communications with the base station and/or communications directly with other user devices. The communication device can communicate on appropriate channels, e.g. listen to a channel on which a station, for example a base station of a cell, transmits.

A communication system and associated devices typically operate in accordance with a given standard or specification which sets out what the various entities associated with the system are permitted to do and how that should be achieved. Communication protocols and/or parameters which shall be used for the connection are also typically defined. Non-limiting examples of standardised radio access technologies include GSM (Global System for Mobile), EDGE (Enhanced Data for GSM Evolution) Radio Access Networks (GERAN), Universal Terrestrial Radio Access Networks (UTRAN) and evolved UTRAN (E-UTRAN). An example communication system architecture is the long-term evolution (LTE) of the Universal Mobile Telecommunications System (UMTS) radio-access technology. The LTE is standardized by the third Generation Partnership Project (3GPP). The LTE employs the Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access and a further development thereof which is sometimes referred to as LTE Advanced (LTE-A).

Since introduction of fourth generation (4G) services increasing interest has been paid to the next, or fifth generation (5G) standard. 5G may also be referred to as a New Radio (NR) network. Standardization of 5G or New Radio networks is an on-going study item.

When a user equipment (UE) has data to transmit, the UE transmits a Scheduling Request (SR) so that the UE can be scheduled to transmit that data. The SR informs the scheduler in the base station (e.g. eNB or gNB) that the UE has uplink (UL) data to transmit. There may be problems associated with delays in sending the SR.

~~Statement of invention~~Summary

According to a first aspect there is provided a method comprising: receiving at a user equipment an uplink grant for transmitting first uplink data from the user equipment at a first time, wherein the uplink grant is a configured grant; ~~determining~~ building a ~~second time for initiating preparation of a~~ transport block for transmitting the first uplink data at the first time, wherein the ~~determining~~ building ~~a second time~~

of the transport block is started not earlier than the first time ~~comprising subtracting~~ minus a processing time for preparing the transport block ~~from the first time~~at the user equipment, wherein a buffer status report included in the transport block reflects a latest status in buffer status reporting, or wherein a power headroom report included in the transport block reflects a latest status in power headroom reporting.

According to an example the method comprises determining, at a third time which is between the receiving the uplink grant and the initiating preparation of a transport block, a presence of second uplink data to be transmitted from the user equipment which has not been scheduled for transmission, the second uplink data comprising urgent data and the presence of the second uplink data triggering a buffer status report, and in response to the buffer status report triggering a scheduling request from the user equipment.

According to an example the method comprises the second uplink data being stored in a buffer of the user equipment.

According to an example the method comprises, in response to the sending of the scheduling request, receiving an uplink grant indicating a fourth time at which the user equipment is scheduled to transmit the second uplink data, the fourth time being before the second time.

According to an example the fourth time is before the second time.

According to an example the method comprises determining the processing time for preparing the transport block based on a number of OFDM symbols associated with the transport block.

According to an example a time period between the second time and the first time being reserved for building of the transport block.

According to an example a time period between the first time and the second time comprises a network defined parameter.

According to a second aspect, the present disclosure provides a computer program comprising program code means adapted to perform steps of the first aspect when the program is run on a data processing apparatus.

According to an ~~second aspect~~ example there is provided a method comprising: sending to a user equipment an uplink grant for transmitting first uplink data from the user equipment at a first time; and receiving a scheduling request from the user equipment, the scheduling request indicating presence of second uplink data to be transmitted from the user equipment which has not been scheduled for transmission, the second uplink data comprising urgent data; and in response to the receiving a scheduling request, sending an uplink grant indicating a second time at which the

user equipment is scheduled to transmit the second uplink data, the second time being before the first time.

According to an example, a time period between the sending of the uplink grant for transmitting first uplink data and the second time comprises a network defined parameter.

According to an example ~~third aspect~~ there is provided a computer program comprising program code means adapted to perform the steps of the first aspect when the program is run on a data processing apparatus.

