Project	**IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>**
Title	Proposed Text of Relay Station Frame Structure for the IEEE 802.16m Amendment
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Re:	IEEE 802.16m-08/042 "Call for Contributions on Project 802.16m Draft Amendment Content"
Abstract	Proposed Text of Base Station and Relay Station Frame Structure for the IEEE 802.16m Amendment
Purpose	We propose 16m base station and relay station frame structure
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Proposed Text of Relay Station Frame Structure for the IEEE 802.16m Amendment

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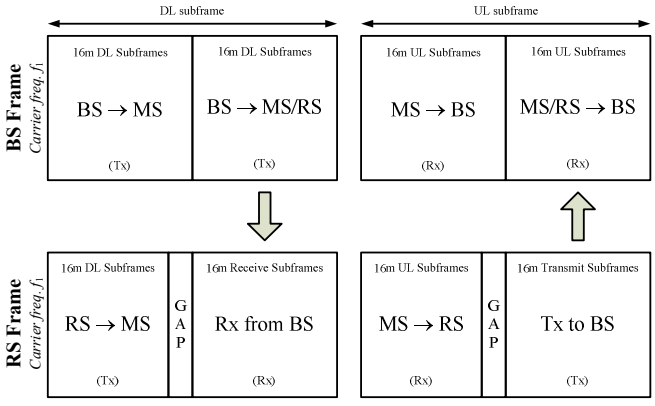
Introduction

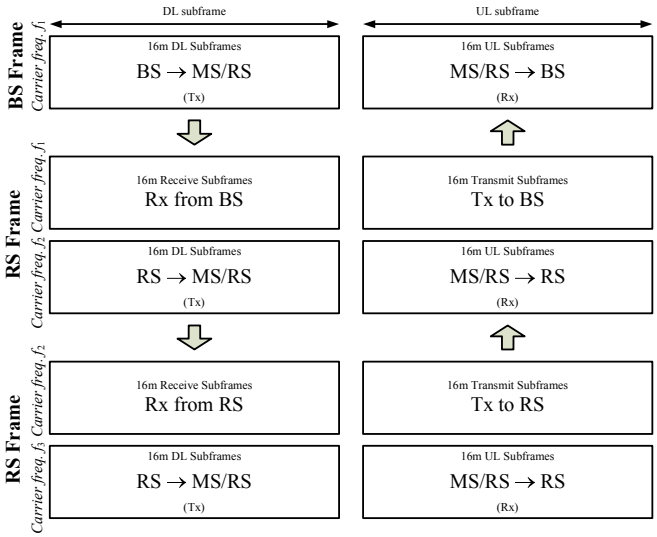
In SDD there are two options defined for the RS frame structure namely option 1 and option 2. For the 2-hop relay system, the RS frame structure for option 1 and option 2 are identical. Therefore, we propose a 2-hop TTR RS frame structure.

For 3+-hop relay system, there are two options of frame structures defined in current SDD: (1) Unidirectional relay zone (option 1) and (2) Bidirectional relay zone (option 2). Option 1 has been studied extensively in 16j. Option 2 has the benefits of scheduling efficiency, but it requires detail technical design to resolve interference and power management issues. We suggested adopting both options in SDD. However, in order to avoid the complexity of coexistence, we suggested that they must not coexist in a 16m relay network.

In addition, the STR RS has been studied extensively in 16j for multi-hop relay system operation, thus, we also propose a STR RS frame structure.



(a) 2-hop TTR frame structure



(b) STR frame structure

Figure 1 Base Station and Relay Station Frame Structure

We propose a contribution include BS frame structure, 2-hop TTR RS frame structure, and STR frame structure for both TDD and FDD operation mode.

Proposed Changes

3. Definitions

Insert the following at the end of section 3:

3.xx superframe: A structured data sequence of fixed duration used by the Advanced Air Interface specifications. A superframe is comprised of four frames.

3.xx subframe: A structured data sequence of a specific duration used by the Advanced Air Interface specifications.

3.xx type-1 subframe: a subframe consists of six OFDM symbols with CP length of 1/8 useful OFDM symbol time for Advanced air interface.

3.xx type-2 subframe: a subframe consists of seven OFDM symbols with CP length of 1/16 useful OFDM symbol time for Advanced air interface.

3.xx idle symbol: a OFDMA symbol reserved for receive-to-transmit turnaround gap (RTG) or transmit-to-receive turnaround gap (TTG) for Advanced air interface.

3.xx idle time: a time interval reserved for receive-to-transmit turnaround gap (RTG) and transmit-to-receive turnaround gap (TTG) for Advanced air interface.

3.xx switching point: a point is defined as a change of directionality, i.e., from DL to UL or from UL to DL, in the TDD system for Advanced air interface.

