

DESCRIPTION

TITLE OF THE INVENTION: MOBILE COMMUNICATION METHOD AND MOBILE STATION

5 **TECHNICAL FIELD**

[0001]

The present invention relates to a mobile communication method and a mobile station.

10 **BACKGROUND ART**

[0002]

With reference to Figs. 8 and 9, two examples are given to describe operations in a mobile communication system of the LTE (long term evolution) scheme specified by the 3GPP at a time when a mobile station UE having a connection #1 established with a radio base station eNB detects an RLF (radio link failure).

[0003]

First, a first example is described with reference to Fig. 8. As shown in Fig. 8, in a state where a connection including a SRB (signalling radio bearer) and a DRB (data radio bearer) is established between the mobile station UE and the radio base station eNB, the radio base station eNB transmits an "RRC Connection Reconfiguration (connection reconfiguration signal)" including a release request of a DRB #15 to the mobile station UE in Step S3001.

[0004]

In Step S3002, the mobile station UE performs releasing processing of the DRB #15 in response to the "RRC Connection Reconfiguration", and then transmits an "RRC Connection

Reconfiguration Complete (connection reconfiguration completion signal)" to the radio base station eNB, so as to notify that the releasing processing of the DRB #15 is completed.

5 [0005]

Thereafter, the mobile station UE detects an RLF before the "RRC Connection Reconfiguration Complete" reaches the radio base station eNB, and transmits an "RRC Connection Re-establishment Request (connection re-establishment request signal)" to the radio base station eNB in Step S3003.

[0006]

In Step S3004, the radio base station eNB transmits an "RRC Connection Re-establishment (connection re-establishment signal)" to the mobile station UE. In Step S3005, the mobile station UE transmits an "RRC Connection Re-establishment Complete (connection re-establishment completion signal)" to the radio base station eNB. As a result, the connection (SRB1) is re-established between the radio base station eNB and the mobile station UE.

20 [0007]

Subsequently, in Step S3006, the radio base station eNB transmits an "RRC Connection Reconfiguration (connection reconfiguration signal)" to the mobile station UE. As a result, a connection (SRB2 and DRB) is re-established between the radio base station eNB and the mobile station UE.

[0008]

Next, a second example is described with reference to Fig. 9. As shown in Fig. 9, in a state where a connection including an SRB and a DRB is established between the mobile station UE

and the radio base station eNB, the mobile station UE detects an RLF in Step S4001, and then the radio base station eNB transmits an "RRC Connection Reconfiguration" including an addition request of a DRB #15 to the mobile station UE in Step
5 S4002.

[0009]

In such a case, the mobile station UE transmits an "RRC Connection Re-establishment Request" to the radio base station eNB in Step S4003 without performing adding processing of the
10 DRB #15.

[0010]

In Step S4004, the radio base station eNB transmits an "RRC Connection Re-establishment" to the mobile station UE. In Step S4005, the mobile station UE transmits an "RRC Connection
15 Re-establishment Complete" to the radio base station eNB. As a result, the connection (SRB1) is re-established between the radio base station eNB and the mobile station UE.

[0011]

Subsequently, in Step S4006, the radio base station eNB
20 transmits an "RRC Connection Reconfiguration" to the mobile station UE. As a result, a connection (SRB2 and DRB) is re-established between the radio base station eNB and the mobile station UE.

25 **DISCLOSURE OF THE INVENTION**

PROBLEMS TO BE SOLVED BY THE INVENTION

[0012]

However, the operations shown in Figs. 8 and 9 described above have the following problems.

[0013]

In the example shown in Fig. 8, in the case where the radio base station eNB transmits an "RRC Connection Reconfiguration" including a release request of the DRB #15 to the mobile station UE in Step S3006, the mobile station UE detects in Step S3007 that its own connection management state does not match with that of the radio base station eNB since the DRB #15 is not established between the mobile station UE and the radio base station eNB. Thereafter, the mobile station UE retransmits an "RRC Connection Re-establishment Request" to the radio base station eNB in Step S3008. This leads to a problem that the mobile station UE repeats the connection re-establishment processing.

