

# Timing Compensation of Idle Mode in MR

**IEEE S802.16j-06.128r2**

Date Submitted:

2006-11-15

Source:

Keiichi Nakatsugawa  
Fujitsu Laboratories Ltd  
Kamikodanaka 4-1-1,  
Kawasaki, 211-8588, Japan

Voice: +81-44-754-2811  
E-mail: [nakatsugawa@jp.fujitsu.com](mailto:nakatsugawa@jp.fujitsu.com)

Yuefeng Zhou  
Fujitsu Laboratories of Europe Ltd  
Hayes Park Central, Hayes End Road  
Hayes, Middlesex, UB4 8FE, UK

Voice: +44 (0) 20 8606 4444  
E-mail: [yuefeng.zhou@uk.fujitsu.com](mailto:yuefeng.zhou@uk.fujitsu.com)

Shiao-Li Tsao, Fang-Ching Ren, Wern-Ho Sheen, I-Kang Fu  
National Chiao Tung University (NCTU)  
Industrial Technology Research Institute (ITRI), Taiwan  
No. 195, Sec. 4, Chung Hsing Rd., Chutung, Hsinchu,

Voice: +886-3-5712121-54717  
Fax: +886-3-5721490  
E-mail: [sltsao@cs.nctu.edu.tw](mailto:sltsao@cs.nctu.edu.tw); [frank\\_ren@itri.org.tw](mailto:frank_ren@itri.org.tw)

Venue:

IEEE 802.16 Session #46, Dallas, Texas, USA

Base Document:

C802.16j-06.128r2

Purpose:

Discuss and adopt proposed text and message format

Notice:

This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.

Release:

The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.

IEEE 802.16 Patent Policy:

The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <<http://ieee802.org/16/ipr/patents/policy.html>>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <[mailto:chair@wirelessman.org](mailto:mailto:chair@wirelessman.org)> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <<http://ieee802.org/16/ipr/patents/notices>>.

