Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>	
Title	MS Periodic Ranging with Non-transparent RS	
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Re:	IEEE 802.16j-06/034: "Call for Technical Proposals regarding IEEE Project P802.16j"	
Abstract	This contribution proposes procedures for MS periodic ranging with non-transparent RS	
Purpose	Text proposal for 802.16j Baseline Document	
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MS Periodic Ranging with Non-transparent RS

Introduction

This contribution describes MS periodic ranging with non-transparent RS under centralized scheduling scheme. In order to facilitate the incorporation of this proposal into IEEE 802.16j standard, specific changes to the baseline working document IEEE 802.16j-06/026r1 are listed below.

Text Proposal

6.3.10 Ranging

6.3.10.3 OFDMA based ranging

6.3.10.3.4 Relaying support for OFDMA based ranging

6.3.10.3.4.4 MS periodic ranging and automatic adjustments with non-transparent RS

   The periodic ranging process shall begin by sending a periodic-ranging CDMA ranging code on the UL allocation dedicated for that purpose.

   When RS receives the CDMA ranging code, it shall send RNG_RSP message to MS on the access link. The bandwidth allocated for the RS to send the RNG-RSP message could be centralized scheduling or de-centralized scheduling. The relaying support for scheduling is defined in 6.3.6.7.

   The message sequence charts (Table xxx and Table yyy) and flow charts (Figure xxx and Figure yyy) define the ranging and adjustment process that shall be followed by compliant RSs and MR-BSs.

Table xxx – RLY-BST message format

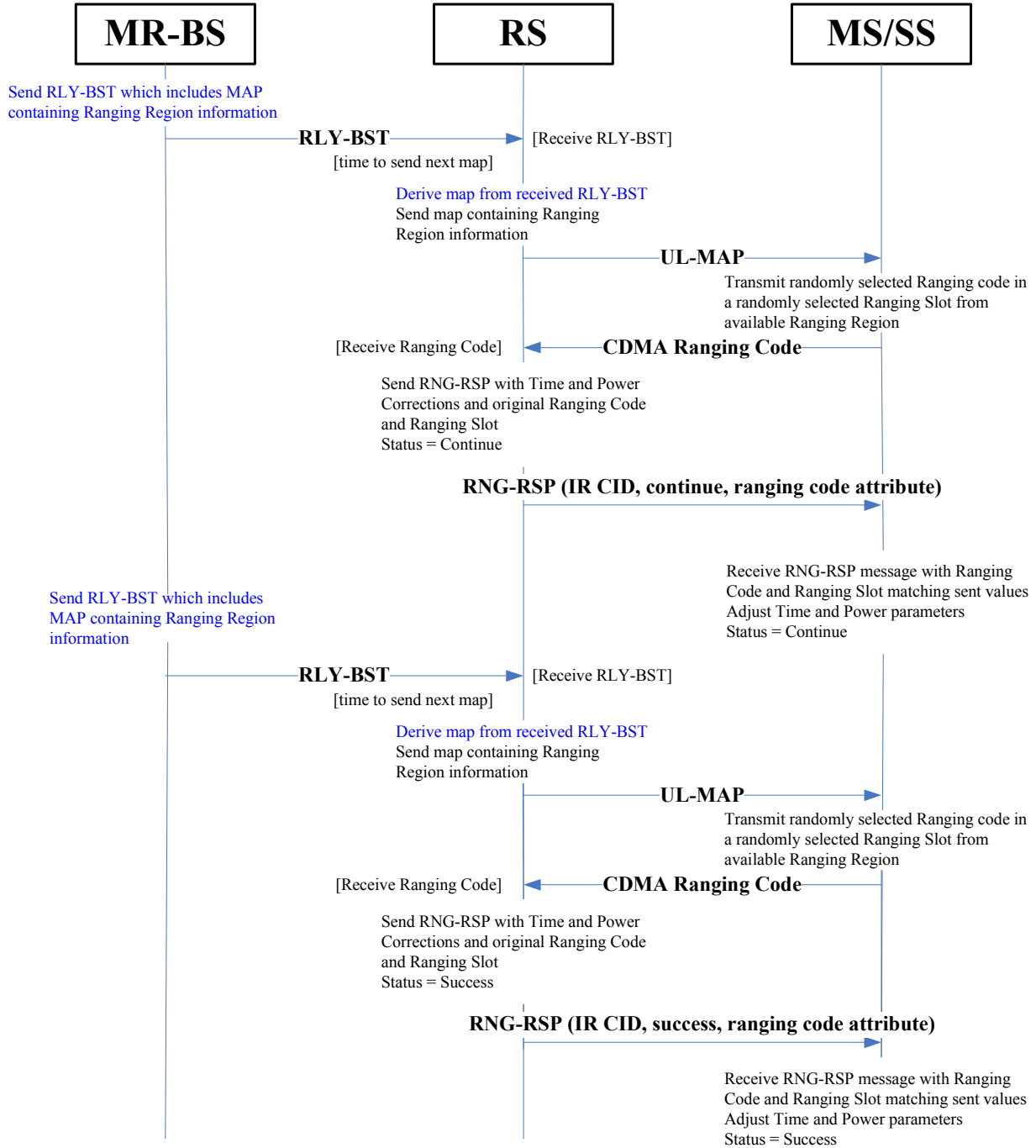| Syntax	Size	Notes
RLY-BST_Message_Format(){		
Management Message Type = xx	8 bits	
Encoded Information	variable	TBD
}		

