Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Details of SDD Section 11.9.2.5 Bandwidth Request Channel**
Date Submitted	**2008-09-05**
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Re:	SDD Session 56 Cleanup, Call for PHY Details
Abstract	This is revised version of Section 11.6 of IEEE 802.16m-08/003r4. This document provides further physical layer details.
Purpose	Draft for further development of the IEEE 802.16m SDD
Notice	
Release	
Patent Policy	

Details of SDD Section 11.9.2.5 Bandwidth Request Channel

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11.9.2.5   Bandwidth Request Channel

Contention based or non-contention based random access is used to transmit a bandwidth request indicator on this control channel. To support different levels of QoS, the bandwidth request channel provides a mechanism for prioritized bandwidth requests for contention based random access.

The random access bandwidth request procedure is described in Figure 1. A 5-step regular procedure (step 1 to 5) or an optional quick access procedure (step 1,4 and 5) may be supported concurrently. Step 2 and 3 are used only in 5-step regular procedure. In step 1, MS sends a bandwidth request indicator that may indicate bandwidth request from MS, and the BS may allocate uplink grant based on certain policy. The 5-step regular procedure is used independently or as fallback mode for quick access procedure. The MS may piggyback additional BW-REQ information along with user data during uplink transmission (step 5).

> **Deleted:** Inclusion of addition information in a bandwidth request indicator such as bandwidth request size, MS-ID, flow identifier, uplink transmit power report and CINR report is FFS.

> **Deleted:** information such as MS addressing and/or request size (FFS) and/or uplink transmit power report (FFS)
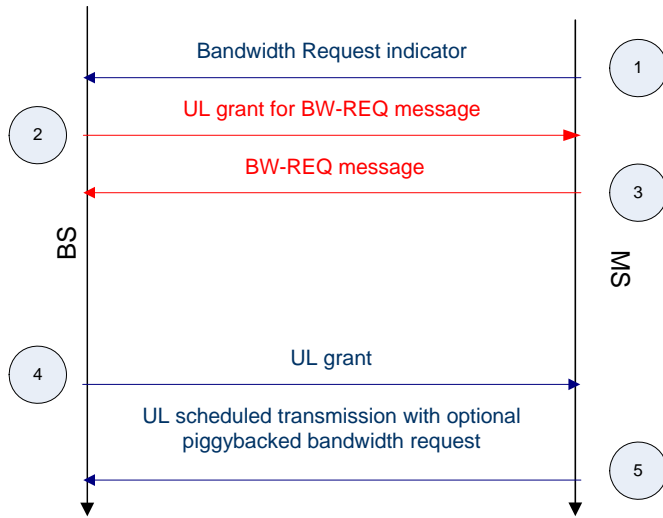

Figure 1 Bandwidth Request Procedure

11.9.2.5.1   *Multiplexing with other control channels and data channels*

The bandwidth request channel starts at a configurable location with the configuration defined in a DL broadcast control message. Non-contention based bandwidth request channels are allocated periodically for MS. The bandwidth request channel is FDM with other UL control and data channels.

11.9.2.5.2   *PHY structure*

For contention based bandwidth request channels, the sequence design and mapping to subcarriers are TBD.

> **Deleted:** The structure of bandwidth request channel resource blocks, pilots and resource mapping are TBD.

> **Deleted:** T

> **Deleted:** ranging

The sequence can be configured per user class, per service class and per sector. Users can be classified based on operator-specific network performance requirements and service level agreements.

Deleted: ranging

For non-contention based bandwidth request channels, the channel physical structure is similar as UL HARQ feedback channel with very low overhead. Non-contention based bandwidth request channel is BPSK modulated. Its transmit power is adaptively adjusted to the fading channel according to UL power control.

