MULTIPLE TRANSMISSION SCHEMES IN WIRELESS COMMUNICATION

TECHNICAL FIELD

This patent document generally relates to systems, devices, and techniques for wireless communications.

BACKGROUND

Wireless communication technologies are moving the world toward an increasingly connected and networked society. The rapid growth of wireless communications and advances in technology has led to greater demand for capacity and connectivity. Other aspects, such as energy consumption, device cost, spectral efficiency, and latency are also important to meeting the needs of various communication scenarios. In comparison with the existing wireless networks, next generation systems and wireless communication techniques need to provide support for an increased number of users and devices.

SUMMARY

This document relates to methods, systems, and devices for multiple transmission schemes in wireless communication. Some implementations of the disclosed technology provide an improved flexibility to support more various scenarios while addressing signaling overhead.

In a first aspect, the present disclosure provides a wireless communication method including: configuring, by a first communication device, a repetition scheme of a second communication device; indicating, by the first communication device, N Transmission Configuration Indicator (TCI) states in a Downlink Control Information (DCI) message to the second communication device, wherein K transmission occasions of a scheduled transmission of data correspond to the N TCI states and the repetition scheme; and performing, by the first communication device, the scheduled transmission of data using the K transmission, N and K being non-negative integers.

In a second aspect, the present disclosure provides a wireless communication method, comprising: receiving, by a second communication device, an indication from a first communication device indicating N Transmission Configuration Indicator (TCI) states in a

Downlink Control Information (DCI) message, wherein K transmission occasions of a scheduled transmission of data correspond to the N TCI states and a configured repetition scheme; and receiving, by the second communication device, the scheduled transmission of data using the K transmission occasions, N and K being non-negative integers.

In a third aspect, the present disclosure provides a wireless communications apparatus comprising a processor that is configured to: configure a repetition scheme of a second communication device; indicate N Transmission Configuration Indicator (TCI) states in a Downlink Control Information (DCI) message to the second communication device, wherein K transmission occasions of a scheduled transmission of data correspond to the N TCI states and the repetition scheme; and perform the scheduled transmission of data using the K transmission occasions.

In a fourth aspect, the present disclosure provides a wireless communications apparatus comprising a processor that is configured to: receive an indication from a first communication device indicating N Transmission Configuration Indicator (TCI) states in a Downlink Control Information (DCI) message, wherein K transmission occasions of a scheduled transmission of data correspond to the N TCI states and a configured repetition scheme; and receive the scheduled transmission of data using the K transmission occasions, N and K being non-negative integers.

In one embodiment, a wireless communication method is provided to include transmitting, by a first communication device, at least one of i) a repetition mode of data transmissions to be sent to a second communication device, ii) a mapping between N indicated beams and scheduled transmissions of the data, or iii) a RV (Redundant Version) relationship among the scheduled transmissions of the data, where the transmitting is based on at least one of the N indicated beam(s), a DMRS (Demodulation Reference Signals) port indication, or K time domain occasions, N and K being non-negative integers.

In another embodiment, a wireless communication apparatus comprising a processor configured to perform the disclosed methods is disclosed.

In another embodiment, a computer readable medium having code stored thereon is disclosed. The code, when implemented by a processor, causes the processor to implement a

CLAIMS

What is claimed is:

1. A wireless communication method including:

configuring, by a first communication device, a repetition scheme of a second communication device;

indicating, by the first communication device, N Transmission Configuration Indicator (TCI) states in a Downlink Control Information (DCI) message to the second communication device, wherein K transmission occasions of a scheduled transmission of data correspond to the N TCI states and the repetition scheme; and

performing, by the first communication device, the scheduled transmission of data using the K transmission, N and K being non-negative integers.

2. The wireless communication method of claim 1, further comprising:

indicating, by the first communication device, one or more Demodulation Reference Signal (DMRS) ports in the DCI message to the second communication device.

3. A wireless communication method, comprising:

receiving, by a second communication device, an indication from a first communication device indicating N Transmission Configuration Indicator (TCI) states in a Downlink Control Information (DCI) message, wherein K transmission occasions of a scheduled transmission of data correspond to the N TCI states and a configured repetition scheme; and

receiving, by the second communication device, the scheduled transmission of data using the K transmission occasions, N and K being non-negative integers.

4. The wireless communication method of claim 3, further comprising:

receiving, by the second communication device, one or more Demodulation Reference Signal (DMRS) ports in the DCI message from the first communication device.

5. The wireless communication method of any one of claims 1 to 4, wherein the repetition scheme includes a Frequency Division Multiplexing (FDM) repetition mode in which the data is transmitted on at least two non-overlapping resource parts in frequency domain.

