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Title	**A frame structure for transparent relay and non-transparent relay coexistence mode**	
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Re:	IEEE 802.16j-07/007r2:"Call for Technical Comments and Contributions regarding IEEE Project 802.16j"	
Abstract	This contribution proposes a frame structure for transparent relay and non-transparent relay coexistence mode in IEEE 802.16j MR network.	
Purpose	Propose the text regarding frame structure design for transparent relay and non-transparent relay coexistence mode.	
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A frame structure for transparent relay and non-transparent relay coexistence mode

1. Introduction

The frame structures of a MR-BS and its subordinate RS for transparent mode and for non-transparent mode are respectively defined in the baseline IEEE802.16j-06/026r2. As mentioned in 8.4.4.7.1 of the baseline, simultaneous operation of transparent RSs and non-transparent RSs within one MR-cell can be supported. A relay network of a transparent relay and non-transparent relay coexistence is illustrated in Figure 1. It has advantages of coverage extension, diversity gain, and so on. However, the frame structure for transparent and non-transparent coexistence mode has not been provided.

This contribution proposes a detailed frame structure for transparent and non-transparent relay coexistence.

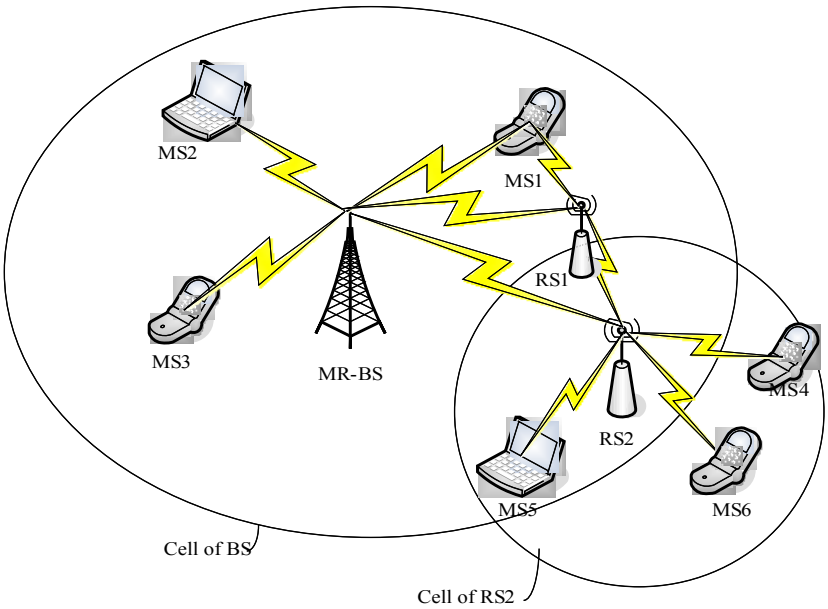


Figure 1: an example of a transparent relay and non-transparent relay coexistence mode

