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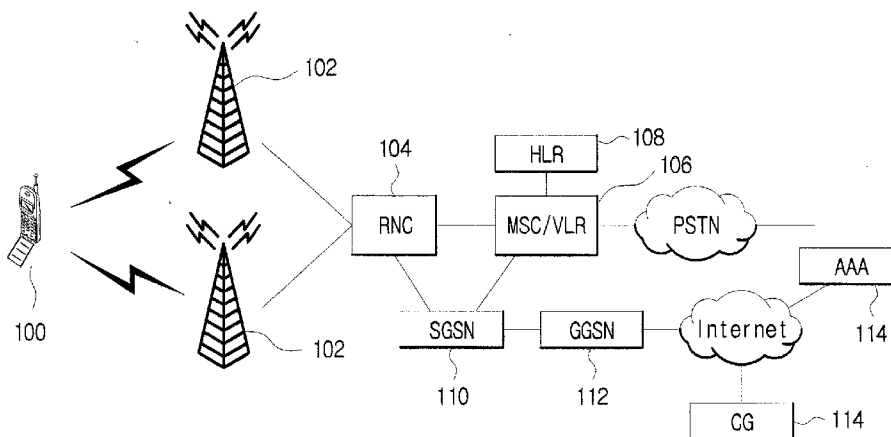
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(54) Title: METHOD AND SYSTEM FOR CHARGING IN MULTI-PDP ENVIROMENT



(57) Abstract: The present invention is related to a charging method and system in a multi-PDP context environment. The method, which is carried out in a GGSN connected to an SGSN and an AAA server via a network, includes (a) receiving a PDP context creating request message from the SGSN if there is a request for activating an additional PDP context from a subscriber's terminal created with at least one PDP context; (b) linking with the AAA server to authenticate a subscriber and generating a charging ID; (c) creating an account session ID of the additional PDP context if the authentication is successful, and creating a first account multi-session ID as the same value as the account session ID of a fist PDP context; and (d) transferring an account start request including the account session ID and the first multi-session ID to the AAA server, whereas the AAA server recognizes the receiving of the account start request of the additional PDP context as a charging in the same call accessing. With the present invention, charging data of a plurality of PDP contexts can be correlated to each other in the multi-PDP context environment.

WO 2007/091819 A1

【DESCRIPTION】**【Invention Title】**

METHOD AND SYSTEM FOR CHARGING IN MULTI-PDP

ENVIROMENT

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【Technical Field】

The present invention is related to a charging method and system in a multi-PDP environment, more specifically to a method and system that can efficiently perform the charging in a WCDMA GPRS network providing various multi-PDP context environments.

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【Background Art】

The wideband code division multiple access (WCDMA), which refers to a method using a wider band than a CDMA method, which uses a pseudo-noise code indigenous to a subscriber's communication channel, is little affected by frequency-selective fading due to the use of a wideband. If the same data is transmitted, the bandwidth is increased, thereby increasing the processing gain, and thus the interference is decreased as much as the increase of the processing gain, to thereby increase the capacity.

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Also, since the WCDMA can decompose a multipath by using a RAKE

receiver, even a micro cell can overcome the electric wave delay of indoor surroundings.

The WCDMA has the high bandwidth efficiency per 1 mega Hz bandwidth, to thereby have the benefit in capacity and increase the processing gain. Accordingly, the cost for realizing can be decreased by reducing the size of a power amplifier, and the power
5 consumption and size of a terminal can be decreased by reducing the size of a power amplifier. Thus, the WCDMA is a third generation communication system, which is employed in Japan and Europe as well as Korea.

This WCDMA technology guarantees high speed transmission of packet data.

The general packet radio service (GPRS) defines a network structure and service for
10 providing packet data service.

A mobile station (MS) can receive the packet data service from a WCDMA GPRS network through a PDP context.

The WCDMA GPRS network provides various multiple packet data protocol (PDP) context environments. For example, the multiple PDP context environments can
15 include watching a particular video (a second PDP context) of Internet navigation (a first PDP context) or separating an IMS SIP signal and actual traffic (e.g. voice, data, and message) in the case of IP multimedia subsystem (IMS).

Also, in the multiple PDP context environments, an MMS can be used by opening a separate PDP context besides the current PDP context if the MMS message is
20 received while browsing or downloading. Moreover, a separate PDP context can be

used to transmit separate data, such as a message or a picture, while carrying out voice or video communication, like VoIP.

In the multiple PDP context environments, the PDP context can be classified into a secondary PDP context, sharing an access point number (APN) and an IP address
5 allotted to the subscriber, and a primary PDP context, allotting a separate APN and a new IP address.

A packet corresponding to each PDP context is gathered by a serving GPRS support node (SGSN) and a gateway GPRS support node (GGSN) by using an international mobile subscriber identity (IMSI) and a network layer service access point
10 identifier (NSAPI) as a key.

At this time, whenever a call or a session is created, a key for charging allots a charging ID to provide it to the SGSN in the GGSN. The charging ID is transferred to a charging gateway (CG) and an authentication authorization accounting (AAA). The CG and the AAA perform the charging by using the charging ID to charge for the packet
15 received by the subscriber.

However, the charging ID functions to merely identify each PDP session. The charging ID is not able to cover various sessions (PDP contexts) generated after the subscriber creates a call.

In other words, using only the charging ID in accordance with the prior art is
20 not able to make it to correlate each session in the multiple PDP context environment.

Typically, a network operator can not only share the APN but also provide variously differentiated services by using strong points of the multiple PDP context environment and making a difference in the quality of service (QoS) per PDP context. The service can be completely separated by changing the APN and allotting a separate
5 IP address.

The subscriber attempts to make a call in the multiple PDP context environments having the aforementioned benefits. Then, the subscriber employs the multiple PDP context environments of the WCDMA GPRS to efficiently use various services provided by the operator. However, in accordance to the prior art, since the key
10 for covering the multiple PDP context environments together is not standardized, the charging information provided to the subscriber is calculated as if various calls are used.

Of course, the combination of the subscriber's number, the IP address allotted to the subscriber and the usage time can be estimated as the charge for the PDP contexts of the same call. However, this kind of estimation is improper for charging, in which
15 charging reliability is an important factor.

