

CLAIMS

WHAT IS CLAIMED IS:

1. A method of wireless communication by a user equipment (UE), comprising:
receiving, from a base station, a plurality of signals through a plurality of beams of the base station, each of the plurality of beams corresponding to a respective antenna port of a plurality of antenna ports of the base station;
performing channel estimation for each beam of the plurality of beams from the plurality of antenna ports based on the plurality of signals; and
transmitting, to the base station, a feedback signal including information about one or more beams selected from the plurality of beams, the feedback signal further including one or more candidate uplink precoders.
2. The method of claim 1, further comprising:
selecting the one or more candidate uplink precoders from a predefined codebook.
3. The method of claim 2, wherein the one or more candidate uplink precoders are selected based on the channel estimation.
4. The method of claim 2, wherein the one or more candidate uplink precoders are each a candidate for a precoder used for scheduling a physical uplink shared channel (PUSCH).
5. The method of claim 1, wherein a millimeter wave (MMW) band is used for the wireless communications.
6. The method of claim 1, wherein the plurality of signals include a plurality of beam reference signals, a plurality of beam refinement reference signals, a plurality of channel state information reference signals (CSI-RS), or a combination thereof.
7. The method of claim 1, wherein the channel estimation includes at least one of narrowband channel estimation or wideband channel estimation.

8. The method of claim 1, wherein the channel estimation is based on a measurement of at least one of a signal-to-noise ratio, an antenna gain, or a reference signal measurement of each of the plurality of beams.
9. The method of claim 1, wherein the feedback signal is transmitted to the base station via at least one of a physical uplink control channel (PUCCH) or uplink control information (UCI) in a physical uplink shared channel (PUSCH).
10. The method of claim 1, wherein the feedback signal is transmitted to the base station through a random access channel (RACH) subframe.
11. A method of wireless communication by a base station, comprising:
 - transmitting, to a user equipment (UE), a plurality of signals through a plurality of beams of the base station, each of the plurality of beams corresponding to a respective antenna port of a plurality of antenna ports of the base station;
 - receiving, from the UE, a feedback signal including information about one or more beams selected from the plurality of beams; and
 - scheduling a physical uplink shared channel (PUSCH) based on the feedback signal.
12. The method of claim 11, wherein the feedback signal further includes one or more candidate uplink precoders, and wherein the scheduling the PUSCH further comprises:
 - selecting a final uplink precoder from the one or more candidate uplink precoders; and
 - scheduling the PUSCH based on the final uplink precoder.
13. The method of claim 12, wherein the one or more candidate uplink precoders are from a predefined codebook.

14. The method of claim 11, wherein a millimeter wave (MMW) band is used for the wireless communication.
15. The method of claim 11, wherein the plurality of signals include a plurality of beam reference signals, a plurality of beam refinement reference signals, a plurality of channel state information reference signals (CSI-RS), or a combination thereof.
16. The method of claim 11, wherein the channel estimation includes at least one of narrowband channel estimation and wideband channel estimation.
17. The method of claim 11, wherein the channel estimation is based on at least one of a signal-to-noise ratio, an antenna gain, or a reference signal measurement of each of the plurality of beams.
18. The method of claim 11, wherein the feedback signal is received from the UE via at least one of a physical uplink control channel (PUCCH) or in uplink control information (UCI) conveyed via a physical uplink shared channel (PUSCH).
19. The method of claim 11, wherein the feedback signal is received from the UE through a random access channel (RACH) subframe.
20. A user equipment (UE) for wireless communication, comprising:
 - a memory; and
 - at least one processor coupled to the memory and configured to:
 - receive, from a base station, a plurality of signals through a plurality of beams of the base station, each of the plurality of beams corresponding to a respective antenna port of a plurality of antenna ports of the base station;
 - perform channel estimation for each beam of the plurality of beams from the plurality of antenna ports based on the plurality of signals; and
 - transmit, to the base station, a feedback signal including information about one or more beams selected from the plurality of beams, the

feedback signal further including one or more candidate uplink precoders.

21. The UE of claim 20, wherein the at least one processor is further configured to:
select the one or more candidate uplink precoders from a predefined codebook.
22. The UE of claim 21, wherein the one or more candidate uplink precoders are selected based on the channel estimation.
23. The UE of claim 21, the one or more candidate uplink precoders are each a candidate for a precoder used for scheduling a physical uplink shared channel (PUSCH).
24. The UE of claim 20, wherein the plurality of signals include a plurality of beam reference signals, a plurality of beam refinement reference signals, a plurality of channel state information reference signals (CSI-RS), or a combination thereof.
25. The UE of claim 20, wherein a millimeter wave (MMW) band is used for the wireless communication.
26. A base station for wireless communication, comprising:
a memory; and
at least one processor coupled to the memory and configured to:
transmit, to a user equipment (UE), a plurality of signals through a plurality of beams of the base station, each of the plurality of beams corresponding to a respective antenna port of a plurality of antenna ports of the base station;
receive, from the UE, a feedback signal including information about one or more beams selected from the plurality of beams; and
schedule a physical uplink shared channel (PUSCH) based on the feedback signal.

27. The base station of claim 26, wherein the feedback signal further includes one or more candidate uplink precoders, and wherein the at least one processor configured to schedule the PUSCH is further configured to:

select a final uplink precoder from the one or more candidate uplink precoders;

and

schedule the PUSCH based on the final uplink precoder.

28. The base station of claim 27, wherein the one or more candidate uplink precoders are from a predefined codebook.

29. The base station of claim 28, wherein a millimeter wave (MMW) band is used for the wireless communication.

30. The base station of claim 26, wherein the plurality of signals include a plurality of beam reference signals, a plurality of beam refinement reference signals, a plurality of channel state information reference signals (CSI-RS), or a combination thereof.