Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**The management operations Multicast for Multi-RSs 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~~ management operation for multi-RSs in one tunneling connection
Purpose	Propose method of ~~multicasting~~ operations for support managing multi-RSs in one tunneling connection
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1 Multicast The management operations for multi-RSs when using Tunnel
2 CID
3

4 1. Introduction

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

13

14   In MR network, MR-BS always needs to control and manage several RSs at the same time. Compared to
15 unicasting identical control message for every RS individually, the usage of multicasting transmitting control
16 message by MR-BS to multi-RSs within one tunnel connection will be more suitable and efficient. In this
17 contribution, we propose to perform multicasting along tunnel these operations by Tunnel Packet mode. With
18 this scheme, it can achieve multicasting along tunnel connection with perform the management operations
19 for multi-RSs with less processing overhead and resources.

20

21 2 Proposal

22   To support multicasting managing multi-RSs within one tunnel connection, every station along this tunnel
23 shall be responsible to forward the encapsulated MPDU to next-hop station and read the associated payload
24 (control message) until the egress of tunneling. When systematic T-CID allocation is used, it is unable to
25 assign a common systematic multicast CID for the multicast group multi-RSs. Instead, establishing multiple
26 unicast connections with different systematic T-CIDs is employed. Figure 1 shows this case and it can be
27 observed that a lot of resources are wasted. Alternatively, if explicit path management is used (non-
28 systematic T-CID allocation), and then a common multicast CID can be assigned for the members of
29 multicast group; however all RSs along a tunnel. However, multicast routing tables shall be maintained for
30 members of multicast group intermediate RSs and conduct them forward the multicastese these packets.
31 Figure 2 shows this case and it can be founded that it needs a lot of overhead.
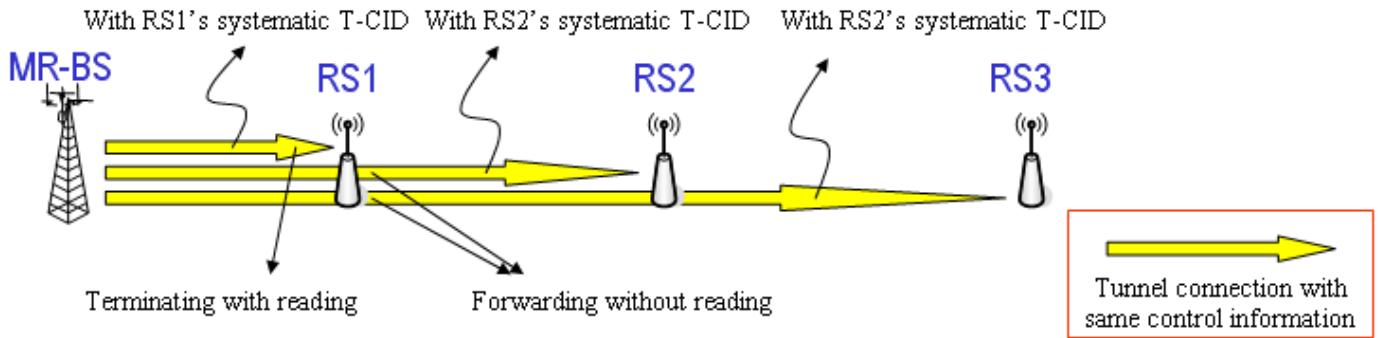
1

