CLAIMS

1. A data transmission method, comprising:

receiving, by a terminal, Media Access Control (MAC) signaling sent from a base station, the MAC signaling being configured to activate beam indication information respectively corresponding to n antenna panels, wherein the beam indication information corresponding to one of the n antenna panels is configured to indicate a corresponding beam when data transmission is performed by using the antenna panel, and the MAC signaling ~~comprises~~ has an information element added and configured to instruct the terminal to activate the n antenna panels, where n is a positive integer;

receiving, by the terminal, Downlink Control Information (DCI) sent from the base station, a beam indication ~~codeword~~bit group included in the DCI being configured to indicate target beam indication information respectively corresponding to the n antenna panels, wherein the target beam indication information corresponding to a target antenna panel included in the n antenna panels is one of a plurality of beam indication information corresponding to the target antenna panel activated by the MAC signaling;

searching, by the terminal, in a preset mapping relationship corresponding to the n antenna panels to acquire beam indication information corresponding to the beam indication ~~codeword~~bit group as the target beam indication information respectively corresponding to the n antenna panels;

determining, by the terminal according to the target beam indication information corresponding to the target antenna panel, a corresponding target beam when data transmission is performed by using the target antenna panel; and

performing, by the terminal, data transmission with the base station by using the target beam corresponding to the target antenna panel,

wherein the terminal comprises a first antenna panel and a second antenna panel,

a first part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel;

a second part of beam indication bit groups in the preset mapping relationship are

configured to indicate target beam indication information corresponding to the second antenna panel; and

a third part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel and target beam indication information corresponding to the second antenna panel.

~~2. The method of claim 1, wherein the terminal comprises a first antenna panel and a second antenna panel, and the terminal stores a first preset mapping relationship corresponding to the first antenna panel, a second preset mapping relationship corresponding to the second antenna panel and a third preset mapping relationship corresponding to the first antenna panel and the second antenna panel,~~

~~wherein any beam indication codeword in the first preset mapping relationship is configured to indicate target beam indication information corresponding to the first antenna panel;~~

~~any beam indication codeword in the second preset mapping relationship is configured to indicate target beam indication information corresponding to the second antenna panel; and~~

~~any beam indication codeword in the third preset mapping relationship is configured to indicate the target beam indication information corresponding to the first antenna panel and the target beam indication information corresponding to the second antenna panel.~~

~~3. The method of claim 2, wherein the MAC signaling activates beam indication information respectively corresponding to the first antenna panel and the second antenna panel; and~~

~~searching, by the terminal, in the preset mapping relationship corresponding to the n antenna panels to acquire the beam indication information corresponding to the beam indication codeword as the target beam indication information respectively corresponding to the n antenna panels comprises:~~

~~in response to that the terminal activates the first antenna panel, searching, by the terminal, in the first preset mapping relationship to acquire the target beam indication information corresponding to the first antenna panel; or~~

~~in response to that the terminal activates the second antenna panel, searching, by the~~

~~terminal, in the second preset mapping relationship to acquire the target beam indication information corresponding to the second antenna panel; or~~

~~in response to that the terminal activates the first antenna panel and the second antenna panel, searching, by the terminal, in the third preset mapping relationship to acquire the target beam indication information corresponding to the first antenna panel and the target beam indication information corresponding to the second antenna panel.~~

~~4. The method of claim 1, wherein the terminal comprises a first antenna panel and a second antenna panel,~~

~~a first part of beam indication codewords in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel;~~

~~a second part of beam indication codewords in the preset mapping relationship are configured to indicate target beam indication information corresponding to the second antenna panel; and~~

~~a third part of beam indication codewords in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel and target beam indication information corresponding to the second antenna panel.~~

~~5~~2. The method of claim 1, wherein a length of the beam indication ~~codeword~~bit group is greater than or equal to 3 bits.

~~6~~3. The method of ~~any one of claims 1 to 5~~claim 1 or 2, wherein the beam indication information is a Transmission Configuration Indication (TCI) state, and a TCI state corresponding to the target antenna panel is configured to indicate a receiving beam used by the terminal when the terminal receives downlink data by using the target antenna panel; or

the beam indication information is Spatial Relation Information (SRI), and SRI corresponding to the target antenna panel is configured to indicate a transmitting beam used by the terminal when the terminal sends uplink data by using the target antenna panel.