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

Table 364—RNG-REQ message encodings

	Type (1 byte)	Length	Value (Variable-length)	PHY Scope
Received Ranging Codes	TBA	Variable	Received Ranging Code Attributes 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 MS transmission so the bursts will arrive at the expected time instance at the RS. Units are PHY specific (see 10.3). The MS shall advance its burst transmission time if the value is negative and delay its burst transmission if the value is positive.	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 MS is to make in order that transmissions arrive at the RS 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 MS is to make in order to better match the RS. (This is fine-frequency adjustment within a channel, not reassignment to a different channel.). The MS shall increase its transmit frequency if the value is positive and decrease its transmit frequency if the value is negative.	OFDMA

Ranging Status	TBA.4	1	Used to indicate whether uplink messages are received within acceptable limits by RS. 1 = continue, 2 = abort, 3 = success	OFDMA
Received Ranging Code Attributes	TBA.5	Variable	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 MS. Bits 7:0 – The 8 least significant bits of the frame number of the OFDMA frame where the MS sent the ranging code.	OFDMA
MS CINR mean	TBA.6	1	The MS CINR mean parameter indicates the CINR measured by the RS from the MS. The value shall be interpreted as a signed byte with units of (TBD) dB. The measurement shall be performed on the CDMA ranging signal sent by the MS and averaged over the measurement period.	OFDMA
MS RSSI mean	TBA.7	1	The MS RSSI mean parameter indicates the Received Signal Strength measured by the RS from the MS. The value shall be interpreted as an unsigned byte with units of (TBD) dB, such that 0x00 is interpreted as (TBD) dBm, an RS shall be able to report values in the range (TBD) dBm to (TBD) dBm. The measurement shall be performed on the CDMA ranging signal sent by the MS and averaged over the measurement period	OFDMA

Table yyy: Ranging and automatic adjustment procedure in non-transparent RS systems

MR-BS	RS	MS/SS

Send RLY-BST which includes MAP containing Ranging Region information

RLY-BST → [Receive RLY-BST]

[time to send next map]

Derive map from received RLY-BST
Send map containing Ranging Region information

UL-MAP →

Transmit randomly selected Ranging code in a randomly selected Ranging Slot from available Ranging Region

[Receive Ranging Code] ← CDMA Ranging Code

Send RNG-RSP with Time and Power Corrections and original Ranging Code and Ranging Slot
Status = Continue

RNG-RSP (IR CID, continue, ranging code attribute) →

Receive RNG-RSP message with Ranging Code and Ranging Slot matching sent values
Adjust Time and Power parameters
Status = Continue

Send RLY-BST which includes MAP containing Ranging Region information

RLY-BST → [Receive RLY-BST]

[time to send next map]

Derive map from received RLY-BST
Send map containing Ranging Region information

UL-MAP →

Transmit randomly selected Ranging code in a randomly selected Ranging Slot from available Ranging Region

[Receive Ranging Code] ← CDMA Ranging Code

Send RNG-RSP with Time and Power Corrections and original Ranging Code and Ranging Slot
Status = Success

RNG-RSP (IR CID, success, ranging code attribute) →

Receive RNG-RSP message with Ranging Code and Ranging Slot matching sent values
Adjust Time and Power parameters
Status = Success

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```
        ( Wait for Periodic Ranging Code )
                      │
                      ▼
        〉 Periodic Ranging Code  │
                      │
                      ▼
        │  Send RNG-RSP to MS  〉
                      │
                      ▼
              ( Done )
```
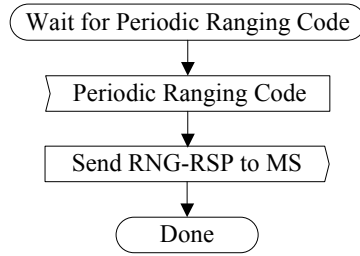
Figure xxx MS CDMA-based Periodic Ranging – Non-transparent Access RS