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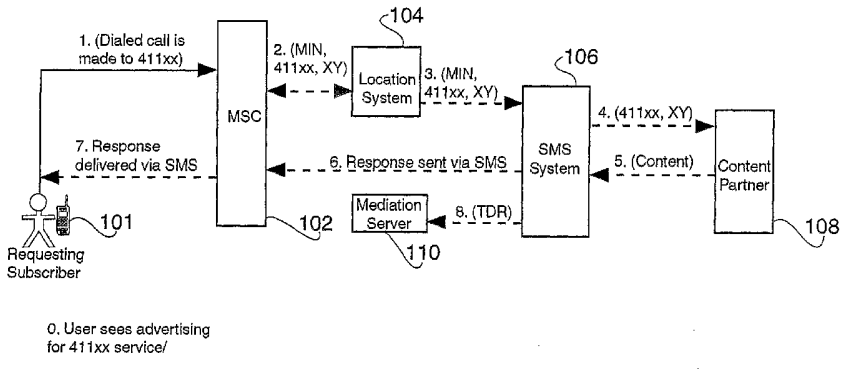
(54) Title: WIRELESS NETWORK LOCATION-BASED REFERENCE INFORMATION



(57) Abstract: The present invention provides a '411xx' value added service to wireless users. The disclosed '411xx' service allows a mobile user who may be unfamiliar with their current geographic location to nevertheless obtain quick, accurate, and current information relating to the geographic area, e.g., different services in their current location, stores, libraries, gas stations, etc., via a mobile terminated (MT) short message system (SMS) message. In addition to the traditional '4-1-1' dialed digits, a mobile user would also dial a number (or numbers) representing a feature code for a particular service, e.g., nearby ATMs, or traffic information. Upon receiving a 411xx call, the MSC generates an ORREQ/TCAP trigger based on a translation of the requested service represented by the extra 'xx' digits. The 411xx call is terminated on the MSC after an audible whisper notice plays to the caller, e.g., "thank you for calling, your requested information will be sent momentarily".

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WIRELESS NETWORK LOCATION-BASED REFERENCE INFORMATION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to the field of wireless telecommunications. More particularly, it relates to a system and method for implementing a location-related information service in a wireless phone network, particularly with respect to short messaging systems (SMS), IS-41C, and location-enabled content pulls.

2. Background of Related Art

In todays world, wireless devices such as wireless telephones play an important role. Much information is but a phone call away.

One service that a wireless device can provide is information relating to a particular area. For instance, if one were traveling or otherwise in an unfamiliar area and wanted to locate a nice restaurant, perhaps a friendly inquisition of a gas station attendant might be helpful. Or, advertising signs might be the basis for selection of a good meal. A phone book is also a conventional way to find a particular service.

Wireless devices have provided the ability to determine the location of services in an area much more conveniently. For instance, one existing wireless device technology uses mobile originated short messaging system (SMS) techniques. In this conventional technique, a user drafts and sends a text message to a particular service to which they subscriber. The text message that the user writes must include the type of content desired, together with basic information regarding a broadly defined location of the user, e.g., zip code, city or state.

Unfortunately, conventional techniques require the user to know their geographic location at any particular time, and to enter

that geographic location as well as the particular type information sought via their mobile originated short message system (SMS) service. This knowledge is often difficult if not impossible to obtain accurately, and the required inputs are cumbersome and extensive.

There is a need for a mobile system that is capable of quick, accurate, and easily obtained location-based information.

SUMMARY OF THE INVENTION

In accordance with the principles of the present invention, a method and apparatus for providing location-based reference information in a wireless network comprises receiving an information telephone call from a subscriber. A telephone number initiating the telephone call includes at least one auxiliary digit beyond those associated with the information telephone call. A location-based wireless service is used to obtain a location of the subscriber. A short message relating to the location is retrieved based on requested information associated with the auxiliary digit(s). The retrieved short message is transmitted to the subscriber.

BRIEF DESCRIPTION OF THE DRAWINGS

Features and advantages of the present invention will become apparent to those skilled in the art from the following description with reference to the drawings, in which:

Fig. 1 shows the four main components of an exemplary 411xx system in accordance with the principles of the present invention.

Fig. 2 is an exemplary 411xx call flow ladder diagram for the exemplary 411xx system shown in Fig. 1.