# Timing Compensation of Idle Mode in MR

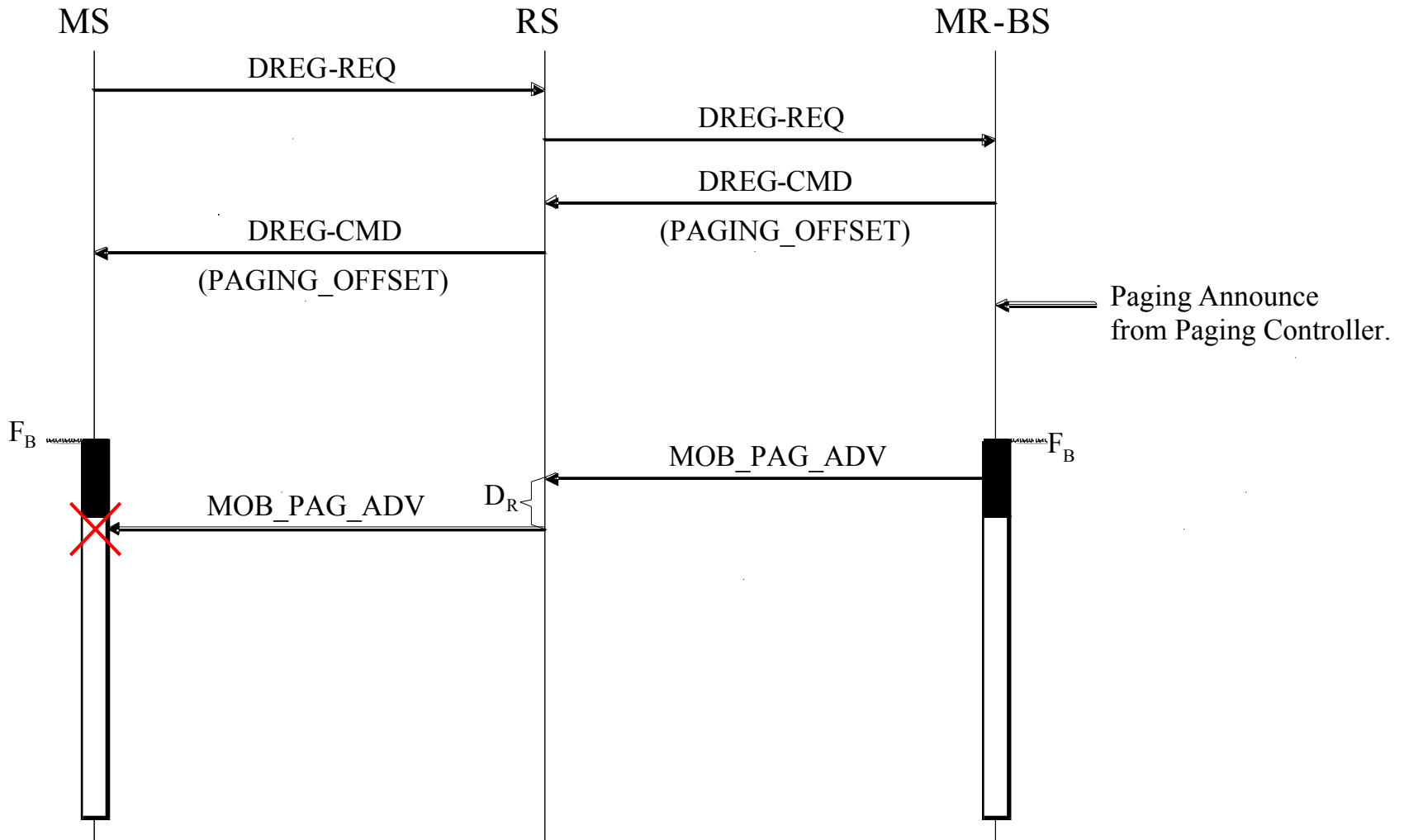
## 1. Assumptions

- Non-transparent RS system
- Processing delay existing in RS. RS may not relay MAC PDU within current frame.
- RS and MR-BS are synchronized, and have same frame number

## 2. Problem Description

- The MOB\_PAG-ADV sent by MR-BS will reach the idle-mode MS “D<sub>R</sub>” frame later because of the processing delay in RS.
- MS may miss the MOB\_PAG-ADV message

