Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>
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Re:	IEEE 802.16j-07/013: “Call for Technical Comments and Contributions regarding IEEE Project 802.16j”
Abstract	This contribution provides support for the proposal for RS downstream and upstream communication in the same subframe by describing the timing relationships between the MR-BS and the RSs and by providing text for the baseline document.
Purpose	This contribution is submitted for discussion and adoption in 802.16j.
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RS downstream and upstream communication in the same subframe

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1 Introduction

In response to “Call for Technical Comments Regarding IEEE Project 802.16j”, this contribution proposes:

- Within the same subframe (DL or UL), an RS may transmit to downstream RSs in one relay zone and transmit to upstream stations (MR-BS, RS) in another relay zone.
- Within the same subframe (DL or UL), an RS may receive from a downstream RSs in one relay zone and receive from an upstream station (MR-BS, RS) in another relay zone.

This contribution describes the timing relationships between super-ordinate and subordinate stations (MR-BS/RS), which is the same as the BS and MS in 802.16e, and provides proposal text for the 802.16j baseline document. It also describes the use of the Relay Frame configuration Message to support this proposal.

2 Description

2.1 802.16e BS/MS timing

In 802.16e, the MS receive window timing is adjusted according to the transmit window of the BS. The MS transmit window timing is adjusted according to the receive window of the BS.

2.2 MR-BS/RS timing

Figure 1 shows a scenario with an MR-BS and 2 Relay Stations, RS1 and RS2. BS is MR-BS, AZ is the Access Zone, Tr is transmit, RZ is Relay Zone, RSx is a Relay Station, Re is Receive, and MSx is a Mobile Station.

For RS1, in the first subframe, it is receiving from the MR-BS in the first Relay Zone and receiving from RS2 in the second Relay Zone. In the next subframe, RS1 is transmitting to MR-BS in the first Relay Zone, and transmitting to RS2 in the second Relay Zone.

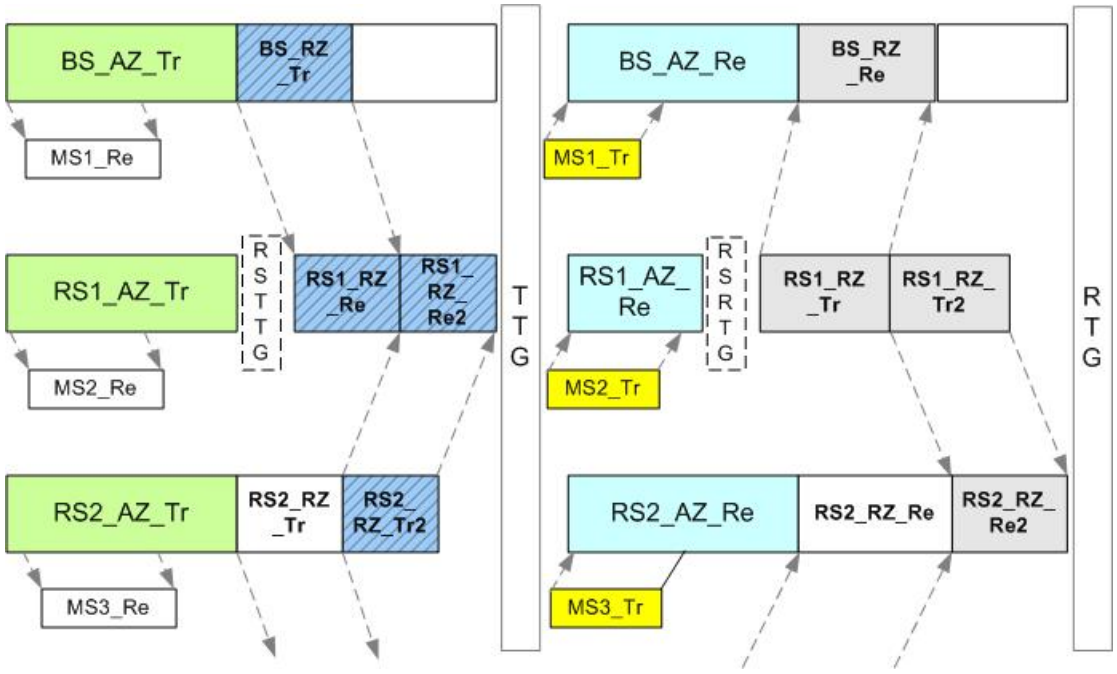

Figure 1: MR-BS, RS1, RS2 transmission/reception scenario

Figure 2 illustrates the timing relationships between the MR-BS and RSs. The locks and arrows with clocks indicate the timing relationships between transmitters and receivers. “Internal sync” just means that timing determined for an RS from an external node determines the timing of the transmissions/receptions to/from other nodes.

