CLAIMS

1. A method of wireless communications in a network by a user equipment (UE), comprising: receiving, from the network, a message comprising sounding reference signal (SRS) configuration information, wherein the SRS configuration information comprises a first configuration information for a first SRS resource set and a second configuration information for a second SRS resource set, wherein the first SRS resource set and the second SRS resource set indicate time and frequency resources to be used for SRS transmission, wherein the first SRS resource set is configured to be backwards compatible with legacy UEs and the second SRS resource set is configured to be compatible with non-legacy UEs; and transmitting at least one SRS according to the received SRS configuration information.

2. The method of claim 1, wherein the at least one SRS transmitted according to at least one of the first SRS resource set or the second SRS resource set include an SRS sequence ID, wherein the SRS sequence ID comprises one of a cell ID or a configured virtual cell ID.

3. The method of claim 1, wherein at least one of the first SRS resource set or the second SRS resource set are configured periodically, aperiodically, semi-persistently or periodically with at least one of a different periodicity or a different offset.

4. The method of claim 1, wherein the first SRS resource set and the second SRS resource set do not comprise overlapped SRS symbols.

5. The method of claim 1, wherein transmitting the at least one SRS according to the received SRS configuration information comprises: determining a transmission power for transmitting the at least one SRS according to the received SRS configuration information.

6. The method of claim 5, wherein the determining is based on a power control command received in a downlink control information (DCI) message from the network, wherein one of: the DCI message comprises a group DCI message; or the DCI message is for a downlink (DL) grant or an uplink (UL) grant.

7. The method of claim 6, wherein the DCI message indicates that the power control command is to be applied to one of: additional SRS symbols of the second SRS resource set but not legacy SRS symbols of the first SRS resource set; legacy SRS symbols of the first SRS resource set but not to additional SRS symbols of the second SRS resource set; or both additional SRS symbols of the second SRS resource set and legacy SRS symbols of the first SRS resource set.

8. The method of claim 5, wherein the determining is based on open-loop power control configuration information received in unicast radio resource control (RRC) signaling, applying to one of: additional SRS symbols of the second SRS resource set but not to legacy SRS of the first SRS resource set; or legacy SRS of the first SRS resource set but not to additional SRS symbols of the second SRS resource set; or both additional SRS symbols of the second SRS resource set and legacy SRS symbols of the first SRS resource set; or both additional SRS symbols of the second SRS resource set and legacy SRS symbols of the first SRS resource set with a power offset configuration information between additional SRS symbols of the second SRS resource set and legacy SRS symbols of the first SRS resource set.

9. The method of claim 1, wherein the at least one of the first SRS resource set or the second SRS resource set configures an SRS for transmission in each of N symbols of a normal uplink (UL) subframe or an uplink pilot time slot (UpPTS) subframe, wherein the SRS configuration information comprises one of: a bitmap indicating locations of the N symbols to transmit an SRS in a subframe or a slot; or a start offset and N consecutive symbols to transmit an SRS; or an indication of one of a plurality of pre-defined SRS transmission patterns based on N and the plurality of pre-defined SRS transmission patterns are configurable based on a capability of the UE for at least one of switching transition time, power changes, or sTTI configuration.

10. The method of claim 1, further comprising repeating transmission of the at least one SRS R times with one of: a same comb, comb offset, cyclic shift, subband, and port as a previous transmission of the at least one SRS; a different comb offset in a symbol from a previous transmission of the at least one SRS; or using R-time subband frequency hopping with same or different comb offsets.

11. The method of claim 1, wherein transmitting the at least one SRS comprises transmitting the at least one SRS according to a configurable frequency hopping or antenna switching transmission pattern, wherein the transmission pattern comprises one of: transmitting a first SRS on a first subband using a first antenna; and transmitting a second SRS on a second subband using a second antenna; or transmitting a first SRS on a first subband using a first antenna; and transmitting a second SRS on the first subband using a second antenna; or transmitting a first SRS on a first subband using a first antenna; and transmitting a second SRS on the second subband using a first antenna.

12. The method of claim 1, further comprising: determining a transmission pattern to reduce at least one of a number of antenna switches, subband switches, or power changes when transmitting a plurality of SRSs, wherein transmitting at least one SRS is performed based, at least in part, on the determined transmission pattern.

13. The method of claim 1, further comprising at least one of: determining an SRS sequence with symbol-specific configuration if group or sequence hopping is enabled; and determining at least one of a root offset, comb offset or cyclic shift offset configuration if group and sequence hopping is disabled.

14. A method of wireless communications in a network by a base station (BS), comprising: determining sounding reference signal (SRS) configuration information, wherein the SRS configuration information comprises a first configuration information for a first SRS resource set and a second configuration information for a second SRS resource set, wherein the first SRS resource set and the second SRS resource set indicate time and frequency resources to be used for SRS transmission, wherein the first SRS resource set is configured to be backwards compatible with legacy UEs and the second SRS resource set is configured to be compatible with non-legacy UEs; transmitting the SRS configuration information to one or more user equipments; and receiving at least one SRS based on the SRS configuration information.

