[5] However, there has been no discussion so far concerning multi-TB scheduling for single DCI-based multi-TRP/Panel transmission and single DCI-based single-TRP and/or Panel transmission which is configured in operation.

[6] There is thus a need for communication apparatuses and methods that can solve the above mentioned issue. Furthermore, other desirable features and characteristics will become apparent from the subsequent detailed description and the appended claims, taken in conjunction with the accompanying drawings and this background of the disclosure.

SUMMARY

[7] The present disclosure presents a non-limiting examples which facilitates implementation of multi-TB scheduling for single DCI-based multi-TRP/Panel transmission and single DCI-based single-TRP/Panel transmission in operation. It also includes the implementation case that the single-TRP/Panel transmission mode is dynamically or semi-statically switched to the multi-TRP/Panel transmission mode, and vice versa. The decision of switching is made by gNB based on different criterions. For instance, one of the multiple TRPs/Panels is only activated in operation by using either implicit or explicit indication from gNB, such as a transmission configuration indicator (TCI) state.

[8] In one aspect, the techniques disclosed herein provide a communication apparatus. For example, the communication apparatus can be a subscriber UE, which may be a normal (non-RedCap or Rel-15/16/17) UE, a RedCap UE or other similar types of UE. The communication apparatus comprises a receiver, which in operation, receives a single downlink control information (DCI) including scheduling information, the scheduling information indicating radio resources of a plurality of transport blocks (TBs); and circuitry, which in operation, obtains the radio resources of the plurality of TBs based on the scheduling information, wherein the scheduling information indicates more than one transmission configuration indicator (TCI) states, wherein each of the indicated TCI states corresponds to an activation of one transmission and reception point (TRP) or panel, and wherein the radio resources of the plurality of TBs are associated with the indicated TCI states,

wherein the plurality of TBs are segmented into a plurality of portions, each of the plurality of portions including one or more code-blocks (CBs) or one or more code-

block-groups (CBGs) from the plurality of TBs, the scheduling information indicating the radio resources of at least one portion and at least one of the indicated TCI states,,wherein the scheduling information further comprises a time-domain resource assignment (TDRA) table or a frequency-domain resource assignment (FDRA) table, and wherein the radio resources of the plurality of TBs are indicated by the TDRA table or FDRA table.

[9] In another example, the techniques disclosed herein provide a communication apparatus. For example, the communication apparatus can be a base station or gNodeB (gNB) which comprises circuitry, which in operation, generates a single DCI

[10] including scheduling information, the scheduling information indicating radio resources of a plurality of transport blocks (TBs); and a transmitter, which in operation, transmits the single DCI to a communication apparatus.

In another aspect, the techniques disclosed herein provide a communication method. The communication method comprises receiving a single DCI including scheduling information, the scheduling information indicating radio resources of a plurality of TBs; and obtaining the radio resources for the plurality of TBs based on the scheduling information,

wherein the scheduling information indicates more than one transmission configuration indicator (TCI) states, wherein each of the indicated TCI states corresponds to an activation of one transmission and reception point (TRP) or panel, and wherein the radio resources of the plurality of TBs are associated with the indicated TCI states,wherein the plurality of TBs are segmented into a plurality of portions, each of the plurality of portions including one or more code-blocks (CBs) or one or more code-block-groups (CBGs) from the plurality of TBs, the scheduling information indicating the radio resources of at least one portion and at least one of the indicated TCI states, wherein the scheduling information further comprises a time-domain resource assignment (TDRA) table or a frequency-domain resource assignment (FDRA) table, and wherein the radio resources of the plurality of TBs are indicated by the TDRA table or FDRA table.

[11] It should be noted that general or specific examples may be implemented as a system, a method, an integrated circuit, a computer program, a storage medium, or any selective combination thereof.

[12] Additional benefits and advantages of the disclosed examples will become apparent from the specification and drawings. The benefits and/or advantages may be individually obtained by the various examples and features of the specification and drawings, which need not all be provided in order to obtain one or more of such benefits and/or advantages.

BRIEF DESCRIPTION OF THE DRAWINGS

[13] Embodiments of the disclosure will be better understood and readily apparent to one of ordinary skilled in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

[14] Fig. 1 shows an exemplary architecture for a 3GPP NR system.

