Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**Improved service flow management process in two-hops distributed security MR**
Date Submitted	**2008-03-15**

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Re:	IEEE 802.16-08/007: “IEEE 802.16 Working Group Letter Ballot Recirc #28b: Announcement”
Abstract	This contribution proposes SF management in two-hop MR systems in distributed security mode.
Purpose	Text proposal for 802.16j Draft Document.
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Improved service flow management process in two-hops distributed security MR

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Introduction

In an MR network operating in distributed scheduling mode, the MR-BS shall send a DSx-message to RSs for the purpose of admission control and/or path management.

Figure 1 shows an example of BS-initiated service flow addition procedure.

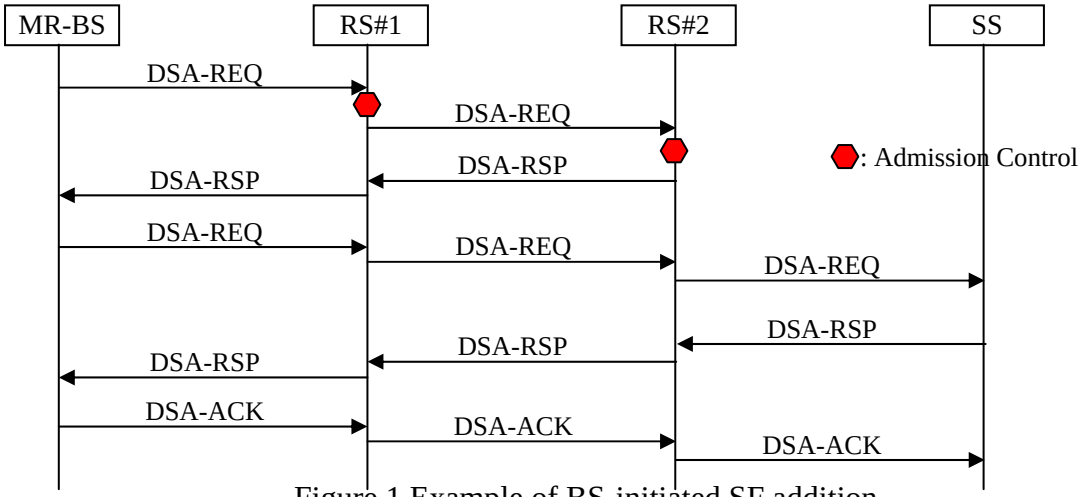

Figure 1 Example of BS-initiated SF addition

The reason why the MR-BS uses a separate DSx-message for admission control and/or path management is that not all RSs can get information from DSx messages exchanged between the MR-BS and RS due to lack of SS security context.

In a two-hop MR network with RSs operating in distributed scheduling and security mode, however, an access RS can get service flow parameters directly from DSx messages sent from/to an SS. Therefore, in order to save additional signaling, the MR-BS does not need to send the separate DSx messages to the RS.

This contribution proposes a method of obtaining SF parameters for an access RS operating in distributed scheduling/security mode in a two-hop MR.

Proposed Method

(1) SS initiated SF addition/change

Figure 2 shows an example of SS-initiated SF addition procedure.

In this figure, management messages transmitted on the access link is protected by the CMAC calculated with a key shared between the RS and the SS, while messages on the relay link is protected by the CMAC calculated with a key shared between the MR-BS and the RS.

When the RS receives DSA-REQ from an SS, it examines the requested SF parameters.

If the RS can fulfill the requested SF parameters, it forwards the DSA-REQ to the MR-BS.

When the RS cannot fulfill the requested SF parameters, it adds ‘acceptable SF parameter TLV’ to the DSA-REQ and forward it to the MR-BS. The acceptable SF parameters TLV indicates SF parameters it can support.

So, the MR-BS receives the DSA-REQ which contains the SF parameters originally requested by the SS and the ones the RS can support. The MR-BS may be able to use both SF parameters for admission control with other network entity support. The detail usage of both SF parameters is out-of scope of the 16j document.

After handling the DSA-REQ, the MR-BS sends DSA-RSP containing CID information.

The RS can obtain CID information and other SF parameters from the received DSA-RSP and forward it to SS after re-calculating CMAC.