# Timing Compensation of Idle Mode in MR



■ Paging Listening Interval

□ Paging Unavailable Interval

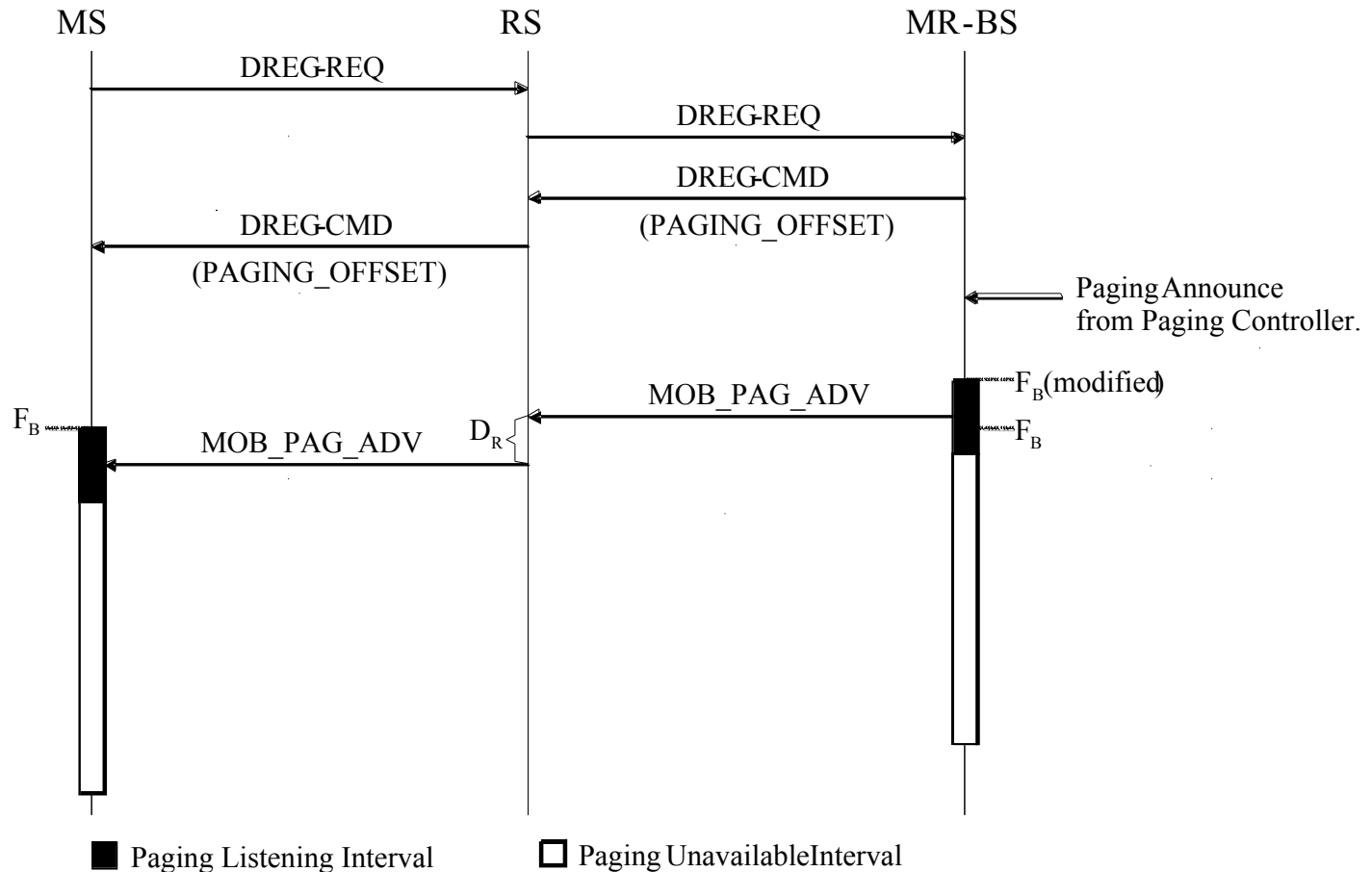
$D_R$ : Relay processing delay of RS

$F_B$ : The beginning frame of Paging Listening Interval

# Timing Compensation of Idle Mode in MR

## 3. Compensation Method

- The delay in RS will be reported to MR-BS as a capability parameter of SBC-REQ message
- MR-BS broadcast the MOB\_PAG-ADV over R-DL earlier than the paging listening interval.



$D_R$  : Relay processing delay of RS

$F_B$  : The beginning frame of Paging Listening Interval

$F_B(\text{modified})$ : Modified beginning frame of Paging Listening Interval

# Timing Compensation of Idle Mode in MR

## 4. Benefits

- Guarantee the idle-mode MS can receive the MOB\_PAG-ADV message in the presence of RS delay
- Support MS roaming
  - \*\* MSs connecting with RS and MSs connecting with MR-BS directly will receive the MOB\_PAG-ADV at the same time.

# Timing Compensation of Idle Mode in MR

## 4. Other Consideration

### - Multiple RSs with different delay

\*\* MR-BS examines the maximum delay,  $D_M$ , of all RS

\*\* MR-BS will inform this maximum delay to all RS by SBC-RSP

message

\*\* MR-BS broadcasts the MOB\_PAG-ADV earlier by  $D_M$ .

\*\* All RS relay the MOB-PAG-ADV with this maximum delay.

### - Deal with the idle-mode MSs connecting MR-BS directly

\*\* MR-BS broadcasts the MOB\_PAG-ADV earlier by  $D_M$  frames over

R-DL

\*\* MR-BS broadcasts the MOB\_PAG-ADV with normal paging listening interval over the access link again.

# Timing Compensation of Idle Mode in MR

*Insert the following text at the end of 6.3.24.5:*

For MR, The RS delay,  $D_R$ , is given to MR-BS as a capability parameter of SBC-REQ message. MR-BS sends MOB\_PAG-ADV over the R-DL as a pre-transmission  $D_R$  frame earlier than the normal MOB\_PAG-ADV transmission time. MR-BS may wait for  $D_R$  frames, and then sends MOB-PAG-ADV data again over the access link.

If multiple RSs with different delay performance existing, MR-BS shall firstly examine the maximum delay of RSs, which is  $D_M$ , and notify it to all RSs by SBC-RSP message. MR-BS sends MOB\_PAG-ADV over the R-DL as a pre-transmission  $D_M$  frame earlier than normal MOB\_PAG-ADV transmission time. MR-BS may wait for  $D_R$  frames, and then sends MOB-PAG-ADV data again over the access link. All RSs shall use  $D_M$  as the delay to transmit MOB\_PAG-ADV over access link. If the MR-BS detects that the delay of a RS is greater than the examined maximum delay, it shall update the current maximum RS delay parameter by this greater value. Also, MR-BS needs to send an unsolicited SBC-RSP message to all RSs to notify the change of the maximum RS delay.

*Insert new subclause 11.8.3.7:*

## 11.8.3.7.X Maximum RS Downlink Delay for Paging Group

| Type | Length | Value  | Scope   |
|------|--------|--|---------|
| TBA  | 1      | Maximum RS Downlink Delay for Paging Group (unit: frame) | SBC-RSP |