Fig. 3 shows an exemplary 411xx application internal call flow for the exemplary 411xx system shown in Fig. 1.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

The present invention provides a '411xx' value added service to wireless users. The disclosed '411xx' service allows a mobile user who may be unfamiliar with their current geographic location to nevertheless obtain desired information.

In accordance with the principles of the present invention, a mobile user is provided with quick, accurate, and current information relating to the geographic area, e.g., different services in their current location, stores, libraries, gas stations, etc., via a mobile terminated (MT) short message system (SMS) message.

The present invention is a variant of the traditional directory assistance information service call 4-1-1. In accordance with an embodiment of the present invention, in addition to the traditional '4-1-1' dialed digits, a mobile user would also dial a number (or numbers) representing a feature code for a particular service. Example services might be 'nearby automated teller machines (ATMs)', or 'local traffic information'.

The 'xx' in the '411xx' service name represents two digits by way of example only. More than 2 extra digits may be implemented within the principles of the present invention, as may only a single extra digit in extremely simple systems.

Upon receiving a 411xx call, the mobile switching center (MSC) generates an ORREQ/TCAP trigger based on a translation of the requested service represented by the extra 'xx' digits. For a GSM system, this could be an ISUP based trigger, or a GSM message such as initialDP.

The 411xx call is terminated on the MSC after an audible whisper notice plays to the caller, e.g., "thank you for calling, your requested information will be sent momentarily".

Auxiliary benefits arise from the present invention as well. For instance, by virtue of terminating a request for services call at the relevant MSC, long distance charges are likely avoided. Moreover, in

many subscriber plans, no airtime charges to the subscriber would apply.

Fig. 1 shows four main components of an exemplary 411xx system in accordance with the principles of the present invention.

In particular, as shown in Fig. 1, an exemplary 411xx system has four major components: an application handling mobile switching center (MSC) feature code translations **102**, a location system **104**, a Short Messaging System (SMS) system **106**, and a content provider **108**.

In operation, as shown in step 1 of Fig. 1, a subscriber **101** requests directed information by dialing '411xx' on his or her wireless telephone. The 411xx dialed number comprises lead digits of '411' (traditionally a telephone number for phone number information), followed by two (or more) trailing digits (i.e., 'XX').

In step 2, the 411xx telephone call is passed in an ORREQ/TCAP message to the location system **104**, and then on to the SMS system **106** as shown in step 3.

In step 4, the SMS system **106** requests content from the relevant content provider **108**.

In step 5, the content provider **108** packages the requested content information into an SMS message back to the SMS system **106**.

In step 6, the SMS system **106** forwards the SMS message including the requested content information to the MSC **102** servicing the subscriber **101**.

In step 7, the SMS message response is delivered to the subscriber **101** from the MSC **102**.

Step 8 depicts TDR messages being transmitted by the SMS system **106** to the billing mediation server **110**.

Fig. 1 also depicts a step 0, which relates to the use of a 411xx service in conjunction with advertising. In this application, once a subscriber sees, hears or is otherwise informed of particular 411xx

information via advertising, he or she becomes induced into dialing the relevant 411xx telephone number.

Fig. 2 is an exemplary 411xx call flow ladder diagram for the exemplary 411xx system shown in Fig. 1. This is an ANSI-only call, and is used for exemplary purposes only. The present invention relates equally to GSM call flow.

In particular, as shown in step **221**, a subscriber **101** makes a phone call with 411xx dialed digits, that is transmitted to the servicing MSC **102**.

In step **222**, an ORREQ INVOKE message is transmitted from the MSC **102** to a STP **202**, with relevant parameters for an otherwise conventional ORREQ INVOKE message, including [BILLID, MIN, ESN, MSCID, DGTSDIAL, ORIGTRIG, and TRANSCAP]

In step **223**, the STP **202** passes the ORREQ INVOKE message to an SCP 411 **204**. The SCP 411 **204** returns an ORREQ RETURN RESULTS message with relevant parameters [identifier, Length, AccessDeniedReason, and ActionCode]

In step **225**, the STP **202** passes the ORREQ RETURN RESULTS message with relevant parameters [AccessDeniedReason and ActionCode] to the MSC **102**.

