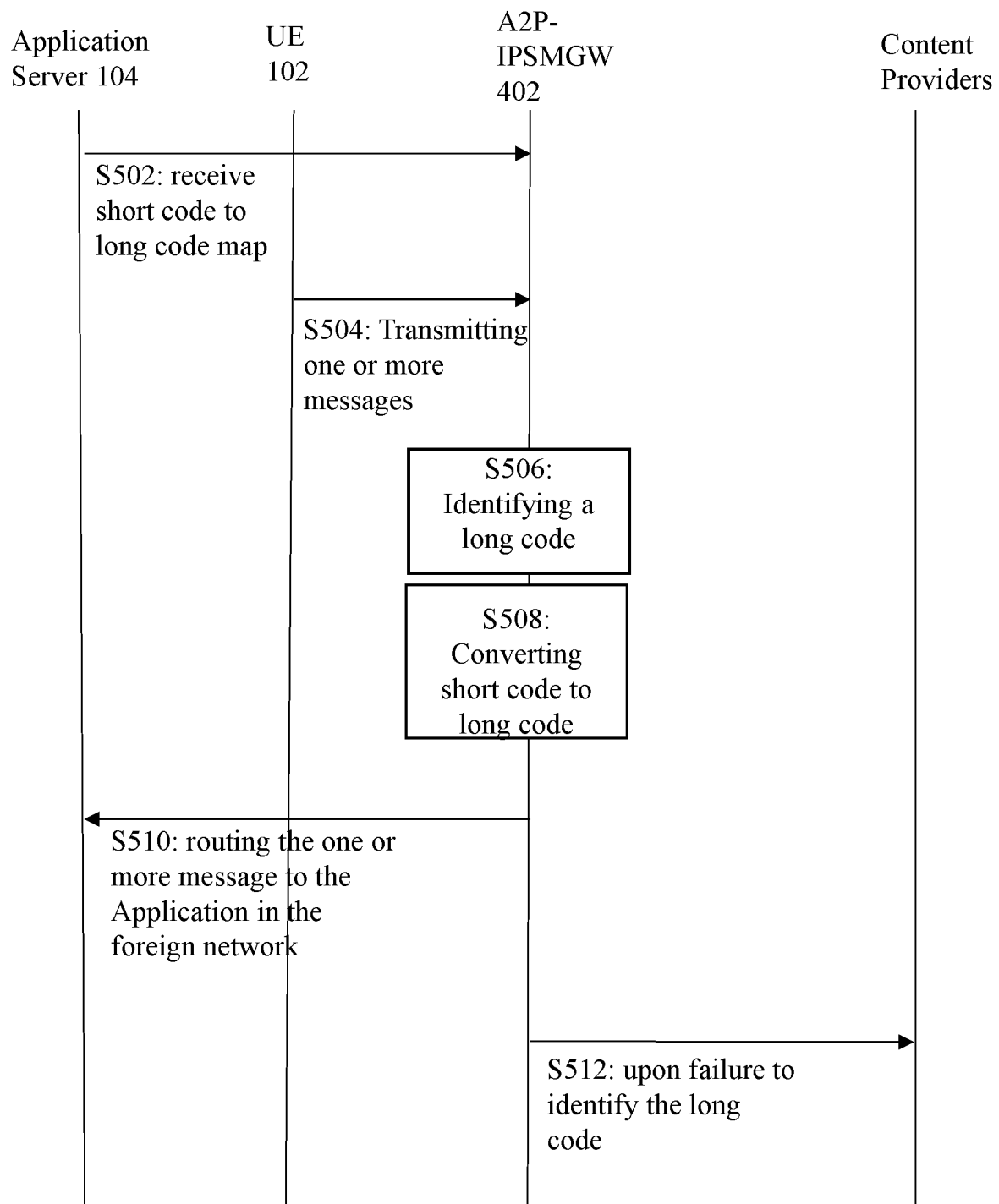


FIG. 5

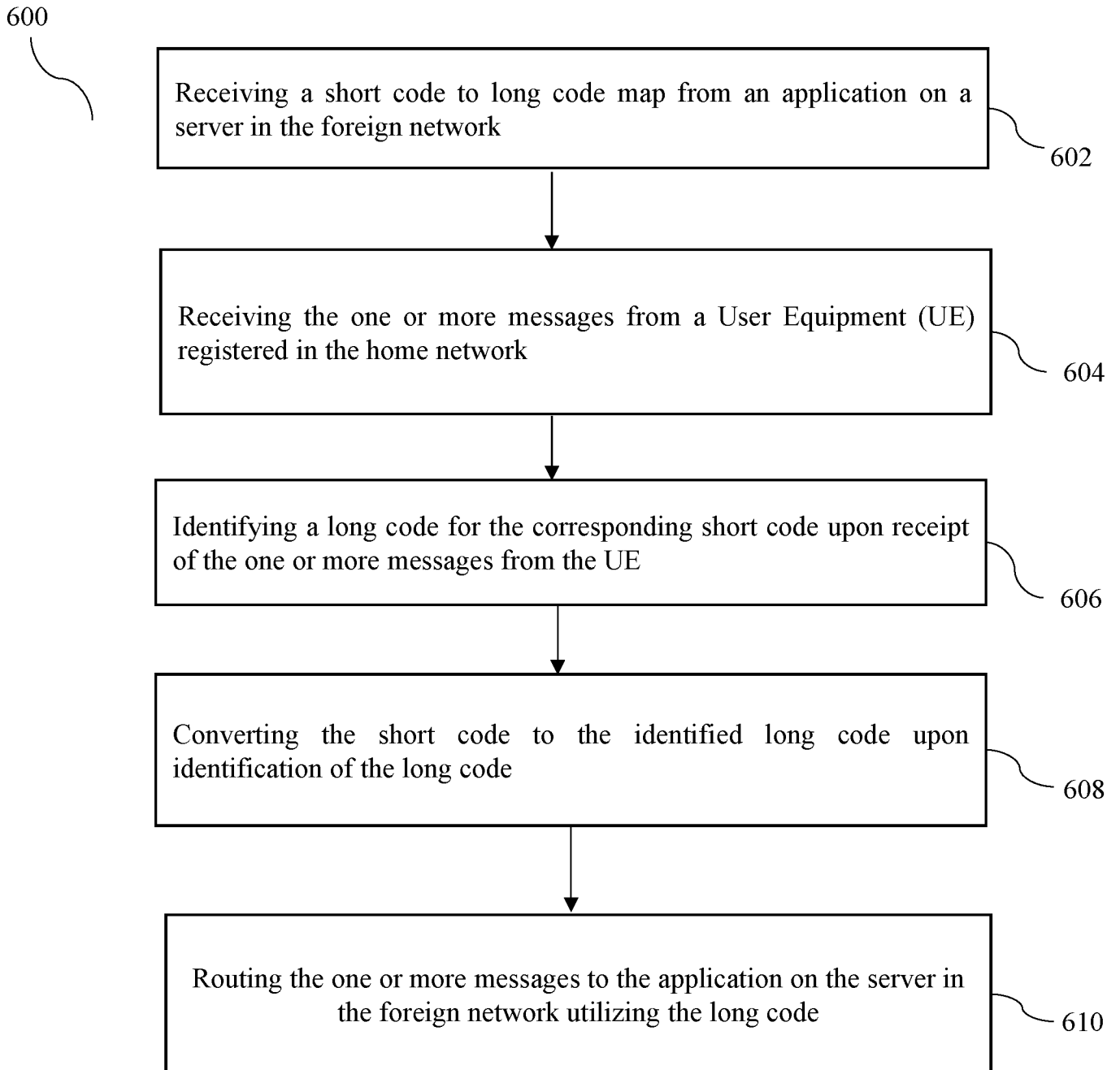


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2024/051103

A. CLASSIFICATION OF SUBJECT MATTER
H04L12/66 Version=2024.01

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 database consulted during the international search (name of database and, where practicable, search terms used)

Databases-Patseer, IPO Internal Database
Keywords- Message routing, Code mapping, Short code

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 20110098049 A1 (TEKELEC GLOBAL INC) 28 November 2011 (28.04.2011). Abstract, Description (Paragraphs [0002]-[0044]), Claims 1-36, Figures 1-6.	1-8

☐ 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

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"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

"I" 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

06-11-2024

Date of mailing of the international search report

06-11-2024

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/IN2024/051103

Citation	Pub.Date	Family	Pub.Date
US 20110098049 A1	28-04-2011	WO 2011035050 A3	04-08-2011