

WHAT IS CLAIMED IS:

1. A method for indicating a physical uplink shared channel (PUSCH), performed by a base station and comprising:

configuring for a terminal a plurality of sounding reference signal (SRS) resource sets which function as a non-codebook, wherein the plurality of SRS resource sets are associated with a plurality of antenna panels in the terminal, and a plurality of SRS resources in the plurality of SRS resource sets are associated with beam related information;

sending a channel state information reference signal (CSI-RS) corresponding to each of the plurality of SRS resource sets to the terminal via a plurality of transmission and reception points (TRPs);

detecting an uplink channel information state of the SRS resource set according to an SRS sent by the terminal, and determining a plurality of beams for uplink coordinated transmission and indication information corresponding to each of the plurality of beams according to a detection result, wherein each of the beams corresponds to a different TRP;

sending a plurality pieces of the indication information to the terminal, wherein the indication information is configured to instruct the terminal to determine the beam related information for uplink coordinated multi-TRP based transmission, and send the PUSCH based on a beam corresponding to the beam related information determined.

2. The method according to claim 1, wherein determining the plurality of beams for coordinated uplink transmission according to the detection result comprises:

determining the plurality of beams for coordinated uplink transmission according to the detection result, a maximum number of data layers that the terminal supports in uplink, and a multiplexing transmission mode of the plurality of beams.

3. The method according to claim 1, wherein the indication information comprises at least one of:

an SRS resource indication identifier (SRI) or an uplink transmission configuration indication (UL TCI) state index.

4. The method according to claim 3, wherein in response to the terminal being

capable of supporting an uplink UL TCI state, the indication information comprises the SRI or the UL TCI state index; or

in response to the terminal being incapable of supporting the uplink UL TCI state, the indication information comprises the SRI.

5. The method according to claim 3, wherein the indication information comprises the UL TCI state index, and a UL TCI state indicated by the UL TCI state index is configured with one of the following reference signal as a source reference signal:

the channel state information reference signal (CSI-RS), or the SRS.

6. The method according to claim 5, wherein the UL TCI state is further configured to indicate a pathloss reference signal (pathloss RS) resource of a beam corresponding to the UL TCI state index.

7. The method according to claim 5, wherein in response to an uplink transmission of the terminal supporting a beam consistency, the UL TCI state indicated by the UL TCI state index is configured with the CSI-RS as the source reference signal, or is configured with the SRS as the source reference signal.

8. The method according to claim 5, wherein in response to an uplink transmission of the terminal not supporting a beam consistency, the UL TCI state indicated by the UL TCI state index is configured with the SRS as the source reference signal.

9. The method according to claim 5, wherein in response to the UL TCI state being not configured to indicate a pathloss RS resource of a beam corresponding to the UL TCI state index, the method further comprises:

sending resource configuration information to the terminal to configure a pathloss RS resource associated with each of the beams.

10. The method according to claim 3, wherein the indication information comprises the UL TCI state index, and the method further comprises:

sending beam configuration information to the terminal to configure a plurality pieces of candidate beam related information for the terminal;

sending beam activation information to the terminal to instruct the terminal to activate a plurality pieces of available beam related information in the plurality pieces of

candidate beam related information;

wherein the UL TCI state index is configured to instruct the terminal to determine the beam related information for uplink coordinated multi-TRP based transmission in the plurality pieces of available beam related information.

11. The method according to any one of claims 1 to 10, wherein the UL TCI state index is in one-to-one correspondence with the SRS resource.

12. The method according to any one of claims 1 to 10, wherein the UL TCI state index corresponds to a single SRS resource and/or a plurality of SRS resources.

13. A method for sending a physical uplink shared channel (PUSCH), performed by a terminal~~base station~~ and comprising:

receiving a plurality of sounding reference signal (SRS) resource sets which function as a non-codebook and configured by ~~the~~a base station, wherein the plurality of SRS resource sets are associated with a plurality of antenna panels in ~~a~~the terminal, and a plurality of SRS resources in the plurality of SRS resource sets are associated with beam related information;

receiving a channel state information reference signal (CSI-RS) corresponding to each of the plurality of SRS resource sets sent by the base station via a plurality of transmission and reception points (TRPs);

determining a shaping vector of each SRS resource in each of the SRS resource sets according to a plurality of the CSI-RSs, and estimating precoding information used for sending an uplink transmission by determining the shaping vector as a column vector;

determining beams for sending the PUSCH via the antenna panels according to the precoding information, and sending an SRS shaped based on the precoding information on the beams via the antenna panels;

receiving indication information corresponding to each of a plurality of the beams for uplink coordinated transmission determined by the base station according to the SRS received, wherein each of the beams corresponds to a different transmission and reception point (TRP) in the base station;

determining beam related information corresponding to a beam for uplink

coordinated transmission according to the indication information, and sending the PUSCH to the base station based on the beam corresponding to the beam related information determined.

14. The method according to claim 13, wherein determining the shaping vector of each SRS resource in each of the SRS resource sets according to the plurality of the CSI-RSs comprises:

determining the shaping vector of each SRS resource in each of the SRS resource sets according to the plurality of the CSI-RSs, a maximum number of data layers that the terminal supports in uplink, and a multiplexing transmission mode of the plurality of the beams.

15. The method according to claim 13, wherein the indication information comprises at least one of:

an SRS resource indication identifier (SRI) or an uplink transmission configuration indication (UL TCI) state index.