Also, it can be important for the operator to identify whether the subscriber accesses a call many times or the subscriber requests various PDP contexts after accessing the call one time, in order to develop and provide a separate product for various fee patterns. For example, the subscriber may access the call twice and then use
20 each of the services A and B, or may access the call one time and generate two PDP

contexts and then use the services A and B.

Especially, since the fee pattern of accessing one call and using various PDP contexts becomes a current type service, this pattern should have been considered differently in terms of providing the service and charging for the service, such as
5 prepayment deduction. However, the prior art has not been able to identify the request of various PDP contexts, to thereby be unable to reflect the aspects as separate consideration.

When charging, the prior art has also not been able to identify the request of various PDP contexts after accessing one call because there has been no parameter
10 currently standardized when linking with a charging gate.

【Disclosure】

【Technical Problem】

Accordingly, the present invention, which is designed to solve the
15 aforementioned problems, provides a charging method and system in a multi-PDP environment that can efficiently perform the charging in the case of accessing one call and requesting various PDP contexts.

Also, the present invention provides a charging method and system in a
multi-PDP environment that can be applied for any one of a RADIUS charging method
20 and a CG charging method.

In addition, the present invention provides a charging method and system in a multi-PDP environment that can be also applied in a CDMA environment using multiple service instances.

5 **【Technical Solution】**

To solve the above problems, according to an embodiment of the present invention, there is provided a charging method in a multi-PDP environment, which is carried out in a GGSN connected to an SGSN and an AAA server via a network including (a) receiving a PDP context creating request message from the SGSN if there
10 is a request for activating an additional PDP context from a subscriber's terminal created with at least one PDP context; (b) authenticating a subscriber by linking with the AAA server, and generating a charging ID; (c) creating an account session ID of the additional PDP context if the authentication is successful, and creating a first account
15 multi-session ID as the same value as the account session ID of a first PDP context; and (d) transferring an account start request including the account session ID and the first multi-session ID to the AAA server, whereas the AAA server recognizes the receiving of the account start request of the additional PDP context as a charging in the same call
20 accessing.

Preferably, the account session ID can be created as a combination of an IP
20 address of the GGSN and the charging ID.

The method of the present invention can further include receiving at least one PDP context deleting request message from the SSGN; and transferring a second account multi-session ID of a deleted PDP context to the AAA server after deleting the PDP context, the second account multi-session ID being set as the first account

5 multi-session ID created when the deleted PDP context is activated.

At this time, the PDP context is preferably deleted based on a teardown indicator received from the SSGN.

Also, in the present invention, the GGSN is connected to a charging gateway, and preferably, the method further includes creating a multi-charging ID as a charging

10 ID of the first PDP context of the additional PDP context

According to the present invention, the method can further include transferring a message having a multi-charging ID field of a deleted PDP context to the charging gateway after deleting the additional PDP context.

At this time, the message can be a data record transfer request message.

15 According to another embodiment of the present invention, there is provided a recorded medium having recorded a program for executing the method, the recorded medium being readable by a computer.

According to another embodiment of the present invention, there is provided a GGSN, connected to an SGSN and an AAA server through a network, the GGSN

20 including an SGSN communication unit, receiving a PDP context creating request

message from the SGSN if there is a request for activating an additional PDP context from a subscriber's terminal created with at least one PDP context; an AAA server communication unit, authenticating a subscriber by linking with the AAA server and receiving and transmitting a message from and to the AAA server; a charging ID
5 generating unit, generating a charging ID for the additional PDP context if the authentication is successful; and an account session ID generating unit, creating an account session ID of the additional PDP context as a combination of an IP address of the GGSN and the charging ID, and creating a first account multi-session ID as the same value as the account session ID of a first PDP context, whereas the AAA server
10 communication unit transfers an account start request including the account session ID and the first account multi-session ID to the AAA server, and the AAA server recognizes the receiving of the account start request of the additional PDP context as a charging in the same call accessing.

At this time, preferably, the session ID generating unit transfers a second
15 account multi-session ID of a deleted PDP context to the AAA server if at least one PDP context deleting request message is received from the SGSN, and sets a second account multi-session ID as the first account multi-session ID of the deleted PDP context.

Also, the GGSN preferably further includes a CG communication unit, being
20 connected to a charging gateway and receiving and transmitting a message; and a

multi-charging ID field generating unit, creating a multi-charging ID as a charging ID of a first PDP context of the additional PDP context.

According to another embodiment of the present invention, there is provided a WCDMA GPRS system, which is a charging system in a multi-PDP environment, the system including an SSGN, receiving a request for activating an additional PDP context from a subscriber's terminal created with at least one PDP context; a GGSN, authenticating a subscriber if a request message for activating the additional PDP context is received corresponding to the activating request, creating an account multi-session ID of the additional PDP context as a charging ID, an account session ID and the account session ID of a first PDP context, and transmitting an account start request including the ID; and an AAA server, recognizing the receiving of the account start request of the additional PDP context as a charging in the same call accessing.

【Description of Drawings】

FIG. 1 illustrates the structure of a mobile communication network in accordance with an embodiment of the present invention;

FIG. 2 is a block diagram illustrating the inside of a GGSN in accordance with an embodiment of the present invention;

FIG. 3 and FIG. 4 are flow charts illustrating a service processing operation in accordance with the present invention;

FIG. 5 is a flow chart illustrating an operation of generating an account session ID in accordance with an embodiment of the present invention; and

FIG. 6 is a flow chart illustrating an operation of generating a multi-charging field in accordance with another embodiment of the present invention.

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【Mode for Invention】

Hereinafter, some embodiments of a charging method and system in a multi-PDP environment in accordance with the present invention will be described in detail with reference to the accompanying drawings.

10

FIG. 1 illustrates the structure of a mobile communication network in accordance with an embodiment of the present invention.

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As illustrated in FIG. 1, the mobile communication network of the present invention can include a node 102, a radio network controller (RNC) 104, a mobile switching center (MSC) 106, a home location register (HLR) 108, a serving GPRS support node (SGSN) 110, a gateway GPRS support node (GGSN) 112, an authentication authorization accounting (AAA) server 114 and a charging gateway (CG) 116. A subscriber's terminal, which is a mobile station (MS) 100, can be configured to primarily connect to the node 102 to receive various services.