3.xx multi-carrier: More than 1 OFDMA carrier is used to exchange data between BS and MSs

3.xx primary carrier: BS and the MS exchange traffic and full PHY/MAC control information defined in the Advanced Air Interface specification. Further, the primary carrier is used for control functions for proper MS operation, such as network entry. Each MS shall have only one carrier it considers to be its primary carrier in a cell.

3.xx secondary carrier: MS may use for traffic, only per BS's specific allocation commands and rules,typically received from the primary carrier. The secondary carrier may also include control signaling to support multicarrier operation.

3.xx fully configured carrier: A carrier for which all control channels including synchronization, broadcast, multicast and unicast control signaling are configured. Further, information and parameters regarding multi-carrier operation and the other carriers can also be included in the control channels.

3.xx partially configured carrier: A carrier with essential control channel configuration to support traffic exchanges during multi-carrier operation

3.xx DL subframe (DL SF): A subframe that an access station can transmit to its subordinate stations (i.e., RSs or SSs) for Advanced air interface.

3.xx UL subframe (UL SF): a subframe that an access station can receive from its subordinate stations (i.e., RSs or SSs) for Advanced air interface.

3.xx receive subframe (Rx SF): a subframe located in an RS frame that the RS can receive from its superordinate station (i.e., BS or RS) for Advanced air interface.

3.xx transmit subframe (Tx SF): A subframe located in an RS frame that the RS can transmit to its superordinate station (i.e., BS or RS) for Advanced air interface.

3.xx uplink-only RS: a relay only relays the uplink traffic from subordinate SSs to its access station, and does not transmit in the DL subframe for Advanced air interface.

Insert a new section 15:

15. Advanced Air Interface

15.3. Physical layer

15.3.3. Frame Structure

15.3.3.6. Relay support in frame structure

15.3.3.6.1. FDD frame structure

15.3.3.6.1.1. STR RS Frame structure

The STR RS frame structure is the same as the frame structure defined in 15.3.3.1.1 on the RS second DL and UL carriers. The STR RS shall communicate with the serving access station on the RS first DL and UL carriers as the SS. The arrangement of signaling shall be the same as that described in 15.3.3.1.1 except that it is possible that the RS frame be configured such that the RS is both transmitting and receiving at the same time but transmission and reception of the RS shall not be used on the same carrier when the interference induced by the transmitter operating in STR mode causes a link adaptation degradation of the link performance related to the STR receiver.

15.3.3.6.1.2. TTR RS Frame structure

For the 2-hop relay system, the TTR RS DL frame may include DL subframes or receive subframes, and the TTR RS UL frame may include UL subframes or transmit subframes. The BS shall not schedule any traffic for the RS except the uplink-only RS in the first DL subframe of the first frame of the superframe since it contains broadcasting management messages, such as superframe header.

For the 3-or-more-hop relay system, the TTR RS frame structure is TBD.

A examples of TTR RS frame structure for 2-hop relay system with DL to UL ratio of 5:3 is illustrated in Figure 308h.

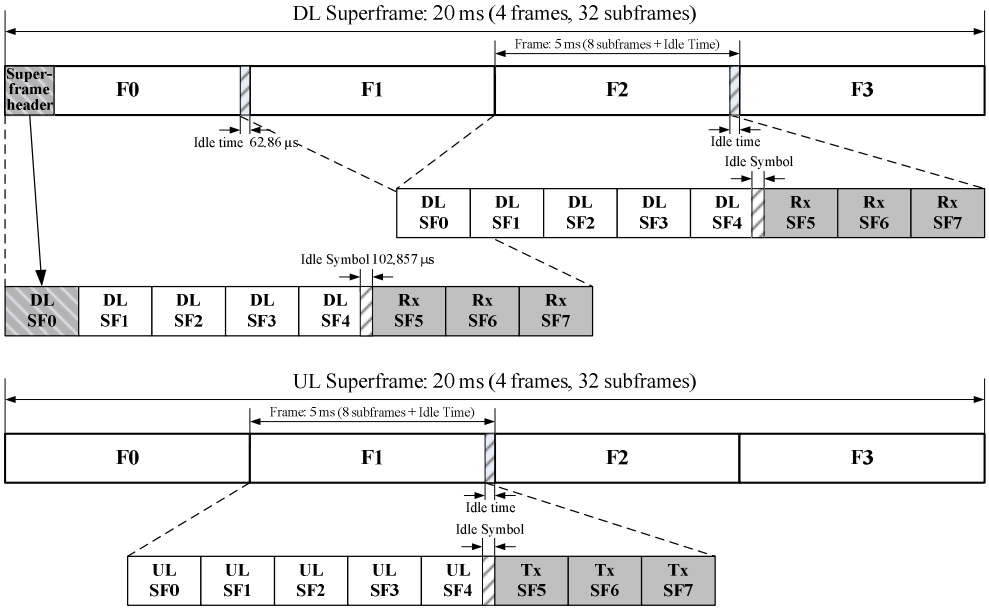


Figure 308h TTR RS Frame Structure in FDD mode

15.3.3.6.1.3. STR RS frame structure coexisting with TTR RS

[TBD]

