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Title	<b>Signaling Scheme for Bandwidth Allocation in MR Network with Distributed Scheduling</b>	
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Re:	IEEE 802.16j-07/007r2:“Call for Technical comments and contributions regarding IEEE Project P802.16j”	
Abstract	This document presents a signaling scheme for scheduling and bandwidth allocation for IEEE 802.16j.	
Purpose	Propose a signaling scheme for scheduling and bandwidth allocation for IEEE 802.16j	
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# Signaling Scheme for Bandwidth Allocation in MR Network with Distributed Scheduling

## Introduction

As described in 16j baseline document IEEE802.16j-06/026r2, the RS with distributed scheduling may transmit a BW request header soon after it receives a BW request header from one of its downstream stations instead of waiting for the actual packets to arrive in order to reduce delay in relaying traffic. This process is depicted in Figure 1.

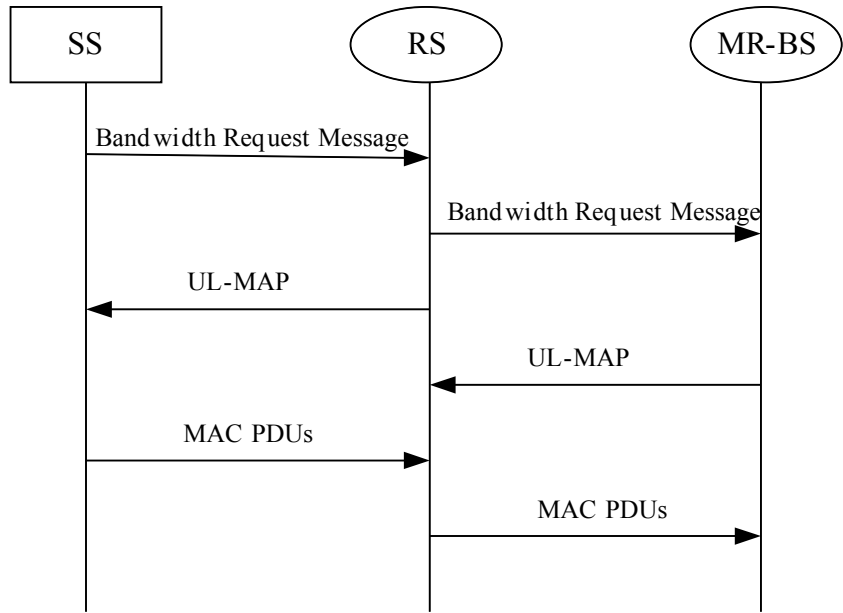


Figure 1 – Reducing latency in relaying traffic by transmitting BW request message on R-UL before packets arrive

For RS with distributed scheduling, such a scenario exists that RS has already received the MAC PDUs from MS or its subordinate RS, but fails to receive the expected uplink bandwidth allocation by MR-BS or superordinate RS for uplink forwarding the received MAC PDU. Figure 2 and Figure 3 illustrates this case.

