

[Claims]

[Claim 1]

A method of performing uplink transmission by a user equipment (UE) in a wireless communication system, the method comprising:

transmitting, to a base station, a sounding reference signal (SRS) for each of a plurality of SRS resources configured for the UE;

receiving, from the base station, downlink control information (DCI) comprising (i) an SRS resource indication (SRI) that indicates an SRS resource among the plurality of SRS resources, and (ii) a precoding indication that indicates a precoder, for the uplink transmission, that corresponds to the SRS resource indicated by the SRI; and

performing the uplink transmission to the base station by applying the precoder that is indicated by the precoding indication and that corresponds to the SRS resource indicated by the SRI.

[Claim 2]

The method of claim 1, wherein a beamforming vector and/or a beamforming coefficient applied for transmission of a precoded SRS is configured through control channel signaling by the base station or arbitrarily determined by the UE.

[Claim 3]

The method of claim 1, wherein at least one of an uplink beamforming vector or an uplink beamforming coefficient is determined based on at least one of a downlink

beamforming vector or a downlink beamforming coefficient used for reception of a downlink reference signal (DL RS) from the base station.

[Claim 4]

The method of claim 3, wherein the DL RS is a channel state information reference signal (CSI-RS), and

wherein a CSI-RS resource used for determining the at least one of the uplink beamforming vector or the uplink beamforming coefficient is indicated by the base station.

[Claim 5]

The method of claim 1, wherein at least one of an uplink beamforming vector or an uplink beamforming coefficient is independently applied for each subband for an uplink.

[Claim 6]

The method of claim 1, wherein a beamforming vector and/or a beamforming coefficient applied for a precoded SRS transmission for each subband is determined based on a beamforming vector and/or a beamforming coefficient used for reception of a downlink reference signal (DL RS).

[Claim 7]

The method of claim 6, wherein the DL RS is a channel state information reference

signal (CSI-RS), and

wherein a CSI-RS resource used for determining at least one of the beamforming vector or the beamforming coefficient applied for a precoded SRS transmission for each subband is indicated by the base station.

[Claim 8]

The method of claim 1, wherein the DCI further comprises a rank indication for the uplink transmission.

[Claim 9]

The method of claim 1, wherein a number of ranks for the uplink transmission is determined as a number of antenna ports of the SRS transmitted in the SRS resource indicated by the SRI.

[Claim 10]

The method of claim 1, wherein the precoding indication comprises a first precoding indication and a second precoding indication, and

wherein the second precoding indication is jointly encoded with uplink resource allocation information scheduled to the UE.

[Claim 11]

An user equipment (UE) configured to perform uplink transmission in a wireless communication system, the UE comprising:

at least one transceiver;

at least one processor; and

at least one computer memory operably connectable to the at least one processor and storing computer instruction that, when executed, cause the at least one processor to perform operations comprising;

transmitting, to a base station, a sounding reference signal (SRS) for each of a plurality of SRS resources configured for the UE;

receiving, from the base station, downlink control information (DCI) comprising (i) an SRS resource indication (SRI) that indicates an SRS resource among the plurality of SRS resources, and (ii) a precoding indication that indicates a precoder, for the uplink transmission, that corresponds to the SRS resource indicated by the SRI; and

performing the uplink transmission to the base station by applying the precoder that is indicated by the precoding indication and that corresponds to the SRS resource indicated by the SRI.

[Claim 12]

The method of claim 1, wherein the precoding indication is configured to indicate the precoder that corresponds to an antenna port of the SRS resource that is indicated by the SRI.

[Claim 13]

The method of claim 1, wherein applying the precoder that is indicated by the precoding indication and that corresponds to the SRS resource indicated by the SRI comprises:

encoding, using the precoder, information that is to be communicated to the base station.

[Claim 14]

The method of claim 1, wherein receiving the precoding indication that indicates the precoder that corresponds to the SRS resource indicated by the SRI comprises:

receiving, from the base station, a transmitted precoding matrix indicator (TPMI).

[Claim 15]

A method of receiving, by a base station, an uplink transmission from a user equipment (UE) in a wireless communication system, the method comprising:

receiving, from the UE, a sounding reference signal (SRS) for each of a plurality of SRS resources configured for the UE;

transmitting, to the UE, downlink control information (DCI) comprising (i) an SRS resource indication (SRI) that indicates an SRS resource among the plurality of SRS resources, and (ii) a precoding indication that indicates a precoder, for the uplink transmission, that corresponds to the SRS resource indicated by the SRI; and

receiving the uplink transmission from the UE that has been precoded by the UE with the precoder indicated by the precoding indication and that corresponds to the SRS resource indicated by the SRI.

[Claim 16]

A base station configured to receive an uplink transmission from a user equipment (UE) in a wireless communication system, the base station comprising:

at least one transceiver;

at least one processor; and

at least one computer memory operably connectable to the at least one processor and storing computer instruction that, when executed, cause the at least one processor to perform operations comprising:

receiving, from the UE, a sounding reference signal (SRS) for each of a plurality of SRS resources configured for the UE;

transmitting, to the UE, downlink control information (DCI) comprising (i) an SRS resource indication (SRI) that indicates an SRS resource among the plurality of SRS resources, and (ii) a precoding indication that indicates a precoder, for the uplink transmission, that corresponds to the SRS resource indicated by the SRI; and

receiving the uplink transmission from the UE that has been precoded by the UE with the precoder indicated by the precoding indication and that corresponds to the SRS resource indicated by the SRI.