Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Enhancements on Neighbor Advertisement Message** **(Harmonization Ad hoc Consensus Version)**
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Re:	This contribution is response to call for contribution about IEEE 802.16e-D4/2004
Abstract	This contribution recommends few enhancements in the NBR_ADV message to reduce its size for OFDMA PHY and support Preferred Hand over. It is the consensus contribution within Harmonization Ad Hoc Group.
Purpose	To be discussed and considered in preparation of new text for hand off sections.
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Recommended Enhancements to the Neighbor Advertisement Message

Suggestions/Comments:

The following items briefly highlight our recommendations for changes in the current structure of NBR_ADV message.

- For OFDMA PHY mode and at the time of measurement, the only thing a mobile needs to know about the neighbors is their RF Channel Number (FA Index) and their 8-bit Preamble Index. Therefore for OFDMA PHY the Neighbor's BS ID do not need to be shared with the mobile. The MSS can obtain full information about the Target BS once it reads its FCH and DL_MAP. Therefore, we recommend that BS-ID can be optionally skipped or omitted from the NBR-ADV Message to reduce the size of the message. This can be indicated by a Skip-Optional-Fields Flag. Although not suggested in this consensus contribution, if desired the Skip-Optional-Fields flag may be expanded and applied to other fields in the message which are later on found to be optional.
- The group has also found it beneficial to add logical hand off preference levels to allow hierarchical cell structure such as overlay/underlay networks. The proposed feature allows the capability of defining three different logical levels of preferred neighbors, namely Preferred, Normal and Non-Preferred with the following implications:

Proposed Text Changes:

[change the table 106d—MOB-NBR-ADV Message Format in Section 6.3.2.3.47 to the following]

Table 106d—MOB-NBR-ADV Message Format

Syntax	Size	Notes
MOB_NBR-ADV_Message Format(){		
Management Message Type =49	8 bits	
Operator ID	24 bits	Unique ID assigned to the operator
Configuration Change Count	8 bits	Change count for this message
N_NEIGHBORS	8 bits	The count of the unique combination of Neighbor BS ID and Preamble Index and DCD
Skip-Optional-Fields Flag	1 bit	If set to '1' and if a neighbor has OFDMA PHY the BS-ID for that neighbor is omitted in this message. If set to '0', BS-ID is not omitted for any neighbor.
For (j=0; j< N_NEIGHBORS; j++){		
Length	8 bits	Length of message information within the iteration of N_NEIGHBOR in bytes
PHY Profile ID	16 bits	TBD This Field indicates the PHY mode channel index and other information related to the neighbor BS.
Neighbor BS ID	24 bits	This is an optional field for OFDMA PHY and it is omitted or skipped if Skip Optional Fields Flag = '1'
Preamble Index	8 bits	The index for the PHY profile specific preamble. Preamble Index is PHY specific for SCa and OFDMA. The value of Preamble Index shall be ignored and a value of '0x00' shall be used for OFDM PHY
		(Note: this has been moved up in the message.)

HO Process Optimization	8 bits	HO Process Optimization is provided as part of this message is indicative only. HO process requirements may change at time of actual HO. For each Bit location, a value of '0' indicates the associated re-entry management messages shall be required, a value of '1' indicates the re-entry management message may be omitted. Regardless of the HO Process Optimization TLV settings, the Target BS may send unsolicited SBC-RSP and/or REG-RSP management messages Bit #0: Omit SBC-REQ/RSP management messages during current re-entry processing Bit #1: Omit PKM-REQ/RSP management message during current re-entry processing Bit #2: Omit REG-REQ/RSP management during current re-entry processing Bit #3: Omit Network Address Acquisition management messages during current re-entry processing Bit #4: Omit Time of Day Acquisition management messages during current re-entry processing Bit #5: Omit TFTP management messages during current re-entry processing Bit #6: Full service and operational state transfer or sharing between Serving BS and Target BS (ARQ, timers, counters, MAC state machines, etc…)
Scheduling Service Supported	4 bits	Bitmap to indicate if BS supports a particular scheduling service. '1' indicates support, '0' indicates not support: bit 0: Unsolicited Grant Service (UGS) bit 1: Real-time Polling Service (rtPS) bit 2: Non-real-time Polling service (nrtPS) bit 3: Best Effort value of '1111' indicates no information on service available

Available Radio Resource	4 bits	Percentage of reported average available subchannels and symbols resources per frame 0000: 0% 0001: 20% 0010: 40% 0011: 60% 0100: 80% 0101: 100% 0110-1110: reserved 0110-1110: reserved value of '1111' indicates no information on service available
Hand Off Neighbor Preference	2 bits	00 Normal 01 Preferred 10 Non-Preferred 11 Reserved
DCD Configuration Change Count	8 bits	
UCD Configuration Change Count	8 bits	
TLV Encoded Neighbor information	*variable*	
}		
}		

[add the following text at line 47 page 36 in section 6.3. 2.3.47]

Skip-Optional-Fields Flag:
This is 1 bit Flag to show if the BS-ID fields are skipped fore neighbors with OFDMA PHY. Therefore if this flag is set to '1' and if a neighbor BS has OFDMA PHY, as indicated in its PHY Profile ID, then the BS-ID for that neighbor is not mentioned in this message. If this flag is set to '0', BS-ID is not omitted for any neighbor.

----------endText----------

[add the following text at line 40 page 37 in section 6.3. 2.3.47]

Handoff Neighbor Preference:
This field defines the logical preference for handing off to a neighbor base stations as determined by the serving base station (see section 6.3.20.1.1.1)

----------end text----------

[add the following text]

Section 6.3.20.1.1.1 Neighbor preference

The message element "Handoff Neighbor Preference" in MOB-NBR-ADV MAC Management message defines a logical assignment of hand off priorities or preferences as determined and set by the serving base station.

In the case of network controlled handover these logical preferences have the following implications on mobile behavior:

- Normal Neighbor: The MSS shall report a Normal Neighbor BS as a handoff candidate in the MSS-HO-REQ if the channel quality, e.g. CINR, of this BS is better than that of its serving BS by a handoff hysterisis margin.
- Preferred Neighbor: The MSS shall report a Preferred Neighbor BS as a handoff candidate in the MSS-HO-REQ as long as it channel quality, e.g. CINR, from the BS is sufficient for access and communications.
- Non-Preferred Neighbor: An MSS shall report this BS as a handoff candidate in the MSS-HO-REQ only when the channel quality, e.g. CINR, from the serving BS is not enough to continue the communication.

The MSS may also consider other factors such as neighbors loading and QoS support in deciding to report a BS as a hand off candidate, according to the rules specified by hand off policy management.