

be apparent to those of ordinary skill in the art who read the present disclosure that various modifications to the disclosed embodiments can be made while remaining within the scope of the invention.

A MCG failure and/or a PCell failure, hereinafter a MCG failure in the present disclosure, can be caused by a radio link failure (RLF), a re-configuration with a synchronization failure, a mobility from NR or E-UTRA failure, an integrity check failure concerning a Signaling Radio Bearer (SRB1 or SRB2), and a Radio Resource Control (RRC) connection reconfiguration failure. When a MCG failure is detected, the wireless communication device (UE) initiates a RRC re-establishment procedure. Such procedure introduces a service interruption since the UE suspends all resource blocks (RBs) and performs a cell re-selection procedure. However, when a MCG failure is detected by the UE, a SCG may still maintain a good link condition, and a split SRB and/or SRB3 may also be configured and activated for the UE. Therefore, there exists a need to develop a method and apparatus for reporting a MCG failure via split SRB and/or SRB3 after suspending MCG transmissions for a MCG reconfiguration to reduce service interruption caused by the RRC re-establishment procedure.

In a first aspect, a method for reporting a Master Cell Group (MCG) failure by a wireless communication device, includes: detecting a first MCG failure; and reporting the first MCG failure to a first wireless communication node, via a second wireless communication node, according to a first indicator, a first failure type of the first MCG failure, a status of a Secondary Cell Group (SCG), and a Signal Radio Bearer (SRB) configuration, wherein the first indicator is configured to indicate whether the wireless communication device is allowed to report the first MCG failure.

In a second aspect, a method for performing a Master Cell Group (MCG) reconfiguration by a first wireless communication node, includes: receiving an MCG

failure report of a first MCG failure reported from a wireless communication device, via a second wireless communication node, according to a first indicator, a first failure type of the first MCG failure, a status of a Secondary

Cell Group (SCG), and a Signal Radio Bearer (SRB) configuration, wherein the first indicator is configured to indicate whether the wireless communication device is allowed to report the first MCG failure; and determining the MCG reconfiguration according to the MCG failure report.

In a third aspect, a wireless communication device, includes: a processor, configured to detect a first Master Cell Group (MCG) failure; and a transceiver, electrically coupled to the processor and configured to report the first MCG failure to a first wireless communication node, via a second wireless communication node, according to a first indicator, a first failure type of the first MCG failure, a status of a Secondary Cell Group (SCG), and a Signal Radio Bearer (SRB) configuration, wherein the first indicator is configured to indicate whether the wireless communication device is allowed to report the first MCG failure.

In a fourth aspect, a wireless communication node, includes: a transceiver, configured to receive an MCG failure report of a first MCG failure from a wireless communication device, via a second wireless communication node, according to a first indicator, a first failure type of the first MCG failure, a status of a Secondary Cell Group (SCG), and a Signal Radio Bearer (SRB) configuration, wherein the first indicator is configured to indicate whether the wireless communication device is allowed to report the first MCG failure; and a processor, electrically coupled to the transceiver and configured to determine a Master Cell Group (MCG) reconfiguration according to the MCG failure report.

Yet in another embodiment, a computing device comprising at least one processor and a memory coupled to the processor, the at least one processor configured to carry out the method.

Yet, in another embodiment, a non-transitory computer-readable medium having stored thereon computer-executable instructions for carrying out the method.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

Aspects of the present disclosure are best understood from the following detailed description when read with the accompanying figures. It is noted that various features are not necessarily drawn to scale. In fact, the dimensions and geometries of the various features may be arbitrarily increased or reduced for clarity of discussion.

FIG. 1A illustrates an exemplary wireless communication network, in accordance with some embodiments of the present disclosure.

FIG. 1B illustrates a block diagram of an exemplary wireless communication system, in accordance with some embodiments of the present disclosure.

FIG. 2 illustrates a method for reporting a master cell group failure, in accordance with some embodiments of the present disclosure.

## **DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS**

Various exemplary embodiments of the invention are described below with reference to the accompanying figures to enable a person of ordinary skill in the art to make and use the invention. As would be apparent to those of ordinary skill in the art, after reading the present disclosure, various changes or modifications to the examples described herein can be made without departing from the scope of the invention. Thus, the present invention is not limited to

# CLAIMS

1. A method for reporting a Master Cell Group (MCG) failure by a wireless communication device, comprising:

detecting a first MCG failure; and

reporting the first MCG failure to a first wireless communication node, via a second wireless communication node, according to a first indicator, a first failure type of the first MCG failure, a status of a Secondary Cell Group (SCG), and a Signal Radio Bearer (SRB) configuration, wherein the first indicator is configured to indicate whether the wireless communication device is allowed to report the first MCG failure.

