Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>
Title	Frame Structure to Support Out-of-Band Relay
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Source(s)	Wendy C Wong wendy.c.wong@intel.com Jerry Sydir jerry.sydir@intel.com Kerstin Johnsson Hannah Hyunjeong Lee Intel Corporation 2200 Mission College Blvd., Santa Clara, CA 95054, USA
Re:	This is a response to the call for proposals 80216j-06_034.pdf.
Abstract	This contribution propose a frame structure to support out-of-band multi-hop (>=2 hop) relay operation.
Purpose	Text proposal for 802.16j Baseline Document.
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Frame Structure Support Out-of-Band Relay

1 Introduction

The frame structure proposal accepted into the working document in the Dallas meeting addresses the case of in-band relay for two hop only networks. It provides a good basis for the frame structure required to support in-band and out-of-band multi-hop relay.

This contribution proposes the additional constructs required to support out-of-band relay. We define out-of-band relay to be the case where access links and relay links operate on different frequencies (channels). In out-of-band relay, the relay link frame structure does not contain access zones, because communication with the MSs occurs on a different channel. Similarly, there will be no relay zones on the access channel.

2 Proposed Solution

Three extensions are required to the super-frame structure currently specified in 80216j-06/026r1 in order to enable out-of-band operation. First the DL Relay_Zones need a relay preamble, which is used for DL acquisition and synchronization. Second, the frame start preamble, the DL Access_Zone and the UL Access Zone within each frame of the super-frame is removed. Third, allow only one DL Relay_Zone and one UL Relay_Zone per frame within the super-frame structure to simplify the design.

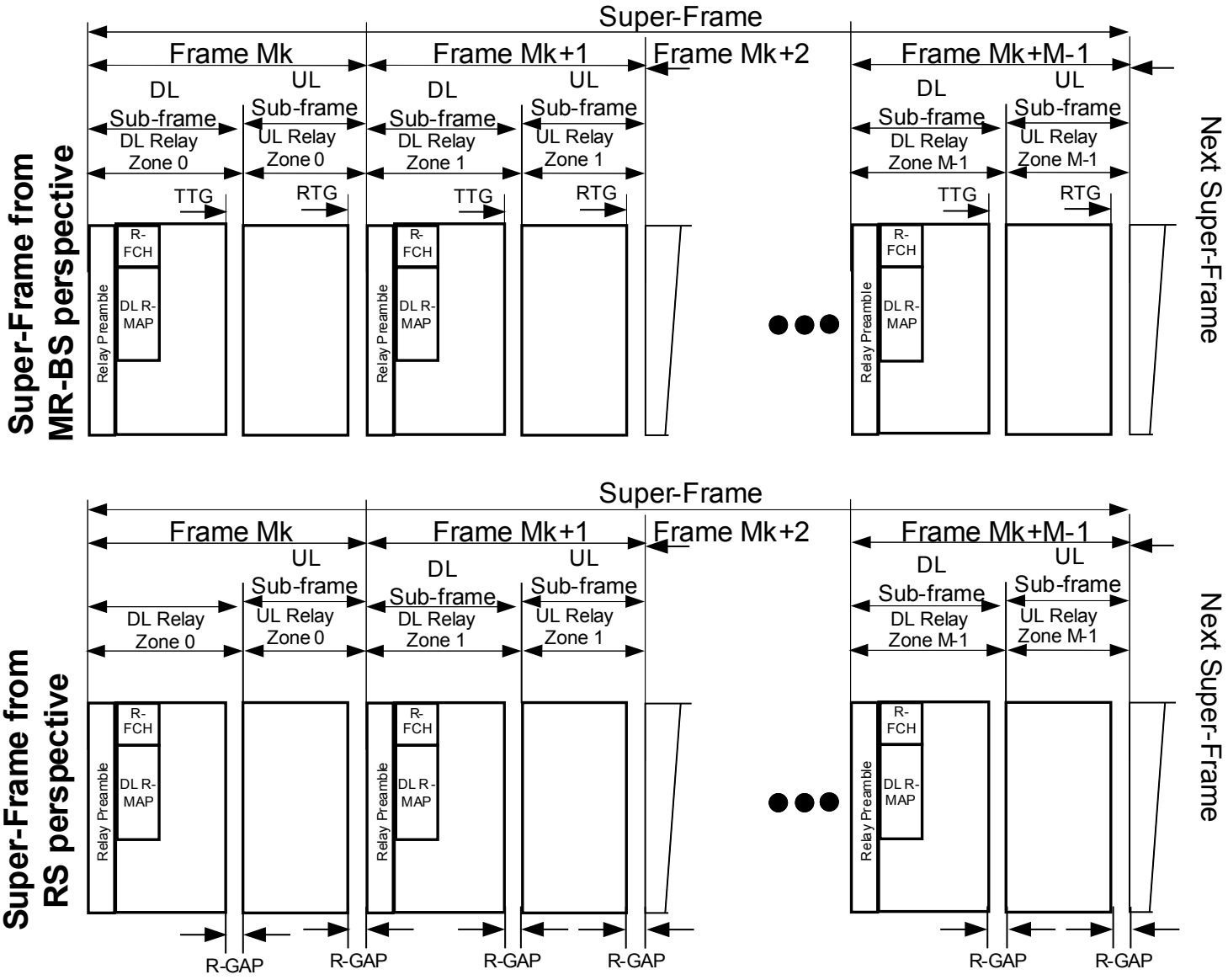
2.1 Super-frame structure for out-of-band relay

