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Title	<b>Additional improvements for synchronous MBS transmission in MR</b>	
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Re:	IEEE802.16j-07/019: "Call for Technical Comments Regarding IEEE Project 802.16j"	
Abstract	This contribution proposes some additional improvements for synchronous MBS transmission defined in the baseline document.	
Purpose	Text proposal for P802.16j Baseline Document.	
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# Additional improvements for synchronous MBS transmission in MR

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## Introduction

This contribution proposes some additional improvements for synchronous MBS transmission defined in the baseline document [1].

## Details

In the current baseline document [1], the synchronous MBS transmission method is defined in 6.3.23.3. To work the method surely, following improvements should be defined additionally.

### MBS burst mapping information

After the pre-transmission of MBS burst, the RS performs synchronized transmission of the MBS burst. At the time, the RS needs to perform re-mapping the MBS burst from the DL\_Relay\_Zone to the DL\_Access\_Zone. And, all the RS need to use same region and burst profile for the MBS burst in the DL\_Access\_Zone.

To achieve the re-mapping of MBS burst, a new TLV for MBS\_MAP message needs to be defined. The TLV is only used for the pre-transmission between the MR-BS and the RS.

The TLV is used for each MBS\_DATA\_IE and/or Extended\_MBS\_DATA IE. The MBS\_MAP message includes the same number of this TLV as the total number of MBS\_DATA\_IE and/or Extended\_MBS\_DATA IE. And the order of this TLV corresponds to the order of MBS\_DATA\_IE and/or Extended\_MBS\_DATA IE.

At the pre-transmission over the relay link, the MR-BS sets the mapping information (MBS DIUC, OFDMA Symbol Offset, Subchannel offset, Boosting, No. OFDMA Symbols, No. Subchannels, Repetition Coding Indication) indicating the MBS region in the DL\_Relay\_Zone in the MBS\_DATA\_IE and/or the Extended\_MBS\_DATA IE. When the RS received MBS\_MAP message including this TLV, it receives the MBS burst from the MBS region in the DL\_Relay\_Zone of the frame which is transmitted after MBS Burst Frame Offset + 2 frames, then performs re-mapping the MBS burst in the DL\_Access\_Zone of the synchronized transmission frame according to the mapping information of this TLV. For the synchronized transmission over the access link, the RS overwrites the mapping information of MBS\_DATA\_IE and/or the Extended\_MBS\_DATA IE with this TLV and removes this TLV from the MBS\_MAP message. Other information of the MBS\_MAP message except the mapping information are reused for the synchronized transmission over the access link.

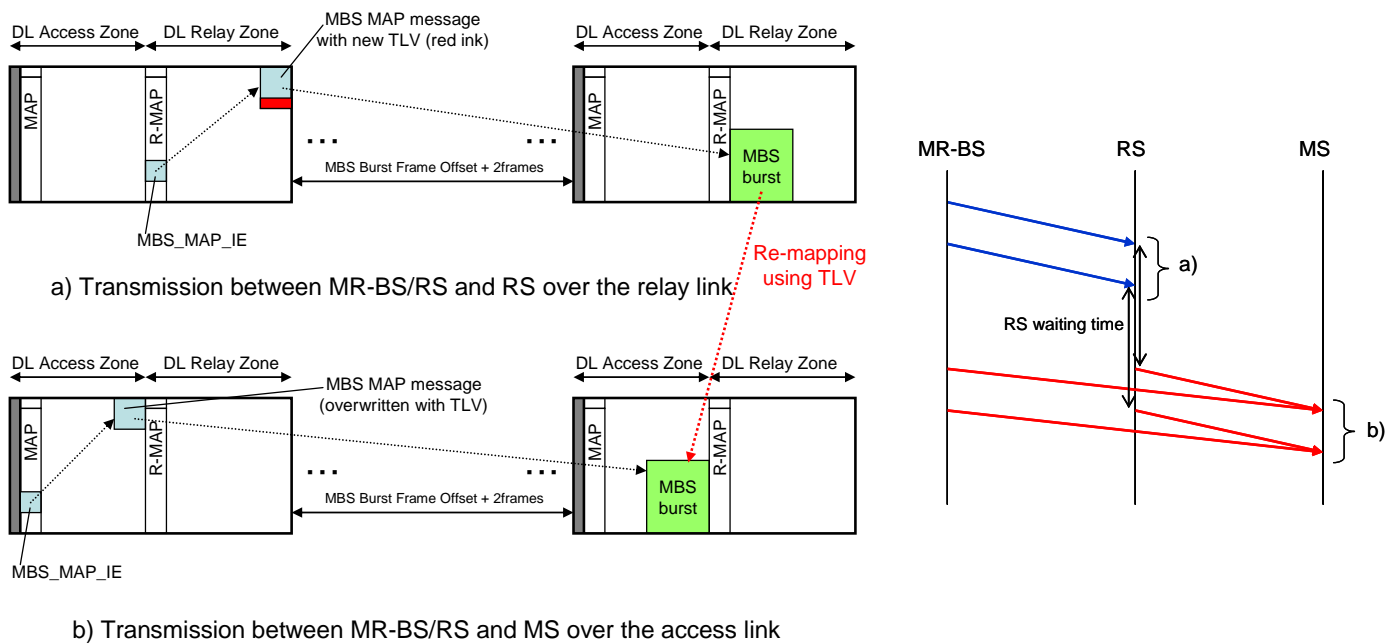


Fig 1 MBS burst re-mapping from DL Relay Zone to DL Access Zone

## Proposed Text Change

### 6.3.23.2 Multi-BS Access

[Modify text in 6.3.23.3:]

### 6.3.23.3 MBS in MR network

For MR networks, MBS transmission within an MBS zone shall be synchronized. In Multi-MR-BS-MBS case, MR-BSs should be synchronized in network level as described in section 6.3.23.2.