The same message flow can be used for SS-initiated DSC procedure.

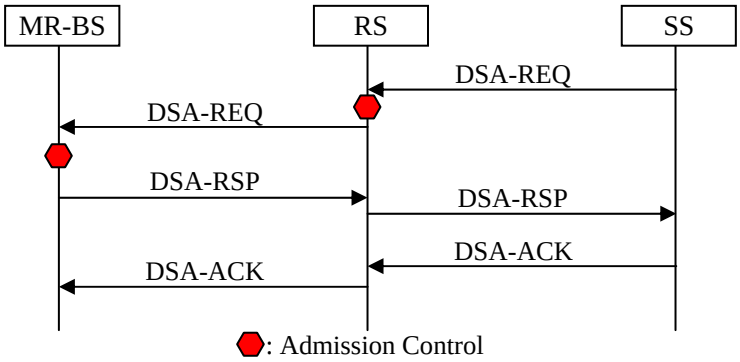

Figure 2 Example of SS-initiated SF addition/change

(2) BS initiated SF addition/change

Figure 3 shows an example of BS-initiated SF addition procedure.

In this figure, management messages transmitted on the access link is protected by the CMAC calculated with a key shared between the RS and the SS, while messages on the relay link is protected by the CMAC calculated with a key shared between the MR-BS and the RS.

The MR-BS sends DSA-REQ containing the SF parameters including CID information. The DSA-REQ may contain ‘minimum QoS parameter set’ which indicates the minimum requirement for the service flow.

When the RS receives DSA-REQ from the MR-BS, it stores CID and examines the requested SF parameters.

If the RS can fulfill the requested SF parameters, it forwards the DSA-REQ to the SS.

When the RS cannot fulfill the requested SF parameters and can support the minimum QoS parameter set, it updates the SF parameter to fulfill the minimum QoS parameter set. It then sends the DSA-REQ to the SS after removing the minimum QoS parameter set TLV.

When the RS cannot fulfill the requested SF parameters and the minimum QoS parameter set, it sends DSA-RSP to the MR-BS with the confirmation code of ‘reject-RS cannot support’. The DSA-RSP may contain acceptable QoS parameter set it can support.

After handling the DSA-REQ, the SS sends back DSA-RSP toward the MR-BS.

The same message flow can be used for BS-initiated DSC procedure.

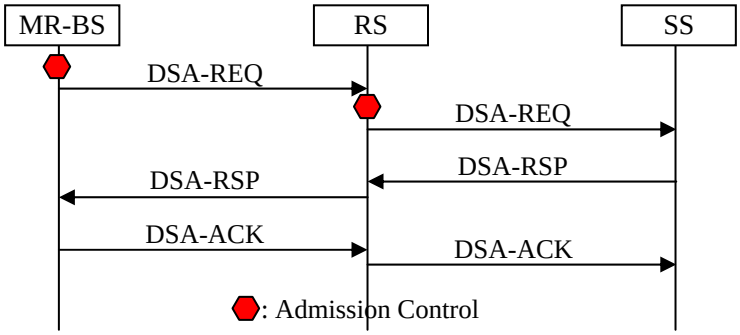

Figure 3 Example of BS-initiated SF addition/change

Specification Changes

Add the following text at the end of the 6.3.14.9.3.1 (SS-initiated DSA).

"In a two-hop MR network with RSs operating in distributed scheduling and security mode, when a DSA-REQ message is sent from an SS, the access RS and the MR-BS may deal with the message in the following way.

- The RS may add the acceptable SF parameter to the DSA-REQ if it cannot support the requested SF parameter. It then sends the DSA-REQ to the MR-BS using the primary management CID of the SS.
- The RS may include Per-RS QoS TLV in the DSA-REQ to the MR-BS. The Per-RS QoS TLV in this case represents the maximum latency at the RS to relay the requested service flow. If the MR-BS receives Per-RS QoS TLV, the MR-BS shall consider the value in Per-RS QoS TLV and ones in the requested QoS parameter set.
- The RS may get the updated SF parameters and confirmation code from DSA-RSP and DSA-ACK sent from the MR-BS and the SS, respectively.
- Upon receiving the DSA-REQ from the SS via the RS, the MR-BS sends back a response to the SS in the same way defined for non-relay systems. Algorithm of admission control is out of scope of this document.
- If the service flow is mapped to a tunnel and the service flow parameters for the tunnel is changed, the MR-BS shall send a DSC-REQ to the access RS before sending DSA-RSP to the SS in the same manner as defined above."