For non-contention based bandwidth request channels, twelve UL bandwidth request channels are multiplexed together using a mixture of FDM/TDM/CDM in three UL DRU tiles. For each group of four tones that are adjacent in time and frequency, pilot and data symbols from four bandwidth request channels are CDMed together in order to take full advantage of the MS transmit power. Further, since these four tones are adjacent in time and frequency, orthogonal codes can be used to separate the four bandwidth request channels. Finally, multiple groups of four tones are allocated in each tile with FDM/TDM. The pilot and data tone allocations are shown in Figure 2.
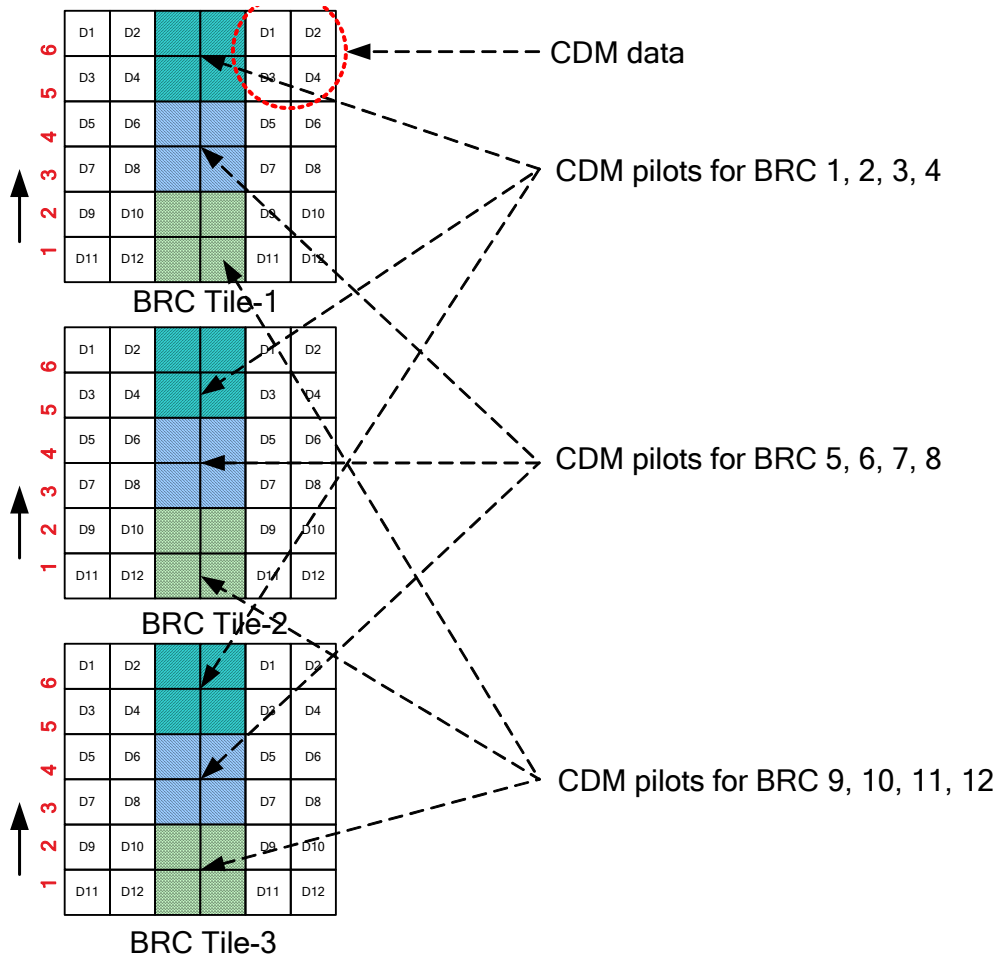
Figure 2. Non-contention based bandwidth request channel pilot and data Tone allocations

In order to improve the coverage of bandwidth request channel for cell edge MSs, the bandwidth request tiles are allocated in time dimension first as shown in Figure 3. Further, subframe based frequency hopping of the tiles can be applied to improve the frequency diversity.
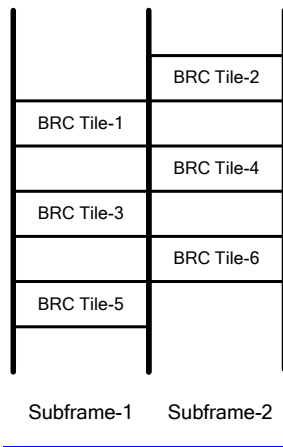
	BRC Tile-2
BRC Tile-1	
	BRC Tile-4
BRC Tile-3	
	BRC Tile-6
BRC Tile-5	

Subframe-1   Subframe-2

1

2   Figure 3. Non-contention based bandwidth request tile allocations

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