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Title	Relay Path Management during Network Entry	
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Re:	IEEE 802.16j-07/013:“Call for Technical Comments Regarding IEEE Project 802.16j”	
Abstract	This contribution proposes modifications on 6.3.25.2.1	
Purpose	Text proposal for 802.16j Baseline Document	
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Relay Path Management during Network Entry

(Comments on 6.3.25.2.1 Path Establishment, Removal and Update)

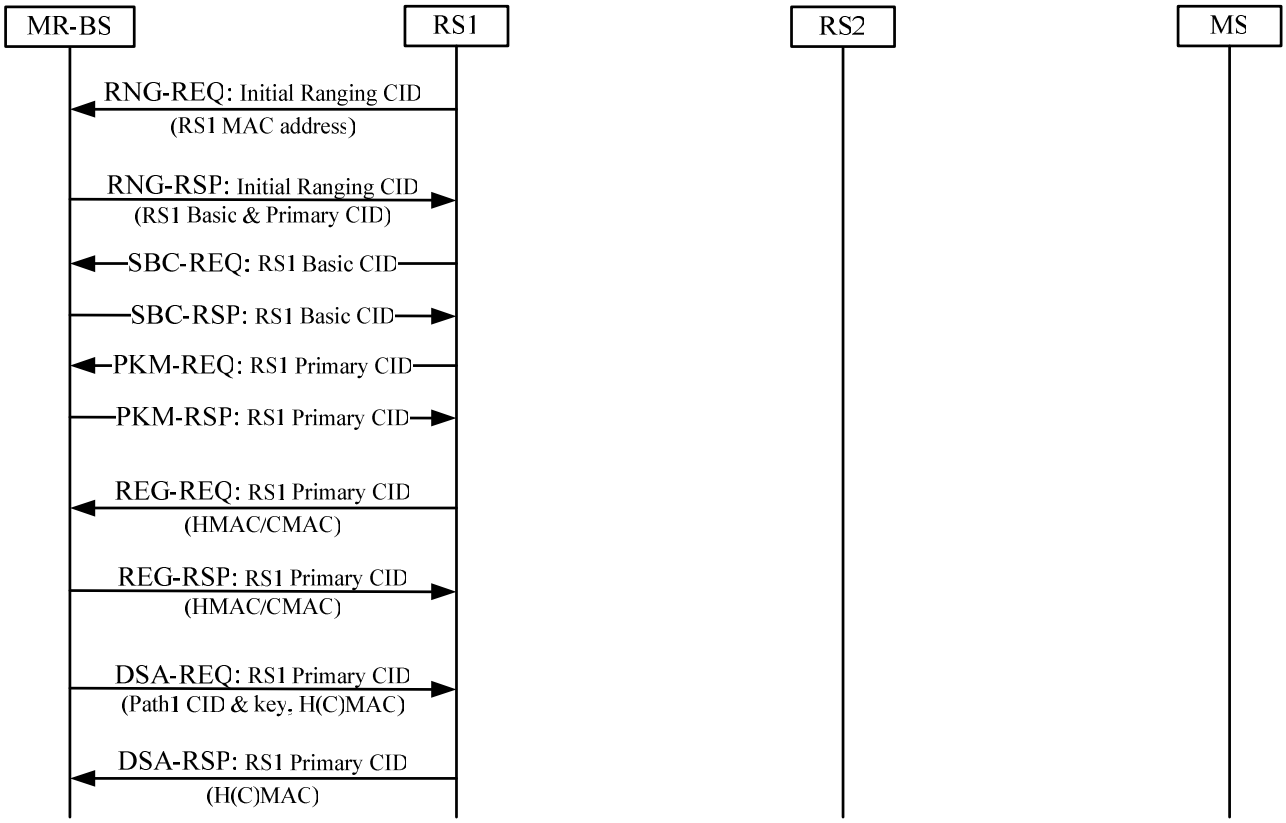
Introduction

In section 6.3.25.2.1 of baseline working document IEEE 802.16j-06/026r3, it states that “When a new path is discovered and calculated as specified in section 6.3.25.2, MR-BS sends a path establishment command to distribute the path information to all the RSs on that path by sending a DSA*-REQ message.”. However, the path setup for forwarding management messages during network entry phase is shortlived in nature until the new MS/RS complete the registration procedure. It is desirable to have a light-weight path management procedure piggyback on the network entry procedure to setup and tear down the temporary routing path with minimum overheads. Once the MS/RS registers to the MR-BS, a regular path management process based on DSA*-REQ message is in effect.