According to an example ~~fourth aspect~~ there is provided a computer program comprising program code means adapted to perform the steps of the second aspect when the program is run on a data processing apparatus.

According to a ~~fifth~~ third aspect there is provided an apparatus comprising at least one processor, and at least one memory including computer program code, wherein the at least one memory and the computer program code are configured, with the at least one processor, to: receive an uplink grant for transmitting first uplink data from the apparatus at a first time, wherein the uplink grant is a configured grant; and ~~determine~~ receive ~~a second time for initiating preparation of~~ a transport block for transmitting the first uplink data, wherein the ~~determining~~ building of ~~a second time comprising subtracting a processing time for preparing~~ the transport block is started not earlier than the first time minus a processing time for preparing the transport block ~~from the first time~~at the apparatus, wherein a buffer status report included in the transport block reflects a latest status in buffer status reporting, or wherein a power headroom report included in the transport block reflects a latest status in power headroom reporting.

According to an example, the apparatus is configured to determine, at a third time which is between the receiving the uplink grant and the initiating preparation of a transport block, a presence of second uplink data to be transmitted from the apparatus which has not been scheduled for transmission, the second uplink data comprising urgent data and the presence of the second uplink data triggering a buffer status report, and in response to the buffer status report the apparatus configured to trigger a scheduling request from the user equipment.

According to an example, the second uplink data is stored in a buffer of the apparatus.

According to an example the apparatus is configured to, in response to the sending of the scheduling request, receive an uplink grant indicating a fourth time at

which the apparatus is scheduled to transmit the second uplink data, the fourth time being before the second time.

According to an example, the fourth time is before the second time.

According to an example, the apparatus is configured to determine the processing time for preparing the transport block based on a number of OFDM symbols associated with the transport block.

According to an example, a time period between the second time and the first time is reserved for building of the transport block.

According to an example, a time period between the first time and the second time comprises a network defined parameter.

According to an ~~sixth aspect~~example there is provided an apparatus comprising at least one processor, and at least one memory including computer program code, wherein the at least one memory and the computer program code are configured, with the at least one processor, to: send to a user equipment an uplink grant for transmitting first uplink data from the user equipment at a first time; and receive a scheduling request from the user equipment, the scheduling request indicating presence of second uplink data to be transmitted from the user equipment which has not been scheduled for transmission, the second uplink data comprising urgent data; and in response to the receiving a scheduling request, send an uplink grant indicating a second time at which the user equipment is scheduled to transmit the second uplink data, the second time being before the first time.

According to an example, a time period between the sending of the uplink grant for transmitting first uplink data and the second time comprises a network defined parameter.

Brief description of Figures

The invention will now be described in further detail, by way of example only, with reference to the following examples and accompanying drawings, in which:

WHAT IS CLAIMED IS:

1. A method comprising:

receiving at a user equipment an uplink grant for transmitting first uplink data from the user equipment at a first time, wherein the uplink grant is a configured grant;

~~determining~~ building ~~a second time for initiating preparation of~~ a transport block for transmitting the first uplink data at the first time, wherein the ~~determining~~ building of the transport block is started not earlier than the first time ~~a second time comprising subtracting~~ minus a processing time for preparing the transport block ~~from the first time~~at the user equipment,

wherein a buffer status report included in the transport block reflects a latest status in buffer status reporting, or

wherein a power headroom report included in the transport block reflects a latest status in power headroom reporting.

2. The method of claim 1, ~~comprising determining, at a third time which is between the receiving the uplink grant and the initiating preparation of a transport block, a presence of second uplink data to be transmitted from the user equipment which has not been scheduled for transmission, the second uplink data comprising urgent data and the presence of the second uplink data triggering a buffer status report, and in response to the buffer status report triggering a scheduling request from the user equipment~~wherein the first time minus the processing time is the latest in time for the transport block to be prepared for transmitting the first uplink data at the first time.

