CLAIMS

1. A method for power control, comprising:

when a cumulative power control mode is enabled, determining a physical uplink shared channel (PUSCH) transmission occasion (i-r) as a reference point corresponding to a closed-loop power control parameter of a ~~physical uplink shared channel (~~PUSCH~~)~~ transmission occasion i according to following two conditions: 1) transmission of physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) is no later than that of physical layer downlink control information for scheduling the PUSCH transmission occasion i; 2) r takes a minimum positive integer which satisfies the condition 1);

determining, according to the reference point, a power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i;

determining, according to the reference point and the power adjustment value, the closed-loop power control parameter of the PUSCH transmission occasion i;

determining, according to the closed-loop power control parameter of the PUSCH transmission occasion i, a transmission power of uplink data to be transmitted within the PUSCH transmission occasion i.

~~2. The method of claim 1, wherein when a cumulative power control mode is enabled, determining the reference point corresponding to the closed loop power control parameter of the PUSCH transmission occasion i comprises:~~

~~determining a PUSCH transmission occasion (i-r) as the reference point according to following two conditions:~~

~~1) transmission of physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) is no later than that of physical layer downlink control information for scheduling the PUSCH transmission occasion i;~~

~~2) r takes a minimum positive integer which satisfies the condition 1);~~

~~correspondingly, determining the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i comprises: determining, according to the reference point, the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i.~~

~~3~~2. The method of claim ~~2~~1, wherein determining, according to the reference point, the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i comprises:

determining a cumulative sum of power adjustment values indicated by transmit power control (TPC) commands included in all physical layer downlink control information between the physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) and the physical layer downlink control information for scheduling the transmission occasion i as the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i,

wherein all the physical layer downlink control information comprises the physical layer downlink control information for scheduling the PUSCH transmission occasion i but does not comprise the physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r).

~~4~~3. The method of claim ~~2~~1, wherein determining, according to the reference point, the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i comprises:

determining all physical layer downlink control information between the physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) and the physical layer downlink control information for scheduling the transmission occasion i as a first physical layer downlink control information set;

removing the physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) from the first physical layer downlink control information set, to obtain a second physical layer downlink control information set;

accumulating power adjustment values indicated by TPC commands included in all

physical layer downlink control information in the second physical layer downlink control information set, to obtain a first accumulated sum;

determining the first accumulated sum as the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i.

~~5~~4. The method of claim ~~2~~1, wherein when r=1, determining the reference point corresponding to the closed-loop power control parameter of the transmission occasion i comprises: determining a PUSCH transmission occasion (i-1) as the reference point corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i;

correspondingly, determining, according to the reference point, the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i comprises:

accumulating power adjustment values indicated by TPC commands included in all physical layer downlink control information between the PUSCH transmission occasion (i-1) and the PUSCH transmission occasion i, to obtain a second accumulated sum;

determining the second accumulated sum as the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i.

~~6~~5. The method of claim 1, further comprising:

receiving higher layer signaling from a base station, wherein the higher layer signaling comprises a plurality of open-loop power control parameter sets;

selecting, according to selection information of an open-loop power control parameter, one open-loop power control parameter set from the plurality of open-loop power control parameters sets;

correspondingly, determining, according to the closed-loop power control parameter of the PUSCH transmission occasion i, the transmission power of uplink data to be transmitted within the PUSCH transmission occasion i comprises: determining, according to the closed-loop power control parameter of the PUSCH transmission occasion i and the

open-loop power control parameter set, the transmission power of the uplink data to be transmitted within the PUSCH transmission occasion i.

~~7~~6. The method of claim ~~6~~5, wherein the selection information of the open-loop power control parameter comprises one of: a logical channel group, a radio network temporary identifier (RNTI) group for scrambling physical layer downlink control information for scheduling data to be transmitted, or first indication information in physical layer downlink control information for scheduling data to be transmitted;

wherein one open-loop power control parameter set has a mapping with at least one piece of the selection information of the open-loop power control parameter.

~~8~~7. The method of claim ~~6~~ 5 or ~~7~~6, wherein when a cumulative power control mode is enabled, determining the reference point corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i comprises:

determining a PUSCH transmission occasion (i-r) as the reference point according to following two conditions;

1) determining the PUSCH transmission occasion (i-r) according to one of following conditions:

i) an open-loop power control parameter set selected for the PUSCH transmission occasion (i-r) and an open-loop power control parameter set selected for the PUSCH transmission occasion i are the same;

ii) data transmitted within the PUSCH transmission occasion (i-r) and data transmitted within the PUSCH transmission occasion i belong to a same service type group or a same logical channel group;

iii) a RNTI for scrambling physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) and a RNTI for scrambling physical layer downlink control information for scheduling the PUSCH transmission occasion i belong to a same RNTI group; or

iv) first indication information included in physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) and first indication

information included in physical layer downlink control information for scheduling the PUSCH transmission occasion i are the same;

2) r takes a minimum positive integer which satisfies the condition 1).

~~9~~8. The method of claim ~~6~~ 5 or ~~6~~7, wherein when a cumulative power control mode is enabled, determining the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i comprises:

determining a power adjustment value indicated by a TPC command included in physical layer downlink control information of the PUSCH transmission occasion i as the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i.