20

Here, the node 102 and the RNC 104 pertain to a wireless access network group, and the MSC 106 and the HLR 108 pertain to a circuit switching core network

group. Also, the SGSN 110 and the GGSN 112 pertain to a packet switching core network group.

In the wireless access network group, a limited wireless resource is efficiently used to provide a high speed packet data service, and functions to satisfy various request conditions for quality of service are performed in a multimedia system.

The MSC 106 pertained to the circuit switching core network group performs the central control function to process a signal received and transmitted from each RNC 104 and to control the RNC 104 to be efficiently operated.

The HLR 108 stores all kinds of information related to a subscriber and information related to a subscriber's additional service and an intelligent network service provided to the subscriber.

The SGSN 110 and the GGSN 112, pertained to the packet switching core network group, provide an IP-based protocol link to be connected with the Internet in order that the MS 100, which is a wireless mobile communication terminal, receives the packet switching service.

For this, the SGSN 110 is connected to various wireless network controllers 104 and manages the mobility of the MS 100 and packet session. With the GGSN, the SGSN 110 creates the PDP context and transfers a protocol data unit by use of tunneling.

Also, the SGSN 110 can perform an IP routing and be connected to a switch to

perform the interaction such as the location registration of the MS 100.

The GGSN 112, which is a gateway directly accessing a packet network and the Internet, maintains routing information with the SGSN 110 and an external network and performs the tunneling and IP routing functions.

5 The AAA server 114 covers authentication, authorization and accounting related to a packet data network and performs a charging function by using the remote access dial-in user service (RADIUS) protocol.

 The charging function can be performed by the charging gateway 116 independently or simultaneously with the AAA server 114. In case that the GGSN 112
10 accesses a call of the MS 100, the AAA server 114 and the charging gateway 116 receive a predetermined message and start to gather charging data, and perform the charging for the usage of packet data till the deletion of the call is requested.

 In the conventional charging process, if the subscriber requests to create a plurality of PDP contexts based on one call accessing, since the creating of the plurality
15 of PDP contexts is not able to be correlated to the charging, the charging is performed as if the call is separately accessed. However, in accordance with an embodiment of the present invention, although there is a request for creating an additional PDP context after the AAA server 114 and the charging gateway 116 access a call, this can be
20 considered as the charging for the same call.

 If activation of the PDP context is requested by the subscriber in order to have

the MS 100 receive a packet call service, the SGSN 110 transfers the subscriber's request to the GGSN 112.

At this time, the GGSN 112 is linked with the AAA server 114 to authenticate the subscriber. If the subscriber is successfully authenticated, a charging ID is generated, and at the same time, a predetermined account session ID for identifying the created session is created.

Preferably, the account session ID can be created as a combination of the charging ID and the IP address created for the GGSN.

The GGSN 112 transfers an account start request including the charging ID to the AAA server 114 after creating the charging ID. When the account start request is received, the AAA server 114 starts to gather the charging data of the corresponding subscriber.

As described above, since the WCDMA GPRS provides the multiple PDP context environments, the subscriber can request to create an additional PDP context after a call is accessed. If there is this request, the GGSN performs the generating operation of the subscriber authentication, charging ID and account session ID of each additional PDP context.

Also, the GGSN 112 of the present invention adds a predetermined parameter to the additional PDP context such that the AAA server 112 can recognize the additional PDP context is created in the same call accessing.

An additional parameter of the present invention is an account multi-session ID.

The GGSN 112 creates the account multi-session ID of the additional PDP context as the account session ID of a first PDP context and transfers to the AAA server 114 the account start request including the account session ID of the additional PDP context and
5 the account multi-session ID.

The AAA server 114 recognizes that the account start request is the creating of a different PDP context in one call session, by verifying that the account multi-session ID of the additional PDP context is the same as the account session ID of the first PDP context, previously transferred. Then, the AAA server 114 starts to gather
10 corresponding charging data. Later, the plurality of PDP contexts can be correlated to each other.

Meanwhile, the charging process can be performed through the charging gateway. The conventional charging gateway performs the charging process based on the charging ID generated as described above. In accordance with the present invention,
15 however, the charging gateway can perform the charging process by using the additional parameter as well.

If the subscriber who accesses a call requests to create the additional PDP context, the GGSN 112 creates a separate multi-charging ID in addition to generating the charging ID of the additional PDP context.

20 At this time, the multi-charging ID of the additional PDP context can be the

charging ID that is associated with the first PDP context in one call accessing. If a message having a multi-charging ID field is received, the charging gateway recognizes that this is the charging in the same call accessing to perform the charging process.

Then, if the subscriber requests to delete at least one PDP context, the GGSN
5 112 deletes the pertinent PDP context and then transfers an account stop request to the AAA server 114. At this time, the account stop request can include the account multi-session ID of the deleted PDP context.

At this time, the account multi-session ID of the deleted PDP context is created as the same value as the account session ID of the previously created first PDP context.
10 Accordingly, the AAA server 114 recognizes that the deleted PDP context is the context created in one call accessing and performs the corresponding charging process.

Also, when deleting the PDP context, the GGSN 112 informs the charging gateway 116 that at least one deleted PDP context is the charging for the same call/session, by transferring a data record transfer request message including the
15 multi-charging ID to the charging gateway 116.

In accordance with the present invention, the parameter, provided as described above, functions as the only key for identifying the overall charging session such that a unit processing the charging can recognize a plurality of PDP contexts belong to the context in one call accessing. Accordingly, a more efficient charging service can be
20 provided to the subscriber.

FIG. 2 is a block diagram illustrating the inside of the GGSN in accordance with an embodiment of the present invention.

As illustrated in FIG. 2, the GGSN of the present invention can include an
5 SGSN communication unit 200, a charging ID generating unit 202, an account session
ID generating unit 204, a multi-charging ID field generating unit 206, an AAA server
communication unit 208 and a CG communication unit 210.

The SGSN communication unit 200, which is configured to be connected to the
SGSN 110, receives a request message of creating a PDP context and a request message
10 of deleting a PDP context, transferred by the SGSN 110 according to the request of the
subscriber's terminal 100, and transmits responses according to the messages to the
SGSN 110.

