[00100] In embodiments of the disclosure, a scenario in which the open-loop power control method for an uplink PUSCH is used is a scenario where a power control parameter is adjusted due to service conflicts that occur during the communication of the terminal. For example, in FIG. 1, terminal 1 performs the URLLC service and the eMBB service, and terminal 2 performs the eMBB service. A starting point of embodiments of the disclosure is to apply to a situation where the terminal 1 requires three different open-loop power levels for power boosting of the eMBB service and URLLC service when the terminal 1 which is configured with both the eMBB service and the URLLC service conflicts with the terminal 2 which is configured with the eMBB service. The three different open-loop power levels are: 1) baseline P0 used for the power boosting of eMBB service, obtained from the P0-PUSCH AlphaSet; 2) higher P0 used for power boosting of a URLLC service that does not conflict with an eMBB service; 3) highest P0 used for a URLLC PUSCH that conflicts with an eMBB.

[00101] To provide a clearer description of how the terminal determines P0 based on high-level parameters and DCI indications, please refer to Table 1. Table 1 shows how the terminal determines P0 based on high-level parameters and DCI indications.

Table 1

high-level parameter	SRI indication field	open-loop power control parameter set indication field	UE obtaining P0
P0-PUSCH-Set-List being not configured	-	0 bit	obtaining P0 from an Rel-15 parameter P0-PUSCH-AlphaSet
P0-PUSCH-Set-List being configured	existing	configuring 1 bit only, indicated as “0”	obtaining P0 from an Rel-15 parameter P0-PUSCH-AlphaSet
		configuring 1 bit only, indicated as “1”	obtaining P0 from P0-PUSCH-Set
	not existing	configuring 1 bit, indicated as “0”; or configuring 2 bits, indicated as “00”	obtaining P0 from an Rel-15 parameter P0-PUSCH-AlphaSet
		configuring 1 bit, indicated as “1”; or configuring 2 bits,	obtaining P0 from P0-PUSCH-Set

information field for indicating the open-loop power control is configured to 1 bit, it can support selecting the open-loop power boosting value used on different TRPs from the P0-PUSCH AlphaSet and the P0-PUSCH Set.

[00123] Referring to Table 1, when the first OLPC power code point indicated by the information field in the DCI is configured as 2 bits, and the 2 bits indicate "00", it can support determining the open-loop power boosting value used on the corresponding TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner in P0-PUSCH AlphaSet. When the first OLPC power code point indicated by the information field in the DCI is configured as 2 bits, and this 2 bit indicates "01", it can support determining a first P0 in P0-PUSCH-Set as the open-loop power boosting value used on the corresponding TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner. When the first OLPC power code point indicated by the information field in the DCI is configured as 2 bits, and the 2 bits indicate "10", it can support determining the second P0 in the P0-PUSCH-Set as the open-loop power boosting value used on the corresponding TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner. That is to say, when the DCI information field for indicating the open-loop power control is configured to 2 bits, configuration selection can be supported in the first P0 value in P0-PUSCH AlphaSet/P0-PUSCH AlphaSet, or the second P0 value in P0-PushCH-Set/P0-PushCH-Set.

[00124] In embodiments of the disclosure, indication information for indicating whether the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner have a same interference situation can be added to the DCI. This indication information is hereinafter referred to as second indication information.

[00125] If the second indication information indicates that the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner have the same interference situation, the multiple TRPs have the same interference situation can use the same open-loop power control parameter. For example, the solution involved in the above embodiments can be used. That is, the open-loop power boosting value used on a corresponding TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner is determined in the PUSCH power control set corresponding to each TRP associated with the first OLPC power code point.