~~10~~9. A device for power control, comprising:

a first determination unit, configured to: when a cumulative power control mode is enabled, ~~–~~determine a physical uplink shared channel (PUSCH) transmission occasion (i-r) as a reference point corresponding to a closed-loop power control parameter of a ~~physical uplink shared channel (~~PUSCH~~)~~ transmission occasion i according to following two conditions: 1) transmission of physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) is no later than that of physical layer downlink control information for scheduling the PUSCH transmission occasion i; 2) r takes a minimum positive integer which satisfies the condition 1);

a second determination unit, configured to determine, according to the reference point, a power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i;

a third determination unit, configured to determine, according to the reference point and the power adjustment value, the closed-loop power control parameter of the PUSCH transmission occasion i;

a fourth determination unit, configured to determine, according to the closed-loop power control parameter of the PUSCH transmission occasion i, a transmission power of uplink data to be transmitted within the PUSCH transmission occasion i.

~~11. The device of claim 10, wherein when a cumulative power control mode is enabled, the first determination unit is specifically configured to:~~

~~determine a PUSCH transmission occasion (i-r) as the reference point according to following two conditions:~~

~~1) transmission of physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) is no later than that of physical layer downlink control information for scheduling the PUSCH transmission occasion i;~~

~~2) r takes a minimum positive integer which satisfies the condition 1);~~

~~correspondingly, the second determination unit is configured to: determine, according to the reference point, the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i.~~

~~12~~10. The device of claim ~~11~~9, wherein the second determination unit is specifically configured to:

determine a cumulative sum of power adjustment values indicated by transmit power control (TPC) commands included in all physical layer downlink control information between the physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) and the physical layer downlink control information for scheduling the transmission occasion i as the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i,

wherein all the physical layer downlink control information comprises the physical layer downlink control information for scheduling the PUSCH transmission occasion i but does not comprise the physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r).

~~13~~11. The device of claim ~~11~~9, wherein the second determination unit comprises:

a first determination module, configured to determine all physical layer downlink control information between the physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) and the physical layer downlink

control information for scheduling the transmission occasion i as a first physical layer downlink control information set;

a second determination module, configured to obtain a second physical layer downlink control information set by removing the physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) from the first physical layer downlink control information set;

a first accumulation module, configured to accumulate power adjustment values indicated by TPC commands included in all physical layer downlink control information in the second physical layer downlink control information set, to obtain a first accumulated sum;

a third determination module, configured to determine the first accumulated sum as the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i.

~~14~~12. The device of claim 9 ~~11~~, wherein when r=1, the first determination unit is configured to determine a PUSCH transmission occasion (i-1) as the reference point corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i;

correspondingly, the second determination unit comprises:

a second accumulation module, configured to accumulate power adjustment values indicated by TPC commands included in all physical layer downlink control information between the PUSCH transmission occasion (i-1) and the PUSCH transmission occasion i, to obtain a second accumulated sum;

a fourth determination module, configured to determine the second accumulated sum as the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i.

~~15~~13. The device of claim ~~10~~9, wherein the device further comprises:

a receiving unit, configured to receive higher layer signaling from a base station, wherein the higher layer signaling comprises a plurality of open-loop power control parameter sets;

a selection unit, configured to select, according to selection information of an open-loop power control parameter, one open-loop power control parameter set from the plurality of open-loop power control parameters sets;

correspondingly, the fourth determination unit is configured to determine, according to the closed-loop power control parameter of the PUSCH transmission occasion i and the open-loop power control parameter set, the transmission power of the uplink data to be transmitted within the PUSCH transmission occasion i.

~~16~~14. The device of claim ~~15~~13, wherein the selection information of the open-loop power control parameter comprises one of: a logical channel group, a radio network temporary identifier (RNTI) group for scrambling physical layer downlink control information for scheduling data to be transmitted, or first indication information in physical layer downlink control information for scheduling data to be transmitted;

wherein one open-loop power control parameter set has a mapping with at least one piece of the selection information of the open-loop power control parameter.

~~17~~15. The device of claim ~~15~~ 13 or ~~16~~14, wherein when a cumulative power control mode is enabled, the first determination unit is configured to determine a PUSCH transmission occasion (i-r) as the reference point according to following two conditions:

1) determining the PUSCH transmission occasion (i-r) according to one of following conditions:

i) an open-loop power control parameter set selected for the PUSCH transmission occasion (i-r) and an open-loop power control parameter set selected for the PUSCH transmission occasion i are the same;

ii) data transmitted within the PUSCH transmission occasion (i-r) and data transmitted within the PUSCH transmission occasion i belong to a same service type group or a same logical channel group;

iii) a RNTI for scrambling physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) and a RNTI for scrambling physical layer downlink control information for scheduling the PUSCH transmission occasion i

belong to a same RNTI group; or

iv) first indication information included in physical layer downlink control information for scheduling the PUSCH transmission occasion (i-r) and first indication information included in physical layer downlink control information for scheduling the PUSCH transmission occasion i are the same;

2) r takes a minimum positive integer which satisfies the condition 1).

~~18~~16. The device of claim 13~~15~~ or ~~16~~14, wherein when a cumulative power control mode is enabled, the second determination unit is configured to:

determine a power adjustment value indicated by a TPC command included in physical layer downlink control information of the PUSCH transmission occasion i as the power adjustment value corresponding to the closed-loop power control parameter of the PUSCH transmission occasion i.

~~19~~17. A terminal, comprising:

a processor, and

a memory storing computer instructions executable by the processor,

wherein the processor is configured to, when executing the computer instructions, perform the method for power control of any one of claims 1 to ~~9~~8.

~~20~~18. A computer-readable storage medium having stored therein computer instructions that, when executed by a processor, cause the processor to perform the method for power control of any one of claims 1 to ~~9~~8.