Claims

1. A method comprising:

obtaining, by an apparatus, information of a reference signal (RS) relationship between an RS and a physical uplink (UL) channel;

obtaining, by the apparatus, a power control set associated with the RS relationship, wherein the power control set includes a target power, a downlink (DL) RS for path-loss estimation, and a factor of a transmit power command;

determining, by the apparatus, according to the RS relationship, a value of the target power, a value of the path-loss estimation corresponding to the DL RS, and a value of the transmit power command; and

determining, by the apparatus, a transmit power for transmitting the physical UL channel based on the value of the target power, the value of the path-loss estimation and the value of the transmit power command.

2. The method of claim 1, wherein the physical UL channel is a physical UL control channel (PUCCH) or a physical UL shared channel (PUSCH).

3. The method of claim 1 or 2, wherein the target power is a user-equipment (UE)-specific target power.

4. The method of claim 1 or 2, wherein the RS relationship is a spatial relationship.

5. The method of any one of claims 1 to 4, wherein the RS includes one of a synchronization signal (SS) block, a channel state information-reference signal (CSI-RS), or a sounding reference signal (SRS).

6. The method of any one of claims 1 to 5, wherein information about the RS includes a resource index of the RS.

7. The method of any one of claims 1 to 6, wherein the information of the RS relationship is indicated by using at least one of radio resource control (RRC) signaling or a media access control (MAC) control element (CE).

8. The method of any one of claims 1 to 7, wherein the transmit power is further related to a nominal partial power, and wherein the nominal partial power is independent of the RS relationship of the physical UL channel.

9. The method of any one of claims 1 to 8,
further comprising:

receiving the nominal partial power over a broadcast channel.

10. The method of any one of claims 1 to 9,
further comprising:

transmitting the physical UL channel according to the transmit power of the physical UL channel.

11. The method of claim 1, the information of the RS relationship including about the RS using a first beam of a first set of beams that is spatially associated with the physical UL channel.

12. An apparatus comprising:

one or more processors in communication with a non-transitory storage medium storing instructions, wherein execution of the instructions by the one or more processors causes the one or more processors to:

obtain information of a reference signal (RS) relationship between an RS and a physical uplink (UL) channel;

obtain a power control set associated with the RS relationship, wherein the power control set includes a target power, a downlink (DL) RS for path-loss estimation, and a factor of a transmit power command;

determine according to the RS relationship, a value of the target power, a value of the path-loss estimation corresponding to the DL RS, and a value of the transmit power command; and

determine a transmit power for transmitting the physical UL channel based on the value of the target power, the value of the path-loss estimation and the value of the transmit power command.

13. The apparatus of claim 12, wherein the physical UL channel is a physical UL control channel (PUCCH) or a physical UL shared channel (PUSCH).

14. The apparatus of any of claims 12 or 13, wherein the apparatus is a UE and the target power is a user-equipment (UE)-specific target power.

15. The apparatus of any of claims 12 to 14, wherein the RS relationship is a spatial relationship.

16. The apparatus of any of claims 12 to 15, wherein the RS includes one of a synchronization signal (SS) block, a channel state information-reference signal (CSI-RS), or a sounding reference signal (SRS).

17. The apparatus of any one of claims 12 to 16, wherein information about the RS includes a resource index of the RS.

18. The apparatus of any of claims 12 to 17, wherein the transmit power is further related to a nominal partial power, and wherein the nominal partial power is independent of the RS relationship of the physical UL channel.

19. The apparatus of claim 18, wherein the execution of the instructions by the one or more processors causes the one or more processors further to:

receive the nominal partial power over a broadcast channel.

20. The apparatus of any one of claims 12 to 19, wherein the execution of the instructions by the one or more processors causes the one or more processors further to:

transmit the physical UL channel according to the transmit power of the physical UL channel.

21. A method comprising:

determining, by an apparatus, information of a reference signal (RS) relationship between an RS and a physical uplink (UL) channel, and a power control set associated with the RS relationship, wherein the power control set includes a target power, a DL RS for path-loss estimation, and a factor of a transmit power command;

transmitting, by the apparatus, the information of the RS relationship and the power control set to a user equipment (UE); and

receiving, by the apparatus, the physical UL channel from the UE, wherein a transmit power of the physical UL channel is obtained based on a value of the target power, a value of the path-loss estimation and a value of the transmit power command, and wherein the value of the target power, the value of the path-loss estimation corresponding to the DL RS, and the value of the transmit power command are determined based on the RS relationship.

22. The method of claim 21, wherein, the physical UL channel is a physical UL control channel (PUCCH) or a physical UL shared channel (PUSCH).

23. The method of claim 21, wherein the RS relationship is a spatial relationship.

24. The method of any one of claims 21 to 23, wherein the RS includes one of a synchronization signal (SS) block, a channel state information-reference signal (CSI-RS), or a sounding reference signal (SRS).

25. The method of any one of claims 21 to 24, wherein the transmit power is further related to a nominal partial power, and wherein the nominal partial power is independent of the RS relationship.

26. An apparatus comprising:

one or more processors in communication with a non-transitory storage medium storing instructions, wherein execution of the instructions by the one or more processors causes the one or more processors to:

determine information of a reference signal (RS) relationship between an RS and a physical uplink (UL) channel, and a power control set associated with the RS relationship, wherein the power control set includes a target power, a downlink (DL) RS for path-loss estimation, and a factor of a transmit power command;

transmit the information of the RS relationship and the power control set to a user equipment (UE); and

receive the physical UL channel from the UE, wherein a transmit power of the physical UL channel is obtained based on a value of the target power, a value of the path-loss estimation and a value of the transmit power command, and wherein the value of the target power, the value of the path-loss estimation corresponding to the DL RS, and the value of the transmit power command are determined based on the RS relationship.

27. The apparatus of claim 26, wherein, the physical UL channel is a physical UL control channel (PUCCH) or a physical UL shared channel (PUSCH).

28. The apparatus of claim 26, wherein the RS relationship is a spatial relationship.

29. The apparatus of any one of claims 26 to 28, wherein the RS includes one of a synchronization signal (SS) block, a channel state information-reference signal (CSI-RS), or a sounding reference signal (SRS).

30. The apparatus of any one of claims 26 to 29, wherein the transmit power is further related to a nominal partial power, and wherein the nominal partial power is independent of the RS relationship.

31. A non-transitory computer-readable medium having instructions stored thereon that, when executed by an apparatus, cause the apparatus to perform operations, the operations comprising:

obtaining information of a reference signal (RS) relationship between an RS and a physical uplink (UL) channel;

obtaining a power control set associated with the RS relationship, wherein the power control set includes a target power, a downlink (DL) RS for path-loss estimation, and a factor of a transmit power command;

determining according to the RS relationship, a value of the target power, a value of the path-loss estimation corresponding to the DL RS, and a value of the transmit power command; and

determining a transmit power for transmitting the physical UL channel based on the value of the target power, the value of the path-loss estimation and the value of the transmit power command.