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Re:	This contribution is a response to ” IEEE 802.16j-07/007r2 Call for Technical Comments and Contributions regarding IEEE Project 802.16j” (2007-02-19)
Abstract	This document proposes service flow management sequence through RS.
Purpose	This document is provided in response for Call for Technical Comments and Contributions regarding IEEE Project 802.16j
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Service flow management for RS

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1. General

This document presents an amendment for service flow management of RS.

2. Background

In centralized scheduling case, the MRBS manages all subordinate nodes. However, in distributed scheduling case, the MR-BS does not need to manage all nodes, and RS may be able to manage its subordinate node by itself.

Based on the method proposed in [2], the management message sent by the MR-BS can be read and authenticated by the nodes on the mulit-hop link. We propose the service flow management sequence through RS for centralized/distributed scheduling case.

3. Text to be inserted into standard

6.3.14.9.3 DSA
6.3.14.9.3.1 SS-initiated DSA
Insert the following table the end of 6.3.14.9.3.1:

In MR centralized scheduling case, a RS only forwards each DSA messages from SS to MR-BS and vice versa. The MR-BS checks whether the QoS requirements can be supported both on relay link (MR-BS ~ RS) and on access link (RS ~ MS). This process is illustrated in Table 125a.

Table 125a – DSA initiated from SS through RS (Centralized scheduling case)

SS		RS		MR-BS
New service flow needed				
Check if resource are available				
Send DSA-REQ	--DSA-REQ-->	Receive / Send DSA-REQ	--DSA-REQ-->	Receive DSA-REQ
Set Timers T7 and T14				
Timer T14 Stops	<--DSX-RVD--	Receive / Send DSX-RVD	<--DSX-RVD--	DSA-REQ integrity valid
				Check whether SS is authorized for Service
				Check whether service flow QoS can be supported both on relay link and on access link
				Create SFID
				If uplink AdmittedQoSParamSet is non-null, map service flow to CID
				If uplink ActiveQoSParamSet is non-null, Enable reception of data on new uplink service flow
Receive DSA-RSP	<--DSA-RSP--	Receive / Send DSA-RSP	<--DSA-RSP--	Send DSA-RSP
Timer T7 Stops				
If ActiveQoSParamSet is non-null, Enable transmission and/or reception of data on new service flow				
Send DSA-ACK	--DSA-ACK-->	Receive / Send DSA-ACK	--DSA-ACK-->	Receive DSA-ACK
				If downlink ActiveQoSParamSet is non-null, Enable transmission of data on new downlink service flow

[a] Authorization happens prior to the DSA-REQ being received by the BS. The details of BS signaling to anticipate a DSA-REQ are beyond the scope of this standard.

In MR distributed scheduling case, RS shall check whether the QoS requirements can be supported on access link (RS ~ SS) or relay link (RS ~ RS) based on the received DSA-RSP. If it can be supported, RS shall send DSA-RSP to the MS or its subordinate RS and send the DSA-ACK to the BS. Otherwise, RS shall respond DSA-RSP with DSA-ACK with CC=reject to the MR-BS.

The MR-BS checks whether the QoS requirements can be supported on relay link (MR-BS ~ RS). This process is illustrated in Table 125b.

Table 125b – DSA initiated from SS through RS (Distributed scheduling case)

SS		RS		MR-BS
New service flow needed				
Check if resource are available				
Send DSA-REQ	--DSA-REQ-->	Receive / Send DSA-REQ	--DSA-REQ-->	Receive DSA-REQ
Set Timers T7 and T14				
Timer T14 Stops	<--DSX-RVD--	Receive / Send DSX-RVD	<--DSX-RVD--	DSA-REQ integrity valid
				Check whether SS is authorized for Service
				Check whether service flow QoS can be supported on relay link (BS~RS)
				Create SFID
				If uplink AdmittedQoSParamSet is non-null, map service flow to CID
				If uplink ActiveQoSParamSet is non-null, Enable reception of data on new uplink service flow

		Receive / Send DSA-RSP	<--DSA-RSP--	Send DSA-RSP
		Check whether service flow (s) QoS can be supported on access link (RS~SS)		
		No → If the QoS can not be supported, reply DSA-ACK (CC=reject) to MR-BS		
		Send DSA-ACK (CC=reject)	--DSA-ACK-->	Receive DSA-ACK (CC=reject)
Receive DSA-RSP	<--DSA-RSP-	*Yes* → Send DSA-RSP		
Timer T7 Stops If ActiveQoSParamSet is non-null, Enable transmission and/or reception of data on new service flow		If ActiveQoSParamSet is non-null, Enable transmission and/or reception of data on new service flow		
Send DSA-ACK	--DSA-ACK-->	Receive / Send DSA-ACK	--DSA-ACK-->	Receive DSA-ACK If downlink ActiveQoSParamSet is non-null, Enable transmission of data on new downlink service flow

[a] Authorization happens prior to the DSA-REQ being received by the BS. The details of BS signaling to anticipate a DSA-REQ are beyond the scope of this standard.

