CLAIMS

1. An apparatus for wireless communication, comprising:

a transceiver;

a memory configured to store instructions; and

one or more processors communicatively coupled with the transceiver and the memory, wherein the one or more processors are configured to execute the instructions to:

transmit, by a user equipment (UE) to a network entity, a component carrier/bandwidth portion (CC/BWP) grouping capability message that indicates a capability of the UE to support CC/BWP group-based signaling, wherein the CC/BWP grouping capability message indicates at least one band-wise group or at least one spatially Quasi Co Location (QCL) CC group or subband;

receive, by the UE from the network entity, a CC/BWP grouping indication that identifies at least one CC/BWP group based on the CC/BWP grouping capability message;

receive, by the UE from the network entity, a CC/BWP configuration message that includes CC/BWP group configuration information that identifies a CC/BWP group configuration for the at least one CC/BWP group;

configure, by the UE, one or more communication parameters for each CC/BWP in the at least one CC/BWP group according to the CC/BWP group configuration; and

communicate, by the UE with the network entity, on at least one CC/BWP of the at least one CC/BWP group based on the one or more communication parameters configured according to the CC/BWP group configuration.

2. The apparatus of claim 1, wherein the at least one band-wise group is indicated by one-bit per band, wherein all configured CCs/BWPs on each band belong to one CC/BWP group, or by one-bit for all configured bands, wherein all configured CCs/BWPs per band belong to the one CC/BWP group.

3. The apparatus of claim 1, wherein the at least one spatially QCL CC group or subband includes a starting and an ending CC index per CC/BWP group.

4. The apparatus of claim 1, wherein the CC/BWP grouping capability message further includes one or more of a maximum number of active TCI states of a CC/BWP group, a total number of active spatial relations per CC/BWP group, or a total number of active CC groups.

5. The apparatus of claim 1, wherein the CC/BWP grouping capability message further includes a maximum number of CCs the UE supports within a corresponding CC/BWP group.

6. The apparatus of claim 1, wherein the one or more processors are configured to execute the instructions to receive the CC/BWP grouping indication that identifies the at least one CC/BWP group, and are further configured to receive at least one of an implicit CC/BWP grouping or an explicit CC/BWP grouping.

7. The apparatus of claim 6, wherein the implicit CC/BWP grouping indicates that all configured CCs/BWPs per band belong to one CC/BWP group, or indicates that each band includes only a single cell group.

8. The apparatus of claim 7, wherein the cell group comprises one or both of a master cell group (MCG) or a secondary cell group (SCG).

9. The apparatus of claim 1, wherein the one or more processors are configured to execute the instructions to receive the CC/BWP configuration message, and are further configured to receive an activation signal configured to activate group CC based communication, or receive a deactivation signal configured to deactivate the group CC based communication.

10. The apparatus of claim 1, wherein the one or more processors are configured to execute the instructions to receive the CC/BWP configuration message, and are further

configured to receive the CC/BWP configuration message from only a predefined cell associated with the at least one CC/BWP group, or from any cell associated with the at least one CC/BWP group, or from any cell associated with the UE with an indication to apply the CC/BWP configuration message to the at least one CC/BWP group, and wherein the CC/BWP configuration message activates either all of the one or more CCs associated with the at least one CC/BWP group or all of the one or more CCs associated with the at least one CC/BWP group associated with the cell from which the CC/BWP configuration message is received.

11. The apparatus of claim 1, wherein the CC/BWP configuration message comprises a first CC/BWP configuration message, and further comprising receiving, after a minimum time gap, a second CC/BWP configuration message that includes second CC/BWP group-based signaling configuration information that identifies a second CC/BWP group configuration for the at least one CC/BWP group based on the CC/BWP group.

12. The apparatus of claim 1, wherein the one or more processors are configured to execute the instructions to receive the CC/BWP configuration message, and are further configured to receive a medium access control (MAC) control element (CE) including at least one CC/BWP identifier (ID) to identify the at least one CC/BWP group, and wherein a value of the CC/BWP ID comprises a null value or a default value or a CC/BWP group ID.

13. The apparatus of claim 1, wherein the one or more processors are configured to execute the instructions to receive the CC/BWP configuration message, and are further configured to receive a medium access control (MAC) control element (CE) including at least one CC/BWP group identifier (ID) to identify the at least one CC/BWP group.

14. The apparatus of claim 1, wherein the one or more processors are configured to execute the instructions to receive the CC/BWP configuration message, and are further configured to receive an activate CC group message to activate the at least one CC/BWP group, or receive a deactivate message to deactivate the at least one CC/BWP group.

15. The apparatus of claim 1, wherein the one or more processors are configured to execute the instructions to receive the CC/BWP configuration message, and are further configured to receive one of:

a secondary cell (Scell) activation/deactivation medium access control (MAC) control element (CE);

a transmission configuration indicator (TCI) state or spatial relation activation/deactivation message;

a channel state information reference signal (CSI-RS) resource set or sounding reference signal (SRS) activation/deactivation message; or

a CSI-RS reporting activation/deactivation message.

16. The apparatus of claim 15, wherein the TCI state or spatial relation activation/deactivation message comprises one of TCI state activation/deactivation for a UE-specific Physical Downlink Shared Channel (PDSCH) MAC CE, a TCI state indication for a UE-specific Physical Downlink Control Channel (PDCCH) MAC CE, or a Physical Uplink Control Channel (PUCCH) spatial relation activation/deactivation MAC CE.