~~7~~4. A data transmission method, comprising:

sending, by a base station, Media Access Control (MAC) signaling to a terminal, the MAC signaling being configured to activate beam indication information respectively corresponding to n antenna panels, wherein the beam indication information corresponding to one of the n antenna panels is configured to indicate a corresponding beam when data transmission is performed by using the antenna panel, and the MAC signaling ~~comprises~~ has an information element added and configured to instruct the terminal to activate the n antenna panels, where n is a positive integer;

sending, by the base station, Downlink Control Information (DCI) to the terminal, a beam indication ~~codeword~~bit group included in the DCI being configured to indicate target beam indication information respectively corresponding to the n antenna panels, wherein the target beam indication information corresponding to a target antenna panel included in the n antenna panels is one of a plurality of beam indication information corresponding to the target antenna panel activated by the MAC signaling;

searching, by the terminal, in a preset mapping relationship corresponding to the n antenna panels to acquire beam indication information corresponding to the beam indication bit group as the target beam indication information respectively corresponding to the n antenna panels;

determining, by the terminal, according to the target beam indication information corresponding to the target antenna panel, a corresponding target beam when data transmission is performed by using the target antenna panel; and

performing, by the ~~base station~~terminal, ~~data transmission with the terminal by using the n antenna panels~~data transmission with the base station by using the target beam corresponding to the target antenna panel,

wherein the terminal comprises a first antenna panel and a second antenna panel,

a first part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel;

a second part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the second

antenna panel; and

a third part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel and target beam indication information corresponding to the second antenna panel.

5. The method of claim 4, wherein a length of the beam indication bit group is greater than or equal to 3 bits.

6. The method of claim 4 or 5, wherein the beam indication information is a Transmission Configuration Indication (TCI) state, and a TCI state corresponding to the target antenna panel is configured to indicate a receiving beam used by the terminal when the terminal receives downlink data by using the target antenna panel; or

the beam indication information is Spatial Relation Information (SRI), and SRI corresponding to the target antenna panel is configured to indicate a transmitting beam used by the terminal when the terminal sends uplink data by using the target antenna panel.

~~8~~7. A data transmission apparatus, applied to a terminal, comprising:

a first receiving module, configured to receive Media Access Control (MAC) signaling sent from a base station, the MAC signaling being configured to activate beam indication information respectively corresponding to n antenna panels, wherein the beam indication information corresponding to one of the n antenna panels is configured to indicate a corresponding beam when data transmission is performed by using the antenna panel, and the MAC signaling ~~comprises~~ has an information element added and configured to instruct the terminal to activate the n antenna panels, where n is a positive integer;

a second receiving module, configured to receive Downlink Control Information DCI sent from the base station, a beam indication ~~codeword~~bit group included in the DCI being configured to indicate target beam indication information respectively corresponding to the n antenna panels, wherein the target beam indication information corresponding to a target antenna panel included in the n antenna panels is one of a plurality of beam indication information corresponding to the target antenna panel activated by the MAC signaling;

an information acquiring module, configured to search in a preset mapping relationship corresponding to the n antenna panels to acquire beam indication information corresponding to the beam indication ~~codeword~~bit group as the target beam indication information respectively corresponding to the n antenna panels;

a beam determining module, configured to determine, according to the target beam indication information corresponding to the target antenna panel, a corresponding target beam when data transmission is performed by using the target antenna panel; and

a data transmission module, configured to perform data transmission with the base station by using the target beam corresponding to the target antenna panel,

wherein the terminal comprises a first antenna panel and a second antenna panel,

a first part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel;

a second part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the second antenna panel; and

a third part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel and target beam indication information corresponding to the second antenna panel.

~~9. The apparatus of claim 8, wherein the terminal comprises a first antenna panel and a second antenna panel, and the terminal stores a first preset mapping relationship corresponding to the first antenna panel, a second preset mapping relationship corresponding to the second antenna panel and a third preset mapping relationship corresponding to the first antenna panel and the second antenna panel,~~

~~wherein any beam indication codeword in the first preset mapping relationship is configured to indicate target beam indication information corresponding to the first antenna panel;~~

~~any beam indication codeword in the second preset mapping relationship is configured to indicate target beam indication information corresponding to the second antenna panel; and~~

any beam indication codeword in the third preset mapping relationship is configured to indicate the target beam indication information corresponding to the first antenna panel and the target beam indication information corresponding to the second antenna panel.

