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Re:	This contribution is response to call for contribution about IEEE 802.16e-D5	
Abstract	This document proposes the a new info field in MOB-NBR-ADV message	
Purpose	Discuss and adapt proposed text and message format.	
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Heterogeneous Neighbor Information in MOB-NBR_ADV message

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1. Problem Statement

The MOB-NBR_ADV message that is defined in IEEE P802.16e/D5 specification contains useful information of neighbor BSs. The information is only for the 802.16-compliant neighbor BSs. For some reasons, however, there are some needs to have information of heterogeneous wireless access service within the Serving BS cell coverage area, if any. In some cases, a MSS may have dual mode or triple mode supporting 802.16, WLAN and cellular systems in one terminal. Sometimes the dual mode terminal, for example 802.16 and WLAN, needs to roam or handoff between the heterogeneous wireless access services in order to have more bandwidth or mobility, then the dual mode MSS start to search WLAN APs until it finds any AP or periodically depends on the application. However, a MSS could consume power in order to keep searching any AP in the cell where there is no AP exist in. That is the only way to find out whether if there is any accessible AP in the cell or not.

~~Another problem that can be occurred—~~

~~have information of heterogeneous wireless access service within the Serving BS cell coverage area, if any. The only way to do this is that MSS keeps trying to search heterogeneous wireless service access points (e.g. WLAN APs).—~~

Once MSS finds the APs or BSs, another problem still remains; the MSS could not figure out whether or not the interworking or roaming service between heterogeneous wireless systems is feasible until it tries to access the APs or BSs to see if it can be accepted based on the contracts with the operator the AP or BS is belongs to other operator or have no contract for interworking with the operator that the MSS have registered.

~~Since we have not included heterogeneous handoff issue in the 802-16e-PAR, the handoff operation between heterogeneous networks may seem to be out of scope. However, one of the reasons for the project in the PAR is to ‘fill the gap between very high data rate wireless local area networks and very high mobility cellular system’. It also aims to ‘support fixed and mobile services for both enterprise and consumer markets’. We have IEEE 802.21 project in order to discuss media independent handoff. However, it will standardize only common part of between various access media. It unfortunately decided not to standardize the media specific changes in the scope.~~

~~We have proposed to add a field in IEEE 802.16e system MOB-NBR_ADV message for providing information of heterogeneous network existence within the 802.16e BS cell coverage in this contribution. The changes of 802.16e message are out of scope in the IEEE 802.21 WG, because they decided not to include media specific changes in their document as the standard and that is the reason why 802.16 is the only WG to discuss this contribution.~~

In this contribution, we propose new fields to provide information of heterogeneous wireless service, APs or BSs, availability which support roaming or handoff.

2. Proposed Remedy

MOB_NBR-ADV message may include HET_NBR_INFO fields in order to provide heterogeneous access service information.

1. Proposed text change

[Modify MOB-NBR-ADV message in Page 62-65, Table 106d]

