

CLAIMS

What is claimed is:

- 1 1. A method for wireless communication at a user equipment (UE),
2 comprising:
3 receiving, from a base station, a plurality of downlink control information
4 (DCI) messages that include a plurality of transmit power control (TPC) commands for an
5 uplink transmission;
6 determining a power adjustment value for the uplink transmission based at
7 least in part on a combination of the plurality of TPC commands;
8 adjusting a transmit power level based at least in part on the determined power
9 adjustment value; and
10 transmitting the uplink transmission to the base station at the adjusted transmit
11 power level.
- 1 2. The method of claim 1, wherein determining the power adjustment
2 value for the uplink transmission based at least in part on the combination of the plurality of
3 TPC commands comprises:
4 identifying a plurality of TPC values from the plurality of TPC commands;
5 and
6 summing the plurality of TPC values to determine the power adjustment value.
- 1 3. The method of claim 2, further comprising:
2 scaling the plurality of TPC values based at least in part on a number of the
3 plurality of TPC commands, wherein summing the plurality of TPC values includes summing
4 the scaled plurality of TPC values.
- 1 4. The method of claim 1, wherein determining the power adjustment
2 value for the uplink transmission based at least in part on the combination of the plurality of
3 TPC commands comprises:
4 identifying a most recently-received TPC command of the plurality of TPC
5 commands; and
6 determining the power adjustment value for the uplink transmission based at
7 least in part on the most recently-received TPC command.

- 1 5. The method of claim 1, further comprising:
2 identifying a change in at least one attribute of the uplink transmission; and
3 determining the power adjustment value for the uplink transmission based at
4 least in part on the combination of the plurality of TPC commands based at least in part on
5 the identified change.
- 1 6. The method of claim 5, further comprising:
2 receiving a value for at least one attribute in one or more of the plurality of
3 DCI messages, wherein the change in at least one attribute of the uplink transmission is
4 identified based at least in part on the received value for the at least one attribute.
- 1 7. The method of claim 5, wherein the at least one attribute of the uplink
2 transmission comprises a UCI payload size, or a physical uplink control channel (PUCCH)
3 resource assignment, or a PUCCH format, or a PUCCH resource pool, or a combination
4 thereof.
- 1 8. The method of claim 5, wherein the uplink transmission is an uplink
2 control information (UCI), the method further comprising:
3 determining, prior to identifying the change in the at least one attribute, the
4 power adjustment value for the UCI based at least in part on a second plurality of TPC
5 commands for the UCI, the plurality of TPC commands restricted to have a common TPC
6 value for TPC commands associated with a single UCI.
- 1 9. The method of claim 1, wherein the uplink transmission is an uplink
2 control information (UCI), and receiving the plurality of DCI messages for the UCI further
3 comprises:
4 receiving at least one DCI message that includes a TPC command for an
5 uplink data channel, the power adjustment value for the UCI determined based at least in part
6 on the TPC command for the uplink data channel.
- 1 10. The method of claim 1, further comprising:
2 receiving a DCI message that includes a first TPC command for an uplink data
3 channel and a second TPC command for uplink control information (UCI) on a control
4 channel, wherein the uplink transmission comprises the UCI.

- 1 11. The method of claim 1, further comprising:
2 receiving a DCI message that includes a TPC command for an uplink data
3 channel; and
4 ignoring, based at least in part on the TPC command for the uplink data
5 channel, one or more TPC commands of the plurality of TPC commands for uplink control
6 information (UCI), wherein the one or more TPC commands are for an uplink control
7 channel, wherein the uplink transmission comprises the UCI.
- 1 12. The method of claim 1, wherein the uplink transmission comprises an
2 acknowledgement on an uplink control channel, or an acknowledgement on an uplink data
3 channel, or an uplink data transmission.
- 1 13. A method for wireless communication at a base station, comprising:
2 identifying, by the base station, a power adjustment value to adjust a transmit
3 power level of an uplink transmission to be transmitted by a user equipment (UE);
4 determining, based at least in part on the identified power adjustment value, a
5 plurality of transmit power control (TPC) commands for the uplink transmission, a
6 combination of the plurality of TPC commands to indicate the power adjustment value to
7 adjust the transmit power for the uplink transmission; and
8 transmitting, to the UE, a plurality of downlink control information (DCI)
9 messages that include the determined plurality of TPC commands.
- 1 14. The method of claim 13, wherein the power adjustment value is a sum
2 of a plurality of TPC values for the plurality of TPC commands.
- 1 15. The method of claim 13, wherein determining the plurality of TPC
2 commands further comprises:
3 identifying that the UE is to use a first TPC command of the plurality of TPC
4 commands as the power adjustment value; and
5 assigning the power adjustment value to be the TPC value for the identified
6 first TPC command based at least in part on the identification.
- 1 16. The method of claim 13, wherein the plurality of DCI messages
2 indicate a change in a value of at least one attribute for an uplink control information (UCI),

3 wherein determining the plurality of TPC commands is based at least in part on the change in
4 the value of the at least one attribute.