In step **227**, the SCP **204** sends a SUBMIT_SM message to the relevant SMPP server **206** including relevant parameters, e.g., [service_type, source_addr_ton, source_addr_npi, source_addr, destination_addr_ton, destination_addr_npi, destination_addr, esm_class, protocol_id, priority_flag, schedule_delivery_time, validity_period, registered_delivery, replace_if_present_flag, data_coding, sm_default_mg_id, sm_length, short_message, user_message_reference, sar_msg_ref_num, sar_total_segments, sar_segment_seqnum]

In step **228**, the SMPP server **206** returns a SUBMIT_SM-RESPONSE message, including relevant parameters [command_length, command_id, command_status, sequence_number, and message_ID]

In step **229**, the SMPP server **206** transmits the SMPP MIN, Short Message to the subscriber **101**.

In step **230**, a SMPP Delivery Receipt is transmitted by the MSC **102** to the SMPP server **206**.

In step **231**, a DELIVER_SM message is transmitted by the SMPP server **206** to the SCP **204**, including relevant parameters [service_type, source_addr_ton, source_addr_npi, source_addr, dest_addr_ton, dest_addr_npi, destination_addr, esm_class, protocol_id, priority_flag, schedule_delivery_time, validity_period, registered_delivery, replace_if_present_flag, data_coding, sm_default_mg_id, sm_length, short_message, user_message_reference, and message_state]

In step **232**, the SCP **204** returns a DELIVER_SM-RESPONSE message back to the SMPP server **206**, including the relevant parameters [command_length, command_id, command_status, sequence_number, and message_ID]

Fig. 3 shows an exemplary 411xx application internal call flow for the exemplary 411xx system shown in Fig. 1.

In particular, as shown in step **321** of Fig. 3, an ORREQ INVOKE message is passed from the STP **301** to a 411 SCPapp **302**, including relevant parameters [BILLID, MIN, ESN, MSCID, DGTSDIAL, ORIGTRIG, and TRANSCAP]

In step **322**, an ORREQ RETURN RESULTS message is passed by the 411 SCPapp **302** back to the STP **301**, including relevant parameters [Identifier, Length, AccessDeniedReason, and ActionCode]

In step **323**, a NQUEUE message is transmitted by the 411 SCPapp **302** to the 411 Queue **303**, including relevant parameters [cellid, mobil_id, dialedDigits, mscid, billingid, and transTime]

In step **324**, the 411 SCPapp **302** transmits a NQUEUE message to a 411 internal queue **304**, including relevant parameters [cellid, mobil_id, dialedDigits, mscid, billingid, transTime]

In step **325**, a DQUEUE message is transmitted by the 411 queue **303** to the 411 content application **305**, including relevant parameters [cellid, mobil_id, dialedDigits, mscid, billingid, and transTime]

In step **326**, a DQUEUE message is transmitted by the 411 internal queue **304** to the 411 content application **305**, including relevant parameters [cellid, mobil_id, dialedDigits, mscid, billingid, and transTime]

In step **327**, an Internet API over TCP/IP message is transmitted by the content provider **307** back to the 411 content application **305**.

In step **328**, a DBSelect message is transmitted from a database **306** to the 411 content application **305**, including relevant parameters cellid, mobil_id, dialedDigits, mscid, billingid, transTime, contentCont, msg, and deliveryCode].

In step **329**, an NQUEUE message is transmitted from the 411 content application **305** to the SMPP queue **309**, including relevant parameters [cellid, mobil_id, dialedDigits, mscid, billingid, transTime, contentCont, msg, and deliveryCode]

In step **330**, a DQUEUE message is transmitted from the MSPP Queue **309** to the 411 back end **310**, including relevant parameters cellid, mobil_id, dialedDigits, mscid, billingid, transTime, contentCont, msg, deliveryCode, and SmppseqNum]

In step **331**, a NQUEUE message is transmitted from the 411 back end **310** to the DB Queue **308**, including relevant parameters cellid, mobil_id, dialedDigits, mscid, billingid, transTime, contentCont, msg, deliveryCode, and SmppseqNum]

In step **332**, a DBinsert message is transmitted from the 411 back end **310** to the database **306**, including relevant parameters [cellid, mobil_id, dialedDigits, mscid, billingid, transTime, contentCont, msg, deliveryCode, and SmppseqNum]

The present invention is applicable for any mobile device that supports mobile terminated SMS (MT SMS), or any wireless

telephone capable of receiving short message system (SMS), EMS or MMS messages. It has applicability with, e.g., call center based concierge services, and text based 4-1-1 services.

The inventive system is relatively easy and affordable for the mobile operator to implement.

