METHOD AND SYSTEM FOR TIME DIVISION DUPLEX COMMUNICATION IN WIRELESS NETWORKS

TECHNICAL FIELD

[0002] The present disclosure relates to a system and method for wireless communications, and, in particular, to a system and method for virtual full time division duplex communication.

BACKGROUND

[0003] Of the two forms of duplex commonly used in wireless networks, namely frequency division duplex (FDD) and time division duplex (TDD), current Long-Term Evolution (LTE) standards accommodate both FDD (LTE FDD) and TDD (LTE TDD) implementations in half duplex mode. Interference, caused by both a user equipment (UE) itself, as well as inter-terminal interference, present obstacles to implementations of full-duplex communication.

[0004] Currently, for all transmission between UEs and base stations, the timeline for a downlink and an uplink transmission is partitioned into units of radio frames. Each radio frame is partitioned into a predetermined number of subframes. For TDD, each subframe used for the downlink may be referred to as a downlink (DL) subframe, and each subframe used for the uplink may be referred to as an uplink (UL) subframe.

[0005] A particular TDD DL/UL subframe configuration is associated with a network, a cell or a cluster of cells. In current implementations, such as LTE, the subframe configuration is shared amongst a large number of cells over a larger geographical region. Further, subframe configurations are selected from a limited set of DL/UL subframe permutations. The network usually determines the subframe configuration

instructions for implementing one or more embodiments, or one or more portions thereof, may be stored on any suitable computer readable storage medium. The computer readable storage medium may be a tangible medium such as optical (e.g., CD, DVD, Blu-Ray, etc.), magnetic, hard disk, volatile or non-volatile memory, solid state memory, or any other type of storage medium known in the art.

[00112] Additional features and advantages of the present disclosure will be appreciated by those skilled in the art.

[00113] The structure, features, accessories, and alternatives of specific embodiments described herein and shown in the Figures are intended to apply generally to all of the teachings of the present disclosure, including to all of the embodiments described and illustrated herein, insofar as they are compatible. In other words, the structure, features, accessories, and alternatives of a specific embodiment are not intended to be limited to only that specific embodiment unless so indicated.

[00114] Moreover, the previous detailed description is provided to enable any person skilled in the art to make or use one or more embodiments according to the present disclosure. Various modifications to those embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments without departing from the scope of the teachings provided herein. Thus, the present methods, systems, and devices are not intended to be limited to the embodiments disclosed herein. The scope of the claims should not be limited by these embodiments, but should be given the broadest interpretation consistent with the description as a whole. Reference to an element in the singular, such as by use of the article "a" or "an" is not intended to mean "one and only one" unless specifically so stated, but rather "one or more". All structural and functional equivalents to the elements of the various embodiments described throughout the disclosure that are known or later come to be known to those of ordinary skill in the art are intended to be encompassed by the elements of the claims.

[00115] Furthermore, nothing herein is intended as an admission of prior art or of common general knowledge. Furthermore, citation or identification of any document

CLAIMS:

1. A processing system for simultaneous bidirectional transmissions, the processing system comprising:

a non-transitory memory storage comprising instructions; and

one or more processors in communication with the memory, wherein the one or more processors execute the instructions to:

determine first transmission time slots for downlink (DL) and uplink (UL) transmissions for a first plurality of user equipment (UEs);

assign a first time slot configuration for a DL transmission for a first shared time slot of said first transmission time slots for a first UE in said first plurality of UEs using a higher layer signaling; and

assign a second time slot configuration for an UL transmission for said first shared time slot for a second UE in said first plurality of UEs using the higher layer signalling, wherein said first time slot configuration is different than said second time slot configuration.

2. The processing system of claim 1, wherein the one or more processors execute the instructions to provide to a first transmission point (TP) and a second TP in a first plurality of TPs, said determined first transmission time slots for use by said first TP in transmitting a DL signal to said first UE in said first shared time slot assigned for DL transmission and for use by said second TP in receiving an UL signal in said first shared time slot from said second UE.

