

WHAT IS CLAIMED IS:

1. ~~An apparatus~~ A terminal device, comprising:

—means for transmitting, at ~~a~~the terminal device, a random access request in a random access procedure to a network device;

Commented [BB1]: Basis in the documents as filed at least: Claim 1, 15, [0007], [0024]

5 —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;~~

10 —means for ~~after~~ 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;

Commented [BB2]: Basis in the documents as filed at least: [0038], [0041], [0052]

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

Commented [BB3]: Basis in the documents as filed at least: [0058], [0060], [0079], [0092], [00108]

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:

Commented [BB4]: Basis in the documents as filed at least: [0043], [0080], [0094], [00108]

20 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.

Commented [BB5]: Basis in the documents as filed at least: Claim 6, [0066], [0094], [00110], [00128]

25 wherein the means for determining whether the random access procedure is successfully completed comprise means for determining that the uplink grant is addressed to a cell radio network temporary identifier.

Commented [BB6]: Basis in the documents as filed at least: Claim 7, [0068], [0091], [00112], [00129]

30 2. The ~~apparatus~~ terminal device of claim 1, wherein the ~~apparatus is caused to transmit~~ means for transmitting the random access request ~~by~~ comprise means for transmitting one of the following:

a contention-free random access preamble; and

a contention-based random access preamble.

3. The ~~apparatus~~terminal device of claim 1 or claim 2, wherein the ~~packet~~medium access control protocol data unit comprises at least one of the following ~~Medium Access Control, MAC, Control Elements, CEs~~medium access control control elements:

- a Cell Radio Network Temporary Identifier, C-RNTI;
- a Buffer Status Report, BSR; and
- a Power Headroom Report, PHR.

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

- a truncated BSR;
- a padding BSR;
- a regular BSR; and
- a periodic BSR.

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

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

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

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

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

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

means for adjusting a size of the truncated BSR.

6. The ~~apparatus~~terminal device of any one of the claims 1 to 5, wherein the ~~sub-packet~~medium access control protocol data unit ~~of the packet data unit stored in the transmission comprises:~~

~~—determining whether the buffer has been generated during a contention-based~~

Commented [BB7]: Basis in the documents as filed at least: [0036]-[0040], [0047], [0049], [0067], [0069]

random access, CBRA, attempt, and

wherein the random access procedure is successfully completed by receiving the uplink grant; and comprises a switching from the contention-based random access attempt to a contention-free random access, CFRA, procedure, and

5 — in response to determining that the random access procedure is considered successfully completed, not taking into consideration a C-RNTI Medium Access Control, MAC, Control Element, CE from the packet data unit in the transmission.

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

10 7. The ~~apparatus~~terminal device of claim 6, wherein the ~~apparatus~~ is caused switching from the contention-based random access attempt to determine whether the contention-free random access procedure is successfully completed by:

15 means for determining that the uplink grant is addressedcorresponds to at least one of the following: a beam change in a multi-beam operation supported by a recovery mechanism.

— a Cell Radio Network Temporary Identifier, C-RNTI; and

— a Random Access Radio Network Temporary Identifier, RA-RNTI.

20 8. The ~~apparatus~~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

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

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

30 means for transmitting, to the network device, at least portion of the sub-packet data units of the packetmedium access control sub-protocol data unit in the-of the medium access control protocol data unit.

10. ~~An apparatus~~A network device, comprising:

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

Commented [BB8]: Basis in the documents as filed at least: [0036] in conjunction with [0002]

Commented [BB9]: Basis in the documents as filed at least: Claims 10, 24, [0008], [0024]

—means for, in response to receiving the random access request, ~~transmit~~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 a size of a ~~packet~~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~~ 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.

11. The ~~apparatus~~network device of claim 10, wherein the ~~apparatus is caused to receive~~means for receiving the random access request ~~by~~comprise means for receiving one of the following:

- a contention-free random access preamble; and
- a contention-based random access preamble.

12. The ~~apparatus~~network device of claim 10 or claim 11, wherein the ~~packet~~medium access control protocol data unit comprises at least one of the following ~~Medium Access Control, MAC, Control Elements, CEs~~medium access control control elements:

- a Cell Radio Network Temporary Identifier, C-RNTI;
- a Buffer Status Report, BSR; and
- a Power Headroom Report, PHR.

Commented [BB10]: Basis in the documents as filed at least:
Claim 6, [0048]-[0049], [0066]

Commented [BB11]: Basis in the documents as filed at least:
Claim 7, [0068]

Commented [BB12]: Basis in the documents as filed at least:
Claim 14, [0039]-[0040], [0052], [0066], [0072], [0092]-[0097]

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

- a truncated BSR;
- a padding BSR;
- 5 a regular BSR; and
- a periodic BSR.

14. The ~~apparatus~~network device of any one of the claims 10 to 13, ~~wherein the apparatus further comprises:~~

10 ~~means for receiving, from the terminal device, at least portion of a sub-packet data unit of the packet data unit.~~

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

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

20 15. A method, comprising:

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

25 ~~— in response to 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, ~~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;~~

30 ~~— after 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 packetmedium access control protocol data unit stored in the buffer, including a medium access control sub-packetprotocol data unit from the medium access control protocol data

Commented [BB13]: [0003], [0028], [0035]-[0038], [0047]

unit in a subsequent uplink transmission.

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 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 temporary identifier.

16. The method of claim 15,

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.

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 implemented at a network device, comprising:

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

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 ~~off~~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

Commented [BB14]: Method claim corresponding to newly added apparatus claim 6

Commented [BB15]: Method claim corresponding to newly added apparatus claim 7

indicating a size, so that the terminal device determines whether the size indicated by the uplink grant matches a size of a ~~packet~~medium access control, MAC, protocol data unit, PDU, stored in a buffer of the terminal device;

receiving, from the terminal device, a transmission,

5 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, 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

10 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,

15 19. The method of claim 18, |

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

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

25 20. A

~~17. A non-transitory~~ computer readable medium comprising program instructions for causing ~~an apparatus~~a terminal device to perform at least:

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

30 ~~— in response to 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; ~~determine;~~

determining whether a size indicated by the uplink grant matches a size of a ~~packet~~

Commented [BB16]: Method claim corresponding to newly added apparatus claim 14

data unit stored in a buffer of the terminal device;

— 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;

5 ~~18. 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;~~

10 ~~— 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;~~
medium 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
15 subsequent uplink transmission,

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
20 receiving the uplink grant; and

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,

25 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.