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Title	QoS Signaling for Distributed Scheduling		
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Re:	Response to the IEEE 802.16 Working Group Letter Ballot #28 (i.e., IEEE 802.16j-07/043).		
Abstract	This contribution proposes changes to DSA/DSC message to accommodate per hop QoS information when distributed scheduling is used.		
Purpose	Discuss and adopt proposed text in TG16j		
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QoS Signaling for Distributed Scheduling

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Introduction

As defined in draft document IEEE 802.16j_D1, when distributed scheduling is used, each RS will perform bandwidth allocation of its relay links and access link based on QoS requirements and channel conditions. In IEEE 802.16j_D1, it is already defined that each RS will receive the end-to-end QoS parameters during transport connection set up using DSA-* signaling and will receive the update to the parameters using DSC-*. However, the end to end QoS parameters need to be translated into per-hop parameters to allow each RS to schedule effectively to ensure overall QoS performance.

This contribution proposes changes to DSA/DSC message to accommodate per hop QoS information when distributed scheduling is used.

Problem Statement

As defined in draft document IEEE 802.16j_D1, when distributed scheduling is used, each RS will perform bandwidth allocation of its relay links and access link based on QoS requirements and channel conditions. In IEEE 802.16j_D1, it is already defined that each RS will receive the end-to-end QoS parameters during transport connection set up using DSA-* signaling and will receive the update to the parameters using DSC-*. However, some of the end to end QoS parameters need to be translated into per-hop parameters to allow each RS to schedule effectively to ensure overall QoS performance. One example of this type of parameter is maximum latency, where the allowed latency needs to be subdivided to a number of per-hop latencies. The subdivision should be performed by MR-BS in a centralized fashion based on factors such as topology and loading at each RS. And the per-hop QoS parameters should be sent to each RS along the path during service flow set up or modification (DSA/DSC).

Proposed Solution

This contribution proposes the following changes to standard:

- Add a per-hop QoS TLV in DSA/DSC message
- Modify text in section 6.3.14.2 to accommodate the addition.

Proposed Text

[Insert the following paragraph to section 6.3.14.9.3.1, page 122, line 55]

6.3.14.9.3.1 SS-initiated DSA

- If the service flow is not mapped to a tunnel, the MR-BS may send a DSA-REQ using the requested service flow parameter to all the RS on the path to obtain admission control decision. The CID in the service flow parameter should be the CID of the individual service flow.

- The MR-BS may include Per-RS QoS TLV in DSC-REQ to RS. If RS receives Per-RS QoS TLV, RS shall use values in Per-RS QoS TLV instead of the ones for the service flow.

[Insert the following paragraph to section 6.3.14.9.4.1, page 123, line 53]

6.3.14.9.4.1 SS-initiated DSC

In MR network with distributed scheduling, before admitting the changes and sending DSC-RSP to the requesting station which could be an MS or RS, the MR-BS shall send DSC-REQ to all the RSs on the path to request for admission control decisions. The MR-BS may include Per-RS QoS TLV in DSC-REQ to RS. If RS receives Per-RS QoS TLV, RS shall use values in Per-RS QoS TLV instead of the ones for the service flow. If the service flow is mapped to a tunnel, the CID in the service flow parameter should be the tunnel CID; otherwise, the CID for the service flow is included. Such DSCREQ is first sent from MR-BS to its subordinate RS using its primary management CID.

[Insert the following paragraph to section 6.3.14.9.4.2, page 124, line 31]

6.3.14.9.4.2 BS-initiated DSC

In MR network with distributed scheduling, before MR-BS sending DSC-REQ to an MS or RS to modify an existing service flow, the MR-BS may first send DSC-REQ to all the RSs on the path to request for admission control decision. The MR-BS may include Per-RS QoS TLV in DSC-REQ to RS. If RS receives Per-RS QoS TLV, RS shall use values in Per-RS QoS TLV instead of the ones for the service flow. Such DSC-REQ is first sent from MR-BS to its subordinate RS using its primary management CID. If the RS' resource condition cannot support the requested SF parameter, it updates the SF parameter with the one it can support.

[Insert the following section 11.13.38, page 124, line 31]

11.13.38 Per-RS QoS

Table 7a—Relay MAC PDU header

<u>Name</u>	<u>Type</u> <u>(1 byte)</u>	<u>Length</u> <u>(1 byte)</u>	<u>Value</u>	<u>Scope</u>
<u>Per-RS QoS</u>	<u>TBD</u>	<u>Variable</u>	<u>Compound</u>	<u>DSA-REQ/RSP</u> <u>DSC-REQ/RSP</u>

The following TLV values shall appear in each Per-RS QoS TLV

<u>Name</u>	<u>Type</u> <u>(1 byte)</u>	<u>Length</u> <u>(1 byte)</u>	<u>Value</u>
<u>RS Basic CID</u>	<u>TBD</u>	<u>Variable</u>	<u>Compound</u>
<u>Maximum Latency for the</u> <u>RS</u>	<u>TBD</u>	<u>4</u>	<u>Milliseconds</u>

Reference

- [1] "Air Interface for Fixed and Mobile Broadband Wireless Access Systems - Multihop Relay Specification", IEEE 802.16j-06/026r4, June 2007