The charging ID generating unit 202 generates a charging ID of creating the
pertinent PDP context through linking with the AAA server 114 in the case of succeeding
15 in the authentication of the subscriber.

The charging ID can be transferred to the charging gateway 116.

After the GGSN 112 is linked with the AAA server 114 through the AAA
server communication unit 208 and performs the authentication process, the account
session ID generating unit 204 generates the account session ID, which becomes basic
20 data for gathering charging data in the case of succeeding in the authentication.

Preferably, the account session ID can be generated as a combination of the charging ID and the IP address of the GGSN 112.

In the meantime, the session ID generating unit 204 generates an account multi-session ID independently of the account session ID. At this time, the account multi-session ID is created as the account session ID of a first PDP context.

The session ID generating unit 204 generates the account multi-session ID in case not only that the subscriber requests to create the PDP context but also that the subscriber requests to delete the PDP context. The session ID generating unit 204 sets the pertinent account multi-session ID as the account session ID of the previous first PDP context to transfer it to the AAA server 114.

Accordingly, the AAA server 114 can recognize that this is the charging in the same call accessing.

As described above, the charging can be performed through the charging gateway 116. If the subscriber requests to delete at least one PDP context, the multi-charging ID field generating unit 206 generates a multi-charging ID field independently of the charging ID and writes the charging ID of the first PDP context in the multi-charging ID field.

The data record transfer request message including the multi-charging ID field can be transferred to the charging gateway 116 through the CG communication unit 210. When the charging gateway 116 receives the message, the charging gateway 116

performs the charging by recognizing that each PDP context is the context in one call
accessing.

FIG. 3 and FIG. 4 are flow charts illustrating a service processing operation in
5 accordance with the present invention.

FIG. 3 and FIG. 4 illustrate the overall processes of a case in which a
subscriber's terminal firstly requests a packet call service and then requests to create an
additional PDP context. Referring to FIG. 3 and FIG. 4, the MS 100 transfers a PDP
context activating request to the SGSN 110 in a step represented by 300. The SGSN 110
10 then transmits a PDP context creating request to the GGSN 112 in a step represented by
302.

The GGSN 112 transmits an access request for authenticating the subscriber to
the AAA server 114 in a step represented by 304. In the case of succeeding in the
authentication, the AAA server 114 transmits the response to whether the authentication
15 is successful to the GGSN 112 in a step represented by 306.

The GGSN 112 performs a predetermined internal processing operation such as
IP allotment. Then, the SGSN 110 transmits to the SGSN 110 the response to the
request for creating the additional PDP context in a step represented by 308. At this
time, in the case of succeeding in the authentication, the GGSN 112 can generate a
20 charging ID by the creating of the PDP context and include the generated charging ID in

the response of the step represented by 308.

The SGSN 110 transmits an activated PDP context accepting message to the MS 100 in a step represented by 310. Accordingly, a packet data service can be performed between the MS 100 and the GGSN 112. The MS 100 can receive and
5 transmit data from and to an application server in a step represented by 316.

Meanwhile, the GGSN 112 transfers an account start request to the AAA server 114 in the case of succeeding in the authentication in a step represented by 312. The AAA server 114 transmits a response to the account start request to the GGSN 112 in a step represented by 314.

10 At this time, the account start request can include the account session ID and the account multi-session ID. The account session ID can be created as a combination of the charging ID and the IP address the GGSN 112. The account multi-session ID can be created as the same value as the account session ID.

Then, the subscriber can request to activate the additional PDP context to
15 receive another service. In this case, the MS 100 transmits a secondary PDP context activating request or an additional main PDP context activating request to the SGSN 110 in a step represented by 318.

If the additional main PDP context activating request is received from the MS 100, the aforementioned steps (represented by 302 through 316) are repeatedly
20 performed.

In accordance with the present invention, in the case of creating the additional PDP context, the GGSN 112 creates the account multi-session ID of the additional PDP context as the same value as the account session ID of a first PDP context and transmits it to the AAA server 114 in a step represented by 322.

5 The AAA server 114 can recognize that a plurality of PDP contexts having identical account multi-session IDs are the PDP contexts in one call accessing. When charging data is generated, the charging data of the plurality of PDP contexts can be correlated with each other.

In the meantime, if the subscriber requests to delete the call, the MS 100
10 transmits a request to deactivate at least one PDP context to the SGSN 110 in a step represented by 330. The SGSN 110 transmits a PDP context deleting request to the GGSN 112 in a step represented by 332.

At this time, the GGSN 112 deletes the PDP context, and then, transmits a response to delete the PDP context to the SGSN 110 in a step represented by 334. The
15 SGSN 110 transmits a deactivated PDP context accepting message to the MS 100 in a step represented by 336.

In the aforementioned PDP context deleting operation, the GGSN 112 transmits a data record transfer request to charging gateway 116 in a step represented by
338.

20 In accordance with the present invention, not only is the charging ID of the

deleted PDP context added to the data record transfer request, but also the multi-charging ID field is added. The multi-charging ID field is written with the charging ID of the first PDP context such that the charging gateway 116 can identify the PDP context in the same call accessing among the plurality of PDP contexts and

5 perform the charging.

Also, when the PDP context is deleted, the GGSN 112 transmits an account stop request to the AAA server 114 in a step represented by 340. This request can also include the multi-session ID, which is created as the account session ID of the first PDP context such that the AAA server 114 can identify the PDP context in the same call

10 accessing among the plurality of PDP contexts.

Then, the charging gate way 116 and the AAA server 114 transmit a response according to the receiving of the message to the GGSN 112 in steps represented by 342 and 344.

Meanwhile, the subscriber can request to delete another PDP context. If the

15 subscriber requests to deactivate another PDP context in a step represented by 344, the same steps as the aforementioned steps (represented by 332 through 344) are repeatedly performed in steps represented by 348 through 360.

FIG. 5 is a flow chart illustrating the process of generating the account session

20 ID in accordance with an embodiment of the present invention.

FIG. 5 illustrates a process performed in case that a subscriber requests to create a PDP context. Referring to FIG. 5, the GGSN 112 receives a request to create a first PDP context from the SGSN 110 in a step represented by 500.

Then, the authentication is performed through linking with the AAA server. If the authentication is successful, the charging ID of the PDP context is created in a step represented by 502, and an account session ID is created as a combination of the charging ID the IP address of the GGSN in a step represented by 504.