In accordance with the principles of the present invention, the short messaging may be combined with audio passages based on the particular application.

While the invention has been described with reference to the exemplary embodiments thereof, those skilled in the art will be able to make various modifications to the described embodiments of the invention without departing from the true spirit and scope of the invention.

CLAIMS

What is claimed is:

1. A method of providing location-based reference information in a wireless network, comprising:

receiving an information telephone call from a subscriber, a telephone number initiating said telephone call including at least one auxiliary digit beyond those associated with the information telephone call;

using a location-based wireless service to obtain a location of said subscriber;

retrieving a short message relating to said location based on requested information associated with said at least one auxiliary digit; and

transmitting said retrieved short message to said subscriber.

2. The method of providing location-based reference information in a wireless network according to claim 1, wherein:

at least two auxiliary digits are included with said information telephone call.

3. The method of providing location-based reference information in a wireless network according to claim 1, wherein:

said information telephone call is initiated with dialed digits "4-1-1".

4. The method of providing location-based reference information in a wireless network according to claim 1, wherein:

said location of said subscriber is obtained using wireless or cellular network signaling.

5. The method of providing location-based reference information in a wireless network according to claim 1, wherein:

said obtained short message is transmitted to said subscriber substantially while said subscriber remains at said determined location.

6. The method of providing location-based reference information in a wireless network according to claim 1, wherein:

said location of said subscriber is determined using an angle of arrival of a wireless signal from said subscriber.

7. The method of providing location-based reference information in a wireless network according to claim 1, wherein:

said location of said subscriber is determined using a network generated location based on a centroid of a cell site sector's radio frequency (RF) polygon.

8. The method of providing location-based reference information in a wireless network according to claim 1, wherein:

said location of said subscriber is determined using a time difference of arrival of wireless signals from said subscriber.

9. The method of providing location-based reference information in a wireless network according to claim 1, wherein:

said location of said subscriber is determined using time of arrival of a wireless signal from said subscriber.

10. The method of providing location-based reference information in a wireless network according to claim 1, wherein:

said location of said subscriber is determined using the known location of a cell/sector servicing said subscriber.

11. A method of providing location-based reference information in a wireless network, comprising:

receiving an information telephone call from a subscriber, a telephone number initiating said telephone call including at least one auxiliary digit beyond those associated with the information telephone call;

using a location-based wireless service to obtain a location of said subscriber;

retrieving a short message relating to said location based on requested information associated with said at least one auxiliary digit; and

transmitting said retrieved short message to said subscriber.

12. The method of providing location-based reference information in a wireless network according to claim 11, wherein:

at least two auxiliary digits are included with said information telephone call.

13. The method of providing location-based reference information in a wireless network according to claim 11, wherein:

said information telephone call is initiated with dialed digits "4-1-1".

14. The method of providing location-based reference information in a wireless network according to claim 11, wherein:

said location of said subscriber is obtained using wireless or cellular network signaling.

15. The method of providing location-based reference information in a wireless network according to claim 11, wherein:

said obtained short message is transmitted to said subscriber substantially while said subscriber remains at said determined location.

16. The method of providing location-based reference information in a wireless network according to claim 11, wherein:

said location of said subscriber is determined using an angle of arrival of a wireless signal from said subscriber.

17. The method of providing location-based reference information in a wireless network according to claim 11, wherein:

said location of said subscriber is determined using a time difference of arrival of wireless signals from said subscriber.

18. The method of providing location-based reference information in a wireless network according to claim 11, wherein:

said location of said subscriber is determined using time of arrival of a wireless signal from said subscriber.

19. The method of providing location-based reference information in a wireless network according to claim 11, wherein:

said location of said subscriber is determined using the known location of a cell/sector servicing said subscriber.

