WHAT IS CLAIMED IS:

1. A power headroom reporting method based on multi-panel transmission, performed by a terminal device with a plurality of panels, comprising:

in response to the terminal device configuring multiple transmission and reception point (multi-TRP) based uplink simultaneous multi-panel transmission (STxMP) for a physical uplink shared channel (PUSCH) on a first transmission slot corresponding to the PUSCH carrying a medium access control control element (MAC CE) PHR report, or on a slot meeting a timeline requirement, and an actual PUSCH transmission being a transmission from a single panel towards a single TRP, calculating at least one actual power headroom (PH) and reporting a power headroom report (PHR) based on a maximum power configuration of the terminal device.

2. The method according to claim 1, wherein the calculating at least one actual power headroom (PH) and reporting the power headroom report (PHR) based on the maximum power configuration of the terminal device comprises at least one of:

in response to the maximum power configuration of the terminal device being a maximum transmission power Pcmax for the terminal device, calculating the at least one actual PH and reporting the PHR based on the Pcmax;

in response to the maximum power configuration of the terminal device being maximum transmission powers Pcmax,p for different panels, calculating the at least one actual PH and reporting the PHR based on a maximum transmission power Pcmax,p corresponding to at least one panel, wherein p is a positive integer less than or equal to N, and N is a number of the panels of the terminal device; or

in response to the maximum power configuration of the terminal device being Pcmax and Pcmax,p corresponding to each panel, calculating the at least one actual PH and reporting the PHR jointly based on the Pcmax, the Pcmax,p.

3. The method according to claim 2, wherein the calculating the at least one actual PH and reporting the PHR based on the Pcmax comprises:

calculating the actual PH and reporting an actual PHR of a first panel corresponding to the actual PUSCH transmission based on the Pcmax, a power allocation rule; or

calculating the actual PH and reporting an actual PHR of a first panel corresponding to the actual PUSCH transmission based on the Pcmax, a power allocation rule, and calculating a virtual PH and reporting a virtual PHR of another panel based on the Pcmax, the power allocation rule,

wherein the actual PHR is associated with a transmission occasion corresponding to the actual

PUSCH transmission on the first panel, and the virtual PHR is associated with a transmission occasion corresponding to a PUSCH transmission reference assumption on the another panel.

4. The method according to claim 2 or 3, wherein the calculating the at least one actual PH and reporting the PHR based on the Pcmax,p corresponding to the at least one panel comprises:

calculating the actual PH and reporting an actual PHR of a first panel corresponding to the actual PUSCH transmission based on a first Pcmax,p corresponding to the first panel; or

calculating the actual PH and reporting an actual PHR of a first panel based on a first Pcmax,p, and calculating a virtual PH and reporting a virtual PHR of another panel based on a second Pcmax,p corresponding to the another panel,

wherein the actual PHR is associated with a transmission occasion corresponding to the actual PUSCH transmission on the first panel, and the virtual PHR is associated with a transmission occasion corresponding to a PUSCH transmission reference assumption on the another panel.

5. The method according to any one of claims 2 to 4, wherein the calculating the at least one actual PH and reporting the PHR jointly based on the Pcmax, the Pcmax,p comprises at least one of:

calculating the actual PH and reporting an actual PHR of a first panel corresponding to the actual PUSCH transmission based on the Pcmax;

calculating the actual PH and reporting an actual PHR of a first panel corresponding to the actual PUSCH transmission based on a first Pcmax,p corresponding to the first panel;

calculating and reporting two actual PHRs of a first panel corresponding to the actual PUSCH transmission based on a first Pcmax,p corresponding to the first panel and the Pcmax;

calculating the actual PH and reporting an actual PHR of a first panel corresponding to the actual PUSCH transmission based on the Pcmax, and calculating a virtual PH and reporting a virtual PHR of another panel based on the Pcmax;

calculating the actual PH and reporting an actual PHR of a first panel based on a first Pcmax,p, and calculating a virtual PH and reporting a virtual PHR of another panel based on a second Pcmax,p corresponding to the another panel;

calculating the actual PH and reporting an actual PHR of a first panel based on a first Pcmax,p, calculating the actual PH and reporting another actual PHR of the first panel based on the Pcmax, and calculating a virtual PHR and reporting a virtual PH of another panel based on the Pcmax;

