Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Multicast when using Tunnel CID**
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Re:	IEEE 802.16j-06/034:"Call for Technical Proposals regarding IEEE Project P802.16j"
Abstract	This contribution describes how to perform multicasting in tunneling connection
Purpose	Propose method of multicasting in tunneling connection
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Multicast when using Tunnel CID

1. Introduction

To utilize the radio resources for MR network, a tunnel connection in relay link [1] is introduced to reduce the MAC overhead and process. There are two modes for tunnel connections. In Tunnel Burst mode, only station at egress of tunnel would read the encapsulated MPDU and other stations along tunnel would directly forward corresponding MPDU after decoding the MAP_IE. Alternatively, in Tunnel Packet mode, every station along tunnel would receive the encapsulated MPDU and read the relay MAC header to see whether T-CID is placed or not. If T-CID is appeared, intermediated stations would forward the MPDU without reading payload and only station at egress of tunnel would read the contents of payload.

In MR network, MR-BS always needs to control and manage several RSs at the same time. Compared to unicast identical control message for every RS, the usage of multicasting control message by MR-BS to RSs is more suitable and efficient. In this contribution, we propose to perform multicasting along tunnel by Tunnel Packet mode. With this scheme, it can achieve multicasting along tunnel with less processing and resources.

2 Proposal

To support multicasting control message along tunnel, every station along this tunnel shall be responsible to forward the encapsulated MPDU to next-hop station and read the associated payload (control message) until the egress of tunneling. When systematic T-CID is used for tunneling, due to the systematic structure, a systematic CID is unable to be assigned for the multicast group. Instead, establishing multiple unicast connections with different systematic T-CIDs is employed. Figure 1 shows this case and it can be observed that a lot of resources are wasted. When non-systematic T-CID is used for tunneling, a common multicast CID can be assigned for the members of multicast group; however, multicast routing tables shall be maintained for the members of multicast group to conduct them forward the multicast packets. Figure 2 shows this case and it can be founded that it needs a lot of overhead.

