

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	A proposal for timing compensation of sleep mode in MR	
Date Submitted	2006-11-07	
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Re:	IEEE802.16j-06/027: "Call for Technical Proposals regarding IEEE802.16j"	
Abstract	This contribution proposes the method of timing compensation for sleep mode.	
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 as 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.

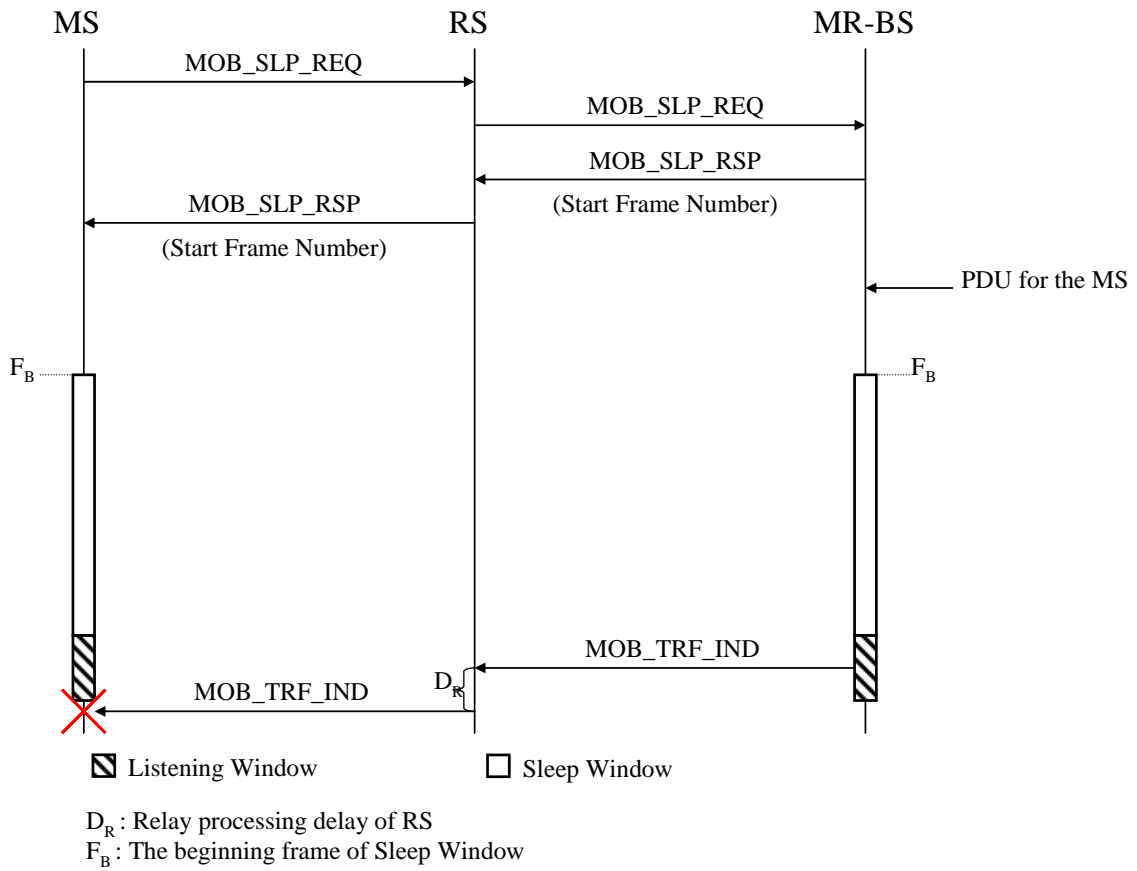


Fig. 1 LW slipping problem of sleep mode in MR

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

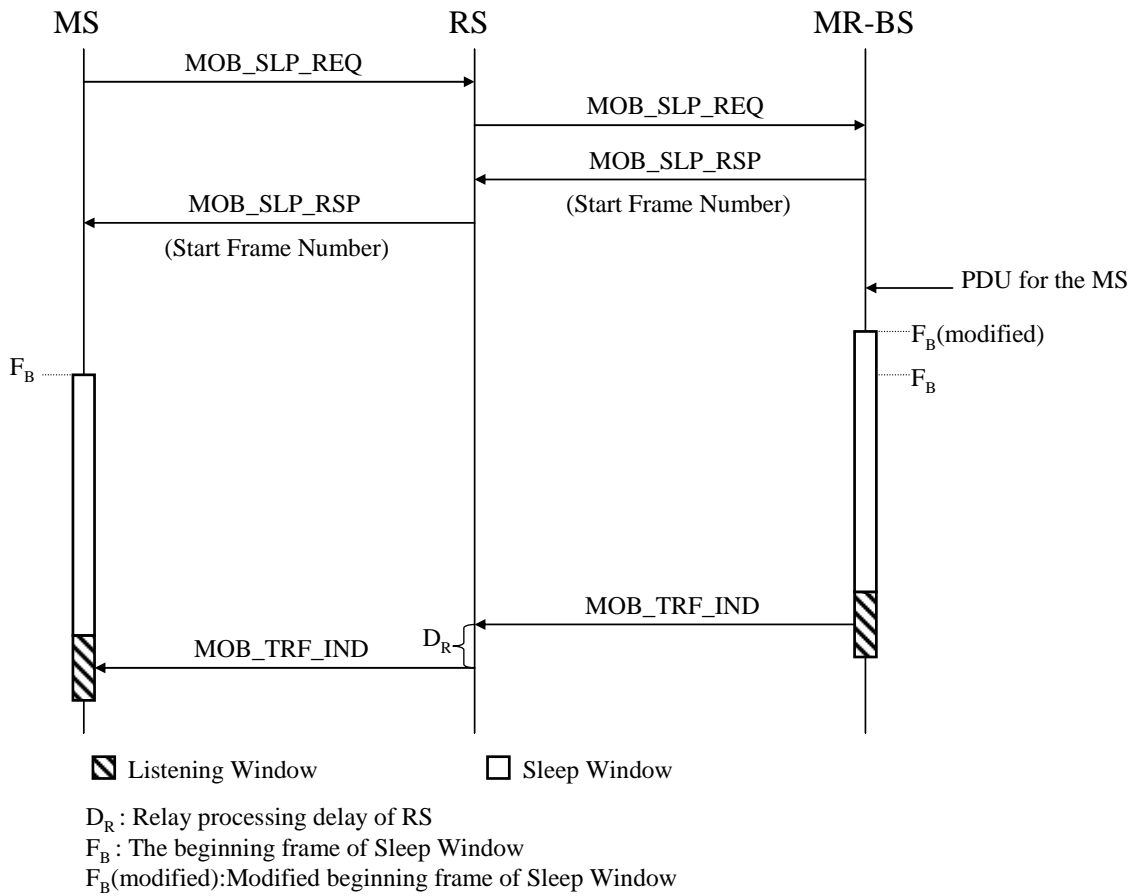


Fig. 2 Compensation for timing of LW

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, Start frame number for first sleep window of MS is shall be compensated for relaying delay of RS. MR-BS determines Start frame number for MS, and compensates Start frame number for itself taking account of RS's delay. The beginning frame of first sleep window in MR-BS is shifted earlier from the beginning frame of first sleep window in MS.

The value of RS's delay will be 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"