6.3.14.9.3.2 BS-initiated DSA

Insert the following table the end of 6.3.14.9.3.2:

In MR centralized scheduling case, a RS only forwards each DSA messages from MR-BS to SS and vice versa. The MR-BS checks whether the QoS requirements can be supported both on relay link (MR-BS ~ RS) and on access link (RS-MS). This process is illustrated in Table 126a.

Table 126a – DSA initiated from BS through RS (Centralized scheduling case)

SS		RS		MR-BS
				New service flow required for SS Check whether SS is authorized for Service Check whether service flow(s) QoS can be supported both on relay link and on access link Create SFID If AdmittedQoSParamSet is non-null, map service flow to CID
Receive DSA-REQ	<--DSA-REQ--	Receive / Send DSA-REQ	<--DSA-REQ--	Send DSA-REQ Set Timer T7
Confirm that SS can support service flow Add Downlink SFID (if present) Enable reception on any new downlink service flow				
Send DSA-RSP	--DSA-RSP-->	Receive / Send DSA-RSP	--DSA-RSP-->	Receive DSA-RSP Timer T7 Stops Enable transmission (downlink) or reception (uplink) of data on new service flow
Receive DSA-ACK	<--DSA-ACK--	Receive / Send DSA-ACK	<--DSA-ACK--	Send DSA-ACK
Enable transmission on new uplink service flow				

In MR distributed scheduling case, the MR-BS only checks whether the QoS requirements can be supported on relay link (MR-BS ~ RS).

RS shall check whether the QoS requirements can be supported on access link (RS-SS) or relay link(RS-RS) based on the received DSA-REQ. If it can be supported, RS shall send DSA-REQ to the MS or its subordinate RS and send the DSA-RSP to the MR-BS. Otherwise, RS shall respond the DSA-REQ with DSA-RSP with CC=reject to the BS. This process is illustrated in Table 126b.

Table 126b – DSA initiated from BS through RS (Distributed scheduling case)

SS		RS		MR-BS
				New service flow required for SS Check whether SS is authorized for Service Check whether service flow(s) QoS can be supported on relay link (MR-BS ~ RS) Create SFID If AdmittedQoSParamSet is non-null, map service flow to CID
		Receive / Send DSA-REQ	<--DSA-REQ--	Send DSA-REQ Set Timer T7
		Check whether service flow(s) QoS can be supported on access link (RS~SS) *No*: If the QoS can not be supported, reply DSA-RSP (CC=reject) to BS		
		Yes: Send DSA-RSP (CC=reject)	--DSA-RSP-->	Receive DSA-RSP (CC=reject)
Receive DSA-REQ	<--DSA-REQ--	Send DSA-REQ		
Confirm that SS can support service flow Add Downlink SFID (if present) Enable reception on any new downlink service flow		Add Downlink SFID (if present) Enable reception of data on new service flow		
		Send DSA-RSP	--DSA-RSP-->	Receive DSA-RSP
Send DSA-RSP	--DSA-RSP-->	Receive / Send DSA-RSP	--DSA-RSP-->	Receive DSA-RSP Timer T7 Stops Enable transmission (downlink) or reception (uplink) of data on new service flow
Receive DSA-ACK Enable transmission on new uplink service flow	<--DSA-ACK--	Receive / Send DSA-ACK Enable transmission of data on new service flow	<--DSA-ACK--	Send DSA-ACK

6.3.14.9.4 DSC

6.3.14.9.4.1 SS-initiated DSC

Insert the following table the end of 6.3.14.9.4.1:

In MR centralized scheduling case, a RS only forwards each DSC messages from SS to MR-BS and vice versa. The MR-BS checks whether the modified requirements can be supported both on relay link (MR-BS ~ RS) and on access link (RS-MS). This process is illustrated in Table 127a.

