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Re:	IEEE802.16j-06/027: “Call for Technical Proposals regarding IEEEP802.16j”
Abstract	This contribution proposes the method of timing compensation for sleep mode in MR.
Purpose	Text proposal for 802.16j Baseline Document
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A proposal for timing compensation of sleep mode in MR

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Introduction

This contribution proposes a method of timing compensation for timing-related control function, such Sleep mode. In 802.16e specification, several messages such as TRF-IND are received at the pre-notified timing. However, in a non-transparent RS system[1], the message processing delay in RS makes it hard to fulfill that reception timing requirement. In order for MS to receive messages at the pre-notified timing, MR-BS compensates the timing when MS can receive messages with taking account of RS processing delay.

Details

In this proposed method, based on the following assumptions:

- The MR system is a non-transparent RS system [1].

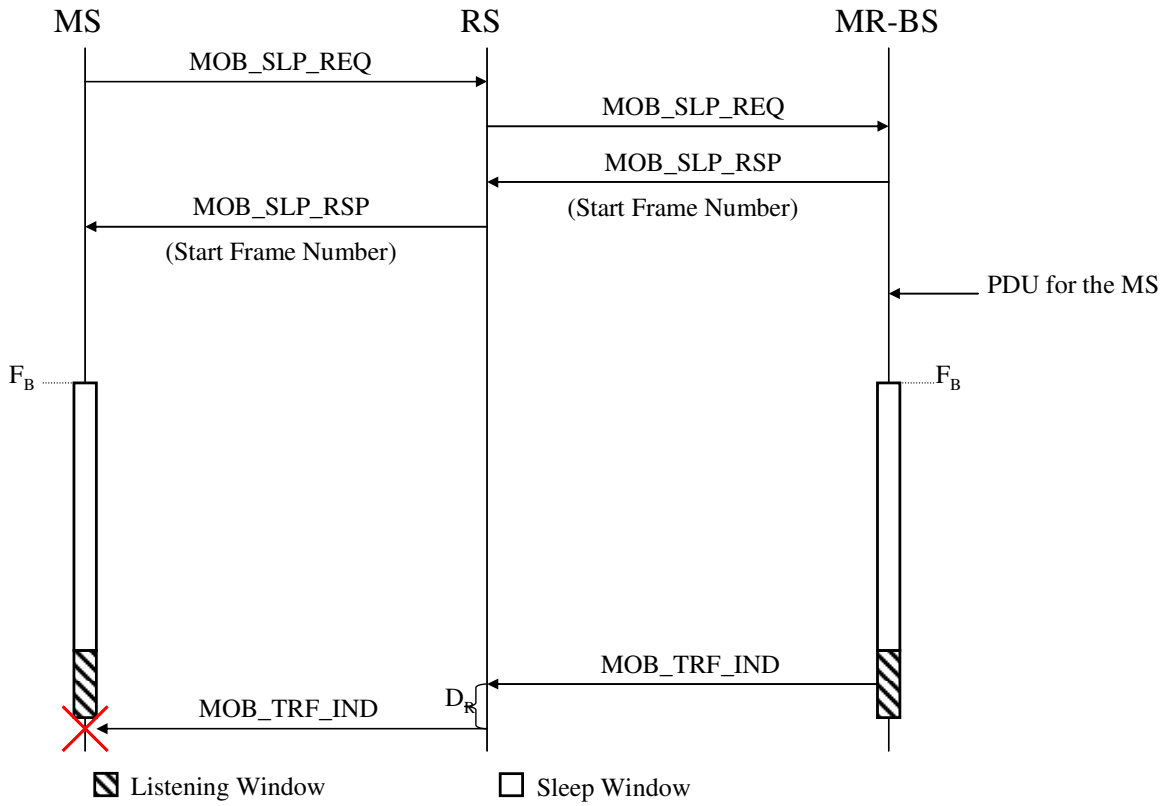
- The RS can not relay message and data within the current frame. The message is delayed for fixed duration on account of relay processing in the RS.

- Each frame sent by MR-BS and RS are synchronized and has same frame number.

Timing compensation for sleep mode

As shown in Fig. 1, MS enters Sleep mode by receiving MOB_SLP-RSP message involving “Start Frame Number” parameter from MR-BS. F_B, the beginning frame of first Sleep Window(SW), is decided by the Start Frame Number.

According to the above assumption, MOB_TRF-IND message sent from MR-BS will delay of “D_R” in RS, it is received at MS D_R frame later. Therefore, it depends on the size of Listening Window(LW) and the timing of that MOB_TRF-IND message is sent from MR-BS, MOB_TRF-IND message does not reach within LW of MS correctly and MS fails to receive the message.



D_R : Relay processing delay of RS
F_B : The beginning frame of Sleep Window

Fig. 1 LW slipping problem of sleep mode in MR

To avoid this problem, the timing of LW managed in MR-BS and MS should be compensated. Proposed method is shown in Fig. 2.