[15] Fig. 2 is a schematic drawing which shows functional split between NG-RAN and 5GC.

[16] Fig. 3 is a sequence diagram for RRC connection setup/reconfiguration procedures.

CLAIMS

1. A communication apparatus comprising:

a receiver, which in operation, receives a single downlink control information (DCI) including scheduling information, the scheduling information indicating radio resources of a plurality of transport blocks (TBs); and

circuitry, which in operation, obtains the radio resources of the plurality of TBs based on the scheduling information,

wherein the scheduling information indicates more than one transmission configuration indicator (TCI) states, wherein each of the indicated TCI states corresponds to an activation of one transmission and reception point (TRP) or panel, and wherein the radio resources of the plurality of TBs are associated with the indicated TCI states,

wherein the plurality of TBs are segmented into a plurality of portions, each of the plurality of portions including one or more code-blocks (CBs) or one or more code-block-groups (CBGs) from the plurality of TBs, the scheduling information indicating the radio resources of at least one portion and at least one of the indicated TCI states,

wherein the scheduling information further comprises a time-domain resource assignment (TDRA) table or a frequency-domain resource assignment (FDRA) table, and wherein the radio resources of the plurality of TBs are indicated by the TDRA table or FDRA table.

2. The communication apparatus according to claim 1, wherein the scheduling information indicates one TCI state corresponding to an activation of one TRP or panel, and wherein the radio resources of the plurality of TBs are associated with the indicated TCI state.

3. The communication apparatus according to claim 1, wherein each of the plurality of TBs is associated with at least one of the indicated TCI states.

4. The communication apparatus according to claim 1, wherein each of the plurality of portions includes one or more TBs from the plurality of TBs.

5. The communication apparatus according to claim 1, wherein the scheduling information further comprises a time-domain resource assignment (TDRA) table or

a frequency-domain resource assignment (FDRA) table, and wherein the radio resources of the plurality of TBs are indicated by the TDRA table or FDRA table.

6. The communication apparatus according to claim 5, wherein the scheduling information includes a start and length indicator (SLIV) corresponding to the at least one portion and at least one of the indicated TCI states.

7. The communication apparatus according to claim 5, wherein the TDRA table or the FDRA table is configured by at least a DCI, MAC CE, or RRC signalling.

8. The communication apparatus according to claim 1, wherein the circuitry is further configured to generate a response signal for each of the plurality of portions.

9. The communication apparatus according to claim 8, wherein an ACK signal is generated if the receiver correctly received all CBs of a portion, and generate a NACK signal if the receiver incorrectly received at least one CB of the portion.

10. The communication apparatus according to claim 9, wherein the scheduling information indicates PUCCH or PUSCH resource indicator (PRI) for the response signal; and wherein the communication apparatus further comprises a transmitter, which in operation, transmits the response signals of the plurality of TBs on a corresponding PUCCH or PUSCH based on the scheduling information.

11. The communication apparatus according to claim 10, wherein the scheduling information indicates to multiplex the response signals of the plurality of TBs as a joint HARQ signal; and wherein the transmitter is further configured to transmit the joint HARQ signal to a TRP configured with the single DCI.

12. A communication method comprising:

receiving a single DCI including scheduling information, the scheduling information indicating radio resources of a plurality of TBs; and

obtaining the radio resources for the plurality of TBs based on the scheduling information,

wherein the scheduling information indicates more than one transmission configuration indicator (TCI) states, wherein each of the indicated TCI states corresponds to an activation of one transmission and reception point (TRP) or panel, and wherein the radio resources of the plurality of TBs are associated with the indicated TCI states,

wherein the plurality of TBs are segmented into a plurality of portions, each of the plurality of portions including one or more code-blocks (CBs) or one or more code-block-groups (CBGs) from the plurality of TBs, the scheduling information indicating the radio resources of at least one portion and at least one of the indicated TCI states,

wherein the scheduling information further comprises a time-domain resource assignment (TDRA) table or a frequency-domain resource assignment (FDRA) table, and wherein the radio resources of the plurality of TBs are indicated by the TDRA table or FDRA table.