CLAIMS

1. A communication apparatus, comprising:

a transceiver, which, in operation, receives control information indicating two or more beams for uplink transmissions; and

circuitry, which, in operation, uses the two or more beams for a plurality of uplink transmission occasions based on the control information and based on at least one condition for beam switching.

2. The communication apparatus of claim 1, wherein the plurality of uplink transmission occasions include one or more of a physical uplink control channel (PUCCH), a physical uplink shared channel (PUSCH) processing from one or more transport blocks, a sounding reference signal (SRS), or a physical random access (PRACH) transmission occasion, and are defined by a slot index, a starting symbol, and a number of consecutive symbols.

3. The communication apparatus of claim 1, wherein the plurality of uplink transmission occasions are transmission occasions among a plurality of repetitions of a physical uplink control channel (PUCCH) or a physical uplink shared channel (PUSCH) in an inter-slot level repetition framework, or transmission occasions among a plurality of nominal/actual repetitions of the PUCCH or the PUSCH in an intra-slot level repetition framework.

4. The communication apparatus of claim 1, wherein the transceiver, in operation, receives an explicit indication of performing the beam switching in a time-domain from a base communication apparatus, wherein the at least one condition for beam switching is based on the explicit indication.

5. The communication apparatus of claim 1, wherein the transceiver, in operation, receives the control information by using at least one of a downlink control information (DCI) signaling, a medium access control layer control element (MAC CE) signaling, or a radio resource control (RRC) signaling.

6. The communication apparatus of claim 1, wherein the at least one condition is that a first interval between two consecutive uplink transmission occasions of the plurality of uplink transmission occasions is not less than a required latency of beam switching.

7. The communication apparatus of claim 6, wherein the beam switching is performed within a cyclic prefix in case the required latency of beam switching is not greater than a duration of the cyclic prefix.

8. The communication apparatus of claim 1, wherein the circuity, in operation, provides assistance information to a base communication apparatus based on capabilities of the two or more beams.

9. The communication apparatus of claim 1, wherein the circuitry, in operation, uses the two or more beams for the plurality of uplink transmission occasions in a cyclical or a sequential pattern.

10. The communication apparatus of claim 1, wherein the circuitry, in operation, associates the two or more beams with a plurality of transmission configuration indicator (TCI) states.

11. The communication apparatus of claim 1, wherein the two or more beams are configured with a set of power control parameters.

12. The communication apparatus of claim 1, wherein the circuitry, in operation, associates the two or more beams with at least one of a plurality of transmit precoders from a codebook for codebook-based transmission based on the control information.

13. The communication apparatus of claim 12, wherein the one of a plurality of transmit precoders is indicated by using at least a transmit precoding matrix indicator (TPMI) and/or a sounding reference signal resource indicator (SRI) in a downlink control information (DCI) signalling.

14. The communication apparatus of claim 1, wherein the circuitry, in operation, associates the two or more beams with at least one of sounding reference signal (SRS) resource sets for codebook-based transmission, wherein the at least one of SRS resource sets is associated with a channel state information reference signal (CSI-RS) resource.

15. The communication apparatus of claim 14, wherein the at least one of SRS resource sets is indicated by using at least a signal resource indicator (SRI) in a downlink control information (DCI) signalling.

16. A communication method, comprising:

receiving control information indicating two or more beams for uplink transmissions; and

using the two or more beams for a plurality of uplink transmission occasions based on the control information and based on at least one condition for beam switching.

17. A base communication apparatus, comprising:

circuitry, which, in operation, generates control information indicating two or more beams for uplink transmissions, wherein at least one condition for beam switching is met; and

a transmitter, which, in operation, transmits the control information.

18. A communication method, comprising:

generating control information indicating two or more beams for uplink transmissions, wherein at least one condition for beam switching is met; and

transmitting the control information.

19. A integrated circuit configured to control a process of a communication apparatus, the process comprising:

receiving control information indicating two or more beams for uplink transmissions; and

using the two or more beams for a plurality of uplink transmission occasions based on the control information and based on at least one condition for beam switching.

20. A integrated circuit configured to control a process of a base communication apparatus, the process comprising:

generating control information indicating two or more beams for uplink transmissions, wherein at least one condition for beam switching is met; and

transmitting the control information.