- For a relay zone, the RS receive window timing is adjusted according to the transmit window of the super-ordinate station (MR-BS or RS) that it is receiving from.
- For a relay zone, the RS transmit window timing is adjusted according to the receive window of the super-ordinate station (MR-BS or RS) that it is transmitting to.
- This is the same mechanisms used in 802.16e between the BS and MS.

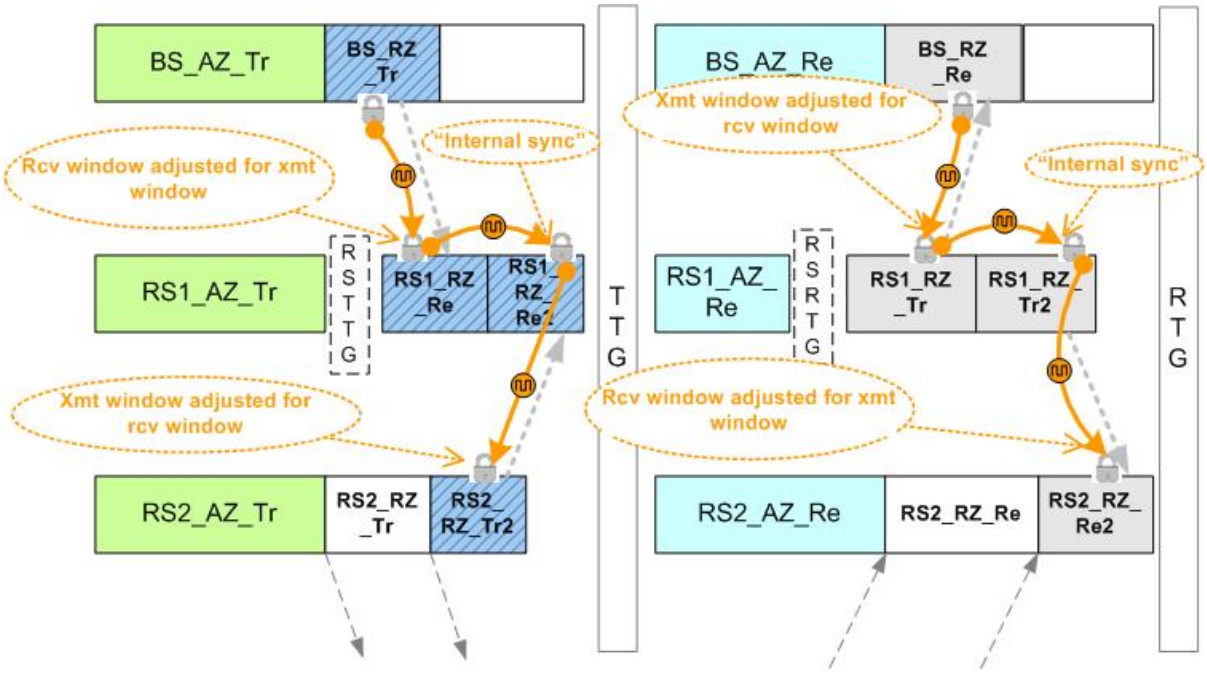

Figure 2: Illustration of the timing relationships between MR-BS and RSs

2.3 Relay Frame configuration Message

Figure 3 provides an example to illustrate the relay zone information used in the Relay Frame configuration Message to support this frame structure.

