Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16 >**	
Title	**Clarification of MDHO and FBSS Sections**	
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Re:	IEEE P802.16e-2005 and IEEE P802.16-2004 In response to call for maintenance change request (IEEE 802.16maint-06/018) issued on 2006-06-16.	
Abstract	Clarification of MDHO and FBSS Sections	
Purpose	Adopt proposed changes	
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Clarification of MDHO and FBSS Sections

ETRI

1. Problem Statement

Although there are two different sections for MDHO and FBSS, respectively, two different HO types and their process and characteristics are described in the all sections.

To avoid the confusion, it's better to separate two HO types and their process and characteristics in their own sections.

2. Proposed Text Changes

[*Modify section 6.3.22.3.1 and 6.3.22.3.2 as follow*]

6.3.22.3.1 MDHO decision and initiation

Support of MDHO ~~or FBSS~~is optional for both the MS and the BS.

For an MS and a BS that support MDHO, the MS and the BS shall maintain a list of BSs that are involved in MDHO with the MS. The list is called the Diversity Set. Among the BSs in the Diversity Set, an Anchor BS is defined. Regular operation when MS is registered at a single BS is a particular case of MDHO with Diversity Set consisting of single BS, which in this case shall be the Anchor BS. When operating in MDHO, the MS communicates with all BSs in the Diversity Set for UL and DL unicast messages and traffic.

There are two methods for the MS to monitor DL control information (i.e., DL-MAP, UL-MAP, and FCH) and DL broadcast messages. The first method is the MS monitors only the Anchor BS for DL control information and DL broadcast messages. In this case, the DL-MAP and UL-MAP of the Anchor BS may contain burst allocation information for the non-Anchor Active BS. The second method is the MS monitors all the BSs in the Diversity Set for DL control information and DL broadcast messages. In this case, the DL-MAP and UL-MAP of any Active BS may contain burst allocation information for the other Active BSs. The method to be used by MS is defined during the REG-REQ and REG-RSP handshake.

A MDHO begins with a decision for an MS to transmit/receive unicast messages and traffic from multiple BSs at the same time interval. For DL MDHO, two or more BSs provide synchronized transmission of MS downlink data such that diversity combining can be performed by the MS. For UL MDHO, the transmission from an MS is received by multiple BSs such that selection diversity of the information received by multiple BSs can be performed.

The BS supporting MDHO or FBSS shall broadcast the DCD message that includes the H_Add Threshold and H_Delete Threshold. These thresholds are used by the ~~FBSS/~~MDHO capable MS to determine if MOB_MSHO-REQ should be sent. When long-term CINR of a ~~serving~~ active BS in the current diversity set is less than H_Delete Threshold, the MS shall send MOB_MSHO-REQ to requires dropping this ~~serving~~ active BS from the diversity set;

when long-term CINR of a neighbor BS is higher than H_Add Threshold, the MS shall send MOB_MSHO-REQ to require adding this neighbor BS to the diversity set.

The decision to update the Diversity Set begins with a notification by the MS through the MOB_MSHOREQ message or by the BS through the MOB_BSHO-REQ management message. The process of Anchor BS update may begin with MOB_MSHO-REQ from MS or MOB_BSHO-REQ from the Anchor BS. Acknowledgement with MOB_BSHO-RSP of a notification is required. After MS transmits MOB_MSHOREQ, MS shall not transmit any MOB_MSHO-REQ prior to expiration of timer MS_handover_retransimssion_timer. MS shall deactivate timer MS_handover_retransmission_timer on MS transmit of MOB_HO-IND or MS receipt of MOB_BSHO-RSP. Process of Anchor BS update may also begin with Anchor switching indication via fast-feedback channel.

If an MS that transmitted a MOB_MSHO-REQ message detects an incoming MOB_BSHO-REQ message, it shall ignore that MOB_BSHO-REQ message. A BS that transmitted a MOB_BSHO-REQ message and detects an incoming MOB_MSHO-REQ or MOB_HO-IND message from the same MS shall ignore its own previous request.

The BSs involving in MDHO with an MS shall use the same set of CIDs for the connections that are established with the MS. The BS may assign a new set of CIDs to the MS during Diversity Set update through MOB_BSHO-REQ message and MOB_BSHO-RSP message.