~~3. A method according to claim 1 or claim 2, the second uplink data being stored in a buffer of the user equipment.~~

~~4. The method of claim 2 or claim 3 comprising, in response to the sending of the scheduling request, receiving an uplink grant indicating a fourth time at which the user~~

~~equipment is scheduled to transmit the second uplink data, the fourth time being before the second time.~~

~~5. A method according to claim 4, the fourth time being before the second time.~~

~~6~~3. ~~A~~ The method according to any one of claims 1 to ~~5~~2, comprising determining the processing time for preparing the transport block based on a number of orthogonal frequency division multiplexing, OFDM, symbols ~~associated with the transport block~~.

~~7~~4. ~~A~~ The method according to any one of claims 1 to ~~6~~3, wherein a time period between the ~~second~~ first time minus the processing time and the first time ~~being~~ is reserved for building of the transport block.

5. The method according to any one of the claims 1 to 4, wherein the processing time is different for different numerologies.

6. The method according to any one of the claims 1 to 5, wherein the grant is a grant free grant or a semi-persistent scheduling grant.

7. The method according to any one of the claims 1 to 6, wherein the first uplink data is transmitted on the Physical Uplink Shared Channel, PUSCH.

8. The method according to any one of the claims 1 to 7, wherein the user equipment awaits the first time minus the processing time before the building of the transport block is started.

9. The method according to any one of the claims 1 to 7, wherein the power headroom report is included in the transport block, and wherein the user equipment awaits the first time minus the processing time before starting the building of the transport block to ensure that the power headroom report included in the transport block reflects the latest status.

10. The method according to any one of the claims 1 to 7, wherein the user equipment, although being capable of building the transport block earlier, awaits the first time minus the processing time before starting the building of the transport block.

11. The method according to any one of the claims 1 to 7, wherein the power headroom report is included in the transport block, and wherein the user equipment, although being capable of building the transport block earlier, awaits the first time minus the processing time before starting the building of the transport block to ensure that the power headroom report included in the transport block reflects the latest status.

~~8. A method according to any of claims 1 to 7, a time period between the first time and the second time comprising a network defined parameter.~~

~~9. A method comprising:~~

~~sending to a user equipment an uplink grant for transmitting first uplink data from the user equipment at a first time; and~~

~~receiving a scheduling request from the user equipment, the scheduling request indicating presence of second uplink data to be transmitted from the user equipment which has not been scheduled for transmission, the second uplink data comprising urgent data; and~~

~~in response to the receiving a scheduling request, sending an uplink grant indicating a second time at which the user equipment is scheduled to transmit the second uplink data, the second time being before the first time.~~

~~10. A method according to claim 9, a time period between the sending of the uplink grant for transmitting first uplink data and the second time comprising a network defined parameter.~~

~~11~~12. A computer program comprising program code means adapted to perform the steps of any one of claims 1 to ~~8~~ 11 when the program is run on a data processing apparatus.

~~12. A computer program comprising program code means adapted to perform the steps of any of claims 9 to 10 when the program is run on a data processing apparatus.~~

~~13~~13. An apparatus configured to, or comprising at least one processor, and at least one memory including computer program code, wherein the at least one memory and the computer program code are configured, with the at least one processor, to:

receive an uplink grant for transmitting first uplink data from the apparatus at a first time, wherein the uplink grant is a configured grant; and

~~determine~~ build ~~a second time for initiating preparation of~~ a transport block for transmitting the first uplink data at the first time, wherein the ~~determining~~ building of the transport block is started not earlier than the ~~a second~~ first time minus ~~comprising subtracting~~ a processing time for preparing the transport block ~~from the first time~~at the apparatus,

wherein a buffer status report included in the transport block reflects a latest status in buffer status reporting, or

wherein a power headroom report included in the transport block reflects a latest status in power headroom reporting.