[0014]

Similarly, also in the example shown in Fig. 9, in a case where the radio base station eNB transmits an "RRC Connection Reconfiguration" including a release request of the DRB #15 to the mobile station UE in Step S4006, the mobile station UE detects in Step S4007 that its own connection management state does not match with that of the radio base station eNB since the DRB #15 is not established between the mobile station UE and the radio base station eNB. Thereafter, the mobile station UE retransmits an "RRC Connection Re-establishment Request" to the radio base station eNB in Step S4008. This leads to a problem that the mobile station UE repeats the connection re-establishment processing.

[0015]

To sum up, the conventional mobile communication system has a problem that the mobile station UE repeats the connection

re-establishment processing when the release request or addition request of a DRB included in the "RRC Connection Reconfiguration" does not match with the state in the connection established before the detection of the RLF.

5 [0016]

The conventional mobile communication system also has a problem that when the content of an information element "measurementConfiguration" included in the "RRC Connection Reconfiguration" does not match with the state established before the detection of the RLF, the mobile station UE still repeats the connection re-establishment processing.

[0017]

The present invention was made in consideration of the foregoing problems. An object of the present invention is to provide a mobile communication method and a mobile station which are capable of avoiding the above-described situation of repeating connection re-establishment processing.

MEANS FOR SOLVING THE PROBLEM

20 [0018]

A first aspect of the present invention is summarized as a mobile communication method for performing communication between a mobile station and a radio base station through a connection including a signalling radio bearer and a data radio bearer, the mobile communication method including the steps of: transmitting, from the mobile station to the radio base station, a connection re-establishment request signal to re-establish the connection between the radio base station and the mobile station, when the mobile station detects a failure in the

connection; and transmitting, from the mobile station to the radio base station, a connection reconfiguration completion signal notifying that processing corresponding to a connection reconfiguration signal is completed, when the mobile station
5 receives the connection reconfiguration signal from the radio base station, and when the connection reconfiguration signal contains a release request of a data radio bearer which is not established between the mobile station and the radio base station.

10 [0019]

A second aspect of the present invention is summarized as a mobile station configured to communicate with a radio base station through a connection including a signalling radio bearer and a data radio bearer, the mobile station including:
15 a re-establishment processor unit configured to transmit, to the radio base station, a connection re-establishment request signal to re-establish the connection with the radio base station, when detecting a failure in the connection; and a transmitter unit configured to transmit, to the radio base
20 station, a connection reconfiguration completion signal notifying that processing corresponding to a connection reconfiguration signal is completed, when receiving the connection reconfiguration signal from the radio base station, and when the connection reconfiguration signal contains a
25 release request of a data radio bearer which is not established between the mobile station and the radio base station.

[0020]

A third aspect of the present invention is summarized as a mobile communication method for performing communication

between a mobile station and a radio base station through a connection including a signalling radio bearer and a data radio bearer, the mobile communication method including the steps of: transmitting, from the mobile station to the radio base station, a connection re-establishment request signal to re-establish the connection between the radio base station and the mobile station, when the mobile station detects a failure in the connection; and transmitting, from the mobile station to the radio base station, a connection reconfiguration completion signal notifying that processing corresponding to a connection reconfiguration signal is completed, when the mobile station receives the connection reconfiguration signal from the radio base station, and when the connection reconfiguration signal contains a removal request for information regarding measurement reports which are not set in the mobile station. [0021]

A fourth aspect of the present invention is summarized as a mobile station configured to communicate with a radio base station through a connection including a signalling radio bearer and a data radio bearer, the mobile station including: a re-establishment processor unit configured to transmit, to the radio base station, a connection re-establishment request signal to re-establish the connection with the radio base station, when detecting a failure in the connection; and a transmitter unit configured to transmit, to the radio base station, a connection reconfiguration completion signal notifying that processing corresponding to a connection reconfiguration signal is completed, when receiving the connection reconfiguration signal from the radio base station,

and when the connection reconfiguration signal contains a removal request for information regarding measurement reports which are not set in the mobile station.