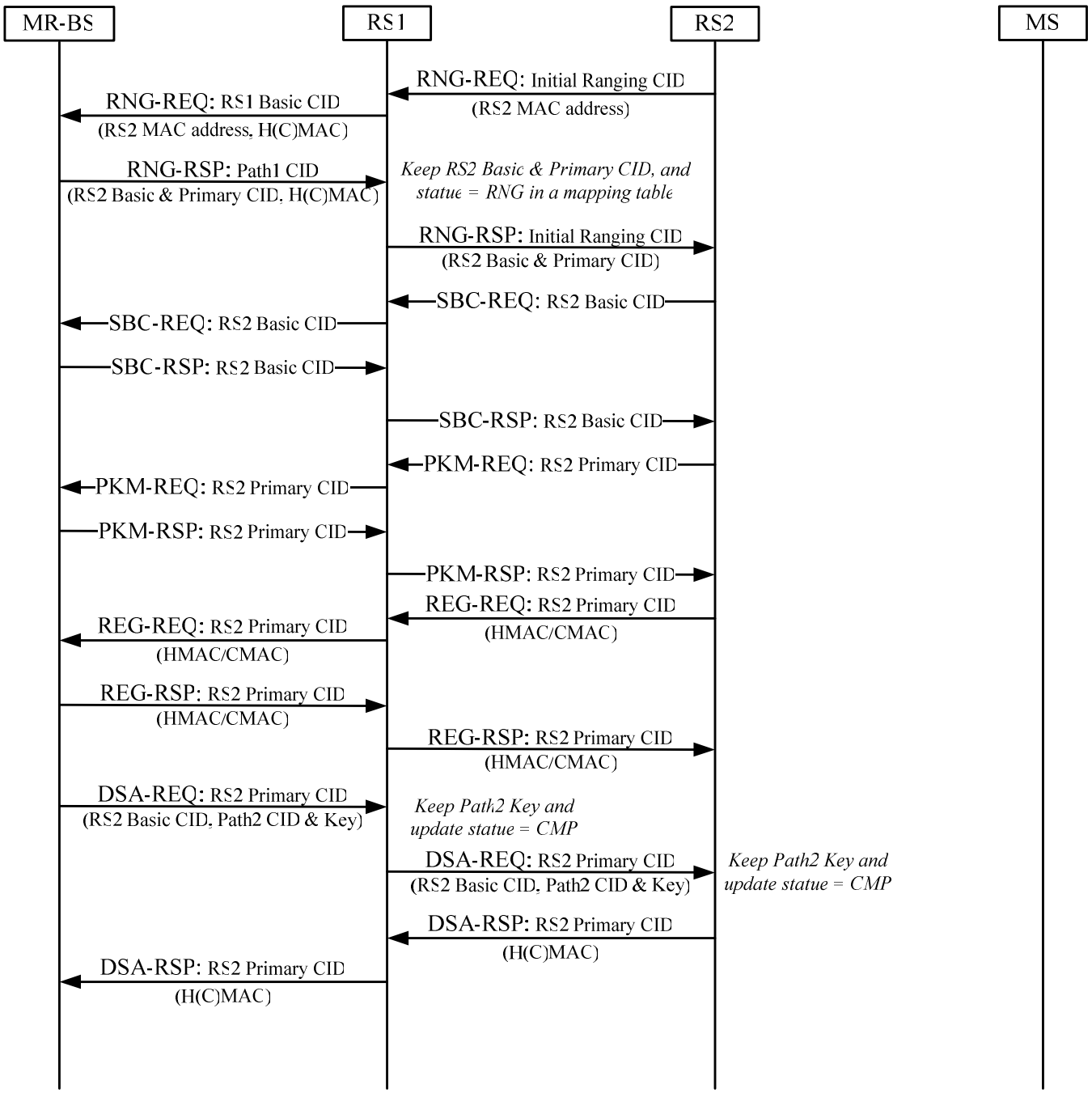
Therefore, we propose the relay path management into two stages. First stage is for forwarding the management messages when an MS/RS is entering an MR network and the other is for service flow establishment after the MS/RS complete the registration. In this contribution, we propose a light-weight relay path management scheme that utilizes the RNG-RSP and a timer for managing the relay path during MS/RS network entry.