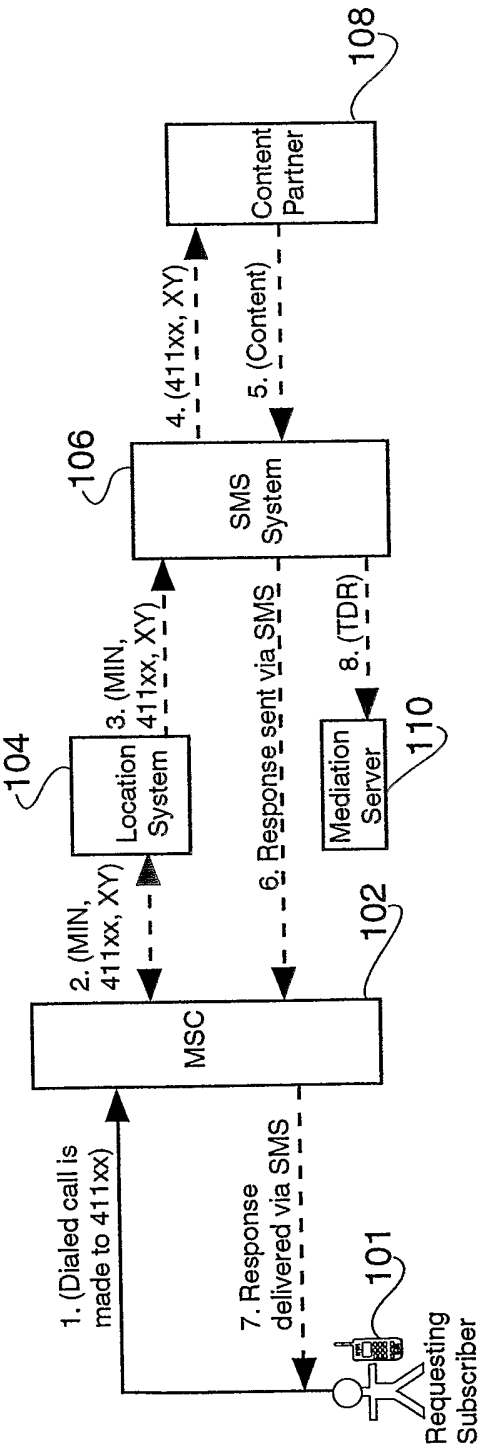
108
Content Partner
4. (411xx, XY)
5. (Content)
106
SMS System
3. (MIN, 411xx, XY)
6. Response sent via SMS
8. (TDR)
104
Location System
Mediation Server
110
2. (MIN, 411xx, XY)
102
MSC
1. (Dialed call is made to 411xx)
7. Response delivered via SMS
101
Requesting Subscriber
0. User sees advertising for 411xx service/