Table 127a – SS-initiated DSC through RS (Centralized scheduling case)

MR-BS		RS		SS
				Service flow requires modifying
Receive DSC-REQ	<--DSC-REQ--	Receive / Send DSC-REQ	<--DSC-REQ--	Send DSC-REQ Set Timers T7 and T14
DSC-REQ integrity valid	--DSX-RVD-->	Receive / Send DSX-RVD	--DSX-RVD-->	Timer T14 Stops
Validate Request both on relay link and on access link				
Modify service flow				
Increase Channel Bandwidth if Required				
Send DSC-RSP	--DSC-RSP-->	Receive / Send DSC-RSP	--DSC-RSP-->	Receive DSC-RSP
				Timer T7 Stops
				Modify service flow
				Adjust Payload Bandwidth
Receive DSC-ACK	<--DSC-ACK--	Receive / Send DSC-ACK	<--DSC-ACK--	Send DSC-ACK
Decease Channel Bandwidth if Required				

In MR distributed scheduling case, RS shall check whether the modified requirements can be supported on access link (RS-SS) or relay link(RS-RS) based on the received DSA-RSP. If it can be supported, RS shall send DSA-RSP to the MS or its subordinate RS and send the DSA-ACK to the BS. Otherwise, RS shall respond DSA-RSP with DSA-ACK with CC=reject to the MR-BS.

The MR-BS checks whether the modified requirements can be supported on relay link (MR-BS ~ RS). This process is illustrated in Table 127b.

Table 127b – SS-initiated DSC through RS (Distributed scheduling case)

MR-BS		RS		SS
				Service flow requires modifying
Receive DSC-REQ	<--DSC-REQ--	Receive / Send DSC-REQ	<--DSC-REQ--	Send DSC-REQ Set Timers T7 and T14
DSC-REQ integrity valid	--DSX-RVD-->	Receive / Send DSX-RVD	--DSX-RVD-->	Timer T14 Stops
Validate Request on relay link (MR-BS ~ SS)				
Modify service flow				
Increase Channel Bandwidth if Required				
Send DSC-RSP	--DSC-RSP-->	Receive / Send DSC-RSP	--DSC-RSP-->	Receive DSC-RSP
		Check whether required service flow(s) QoS can be supported on access link (RS~SS)		
		If the QoS can not be supported, reply DSC-ACK (CC=reject) to SS	*No*	
Receive DSC-ACK (CC=reject)	<--DSC-ACK--	Send DSC-ACK (CC=reject)	*Yes*	
		Send DSC-RSP	DSC-RSP-->	Receive DSC-RSP
		Modify service flow		Timer T7 Stops
		Increase access uplink and decrease relay downlink Payload Bandwidth if required.		Modify service flow
				Adjust Payload Bandwidth
Receive DSC-ACK	<--DSC-ACK--	Receive / Send DSC-ACK	<--DSC-ACK--	Send DSC-ACK
Decease Channel Bandwidth if Required				

Send DSC-ACK	--DSC-ACK-->	Receive DSC-ACK Modify service flow Decrease access uplink and increase relay downlink Payload Bandwidth if required.		

6.3.14.9.4.2 BS-initiated DSC

Insert the following table the end of 6.3.14.9.4.2:

In MR centralized scheduling case, a RS only forwards each DSC messages from MR-BS to SS and vice versa. The MR-BS checks whether the modified requirements can be supported both on relay link (MR-BS ~ RS) and on access link (RS ~ MS). This process is illustrated in Table 128a.

Table 128a – MR-BS-initiated DSC through RS (Centralized scheduling case)

MR-BS		RS		SS
Service flow requires modifying Validate the modifying both on relay link and on access link				
Send DSC-REQ Set Timers T7	--DSC-REQ-->	Receive / Send DSC-REQ	--DSC-REQ-->	Receive DSC-REQ Validate Request Modify service flow Decrease Payload Bandwidth if Required
Receive DSC-RSP Timer T7 Stops Modify service flow Adjust Payload Bandwidth	<--DSC-RSP--	Receive / Send DSC-RSP	<--DSC-RSP--	Send DSC-RSP
Send DSC-ACK	--DSC-ACK-->	Receive / Send DSC-ACK	--DSC-ACK-->	Receive DSC-ACK Increase Payload Bandwidth if Required

In MR distributed scheduling case, the MR-BS only checks whether the modified requirements can be supported on relay link (MR-BS ~ RS).

And then the RS shall check whether the modified requirements can be supported on access link (RS-SS) or relay link (RS-RS) based on the received DSC-REQ. If the requirement can be supported, the RS transfers a DSC-REQ message to the MS or its subordinate RS and replies the DSC-RSP to the MR-BS. Otherwise, RS shall reply a DSC-RSP with CC=reject in order to inform the requirements can be not supported. This process is illustrated in Table 128b.