2   Figure 1, an example of ~~multicasting~~ management operations for multi-RSs when systematic CID is used

3
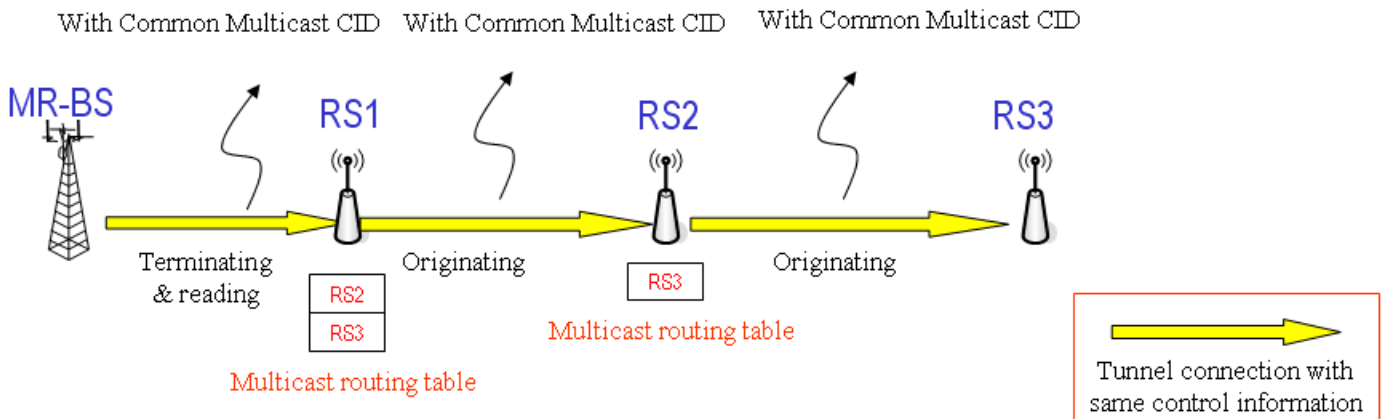
4

5   Figure 2, an example of management operations for multi-RSs ~~multicasting~~ when non-systematic CID is

6   used

7

8   To avoid these problems, a refinement of Tunnel Packet mode is proposed. We will endow the relay MAC
9 header with an additional functionality: One bit called Owner-ship type in relay MAC header will be used to
10 indicate whether intermediated station needs to read the contents of payload or not after its forwarding. The
11 total operations are as follow: one tunnel connection with last-hop station's T-CID (can be systematic or
12 non-systematic) is used and "Owner-ship type" bit in the header will be set to '1' to indicate intermediate
13 RSs to read and forward the payload (the contents of payload shall be all read or all not be read by
14 intermediate RSs) ~~can realize the multicasting along this tunnel at once time~~. An example of the proposed
15 scheme is shown in Figure 3. With this application, to ensure the CMAC/HMAC validation; a general
16 method is assigning a group key for multi-RSs in advance. When intermediate RSs check "Owner-ship type"
17 bit be enabled (set to '1'), then it will use this group key for this PDU. Besides, other new security
18 approaches for IEEE 802.16j may be also employed (TBD) in this method.

With RS3's T-CID (can be systematic or non-systematic)
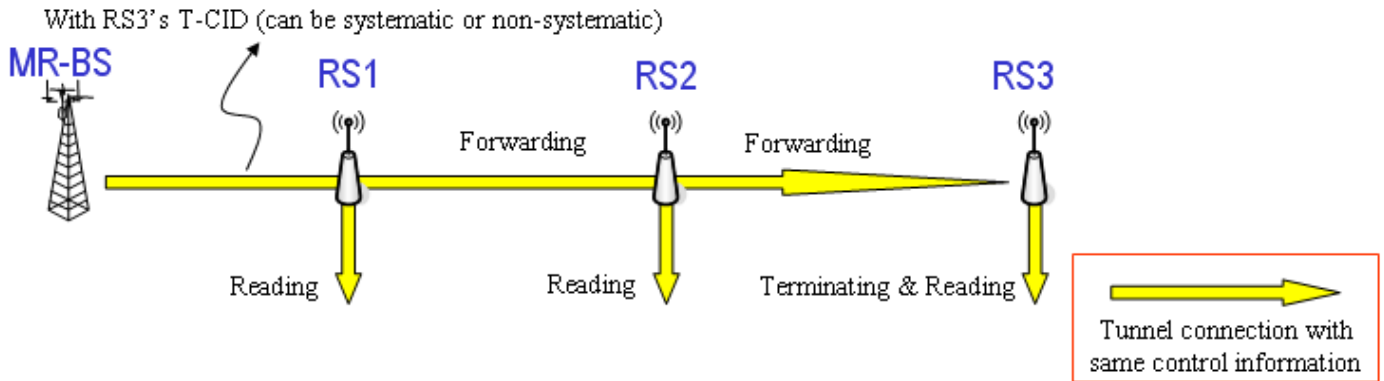
1

2   Figure 3, Perform management operations for multi-RSs multicasting by proposed scheme

3

4   This scheme provides following benefits:

5   ➢   More efficient transmission – the radio resources regarding multicasting Transmission for multi-
6   RSs can be achieved by one tunnel connection within less radio resources.

7   ➢   Less signaling overhead– with this scheme, no additional siganling is required to maintain the
8   mutlicasting routing tables for management operations of multi-RSs.

9

10

3   Proposed Text Change

12

13---Start of the Text---

14

15 *[Add following text into session 6.3.3.8.1]*

16 6.3.3.8.1 Transmission using tunnels

17 For multicasting control message managing multi-RSs along a tunnel path, the MR-BS can arrange a tunnel
18 connection by Tunnel Packet mode. In this relay MAC header, the T-CID of last-hop station would be placed
19 and the "Owner-ship_type" bit would be set to "1" to let intermediate RSs along this tunnel can forward and
20 read process the associated management message. For example, DSX-* message used for end-to-end
21 signaling and RNG-REQ/RSP used for initial topology discovery.

22

23 *[Add the following text to the end of 6.3.2.1.1.1; please refer to C802.16j-07_198r8]*

24 6.3.2.1.1.1 Relay MAC PDU header format

25 For managing operations of multi-RSs when using Tunnel CID, the bit #1 (2th MSB in the header) in the
26 first byte of relay MAC header is used as "Ownership type". If this the bit "Owenship_type" is set to "1",
27 the intermediate RS shall read process the associated payload management message.

28

29 *[Mark one of the reserved bit as "Owenership_type" bit in figure 19b proposed in C802.16j-07/198r8]*

30

HT=0 (1)	RSV (1) Ownership (1)	RMI (1)	RSV (5)	
RSV (5)			LEN (3)	
LEN LSB (8)				
CID #0 (MSB) (8)				
CID #0 (LSB) (8)				
HCS (8)				

31   *Figure 19b – Header format of relay MAC PDU with payload*

32

33--End of the Text--

34

35

36References

37[1]   IEEE 802.16j-06/026r3, "P802.16j Baseline Document".

38[2]   IEEE C802.16j-06/241r5, "Connection Management and Relay Path Configuration".

39