14. The apparatus ~~of~~ according to claim 13, wherein the first time minus the processing time is the latest in time for the transport block to be prepared for transmitting the first uplink data at the first time~~the apparatus configured to determine, at a third time which is between the receiving the uplink grant and the initiating preparation of a transport block, a presence of second uplink data to be transmitted from the apparatus which has not been scheduled for transmission, the second uplink data comprising urgent data and the presence of the second uplink data triggering a buffer status report, and in response to the buffer status report the apparatus configured to trigger a scheduling request from the user equipment~~.

~~15. An apparatus according to claim 13 or claim 14, the second uplink data being stored in a buffer of the apparatus.~~

~~16. The apparatus of claim 14 or claim 15 configured to, in response to the sending of the scheduling request, receive an uplink grant indicating a fourth time at which the apparatus is scheduled to transmit the second uplink data, the fourth time being before the second time.~~

~~17. An apparatus according to claim 16, the fourth time being before the second time.~~

~~18~~15. An apparatus according to any one of claims 13 to ~~17~~14, wherein the apparatus is, or the at least one memory and the computer program code, with the at least one processor, are configured to: determine the processing time for preparing the transport block based on a number of orthogonal frequency division multiplexing, OFDM, symbols ~~associated with the transport block~~.

~~19~~16. ~~An~~ The apparatus according to any one of claims 13 to ~~18~~ 15, wherein a time period between the ~~second~~ first time minus the processing time and the first time ~~being~~ is reserved for building of the transport block.

17. The apparatus according to any one of the claims 13 to 16, wherein the processing time is different for different numerologies.

18. The apparatus according to any one of the claims 13 to 17, wherein the grant is a grant free grant or a semi-persistent scheduling grant.

19. The apparatus according to any one of the claims 13 to 18, wherein the first uplink data is transmitted on the Physical Uplink Shared Channel, PUSCH.

20. The apparatus according to any one of the claims 13 to 19, wherein the apparatus is, or the at least one memory and the computer program code, with the at least one processor, are configured to await the first time minus the processing time before the building of the transport block is started.

21. The apparatus according to any one of the claims 13 to 19, wherein the power headroom report is included in the transport block, and wherein the apparatus is, or the at least one memory and the computer program code, with the at least one processor, are configured to await the first time minus the processing time (N2) before starting the building of the transport block to ensure that the power headroom report included in the transport block reflects the latest status.

22. The apparatus according to any one of the claims 13 to 19, wherein the apparatus is, or the at least one memory and the computer program code, with the at least one processor, are configured to, although being capable of building the transport

block earlier, await the first time minus the processing time before starting the building of the transport block.

23. The apparatus according to any one of the claims 13 to 19, wherein the power headroom report is included in the transport block, and wherein the apparatus is, or the at least one memory and the computer program code, with the at least one processor, are configured to, although being capable of building the transport block earlier, await the first time minus the processing time before starting the building of the transport block to ensure that the power headroom report included in the transport block reflects the latest status.

24. The apparatus according to any one of the claims 13 to 23, wherein the apparatus is a user equipment or a component thereof, wherein the user equipment is capable of sending and receiving radio signals.

~~20. An apparatus according to any of claims 13 to 19, a time period between the first time and the second time comprising a network defined parameter.~~

~~21. An apparatus comprising at least one processor, and at least one memory including computer program code, wherein the at least one memory and the computer program code are configured, with the at least one processor, to:~~

~~send to a user equipment an uplink grant for transmitting first uplink data from the user equipment at a first time; and~~

~~receive a scheduling request from the user equipment, the scheduling request indicating presence of second uplink data to be transmitted from the user equipment which has not been scheduled for transmission, the second uplink data comprising urgent data; and~~

~~in response to the receiving a scheduling request, send an uplink grant indicating a second time at which the user equipment is scheduled to transmit the second uplink data, the second time being before the first time.~~

~~22. An apparatus according to claim 21, a time period between the sending of the uplink grant for transmitting first uplink data and the second time comprising a network defined parameter.~~