Timing Compensation of Idle Mode in MR

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Purpose:
Discuss and adopt proposed text and message format

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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 “Dr” 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

Paging Announce from Paging Controller.
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.

\[ D_{R} : \text{Relay processing delay of RS} \]
\[ F_{B} : \text{The beginning frame of Paging Listening Interval} \]
\[ F_{B}(\text{modified}) : \text{Modified beginning frame of Paging Listening Interval} \]
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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.
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.
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

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<thead>
<tr>
<th>Type</th>
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<td>Maximum RS Downlink Delay for Paging Group (unit: frame)</td>
<td>SBC-RSP</td>
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