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Title	Changes on CDMA-based BW Request Procedures in OFDMA-PHY for Mobile Environment	
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Re:	This is a response to a Call for Comments IEEE 802.16e-03/23 on IEEE 802.16e-03/07r4	
Abstract	This document contains suggestions to the improvement of the CDMA-based bandwidth request procedures in OFDMA-PHY.	
Purpose	The document is submitted for review by 802.16e Working Group members.	
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Changes on CDMA-based BW Request Procedures in OFDMA-PHY for Mobile Environment

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1. Background

In IEEE P802.16-REVd/D1-2003 OFDMA-PHY, CDMA-based periodic ranging and bandwidth-request transmissions are transmitted in the same uplink allocations for UIUC = 11. Bandwidth-request transmissions are for requesting uplink allocations from the BS, and periodic ranging transmissions are sent for periodic adjustment for the system reflecting the channel conditions (timing and power adjustments). The two ranging codes (BW-request and periodic ranging) are discriminated only by the code usage groups dynamically allocated and notified via UCD messages by the BS.

For detecting the bandwidth-request CDMA codes, BSs also perform the same correlation procedure as the periodic ranging codes. Therefore, the BSs can provide the adjust parameters for timing, power, and frequency for the bandwidth-request codes as well as periodic ranging codes by any additional receiver complexity. In the fixed wireless circumstances, the scope of the 802.16d, it is not necessary to applying the unsolicited ranging response to the bandwidth-request ranging codes, because the periodic ranging can possibly support the channel variations for the SSs. Since channel conditions in the mobile environment are changed more than in the fixed environment, it is required more frequent periodic ranging. But the more frequently it tries periodic ranging, the more overhead is required to support the periodic ranging.

Therefore, we propose the unsolicited RNG-RSP transmission as a response to a CDMA-based bandwidth request before the CDMA_Allocation_IE in UL-MAP for uplink transmission to the MSS as an explicit procedure for a CDMA-based bandwidth request. Then the MSS can adapt to a more recent channel conditions (such as timing and power offset) and send uplink data using appropriate modulation and channel coding.

In Figure 1, we describe the current procedure for CDMA-based bandwidth-request in OFDMA-PHY. And, in Figure 2, we describe the proposed procedure for CDMA-based bandwidth request in OFDMA-PHY.

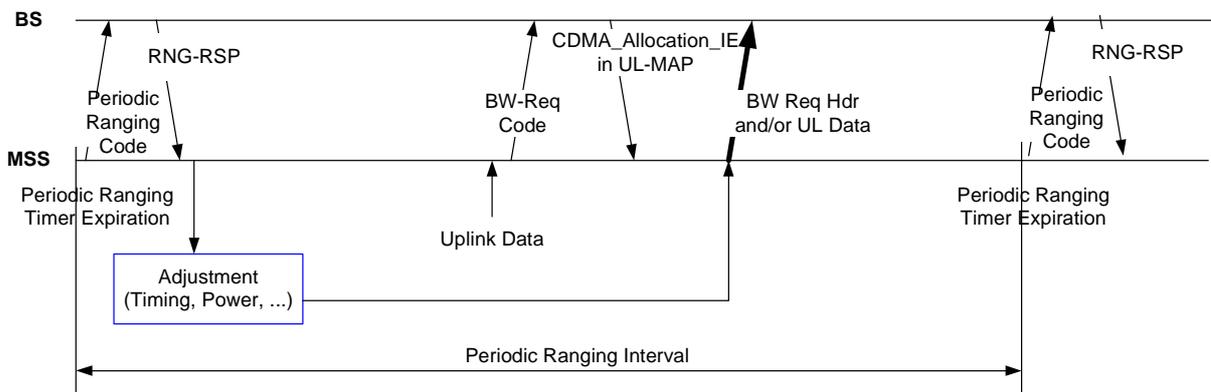


Figure 1. Current CDMA-based bandwidth-request procedure in OFDMA-PHY.