Also, the GGSN 112 sets an account multi-session ID, included in a message transmitted to the AAA server 114, as the same value as the account session ID in a step represented by 506.

On the other hand, in one call accessing, the subscriber can request to activate an additional PDP context. If a request to activate the additional PDP context is received in a step represented by 508, the GGSN 112 sets the account multi-session ID of the additional PDP context as the same value as the account session ID of a first PDP context in a step represented by 512 and provide it to the AAA server in addition to repeatedly performing the aforementioned steps (represented by 502 and 504).

In accordance with the present invention, if a plurality of PDP contexts are created in one call accessing, an identical account multi-session ID is allotted to the plurality of PDP contexts such that the AAA server 114 can allow the plurality of PDP contexts to be correlated to each other.

On the other hand, FIG. 6 is a flow chart illustrating the process of generating a multi-charging field in accordance with another embodiment of the present invention.

FIG. 6 illustrates a processing operation when a subscriber requests to deactivate a PDP context.
5 context.

Referring to FIG. 6, if a request to delete the PDP context is received in a step represented by 600, the GGSN 112 processes the deleting operation of at least one PDP context in a step represented by 602.

At this time, the GGSN 112 of the present invention creates an account
10 multi-session ID included in an account stop request transmitted to the AAA server 114 in a step represented by 604. This account multi-session ID is created as an account multi-session ID generated when the PDP context is activated.

Then, a data record transfer request message is transmitted to charging gateway.
At this time, the GGSN adds a multi-charging ID field to the message in a step
15 represented by 606 and writes the charging ID of the first PDP context in the multi-charging ID field in a step represented by 608.

In accordance with the present invention, a charging processing unit can allow the plurality of PDP contexts to be correlated to each other by providing an additional parameter capable of identifying that the plurality of PDP contexts are created in one
20 call accessing. This can allow efficient execution of the charging.

Hitherto, although some embodiments of the present invention have been shown and described for the above-described objects, it will be appreciated by any person of ordinary skill in the art that a large number of modifications, permutations and
5 additions are possible within the principles and spirit of the invention, the scope of which shall be defined by the appended claims and their equivalents.

【Industrial Applicability】

As described above, in accordance with the present invention, it is possible to
10 operate a flexible charging system because a plurality of PDP contexts can be identified as the PDP contexts in one call accessing.

Also, the present invention can be applied for any one of an RADIUS charging method and a CG charging method.

In addition, the present invention can be applied in a CDMA environment
15 using multiple service instances.

【CLAIMS】**【Claim 1】**

A charging method in a multi-PDP environment, the method being carried out in a GGSN connected to an SGSN and an AAA server via a network, the method

5 comprising:

(a) receiving a PDP context creating request message from the SGSN if there is a request for activating an additional PDP context from a subscriber's terminal created with at least one PDP context;

(b) authenticating a subscriber by linking with the AAA server, and generating
10 a charging ID;

(c) creating an account session ID of the additional PDP context if the authentication is successful, and creating a first account multi-session ID as the same value as the account session ID of a first PDP context; and

(d) transferring an account start request including the account session ID and
15 the first multi-session ID to the AAA server,

whereas the AAA server recognizes the receiving of the account start request of the additional PDP context as a charging in the same call accessing.

【Claim 2】

20 The method of Claim 1, wherein the account session ID is created as a

combination of an IP address of the GGSN and the charging ID.

【Claim 3】

The method of Claim 1, further comprising:

5 receiving at least one PDP context deleting request message from the SSGN;

and

transferring a second account multi-session ID of a deleted PDP context to the

AAA server after deleting the PDP context, the second account multi-session ID being

set as the first account multi-session ID created when the deleted PDP context is

10 activated.

【Claim 4】

The method of Claim 3, wherein the PDP context is deleted based on a

teardown indicator received from the SSGN.

15

【Claim 5】

The method of Claim 1, wherein the GGSN is connected to a charging gateway,

and the method further comprises creating a multi-charging ID as a charging ID of the

first PDP context of the additional PDP context.

20

【Claim 6】

The method of Claim 5, further comprising transferring a message including a multi-charging ID field of a deleted PDP context to the charging gateway after deleting the additional PDP context.

5

【Claim 7】

The method of Claim 6, wherein the message is a data record transfer request message.

10

【Claim 8】

A recorded medium having recorded a program for executing a method in accordance with any one of claims 1 through 7, the recorded medium being readable by a computer.

【Claim 9】

15

A GGSN, connected to an SGSN and an AAA server through a network, the GGSN comprising:

an SGSN communication unit, receiving a PDP context creating request message from the SGSN if there is a request for activating an additional PDP context from a subscriber's terminal created with at least one PDP context;

20

an AAA server communication unit, authenticating a subscriber by linking

with the AAA server and receiving and transmitting a message from and to the AAA server;

a charging ID generating unit, generating a charging ID for the additional PDP context if the authentication is successful; and

5 an account session ID generating unit, creating an account session ID of the additional PDP context as a combination of an IP address of the GGSN and the charging ID, and creating a first account multi-session ID as the same value as the account session ID of a first PDP context,

whereas the AAA server communication unit transfers an account start request
10 including the account session ID and the first account multi-session ID to the AAA server, and the AAA server recognizes the receiving of the account start request of the additional PDP context as a charging in the same call accessing.

【Claim 10】

15 The GGSN of Claim 9, wherein the session ID generating unit transfers a second account multi-session ID of a deleted PDP context to the AAA server if at least one PDP context deleting request message is received from the SSGN, and sets a second account multi-session ID as the first account multi-session ID of the deleted PDP context.

20

【Claim 11】

The GGSN of Claim 9, further comprising:

a CG communication unit, being connected to a charging gateway and receiving and transmitting a message; and

5 a multi-charging ID field generating unit, creating a multi-charging ID as a charging ID of a first PDP context of the additional PDP context.