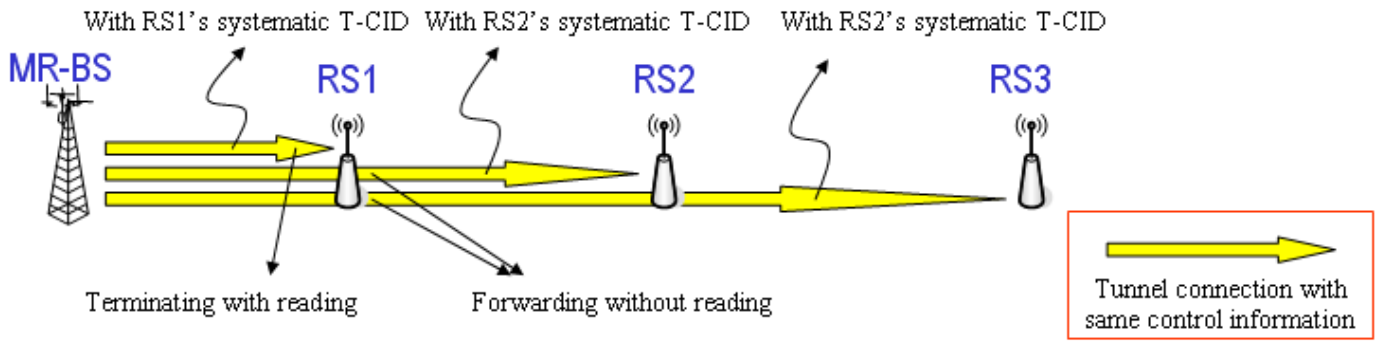

Figure 1, An example of multicasting when systematic CID is used

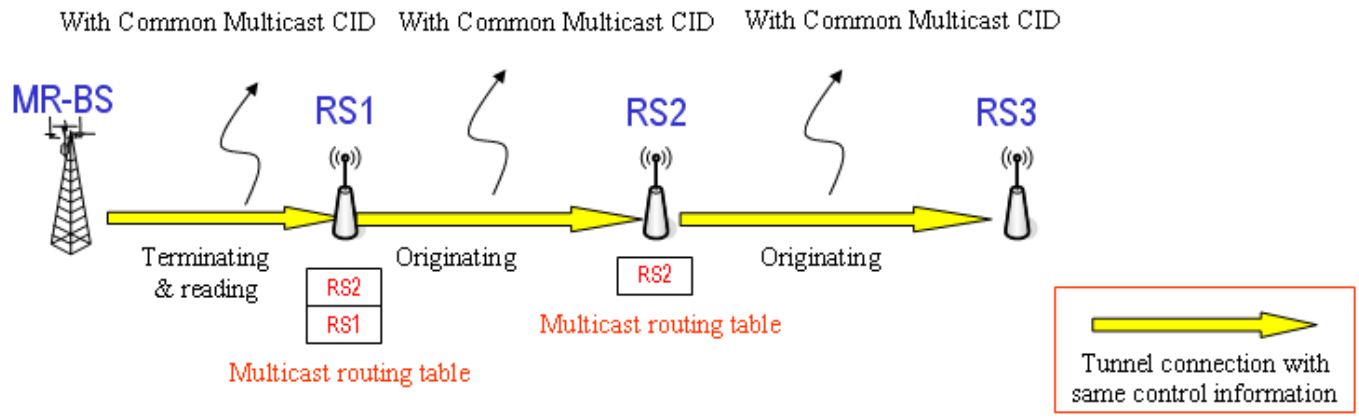

Figure 2, An example of multicasting when non-systematic CID is used

To avoid these problems, a refinement of Tunnel Packet mode is proposed. We will endow the relay MAC header an additional functionality: One bit called Owner-ship type in relay MAC header will be used to indicate whether intermediated station needs to read the contents of payload after its forwarding. With this refinement, one tunnel connection with last-hop station's T-CID (can be systematic or non-systematic) and enabled "Owner-ship type" bit in the header can realize the multicasting along this tunnel at once time. An example of the proposed scheme is shown in Figure 3.

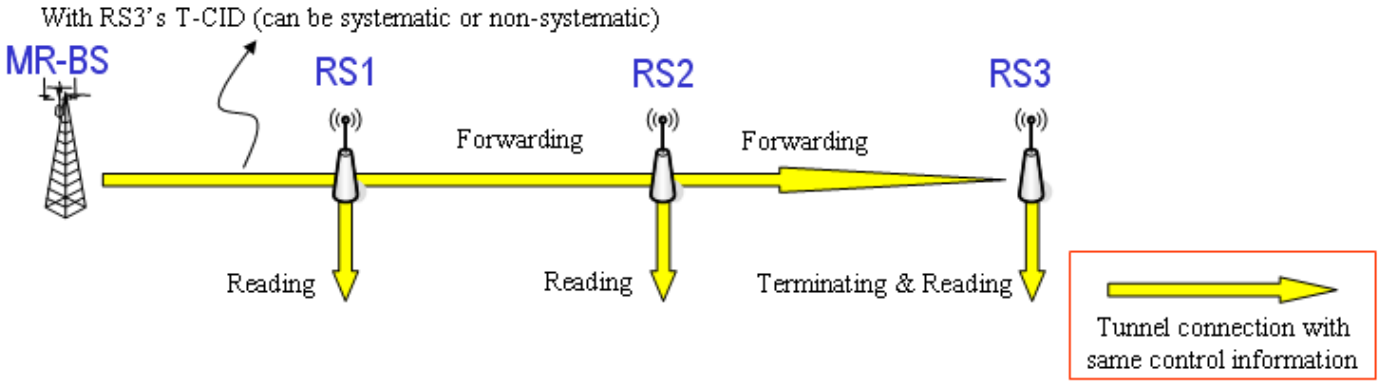

Figure 2, Perform multicasting by proposed scheme

This scheme provides the following benefits:

- More efficient transmission – the radio resources regarding with multicasting can be achieved within one tunnel connection.
- Less signaling overhead– with this scheme, it doesn't need additional siganling to maintain the mutlicasting routing table .

3 Proposed Text Change

----------Start of the Text----------

[Add following text into session 6.3.3.8.1]

6.3.3.8.1 Transmission using tunnels

For multicasting control message along a tunnel, the MR-BS can arrange a tunnel connection by Tunnel Packet mode. In this relay MAC header, the systematic CID of last-hop station would be placed and the "Owner-ship" bit would be set to "1" to let intermediated stations along this tunnel can forward and read the associated control message.

----------End of the Text----------

References

[1] IEEE 802.16j-06/026r2, "P802.16j Baseline Document".

[2] IEEE C802.16j-06/241r5, "Connection Management and Relay Path Configuration".