Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Method for Supporting Near-seamless Frequency Assignment Change**
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Re:	Call for inputs for the Handoff Ad-hoc group
Abstract	This contribution describes method for supporting near-seamless frequency assignment change.
Purpose	Handoff Ad Hoc draft proposal for the IEEE802.16e group.
Notice	
Release	
Patent Policy and Procedures	

Method for Supporting Near-seamless Frequency Assignment Change

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1. Problem Statements

Vendors may choose to offer multiple channels (or frequency assignments (FAs)) within one MAC service access point. In order words, a BS may support one or more FAs. In case of BS with support for multiple FAs, it needs to make an (M)SS transit from one FA to another FA in order to facilitate load sharing among FAs.

According to current IEEE P802.16REVd/D3-2004, however, there is the only way, that is, of using DREG-CMD message, in changing FA. The message, DREG-CMD which is used in different usage from its very beginning, has no indication of the target FA. In addition, when an SS receives the message, it shall restart the initial re-entry sequence after cell selection. The former limit makes impossible the load sharing among FAs, and the latter inefficiency causes too long disruption of service.

In the handover scheme according to the current IEEE P802.16e/D2-2004, there are three major disadvantages because of the poor concern about the inter-FA (Frequency Assignment) handover.

- No indication of the target FA

Although the current IEEE P802.16e/D2-2004 says that a BS may be the initiator of a handover to facilitate load sharing among BS, the practical objective of the BS-initiated handover is to distribute the traffic load through the FAs in the cellular multiple-FA system. However, the efficient load sharing is not possible in the current 802.16e version because the BS cannot indicate the target FA to the MSS through the MOB_BSHO-REQ message explicitly. In the inter-FA handover the target FA is determined by the MSS after FA scanning procedure. Even if the BS recommends just one target FA to the MSS, the MSS shall scan the FA through the prescribed procedures and then it determines whether it can accept the BS's recommendation or not.

- Too long disruption for the reliable scanning

If the MSS wants to scan the other FA, it sends a MOB_SCN-REQ message to the BS to grant permission for the scanning. After receiving the MOB_SCN-RSP message with the BS's approval, the MSS changes its center frequency, synchronizes with the downlink of the FA, and obtains PHY parameters. If the MSS wants to scan actively, it will obtain the uplink parameters and send a RNG-REQ message to the BS through the FA. The scanning results are reliable only if the MSS receives the RNG-RSP message respective to the RNG-REQ message. According to the random access characteristic of the sending a RNG-REQ message, the scanning causes a sizable amount of latency. Since the MSS shall scan one or more FAs, the total disruption time of the scanning processes causes significant service degradation. If the MSS wants to apply the MOB_NBR-ADV message to reduce this disruption before it starts the scanning, it must wait until it collects sufficient and reliable information through the message. Therefore, this method may degrade the effectiveness of the inter-FA handover.

- Inefficient network re-entry procedure

On the inter-FA handover in the present standard, the MSS has to send the MOB_MSSHO-RSP message, receive the MOB_BSHO-RSP, and send the MOB_HO-IND message. When the MSS proceeds the inter-FA handover, the MSS and BS shall perform the normal handover by exchanging MAC messages and then the network re-initialization procedures. Although the MSS handovers to another FA using fast network re-entry procedure, the network re-entry procedure is still long and slow due to heavy message exchanges (ranging, capability negotiation, re-authorization, registration). Unfortunately, all service flows may be interrupted during this network re-entry.

To address these problems, this contribution introduces the powerful message which is concentrated in the inter-FA handover and presents the enhanced inter-FA handover procedures.