The super-frame structure for out-of-band relay can be found in Figure 1. A super-frame is defined to be a set of consecutive frames and the number of frames in a super frame is configurable. The MR-BS and RSs can participate in 1 or more Relay_Zones to transmit and receive depending on the deployment scenarios and network assignments.

Each frame within a super-frame is divided into a DL Relay_Zone and a UL Relay_Zone. Each DL Relay_Zone is started with a relay preamble, followed by R-FCH and R-MAP. During a DL Relay_Zone of a frame within the super-frame structure, the MR-BS or parent RS transmits to its child RS. During a UL Relay_Zone of a frame within the super-frame structure, child RSs transmits to its parent RS or MR-BS who have transmitted to the child RSs in the earlier DL Relay_Zone of the same frame.

MR-BS or RS can participate in 1 or more Relay_Zone per super-frame. An RS can switch between being a parent RS and a child RS among the various frames within a super-frame. However, during each frame within the super-frame structure, an RS can be either a parent RS or a child RS but not both.

Figure 1.k[th] super-frame structure for out-of-band relay



3 Proposed text changes

++++++++++++ start text proposal ++++++++++++++++++++++++++++++++++

[Insert the following after the end of section 3:]

In-band Relay: a relay mode in which a single frequency channel is used to support both access link and relay link communication. Descriptions in 8.4.4.7.2.1 to 8.4.4.7.2.3 refer to in-band relay.
Out-of-band Relay: a relay mode in which access link and relay link communications occur on different frequency channels.

[Insert section 8.4.4.7.2.4 at the end of section 8.4.4.7.2.3]

8.4.4.7.2.4 Super-frame structure to support out-of-band multi-hop relay (>= 2 hops)

The super-frame structure for out-of-band relay can be found in Figure xxx. A super-frame is defined to be a set of consecutive frames and the number of frames in a super-frame is configurable. The MR-BS and RSs can participate in 1 or more Relay_Zones to transmit and receive depending on the deployment scenarios and network assignments. An RS can switch between being a parent RS and a child RS among the frames within a super-frame. However, during each frame within the super-frame structure, an RS can be either a parent RS or a child RS but not both.

Each frame within a super-frame is divided into a DL Relay_Zone and a UL Relay_Zone.

The DL Relay_Zone within each MR-BS super-frame starts with a relay preamble, followed by R-FCH, R-MAP. During a DL Relay_Zone of a frame within the MR-BS super-frame structure, the MR-BS transmits to its child RSs. During a UL Relay_Zone of a frame within the MR-BS super-frame structure, child RSs transmits to the MR-BS who has transmitted to the child RSs in the earlier DL Relay_Zone of the same frame within the MR-BS super-frame structure.

A TTG shall be inserted between each DL Relay_Zone and UL Relay_Zone within each frame in the MR-BS super-frame. A RTG shall be inserted at the end of each frame in the MR-BS super-frame.