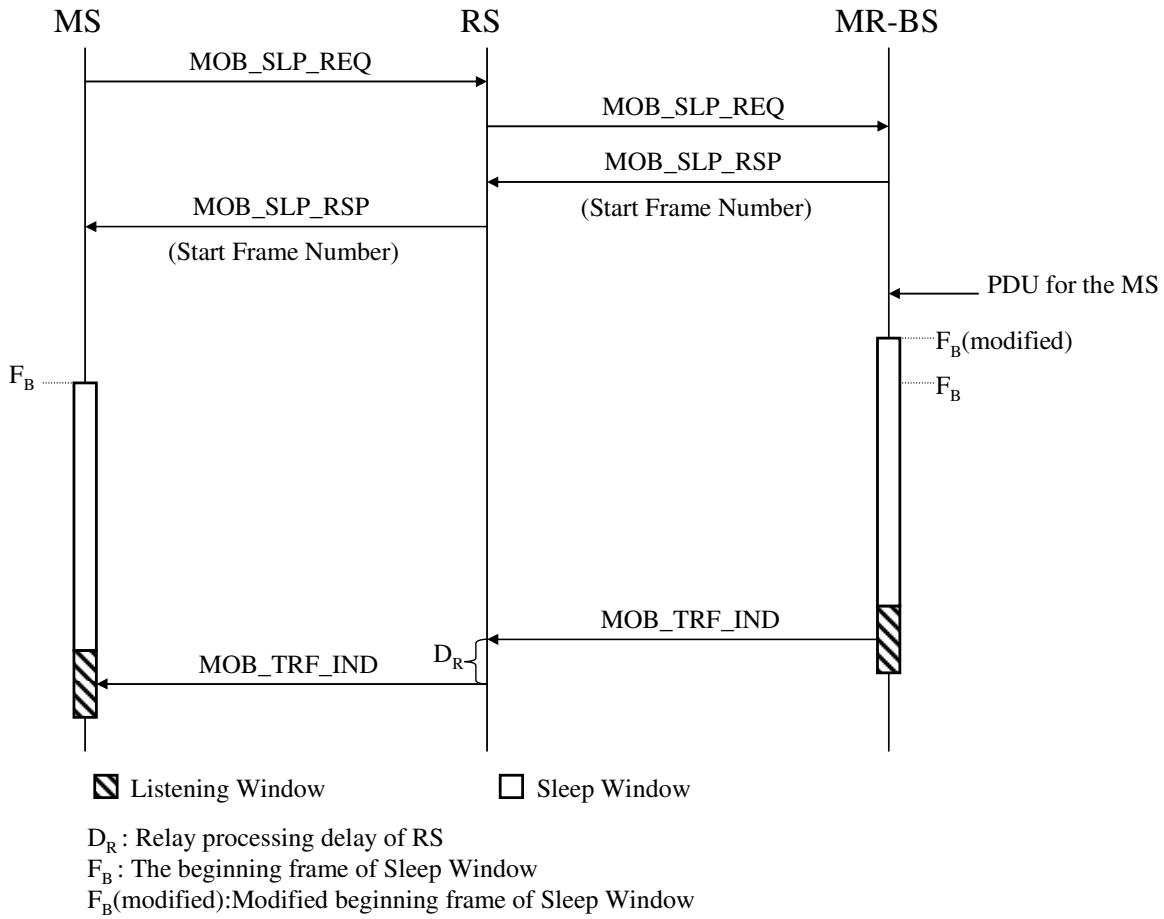


Fig. 2 Compensation for timing of LW

When MR-BS receives MOB_SLP-REQ message and decides Start Frame Number, MR-BS decides normal Start Frame Number value with regular manner at first and notifies MS of it by MOB_SLP-RSP message. And, MR-BS also decides modified Start Frame Number value for itself. Modified value will be decided to that the SW and LW managed internally in MR-BS are just shifted D_R earlier from the SW and LW of MS.

With this compensation method, MOB_TRF-IND sent over the R-DL at any frame within LW managed in MR-BS is received successfully within MS' LW via RS relaying.

In order to decide the modified Start Frame Number value in MR-BS, MR-BS needs to know D_R of RS. The value of RS's delay is given to MR-BS as a capability parameter of SBC-REQ message.

Note that modification for capability parameter of SBC-REQ message will be proposed in other contribution [2].

Conclusion

According to this compensation method, the MOB_TRF-IND messages are surely delivered from MR-BS to MS through RS relaying.

Specific text changes

Insert the following text at the end of 6.3.21.2:
Insert the following text at the end of 6.3.21.3:
Insert the following text at the end of 6.3.21.4:

For MR, to guarantee the sleep-mode MS receiving traffic indication in time in the presence of processing delay of RS, which is D_R, the MR-BS may transmit MOB_TRF-IND twice over R-DL and access link separately. MR-BS sends MOB_TRF-IND over the R-DL as a pre-transmission D_R frame earlier than the normal MOB_TRF-IND transmission time. MR-BS may wait for D_R frames, and then sends MOB_TRF-IND again over the access link. The RS delay, D_R, is given to MR-BS as a capability parameter of SBC-REQ message.

References

[1] IEEE C802.16j/132, “Relaying methods proposal for 802.16j”

[2] IEEE C802.16j/143, Network entry procedure for non-transparent relay station”