Add the following text at the end of the 6.3.14.9.3.2 (BS-initiated DSA).

"In a two-hop MR network with RSs operating in distributed scheduling and security mode, when an MR-BS initiates a DSA-REQ message to an SS via an access RS, the access RS and the MR-BS may deal with the message in the following way.

- If the service flow is mapped to a tunnel and the service flow parameters for the tunnel is changed the MR-BS shall send a DSC-REQ to the access RS before sending the DSA-REQ to the SS in the same manner as defined above."
- The MR-BS may include the minimum SF parameter to the DSA-REQ in addition to the requested SF parameter. The minimum SF parameter represents the minimum requirement that the service flow shall meet.
- The MR-BS may include Per-RS QoS TLV in the DSA-REQ to RS. If the RS receives Per-RS QoS TLV, the RS shall use values in Per-RS QoS TLV instead of the ones in the service flow parameters.
- When the RS can support the requested SF parameter, it sends the DSA-REQ to the SS using the primary management CID of the SS after removing the minimum SF parameter.

- When the RS cannot support the requested SF parameter but can support the minimum SF parameter in the DSA-REQ, the RS may update the SF parameter with the one it can support. It then sends the DSA-REQ to the SS using the primary management CID of the SS after removing the minimum SF parameter.
- When the RS cannot support the minimum SF parameter in the DSA-REQ, it sends DSA-RSP back to the MR-BS indicating that it can support neither the requested nor the minimum SF parameters. The DSA-RSP may contain the acceptable SF parameters the RS can support.
- The RS may get the updated SF parameters and confirmation code from DSA-RSP and DSA-ACK sent from the SS and the MR-BS, respectively.

Add the following text at the end of the 6.3.14.9.4.1 (SS-initiated DSC).

"In a two-hop MR network with RSs operating in distributed scheduling and security mode, when a DSC-REQ message is sent from an SS, an access RS and the MR-BS may deal with the message in the following way.

- The RS may add the acceptable SF parameter to the DSC-REQ if it cannot support the requested SF parameter. It then sends the DSC-REQ to the MR-BS using the primary management CID of the SS.
- The RS may include Per-RS QoS TLV in the DSC-REQ to the MR-BS. The Per-RS QoS TLV in this case represents the maximum latency at the RS to relay the requested service flow. If the MR-BS receives Per-RS QoS TLV, the MR-BS shall consider the value in Per-RS QoS TLV and ones in the requested QoS parameter set.
- The RS may get the updated SF parameters and confirmation code from DSC-RSP and DSC-ACK sent from the MR-BS and the SS, respectively.
- Upon receiving the DSC-REQ from the SS via the RS, the MR-BS sends back a response to the SS in the same way defined for non-relay systems. Algorithm of admission control is out of scope of this document."
- If the service flow is mapped to a tunnel and the service flow parameters for the tunnel is changed, the MR-BS shall send a DSC-REQ to the access RS before sending DSC-RSP to the SS in the same manner as defined above."

Add the following text at the end of the 6.3.14.9.4.2 (BS-initiated DSC).

"In a two-hop MR network with RSs operating in distributed scheduling and security mode, when an MR-BS initiates a DSC-REQ message to an SS via an access RS, the access RS and the MR-BS may deal with the message in the following way.

