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Re:	IEEE802.16j-06/027: "Call for Technical Proposals regarding IEEEP802.16j"
Abstract	This contribution proposes the method of synchronization for MBS transmission among BS and RS.
Purpose	Text proposal for P802.16j Baseline Document.
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A proposal for synchronous MBS transmission in MR

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Introduction

This contribution proposes the method of synchronization for MBS transmission among MR-BS and RS.

Details

In Multicast and Broadcast Service (MBS) for MR, especially for Multi-BS MBS, data traffic of MBS will be broadcasted among not only BS but also RS.

As mentioned in section 6.3.23.2.2 "Performance enhancement with macro diversity" of 802.16e specification [1], from the receiving performance point of view, transmission of broadcast data from MR-BS and RS should be synchronized.

In order to synchronize the timing of MBS data sent from both MR-BS and RS, MBS data should be transmitted with three steps, as shown in Fig. 1.
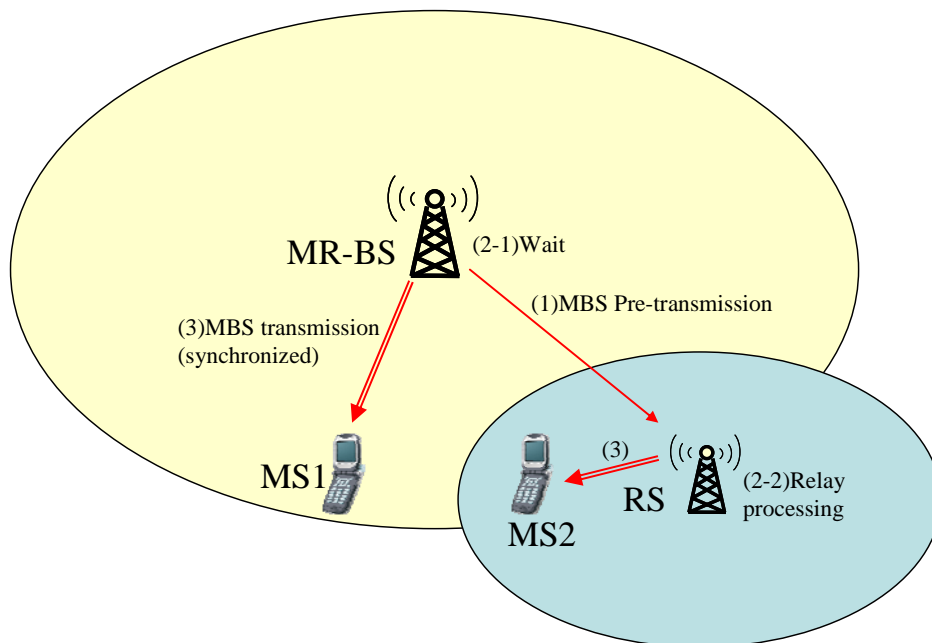

Fig. 1 Synchronized transmission for MBS traffic in MR

MS2   RS   MS1   MR-BS

(1)MBS Traffic (pre-transmission)

(3)MBS Traffic   (2-1)Relay D_R (3)MBS Traffic
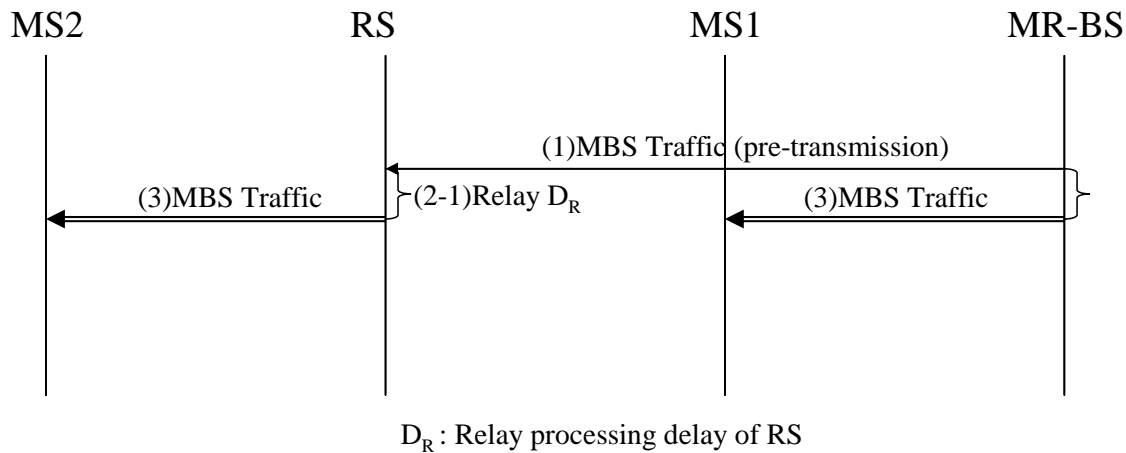
D_R : Relay processing delay of RS

Fig. 2 Transmission sequence of MBS traffic in MR

For the following method, it assumes that frame synchronization among MR-BS and RS is established in a same MBS zone.

(1)Pre-transmission from MR-BS to RS

Firstly, MR-BS sends MBS data to RS as pre-transmission earlier than formal transmission time. For this pre-transmission, MR-BS use a multicast connection corresponded to RS multicast CID [2] over the R-DL.

(2-1)MR-BS waits for relay processing in RS and (2-2)Relay processing in RS

It takes D_R that MBS data received at RS is relayed to MS(MS2 in Fig.1), in that period, MR-BS maintains MBS data sent to RS as pre-transmission and waits for relay processing in RS. Here, it assumes that RS relays MBS data within a fixed D_R delay.

