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Re:	IEEE802.16j-06/027: “Call for Technical Proposals regarding IEEEP802.16j”
Abstract	This contribution proposes MS network entry procedures and additional TLVs in non-transparent Relay Station systems.
Purpose	To propose text to describe MS network entry in non-transparent Relay Station systems
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MS network entry for non-transparent Relay Station

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Introduction

This contribution proposes MS network entry procedures and additional TLVs in non-transparent Relay Station systems. A non-transparent RS transmits its own preamble, DL-MAP and UL-MAP. Therefore, a MS recognizes it as a BS. The non-transparent RS has two types, centralized and distributed scheduling. The centralized scheduling type RS does not create DL-MAP and UL-MAP by itself, However RS may modify it if required. Associated MR-BS creates and sends DL-MAP and UL-MAP to the RS, and the RS broadcasts them on its access link. The distributed scheduling type RS creates MAPs by itself and broadcasts them to MS.

The MR-BS has MS management and connection management function in order to simplify RS function. Therefore, the intermediate RS basically relays MAC management messages between the MR-BS and MS except for some additional function. In order for the MR-BS to manage network entry procedure of a MS under a RS, the RS and the MR-BS are required to exchange MAC management messages with new TLVs.

This contribution describes detail message sequences and RS/MR-BS behavior in addition to new TLV.

Specific Text Changes

Insert the new subclause 6.3.9.16.2 (Support for network entry and initialization in relay mode):

6.3.9.16.2 MS network entry procedures in non-transparent RS systems

6.3.9.16.2.1 Non-transparent RS with Centralized scheduling

In MS network entry procedures in non-transparent RS systems, MS scans for downlink channel and establish synchronization with the non-transparent RS, then obtains transmit parameters from UCD message as described in 6.3.9.1 through 6.3.9.4.

The initial ranging process shall begin by sending an initial-ranging CDMA codes on the UL allocation dedicated for that purpose (for more details see 6.3.10.3).

When RS receives the CDMA code resulting in continue status, RS shall locally send RNG_RSP to MS on the access link. In order to send RNG_RSP to MS on the access link, it send a RS BR header to the MR-BS. Upon receipt of RS BR header at MR-BS, MR-BS will allocate resources for RNG_RSP and indicate to RS with RS_DL_MAP-IE in DL-MAP. (see more detail in [4]). This procedure shall also be used in case of periodic ranging and handover ranging. Furthermore, the above procedure shall also be used in case of periodic ranging where RS receives the CDMA code resulting in success status,

When the RS receives multiple codes in a frame resulting in continue status, the RS sends a RS BR header which contains information of number of received codes

once a RS receives the CDMA code resulting in success status , it transmits a RNG-REQ with the RS basic CID to the MR-BS, containing ranging status, ranging code attributes and MS ranging indicator. The RNG-REQ may also contain adjustment information, such as frequency, timing and power if necessary. When the RS

successfully receives multiple codes in a frame, the RS sends a RNG-REQ message which contains information of multiple received codes.

When the MR-BS receives the RNG-REQ with success status, it sends to the RS a RS UL-MAP including a CDMA_Allocation-IE as well as a RNG-RSP containing MS ranging indicator and status.

The RS receiving the RNG-RSP including MS ranging indicator relays the message with the initial ranging CID after removing the MS ranging indicator.

When the MS receives success status in the RNG-RSP, it sends a RNG-REQ message using uplink bandwidth allocated by CDMA_Allocation-IE.

Receiving the RNG-REQ with the initial ranging CID, the RS relay it to the MR-BS with the RS basic CID.

Once the MR-BS receives the RNG-REQ containing MSID with the RS basic CID, the MR-BS shall assign Basic and Primary management CIDs to the MS, and transmit a RNG-RSP containing those management CIDs and MSID with the RS basic CID.

The RS receiving the RNG-RSP containing the management CIDs and MSID relays it to the MS with the initial ranging CID.

After assigning the basic and primary management CID to a MS, the MS and MR-BS continue network entry process as described in the 6.3.9.7 through 6.3.9.13 using MS's management CIDs. The RS shall relay management messages between them. The RS may monitor management messages and derive some information, such as capability information.