- If the service flow is mapped to a tunnel and the service flow parameters for the tunnel is changed, the MR-BS shall send a DSC-REQ to the access RS before sending the DSC-REQ to the SS in the same manner as defined above."
- The MR-BS may include the minimum SF parameter to the DSC-REQ in addition to the requested SF parameter. The minimum SF parameter represents the minimum requirement that the service flow shall meet.
- The MR-BS may include Per-RS QoS TLV in DSC-REQ to RS. If the RS receives Per-RS QoS TLV, the RS shall use values in Per-RS QoS TLV instead of the ones in the service flow parameters.
- When the RS can support the requested SF parameter, it sends the DSC-REQ to the SS using the primary management CID of the SS after removing the minimum SF parameter.
- When the RS cannot support the requested SF parameter but can support the minimum SF parameter in the DSC-REQ, the RS may update the SF parameter with the one it can support. It then sends the DSC-REQ to the SS using the primary management CID of the SS after removing the minimum SF parameter.
- When the RS cannot support the minimum SF parameter in the DSC-REQ, it sends DSC-RSP back to the MR-BS indicating that it cannot support the requested and minimum SF parameters. The DSC-RSP may contain the acceptable SF parameters the RS can support.
- The RS may get the updated SF parameters and confirmation code from DSC-RSP and DSC-ACK sent

from the SS and the MR-BS, respectively.

Add the following text at the end of the 6.3.14.9.5.1 (SS-initiated DSD).

"In a two-hop MR network with RSs operating in distributed scheduling and security mode, when a DSD-REQ message is sent from an SS, the access RS relays it to the MR-BS using the primary management CID of the SS. After processing the DSD-REQ, the MR-BS replies with a DSD-RSP using the SS primary management CID. When the access RS receives the DSD-RSP, it deletes the service flow information and relays it to the SS. If the service flow is mapped to a tunnel and the service flow parameters for the tunnel is changed, the MR-BS shall send a DSC-REQ to the access RS in the same manner as defined above."

Add the following text at the end of the 6.3.14.9.5.2 (BS-initiated DSD).

"In a two-hop MR network with RSs operating in distributed scheduling and security mode, when an MR-BS initiates a DSD-REQ message to an SS via an access RS using the primary management CID of the SS, the access RS relays it to the SS using the primary management CID of the SS. When the access RS receives an DSD-RSP sent from the SS, it deletes the service flow information and relays it to the MR-BS. If the service flow is mapped to a tunnel and the service flow parameters for the tunnel is changed, the MR-BS shall send a DSC-REQ to the access RS in the same manner as defined above."

Modify the table in 11.13.4 (QoS parameter set type) as indicated.

Bit 0: Provisioned Set
Bit 1: Admitted Set
Bit 2: Active Set
Bit 3: Acceptable Set
Bit 4: Minimum Set
Bits ~~3~~5–7: *Reserved*

Add the text in the paragraph after the table in 11.13.4 (QoS parameter set type) as indicated.

"A BS shall handle a single update to each of the Active and Admitted QoS parameter sets. The ability to process multiple service flow encodings that specify the same QoS parameter set is not required and is left as a vendor-specific function. If a DSA/DSC contains multiple updates to a single QoS parameter set and the vendor does not support such updates, then the BS shall reply with CC 2 (reject-unrecognized-configuration-setting). The Acceptable QoS parameter set may be used for indicating QoS parameters the RS cannot support. The QoS parameters appeared in the requested QoS parameter set but not in the acceptable QoS parameter set are by default support by the RS. The Minimum QoS parameter set is used for indicating the minimum requirement of the requested service flow. The QoS parameters appeared in the requested QoS parameter set but not in the minimum QoS parameter set represents the minimum requirements." _

Add the following text at the end of the 6.3.27.2.2 (CID to path binding).

" In a two-hop MR network with RSs operating in distributed scheduling and security mode, an RS may obtain SS transport CID information from DSA/DSC-REQ/RSP transmitted from the MR-BS to the SS."

Modify the table in 11.7.8.10 (MR-BS and RS MAC feature support) as indicated.

Bit #17: DSx support
Bit #18-#23: Reserved

Add the text at the end of the 11.7.8.10 (MR-BS and RS MAC feature support) as indicated.

Bit #17 is only applicable for distributed security mode (i.e. if bit #9 is set to 1). If bit #17 is set to 1, the RS in a two-hop system directly gets SF parameters from the DSx messages exchanged between the MR-BS and an SS.

Add a new row at the end of the table 574 (Rev2) in 11.13 (Service flow management encodings) as indicated.

Table 574 – CC values

CC	Status
(skip)	*(skip)*
18	reject-RS-not-supported-parameter-value