In the MS/RS network entry phase, because the MR-BS shall send the RNG-RSP with success status to the new RS via the selected relay path to complete the ranging process, it is more efficient to piggyback the RNG-RSP message with additional TLVs as the path establishment command instead of using extra DSA/DSD*-REQ messages. In order to elaborate the proposed light-weight relay path management scheme, an example is given as follows, which depicts the path establishment flows of a 3-hop MR network. Moreover, to facilitate the incorporation of this proposal into IEEE 802.16j standard, specific changes to the baseline working document IEEE 802.16j-06/026r3 are listed below.

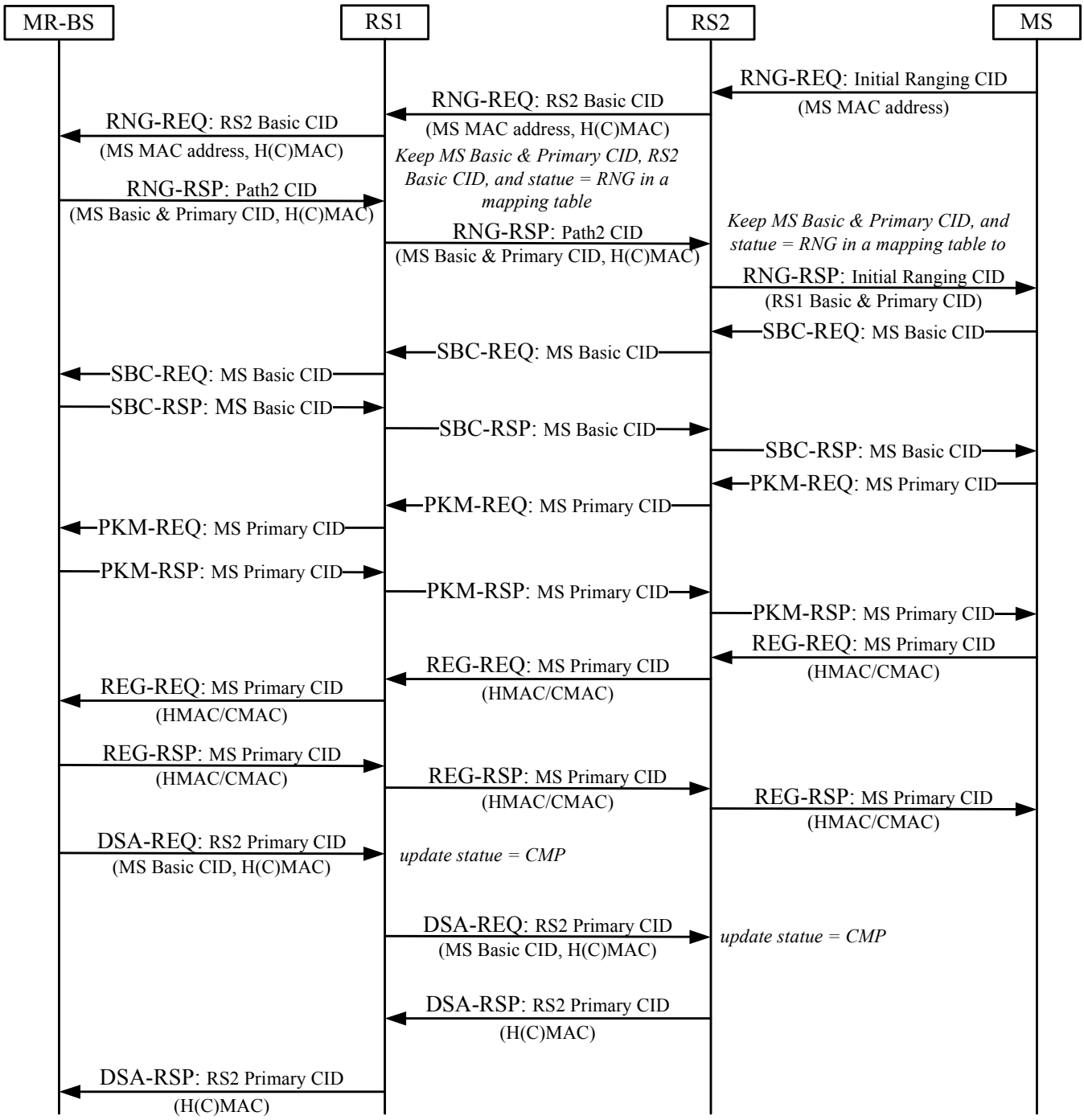
Example 1a: RS1 entering the MR-BS network directly