Table 128b – MR-BS-initiated DSC through RS (Distributed scheduling case)

MR-BS		RS		SS
Service flow requires modifying				
Validate the modifying on relay link (MR-BS ~ RS)				
Send DSC-REQ Set Timers T7	--DSC-REQ-->	Receive / Send DSC-REQ		
		Check whether required service flow(s) QoS can be supported on access link (RS~SS)		
		If the QoS can not be supported, reply DSC-RSP (CC=reject) to MR-BS	*No*	
Receive DSA-RSP (CC=reject)	<--DSC-RSP--	Send DSA-RSP (CC=reject)	*Yes*	
		Send DSC-REQ	DSC-REQ-->	Receive DSC-REQ
		Modify service flow		Validate Request
		Decrease relay uplink and increase access downlink Payload Bandwidth if required.		Modify service flow Decrease Payload Bandwidth if Required
Receive DSC-RSP Timer T7 Stops	<--DSC-RSP--	Receive / Send DSC-RSP	<--DSC-RSP--	Send DSC-RSP
Modify service flow				
Adjust Payload Bandwidth				
Send DSC-ACK	--DSC-ACK-->	Receive / Send DSC-ACK	--DSC-ACK-->	Receive DSC-ACK
		Increase relay uplink and decrease access downlink Payload Bandwidth if Required		Increase Payload Bandwidth if Required

6.3.14.9.5 Connection release

6.3.14.9.5.1 SS-initiated DSD

Insert the following table the end of 6.3.14.9.5.1:

In MR centralized scheduling case, the MR-BS shall delete the service flow both on relay link (MR-BS ~ RS) and on access link (RS-SS). This process is illustrated in Table 129b.

Table 129a – DSD-initiated from SS through RS (Centralized scheduling case)

SS		RS		MR-BS
Service flow no longer needed				
Delete service flow				
Send DSD-REQ	--DSD-REQ-->	Receive / Send DSD-REQ	--DSD-REQ-->	Receive DSD-REQ
				Verify SS is service flow "owner"
				Delete service flow both on relay link and on access link
Receive DSD-RSP	<--DSD-RSP--	Receive / Send DSD-RSP	<--DSD-RSP--	Send DSD-RSP

In MR distributed scheduling case, the MR-BS shall delete the service flow on relay link (MR-BS ~ RS). And then the RS shall delete the service flow on access link (RS-SS). This process is illustrated in Table 128b.

Table 129b – DSD-initiated from SS through RS (Distributed scheduling case)

SS		RS		MR-BS
Service flow no longer needed				
Delete service flow				
Send DSD-REQ	--DSD-REQ-->	Receive / Send DSD-REQ	--DSD-REQ-->	Receive DSD-REQ
				Verify SS is service flow "owner"
				Delete service flow on relay link (MR-BS ~ RS)
Receive DSD-RSP	<--DSD-RSP--	Receive / Send DSD-RSP	<--DSD-RSP--	Send DSD-RSP
		Delete service flow on access link (RS ~ SS)		

6.3.14.9.5.2 BS-initiated DSD

Insert the following table the end of 6.3.14.9.5.2:

In MR centralized scheduling case, the MR-BS shall delete the service flow both on relay link (MR-BS ~ RS) and on access link (RS-SS). This process is illustrated in Table 130b.

Table 130a – DSD-initiated from MR-BS through RS (Centralized scheduling case)

SS		RS		MR-BS
				Service flow no longer needed
				Delete service flow both on relay link and on access link
				Determine associated SS for this service flow
Receive DSD-REQ	<--DSD-REQ--	Receive / Send DSD-REQ	<--DSD-REQ--	Send DSD-REQ
Delete service flow				
Send DSD-RSP	--DSD-RSP-->	Receive / Send DSD-RSP	--DSD-RSP-->	Receive DSD-RSP

In MR distributed scheduling case, the MR-BS shall delete the service flow on relay link (MR-BS ~ RS). And then the RS shall delete the service flow on access link (RS-SS). This process is illustrated in Table 130b.

Table 130b – DSD-initiated from MR-BS through RS (Distributed scheduling case)

SS		RS		MR-BS
				Service flow no longer needed
				Delete service flow on relay link (MR-BS ~ RS)
				Determine associated SS for this service flow
Receive DSD-REQ	<--DSD-REQ--	Receive / Send DSD-REQ	<--DSD-REQ--	Send DSD-REQ
Delete service flow		Delete service flow on access link (RS ~ SS)		
Send DSD-RSP	--DSD-RSP-->	Receive / Send DSD-RSP	--DSD-RSP-->	Receive DSD-RSP

References

[1] IEEE 802.16j-06/282, "Service flow management for RS", Kenji Saito, Takashi Inoue
[2] IEEE 802.16j-07/188, "Shared Management Message: Format, Transfer and Security", Shulan Feng, Yanling Lu, Ting Li, Liangliang Zhang, Hisilicon Technologies.