RANDOM ACCESS PROCEDURE

TECHNICAL FIELD

[0001] Embodiments of the present disclosure generally relate to the field of telecommunication, and in particular, to methods, devices and computer readable storage media for random access procedure.

BACKGROUND

[0002] The 5G New Radio (NR) is provided with a multi-beam operation. Support for the multi-beam operation in NR includes beam quality measurement, beam quality reporting, beam assignment, and recovery mechanism in case the assigned beam quality is not good enough. NR provides support for multi-beam operation at every stage of the radio operation: initial/random access, paging, data/control transmission/reception, and mobility handling.

[0003] In the case of the multi-beam operation in NR, user equipments (UEs) may switch between the beams allocated with Contention Free Random Access (CFRA) resources and the beams allocated with Contention Based Random Access (CBRA) resources. However, in LTE, the communication network allocates CFRA resources in the whole cell for the UEs. In other words, there is no switching between CFRA and CBRA. Thus, when the beam switching procedure occurs in NR, a size of Medium Access Control (MAC) Protocol Data Unit (PDU) allowed in an uplink grant allocated during a Random Access (RA) procedure, which is transmitted from a network device (for example, gNB), may be different from a size of MAC PDU obtained from the Msg3 Buffer of an UE.

SUMMARY

[0004] In general, example embodiments of the present disclosure provide methods, devices and computer readable storage media for random access procedure.

[0005] In a first embodiment, there is provided method implemented at a terminal device. The method comprises transmitting, at a terminal device, a random access request in a random access procedure to a network device; in response to receiving, in the random access procedure, from the network device an uplink grant for the terminal device, determining whether a first size of a first data unit indicated by the uplink grant matches a second size of a second data unit stored in a buffer of the terminal device; in response to determining that

the first size mismatches the second size, determining a first part of the second data unit for subsequent transmissions.

[0006] In a second embodiment, there is provided method implemented at a network device. The method comprises receiving, from a terminal device, a random access request in a random access procedure; in response to receiving the random access request, transmitting, to the terminal device, an uplink grant of the terminal device, the uplink grant indicating a first size of a first data unit, so that the terminal device determines whether the first size of the first data matches a second size of a second data unit stored in a buffer of the terminal device.

[0007] In a third embodiment, there is provided a terminal device. The device comprises at least one processor; and at least one memory including computer program codes. The at least one memory and the computer program codes are configured to, with the at least one processor, cause the device at least to perform the method according to the first aspect.

[0008] In a fourth embodiment, there is provided a network device. The device comprises at least one processor; and at least one memory including computer program codes. The at least one memory and the computer program codes are configured to, with the at least one processor, cause the device at least to perform the method according to the second aspect.

[0009] In a fifth embodiment, there is provided an apparatus comprising means to perform the steps of the method according to the first aspect.

[0010] In a sixth embodiment, there is provided an apparatus comprising means to perform the steps of the method according to the second aspect.

[0011] In a seventh embodiment, there is provided a computer readable medium having a computer program stored thereon which, when executed by at least one processor of a device, causes the device to carry out the method according to the first aspect.

[0012] In an eighth embodiment, there is provided a computer readable medium having a computer program stored thereon which, when executed by at least one processor of a device, causes the device to carry out the method according to the second aspect.

[0012a] In view of the above, in accordance with a first aspect of the present disclosure, there is provided an apparatus. The apparatus comprises means for transmitting, at a terminal device, a random access request in a random access procedure to a network device; means for in response to receiving, during the random access procedure, from the network device

an uplink grant for the terminal device, determine whether a size indicated by the uplink grant matches a size of a packet data unit stored in a buffer of the terminal device; and means for, after determining that the size indicated by the uplink grant mismatches the size of the packet data unit stored in the buffer, including a sub-packet data unit in a transmission.

[0012b] In accordance with a second aspect of the present disclosure, there is provided an apparatus. The apparatus comprises means for receiving, from a terminal device, a random access request in a random access procedure; and means for in response to receiving the random access request, transmit, to the terminal device, an uplink grant of the terminal device, the uplink grant indicating a size, so that the terminal device determines whether the size indicated by the uplink grant matches a size of a packet data unit stored in a buffer of the terminal device.

[0012c] In accordance with a third aspect of the present disclosure, there is provided a method. The method comprises: transmitting, at a terminal device, a random access request in a random access procedure to a network device; in response to receiving, during the random access procedure, from the network device an uplink grant for the terminal device, determine whether a size indicated by the uplink grant matches a size of a packet data unit stored in a buffer of the terminal device; and after determining that the size indicated by the uplink grant mismatches the size of the packet data unit stored in the buffer, including a sub-packet data unit in a transmission.

[0012d] In accordance with a fourth aspect of the present disclosure, there is provided a method implemented at a network device. The method comprises: receiving, from a terminal device, a random access request in a random access procedure; in response to receiving the random access request, transmit, to the terminal device, an uplink grant of the terminal device, the uplink grant indicating a size, so that the terminal device determines whether the size indicated by the uplink grant matches a size of a packet data unit stored in a buffer of the terminal device.

[0012e] In accordance with a fifth aspect of the present disclosure, there is provided a non-transitory computer readable medium comprising program instructions for causing an apparatus to perform at least: transmitting, at a terminal device, a random access request in a random access procedure to a network device; in response to receiving, during the random access procedure, from the network device an uplink grant for the terminal device, determine whether a size indicated by the uplink grant matches a size of a packet data unit stored in a

buffer of the terminal device; and after determining that the size indicated by the uplink grant mismatches the size of the packet data unit stored in the buffer, including a sub-packet data unit in a transmission.

[0012f] In accordance with a sixth aspect of the present disclosure, there is provided a non-transitory computer readable medium comprising program instructions for causing an apparatus to perform at least: receiving, from a terminal device, a random access request in a random access procedure; and in response to receiving the random access request, transmit, to the terminal device, an uplink grant of the terminal device, the uplink grant indicating a size , so that the terminal device determines whether the size indicated by the uplink grant matches a size of a packet data unit stored in a buffer of the terminal device.

[0013] It is to be understood that the summary section is not intended to identify key or essential features of embodiments of the present disclosure, nor is it intended to be used to limit the scope of the present disclosure. Other features of the present disclosure will become easily comprehensible through the following description.