10. The apparatus of claim 9, wherein the MAC signaling activates beam indication information respectively corresponding to the first antenna panel and the second antenna panel; and

the information acquiring module is configured to:

in response to that the terminal activates the first antenna panel, search in the first preset mapping relationship to acquire the target beam indication information corresponding to the first antenna panel; or

in response to that the terminal activates the second antenna panel, search in the second preset mapping relationship to acquire the target beam indication information corresponding to the second antenna panel; or

in response to that the terminal activates the first antenna panel and the second antenna panel, search in the third preset mapping relationship to acquire the target beam indication information corresponding to the first antenna panel and the target beam indication information corresponding to the second antenna panel.

11. The apparatus of claim 8, wherein the terminal comprises a first antenna panel and a second antenna panel,

a first part of beam indication codewords in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel;

a second part of beam indication codewords in the preset mapping relationship are configured to indicate target beam indication information corresponding to the second antenna panel; and

a third part of beam indication codewords in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel and target beam indication information corresponding to the second antenna panel.

~~12~~8. The apparatus of claim 1, wherein a length of the beam indication ~~codeword~~bit group is greater than or equal to 3 bits.

~~13~~9. The apparatus of claim 7 or 8, wherein the beam indication information is a Transmission Configuration Indication (TCI) state, and a TCI state corresponding to the target antenna panel is configured to indicate a receiving beam used by the terminal when the terminal receives downlink data by using the target antenna panel; or

the beam indication information is Spatial Relation Information (SRI), and SRI corresponding to the target antenna panel is configured to indicate a transmitting beam used by the terminal when the terminal sends uplink data by using the target antenna panel.

~~14~~10. A data transmission ~~apparatus~~system, ~~applied to a base station,~~ comprising:

a first sending module, configured to send Media Access Control (MAC) signaling to a terminal, the MAC signaling being configured to activate beam indication information respectively corresponding to n antenna panels, wherein the beam indication information corresponding to one of the n antenna panels is configured to indicate a corresponding beam when data transmission is performed by using the antenna panel, and the MAC signaling ~~comprises~~ has an information element added and configured to instruct the terminal to activate the n antenna panels, where n is a positive integer;

a second sending module, configured to send Downlink Control Information (DCI) to the terminal, a beam indication ~~codeword~~bit group included in the DCI being configured to indicate target beam indication information respectively corresponding to the n antenna panels, wherein the target beam indication information corresponding to a target antenna panel included in the n antenna panels is one of a plurality of beam indication information corresponding to the target antenna panel activated by the MAC signaling; ~~and~~

an information acquiring module, configured to search in a preset mapping relationship corresponding to the n antenna panels to acquire beam indication information corresponding to the beam indication bit group as the target beam indication information respectively corresponding to the n antenna panels;

a beam determining module, configured to determine, according to the target beam indication information corresponding to the target antenna panel, a corresponding target beam when data transmission is performed by using the target antenna panel; and

a data transmission module, configured to perform ~~data transmission with the terminal by using the n antenna panels~~ data transmission with the base station by using the target beam corresponding to the target antenna panel,

wherein the terminal comprises a first antenna panel and a second antenna panel,

a first part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel;

a second part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the second antenna panel; and

a third part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel and target beam indication information corresponding to the second antenna panel.

11. The system of claim 10, wherein a length of the beam indication bit group is greater than or equal to 3 bits.

12. The system of claim 10 or 11, wherein the beam indication information is a Transmission Configuration Indication (TCI) state, and a TCI state corresponding to the target antenna panel is configured to indicate a receiving beam used by the terminal when the terminal receives downlink data by using the target antenna panel; or

the beam indication information is Spatial Relation Information (SRI), and SRI corresponding to the target antenna panel is configured to indicate a transmitting beam used by the terminal when the terminal sends uplink data by using the target antenna panel.