(3)Synchronous transmission from both MR-BS and RS.

Secondly, after D_R since pre-transmission, RS send MBS data to MS (MS2) and MR-BS also send same MBS data synchronously. For these transmissions, MR-BS and RS use broadcast connection for MBS over the access link.

In order for MR-BS to wait D_R, MR-BS needs to know D_R of RS. The value of D_R will be given to the MR-BS as a capability parameter of SBC-REQ message.

Note that additional capability parameter for RS is proposed with other contribution [3].

Consider the case that there are multiple RS exist and each delay of RS are not same, as shown in Fig.3. In such case, MR-BS shall examine the maximum delay of RS and notify all RS of it. After the time notified by MR-BS,

all RS and MR-BS formally transmit MBS data to MS synchronously with the slowest RS. Such the maximum delay will be notified in SBC-RSP message.

If the MR-BS detects that the maximum delay of RS is replaced with the greater value, MR-BS may send unsolicited SBC-RSP message and notifies all RS of it.
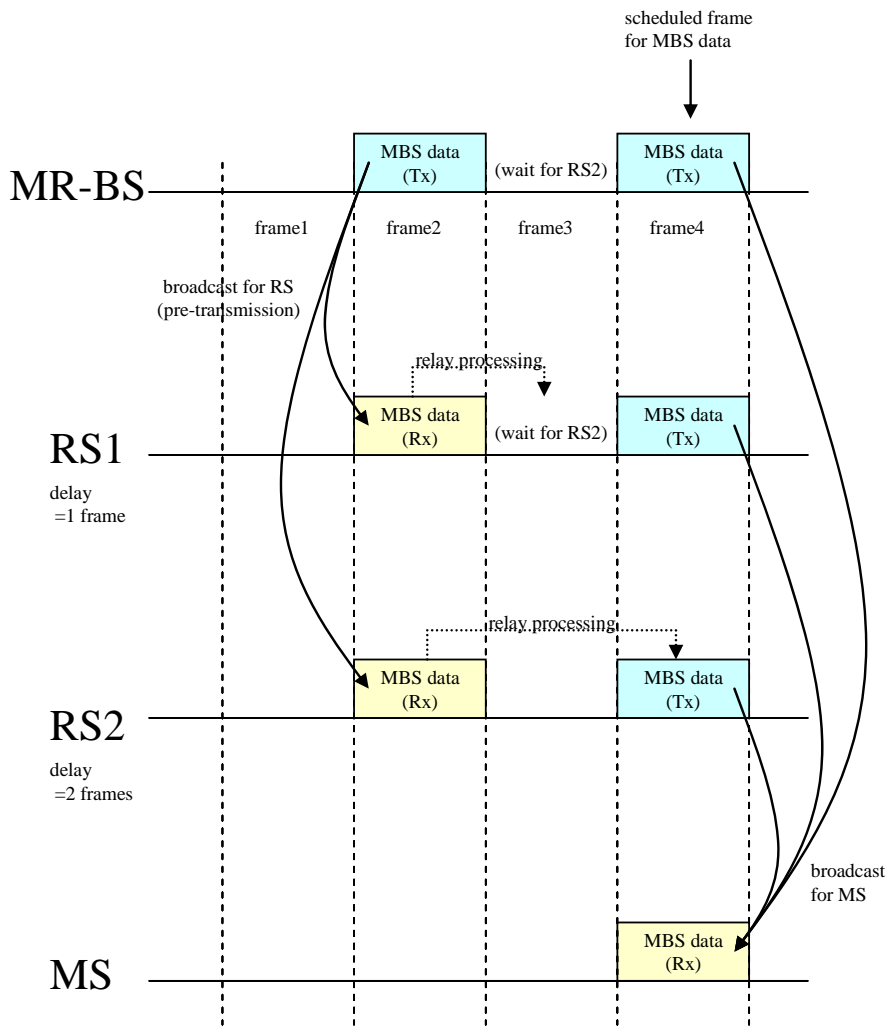
Fig.3 Synchronized MBS data transmission (different RS delay)

Conclusion

According to this transmission method, MBS data which is received at MS under MR-BS or RS is synchronized exactly. If MS moves between MR-BS and RS, MS can receive MBS data without any discontinuance.

Specific text changes

- 6.3.23.2.2 Performance enhancement with macro diversity

Insert the following text at the end of 6.3.23.2.2:

For MR, MBS transmission in a group of MR-BS and RS shall also be synchronized. However, relay process of RS may cause one or more frames delay. Therefore, MR-BS needs to know the delay of RS and firstly sends MBS data over the R-DL as pre-transmission to RS earlier than formal transmission time. MR-BS waits for RS while processing of relay, then formally sends MBS data over the access link to MS synchronized with RS.

In the case that there are multiple RS exist and each delay of RS are not same, MR-BS shall examine the maximum delay of RS and notify all RS of it. After the notified duration, all RS and MR-BS formally transmit MBS data over access link to MS synchronously. Such the maximum delay is notified in SBC-RSP message. If the MR-BS detects that the maximum delay of RS is replaced with the greater value, MR-BS sends unsolicited SBC-RSP message and notifies all RS of it.

- 11.8 SBC-REQ/RSP management message encodings

Insert new subclause 11.8.3.7:

11.8.3.7.X Maximum RS Downlink Delay for MBS Zone

Type	Length	Value	Scope
TBA	1	Maximum RS Downlink Delay for MBS Zone (unit: frame)	SBC-RSP

References

[1] IEEE 802.16e-2005

[2] IEEE C802.16j-06/289, "RS Multicast CID for 802.16j"

[3] IEEE C802.16j-06/143, "Network entry procedure for non-transparent relay station"