3. The processing system of claim 2, wherein the one or more processors execute the instructions to provide said determined first transmission time slots to said first plurality of UEs.

4. The processing system of claim 1, wherein the one or more processors execute the instructions to designate a first TP and a second TP in a first plurality of TPs to collaborate in said assigned UL and assigned DL transmission.

5. The processing system of claim 1, wherein the one or more processors execute the instructions to coordinate interference mitigation (IM) between said first UE and said second UE.

6. The processing system of claim 1, wherein the one or more processors execute the instructions to determine second transmission time slots for DL and UL transmissions for a second plurality of UEs wherein at least one time slot in said second transmission time slots is shared with a time slot in said first transmission time slots of said first plurality of UEs.

7. The processing system of claim 6, wherein the one or more processors execute the instructions to assign a DL transmission to said shared time slot for said second plurality of UEs; and
assign an UL transmission to said shared time slot for said first plurality of UEs.

8. The processing system of claim 7, wherein the one or more processors execute the instructions to provide said second transmission time slots to said second plurality of UEs.

9. The processing system of claim 6, wherein the one or more processors execute the instructions to provide to a second plurality of TPs, said determined second transmission time slots for use by said second plurality of TPs in communicating with said second plurality of UEs.

10. The processing system of claim 9, wherein the one or more processors execute the instructions to monitor collaboration between said first plurality of TPs and said second plurality of TPs.

11. The processing system of claim 1, wherein each of said first and second time slot configuration is determined based on a respective need; and
said need comprises at least one of downlink to uplink (DL/UL) traffic load ratios of said respective UE, possible device-to-device (D2D) communication, a traffic type of said respective UE, and a factor relating to interference of said respective UE.

12. The processing system of claim 11, wherein said traffic type is selected from one or more of delay sensitivity of communicated data, maximum allowed delay for retransmission (reTX) and burstiness.

13. The processing system of claim 11, wherein the one or more processors execute the instructions to determine time slots for:

one or more of broadcast or multicast channels;

pilot transmissions for DL measurement; and

common control channels.

14. The processing system of claim 11, wherein the one or more processors execute the instructions to determine special time slots selected from one or more of device-to-device (D2D) time slots for inter UE communication, auxiliary time slots for DL/UL/D2D communication, and muted time slots for interference mitigation(IM), measurements and power saving.

15. The processing system of claim 1, wherein said first and second UEs form a virtual UE to communicate in virtual full duplex in at least said first shared time slot.

16. A communication method, comprising:

sending, by a user equipment (UE), a request for a new subframe configuration to a network device;

receiving, by the UE, an indication of the new UE specific subframe configuration; and

communicating, by the UE, with the network device using the new UE specific subframe configuration that is assigned using a higher layer signaling.

17. The communication method of claim 16, wherein the new subframe configuration is associated with a specific UE or a group of UEs that includes the UE.

18. The communication method of claim 16, wherein the request is based on characteristics of the UE, the characteristics including at least one of a downlink to uplink (DL/UL) traffic load ratio of the UE, possible device-to-device (D2D) communication, the UE's traffic type, and a factor relating to interference of the UE.

19. A user equipment (UE), comprising:

a non-transitory memory storage comprising instructions; and

one or more processors in communication with the memory, wherein the one or more processors execute the instructions to:

send a request for a new subframe configuration to a network device;

receive an indication of the new UE specific subframe configuration; and

communicate with the network device using the new UE specific subframe configuration that is assigned using a higher layer signaling.

20. The UE of claim 19, wherein the new subframe configuration is associated with a specific UE or a group of UEs that includes the UE.

21. The UE of claim 19, wherein the request is based on characteristics of the UE, the characteristics including at least one of a downlink to uplink (DL/UL) traffic load ratio of the UE, possible device-to-device (D2D) communication, the UE's traffic type, and a factor relating to interference of the UE.