5 **EFFECT OF THE INVENTION**

[0022]

As described above, according to the present invention, it is possible to provide a mobile communication method and a mobile station which are capable of avoiding the
10 above-described situation of repeating connection re-establishment processing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

15 [Fig. 1] Fig. 1 is an overall configuration diagram of a mobile communication system according to a first embodiment of the present invention.

[Fig. 2] Fig. 2 is a functional block diagram of a mobile station according to the first embodiment of the present
20 invention.

[Fig. 3] Fig. 3 is a diagram for explaining an "RRC Connection Reconfiguration" transmitted and received in the mobile communication system according to the first embodiment of the present invention.

25 [Fig. 4] Fig. 4 is a diagram for explaining "RadioResourceConfigDedicated" included in the "RRC Connection Reconfiguration" transmitted and received in the mobile communication system according to the first embodiment of the present invention.

[Fig. 5] Fig. 5 is a diagram for explaining a "Measurement Configuration" transmitted and received in the mobile communication system according to the first embodiment of the present invention.

5 [Fig. 6] Fig. 6 is a sequence diagram showing operations of the mobile communication system according to the first embodiment of the present invention.

[Fig. 7] Fig. 7 is a sequence diagram showing operations of the mobile communication system according to the first
10 embodiment of the present invention.

[Fig. 8] Fig. 8 is a sequence diagram showing operations of a conventional mobile communication system.

[Fig. 9] Fig. 9 is a sequence diagram showing operations of the conventional mobile communication system.

15

BEST MODES FOR CARRYING OUT THE INVENTION

[0024]

(Configuration of Mobile Communication System According to First Embodiment of the Invention)

20 With reference to Figs. 1 to 5, a configuration of a mobile communication system according to a first embodiment of the present invention is described.

[0025]

As shown in Fig. 1, the mobile communication system
25 according to this embodiment is an mobile communication system of the LTE scheme, and is configured to establish a connection between a radio base station eNB and a mobile station UE.

[0026]

Such a connection includes an SRB as a C-plane radio bearer

and a DRB as a U-plane radio bearer.

[0027]

As shown in Fig. 2, the mobile station UE includes a re-establishment processor unit 11, an RRC Connection Reconfiguration receiver unit 12, a manager unit 13, and an RRC Connection Reconfiguration Complete transmitter unit 14.

[0028]

When detecting a failure (RLF) in the connection established between the mobile station UE and the radio base station eNB, the re-establishment processor unit 11 is configured to transmit an "RRC Connection Re-establishment Request (connection re-establishment request signal)" to the radio base station eNB, and to re-establish such a connection with the radio base station eNB.

[0029]

The RRC Connection Reconfiguration receiver unit 12 is configured to receive an "RRC Connection Reconfiguration (connection reconfiguration signal)" transmitted by the radio base station eNB.

[0030]

Here, the "RRC Connection Reconfiguration" is a signal to instruct the mobile station UE to change the configuration of the connection established between the radio base station eNB and the mobile station UE.

[0031]

For example, as shown in Fig. 3, the "RRC Connection Reconfiguration" includes "radioResourceConfiguration", "measurementConfiguration" and the like as information elements.

[0032]

Moreover, as shown in Fig. 4, "radioResourceConfiguration (RadioResourceConfigDedicated)" includes "drb-ToAddModifyList", "drb-ToReleaseList" and the
5 like as information elements.

[0033]

The "drb-ToAddModifyList" is an information element including an addition request and a modification request for one or more DRBs, and the "drb-ToReleaseList" is an information
10 element including a release request for one or more DRBs.

[0034]

Furthermore, as shown in Fig. 5, the "measurementConfiguration" includes "meaObjectToRemoveList", "meaObjectToAddModifyList", "reportConfigToRemoveList",
15 "reportConfigToAddModifyList", "meaIDToRemoveList", "meaIDToAddModifyList" and the like as information elements.

