Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Recommended IEEE 802.16m Requirements Text for Section 9.0**
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Re:	Response to call for contributions on requirements for P802.16m – Advanced Air Interface
Abstract	This document proposes text for Section 9.0
Purpose	For consideration of 802.16 TGm Requirements drafting group
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9.0Usage Models

The IEEE 802.16m air interface, as an amendment to the existing IEEE 802.16-2004 and IEEE 802.16e-2005 standards, shall support a wide range of deployment scenarios and usage models including a) those considered during formulation of the existing standards and b) as envisioned by IMT-Advanced requirements. The examples provided in this section are informative only.

9.1 Service and Application Scenarios

The types of services that can be provided by IEEE802.16m-based packet-switched network can include:

Voice services (e.g., VoIP)
Data services (e.g., Email, IMS, web browsing, file transfer, internet gaming)
Multimedia services (e.g., Audio and/or video streaming, broadcast, interactive conferencing)

Section 5.7 provides details on the class of services for next generation of mobile networks.

The type of end users can include:

Personal use (e.g., mobile internet)
Business/Enterprise use (e.g., backhaul, VPN)
Special use (e.g., dedicated network for public safety needs)

9.2 Deployment Scenarios

The IEEE 802.16m radio access technology shall be suitable for deployment in a number of propagation environments including

Outdoor environments including outdoor-to-indoor environments (e.g., rural, urban, suburban)
Indoor environments (e.g., hot-spot, overlay for improved coverage and/or capacity)

The end users in an IEEE80.16m-based network also shall be supportable with different levels of mobility including

Fixed/Stationary (e.g., CPE with fixed antenna)
Pedestrian or quasi-static (e.g., portable devices)
Mobile (e.g., handsets)

9.2.1 Frequency Reuse

In the usage model example of cellular networks, a network coverage area can be served by a number of Base Stations (BS), each of which may further contain a certain number of sectors. For areas that need enhanced coverage or require additional throughout, additional IEEE 802.16m-based BS's can be overlaid onto existing 802.16e reference system topologies.

Cellular deployment scenarios specify the pattern of RF channel (or carrier) usage in terms of a "frequency reuse factor". RF channels are assigned to different cells (i.e. BS sites) or sectors and this allocation is repeated across adjacent sites or adjacent cluster of sites throughout the network. The resulting frequency reuse can be indicated as the triplet (*c, s, n*) where *c* is the number of BS sites per cluster, *s* is the number of sectors per BS site and *n* is the number of unique RF channels needed for reuse. Typical examples of reuse (1,3,1) and (1,3,3) are shown in Figure Z.

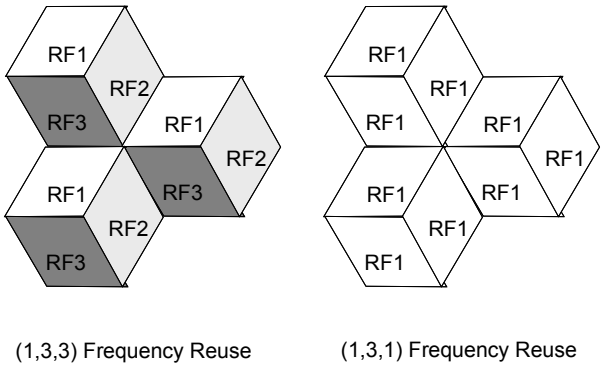

Figure Z — Examples of (1,3,3) and (1,3,1) frequency reuse.

The IEEE 802.16m amendment may support the following deployment modes:

(1,3,1) : Frequency reuse of (1,1) with 3 sectors per BS site (i.e., each cluster comprising one BS site. Each BS site has three sectors and all sectors are assigned the same RF channel)

(1,3,3) : Frequency reuse of (1,3) with 3 sectors per BS site (i.e., each cluster comprising one BS site. Each BS site having three sectors where each of the three sectors is assigned a unique RF channel)

(1,6,3) : Frequency reuse of (1,3) with 6 sectors per BS Site

(1,4,2) : Frequency reuse of (1,2) with 4 sectors per BS Site

(1,4,1) : Frequency reuse of (1,1) with 4 sectors per BS Site

(1,6,1) : Frequency reuse of (1,1) with 6 sectors per BS Site

The existing 802.16e reference network allows each sector to use only a non-overlapping subset of OFDM subcarriers, thus creating an equivalent reuse pattern. For example in PUSC permutation, the whole band is divided into six major groups and the FCH (Frame Control Header) message of each sector contains a bitmap that indicates the major groups usable to that sector. If the major groups are divided equally to three sets, an reuse pattern equivalent to (1,3) will be created. Sometimes, the PUSC frequency reuse is referred to as "in-band" reuse.

It is also possible to have a different reuse pattern in MBS deployment than the reuse pattern for regular data traffic . For example, a (1,1,1) pattern can be used in the so-called "Multicast Broadcast Single Frequency Network" deployment, while the other data service can still use (1,3,1) reuse pattern.

Co-Deployment with Other Networks

The IEEE 802.16m amendment is anticipated to be deployed in the same RF carrier as the legacy network (refer to the Section 5.1 and 8.1). Moreover, it is also envisioned that the IEEE 802.16m air interface can be deployed in the same or overlapping geographical areas with other wireless networks based on different RAT (Radio Access Technologies). These non-802.16 networks may operate in the neighboring licensed frequency bands such as CDMA2000, 3GPP (e.g., GSM, UMTS, LTE) or in unlicensed bands such as 802.11x networks. They may or may not have the same network topology. Coexistence of networks specified on the basis of the IEEE 802.16m amendment with these networks must be guaranteed from the perspective of being both an interferer and being a victim. Inter-working in the form of handoff as described in Section 7 is also expected.