The message sequences chart (Table xxx) and flow charts (Figure xxx, Figure xxx, and Figure xxx) on the following pages define the ranging and adjustment process that shall be followed by compliant RSs and MR-BSs. For CDMA ranging process between RS and MS, these details can be found in 6.3.10.3.

Table xxx Ranging and automatic adjustments procedure in MR mode

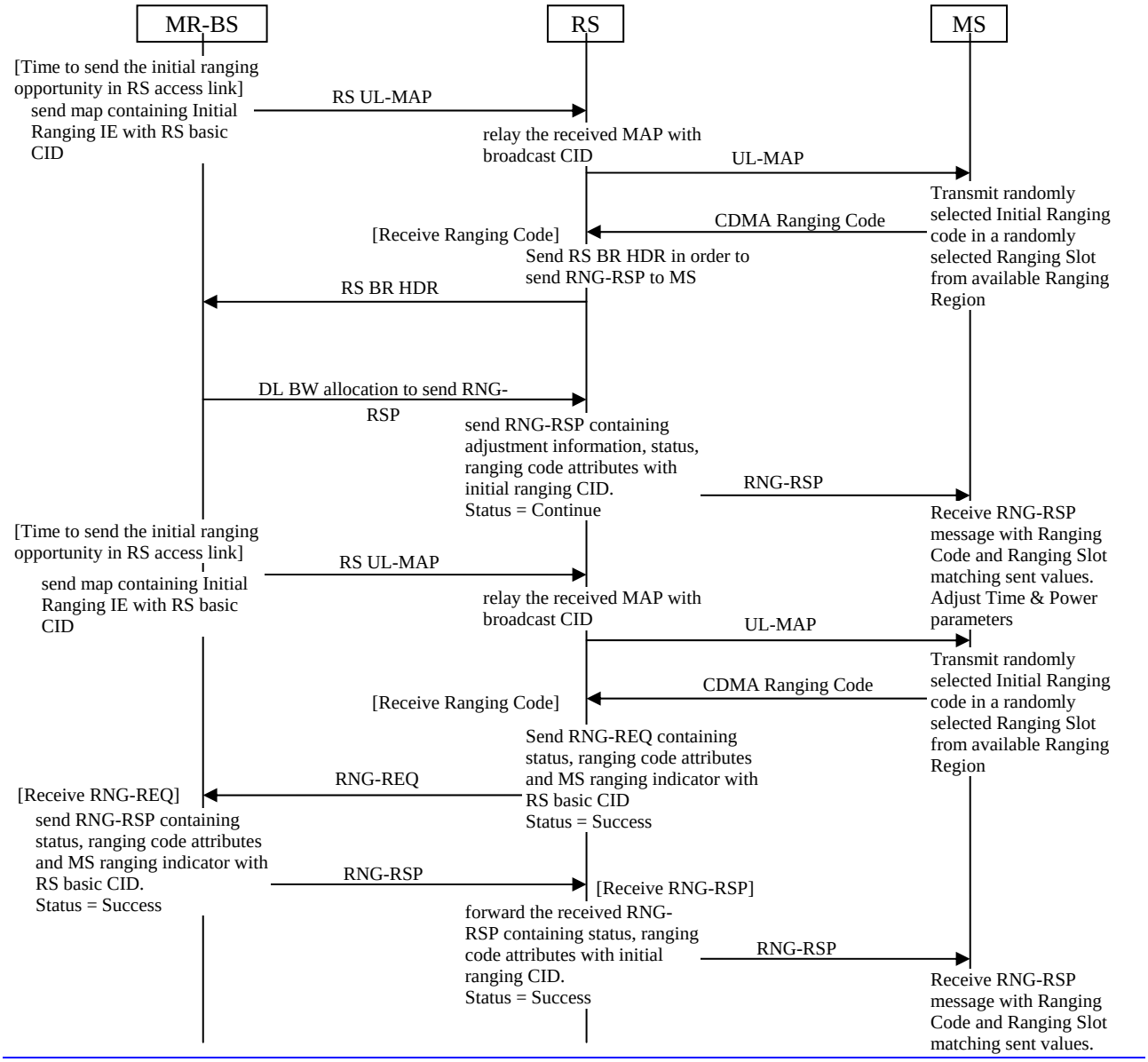
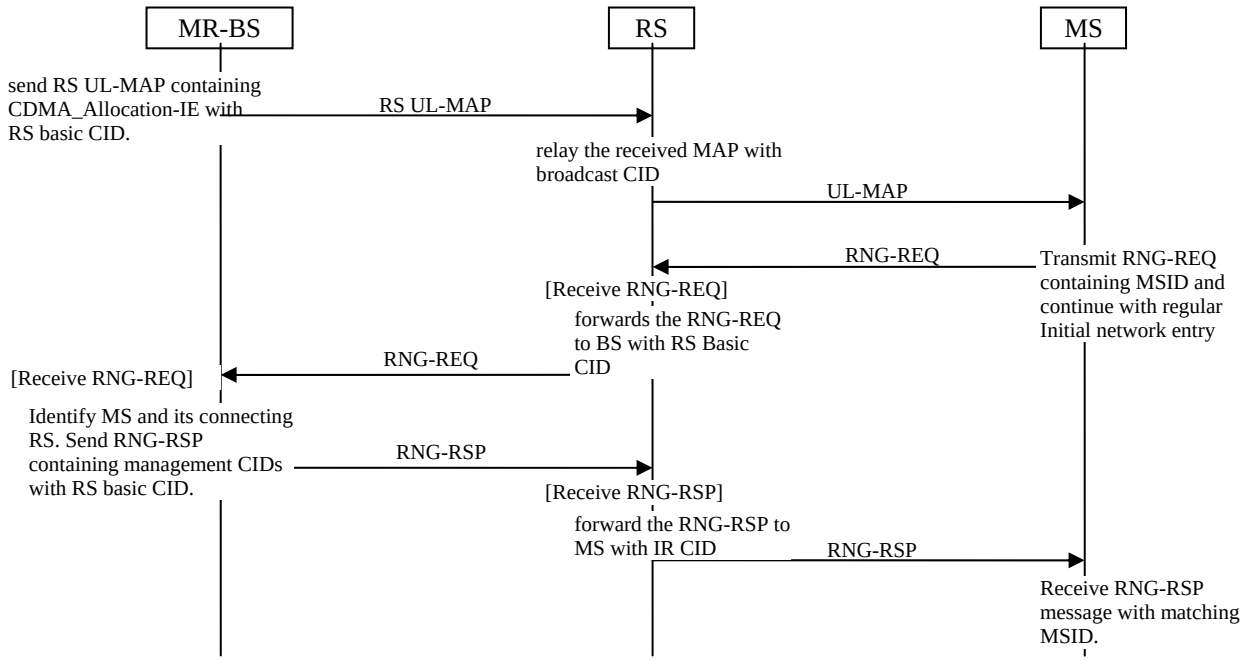