[0035]

In other words, the "measurementConfiguration" includes information elements including removal request, addition
20 request, and modification request of "information regarding measurement reports".

[0036]

The "meaObjectToRemoveList" is an information element including a removal request for one or more "measurement
25 objects", and the "meaObjectToAddModifyList" is an information element including an addition request and a modification request for one or more measurement objects.

[0037]

Here, the measurement object is information (e.g., a

radio access method, a frequency, a PCI (physical cell ID) and the like) for specifying a cell to be measured for its reception quality in the mobile station UE. Note that the measurement object is one of the "information regarding measurement reports" described above.

[0038]

The "reportConfigToRemoveList" is an information element including a removal request for one or more "report configurations", and the "reportConfigToAddModifyList" is an information element including an addition request and a modification request for one or more report configurations.

[0039]

Here, the report configuration is information specifying a report configuration for giving the radio base station eNB the measurement report containing the reception quality of the measurement object described above. Note that the report configuration is also one of the "information regarding measurement reports" described above.

[0040]

Furthermore, the "meaIDToRemoveList" is an information element including a removal request for one or more "measurement IDs", and the "meaIDToAddModifyList" is an information element including an addition request and a modification request for one or more measurement IDs.

[0041]

Here, the measurement ID is information for associating the measurement object with the report configuration. Note that the measurement ID is also one of the "information regarding measurement reports" described above.

[0042]

The manager unit 13 is configured to manage information on the connection established between the mobile station UE and the radio base station eNB. Here, even if an RLF is detected
5 in a specific connection, when re-establishment processing is performed on the specific connection, the manager unit 13 is configured to keep on managing information on the specific connection.

[0043]

10 For example, the manager unit 13 is configured to manage "information on the DRB" set in each connection on the basis of the information element "radioResourceConfiguration" in each "RRC Connection Reconfiguration".

[0044]

15 Furthermore, the manager unit 13 is configured to manage the "information regarding measurement reports" received through each connection on the basis of the information element "measurementConfiguration" in each "RRC Connection Reconfiguration".

20 [0045]

The RRC Connection Reconfiguration Complete transmitter unit 14 is configured to transmit an "RRC Connection Reconfiguration Complete" to the radio base station eNB, the "RRC Connection Reconfiguration Complete" notifying that
25 processing corresponding to the "RRC Connection Reconfiguration" received from the radio base station eNB is completed.

[0046]

Here, the RRC Connection Reconfiguration Complete

transmitter unit 14 may be configured as follows. Even if a release request of a DRB which is not established between the mobile station UE and the radio base station eNB is contained in the information element "drb-ToReleaseList" included in the information element "radioResourceConfiguration" in the "RRC Connection Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured to ignore such release request, and to transmit the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC Connection Reconfiguration" is completed to the radio base station eNB.

[0047]

Moreover, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured as follows. Even if a modification request of a DRB which is not established between the mobile station UE and the radio base station eNB is contained in the information element "drb-ToAddModifyList" included in the information element "radioResourceConfiguration" in the "RRC Connection Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured to ignore such modification request, and to transmit the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC Connection Reconfiguration" is completed to the radio base station eNB.

[0048]

In addition, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured as follows. Even if an

addition request of a DRB which is established between the mobile station UE and the radio base station eNB is contained in the information element "drb-ToAddModifyList" included in the information element "radioResourceConfiguration" in the "RRC Connection Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter 14 may be configured to ignore such addition request, and to transmit the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC Connection Reconfiguration" is completed to the radio base station eNB.

[0049]

Meanwhile, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured as follows. Even if a removal request for a measurement object which is not set in the mobile station UE is contained in the information element "MeasObjectToRemoveList" included in the information element "measurementConfiguration" in the "RRC Connection Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured to ignore such removal request, and to transmit the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC Connection Reconfiguration" is completed to the radio base station eNB.

