SYSTEMS AND METHODS FOR PUBLIC CHANNELS AND SIGNALS

TECHNICAL FIELD

The disclosure relates generally to wireless communications, including but not limited to systems and methods for public channels and signals.

BACKGROUND

The standardization organization Third Generation Partnership Project (3GPP) is currently in the process of specifying a new Radio Interface called 5G New Radio (5G NR) as well as a Next Generation Packet Core Network (NG-CN or NGC). The 5G NR will have three main components: a 5G Access Network (5G-AN), a 5G Core Network (5GC), and a User Equipment (UE). In order to facilitate the enablement of different data services and requirements, the elements of the 5GC, also called Network Functions, have been simplified with some of them being software based, and some being hardware based, so that they could be adapted according to need.

SUMMARY

The example embodiments disclosed herein are directed to solving the issues relating to one or more of the problems presented in the prior art, as well as providing additional features that will become readily apparent by reference to the following detailed description when taken in conjunction with the accompany drawings. In accordance with various embodiments, example systems, methods, devices and computer program products are disclosed herein. It is understood, however, that these embodiments are presented by way of example and are not limiting, and it will be apparent to those of ordinary skill in the art who read the present disclosure that various modifications to the disclosed embodiments can be made while remaining within the scope of this disclosure.

In a first aspect, the present disclosure provides a method comprising: determining, by a wireless communication node, a configuration for a resource configuration set scheduled in a cross-division duplex (XDD) slot, wherein one or more resource units of the resource configuration set that overlap with a frequency band in the XDD slot that is of a different

transmission direction as the resource configuration set, are to be remapped or excluded in a defined manner; and sending, by the wireless communication node to a wireless communication device, the configuration.

In a second aspect, the present disclosure provides a method method comprising: receiving, by a wireless communication device from a wireless communication node, a configuration, wherein the configuration is for a resource configuration set scheduled in a cross-division duplex (XDD) slot, wherein one or more resource units of the resource configuration set that overlap with a frequency band in the XDD slot that is of a different transmission direction as the resource configuration set, are to be remapped or excluded in a defined manner.

In a third aspect, the present disclosure provides a wireless communication node, comprising: at least one processor configured to: determine a configuration for a resource configuration set scheduled in a cross-division duplex (XDD) slot, wherein one or more resource units of the resource configuration set that overlap with a frequency band in the XDD slot that is of a different transmission direction as the resource configuration set, are to be remapped or excluded in a defined manner; and send, via a transmitter to a wireless communication device, the configuration.

In a fourth aspect, the present disclosure provides a wireless communication device, comprising: at least one processor configured to: receive, via a receiver from a wireless communication node, a configuration, wherein the configuration is for a resource configuration set scheduled in a cross-division duplex (XDD) slot, wherein one or more resource units of the resource configuration set that overlap with a frequency band in the XDD slot that is of a different transmission direction as the resource configuration set, are to be remapped or excluded in a defined manner.

At least one example is directed to a system, method, apparatus, or a non-transitory computer-readable medium for supporting and/or co-existence with public/common signal(s) and/or channel(s), for instance. In one example, a wireless communication node (e.g., base station) may determine a configuration for a resource configuration set scheduled in a cross-

division duplex (XDD) slot. In some examples, the configuration may indicate that any one or more resource units of the resource configuration set that may overlap with a frequency band in the XDD slot that is of a different transmission direction (e.g., downlink or uplink) as the resource configuration set. In certain examples, the one or more resource units of the resource configuration set can be to be remapped/re-scheduled in a defined matter. In some examples, the wireless communication node (e.g., base station) may send the configuration to a wireless communication device (e.g., user equipment). In some examples, the resource configuration set may include at least one of: a control resource set 0 (CORESET0), a downlink initial bandwidth part (BWP), an uplink initial BWP, a downlink BWP, or an uplink BWP. In some examples, each of the one or more resource units may comprise a resource element (RE), a resource block (RB), a RB group (RBG), a physical RB (PRB), or a control channel element (CCE).

In some examples, the configuration may indicate that all resource units of the resource configuration set or at least the one or more resource units of the resource configuration set that overlap with the frequency band, can be to be remapped to one or more other frequency bands in the XDD slot overlapping with the resource configuration set that are of a same transmission direction as the resource configuration set.

In some examples, the configuration may indicate that all resource units of the resource configuration set or at least the one or more resource units of the resource configuration set that overlap with the frequency band, can be to be remapped to one or more other frequency bands in the XDD slot that are of a same transmission direction as the resource configuration set.