【Claim 12】

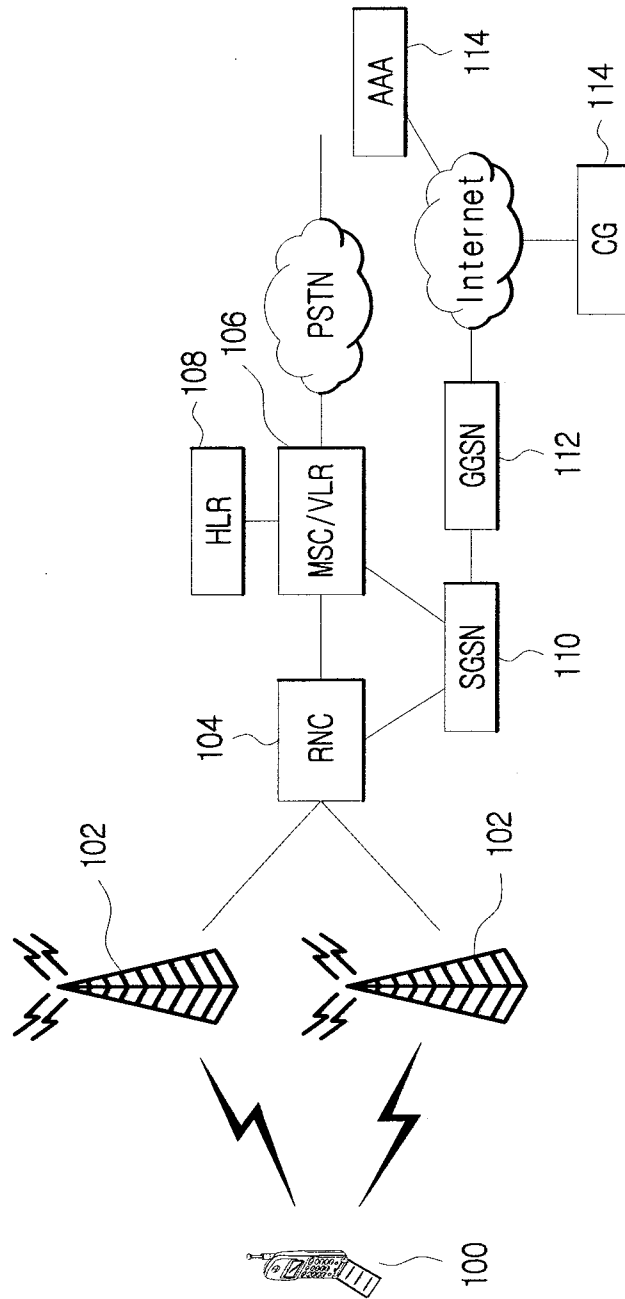
A WCDMA GPRS system, which is a charging system in a multi-PDP environment, the system comprising:

an SSGN, receiving a request for activating an additional PDP context from a subscriber's terminal created with at least one PDP context;

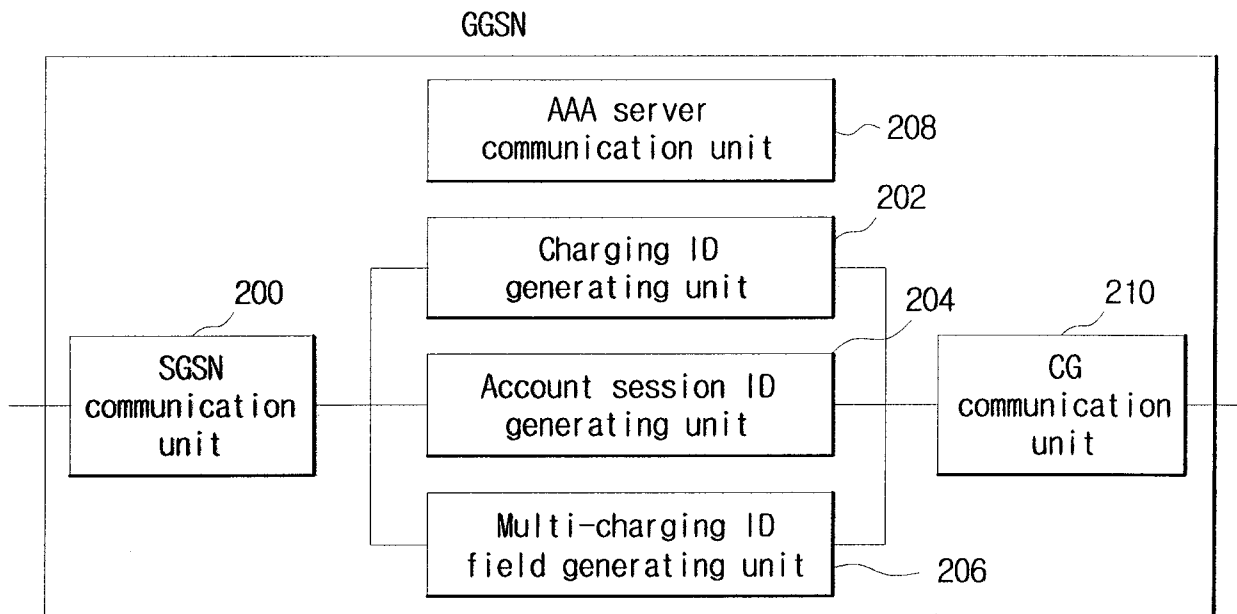
a GGSN, authenticating a subscriber if a request message for activating the additional PDP context is received corresponding to the activating request, creating an
15 account multi-session ID of the additional PDP context as a charging ID, an account session ID and the account session ID of a first PDP context, and transmitting an account start request including the ID; and

an AAA server, recognizing the receiving of the account start request of the additional PDP context as a charging in the same call accessing.