15.3.3.6.2. TDD frame structure

15.3.3.6.2.1. STR RS frame structure

The STR RS frame structure is the same as the frame structure defined in 15.3.3.2.2 on the second carrier of the RS. The STR RS shall receive data in the DL subframes and transmit data in the UL subframes on the first carrier as a SS. The arrangement of signaling shall be the same as that described in 15.3.3.2.2 except that it is possible that the RS frame be configured such that the RS is both transmitting and receiving at the same time but transmission and reception of the RS shall not be used on the same carrier when the interference induced by the transmitter operating in STR mode causes a link adaptation degradation of the link performance related to the STR receiver.

15.3.3.6.2.2. TTR RS frame structure

For the 2-hop relay system, the TTR RS frame may include DL subframes, or receive subframes, or UL subframes, or transmit subframes. The BS shall not schedule any traffic for the RS except the uplink-only RS in the first DL subframe of the first frame of the superframe since it contains broadcasting management messages, such as superframe header.

For the 3-or-more-hop relay system, the TTR RS frame structure is TBD.

Two examples of TTR RS frame structure for 2-hop relay system with DL to UL ratio of 5:3 is illustrated in Figure 308d and Figure 308e, where OFDM symbol durations are 102.857μs and 97.143 μs respectively, and CP lengths are 1/8 useful OFDM symbol time and 1/16 useful OFDM symbol time respectively.

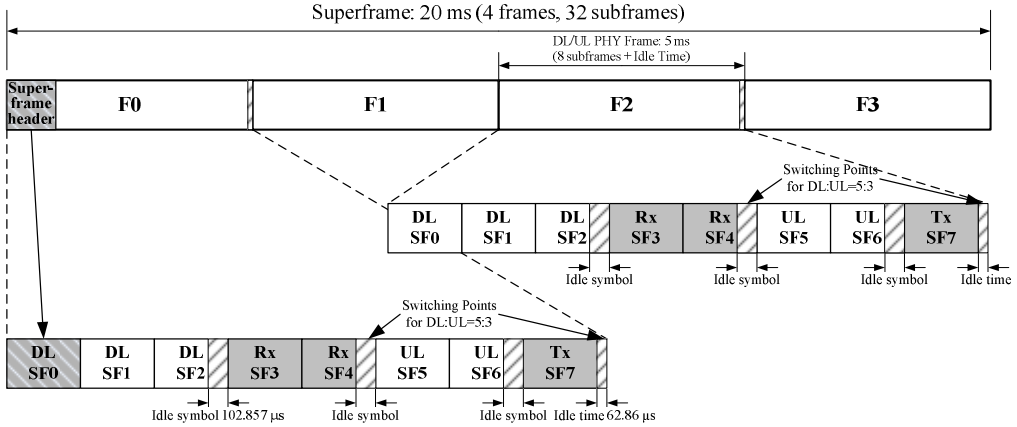


Figure 308d TTR RS Frame Structure in TTR TDD mode (CP of 1/8 useful OFDM symbol time and DL to UL ratio of 3)

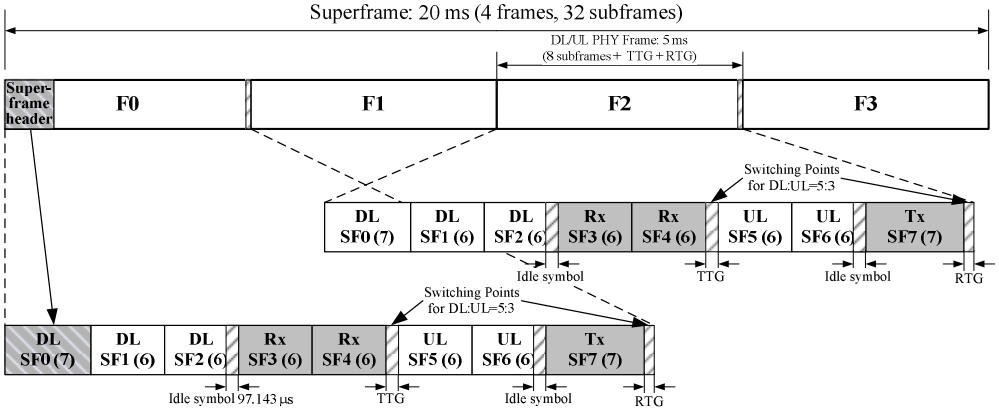


Figure 308e TTR RS Frame Structure in TDD mode (CP of 1/16 useful OFDM symbol time and DL to UL ratio of 5:3)

15.3.3.6.2.3. STR RS frame structure coexisting with TTR RS

[TBD]