

I/WE CLAIM

1. A method, comprising:

establishing, by a mobile device, communication with one or more base stations through a primary serving cell (PCell) and a secondary serving (SCell), the PCell being established with a first TDD configuration, the SCell being established with a second TDD configuration;

receiving, by the mobile device, downlink data through the SCell;

selecting, by the mobile device, a reference TDD configuration based on the first and second TDD configurations; and

transmitting acknowledgement information associated with the downlink data according to a hybrid automatic repeat request (HARQ) timing of the reference TDD configuration.

2. The method of claim 1, wherein the reference TDD configuration is different from the TDD configuration indicated by a system information block of the SCell.

3. The method of claim 2, wherein the system information block is System Information Block 1 (SIB1).

4. The method of claim 1, further comprising:

the first TDD configuration is indicated by SIB1 of PCell; and

the second TDD configuration is indicated by SIB1 of SCell.

5. The method of claim 1, further comprising:

determining uplink subframes common between the first TDD configuration and the second TDD configuration; and

selecting the reference TDD configuration based on the determined uplink subframes common between the first TDD configuration and the second TDD configuration.

6. The method of claim 5, wherein selecting the reference TDD configuration includes:

identifying the uplink subframes common between the first TDD configuration and the second TDD configuration; and

selecting the reference TDD configuration based on a determination that uplink subframes of the reference TDD configuration are the same as the common uplink subframes between the first TDD configuration and the second configuration.

7. The method of claim 6, wherein selecting the reference TDD configuration includes:

selecting the first TDD configuration as the reference TDD configuration if all downlink subframes of the second TDD configuration are a subset of all downlink subframes of the first TDD configuration; and

selecting the second TDD configuration as the reference TDD configuration if all downlink subframes of the second TDD configuration are a superset of all downlink subframes of the first TDD configuration.

8. The method of any of claims 1-6, wherein selecting the reference TDD configuration includes:

selecting TDD DL/UL configuration 4, if the first TDD configuration is TDD DL/UL configuration 1 and the second TDD configuration is TDD DL/UL configuration 3;

selecting TDD DL/UL configuration 5, if the first TDD configuration is TDD DL/UL configuration 2 and the second TDD configuration is TDD DL/UL configuration 3; and

selecting TDD DL/UL configuration 5, if the first TDD configuration is TDD DL/UL configuration 2 and the second TDD configuration is TDD DL/UL configuration 4.

9. The method of any of claims 1-6, wherein selecting the acknowledgment TDD further includes:

selecting TDD DL/UL configuration 4, if the first TDD configuration is TDD DL/UL configuration 3 and the second TDD configuration is TDD DL/UL configuration 1;

selecting TDD DL/UL configuration 5, if the first TDD configuration is TDD DL/UL configuration 3 and the second TDD configuration is TDD DL/UL configuration 2; and

selecting TDD DL/UL configuration 5, if the first TDD configuration is TDD DL/UL configuration 4 and the second TDD configuration is TDD DL/UL configuration 2.

10. The method of any of claims 1-6, wherein acknowledgement information includes hybrid automatic repeat request acknowledgement (HARQ-ACK) signals, wherein only HARQ-ACK signals associated with the downlink data of the SCell are transmitted according to the HARQ timing of the reference TDD configuration, wherein HARQ-ACK signals associated with downlink data of the PCell is transmitted only according to the HARQ timing of the first TDD configuration.

11. The method of any of claims 1-6, wherein transmitting the acknowledgement information comprises:

transmitting a positive or negative acknowledgement according to the HARQ timing of the reference TDD configuration through at least one uplink subframe.

12. The method of any of claims 1-6, wherein each of the first, second, and reference TDD configurations include at least one of TDD downlink/uplink (DL/UL) configurations 0-6 associated with release 8 of 3rd Generation Partnership Project's long term evolution (LTE) advanced wireless communication standard.

13. A method, comprising:

communicating, by a mobile device, with one or more base stations via first and second component carriers having different frequency bands and time division duplexing (TDD) configurations;

receiving one or more downlink transmissions via the second component carrier;

selecting a hybrid automatic repeat request (HARQ) timing sequence based on the TDD configurations of the first and second component carriers; and

transmitting one or more positive acknowledgment and/or negative acknowledgement (ACK/NACK) signals, associated with the one or more downlink transmissions, according to the selected HARQ timing sequence.

14. The method of claim 13, wherein selecting the HARQ timing sequence includes:

identifying, by the mobile device, each downlink subframe of the first and second component carriers as either a first type of downlink subframe or a second type of downlink subframe, wherein each downlink subframe of one of the first and second component carriers is the first type if a corresponding subframe of the other of the first and second component carriers is also a downlink subframe, wherein each downlink subframe of the one of the first and second component carriers is the second type if a corresponding subframe of the other of the first and second component carriers is an uplink subframe; and

selectively transmitting, by the mobile device, the one or more ACK/NACK signals associated with each downlink subframe based on whether the downlink subframe is identified as the first type of downlink subframe or the second type of downlink subframe.

15. The method of claim 14, wherein selectively transmitting the one or more ACK/NACK signals includes transmitting the one or more ACK/NACK signals according to the TDD configuration of the first component carrier for each downlink subframe identified as the first type of downlink subframe.

16. The method of claim 14, wherein selectively transmitting the one or more ACK/NACK signals includes transmitting the one or more ACK/NACK signals according to the TDD configuration of the second component carrier for each downlink subframe of the second component carrier identified as the second type of downlink subframe and transmitting the one or more ACK/NACK signals according to the TDD configuration of the first component carrier for each downlink subframe of the first component carrier identified as the second type of downlink subframe.

17. The method of claim 15, wherein selectively transmitting the one or more ACK/NACK signals includes transmitting the one or more ACK/NACK signals according to a reference TDD configuration for each downlink subframe of the second component carrier identified as the second type and transmitting the one or more ACK/NACK signals according to the TDD configuration of the first component carrier for each downlink subframe of the first component carrier identified as the second type.

18. The method of claim 17, wherein the reference TDD configuration is selected to contain uplink subframes that are the same as subframes that are common to TDD configurations of both the first and second component carriers.

19. The method of any one of claims 13 to 18, wherein each of the TDD configurations include one of configurations 0-6 associated with release 8 of 3rd Generation Partnership Project's (3GPP) long term evolution (LTE) advanced wireless communication standard.

20. The method of any one of claims 1 or 13, wherein the mobile device is a mobile phone, a netbook, a laptop, an electronic tablet, or a data system of a vehicle.

21. An apparatus, comprising:

a communication module configured to:

communicate with one or more base stations via first and second component carriers having different frequency bands and time division duplexing (TDD) configurations; and

receive one or more downlink transmissions via the second component carrier; and

a hybrid automatic repeat request (HARQ) module coupled with the communication module and configured to:

select a HARQ timing sequence based on the TDD configurations of the first and second component carriers; and

generate one or more positive acknowledgment and/or negative acknowledgement (ACK/NACK) signals, associated with the one or more downlink transmissions,

wherein the communication module is further configured to transmit the one or more ACK/NACK signals according to the selected HARQ timing sequence.

22. The apparatus of claim 21; wherein the HARQ module is further configured to:

identify uplink subframes common between the TDD configurations of the first and second component carriers, wherein the selected HARQ timing sequence is a HARQ timing sequence of a reference TDD configuration having the same uplink subframes as the identified common uplink subframes.

23. The apparatus of any one of claims 21 or 22, wherein each of the TDD configurations include one of TDD configurations 0-6 associated with release 8 of 3rd Generation Partnership Project's long term evolution (LTE) advanced wireless communication standard.

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