The DL Relay_Zone within each RS super-frame starts with a relay preamble, followed by R-FCH, R-MAP. During a DL Relay_Zone of a frame within the RS super-frame structure, a parent RS transmits to its child RSs. During a UL Relay_Zone of a frame within the RS super-frame structure, child RSs transmits to its parent RS who have transmitted to the child RSs in the earlier DL Relay_Zone of the same frame within the RS super-frame structure.

An R-GAP shall be inserted between each DL Relay_Zone and UL Relay_Zone and between each frame within the RS super-frame structure.

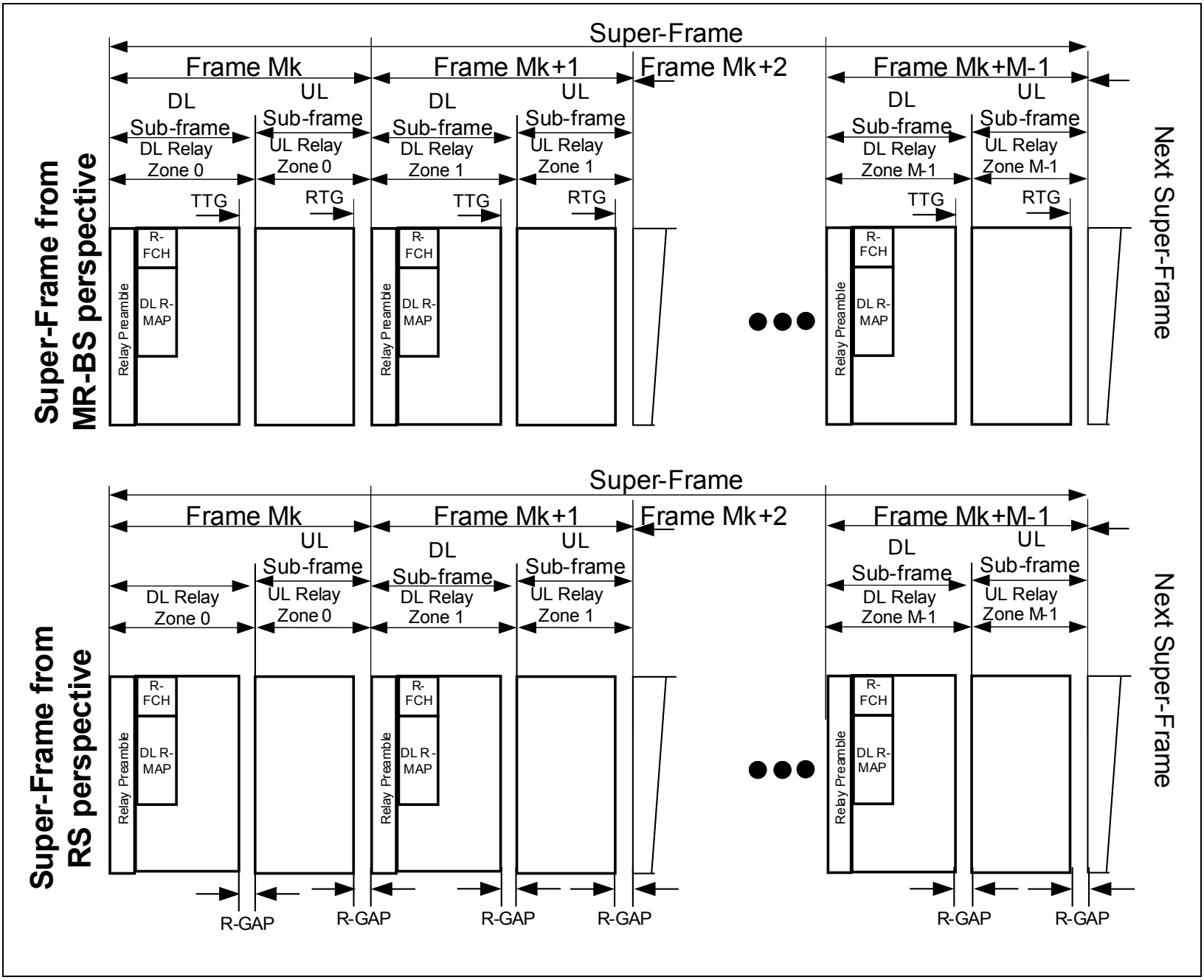


Figure xxx Example of M-1 frame MR-BS and RS Super-Frame k for out-of-band relay

++++++++++++++++++++ *End of text proposal* ++++++++++++++++++++