If there is only one RS connecting with the MR-BS, that RS shall report its processing delay (in units of a frame), DR, to the MR-BS as a capability parameter in the SBC-REQ message. When an MBS transmission is necessary, the MR-BS shall first send the MBS data over the relay downlink as a pre-transmission, and then after DR frames, the MR-BS and RS shall synchronously transmit this MBS data over the access link.

If there are multiple RSs in the MBS zone at various hop counts from the MR-BS and/or with different processing delays, each RS shall report its processing delay, DR, to the MR-BS as a capability parameter in the SBC-REQ message. The MR-BS shall determine the maximum cumulative delay, DM, of all RSs in the MBS zone based on their positions in the tree and their individual processing delays. The MR-BS shall then calculate the required waiting time, Wi, for each RS based on the value of DM and each RS's cumulative delay and notify each RS of its waiting time via an SBC-RSP message. If the MR-BS detects that the waiting time has changed for a particular RS, it may send an unsolicited SBC-RSP message to that RS to update its waiting time.

When an MBS transmission is necessary, the MR-BS shall forward the MBS data over the relay downlink as a pre-transmission DM frames before transmitting this MBS data over the access link. Each RS in the MBS zone shall forward the MBS data it receives over the relay downlink. Finally, once the MR-BS has waited DM

frames and each RS has waited its specified waiting time,  $W_i$ , the MR-BS and RSs shall synchronously transmit the MBS data over the access link.

At the pre-transmission over the relay link, the MR-BS sets the mapping information (MBS DIUC, OFDMA Symbol Offset, Subchannel offset, Boosting, No. OFDMA Symbols, No. Subchannels, Repetition Coding Indication) in the MBS\_DATA\_IE and/or the Extended MBS\_DATA\_IE to indicate the MBS region in the DL\_Relay\_Zone. When the RS received MBS\_MAP message including this TLV, it receives the MBS burst from the MBS region in the DL\_Relay\_Zone of the frame which is transmitted after MBS\_Burst\_Frame\_Offset + 2 frames, then performs re-mapping the MBS burst in the DL\_Access\_Zone of the synchronized transmission frame according to the mapping information of this TLV. For the synchronized transmission over the access link, the RS overwrites the mapping information of MBS\_DATA\_IE and/or the Extended MBS\_DATA\_IE with values of this TLV and removes this TLV from the MBS\_MAP message. Other information of the MBS\_MAP message except the mapping information are reused for the synchronized transmission over the access link.

## 11.8 SBC-REQ/RSP management message encodings

[Insert the following text in 11.8.3.7.21:]

### 11.8.3.7.21 RS Downlink Processing Delay

This TLV indicates the time delay for an RS to forward timing-related messages such as MOB\_PAG-ADV, MOB\_TRF-IND to its subordinate RS or MS. When MBS data synchronization with pre-defined relative transmission time is supported, it also indicates the time delay for RS to forward MBS\_MAP message and MBS data burst. The value is defined as a maximum fixed delay which includes PHY processing delay and MAC scheduling and queuing delay. When the RS received timing-related messages or data over the relay link, it shall forwards the message or data after this delay time.

Type	Length	Value	Scope
TBA	1	RS Downlink Processing Delay (unit: frame)	SBC-REQ

[Insert the following text in 11.8.3.7.22:]

### 11.8.3.7.22 RS waiting time for MBS

When MBS data synchronization with pre-defined relative transmission time is supported, this TLV indicates the waiting time for synchronized MBS transmission. When the RS received MBS\_MAP message or MBS burst over the relay link, it transmits the message or burst over the access link after this waiting time.

Type	Length	Value	Scope
TBA	1	RS waiting time for MBS (unit: frame)	SBC-RSP

[Insert new subclause in 11.22:]

## 11.22 Multicast Broadcast Service Map (MBS\_MAP) message encodings

### 11.22.1 MBS burst relay zone to access zone mapping information

This TLV is included in the MBS\_MAP message and transmitted from the MR-BS to the RS over the relay link in order to indicate mapping information for the MBS burst over the access link. This TLV is used and corresponded to each MBS\_DATA\_IE and/or Extended MBS\_DATA\_IE. MBS\_MAP message includes the same number of this TLV as the total number of MBS\_DATA\_IE and/or Extended MBS\_DATA\_IE. And the order of this TLV corresponds to the order of MBS\_DATA\_IE and/or Extended MBS\_DATA\_IE.

<u>Type</u>	<u>Length</u>	<u>Value</u>	<u>Scope</u>
<u>TBA</u>	<u>5</u>	<u>Bit #0-3: MBS DIUC</u> <u>Bit #4-11: OFDMA Symbol Offset</u> <u>Bit #12-17: Subchannel offset</u> <u>Bit #18-20: Boosting</u> <u>Bit #21-27: No. OFDMA Symbols</u> <u>Bit #28-33: No. Subchannels</u> <u>Bit #34-35: Repetition Coding Indication</u> <u>Bit #36-39: <i>Reserved</i></u> <u>Note: The definition of each value is same as MBS_DATA_IE and extended MBS_DATA_IE.</u>	<u>MBS_MAP</u>

## **References**

[1] IEEE 802.16j-06/026r4 P802.16j baseline document