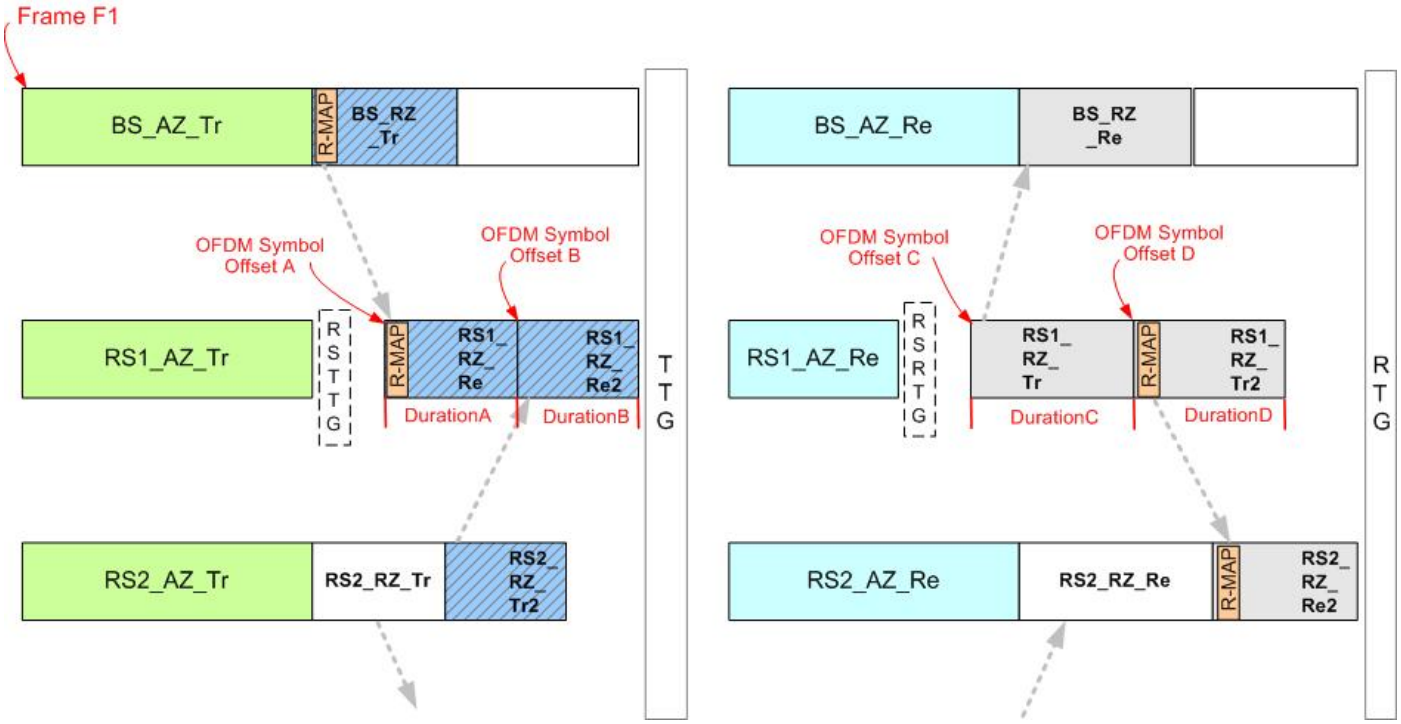

Figure 3: Illustration of parameters for Relay Frame Configuration Message

Table 1 summarizes the relay zone information to be used in the Relay Frame Configuration Message for the example shown in Figure 3.

Relay Zone	DL/UL Indication	Transceiver mode	OFDM Symbol Offset	Duration
RS1_RZ_Re	DL	Receive	OFDM Symbol Offset A	DurationA
RS1_RZ_Re2	UL	Receive	OFDM Symbol Offset B	DurationB
RS1_RZ_Tr	UL	Transmit	OFDM Symbol Offset C	DurationC
RS1_RZ_Tr2	DL	Transmit	OFDM Symbol Offset D	DurationD

Table 1: Summary of the parameters for Relay Frame Configuration Message

Table 2 shows the Relay Frame Configuration Message containing the relay zone information for the example shown in Figure 3.

Relay_Frame_configuration_Message_format(){	**Value**
Management Message Type	TBD
Frame Number	F1
DL indicator	1
UL indicator	1
if(DL indicator == 1) {	
Number of frame	1
For Frame F1 {	
Number of relay zone	2
For **RS1_RZ_Re** {	
Transceiver mode	01 (rcv)
OFDMA Symbol Offset	A
Duration	DurationA
}	
For **RS1_RZ_Tr2** {	
Transceiver mode	00 (xmt)
OFDMA Symbol Offset	D
Duration	DurationD
}	
}	
}	
if(UL indicator == 1){	
Number of frame	1
For Frame F1 {	
Number of relay zone	2
For **RS1_RZ_Re2** {	
Transceiver mode	01 (rcv)
OFDMA Symbol Offset	B
Duration	DurationB
}	
For **RS1_RZ_Tr** {	
Transceiver mode	00 (xmt)
OFDMA Symbol Offset	C
Duration	DurationC
}	
}	
}	
}	

Table 2: Relay Frame configuration Message

Text Proposal

[Insert in subclause 8.4.4.7.2.2]

8.4.4.7.2.2 Relay frame structure

[…]

For a relay zone, the RS receive window timing shall be adjusted according to the transmit window of the super-ordinate station (MR-BS or RS) that it is receiving from.

For a relay zone, the RS transmit window timing shall be adjusted according to the receive window of the super-ordinate station (MR-BS or RS) that it is transmitting to.

[…]

Within one DL subframe, an RS may transmit to downstream RSs in a relay zone and transmit to upstream RSs in another relay zone.
Within one DL subframe, an RS may receive from an upstream RS in a relay zone and receive from a downstream RS in another relay zone.

Within one UL subframe, an RS may transmit to downstream RSs in a relay zone and transmit to upstream RSs in another relay zone.
Within one UL subframe, an RS may receive from an upstream RS in a relay zone and receive from a downstream RS in another relay zone.