

WHAT IS CLAIMED IS:

1. A terminal device, comprising:
 - means for transmitting, at the terminal device, a random access request in a random access procedure to a network device;
 - 5 means for receiving, during the random access procedure, from the network device an uplink grant for the terminal device;
 - means for determining whether a size indicated by the uplink grant matches a size of a medium access control, MAC, protocol data unit, PDU, stored in a buffer of the terminal device;
 - 10 means for, if determining that the size indicated by the uplink grant mismatches the size of the medium access control protocol data unit stored in the buffer, including a medium access control sub-protocol data unit from the medium access control protocol data unit in a subsequent uplink transmission,
 - wherein the means for including the medium access control sub-protocol data unit from the medium access control protocol data unit in the subsequent uplink transmission comprise:
 - 15 means for determining whether the random access procedure is successfully completed by receiving the uplink grant; and
 - means for, in response to determining that the random access procedure is considered successfully completed, discarding or not taking into consideration a cell radio network temporary identifier, C-RNTI, medium access control, MAC, control element, CE, from the medium access control protocol data unit in the subsequent uplink transmission,
 - wherein the means for determining whether the random access procedure is successfully completed comprise means for determining that the uplink grant is addressed to
 - 25 a cell radio network temporary identifier.

2. The terminal device of claim 1, wherein the means for transmitting the random access request comprise means for transmitting one of the following:
 - a contention-free random access preamble; and
 - 30 a contention-based random access preamble.

3. The terminal device of claim 1 or claim 2, wherein the medium access control protocol data unit comprises at least one of the following medium access control control

elements:

a Cell Radio Network Temporary Identifier, C-RNTI;

a Buffer Status Report, BSR; and

a Power Headroom Report, PHR.

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4. The terminal device of claim 3, wherein the BSR comprises at least one of the following:

a truncated BSR;

a padding BSR;

10 a regular BSR; and

a periodic BSR.

5. The terminal device of any of the claims 1 to 4, wherein the means for including the medium access control sub-protocol data unit in the subsequent uplink transmission
15 comprise at least one of:

means for discarding a truncated BSR from the medium access control protocol data unit;

means for discarding a padding BSR from the medium access control protocol data unit;

20 means for discarding a regular BSR from the medium access control protocol data unit;

means for discarding a periodic BSR from the medium access control protocol data unit;

means for discarding a PHR from the medium access control protocol data unit;

25 and

means for adjusting a size of the truncated BSR.

6. The terminal device of any one of the claims 1 to 5,
wherein the medium access control protocol data unit stored in the buffer has been
30 generated during a contention-based random access, CBRA, attempt, and

wherein the random access procedure comprises a switching from the contention-based random access attempt to a contention-free random access, CFRA, procedure, and

wherein the random access request is a contention-free random access preamble for the contention-free random access procedure.

7. The terminal device of claim 6, wherein the switching from the contention-based random access attempt to the contention-free random access procedure corresponds to a beam change in a multi-beam operation supported by a recovery mechanism.

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8. The terminal device of any of the claims 1 to 7, wherein the subsequent uplink transmission comprises at least one of the following:

a transmission associated with the uplink grant; and

10 a transmission associated with a further uplink grant, the further uplink grant being different with the uplink grant.

9. The terminal device of any of the claims 1 to 8, wherein the terminal device further comprises:

15 means for transmitting, to the network device, at least portion of the medium access control sub-protocol data unit of the medium access control protocol data unit.

10. A network device, comprising:

means for receiving, from a terminal device, a random access request in a random access procedure;

20 means for, in response to receiving the random access request, transmitting, to the terminal device, an uplink grant for the terminal device so that the terminal device determines that the random access procedure is successfully completed, the uplink grant being addressed to a cell radio network temporary identifier, C-RNTI, and the uplink grant indicating a size, so that the terminal device determines whether the size indicated by the uplink grant matches
25 a size of a medium access control, MAC, protocol data unit, PDU, stored in a buffer of the terminal device;

means for receiving, from the terminal device, a transmission,

wherein the transmission includes a medium access control sub-protocol data unit from the medium access control protocol data unit stored in the buffer of the terminal device
30 and does not include a cell radio network temporary identifier medium access control, MAC, control element, CE, from the medium access control protocol data unit stored in the buffer of the terminal device, if the terminal device determines that the size indicated by the uplink grant mismatches the size of the medium access control protocol data unit stored in the buffer of the terminal device, and

wherein the transmission includes the medium access control protocol data unit stored in the buffer of the terminal device, if the terminal device determines that the size indicated by the uplink grant is equal to the size of the medium access control protocol data unit stored in the buffer of the terminal device.

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11. The network device of claim 10, wherein the means for receiving the random access request comprise means for receiving one of the following:

a contention-free random access preamble; and

a contention-based random access preamble.