Table xxx Ranging and automatic adjustments procedure in MR mode *(continued)*



6.3.9.16.2.2 Non-transparent RS with Distributed scheduling

In MS network entry procedures to non-transparent RS systems, MS scans for downlink channel and establish synchronization with the non-transparent RS, then obtains transmit parameters from UCD message as described in 6.3.9.1 through 6.3.9.4.

The initial ranging process shall begin by sending an initial-ranging CDMA codes on the UL allocation dedicated for that purpose (for more details see 6.3.10.3). RS and MS continue CDMA code transmission and reception as defined in 6.3.10.3 until RS receives the CDMA code successfully or the MS abort the ranging procedure.

When the RS receives the CDMA code resulting in success status, it sends a RNG-RSP containing success status to the MS. And the RS also provides bandwidth allocation to the MS with CDMA_Allocation-IE in UL-MAP, so that the MS can send a RNG-REQ containing MSID with initial ranging CID.

As an option, the RS may send a RNG-REQ message containing New MS Indication ID TLV with the RS's basic CID to the MR-BS after receiving the CDMA code successfully. In this case, up on receiving the RNG-REQ containing New MS Indication ID TLV, the MR-BS confirms whether it can accept a new MS entry request. If it can accept the request, it sends a RNG-RSP containing success status to the RS, otherwise a RNG-RSP with abort status. When the RS receives the RNG-RSP with ranging status from the MR-BS, it advertises a RNG-RSP containing the same ranging status as in the received RNG-RSP and the ranging code attributes with initial ranging CID. If the ranging status in the RNG-RSP is success, the RS provides bandwidth allocation with CDMA_Allocation-IE in UL-MAP, so that the MS can send a RNG-REQ containing MSID with initial ranging CID.