FIG. 1

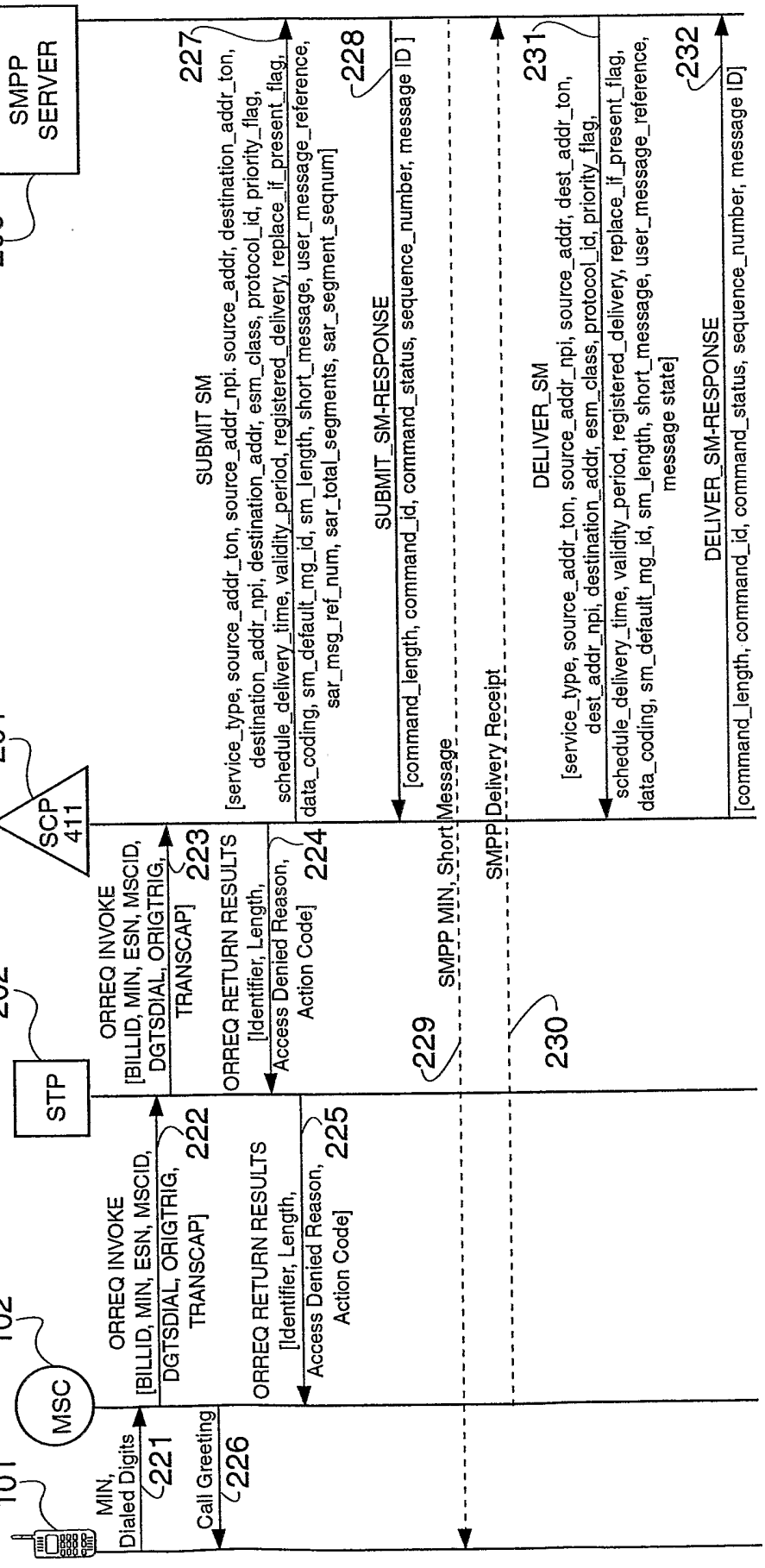
411xx Callflow Ladder Diagram
101
MSC
102
STP
202
SCP 411
204
SMPP SERVER
206
MIN, Dialed Digits
221
ORREQ INVOKE [BILLID, MIN, ESN, MSCID, DGTSDIAL, ORIGTRIG, TRANSCAP]
222
ORREQ RETURN RESULTS [Identifier, Length, Access Denied Reason, Action Code]
225
Call Greeting
226
ORREQ INVOKE [BILLID, MIN, ESN, MSCID, DGTSDIAL, ORIGTRIG, TRANSCAP]
223
ORREQ RETURN RESULTS [Identifier, Length, Access Denied Reason, Action Code]
224
SUBMIT SM
227
[service_type, source_addr_ton, source_addr_npi. source_addr, destination_addr_ton, destination_addr_npi, destination_addr, esm_class, protocol_id, priority_flag, schedule_delivery_time, validity_period, registered_delivery, replace_if_present_flag, data_coding, sm_default_mg_id, sm_length, short_message, user_message_reference, sar_msg_ref_num, sar_total_segments, sar_segment_seqnum]
SUBMIT_SM-RESPONSE
228
[command_length, command_id, command_status, sequence_number, message ID]
SMPP MIN, Short Message
229
SMPP Delivery Receipt
230
DELIVER_SM
231
[service_type, source_addr_ton, source_addr_npi, source_addr, dest_addr_ton, dest_addr_npi, destination_addr, esm_class, protocol_id, priority_flag, schedule_delivery_time, validity_period, registered_delivery, replace_if_present_flag, data_coding, sm_default_mg_id, sm_length, short_message, user_message_reference, message state]
DELIVER_SM-RESPONSE
232
[command_length, command_id, command_status, sequence_number, message ID]