Example 1b: RS2 entering the MR-BS network via RS1



Example 1c: MS entering the MR-BS network via RS1 and RS2



Text Proposal

6.3.2.3.6 Ranging Response (RNG-RSP) message

[Insert the following text at the end subclause 6.3.2.3.6]

The RNG-RSP message may contain the following TLVs:

- Path Addition (see 11.21.1)
  - Specification of the path addition operations
- Path CID Binding Update (see 11.21.2)
  - Specification of the path/CID binding operations including adding the binding between CIDs to the specific path.
- HMAC/CMAC Tuple (see 11.1.2)
  - The HMAC/CMAC Tuple attribute contains a keyed message digest (to authenticate the sender).
  - The HMAC Tuple attribute shall be the final attribute in the RNG-RSP message's attribute list.

10.1 Global values

[Change Table 342 as indicated:]

Table 342—Parameters and constants

System	Name	Time Reference	Minimum value	Default value	Maximum value
RS	Txx	Wait for DSA-REQ after receiving RNG-RSP with Path-Addition TLV or Path-CID-Binding-Update TLV	TBD	TBD	TBD

11.21.1 Path-Addition TLV

[Change the text in section 11.21.1 as indicated:]

Type	Length	Value	Scope
TBD	variable	Compound	DSA-REQ、RNG-RSP

11.21.2 Path-CID-Binding-Update TLV

[Change the text in section 11.21.2 as indicated:]

Type	Length	Value	Scope
TBD	variable	Compound	DSA-REQ、RNG-RSP

6.3.25.2.1 Path Establishment, Removal and Update

[Insert the text in section 6.3.25.2.1 "Path Establishment, Removal and Update" as indicated:]

When a new path is determined by MR-BS during MS/RS network entry, relay path management for forwarding the management messages of other MS/RS network entry procedures can be conducted as defined below.

- After processing the RNG-REQ with RS basic CID originated from MS or the RS having the RS basic CID, the MR-BS replies a RNG-RSP with path CID of the path ID, associated with RS, to RS and may protect the message with HMAC/CMAC tuple using the Group Key associated with the path ID.
- When an RS receives RNG-RSP message with the path CID, it may verify the message using the HMAC/CMAC tuple with Group Key. If the message is valid, it should bind with basic CID and primary CID containing in the message with the path ID and start a timer Txx associated with the path ID. If the RS is the endpoint of the path, it should remove the HMAC/CMAC tuple, replace path CID with initial ranging CID, and forward to the MS or RS originating RNG-REQ.
- If Txx expires before the RS receiving DSA-REQ, the RS shall remove the path ID and associated basic CID and primary CID. Otherwise, the RS shall stop Txx when receiving DSA-REQ with the same path ID.

[Change the text in section 6.3.25.2.1 "Path Establishment, Removal and Update" as indicated:]

~~When~~ After a new path is discovered and calculated as specified in section 6.3.25.2 and a new MS/RS complete the registration process, MR-BS sends a path establishment command to distribute the path information to all the RSs on that path by sending a DSA*-REQ message. The explicit path information and an uniquely assigned path id are included. The CIDs to be routed on this path and their associated service flow parameters are also included for path/CID binding operation. If DSA*-REQ is issued from an access RS, the explicit path path-ID and/or associated CIDs are included in the DSA-RSP message sent from the MR-BS.