Syntax	Size	Notes
MOB-NBR_ADV Message_Formant() {		
Management message type = 53	8 bits	
Operator ID	24 bits	Unique ID assigned to the operator
Configuration Change Count	8 bits	Incremented each time the information for the associated neighbors BS has changed
Fragmentation Index	4 bits	This field indicates the current fragmentation index.
Total Fragmentation	4 bits	This field indicates the total number of fragmentations.
Skip-Optional-Fields <u>bitmapFlag</u>	4 bits	<p>[0] 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.</p> <p>[1] If set to '1' HET_NBR_INFO field shall be omitted in this message.</p> <p>[2] and [3] are reserved</p>
<u>HET_NBR_INFO</u>	4 bits	<p>[0]: accessible WLAN APs exist</p> <p>[1]: accessible Cellular systems exist</p> <p>[2] - [3]: reserved</p>
N_NEIGHBORS	8 bits	
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	8 bits	Aggregated IDs of Co-located FA Indicator, FA Configuration Indicator, FFT size, Bandwidth, Operation Mode of the starting subchannelization of a frame, and Channel Number
if (FA Index indicator==1){		
FA Index	8 bits	This field, Frequency Assignment Index, is present only the FA Index Indicator in PHY Profile ID is set. Otherwise, the neighbor BS has the same FA Index or the center frequency is indicated using the TLV encoded information.
}		
if (BS EIRP indicator==1){		
BS EIRP	8 bits	Signed Integer from -128 to 127 in unit of dBm This field is present only if the BS EIRP indicator is set in PHY Profile ID. Otherwise, the BS has the same EIRP as the serving BS.
}		
Neighbor BS-ID	24 bits	This is an optional field for OFDMA PHY
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
HO Process Optimization	8 bits	<p>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 reentry management messages shall be required, a value of '1' indicates the reentry 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</p> <p>Bit #0: Omit SBC-REQ/RSP management messages during current re-entry processing</p> <p>Bit #1: Omit PKM-REQ/RSP management message during current re-entry processing</p> <p>Bit #2: Omit REG-REQ/RSP management during current re-entry processing</p> <p>Bit #3: Omit Network Address Acquisition management messages during current reentry processing</p> <p>Bit #4: Omit Time of Day Acquisition management messages during current reentry processing</p> <p>Bit #5: Omit TFTP management messages during current re-entry processing</p> <p>Bit #6: Full service and operational state transfer or sharing between Serving BS and Target BS (ARQ, timers, counters, MAC state machines, etc...)</p>
Scheduling Service Supported	4 bits	<p>Bitmap to indicate if BS supports a particular scheduling service. '1' indicates support, '0' indicates not support:</p> <p>bit 0: Unsolicited Grant Service (UGS)</p> <p>bit 1: Real-time Polling Service (rtPS)</p> <p>bit 2: Non-real-time Polling service (nrtPS)</p> <p>bit 3: Best Effort value of '1111' indicates no information on service available</p>
Available Radio Resource	4 bits	<p>Percentage of reported average available subchannels and symbols resources per frame</p> <p>0000: 0%</p> <p>0001: 20%</p> <p>0010: 40%</p> <p>0011: 60%</p> <p>0100: 80%</p> <p>0101: 100%</p> <p>0110-1110: reserved</p>

		0110-1110: reserved value of '1111' indicates no information on service available
Handoff Neighbor Preference	2 bits	00 Normal 01 Preferred 10 Non-Preferred 11 Reserved
DCD Configuration Change Count	3 bits	This represents the Neighbor BS current DCD configuration change count
UCD Configuration Change Count	3 bits	This represents the Neighbor BS current UCD configuration change count
TLV Encoded Neighbor information	Variable	TLV specific
}		
<u>TLV Encoded information</u>	<u>Variable</u>	<u>TLV specific</u>
}		

HET_NBR_INFO

This field shall be omitted if Skip-optional-field bitmap #1 bit is set '1'. This field provides the information represent which heterogeneous access AP or BS existence and accessibility.

[0] bit : accessible WLAN AP existence (0: exist) (1:not exist). If this bit is set to '0', specific information for WLAN AP may be provided by TLV

[1] bit: accessible Cellular (0: exist) (1:not exist). If this bit is set to '0', specific information for identifying accessible target Cellular BS may be provided by TLV

[2] - [3] bits : reserved

[Add following new TLVsection]

11.9 MOB_NBR-ADV message encodings

11.9.1 Heterogeneous Network Information TLV

<u>Name</u>	<u>Type (1byte)</u>	<u>Length(1byte)</u>	<u>Value</u>
<u>WLAN network specific information</u>	<u>XX</u>	<u>Variable</u>	<u>WLAN network specific informations</u>
<u>Cellular network specific information</u>	<u>XXX</u>	<u>Variable</u>	<u>Cellular network specific informations</u>