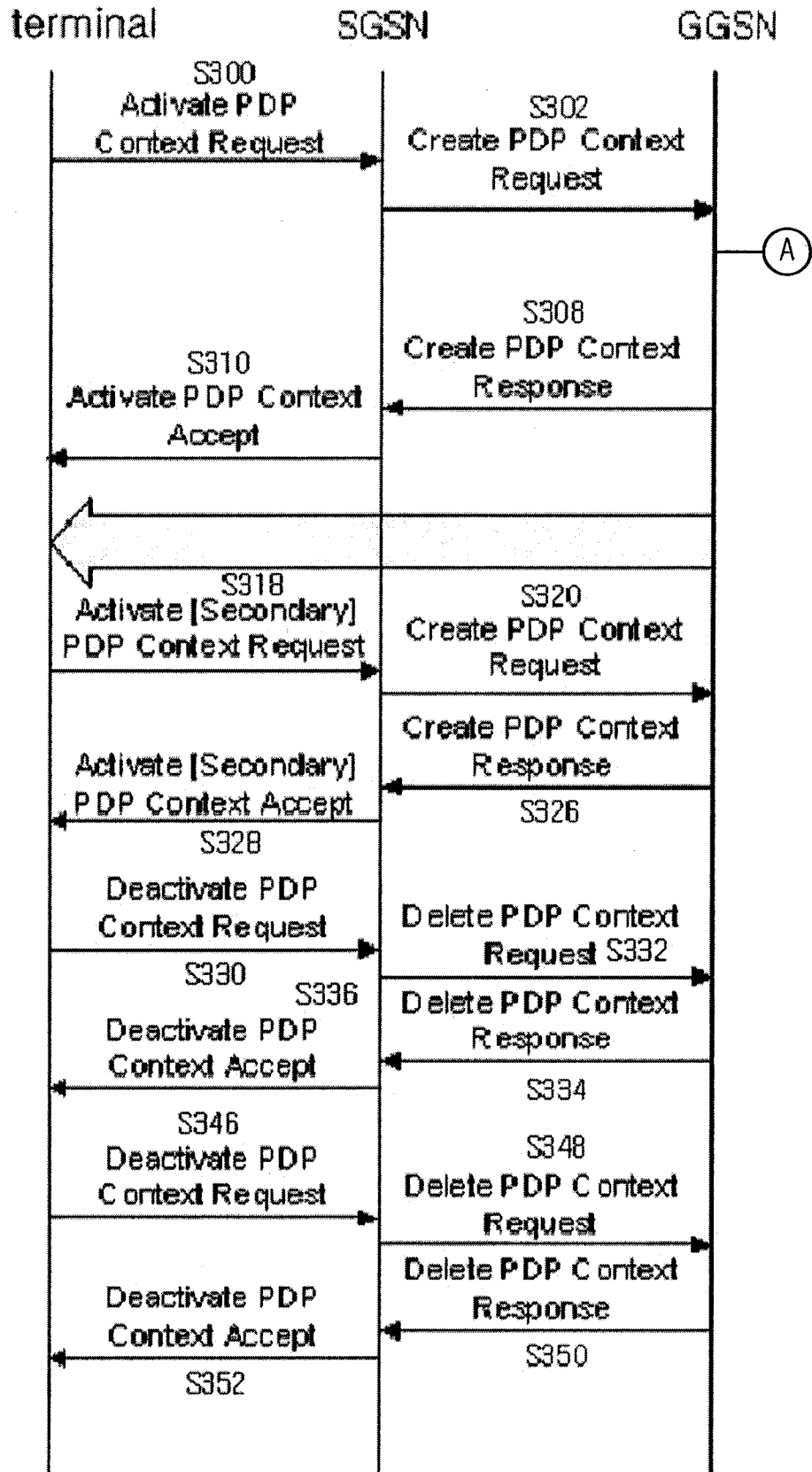
FIG. 1



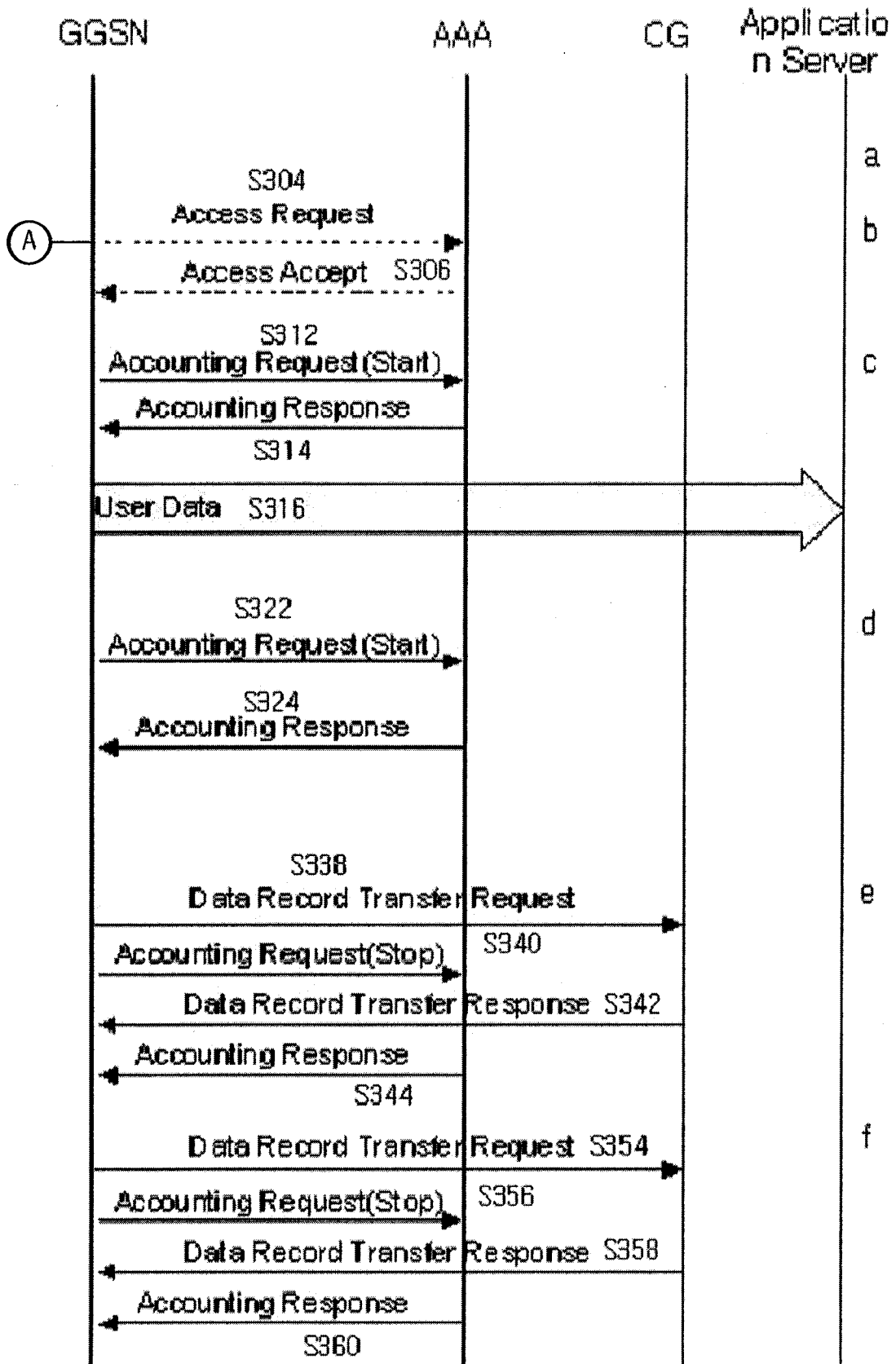
2/6
FIG. 2



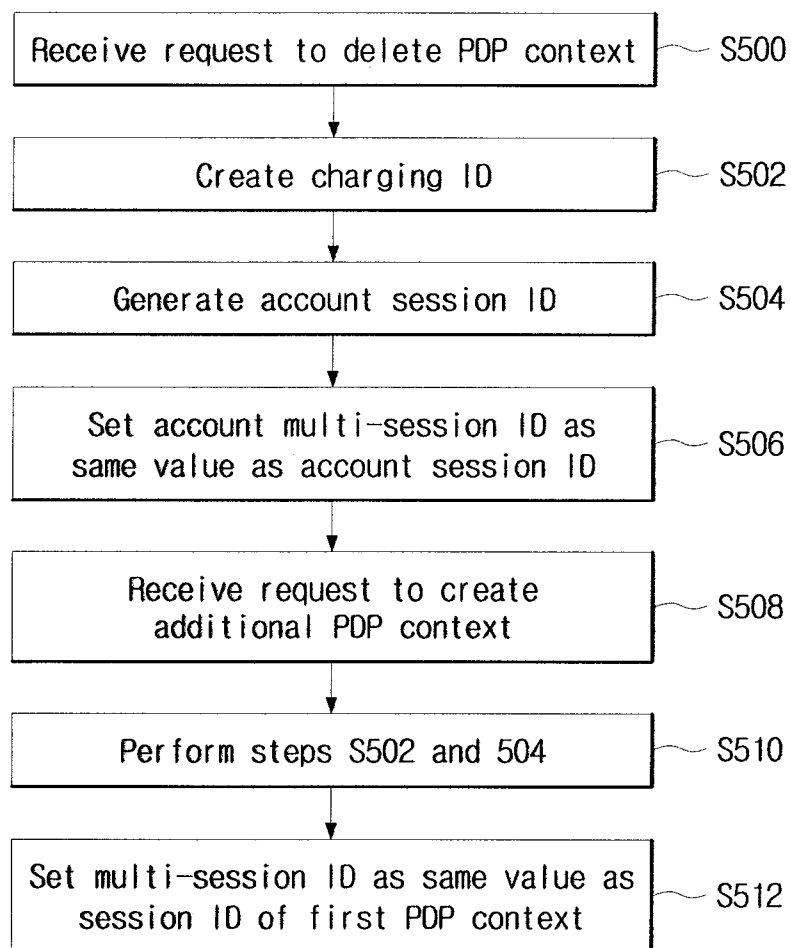
3/6
FIG. 3



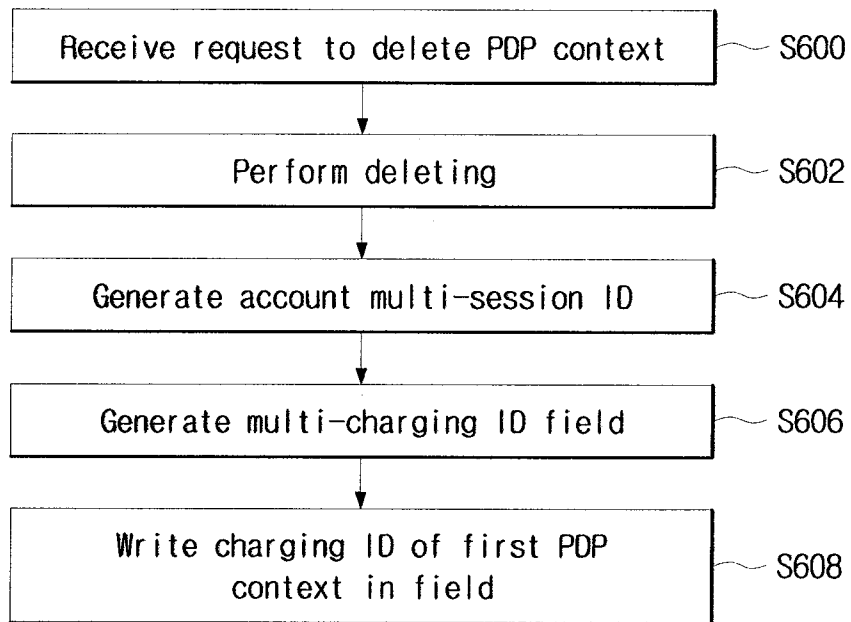
4/6
FIG. 4



5/6
FIG. 5



6/6
FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/000630**A. CLASSIFICATION OF SUBJECT MATTER***H04L 12/14(2006.01)i*

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)

IPC8: H04M 11/00, 15/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, eKIPASS(KIPO internal)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002-0068545 A1 (JOHNSON OYAMA et al.) 6 June 2002 See abstract; figures 13, 15, 16, 20, 23; claims 34-51, 63-68.	1, 3, 5-12
A	US 2002-0127995 A1 (STEFANO FACCINN et al.) 12 September 2002 See abstract; figures 2, 7, 8, 10, 11; claims 1-12.	1, 3, 5-12
A	US 2004-0152444 A1 (HELEN LIALIAMOU et al.) 5 August 2004 See abstract; figures 3, 6; paragraphs 64-66, 71; claims 1-3.	1, 3, 5-12
A	US 2003-0165222 A1 (JARI SYRJALA et al.) 4 September 2003 See abstract; figures 2-4; paragraphs 26-30; claims 1, 5, 15-17.	1, 3, 5-12

 Further documents are listed in the continuation of Box C. See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

08 MAY 2007 (08.05.2007)

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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