2. The method of claim 1, wherein the first failure type comprises an MCG Radio Link Failure (RLF).

3. The method of claim 1, wherein reporting the first MCG failure to the first wireless communication node comprising:

transmitting a first message to the second wireless communication node;

transmitting a second message to the first wireless communication node from the second wireless communication node;

determining an MCG reconfiguration by the first wireless communication node;

receiving a third message by the second wireless communication node from the first wireless communication node; and

receiving a fourth message by the wireless communication device from the second wireless communication node,

wherein the first message and the second message each comprises information of an MCG failure report, and wherein the third message and the fourth message each comprises information of the MCG reconfiguration.

4. The method of claim 1, wherein the first MCG failure is reported through one of the following: an SRB3 or an SCG leg of a split SRB1.

5. The method of claim 1, wherein reporting the first MCG failure to the first wireless communication node comprises transmitting an MCG failure report to the second wireless communication node, and the MCG failure report comprises at least one of the following: the first failure type, measurement results of at least one serving cell, or measurement results of at least one neighboring cell.

6. The method of claim 3, wherein the fourth message is transmitted through an SRB3 or an SCG leg of a split SRB1.

7. The method of claim 3, wherein the MCG failure report is encapsulated in at least one RRC container and wherein the MCG reconfiguration is encapsulated in at least one RRC container.

8. The method of claim 1, further comprising  
performing at least one of the following:  
terminating a first timer;  
starting a second timer; or

resetting an MCG MAC.

9. The method of claim 8, wherein the first timer is configured for RL monitoring and beam failure detection, and wherein the second timer is configured for MCG failure report.

10. The method of claim 1, further comprising  
performing an RRC re-establishment, in response to at least one of the following conditions is met: when a SCG is not available; when an on-going procedure, comprising a primary secondary cell (PSCell) change procedure, is performed; or when a second timer is expired.

11. A method for performing a Master Cell Group (MCG) reconfiguration by a first wireless communication node, comprising:

receiving an MCG failure report of a first MCG failure reported from a wireless communication device, via a second wireless communication node, according to a first indicator, a first failure type of the first MCG failure, a status of a Secondary Cell Group (SCG), and a Signal Radio Bearer (SRB) configuration, wherein the first indicator is configured to indicate whether the wireless communication device is allowed to report the first MCG failure; and

determining the MCG reconfiguration according to the MCG failure report.

12. The method of claim 11, wherein the first failure type comprises an MCG Radio Link Failure (RLF).

13. The method of claim 11, wherein the MCG failure report is transmitted through one of the following: an SRB3 or an SCG leg of a split SRB1.

14. A wireless communication device, comprising:

a processor, configured to detect a first Master Cell Group (MCG) failure; and

a transceiver, electrically coupled to the processor and configured to report the first MCG failure to a first wireless communication node, via a second wireless communication node, according to a first indicator, a first failure type of the first MCG failure, a status of a Secondary Cell Group (SCG), and a Signal Radio Bearer (SRB) configuration, wherein the first indicator is configured to indicate whether the wireless communication device is allowed to report the first MCG failure.

15. The wireless communication device of claim 14, wherein the first failure type comprises an MCG Radio Link Failure (RLF).

16. The wireless communication device of claim 14, wherein the first MCG failure is reported through one of the following: an SRB3 or an SCG leg of a split SRB1.

17. The wireless communication device of claim 14, wherein the transceiver is further configured to, for reporting the first MCG failure to the first wireless communication node, transmit an MCG failure report to the second wireless communication node, and wherein the MCG failure report comprises at least one of the following: the first failure type, measurement results of at least one serving cell, or measurement results of at least one neighboring cell.

18. The wireless communication device of claim 14, wherein the processor is further configured to:

terminate a first timer;

start a second timer; or

reset an MCG MAC.

19. The wireless communication device of claim 18, wherein the first timer is configured for RL monitoring and beam failure detection, and wherein the second timer is configured for MCG failure report.

20. The wireless communication device of claim 18, wherein the processor is further configured to cause the transceiver to perform an RRC re-establishment in response to at least one of the following conditions is met:

when a SCG is not available;

when an on-going procedure, comprising a primary secondary cell (PSCell) change procedure, is performed; or

when a second timer is expired.

21. A wireless communication node, comprising:

a transceiver, configured to receive an MCG failure report of a first MCG failure from a wireless communication device, via a second wireless communication node, according to a first indicator, a first failure type of the first MCG failure, a status of a Secondary Cell Group (SCG), and a Signal Radio Bearer (SRB) configuration, wherein the first indicator is configured to

indicate whether the wireless communication device is allowed to report the first MCG failure;  
and

a processor, electrically coupled to the transceiver and configured to determine a Master Cell Group (MCG) reconfiguration according to the MCG failure report.

22. The wireless communication node of claim 21, wherein the first failure type comprises an MCG Radio Link Failure (RLF).

23. The wireless communication node of claim 21, wherein the MCG failure report is transmitted through one of the following: an SRB3 or an SCG leg of a split SRB1.