[0050]

Moreover, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured as follows. Even if a modification request for a measurement object which is not set in the mobile station UE is contained in the information element

"MeasObjectToAddModifyList" included in the information element "measurementConfiguration" in the "RRC Connection Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may
5 be configured to ignore such modification request, and to transmit the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC Connection Reconfiguration" is completed to the radio base station eNB.

10 [0051]

Furthermore, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured as follows. Even if an addition request for a measurement object which is set in the mobile station UE is contained in the information element
15 "MeasObjectToAddModifyList" included in the information element "measurementConfiguration" in the "RRC Connection Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured to ignore such addition request, and to transmit
20 the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC Connection Reconfiguration" is completed to the radio base station eNB.
[0052]

In addition, the RRC Connection Reconfiguration Complete
25 transmitter unit 14 may be configured as follows. Even if a removal request for a report configuration which is not set in the mobile station UE is contained in the information element "reportConfigToRemoveList" included in the information element "measurementConfiguration" in the "RRC Connection

Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured to ignore such removal request, and to transmit the "RRC Connection Reconfiguration Complete" notifying that
5 the processing corresponding to the "RRC Connection Reconfiguration" is completed to the radio base station eNB.

[0053]

Moreover, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured as follows. Even if a
10 modification request for a report configuration which is not set in the mobile station UE is contained in the information element "reportConfigToAddModifyList" included in the information element "measurementConfiguration" in the "RRC Connection Reconfiguration" received from the radio base
15 station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured to ignore such modification request, and to transmit the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC Connection Reconfiguration" is
20 completed to the radio base station eNB.

[0054]

Furthermore, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured as follows. Even if an
25 addition request for a report configuration which is set in the mobile station UE is contained in the information element "reportConfigToAddModifyList" included in the information element "measurementConfiguration" in the "RRC Connection Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may

be configured to ignore such addition request, and to transmit the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC Connection Reconfiguration" is completed to the radio base station eNB.

5 [0055]

In addition, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured as follows. Even if a removal request for a measurement ID which is not set in the mobile station UE is contained in the information element
10 "measIdToRemoveList" included in the information element "measurementConfiguration" in the "RRC Connection Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured to ignore such removal request, and to transmit
15 the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC Connection Reconfiguration" is completed to the radio base station eNB.
[0056]

Moreover, the RRC Connection Reconfiguration Complete
20 transmitter unit 14 may be configured as follows. Even if a modification request for a measurement ID which is not set in the mobile station UE is contained in the information element "measIdToAddModifyList" included in the information element "measurementConfiguration" in the "RRC Connection
25 Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured to ignore such modification request, and to transmit the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC

Connection Reconfiguration" is completed to the radio base station eNB.

[0057]

Furthermore, the RRC Connection Reconfiguration Complete
5 transmitter unit 14 may be configured as follows. Even if an addition request for a measurement ID which is set in the mobile station UE is contained in the information element "measIdToAddModifyList" included in the information element "measurementConfiguration" in the "RRC Connection
10 Reconfiguration" received from the radio base station eNB, the RRC Connection Reconfiguration Complete transmitter unit 14 may be configured to ignore such addition request, and to transmit the "RRC Connection Reconfiguration Complete" notifying that the processing corresponding to the "RRC Connection
15 Reconfiguration" is completed to the radio base station eNB.

[0058]

(Operations of Mobile Communication System According to First Embodiment of the Invention)

With reference to Figs. 6 and 7, two examples are given
20 to describe operations of the mobile communication system according to the first embodiment of the present invention.

[0059]

First, a first example is described with reference to Fig. 6. As shown in Fig. 6, in a state where a connection including
25 an SRB and a DRB is established between the mobile station UE and the radio base station eNB, the radio base station eNB transmits an "RRC Connection Reconfiguration" including a release request of a DRB #15 or a removal request of a measurement object #1 to the mobile station UE in Step S1001.