There are several conditions that are required to enable macro diversity handover ~~and or Fast BS Switching handover~~ between MS and a group of BSs. These conditions are listed below:

- The BSs involving in MDHO are synchronized based on a common time source.
- The frames sent by the BSs involving in MDHO at a given frame time arrive at the MS within the prefix interval.
- BSs involving in MDHO have synchronized frame structure.
- BSs involving in MDHO have the same frequency assignment.
- BSs involving in MDHO shall use the same set of CIDs for the connections that are established with the MS.
- The same MAC/PHY PDUs shall be sent by all the BSs involving in MDHO to the MS.
- BSs involved in MDHO are also required to share or transfer MAC context. Such context includes all information the MS and BS normally exchange during Network Entry, particularly authentication state, so that an MS authenticated/registered with one of BSs from diversity set BSs is automatically authenticated/registered with other BSs from the same diversity set. The context also includes a set of Service Flows and corresponding mapping to connections associated with MS, current authentication, and encryption keys associated with the connections.

6.3.22.3.2 FBSS decision and initiation

Support of FBSS is optional for both MS and BS.

For MS and BS that support FBSS, the MS and the BS shall maintain a list of BSs that are involved in FBSS with the MS. The list is called the Diversity Set. Among the BSs in the Diversity Set, an Anchor BS is defined. Regular operation when MS is registered at a single BS is a particular case of FBSS with Diversity Set consisting of single BS, which in this case shall be the Anchor BS. When operating in FBSS, the MS only communicates with the

Anchor BS for UL and DL messages including management and traffic connections. Transition from one Anchor BS to another ("switching") is performed without invocation of HO procedure described in 6.3.22.2. Anchor update procedure is defined in 6.3.22.3.4.

The BS supporting FBSS shall broadcast the DCD message that includes the H_Add Threshold and H_Delete Threshold. These thresholds may be used by the FBSS capable MS to determine if MOB_MSHOREQ should be sent to request switching to another Anchor BS or changing Diversity Set. When mean CINR of a active BS in the current diversity set is less than H_Delete Threshold, the MS may send MOB_MSHO-REQ to request dropping this BS from the diversity set; when mean CINR of a neighbor BS is higher than H_Add Threshold, the MS may send MOB_MSHO-REQ to request adding this neighbor BS to the diversity set. In each case, Anchor BS responds with MOB_BSHO-RSP with updated Diversity Set.

The process of Anchor BS update may begin with MOB_MSHO-REQ from MS or MOB_BSHOREQ from the Anchor BS. Acknowledgement of MOB_MSHO-REQ with MOB_BSHO-RSP is required. After MS transmits MOB_MSHO-REQ, MS shall not transmit any MOB_MSHO-REQ prior to expiration of timer MS_handover_retransmssion_timer. The MS shall deactivate the timer ~~MS handover retransmission timer~~ MS_handover_retransmission_timer upon MS transmit of MOB_HO-IND or upon MS receipt of MOB_BSHO-RSP. The process of Anchor BS update may also begin with Anchor switching indication via fast-feedback channel.

If an MS that transmitted a MOB_MSHO-REQ message detects an incoming MOB_BSHO-REQ message, it shall ignore that MOB_BSHO-REQ message. A BS that transmitted a MOB_BSHO-REQ message and detects an incoming MOB_MSHO-REQ or MOB_HO-IND message from the same MS shall ignore its own previous request.

There are several conditions that are required to enable Fast BS Switching handover between MS and a group of BSs. These conditions are listed below:

- BSs involving in FBSS are synchronized based on a common time source
- The frames sent by the BSs from Diversity Set arrive at the MS within the prefix interval
- BSs involving in FBSS have synchronized frames
- BSs involving in FBSS operate at same frequency channel
- BSs involving in FBSS are also required to share or transfer MAC context. Such context includes all information MS and BS normally exchange during Network Entry, particularly authentication state, so that an MS authenticated/registered with one of BSs from diversity set BSs is automatically authenticated/registered with other BSs from the same diversity set. The context also includes a set of Service Flows and corresponding mapping to connections associated with MS, current authentication, and encryption keys associated with the connections.