calculating and reporting two actual PHRs of a first panel respectively based on a first Pcmax,p corresponding to the first panel and the Pcmax, and calculating and reporting a virtual PHR of another panel based on a second Pcmax,p corresponding to the another panel;

calculating the actual PH and reporting an actual PHR of a first panel based on a first Pcmax,p, and calculating and reporting two virtual PHRs of another panel respectively based on a second Pcmax,p corresponding to the another panel and the Pcmax;

calculating the actual PH and reporting an actual PHR of a first panel based on the Pcmax, and calculating and reporting two virtual PHRs of another panel respectively based on a second Pcmax,p corresponding to the another panel and the Pcmax;

calculating and reporting one actual PHR of a first panel based on a first Pcmax,p, calculating and reporting one virtual PHR corresponding to another panel based on a second Pcmax,p, and calculating and reporting one PHR corresponding to the terminal device jointly based on the first Pcmax,p, the second Pcmax,p and the Pcmax;

calculating and reporting two actual PHRs of a first panel respectively based on a first Pcmax,p corresponding to the first panel and the Pcmax, and calculating and reporting two virtual PHRs of another panel respectively based on a second Pcmax,p corresponding to the another panel and the Pcmax; or

calculating and reporting two actual PHRs of a first panel respectively based on a first Pcmax,p corresponding to the first panel and the Pcmax, calculating and reporting two virtual PHRs of another panel respectively based on a second Pcmax,p corresponding to the another panel and the Pcmax, and calculating and reporting one PHR corresponding to the terminal device jointly based on the first Pcmax,p, the second Pcmax,p and the Pcmax,

wherein the actual PHR is associated with a transmission occasion corresponding to the actual PUSCH transmission on the first panel, and the virtual PHR is associated with a transmission occasion corresponding to a PUSCH transmission reference assumption on the another panel.

6. The method according to any one of claims 3 to 5, further comprising:

in response to the PUSCH being scheduled based on a single downlink control information (DCI), determining a reference format of the virtual PHR based on transmission manners of different panels when one PUSCH is transmitted from the panels in a space division multiplexing (SDM) or frequency division multiplexing (FDM) transmission scheme; or

in response to the PUSCH being scheduled based on multi-DCI, determining a reference format of the virtual PHR based on PUSCH transmission manners of different panels when two PUSCHs are transmitted from the panels in an SDM or FDM or time division multiplexing (TDM) transmission scheme.

7. The method according to any one of claims 1 to 6, further comprising:

receiving indication information transmitted by a network device, wherein the indication

information is used to indicate a PHR reporting manner; and

calculating and reporting the PHR based on the maximum power configuration of the terminal device and the PHR reporting manner.

8. The method according to claim 7, wherein the PHR reporting manner comprises any one of:

reporting one PHR, reporting two PHRs, reporting three PHRs, reporting four PHRs, or reporting five PHRs.

9. A power headroom reporting method based on multi-panel transmission, performed by a network device, comprising:

in response to a terminal device configuring multiple transmission and reception point (multi-TRP) based uplink simultaneous multi-panel transmission (STxMP) for a physical uplink shared channel (PUSCH) on a first transmission slot corresponding to the PUSCH carrying a medium access control control element (MAC CE) PHR report, or on a slot meeting a timeline requirement, and an actual PUSCH transmission being a transmission from a single panel towards a single TRP, determining that a power headroom report (PHR) reported by the terminal device is calculated based on a maximum power configuration of the terminal device and at least one actual power headroom (PH).

10. The method according to claim 9, wherein the determining that the power headroom report (PHR) reported by the terminal device is calculated based on the maximum power configuration of the terminal device and the at least one actual power headroom (PH) comprises at least one of:

in response to the maximum power configuration of the terminal device being a maximum transmission power Pcmax for the terminal device, determining that the PHR reported by the terminal device is calculated based on the Pcmax and the at least one actual PH;

in response to the maximum power configuration of the terminal device being maximum transmission powers Pcmax,p for different panels, determining that the PHR reported by the terminal device is calculated based on a maximum transmission power Pcmax,p corresponding to at least one panel and the at least one actual PH; or

in response to the maximum power configuration of the terminal device being Pcmax and Pcmax,p corresponding to each panel, determining that the PHR reported by the terminal device is calculated jointly based on the Pcmax, the Pcmax,p, and the at least one actual PH.

