MAC Management Message Transmission to RSs

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Purpose:
The purpose of this slide set is to introduce contribution C802.16j-06_196. This contribution is proposing Transmission Scheme of MAC Manage Message to RS Group in multi-hop relay system. Changes in the standard are described in contribution C802.16j-06_196.pdf.

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Outline

• Introduction

• Transmission scheme for MAC-Mng-Msg to a group of RS.
  • End-to-End Unicast
  • Hop-by-Hop Unicast with end-to-end response

• Summary
**Introduction**

- In single-hop system, the MAC management messages are transmitted b/w BS and MS.
- In multi-hop relay system, MAC messages (termed as MAC-Mng-Msgs) are needed for the control function between MMR-BS and RSs.
- For certain functions, MMR-BS sends a MAC-Mng-Msg to a group of RSs. For example:
  - MMR-BS may send the mapping information between an established relay path (e.g. RS-Group1 and RS-Group2) and CIDs for routing.
  - MMR-BS may send its reset/unavailable status to all the RSs.
- This contribution proposes two transmission schemes:
  - End-to-end unicast
  - Hop-by-hop unicast
End-to-End Unicast with End-to-End Response

- MMR-BS unicasts the MAC-Mng-Msg to each RS in the RS-Group. The response message from each RS is unicast directly to the MMR-BS.
- Procedure is simple and involves less complexity on RS.
- Overhead introduced by this scheme is non-trivial especially if the number of RSs on one relay path is large.
Hop-by-Hop Unicast with End-to-end Response

- The MAC-Mng-Msg is unicast on each hop and processed by each RS.
  - Message contains Path ID, which represents relay path. This is established across relays during path establishment.
- Upon receiving the MAC-Mng-Msg, each RS sends a response directly to the MMR-BS.
- If the response is success, the RS forwards it to the next hop. Otherwise, the procedure terminates.
Establishing Path ID

- MMR-BS determines path during topology discovery
- MMR-BS advertises the complete path to all the RSs on a particular path

- MMR-BS sends PATH-ADV-REQ (MAC-Mng-Msg) with the Action-Type field set to ESTABLISH with a uniquely assigned path id

- The complete path information and the path id are carried in the Path-Information TLV and Path-Id TLV.

- Each RS receiving the PATH-ADV-REQ message records the path id and the complete path information, and then responds with a PATH-ADV-RSP

- This path id is used directly in subsequent MAC-Mng-Msg
Transmission Failure

- MMR-BS maintains timers (MAC-Mng-Msg-RES-Timer) for the response.
- The value of MAC-Mng-Msg-RES-Timer for each RS varies and depends on the possible transmission and processing latency between MMR-BS and the RS.
  - Latency could be estimated for example based on the number of hops between MMR-BS and the RS.
- If the timer expires or a failure is received, the MMR-BS determines that the RS doesn’t receive the MAC-Mng-Msg and has failed the chained operation due to error processing or link loss.
- The MMR-BS may reissue the MAC-Mng-Msg and directly send it to the first failed RS.
Summary

• In multi-hop relay system, need of transmission scheme to a group of RS is described and two transmission schemes are proposed for different scenarios.

• End-to-end response scheme
  • Simple, less complexity on RS
  • More overhead compared to hop-by-hop response scheme
  • Applicable where the number of RSs is small (e.g., 2 hop relay); or the RSs have low capability.

• Hop-by-hop response scheme
  • Less bandwidth overhead, especially when the relay path contains a large number of RSs,
  • Increased complexity in the RSs.
  • Applicable for a large number of RS or high-capability RSs

• Scheme can be selected by the MMR-BS based on the scenario. MMR-BS indicates the scheme type by setting the Transmission Type field in the MAC-Mng-Msg

• Further details of the transmission schemes and corresponding specs changes are described in Contribution C802.16j_196.pdf.