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12. The network device of claim 10 or claim 11, wherein the medium access control protocol data unit comprises at least one of the following medium access control control elements:

a Cell Radio Network Temporary Identifier, C-RNTI;

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a Buffer Status Report, BSR; and

a Power Headroom Report, PHR.

13. The network device of any of the claims 10 to 12, wherein the BSR comprises at least one of the following:

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a truncated BSR;

a padding BSR;

a regular BSR; and

a periodic BSR.

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14. The network device of any one of the claims 10 to 13,

wherein resources for a contention-free random access, CFRA, are allocated to a subset of beams in a cell of the network device so that the terminal device has a possibility to switch between beams allocated with resources for a contention-based random access, CBRA, and beams allocated with the resources for the contention-free random access in the cell; and

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wherein the random access request is a preamble for the contention-free random access.

15. A method, comprising:

transmitting, at a terminal device, a random access request in a random access procedure to a network device;

receiving, during the random access procedure, from the network device an uplink grant for the terminal device;

5 determining whether a size indicated by the uplink grant matches a size of a medium access control, MAC, protocol data unit, PDU, stored in a buffer of the terminal device;

if determining that the size indicated by the uplink grant mismatches the size of the medium access control protocol data unit stored in the buffer, including a medium access control sub-protocol data unit from the medium access control protocol data unit in a subsequent uplink transmission,

10 wherein including the medium access control sub-protocol data unit from the medium access control protocol data unit in the subsequent uplink transmission comprises:

determining whether the random access procedure is successfully completed by receiving the uplink grant; and

15 in response to determining that the random access procedure is considered successfully completed, discarding or not taking into consideration a cell radio network temporary identifier, C-RNTI, medium access control, MAC, control element, CE, from the medium access control protocol data unit in the subsequent uplink transmission,

20 wherein the determining whether the random access procedure is successfully completed comprises determining that the uplink grant is addressed to a cell radio network temporary identifier.

16. The method of claim 15,

25 wherein the medium access control protocol data unit stored in the buffer has been generated during a contention-based random access, CBRA, attempt, and

wherein the random access procedure comprises a switching from the contention-based random access attempt to a contention-free random access, CFRA, procedure, and

wherein the random access request is a contention-free random access preamble for the contention-free random access procedure.

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17. The method of claim 16, wherein the switching from the contention-based random access attempt to the contention-free random access procedure corresponds to a beam change in a multi-beam operation supported by a recovery mechanism.

18. A method, comprising:

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
5 device, an uplink grant for the terminal device so that the terminal device determines that the random access procedure is successfully completed, the uplink grant being addressed to a cell radio network temporary identifier, C-RNTI, and 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 medium access control, MAC, protocol data unit, PDU, stored in a buffer of the
10 terminal device;

receiving, from the terminal device, a transmission,

wherein the transmission includes a medium access control sub-protocol data unit from the medium access control protocol data unit stored in the buffer of the terminal device and does not include a cell radio network temporary identifier medium access control, MAC,
15 control element, CE, from the medium access control protocol data unit stored in the buffer of the terminal device, if the terminal device determines that the size indicated by the uplink grant mismatches the size of the medium access control protocol data unit stored in the buffer of the terminal device, and

wherein the transmission includes the medium access control protocol data unit
20 stored in the buffer of the terminal device, if the terminal device determines that the size indicated by the uplink grant is equal to the size of the medium access control protocol data unit stored in the buffer of the terminal device.

19. The method of claim 18,

25 wherein resources for a contention-free random access, CFRA, are allocated to a subset of beams in a cell so that the terminal device has a possibility to switch between beams allocated with resources for a contention-based random access, CBRA, and beams allocated with the resources for the contention-free random access in the cell; and

wherein the random access request is a preamble for the contention-free random
30 access.

20. A computer readable medium comprising program instructions for causing a terminal device to perform at least:

transmitting, at the terminal device, a random access request in a random access

procedure to a network device;

receiving, during the random access procedure, from the network device an uplink grant for the terminal device;

determining whether a size indicated by the uplink grant matches a size of a medium
5 access control protocol data unit stored in a buffer of the terminal device;

if determining that the size indicated by the uplink grant mismatches the size of the medium access control protocol data unit stored in the buffer, including a medium access control sub-protocol data unit from the medium access control protocol data unit in a subsequent uplink transmission,

10 wherein including the medium access control sub-protocol data unit from the medium access control protocol data unit in the subsequent uplink transmission comprises:

determining whether the random access procedure is successfully completed by receiving the uplink grant; and

in response to determining that the random access procedure is considered
15 successfully completed, discarding or not taking into consideration a cell radio network temporary identifier, C-RNTI, medium access control, MAC, control element, CE, from the medium access control protocol data unit in the subsequent uplink transmission,

wherein the determining whether the random access procedure is successfully completed comprises determining that the uplink grant is addressed to a cell radio network
20 temporary identifier.