[0060]

In Step S1002, the mobile station UE performs releasing processing of the DRB #15 or removing processing the measurement object #1 in response to the "RRC Connection Reconfiguration",
5 and then transmits an "RRC Connection Reconfiguration Complete" to the radio base station eNB, so as to notify that the releasing processing of the DRB #15 or the removing processing of the measurement object #1 is completed.

[0061]

10 Thereafter, the mobile station UE detects an RLF before the "RRC Connection Reconfiguration Complete" reaches the radio base station eNB, and transmits an "RRC Connection Re-establishment Request" to the radio base station eNB in Step S1003.

15 [0062]

In Step S1004, the radio base station eNB transmits an "RRC Connection Re-establishment" to the mobile station UE. In Step S1005, the mobile station UE transmits an "RRC Connection Re-establishment Complete" to the radio base station eNB. As
20 a result, the connection (SRB1) is re-established between the radio base station eNB and the mobile station UE.

[0063]

Thereafter, in Step S1006, the radio base station eNB transmits the "RRC Connection Reconfiguration" including the
25 release request of the DRB #15 or the removal request of the measurement object #1 to the mobile station UE.

[0064]

Even when determining in Step S1007 that the DRB #15 is not established between the mobile station UE and the radio base

station eNB or that the measurement object #1 is not set in the mobile station UE in the state before detection of the RLF, i.e., even when detecting that a connection management state or a reception quality measurement method management state does not
5 match with the radio base station eNB, the mobile station UE transmits an "RRC Connection Reconfiguration Complete" notifying that processing corresponding to the "RRC Connection Reconfiguration" is completed to the radio base station eNB in Step S1008.

10 [0065]

As a result, a connection (SRB2 and DRB) is re-established between the radio base station eNB and the mobile station UE without repeating the connection re-establishment processing.
[0066]

15 Next, a second example is described with reference to Fig. 7. As shown in Fig. 7, in a state where a connection including an SRB and a DRB is established between the mobile station UE and the radio base station eNB, the mobile station UE detects an RLF in Step S2001, and then the radio base station eNB
20 transmits an "RRC Connection Reconfiguration" including an addition request of a DRB #15 or an addition request of a measurement object #1 to the mobile station UE in Step S2002.
[0067]

In such a case, the mobile station UE transmits an "RRC
25 Connection Re-establishment Request" to the radio base station eNB in Step S2003 without performing adding processing of the DRB #15 or the measurement object #1.
[0068]

In Step S2004, the radio base station eNB transmits an

“RRC Connection Re-establishment” to the mobile station UE. In Step S2005, the mobile station UE transmits an “RRC Connection Re-establishment Complete” to the radio base station eNB. As a result, the connection (SRB1) is re-established between the
5 radio base station eNB and the mobile station UE.

[0069]

Thereafter, in Step S2006, the radio base station eNB transmits the “RRC Connection Reconfiguration” including the release request of the DRB #15 or the removal request of the
10 measurement object #1 to the mobile station UE.

[0070]

Even when determining in Step S2007 that the DRB #15 is not established between the mobile station UE and the radio base station eNB or that the measurement object #1 is not set in the
15 mobile station UE in the state before detection of the RLF, i.e., even when detecting that a connection management state or a reception quality measurement method management state does not match with the radio base station eNB, the mobile station UE transmits an “RRC Connection Reconfiguration Complete”
20 notifying that processing corresponding to the “RRC Connection Reconfiguration” is completed to the radio base station eNB in Step S2008.

[0071]

As a result, a connection (SRB2 and DRB) is re-established
25 between the radio base station eNB and the mobile station UE without repeating the connection re-establishment processing.

[0072]

(Advantageous Effects of Mobile Communication System According to First Embodiment of the Invention)

According to the first embodiment of the present invention, in the operation when the mobile station UE has detected an RLF, even when determining that the DRB #15 is not established between the mobile station UE and the radio base station eNB or that the measurement object #1 is not set in the mobile station UE in the state before the detection of the RLF, i.e., even when detecting that a connection management state or a reception quality measurement method management state does not match with the radio base station eNB, the mobile station UE can notify that the processing corresponding to the "RRC Connection Reconfiguration" is completed by transmitting the "RRC Connection Reconfiguration Complete" to the radio base station eNB. Thus, a problem of repeating the connection re-establishment processing can be resolved.