11. The method according to claim 10, wherein the determining that the PHR reported by the terminal device is calculated based on the Pcmax and the at least one actual power headroom (PH)

comprises:

in response to the terminal device reporting one PHR, determining that the one PHR is an actual PHR of a first panel corresponding to the actual PUSCH transmission and calculated by the terminal device based on the Pcmax, a power allocation rule and the actual PH; or

in response to the terminal device reporting two PHRs, determining that the two PHRs are an actual PHR of a first panel corresponding to the actual PUSCH transmission and calculated by the terminal device based on the Pcmax, a power allocation rule and the actual PH, and a virtual PHR of another panel calculated based on the Pcmax, the power allocation rule, and a virtual PH,

wherein the actual PHR is associated with a transmission occasion corresponding to the actual PUSCH transmission on the first panel, and the virtual PHR is associated with a transmission occasion corresponding to a PUSCH transmission reference assumption on the another panel.

12. The method according to claim 10 or 11, wherein the determining that the PHR reported by the terminal device is calculated based on the Pcmax,p corresponding to the at least one panel and the at least one actual power headroom (PH) comprises:

in response to the terminal device reporting one PHR, determining that the one PHR is an actual PHR of a first panel corresponding to the actual PUSCH transmission and calculated by the terminal device based on a first Pcmax,p corresponding to the first panel; or

in response to the terminal device reporting two PHRs, determining that the two PHRs comprise an actual PHR of a first panel calculated by the terminal device based on a first Pcmax,p and the actual PH, and a virtual PHR of another panel calculated based on a second Pcmax,p corresponding to the another panel and a virtual PH,

wherein the actual PHR is associated with a transmission occasion corresponding to the actual PUSCH transmission on the first panel, and the virtual PHR is associated with a transmission occasion corresponding to a PUSCH transmission reference assumption on the another panel.

13. The method according to any one of claims 10 to 12, wherein the determining that the PHR reported by the terminal device is calculated jointly based on the Pcmax, the Pcmax,p, and the at least one actual power headroom (PH) comprises at least one of:

in response to the terminal device reporting one PHR, determining that the one PHR is an actual PHR of a first panel corresponding to the actual PUSCH transmission and calculated by the terminal device based on the Pcmax and the actual PH;

in response to the terminal device reporting one PHR, determining that the one PHR is an actual PHR of a first panel corresponding to the actual PUSCH transmission and calculated by the terminal device based on a first Pcmax,p corresponding to the first panel and the actual PH;

in response to the terminal device reporting two PHRs, determining that the two PHRs comprise two actual PHRs of a first panel corresponding to the actual PUSCH transmission and calculated by the terminal device based on a first Pcmax,p corresponding to the first panel and the Pcmax;

in response to the terminal device reporting two PHRs, determining that the two PHRs comprise an actual PHR of a first panel corresponding to the actual PUSCH transmission and calculated by the terminal device based on the Pcmax and the actual PH, and a virtual PHR of another panel calculated based on the Pcmax and a virtual PH;

in response to the terminal device reporting two PHRs, determining that the two PHRs comprise an actual PHR of a first panel calculated by the terminal device based on a first Pcmax,p and the actual PH, and a virtual PHR of another panel calculated based on a second Pcmax,p corresponding to the another panel and a virtual PH;

in response to the terminal device reporting three PHRs, determining that the three PHRs comprise an actual PHR of a first panel calculated by the terminal device based on a first Pcmax,p and the actual PH, and another actual PHR of the first panel calculated based on the Pcmax and the actual PH, and a virtual PHR of another panel calculated based on the Pcmax and a virtual PH;

in response to the terminal device reporting three PHRs, determining that the three PHRs comprise two actual PHRs of a first panel calculated by the terminal device respectively based on a first Pcmax,p corresponding to the first panel and the Pcmax, and a virtual PHR of another panel calculated based on a second Pcmax,p corresponding to the another panel;

in response to the terminal device reporting three PHRs, determining that the three PHRs comprise an actual PHR of a first panel corresponding to the actual PUSCH transmission and calculated by the terminal device based on a first Pcmax,p and the actual PH, and two virtual PHRs of another panel calculated respectively based on a second Pcmax,p corresponding to the another panel and the Pcmax;