Receiving the RNG-REQ containing the MSID, the RS forwards it with the RS basic management CID to MR-BS. The RNG-REQ message may contain New MS Indication ID. The RS shall use the same value of New MS Indication ID as in the previous RNG-REQ transmitted upon successful reception of CDMA ranging code,

so that the MR-BS can recognize the two RNG-REQ messages containing the same New MS Indication ID are used for the same MS network entry process.

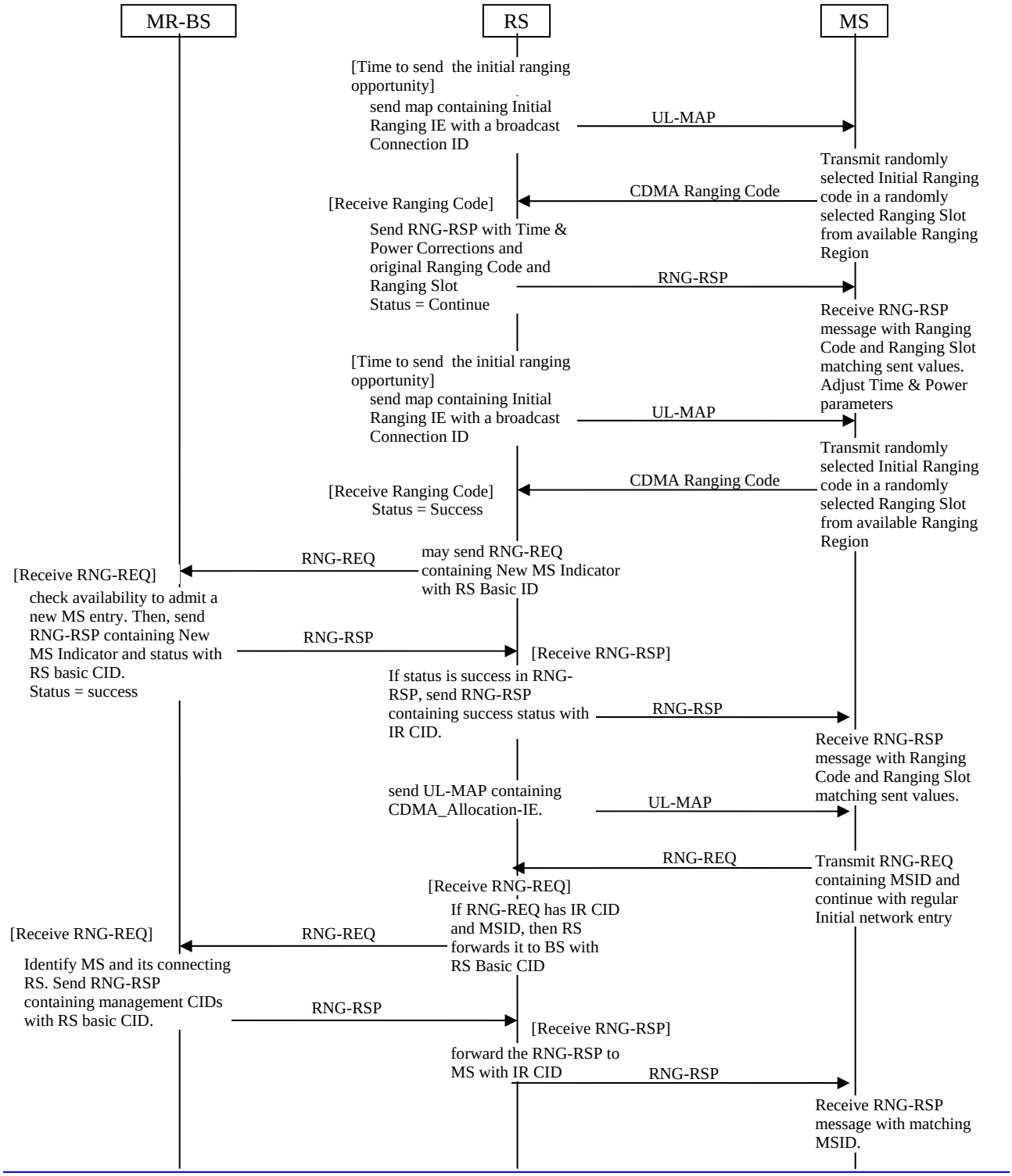
Once the MR-BS receives the RNG-REQ containing MSID with the RS basic CID, the MR-BS shall assign Basic and Primary management CIDs to the MS, and transmit a RNG-RSP containing those management CIDs and MSID with the RS basic CID.