In some examples, the configuration may indicate that the one or more resource units of the resource configuration set that overlap with the frequency band, can be to be remapped to one or more other frequency bands in the XDD slot that are of a same transmission direction as the resource configuration set, corresponding to a next available time domain region in the XDD slot.

In some examples, the configuration may indicate that all resource units of the resource configuration set can be to be remapped to a next available slot that is of a same transmission direction as the resource configuration set.

In some examples, the configuration may indicate that the one or more resource units of the resource configuration set that overlap with the frequency band, can be to be un-scheduled, or remapped to no region in the XDD slot.

In some examples, the wireless communication node (e.g., base station) may send an indication of a time duration and a transmission direction of the frequency band of the XDD slot to the wireless communication device (e.g., user equipment) via signaling. In some examples, the indication may include a bitmap of N bits, and T time domain units for the time duration that is partitioned into N groups corresponding to the N bits. In certain examples, each of the N bits may indicate a transmission direction of a corresponding one of the N groups. In some examples, N and T can be each a positive integer value.

In some examples, the indication further may include another bitmap of M bits, and F frequency domain units of the frequency band that is partitioned into M groups corresponding to the M bits. In some examples, each of the M bits may indicate a transmission direction of a corresponding one of the M groups. In some examples, M and F can be each a positive integer value.

In some examples, the indication may include N bits, and T time domain units for the time duration that is partitioned into G groups, and F frequency domain units. In some embodiments, each of G sets of bits from a most significant byte (MSB) of the N bits may have a one-to-one-mapping with the G groups. In some examples, N, T and G can be each a positive integer value.

In some examples, the indication may include N bits, and T time domain units for the time duration, and F frequency domain units for the frequency band that is partitioned into G groups. In some embodiments, each of G sets of bits from a most significant byte (MSB) of the N bits may have a one-to-one-mapping with the G groups. In some examples, N, T and G can be each a positive integer value.

At least one example is directed to a system, method, apparatus, or a non-transitory computer-readable medium. In some examples, a wireless communication device may receive a configuration from a wireless communication node (e.g., a ground terminal, a base

station, a gNB, an eNB, or a serving node). In some examples, the configuration may be for a resource configuration set scheduled in a cross-division duplex (XDD) slot, and may indicate that one or more resource units of the resource configuration set that overlap with a frequency band in the XDD slot that is of a different transmission direction as the resource configuration set, can be to be remapped in a defined manner.

BRIEF DESCRIPTION OF THE DRAWINGS

Various example embodiments of the present solution are described in detail below with reference to the following figures or drawings. The drawings are provided for purposes of illustration only and merely depict example embodiments of the present solution to facilitate the reader's understanding of the present solution. Therefore, the drawings should not be considered limiting of the breadth, scope, or applicability of the present solution. It should be noted that for clarity and ease of illustration, these drawings are not necessarily drawn to scale.

FIG. 1 illustrates an example cellular communication network in which techniques disclosed herein may be implemented, in accordance with an embodiment of the present disclosure;

FIG. 2 illustrates a block diagram of an example base station and a user equipment device, in accordance with some embodiments of the present disclosure;

FIG. 3 illustrates an example cross-division duplex (XDD) slot, in accordance with some embodiments of the present disclosure;

FIG. 4 illustrates an example cross-division duplex (XDD) slot, in accordance with some embodiments of the present disclosure;

FIG. 5 illustrates an example cross-division duplex (XDD) slot, in accordance with some embodiments of the present disclosure;

FIG. 6 illustrates an example of a resource configuration set in a cross-division duplex (XDD) slot, in accordance with some embodiments of the present disclosure;

CLAIMS

What is claimed is:

1. A method comprising:

determining, by a wireless communication node, a configuration for a resource configuration set scheduled in a cross-division duplex (XDD) slot, wherein one or more resource units of the resource configuration set that overlap with a frequency band in the XDD slot that is of a different transmission direction as the resource configuration set, are to be remapped or excluded in a defined manner; and

sending, by the wireless communication node to a wireless communication device, the configuration.

2. The method of claim 1, wherein the resource configuration set includes at least one of: a control resource set 0 (CORESET0), a downlink initial bandwidth part (BWP), an uplink initial BWP, a downlink BWP, or an uplink BWP.

3. The method of claim 1, wherein each of the one or more resource units comprises a resource element (RE), a resource block (RB), a RB group (RBG), a physical RB (PRB), or a control channel element (CCE).