in response to the terminal device reporting three PHRs, determining that the three PHRs comprise an actual PHR of a first panel calculated by the terminal device based on the Pcmax and the actual PH, and two virtual PHRs of another panel calculated respectively based on a second Pcmax,p corresponding to the another panel and the Pcmax;

in response to the terminal device reporting three PHRs, determining that the three PHRs comprise one actual PHR of a first panel calculated by the terminal device based on a first Pcmax,p, one virtual PHR corresponding to another panel calculated based on a second Pcmax,p, and one PHR corresponding to the terminal device calculated jointly based on the first Pcmax,p, the second

Pcmax,p and the Pcmax;

in response to the terminal device reporting four PHRs, determining that the four PHRs comprise two actual PHRs of a first panel calculated by the terminal device respectively based on a first Pcmax,p corresponding to the first panel and the Pcmax, and two virtual PHRs of another panel calculated respectively based on a second Pcmax,p corresponding to the another panel and the Pcmax; or

in response to the terminal device reporting five PHRs, determining that the five PHRs comprise two actual PHRs of a first panel calculated by the terminal device respectively based on a first Pcmax,p corresponding to the first panel and the Pcmax, two virtual PHRs of another panel calculated respectively based on a second Pcmax,p corresponding to the another panel and the Pcmax, and one PHR corresponding to the terminal device calculated jointly based on the first Pcmax,p, the second Pcmax,p and the Pcmax,

wherein the actual PHR is associated with a transmission occasion corresponding to the actual PUSCH transmission on the first panel, and the virtual PHR is associated with a transmission occasion corresponding to a PUSCH transmission reference assumption on the another panel.

14. The method according to any one of claims 11 to 13, further comprising:

in response to the PUSCH being scheduled based on a single downlink control information (DCI), determining a reference format of the virtual PHR based on transmission manners of different panels when one PUSCH is transmitted by the terminal device from the panels in a space division multiplexing (SDM) or frequency division multiplexing (FDM) transmission scheme; or

in response to the PUSCH being scheduled based on multi-DCI, determining a reference format of the virtual PHR based on transmission manners of different panels when two PUSCHs are transmitted by the terminal device from the panels in an SDM or FDM or time division multiplexing (TDM) transmission scheme.

15. The method according to any one of claims 9 to 14, further comprising:

transmitting indication information to the terminal device, wherein the indication information is used to indicate a PHR reporting manner.

16. The method according to claim 15, wherein the PHR reporting manner comprises any of the following:

reporting one PHR, reporting two PHRs, reporting three PHRs, reporting four PHRs, or reporting five PHRs.

17. A communication device, applied to a terminal device with a plurality of panels, comprising:

a processing module, configured to: in response to the terminal device configuring multiple transmission and reception point (multi-TRP) based uplink simultaneous multi-panel transmission (STxMP) for a physical uplink shared channel (PUSCH) on a first transmission slot corresponding to the PUSCH carrying a medium access control control element (MAC CE) PHR report, or on a slot meeting a timeline requirement, and an actual PUSCH transmission being a transmission from a single panel towards a single TRP, calculate at least one actual power headroom (PH) and report a power headroom report (PHR) based on a maximum power configuration of the terminal device.

18. A communication device, applied to a network device, comprising:

a processing module, configured to: in response to a terminal device configuring multiple transmission and reception point (multi-TRP) based uplink simultaneous multi-panel transmission (STxMP) for a physical uplink shared channel (PUSCH) on a first transmission slot corresponding to the PUSCH carrying a medium access control control element (MAC CE) PHR report, or on a slot meeting a timeline requirement, and an actual PUSCH transmission being a transmission from a single panel towards a single TRP, determine that a power headroom report (PHR) reported by the terminal device is calculated based on a maximum power configuration of the terminal device and at least one actual power headroom (PH).

19. A communication device, comprising a processor and a memory, wherein the memory is configured to store a computer program, and the processor is configured to execute the computer program stored in the memory to cause the device to execute the method according to any one of claims 1 to 8, or to execute the method according to any one of claims 9 to 16.

20. A computer-readable storage medium, configured to store instructions that, when executed, cause the method according to any one of claims 1 to 8 or the method according to any one of claims 9 to 16 to be implemented.