Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**Comments on Synchronous MBS Transmission in MR Networks**
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Re:	IEEE 802.16j-07/019, "Call for Technical Comments Regarding IEEE Project 802.16j."
Abstract	This contribution proposes comments on synchronous MBS transmission method
Purpose	Propose the text changes regarding MBS in multi-hop relay networks for QoS support
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Comments on Synchronous MBS Transmission in MR Networks

Introduction

The document is to introduce some modifications of the baseline document regarding synchronous MBS transmission for QoS support, as an input for call for technical contribution of the IEEE 802.16j.

The basic procedure of MBS in multi-hop relay has been accepted and included in the baseline document [1]. MBS transmission synchronization is achieved by previously transmitting MBS data on the relay link to all the RS(s) while informing the RS(s) fixed waiting time. After waiting the specified time, MR-BS and RSs synchronously transmit the MBS data over the access link. It is an easy and practical procedure for MBS in multi-hop relay. However, there maybe a QoS issue regarding this method: this solution assumes that all types of MBS traffic being relayed are treated equally without QoS awareness. From IEEE 802.16e description a MBS transport connection is associated with a service flow.

The MBS method in this proposal has a little modification of the baseline document to achieve MBS QoS awareness support with more flexibility. The proposed modification supports MBS data synchronization by associating waiting time with connections. The QoS-aware approach is consistent with mechanisms already provided by 802.16e.

Proposed Solution

This proposal gives some modifications of synchronous MBS transmission in multi-hop relay for QoS support as optional case.

As defined in IEEE 802.16j-06/026r4, MR-BS needs to know the maximum required waiting delay for MBS traffic delivered to each RS. The value of this delay will be reported to the MR-BS through management messages. MR-BS determines cumulative delay based on information received from RS and scheduling information. When MBS data is scheduled, the maximum transit delays to all access RSs are determined by the MR-BS, while the maximum transit delay should reflect the QoS level associated with different MBS CID. In other words, different MBS connections may have different values of maximum transit delay in one MR cell. The MR-BS shall then calculate the required waiting time for each connection in each RS based on the value of cumulative delay and processing time reported by RS. For a given RS, MR-BS configures different waiting delays for different MBS connection. High priority MBS connections are configured with short waiting delays. Low priority MBS ones are configured with long transit delay to let limited bandwidth firstly served to other time-constraint services.

An example is illustrated in Fig. 1, there are two MBSs with CID1 and CID2, where the first one has higher QoS priority. In the case of limited bandwidth, MR-BS allocates resource for the MBS with CID1 firstly with short waiting time configured. In comparison, the MBS traffic with CID2 is configured with a longer waiting time in RS. RS may receive MBS data within one frame, however re-transmits different MBS data at different frames.