CLAIMS

WHAT IS CLAIMED IS:

1. An open-loop power control (OLPC) method for an uplink physical uplink shared channel (PUSCH), performed by a network device, comprising:

sending first indication information, wherein the first indication information indicates an open-loop power boosting value used when the PUSCH is sent based on multi- transmission reception points (multi-TRP) cooperation, and the open-loop power boosting value used when the PUSCH is sent corresponds to different cooperative TRPs to which the PUSCH is sent; and

in response to an absence of a sounding reference signal (SRS) resource indication (SRI) indication field in the first indication information, configuring and determining an OLPC parameter of one or more transmission reception points (TRPs) used by a terminal when the terminal sends the PUSCH to multiple TRPs in a cooperation manner, the OLPC parameter comprising a corresponding open-loop power boosting value.

2. The method of claim 1, wherein configuring and determining the OLPC parameter of one or more TRPs used by the terminal when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner comprises:

configuring a power control parameter set for each TRP direction of the multiple cooperative TRPs indicated by the first indication information, each power control parameter set comprising one or more OLPC parameters of a corresponding TRP direction; and

in the power control parameter set corresponding to each TRP direction, determining an OLPC parameter corresponding to the TRP direction used by the terminal when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner.

3. The method of claim 1 or 2, wherein the first indication information is carried in downlink control information (DCI), and the DCI comprises an information field;

the information field indicates the open-loop power boosting value of one or more TRPs used by the terminal when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner.

4. The method of claim 3, wherein the information field indicates that the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner correspond to a same OLPC parameter.

5. The method of claim 4, wherein the DCI comprises a first OLPC power code point associated with a PUSCH power control parameter set corresponding to each TRP;

determining the OLPC parameter of the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner comprises:

in the PUSCH power control parameter set corresponding to each TRP associated with the first OLPC power code point, determining an open-loop power boosting value used on a corresponding TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner.

6. The method of claim 3, wherein the DCI comprises a first OLPC power code point and second indication information, the second indication information indicating at least one of: whether the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner have a same interference situation, or information of a TRP that requires power boosting in one or more TRPs used when the PUSCH is sent to the multiple TRPs in the cooperation manner.

7. The method of claim 6, wherein determining the OLPC parameter of the one or more TRPs used by the terminal when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner comprises:

in response to the second indication information indicating that the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner have the same interference situation, determining, in a PUSCH power control parameter set corresponding to each TRP associated with the first OLPC power code point, an open-loop power boosting value used on a corresponding TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner according to the same OLPC parameter;

in response to the second indication information indicating that the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner

have different interference situations, or the second indication information indicating that the TRP requiring the power boosting is a first cooperative TRP, determining, in the PUSCH power control parameter set associated with the first OLPC power code point, an open-loop power boosting value used on the first cooperative TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner, and determining, in the PUSCH power control parameter set associated with the first OLPC power code point, an open-loop power boosting value used on a second cooperative TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner based on a predefined mode;

wherein the second cooperative TRP comprises one or more TRPs different from the first cooperative TRP in the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner.

8. The method of claim 6, wherein the second indication information comprises:

a maximum extended bit in the information field; or

a minimum extended bit value in the information field.

9. The method of claim 3, further comprising:

determining a cooperative TRP corresponding to the open-loop power boosting value.

10. The method of claim 9, wherein determining the cooperative TRP corresponding to the open-loop power boosting value comprises at least one of:

determining according to an SRS resource set identifier corresponding to a power control parameter set corresponding to each TRP direction, wherein a magnitude of the SRS resource set identifier has a correspondence with a direction order of the TRPs; or

determining according to a mapping relationship between the cooperative TRPs and SRS resource sets indicated in the DCI indication field for dynamically indicating switching between a single-TRP mode and a multi-TRP mode, wherein the direction order of the cooperative TRPs is consistent with the mapping relationship between the cooperative TRPs and the SRS resource sets indicated in the DCI indication field.

11. An open-loop power control (OLPC) method for an uplink physical uplink shared channel (PUSCH), performed by a terminal, comprising:

receiving first indication information, wherein no sounding reference signal (SRS) resource indication (SRI) indication field exists in the first indication information, and the first indication information indicates an open-loop power boosting value used when a PUSCH is sent based on multi-TRP cooperation; and

determining an open-loop power boosting value of one or more transmission reception points (TRPs) used by the terminal when the terminal sends the PUSCH to multiple TRPs in a cooperation manner, wherein the open-loop power boosting value used when the PUSCH is sent corresponds to different cooperative TRPs to which the PUSCH to which.