17. The apparatus of claim 15, wherein the one or more processors are configured to execute the instructions to:

activate spatial relation information for one or more semi-persistent (SP)/access point (AP) SRS resources by a MAC CE for a set of CC/BWPs for at least a same bandwidth; and

apply the spatial relation information for the one or more SP/AP SRS resources with a same SRS resource ID for all BWPs in indicated CCs, wherein the indicated CCs are included in the applicable list by RRC signaling.

18. The apparatus of claim 15, wherein the CSI-RS resource set or SRS activation/deactivation message comprises one of a semi-persistent (SP) channel state information (CSI) resource signal (RS) / CSI-interference measurement (IM) resource set activation/deactivation MAC CE, a SP SRS activation/deactivation MAC CE, a SP zero power (ZP) CSI-RS resource set activation/deactivation MAC CE, or an aperiodic CSI trigger state subselection MAC CE.

19. The apparatus of claim 15, wherein the CSI-RS reporting activation/deactivation message corresponds to a semi-persistent (SP) channel state information (CSI) reporting activation/deactivation MAC CE on a Physical Uplink Control Channel (PUCCH).

20. The apparatus of claim 1, wherein the one or more processors are configured to execute the instructions to:

identify a Quasi Co Location (QCL) relationship between two or more beams in a first CC/BWP; and

apply the QCL relationship between the two or more beams in the first CC/BWP to one or more transmission configuration indicator (TCI) states in a second CC/BWP of a same CC/BWP group.

21. The apparatus of claim 20, wherein the QCL relationship corresponds to a QCL Type D relationship enabling two or more beams to be received using a same receiver beamforming configuration.

22. The apparatus of claim 21, wherein each of the two or more beams corresponds to two or more TCI states.

23. An apparatus for wireless communication, comprising:

a transceiver;

a memory configured to store instructions; and

one or more processors communicatively coupled with the transceiver and the memory, wherein the one or more processors are configured to execute the instructions to:

receive, by a network entity from a user equipment (UE), a component carrier/bandwidth portion (CC/BWP) grouping capability message that indicates a capability of the UE to support CC/BWP group-based signaling, wherein the CC/BWP grouping capability message indicates at least one band-wise group or at least one spatially Quasi Co Location (QCL) CC group or subband;

transmit, by the network entity to the UE, a CC/BWP grouping indication that identifies at least one CC/BWP group based on the CC/BWP grouping capability message;

transmit, by the network entity to the UE, a CC/BWP configuration message that includes CC/BWP group configuration information that identifies a CC/BWP group configuration for the at least one CC/BWP group; and

communicate, by the network entity with the UE, on at least one CC/BWP of the at least one CC/BWP group based on one or more communication parameters configured according to the CC/BWP group configuration.

24. The apparatus of claim 23, wherein the one or more processors are configured to execute the instructions to:

identify a Quasi Co Location (QCL) relationship between two or more beams in a CC/BWP group;

indicate to the UE the QCL relationship between the two or more beams in a first CC/BWP in the CC group to one or more transmission configuration indicator (TCI) states; and

communicate to the UE on a second CC/BWP in the same CC group based on the indicated QCL relationship in the first CC.

25. The apparatus of claim 24, wherein the QCL relationship corresponds to a QCL Type D relationship enabling two or more beams to be received using a same receiver beamforming configuration.

26. The apparatus of claim 25, wherein each of the two or more beams corresponds to two or more TCI states.

27. The apparatus of claim 26, wherein the one or more processors are configured to execute the instructions to:

activate spatial relation information for one or more semi-persistent (SP)/access point (AP) sounding reference signal (SRS) resources by a MAC CE for a set of CC/BWPs for at least a same bandwidth; and

apply the spatial relation information for the one or more SP/AP SRS resources with a same SRS resource ID for all BWPs in indicated CCs, wherein the indicated CCs are included in the applicable list by RRC signaling.

28. A method of communication, comprising:

transmitting, by a user equipment (UE) to a network entity, a component carrier/bandwidth portion (CC/BWP) grouping capability message that indicates a capability of the UE to support CC/BWP group-based signaling, wherein the CC/BWP grouping capability message indicates at least one band-wise group or at least one spatially Quasi Co Location (QCL) CC group or subband;

receiving, by the UE from the network entity, a CC/BWP grouping indication that identifies at least one CC/BWP group based on the CC/BWP grouping capability message;

receiving, by the UE from the network entity, a CC/BWP configuration message that includes CC/BWP group configuration information that identifies a CC/BWP group configuration for the at least one CC/BWP group;

configuring, by the UE, one or more communication parameters for each CC/BWP in the at least one CC/BWP group according to the CC/BWP group configuration; and

communicating, by the UE with the network entity, on at least one CC/BWP of the at least one CC/BWP group based on the one or more communication parameters configured according to the CC/BWP group configuration.

29. A method of communication, comprising:

receiving, by a network entity from a user equipment (UE), a component carrier/bandwidth portion (CC/BWP) grouping capability message that indicates a capability of the UE to support CC/BWP group-based signaling, wherein the CC/BWP grouping capability message indicates at least one band-wise group or at least one spatially Quasi Co Location (QCL) CC group or subband;

transmitting, by the network entity to the UE, a CC/BWP grouping indication that identifies at least one CC/BWP group based on the CC/BWP grouping capability message;

transmitting, by the network entity to the UE, a CC/BWP configuration message that includes CC/BWP group configuration information that identifies a CC/BWP group configuration for the at least one CC/BWP group; and

communicating, by the network entity with the UE, on at least one CC/BWP of the at least one CC/BWP group based on one or more communication parameters configured according to the CC/BWP group configuration.