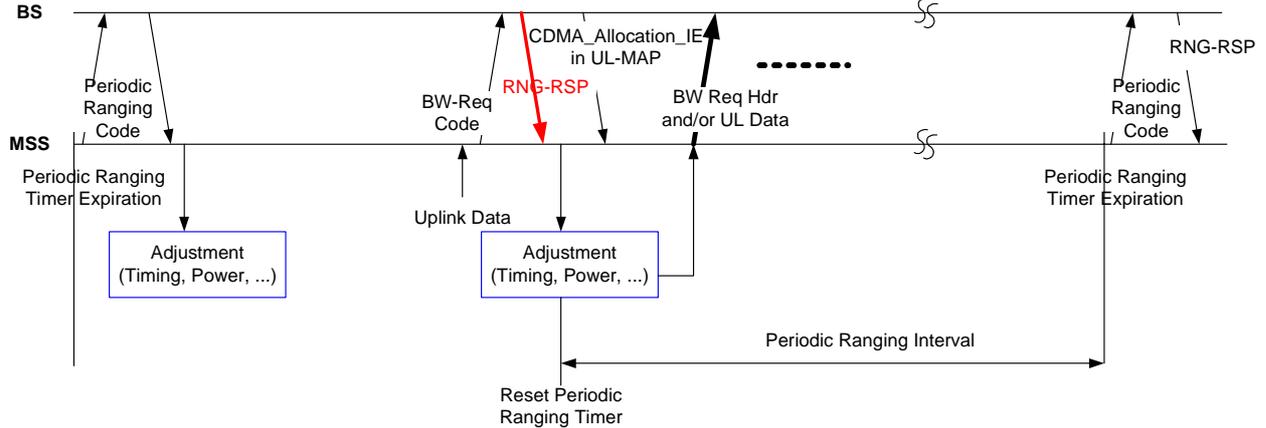


Figure 2. Proposed CDMA-based bandwidth-request procedure in OFDMA-PHY for mobile environment.

If we apply the unsolicited RNG-RSP to the CDMA-based bandwidth-request, information for discriminating the SS (frame number, slot number, subchannel number, code number, etc.) which is used to transmitted the bandwidth request codes are provided duplicated in the RNG-RSP message and CDMA_Allocation_IE, respectively. For reducing the overhead information designating the transmitting SS and maintaining consistency in the UL-MAP_IE format, we can provide temporary CID to the MSS in the RNG-RSP message. Then the BS can allocate the uplink resource to the MSS using the temporary CID, and the MSS can transmit the uplink data using the uplink resource allocated to the temporary CID. We describe the situation in Figure 3.

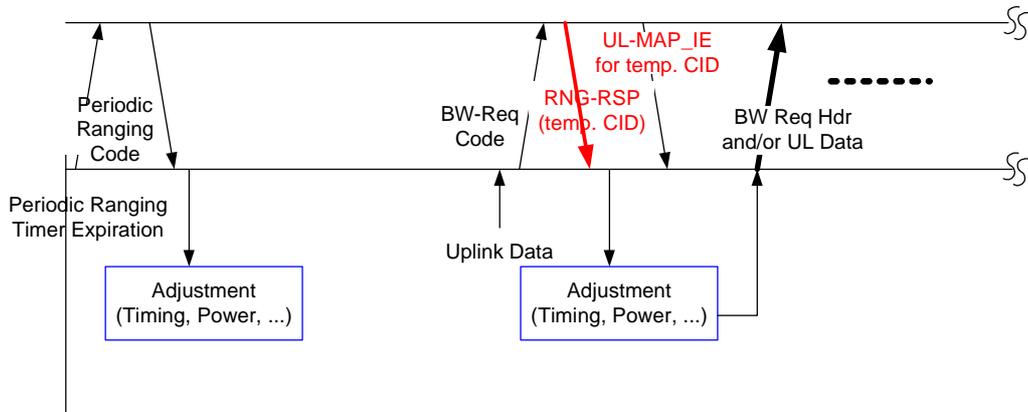


Figure 3. Temporary CID Allocation as a response to CDMA-based Bandwidth-request (Proposed).

2. Proposed changes on CDMA-based bandwidth-request procedure in OFDMA-PHY and addition to the IEEE 802.16e-03/07r4

[add the following to sections to the end of 6.4.10.2 OFDMA-based ranging]

6.4.10.2 OFDMA-based Ranging

(Preceding paragraphs need not be changed, and the following paragraphs are added to the end of the section.)

- The BS may send the unsolicited RNG-RSP as a response to a CDMA-based bandwidth-request. And if the allocation of a temporary CID to the user transmitting the bandwidth-request code is

enabled, the BS should contain the temporary CID in the RNG-RSP message in the Basic CID region.

- When the MSS receives a unsolicited RNG-RSP message after transmitting the bandwidth-request code, it shall reset the periodic ranging timeout, adjust the parameters (timing and power, etc.) as notified in the RNG-RSP message, and (if contained in the RNG-RSP message) allocate the temporary CID to identify the uplink resource allocation for it.