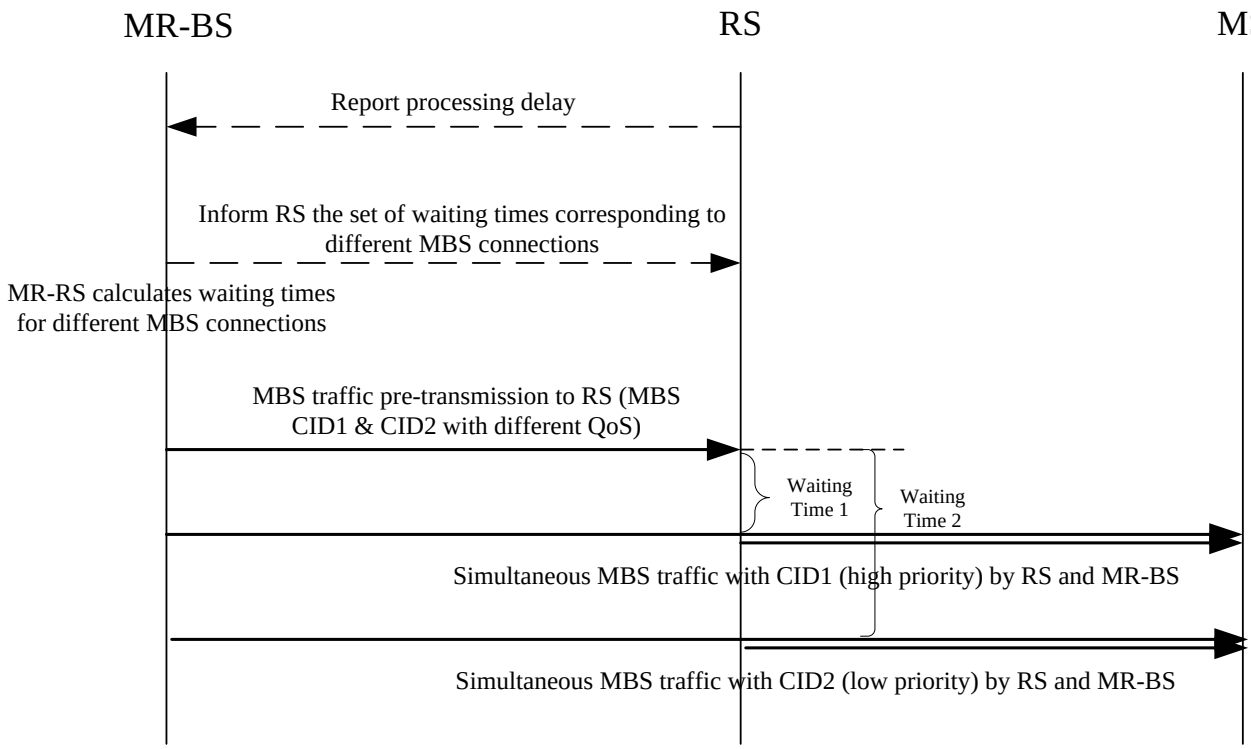

Fig.1 Procedures of Synchronized MBS for Multi-hop Relaying

MR-BS also knows the traffic status information for each RS. Based on its knowledge, MR-BS may adaptively adjust the waiting time for each connection in different RS. How to collect the traffic status information is outside the scope of this contribution.

This document proposes a synchronized QoS-aware MBS scheme for multi-hop relay. It associates RS waiting time with MBS connection, and thus provides QoS support for MBS transmission. It can be taken as optional complementarities to existing MBS transmission.

Proposed Text Changes

[Modify text in section 6.3.23.3:]

For MR networks, MBS transmission within an MBS zone shall be synchronized. In Multi-MR-BS-MBS case, MR-BSs should be synchronized in network level as described in section 6.3.23.2.

If there is only one RS connecting with the MR-BS, that RS shall report its processing delay (in units of a frame), D_R to the MR-BS as a capability parameter in the SBC-REQ message. Optionally, the MR-BS may determine the waiting delay, D_j for each connection based on their service level. When an MBS transmission is necessary, the MR-BS shall first send the MBS data over the relay downlink as a pre-transmission, and then after D_R frames or optionally after D_j frames regarding different connections, the MR-BS and RS shall synchronously transmit this MBS data over the access link.

If there are multiple RSs in the MBS zone at various hop counts from the MR-BS and/or with different processing delays, each RS shall report its processing delay, D_R, to the MR-BS as a capability parameter in the

SBC-REQ message. The MR-BS shall determine the maximum cumulative delay, D_M, of all RSs in the MBS zone based on their positions in the tree and their individual processing delays. The MR-BS shall then calculate the required waiting time, W_i, for each RS based on the value of D_M and each RS's cumulative delay and notify each RS of its waiting time via an SBC-RSP message. If the MR-BS detects that the waiting time has changed for a particular RS, it may send an unsolicited SBC-RSP message to that RS to update its waiting time. Optionally, the MR-BS may determine the maximum cumulative delays, D_M, of all RSs in the MBS zone for each connection based on their service level, as well as their positions in the tree and their individual processing delays. The MR-BS shall then calculate the required waiting time, Wi, for each connection in different RS based on the value of D_M and each RS's cumulative delay and notify each RS of its waiting time, as well as corresponding connection via an SBC-RSP message.

When an MBS transmission is necessary, the MR-BS shall forward the MBS data over the relay downlink as a pre-transmission D_M frames before transmitting this MBS data over the access link. Each RS in the MBS M zone shall forward the MBS data it receives over the relay downlink. Finally, once the MR-BS has waited D_M frames and each RS has waited its specified waiting time, W_i, the MR-BS and RSs shall synchronously transmit the MBS data over the access link.

[Insert the subclause as follows]

11.8.3.7.X RS waiting time for MBS

Type	Length	Value	Scope
TBA	variable	Compound	SBC-RSP

These TLV values shall appear in each above TLV

Type	Length	Value
TBA.1	2	CID
TBA.2	1	RS waiting time regarding connection

Reference

[1] P802.16j Baseline Document (IEEE 802.16j-06/026r4)