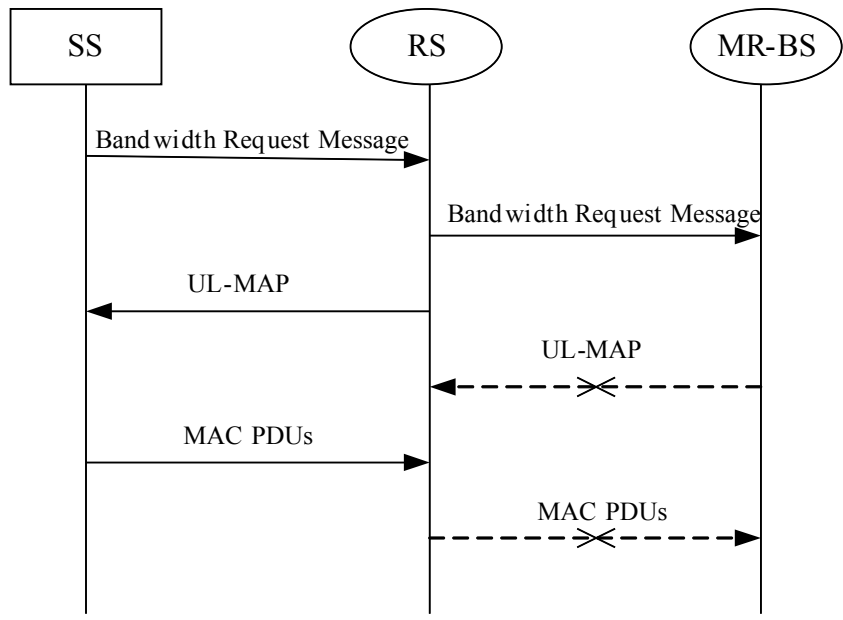


Figure 2 – one example of failure of RS uplink data forwarding

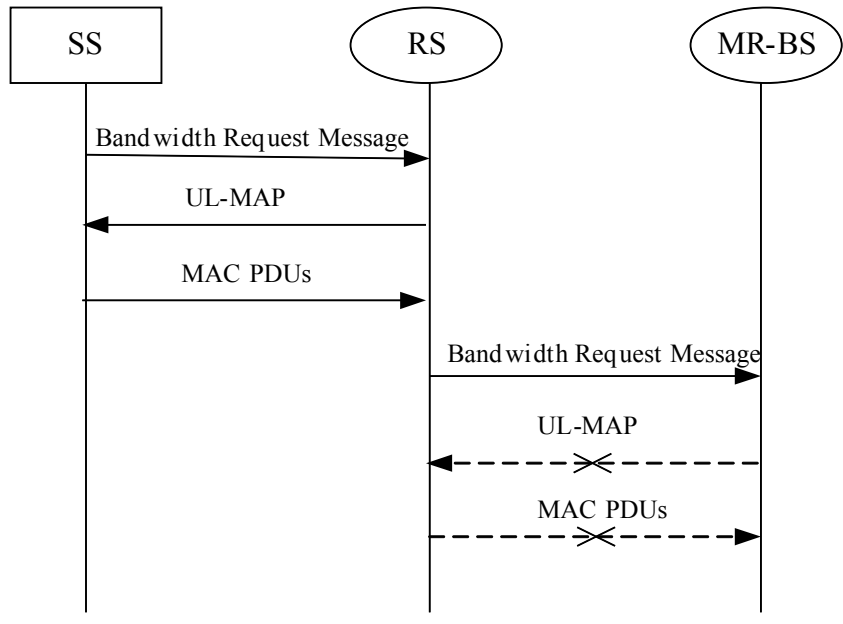


Figure 3 – another example of failure of RS uplink data forwarding

In this case, RS has to buffer the received MAC PDUs for a limited time and continue to request the uplink bandwidth. If MR-BS or superordinate RS still fails to allocate the appropriate uplink bandwidth for RS to forwarding the received MAC PDUs, or the buffer timer of RS expire, RS will have to discard the received MAC PDUs.

So the distributed scheduling scheme between MR-BS and RS can result in the unbalanced resource allocation between MR-BS and RS. This kind of unbalanced resource allocation will cause the unexpected latency of MAC PDUs transfer between MS and MR-BS via RS, even discarding of MS MAC PDUs. Therefore the quality of service of subscribers will be degraded significantly.

We propose a signaling scheme between MR-BS and RSs to inform the superordinate station of a failure in

establishing an uplink related to the subordinate RS. This signaling scheme can facilitate the superordinate station to timely adjust the scheduling and allocate the appropriate uplink bandwidth for subordinate RS to forwarding the MAC PDUs to MR-BS.

## Specific Text change

*[Insert the following subclause 6.3.2.3-652.7.9]*

### **6.3.2.2.7.9 MR Extended Subheader format**

MR extended subheader format is same with 16e extended subheader. The lists of defined extended subheader are given in the following tables for downlink and uplink.

Table xxx- MR extended subheader types for DL

<u>ES type</u>	<u>Name</u>	<u>ES body size</u>	<u>Description</u>
<u>6</u>	<u>MR uplink transmission failure request extended subheader</u>	<u>1 byte</u>	<u>6.3.2.2.7.9.1</u>
<u>7~127</u>	<u>Reserved</u>		

Table xxx- MR extended subheader type for UL

<u>ES type</u>	<u>Name</u>	<u>ES body size</u>	<u>Description</u>
<u>5</u>	<u>MR uplink transmission failure report extended subheader</u>	<u>2 byte</u>	<u>6.3.2.2.7.9.2</u>
<u>6~127</u>	<u>Reserved</u>		

### **6.3.2.2.7.9.13.65 MR Uplink Transmission Failure Request Report message extended subheader**

This extended subheader is sent by MR-BS or superordinate RS to its subordinate RS to request the uplink transmission failure report. The uplink bandwidth should be unsolicited allocated by MR-BS or superordinate RS for subordinate RS sending the uplink transmission failure report.

Table xxx – MR uplink transmission failure request extended subheader format

<u>Name</u>	<u>Size (bits)</u>	<u>Description</u>
<u>Requested report type</u>	<u>3</u>	<u>000: the discarded PDUs</u> <u>001: the delayed PDUs</u> <u>Others: reserved</u>
<u>Report period</u>	<u>5</u>	<u>The period of report sent by RS in frame.</u>

### **6.3.2.2.7.9.2 MR Uplink Transmission Failure Report extended subheader format**

This extended subheader message is used by RS to inform the MR-BS or its superordinate RS of a failure in establishing uplink related the RS. This message can be transmitted by RS to MR-BS or its superordinate RS unsolicitedly or periodically as a response to MR-BS or superordinate RS. The report period should be determined by subordinate RS itself. This message is transmitted using RS's basic CID.

Table xxx- MR Uplink Transmission Failure Report extended subheader message format

Syntax	Size (bits)	Notes
MR_UL_TRx_Failure_REP message format () {		
Management message type = xx	8	
Size of Discarded PDUs	16	In bytes.
Measurement Frame Duration	8	In frames.
}		

Name	Size (bits)	Description
Size of discarded or delayed PDUs	8	In bytes
The delayed time	8	For delayed PDUs, RS reports the waiting time. For discarded PDU, set to 0.

[Insert the following paragraphs at the end of section 6.3.6.7.1.1]

#### 6.3.6.7.1.1 Bandwidth requests

~~When MAC PDUs to be relayed arrives at an RS, the An RS shall buffer the intended MAC PDUs to be delivered to MR-BS or its superordinate RS and start the buffer timer T51. The RS shall clear timer T51 when uplink bandwidth allocation is received for the associated MAC PDUs. When RS fails to receive expected bandwidth allocation from MR-BS or its superordinate RS for uplink transmission, At expiration of timer T51, the -RS shall generates a UL Transmission Failure ReportMR\_UL\_TRx\_Failure\_REP extended subheader message and -RS sends this failure report -to MR-BS or its superordinate RS in the sequent appropriate transmission opportunity. After the buffer timer T51 expires, Also, the RS shall discards the intended MAC PDUs to be uplink deliveredwith expired timer T51.~~

[Insert the following row in Table 342 in section 10.1]

Table 342—Parameters and constants (continued)

System	Name	Time reference	Minimum value	Default value	Maximum value
RS	T51	Time for RS to buffer the intended MAC PDUs to be uplink delivered.	=	=	=

## References

[1] IEEE802.16j-06/026r2 Baseline Document for Draft Standard for 16j