2. Proposed solution

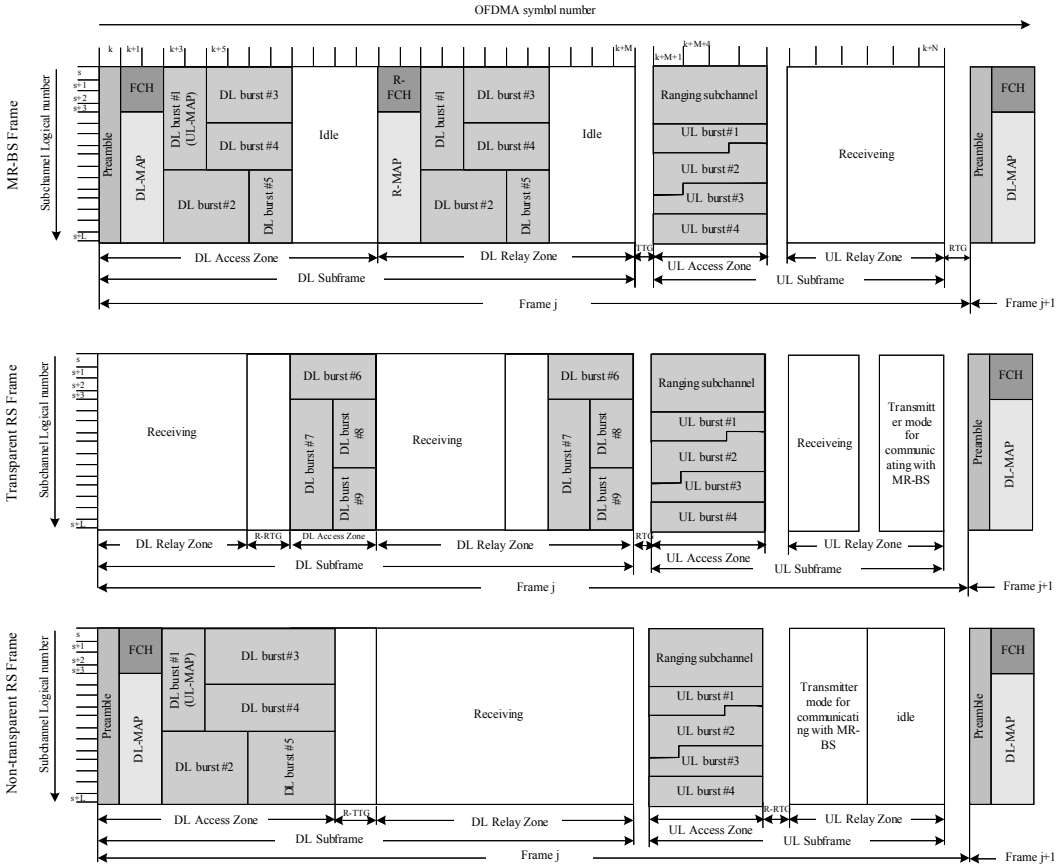
To maintain backward compatibility and interoperability with the legacy MSs that are in direct transmission range of BS and/or RSs, a two-dimensional format similar to the frame structure in 802.16e has been designed.

The TDD frame structure for a transparent relay and non-transparent relay coexistence mode illustrated in Figure 1 is proposed, as shown in Figure 2.

This proposed solution has following advantages:

- Diversity gain can be obtained because MR-BS and transparent RS transmit same information.
- Coverage can be extended because received signal quality in non-transparent RS is improved.
- Enhance the network reliability.

Figure 2 frame structure of a transparent relay and non-transparent relay coexistence mode