FIG. 2

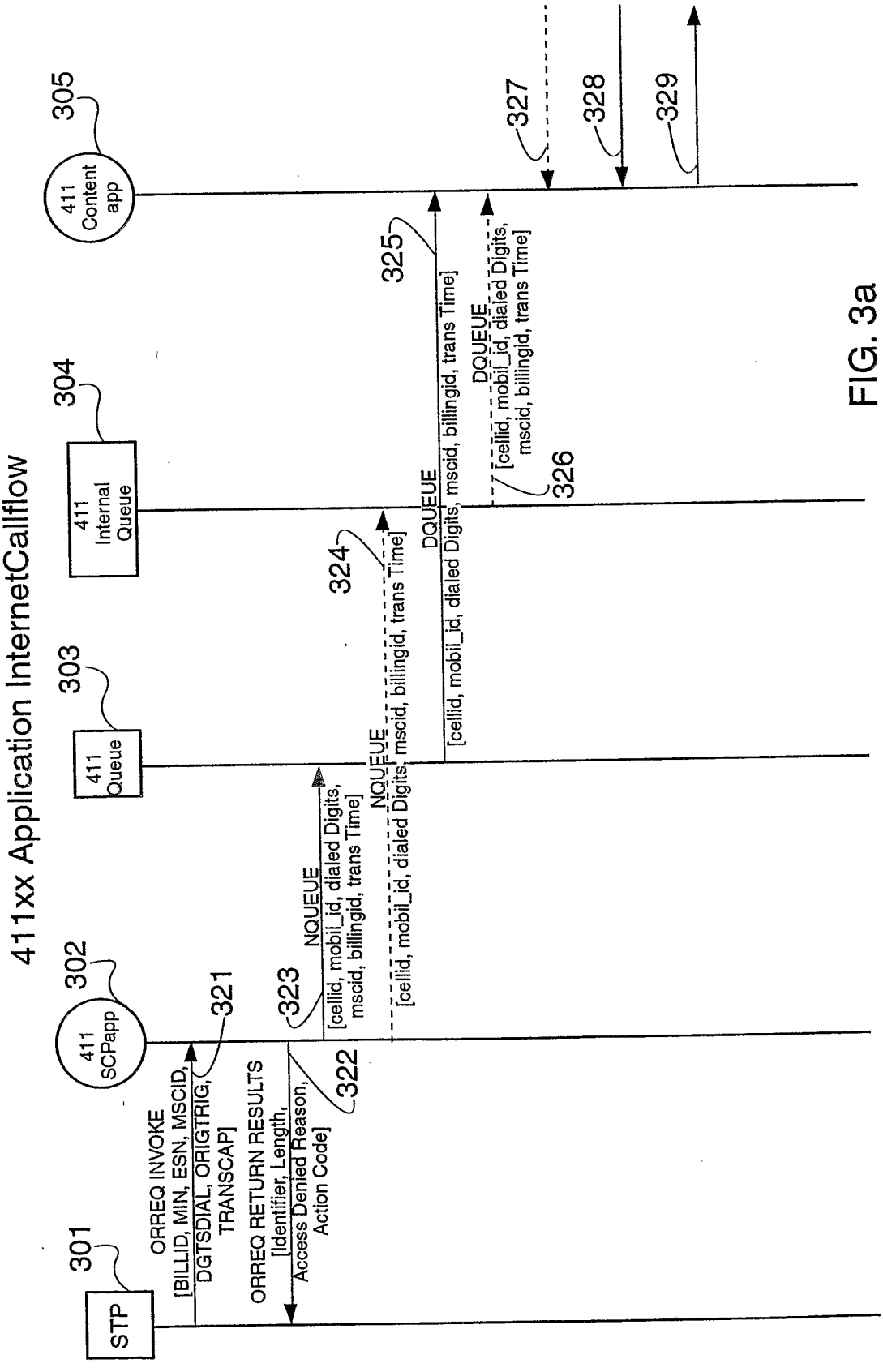
411xx Application InternetCallflow
301
STP
302
411 SCPapp
303
411 Queue
304
411 Internal Queue
305
411 Content app
ORREQ INVOKE [BILLID, MIN, ESN, MSCID, DGTSDIAL, ORIGTRIG, TRANSCAP]
ORREQ RETURN RESULTS [Identifier, Length, Access Denied Reason, Action Code]
NQUEUE [cellid, mobil_id, dialed Digits, mscid, billingid, trans Time]
NQUEUE [cellid, mobil_id, dialed Digits, mscid, billingid, trans Time]
DQUEUE [cellid, mobil_id, dialed Digits, mscid, billingid, trans Time]
DQUEUE [cellid, mobil_id, dialed Digits, mscid, billingid, trans Time]
321
322
323
324
325
326
327
328
329