15. The method of claim 14, wherein the at least one SRS transmitted according to at least one of the first SRS resource set or the second SRS resource set include an SRS sequence ID, wherein the SRS sequence ID comprises one of a cell ID or a configured virtual cell ID.

16. The method of claim 14, wherein at least one of the first SRS resource set or the second SRS resource set are configured periodically, aperiodically, semi-persistently or periodically with at least one of a different periodicity or a different offset.

17. The method of claim 14, wherein the first SRS resource set and the second SRS resource set do not comprise overlapped SRS symbols.

18. The method of claim 14, further comprising: determining that power control needs to be performed on SRS transmissions; and transmitting a power control command to the one or more user equipments, instructing the UEs to perform the power control on SRS transmissions, wherein: the power control command is transmitted in a downlink control information (DCI) message; and one of: the DCI message comprises a group DCI message; or the DCI message is for a downlink (DL) grant or an uplink (UL) grant.

19. The method of claim 18, the DCI message indicates that the power control command is to be applied to one of: additional SRS symbols of the second SRS resource set but not legacy SRS symbols of the first SRS resource set; legacy SRS symbols of the first SRS resource set but not to additional SRS symbols of the second SRS resource set; or both additional SRS symbols of the second SRS resource set and legacy SRS symbols of the first SRS resource set.

20. The method of claim 18, further comprising transmitting open-loop power control configuration information based on the determination that power control needs to be performed on the SRS transmissions, wherein the open-loop power control configuration information is transmitted in unicast radio resource control (RRC) signaling, and wherein the open-loop power control configuration applies to one of: additional SRS symbols of the second SRS resource set but not to legacy SRS of the first SRS resource set; or legacy SRS of the first SRS resource set but not to additional SRS symbols of the second SRS resource set; or both additional SRS symbols of the second SRS resource set and legacy SRS symbols of the first SRS resource set; or both additional SRS symbols of the second SRS resource set and legacy SRS symbols of the first SRS resource set with a power offset configuration information between additional SRS symbols of the second SRS resource set and legacy SRS symbols of the first SRS resource set.

21. The method of claim 14, wherein the at least one of the first SRS resource set or the second SRS resource set configures an SRS for transmission in each of N symbols of a normal uplink (UL) subframe or an uplink pilot time slot (UpPTS) subframe, wherein the SRS configuration information comprises one of: a bitmap indicating locations of the N symbols to transmit an SRS in a subframe or a slot; a start offset and N consecutive symbols to transmit an SRS; or an indication of one of a plurality of pre-defined SRS transmission patterns based on N and the plurality of pre-defined SRS transmission patterns are configurable based on a capability of the UE for at least one of switching transition time or sTTI configuration.

22. The method of claim 14, further comprising receiving one or more repeated SRS transmissions with one of: a same comb, comb offset, cyclic shift, subband, and port as a previous transmission of the at least one SRS; a different comb offset in a symbol from a previous transmission of the at least one SRS; or using R-time subband frequency hopping with same or different comb offsets.

23. The method of claim 14, wherein receiving the at least one SRS comprises: receiving a first SRS on a first subband using a first antenna; and receiving a second SRS on a second subband using a second antenna.

24. The method of claim 14, wherein receiving the at least one SRS comprises: receiving a first SRS on a first subband using a first antenna; and receiving a second SRS on the first subband using a second antenna.

25. The method of claim 14, further comprising: determining a transmission pattern to reduce at least one of a number of antenna switches, subband switches, or power changes when transmitting a plurality of SRSs, wherein the SRS configuration information includes an indication of the determined transmission pattern.

26. The method of claim 25, wherein receiving the at least one SRS is based on the transmission pattern.

27. An apparatus for wireless communications in a network by a user equipment (UE), comprising: at least one processor configured to: receive, from the network, a message comprising sounding reference signal (SRS) configuration information, wherein the SRS configuration information comprises a first configuration information for a first SRS resource set and a second configuration information for a second SRS resource set, wherein the first SRS resource set and the second SRS resource set indicate time and frequency resources to be used for SRS transmission, wherein the first SRS resource set is configured to be backwards compatible with legacy UEs and the second SRS resource set is configured to be compatible with non-legacy UEs; and transmit at least one SRS according to the received SRS configuration information; and a memory coupled with the at least one processor.

28. An apparatus for wireless communications in a network by a base station (BS), comprising: at least one processor configured to: determine sounding reference signal (SRS) configuration information, wherein the SRS configuration information comprises a first configuration information for a first SRS resource set and a second configuration information for a second SRS resource set, wherein the first SRS resource set and the second SRS resource set indicate time and frequency resources to be used for SRS transmission, wherein the first SRS resource set is configured to be backwards compatible with legacy UEs and the second SRS resource set is configured to be compatible with non-legacy UEs; transmit the SRS configuration information to one or more user equipments; and receive at least one SRS based on the SRS configuration information; and a memory coupled with the at least one processor.