6. The wireless communication method of claim 3, wherein, for the FDM repetition mode, (TCI state i, TCI state i+1) of the N TCI states are applied to a time domain occasion k, wherein ($i = 2\left\lfloor \frac{k}{2K/N} \right\rfloor$, $i+1 = 2\left\lfloor \frac{k}{2K/N} \right\rfloor + 1$), and wherein k is from 0 to K-1.

7. The wireless communication method of any one of claims 1 to 4, wherein the repetition scheme includes a Time Division Multiplexing (TDM) repetition mode in which the data is transmitted on at least two transmission occasions using non-overlapping resources in time domain.

8. The wireless communication method of claim 5, wherein for the TDM repetition mode, a TCI state i of the N TCI states is applied to a time domain occasion k, wherein $i = \left\lfloor \frac{k}{K/N} \right\rfloor$, and wherein k is from 0 to K-1.

9. The wireless communication method of any one of claims 1 to 8, wherein the repetition scheme further comprises a mode in which the data is associated with different DMRS ports corresponding to different Code Division Multiplexing (CDM) groups.

10. The wireless communication method of claim 9, wherein for the mode in which the data is associated with different DMRS ports corresponding to different CDM groups, a TCI state i of the N TCI states corresponds to a first CDM group associated with a first DMRS port and a TCI state i+1 of the N TCI states corresponds to a second CDM group associated with a second DMRS port.

11. The wireless communication method of any one of claims 1 to 10, wherein a redundancy version to be applied to one or more of the K transmission occasions is predefined.

12. The wireless communication method of any one of claims 1 to 11, wherein data repetitions are divided into N groups, the data repetitions within a group of the N groups are indicated with a same beam, and a redundancy version (RV) to be applied to the data repetitions within the group is predefined.

13. A wireless communications apparatus comprising a processor that is configured to:

configure a repetition scheme of a second communication device;

indicate N Transmission Configuration Indicator (TCI) states in a Downlink Control Information (DCI) message to the second communication device, wherein K transmission occasions of a scheduled transmission of data correspond to the N TCI states and the repetition scheme; and

perform the scheduled transmission of data using the K transmission occasions.

14. The wireless communication apparatus of claim 13, wherein the processor is configured to indicate one or more Demodulation Reference Signal (DMRS) ports in the DCI message to the second communication device.

15. A wireless communications apparatus comprising a processor that is configured to:

receive an indication from a first communication device indicating N Transmission Configuration Indicator (TCI) states in a Downlink Control Information (DCI) message, wherein K transmission occasions of a scheduled transmission of data correspond to the N TCI states and a configured repetition scheme; and

receive the scheduled transmission of data using the K transmission occasions, N and K being non-negative integers.

16. The wireless communications apparatus of claim 15, wherein the processor is configured to receive one or more Demodulation Reference Signal (DMRS) ports in the DCI message from the first communication device.

17. The wireless communication apparatus of any one of claims 13 to 16, wherein the repetition scheme includes a Frequency Division Multiplexing (FDM) repetition mode in which the data is transmitted on at least two non-overlapping resource parts in fre6uency domain.

18. The wireless communication apparatus of claim 17, wherein, for the FDM repetition mode, (TCI state i, TCI state i+1) of the N TCI states are applied to a time domain occasion k, wherein ($i = 2\left\lfloor \frac{k}{2K/N} \right\rfloor$, $i+1 = 2\left\lfloor \frac{k}{2K/N} \right\rfloor + 1$), and wherein k is from 0 to K-1.

19. The wireless communication apparatus of any one of claim 13 to 16, wherein the repetition scheme includes a Time Division Multiplexing (TDM) repetition mode in which the data is transmitted on at least two transmission occasions using non-overlapping resources in time domain.

20. The wireless communication apparatus of claim 19, wherein, for the TDM repetition mode, a TCI state i of the N TCI states is applied to a time domain occasion k, wherein $i = \left\lfloor \frac{k}{K/N} \right\rfloor$, and wherein k is from 0 to K-1.

21. The wireless communication apparatus of any one of claims 13 to 20, wherein the repetition scheme further comprises a mode in which the data is associated with different DMRS ports corresponding to different Code Division Multiplexing (CDM) groups.

22. The wireless communication apparatus of claim 21, wherein, for the mode in which the data is associated with different DMRS ports corresponding to different Code Division Multiplexing (CDM) groups, a TCI state i of the N TCI states corresponds to a first CDM group associated with a first DMRS port and a TCI state i+1 of the N TCI states corresponds to a second CDM group associated with a second DMRS port.

23. The wireless communication apparatus of any one of claims 13 to 22, wherein a redundancy version to be applied to one or more of the K transmission occasions is predefined.

24. The wireless communication apparatus of any one of claims 13 to 23, wherein data repetitions are divided into N groups, the data repetitions within a group of the N groups are indicated with a same beam, and a redundancy version (RV) to be applied to the data repetitions within the group is predefined.