16. The method according to claim 15, wherein in response to the terminal being capable of supporting an uplink UL TCI state, the indication information comprises the SRI or the UL TCI state index; or

in response to the terminal being incapable of supporting the uplink UL TCI state, the indication information comprises the SRI.

17. The method according to claim 15, wherein the indication information comprises the UL TCI state index, and a UL TCI state indicated by the UL TCI state index is configured with one of the following reference signal as a source reference signal:

a channel state information reference signal (CSI-RS), or the SRS.

18. The method according to claim 17, wherein the UL TCI state is further configured to indicate a pathloss reference signal (pathloss RS) resource of a beam corresponding to the UL TCI state index.

19. The method according to claim 17, wherein in response to an uplink transmission of the terminal supporting a beam consistency, the UL TCI state indicated by the UL TCI state index is configured with the CSI-RS as the source reference signal, or is configured

with the SRS as the source reference signal.

~~20. The method according to claim 17, wherein in response to an uplink transmission of the terminal not supporting a beam consistency, the UL TCI state indicated by the UL TCI state index is configured with the SRS as the reference signal.~~

~~21. The method according to claim 17, wherein in response to the UL TCI state being not configured to indicate a pathloss RS resource of a beam corresponding to the UL TCI state index, the method further comprises:~~

~~sending resource configuration information to the terminal to configure a pathloss RS resource associated with each of the beams.~~

~~22. The method according to claim 15, wherein the indication information comprises the UL TCI state index, and the method further comprises:~~

~~sending beam configuration information to the terminal to configure a plurality pieces of candidate beam related information for the terminal;~~

~~sending beam activation information to the terminal to instruct the terminal to activate a plurality pieces of available beam related information in the plurality pieces of candidate beam related information;~~

~~wherein the UL TCI state index is configured to instruct the terminal to determine the beam related information for uplink coordinated transmission in the plurality pieces of available beam related information.~~

~~23. The method according to any one of claims 13 to 22, wherein the UL TCI state index is in one-to-one correspondence with the SRS resource.~~

~~24. The method according to any one of claims 13 to 22, wherein the UL TCI state index corresponds to a single SRS resource and/or a plurality of SRS resources.~~

~~25. An apparatus for indicating a physical uplink shared channel (PUSCH), performed by a base station and comprising:~~

~~a set configuring module configured to configure for a terminal a plurality of sounding reference signal (SRS) resource sets which function as a codebook, wherein the plurality of SRS resource sets are associated with a plurality of antenna panels in the~~

~~terminal, and a plurality of SRS resources in the plurality of SRS resource sets are associated with beam related information;~~

~~a signal sending module configured to send a channel state information reference signal (CSI-RS) corresponding to each of the plurality of SRS resource sets to the terminal via a plurality of transmission and reception points (TRPs);~~

~~an indication determining module configured to detect an uplink channel information state of the SRS resource set according to an SRS sent by the terminal, and determining a plurality of beams for uplink coordinated transmission and indication information corresponding to each of the plurality of beams according to a detection result, wherein each of the beams corresponds to a different TRP;~~

~~an indication sending module configured to send a plurality pieces of the indication information to the terminal, wherein the indication information is configured to instruct the terminal to determine the beam related information for uplink coordinated transmission, and send the PUSCH based on a beam corresponding to the beam related information determined.~~

~~26. An apparatus for sending a physical uplink shared channel (PUSCH), performed by a terminal and comprising:~~

~~a set receiving module configured to receive a plurality of sounding reference signal (SRS) resource sets which function as a non-codebook and configured by a base station, wherein the plurality of SRS resource sets are associated with a plurality of antenna panels in a terminal, and a plurality of SRS resources in the plurality of SRS resource sets are associated with beam related information;~~

~~a signal receiving module configured to receive a channel state information reference signal (CSI-RS) corresponding to each of the plurality of SRS resource sets sent by the base station via a plurality of transmission and reception points (TRPs);~~

~~a precoding determining module configured to determine a shaping vector of each SRS resource in each of the SRS resource sets according to a plurality of the CSI-RSs, and estimate precoding information used for sending an uplink transmission by determining the shaping vector as a column vector;~~

~~an SRS sending module configured to determine beams for sending the PUSCH via the antenna panels according to the precoding information, and send an SRS shaped based on the precoding information on the beams via the antenna panels;~~

~~an indication receiving module configured to receive indication information corresponding to each of a plurality of the beams for uplink coordinated transmission determined by the base station according to the SRS received, wherein each of the beams corresponds to a different transmission and reception point (TRP) in the base station;~~

~~a PUSCH sending module configured to determine beam related information corresponding to a beam for uplink coordinated transmission according to the indication information, and send the PUSCH to the base station based on the beam corresponding to the beam related information determined.~~

270. An electronic device, comprising:

a processor; and

a memory for storing instructions executable by the processor;

wherein the processor is configured to implement the method for indicating the PUSCH according to any one of claims 1 to 12 and/or the method for sending the PUSCH according to any one of claims 13 to 19.

~~28. An electronic device, comprising:~~

~~a processor; and~~

~~a memory for storing instructions executable by the processor;~~

~~wherein the processor is configured to implement the method for sending the PUSCH according to any one of claims 13 to 24.~~

~~29. A computer readable storage medium having stored therein computer programs that, when executed by a processor, cause the processor to implement steps of the method for indicating the PUSCH according to any one of claims 1 to 12.~~

~~30. A computer readable storage medium having stored therein computer programs that, when executed by a processor, cause the processor to implement steps of the method for sending the PUSCH according to any one of claims 13 to 24.~~