4. The method of claim 1, wherein all resource units of the resource configuration set or at least the one or more resource units of the resource configuration set that overlap with the frequency band, are to be migrated or remapped to one or more other frequency bands in the XDD slot overlapping with the resource configuration set that are of a same transmission direction as the resource configuration set.

5. The method of claim 1, wherein all resource units of the resource configuration set or at least the one or more resource units of the resource configuration set that overlap with the frequency band, are to be migrated or remapped to one or more other frequency bands in the XDD slot that are of a same transmission direction as the resource configuration set.

6. The method of claim 1, wherein the one or more resource units of the resource configuration set that overlap with the frequency band, are to be migrated or remapped to one or more other frequency bands in the XDD slot that are of a same transmission direction as the resource configuration set, corresponding to a next available time domain region in the XDD slot.

7. The method of claim 1, wherein all resource units of the resource configuration set are to be migrated or remapped to a next available slot that is of a same transmission direction as the resource configuration set.

8. The method of claim 1, wherein the one or more resource units of the resource configuration set that overlap with the frequency band, are to be remapped or excluded, and a transmission based on the resource configuration set is mapped to remaining resource units of the resource configuration set.

9. The method of claim 1, comprising:

sending, by the wireless communication node to the wireless communication device via a signaling, an indication of a time duration and a transmission direction of the frequency band of the XDD slot.

10. The method of claim 9, wherein the indication includes a bitmap of N bits, and T time domain units for the time duration that is partitioned into N groups corresponding to the N bits,

where each of the N bits indicates a transmission direction of a corresponding one of the N groups, and

where N and T are each a positive integer value.

11. The method of claim 10, wherein the indication further includes another bitmap of M bits, and F frequency domain units of the frequency band that is partitioned into M groups corresponding to the M bits,

where each of the M bits indicates a transmission direction of a corresponding one of the M groups, and

where M and F are each a positive integer value.

12. The method of claim 9, wherein the indication includes N bits, and T time domain units for the time duration that is partitioned into G groups, and F frequency domain units,

where each of G sets of bits from a most significant byte (MSB) of the N bits have a one-to-one-mapping with the G groups, and

where N, T and G are each a positive integer value.

13. The method of claim 9, wherein the indication includes N bits, and T time domain units for the time duration, and F frequency domain units for the frequency band that is partitioned into G groups,

where each of G sets of bits from a most significant byte (MSB) of the N bits have a one-to-one-mapping with the G groups, and

where N, T and G are each a positive integer value.

14. The method of claim 1, wherein the one or more resource units of the resource configuration set are to be remapped or excluded according to an indication associated with the configuration.

15. A method comprising:

receiving, by a wireless communication device from a wireless communication node, a configuration,

wherein the configuration is for a resource configuration set scheduled in a cross-division duplex (XDD) slot, wherein one or more resource units of the resource configuration set that overlap with a frequency band in the XDD slot that is of a different transmission direction as the resource configuration set, are to be remapped or excluded in a defined manner.

16. A wireless communication node, comprising:

at least one processor configured to:

determine a configuration for a resource configuration set scheduled in a cross-division duplex (XDD) slot, wherein one or more resource units of the resource configuration set that overlap with a frequency band in the XDD slot that is of a different transmission direction as the

resource configuration set, are to be remapped or excluded in a defined manner; and

send, via a transmitter to a wireless communication device, the configuration.

17. A wireless communication device, comprising:

at least one processor configured to:

receive, via a receiver from a wireless communication node, a configuration,

wherein the configuration is for a resource configuration set scheduled in a cross-division duplex (XDD) slot, wherein one or more resource units of the resource configuration set that overlap with a frequency band in the XDD slot that is of a different transmission direction as the resource configuration set, are to be remapped or excluded in a defined manner.

18. The wireless communication device of claim 17, wherein the resource configuration set includes at least one of: a control resource set 0 (CORESET0), a downlink initial bandwidth part (BWP), an uplink initial BWP, a downlink BWP, or an uplink BWP.

19. The wireless communication device of claim 17, wherein each of the one or more resource units comprises a resource element (RE), a resource block (RB), a RB group (RBG), a physical RB (PRB), or a control channel element (CCE).

20. The wireless communication device of claim 17, wherein all resource units of the resource configuration set or at least the one or more resource units of the resource configuration set that overlap with the frequency band, are to be migrated or remapped to one or more other frequency bands in the XDD slot overlapping with the resource configuration set that are of a same transmission direction as the resource configuration set.