1 17. The method of claim 16, wherein the at least one attribute of the uplink
2 transmission comprises a UCI payload size, or a physical uplink control channel (PUCCH)
3 resource assignment, or a PUCCH format, or a PUCCH resource pool, or a combination
4 thereof.

1 18. The method of claim 13, wherein transmitting the determined plurality
2 of DCI messages to the UE further comprises:
3 transmitting at least one uplink DCI message that includes a TPC command
4 for an uplink data channel, the plurality of TPC commands for the uplink transmission
5 determined based at least in part on the TPC command for the uplink data channel.

1 19. The method of claim 13, further comprising:
2 receiving, from the UE, the uplink transmission transmitted according to the
3 transmit power.

1 20. The method of claim 19, wherein the UCI comprises an
2 acknowledgement on an uplink control channel, or an acknowledgement on an uplink data
3 channel, or an uplink data transmission.

1 21. An apparatus for wireless communication at a user equipment (UE),
2 comprising:
3 means for receiving, from a base station, a plurality of downlink control
4 information (DCI) messages that include a plurality of transmit power control (TPC)
5 commands for an uplink transmission;
6 means for determining a power adjustment value for the uplink transmission
7 based at least in part on a combination of the plurality of TPC commands;
8 means for adjusting a transmit power level based at least in part on the
9 determined power adjustment value; and
10 means for transmitting an uplink transmission to the base station at the
11 adjusted transmit power level.

1 22. The apparatus of claim 21, wherein the means for determining the
2 power adjustment value for the uplink transmission based at least in part on the combination
3 of the plurality of TPC commands comprises:

4 means for identifying a plurality of TPC values from the plurality of TPC
5 commands; and

6 means for summing the plurality of TPC values to determine the power
7 adjustment value.

1 23. The apparatus of claim 22, further comprising:

2 means for scaling the plurality of TPC values based at least in part on a
3 number of the plurality of TPC commands, wherein summing the plurality of TPC values
4 includes summing the scaled plurality of TPC values.

1 24. The apparatus of claim 21, wherein the means for determining the
2 power adjustment value for the uplink transmission based at least in part on the combination
3 of the plurality of TPC commands comprises:

4 means for identifying a most recently-received TPC command of the plurality
5 of TPC commands; and

6 means for determining the power adjustment value for the uplink transmission
7 based at least in part on the most recently-received TPC command.

1 25. The apparatus of claim 21, further comprising:

2 means for identifying a change in at least one attribute of an uplink control
3 information (UCI); and

4 means for determining the power adjustment value for the UCI based at least
5 in part on the combination of the plurality of TPC commands based at least in part on the
6 identified change

1 26. The apparatus of claim 21, wherein the means for receiving the
2 plurality of DCI messages for the uplink transmission further comprises:

3 means for receiving at least one DCI message that includes a TPC command
4 for an uplink data channel, the power adjustment value for the uplink transmission
5 determined based at least in part on the TPC command for the uplink data channel.

1 27. An apparatus for wireless communication at a base station, comprising:
2 means for identifying, by the base station, a power adjustment value to adjust
3 a transmit power level of an uplink transmission to be transmitted by a user equipment (UE);
4 means for determining, based at least in part on the identified power
5 adjustment value, a plurality of transmit power control (TPC) commands for the uplink
6 transmission, a combination of the plurality of TPC commands to indicate the power
7 adjustment value to adjust the transmit power for the uplink transmission; and
8 means for transmitting, to the UE, a plurality of downlink control information
9 (DCI) messages that include the determined plurality of TPC commands.

1 28. The apparatus of claim 27, wherein the means for determining the
2 power adjustment value for the uplink transmission based at least in part on the combination
3 of the plurality of TPC commands comprise:
4 means for identifying a plurality of TPC values from the plurality of TPC
5 commands; and
6 means for summing the plurality of TPC values to determine the power
7 adjustment value.

1 29. The apparatus of claim 28, further comprising:
2 means for scaling the plurality of TPC values based at least in part on a
3 number of the plurality of TPC commands, wherein summing the plurality of TPC values
4 includes summing the scaled plurality of TPC values.

1 30. The apparatus of claim 27, wherein the means for determining the
2 power adjustment value for the uplink transmission based at least in part on the combination
3 of the plurality of TPC commands comprise:
4 means for identifying a most recently-received TPC command of the plurality
5 of TPC commands; and
6 means for determining the power adjustment value for the uplink transmission
7 based at least in part on the most recently-received TPC command.