The RS receiving the RNG-RSP containing the management CIDs and MSID shall forward it to the MS with the initial ranging CID.

After assigning the basic and primary management CID to a MS, the MS and MR-BS continue network entry process as described in the 6.3.9.7 through 6.3.9.13 using MS's management CIDs. The RS shall relay management messages between them. The RS may monitor management messages and derive some information, e.g. capability information, etc.

The message sequences chart (Table xxx) and flow charts (Figure xxx, Figure xxx, and Figure xxx) on the following pages define the ranging and adjustment process that shall be followed by compliant RSs and MR-BSs. For CDMA ranging process between RS and MS, these details can be found in 6.3.10.3.

Table xxx Ranging and automatic adjustments procedure in MR mode



Insert the following rows into Table 364 at 11.5 RNG-REQ TLV:

Table 364—RNG-REQ message encodings

Name	Type (1 byte)	Length	Value (variable-length)	PHY Scope
New MS Indication ID	TBA	1	Unique identifier assigned by RS for each MS under ranging process.	OFDMA
MS ranging Indicator	TBA	1	0: reserved 1: indicates this message used for MS ranging 2-255: reserved	OFDMA
Received Ranging Codes	TBA	Variable	Received Ranging Codes is a compound TLV value that indicates received code information.	OFDMA
Timing Adjust	TBA.1	4	Tx timing offset adjustment (signed 32-bit). The amount of time required to adjust SS transmission so the bursts will arrive at the expected time instance at the BS. Units are PHY specific (see 10.3).	OFDMA
Power Level Adjust	TBA.2	1	Tx Power offset adjustment (signed 8-bit, 0.25 dB units) Specifies the relative change in transmission power level that the SS is to make in order that transmissions arrive at the BS at the desired power. When subchannelization is employed, the subscriber shall interpret the power offset adjustment as a required change to the transmitted power density.	OFDMA
Offset Frequency Adjust	TBA.3	4	Tx frequency offset adjustment (signed 32-bit, Hz units) Specifies the relative change in transmission frequency that the SS is to make in order to better match the BS. (This is fine-frequency adjustment within a channel, not reassignment to a different channel.)	OFDMA
Ranging Status	TBA.4	1	Used to indicate whether uplink messages are received within acceptable limits by BS. 1 = continue, 2 = abort, 3 = success	OFDMA
Ranging code attributes	TBA.5	4	Bits 31:22 – Used to indicate the OFDM time symbol reference that was used to transmit the ranging code. Bits 21:16 – Used to indicate the OFDMA subchannel reference that was used to transmit the ranging code. Bits 15:8 – Used to indicate the ranging code index that was sent by the SS. Bits 7:0 – The 8 least significant bits of the frame number of the OFDMA frame where the SS sent the ranging code.	OFDMA

Insert the following rows into Table 367 at 11.6 RNG-RSP TLV:

Table 367—RNG-RSP message encodings

Name	Type (1 byte)	Length	Value (variable-length)
New MS Indication ID	TBA	1	New MS Indication ID from corresponding RNG-REQ froMRS.
MS ranging Indicator	TBA	1	0: reserved 1: indicates this message used for MS ranging 2-255: reserved

References

[1] M.Okuda, “relaying method proposal for 802.16j”, IEEE C802.16j-06_132, IEEE 802.16 meeting #46, Dallas, November 2006.

[2] M.Okuda, “MS network entry for transparent Relay Station”, IEEE C802.16j-06_124, IEEE 802.16 meeting #46, Dallas, November 2006.

[3] Y. Saifullah, “Resource Request for Bandwidth”, IEEE C802.16j-06_189, IEEE 802.16 meeting #46, Dallas, November 2006.

[4] Shashikant Maheshwari, “RS support for OFDMA Based Ranging” IEEE C80216j-06_193, IEEE 802.16 meeting #46, Dallas, November 2006.