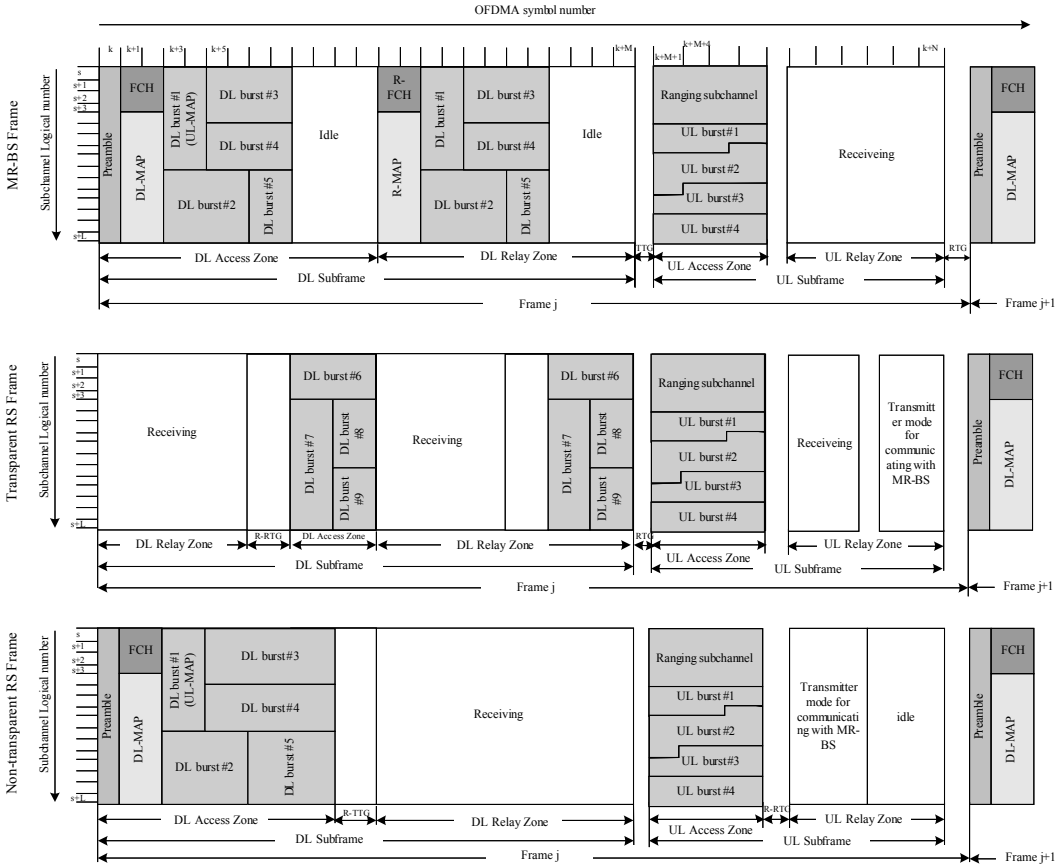
3. Proposed text changes

[Insert section 8.4.4.7.3 "Frame structure for transparent and non-transparent coexistence mode" as indicated:]

8.4.4.7.3 Frame structure for transparent and non-transparent coexistence mode

This section describes the minimal requirements for an in-band frame structure for a MR-BS and its subordinate RSs.

Figure <xxx> Example of configuration for an in-band transparent and non-transparent relay coexistence frame structure



8.4.4.7.3.1 Frame structure for MR-BS

For the TDD mode, an example of the MR-BS frame structure is shown in Figure <xxx>.

The frame structure consists of DL sub-frame period and UL sub-frame period. Each frame in the downlink starts with a preamble followed by an FCH, DL MAP and possibly UL MAP. The DL sub-frame shall include at least one DL Access Zone and one or more DL Relay Zone. The DL Relay Zoneshall include an R-FCH, a DL R-MAP and possibly UL R-MAP. The UL sub-frame shall include one or more UL Access Zone and may include one or more UL Relay Zone. An Access Zone or Relay Zone heremay be used for transmission, reception, or idle mode. In each frame, the TTG shall be inserted between the DL sub-frame and UL sub-frame. The RTG shall be inserted at the end of each frame.

8.4.4.7.3.2 Frame structure for transparent RS

From transparent RS view, an example of an RS TDD frame is shown in Figure <xxx>.

For a transparent RS, the preamble and MAP are not transmitted at the beginning of the frame. Instead it listens to the preamble, DL MAP and possibly UL MAP from MR-BS. The detailed allocation for transparent RS can be indicated by MAP or R-MAP. The signaling method shall be negotiated in transparent RS network entry procedure. The TTG shall be inserted between the DL sub-frame and UL sub-frame. The RTG shall be inserted at the end of each frame.

The frame structure for transparent RS consists of DL sub-frame period and UL sub-frame period. The DL sub-frame shall include three zones. The first zone is used for transparent RS and MR-BS's subordinate MSs to receive bursts from the MR-BS, the second zone for transparent RS to transmit bursts to its subordinate MSs, and the last one for transparent RS to receive bursts from MR-BS and then send bursts to non-transparent RS. The UL sub-frame shall include zero or one zone for receiving bursts from its subordinate MSs, and zero or one zone for firstly receiving bursts from non-transparent RS and then transmitting bursts to MR-BS. The R-TTG or R-RTG shall be inserted between transmission and reception mode in DL sub-frame and UL sub-frame.

8.4.4.7.3.3 Frame structure for non-transparent RS
From non-transparent RS view, an example of an RS TDD frame is shown in Figure <xxx>.

The frame structure for non-transparent RS consists of DL sub-frame period and UL sub-frame period. The DL sub-frame shall include at least one DL Access Zone and one DL Relay Zone. DLAccess Zone begins with a preamble followed by DL MAP and possibly UL MAP. DL Relay Zone is utilized for reception from MR-BS and/or transparent RS. The UL sub-frame shall include at least one UL Access Zone and one UL Relay Zone. UL Relay Zone is divided into two intervals. One interval is used for transmission to MR-BS and the other for idle mode. The R-TTG or R-RTG shall be inserted between transmission and reception mode in DL sub-frame and UL sub-frame.

4. References

[1] IEEE802.16j-06/026r2 Baseline Document for Draft Standard for 16j
[2] IEEE802.16j-06/178