12. The method of claim 11, wherein each TRP direction of the multiple cooperative TRPs indicated by the first indication information is configured with a power control parameter set, each power control parameter set comprises one or more OLPC parameters of a corresponding TRP direction;

determining the open-loop power boosting value of one or more TRPs used by the terminal when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner comprises:

in the power control parameter set corresponding to each TRP direction, determining an OLPC parameter corresponding to the TRP direction used by the terminal when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner.

13. The method of claim 11 or 12, wherein the first indication information is carried in downlink control information (DCI), and the DCI comprises an information field;

the information field indicates the open-loop power boosting value of one or more TRPs used by the terminal when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner.

14. The method of claim 13, wherein the information field indicates that the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner correspond to a same OLPC parameter.

15. The method of claim 14, wherein the DCI comprises a first OLPC power code point associated with a PUSCH power control parameter set corresponding to each TRP;

determining the open-loop power boosting value of the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner comprises:

in the PUSCH power control parameter set corresponding to each TRP associated with the first OLPC power code point, determining the open-loop power boosting value used on a corresponding TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner.

16. The method of claim 13, wherein the DCI comprises a first OLPC power code point and second indication information, the second indication information indicating at least one of: whether the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner have a same interference situation, or information of a TRP that requires power boosting in one or more TRPs used when the PUSCH is sent to the multiple TRPs in the cooperation manner.

17. The method of claim 16, wherein determining the open-loop power boosting value of the one or more TRPs used by the terminal when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner comprises:

in response to the second indication information indicating that the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner have the same interference situation, determining, in a PUSCH power control parameter set corresponding to each TRP associated with the first OLPC power code point, an open-loop power boosting value used on a corresponding TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner according to the same OLPC parameter;

in response to the second indication information indicating that the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner have different interference situations, or the second indication information indicating that the TRP requiring the power boosting is a first cooperative TRP, determining, in the PUSCH power control parameter control parameter set associated with the first OLPC power code point, an open-loop power boosting value used on the first cooperative TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner, and

determining, in the PUSCH power set associated with the first OLPC power code point, an open-loop power boosting value used on a second cooperative TRP when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner based on a predefined mode;

wherein the second cooperative TRP comprises one or more TRPs different from the first cooperative TRP in the one or more TRPs used when the terminal sends the PUSCH to the multiple TRPs in the cooperation manner.

18. The method of claim 16, wherein the second indication information comprises:

a maximum extended bit in the information field; or

a minimum extended bit value in the information field.

19. The method of claim 13, further comprising:

determining a cooperative TRP corresponding to the open-loop power boosting value.

20. The method of claim 19, wherein the cooperative TRP corresponding to the open-loop power boosting value is determined by at least one of:

determining according to an SRS resource set identifier corresponding to a power control parameter set corresponding to each TRP direction, wherein a magnitude of the SRS resource set identifier has a correspondence with a direction order of the TRPs;

determining according to a mapping relationship between the cooperative TRPs and SRS resource sets indicated in the DCI indication field for dynamically indicating switching between a single-TRP mode and a multi-TRP mode, wherein the direction order of the cooperative TRPs is consistent with the mapping relationship between the cooperative TRPs and the SRS resource sets indicated in the DCI indication field.

21. An open-loop power control device for an uplink PUSCH, comprising:

a processor; and

a memory for storing instructions executable by the processor; wherein

the processor is configured to perform the method of any one of claims 1-10 or the method of any one of claims 11-20.

22. A storage medium having instructions stored thereon that, when executed by a processor of a network device, cause the network device to perform the method of any

one of claims 1-10, or when executed by a processor of a terminal, cause the terminal to perform the communication method of any one of claims 11-20.