FIG. 3a

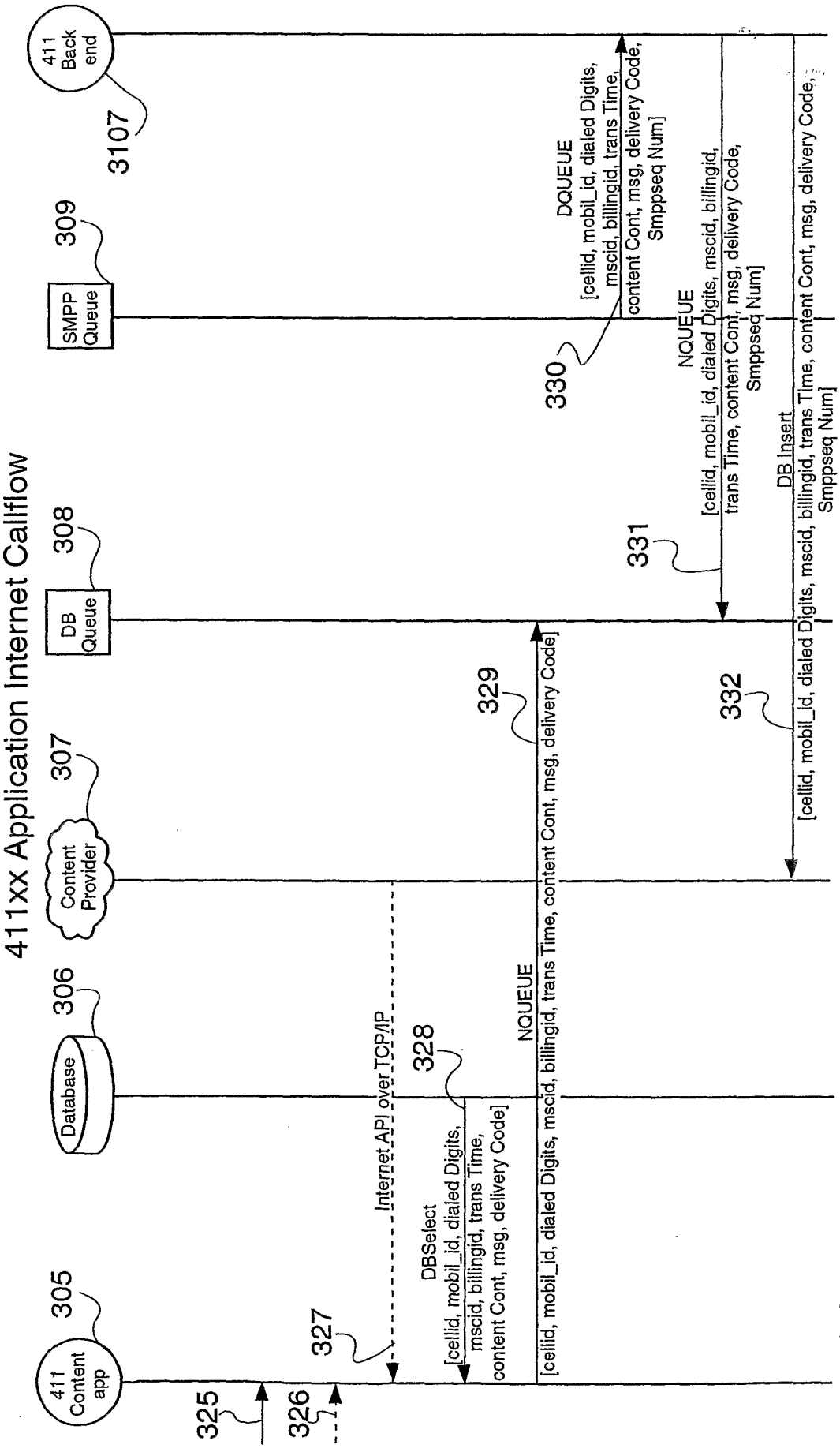
411xx Application Internet Callflow
411 Content app
305
Database
306
Content Provider
307
DB Queue
308
SMPP Queue
309
411 Back end
3107
325
326
327
Internet API over TCP/IP
DBSelect
[cellid, mobil_id, dialed Digits, mscid, billingid, trans Time, content Cont, msg, delivery Code]
328
NQUEUE
[cellid, mobil_id, dialed Digits, mscid, billingid, trans Time, content Cont, msg, delivery Code]
329
DQUEUE
[cellid, mobil_id, dialed Digits, mscid, billingid, trans Time, content Cont, msg, delivery Code, Smppseq Num]
330
NQUEUE
[cellid, mobil_id, dialed Digits, mscid, billingid, trans Time, content Cont, msg, delivery Code, Smppseq Num]
331
DB Insert
[cellid, mobil_id, dialed Digits, mscid, billingid, trans Time, content Cont, msg, delivery Code, Smppseq Num]
332

FIG. 3b