[0073]

Note that operation of the above described mobile station UE and the radio base station eNB may be implemented by means of hardware, a software module executed by a processor, or a combination of both.

[0074]

The software module may be provided in any type of storage medium such as an RAM (Random Access Memory), a flash memory, a ROM (Read Only Memory), an EPROM (Erasable Programmable ROM), an EEPROM (Electrically Erasable and Programmable ROM), a register, a hard disk, a removable disk, or a CD-ROM.

[0075]

The storage medium is connected to the processor so that the processor can read and write information from and to the storage medium. Also, the storage medium may be integrated into

the processor. Also, the storage medium and the processor may be provided in an ASIC. The ASIC may be provided in the mobile station UE and the radio base station eNB. Also, the storage medium and the processor may be provided in the mobile station
5 UE and the radio base station eNB as a discrete component.

[0076]

Hereinabove, the present invention has been described in detail using the above embodiment; however, it is apparent to those skilled in the art that the present invention is not
10 limited to the embodiment described herein. Modifications and variations of the present invention can be made without departing from the spirit and scope of the present invention defined by the description of the scope of claims. Thus, what is described herein is for illustrative purpose, and has no
15 intention whatsoever to limit the present invention.

CLAIMS

[1] A mobile communication method for performing communication between a mobile station and a radio base station through a connection including a signalling radio bearer and a data radio bearer, the mobile communication method comprising the steps of:

transmitting, from the mobile station to the radio base station, a connection re-establishment request signal to re-establish the connection between the radio base station and the mobile station, when the mobile station detects a failure in the connection; and

transmitting, from the mobile station to the radio base station, a connection reconfiguration completion signal notifying that processing corresponding to a connection reconfiguration signal is completed, when the mobile station receives the connection reconfiguration signal from the radio base station, and when the connection reconfiguration signal contains a release request of a data radio bearer which is not established between the mobile station and the radio base station.

[2] A mobile station configured to communicate with a radio base station through a connection including a signalling radio bearer and a data radio bearer, the mobile station comprising:

a re-establishment processor unit configured to transmit, to the radio base station, a connection re-establishment request signal to re-establish the connection with the radio base station, when detecting a failure in the connection; and

a transmitter unit configured to transmit, to the radio base station, a connection reconfiguration completion signal notifying that processing corresponding to a connection reconfiguration signal is completed, when receiving the
5 connection reconfiguration signal from the radio base station, and when the connection reconfiguration signal contains a release request of a data radio bearer which is not established between the mobile station and the radio base station.

10 [3] A mobile communication method for performing communication between a mobile station and a radio base station through a connection including a signalling radio bearer and a data radio bearer, the mobile communication method comprising the steps of:

15 transmitting, from the mobile station to the radio base station, a connection re-establishment request signal to re-establish the connection between the radio base station and the mobile station, when the mobile station detects a failure in the connection; and

20 transmitting, from the mobile station to the radio base station, a connection reconfiguration completion signal notifying that processing corresponding to a connection reconfiguration signal is completed, when the mobile station receives the connection reconfiguration signal from the radio
25 base station, and when the connection reconfiguration signal contains a removal request for information regarding measurement reports which are not set in the mobile station.

[4] A mobile station configured to communicate with a radio

base station through a connection including a signalling radio bearer and a data radio bearer, the mobile station comprising:

a re-establishment processor unit configured to transmit, to the radio base station, a connection re-establishment request signal to re-establish the connection with the radio base station, when detecting a failure in the connection; and

5 a transmitter unit configured to transmit, to the radio base station, a connection reconfiguration completion signal notifying that processing corresponding to a connection reconfiguration signal is completed, when receiving the
10 connection reconfiguration signal from the radio base station, and when the connection reconfiguration signal contains a removal request for information regarding measurement reports which are not set in the mobile station.