~~15~~13. A data transmission apparatus, applied to a terminal, comprising:

a processor;

a memory for storing instructions executable by the processor;

wherein the processor is configured to:

receive Media Access Control (MAC) signaling sent from a base station, the MAC signaling being configured to activate beam indication information respectively corresponding to n antenna panels, wherein the beam indication information corresponding to one of the n antenna panels is configured to indicate a corresponding beam when data transmission is performed by using the antenna panel, and the MAC signaling ~~comprises~~ has an information element added and configured to instruct the terminal to activate the n antenna panels, where n is a positive integer;

receive Downlink Control Information (DCI) sent from the base station, a beam indication ~~codeword~~bit group included in the DCI being configured to indicate target beam indication information respectively corresponding to the n antenna panels, wherein the target beam indication information corresponding to a target antenna panel included in the n antenna panels is one of a plurality of beam indication information corresponding to the target antenna panel activated by the MAC signaling;

search in a preset mapping relationship corresponding to the n antenna panels to acquire beam indication information corresponding to the beam indication ~~codeword~~bit group as the target beam indication information respectively corresponding to the n antenna panels;

determine, according to the target beam indication information corresponding to the target antenna panel, a corresponding target beam when data transmission is performed by using the target antenna panel; and

perform data transmission with the base station by using the target beam corresponding to the target antenna panel,

wherein the terminal comprises a first antenna panel and a second antenna panel,

a first part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel;

a second part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the second antenna panel; and

a third part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel and target beam indication information corresponding to the second antenna panel.

14. The apparatus of claim 13, wherein a length of the beam indication bit group is greater than or equal to 3 bits.

15. The apparatus of claim 13 or 14, wherein the beam indication information is a Transmission Configuration Indication (TCI) state, and a TCI state corresponding to the target antenna panel is configured to indicate a receiving beam used by the terminal when the terminal receives downlink data by using the target antenna panel; or

the beam indication information is Spatial Relation Information (SRI), and SRI corresponding to the target antenna panel is configured to indicate a transmitting beam used by the terminal when the terminal sends uplink data by using the target antenna panel.

16. A data transmission ~~apparatus~~system, ~~applied to a base station,~~ comprising a base station and a terminal, wherein each of the base station and the terminal comprises:

a processor;

a memory for storing instructions executable by the processor;

wherein the processor of the base station is configured to:

send Media Access Control (MAC) signaling to ~~a~~ the terminal, the MAC signaling being configured to activate beam indication information respectively corresponding to n antenna panels, wherein the beam indication information corresponding to one of the n antenna panels is configured to indicate a corresponding beam when data transmission is performed by using the antenna panel, and the MAC signaling ~~comprises~~ has an information element added and configured to instruct the terminal to activate the n antenna panels, where n is a positive integer; and

send Downlink Control Information (DCI) to the terminal, a beam indication ~~codeword~~bit group included in the DCI being configured to indicate target beam indication information respectively corresponding to the n antenna panels, wherein the target beam

indication information corresponding to a target antenna panel included in the n antenna panels is one of a plurality of beam indication information corresponding to the target antenna panel activated by the MAC signaling;

wherein the processor of the terminal is configured to:

search, in a preset mapping relationship corresponding to the n antenna panels to acquire beam indication information corresponding to the beam indication bit group as the target beam indication information respectively corresponding to the n antenna panels;

determine, according to the target beam indication information corresponding to the target antenna panel, a corresponding target beam when data transmission is performed by using the target antenna panel; and

perform ~~data transmission with the terminal by using the n antenna panels~~ data transmission with the base station by using the target beam corresponding to the target antenna panel,

wherein the terminal comprises a first antenna panel and a second antenna panel,

a first part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel;

a second part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the second antenna panel; and

a third part of beam indication bit groups in the preset mapping relationship are configured to indicate target beam indication information corresponding to the first antenna panel and target beam indication information corresponding to the second antenna panel.

17. The system of claim 16, wherein a length of the beam indication bit group is greater than or equal to 3 bits.

18. The system of claim 16 or 17, wherein the beam indication information is a Transmission Configuration Indication (TCI) state, and a TCI state corresponding to the target antenna panel is configured to indicate a receiving beam used by the terminal when the terminal

receives downlink data by using the target antenna panel; or

the beam indication information is Spatial Relation Information (SRI), and SRI corresponding to the target antenna panel is configured to indicate a transmitting beam used by the terminal when the terminal sends uplink data by using the target antenna panel.

~~17~~19. A non-transitory computer-readable storage medium having stored thereon a computer program that, when executed by a processor, implements the operations of the method of any one of claims 1 to ~~6~~3, or implements the operations of the method of ~~claim 7~~any one of claims 4 to 6.