Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**NBR-ADV changes – HO Ad-Hoc Consensus**
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Source(s)	Phillip Barber Broadband Mobile Technologies, Inc. 8302 Sebastian Inlet Frisco, Tx 75035	Voice: +1 (972) 365-6314 Fax: +1 (925) 396-0269 [mailto:pbarber@BroadbandMobileTech.com]
	Prakash Iyer David Johnston Intel Corp. 2111 NE 25th Ave, MS: JF3-206, Hillsboro, OR 97124	Voice: +1 (503) 264 1815 Fax: +1 (503) 264 4230 [mailto:prakash.iyer@intel.com] [mailto:dj.johnston@intel.com]
	Dongkie Lee SK Telecom 15F, Seoul Finance Center, 84, Taepyungpro 1 ga, Chung-gu, Seoul	Voice: +82 (11) 758-4359 Fax: +82-2-6323-4493 [mailto:galahad@sktelecom.com]
	Min-Sung Kim KT 17 Woomyeon-dong, Seocho-gu, Seoul 137-792, Korea	Voice: +82-2-526-6109 Fax: +82-2-526-5200 [mailto:cyberk@kt.co.kr]
	Sohyun Kim Jungwon Kim Jungje Son Changhoi Koo Hong Sung Jang Samsung Elec. 416, Maetan-3dong, Youngtong-gu Suwon-si, Gyeonggi-do, Korea	Voice: +82-31-279-5091 Fax: +82-31-279-5130 [mailto:binde.kim@samsung.com] [mailto:jungwon74.kim@SAMSUNG.COM] [mailto:jungje.son@samsung.com] [mailto:chkoo@samsung.com]
	Yong-Ho Kim LG Electronics,Inc. 533,Hogye-1dong,Dongan-gu, Anyang-shi,Kyongki-do,Korea	Voice: +82-31-450-4387 Fax: +82-31-450-7912 [mailto: ronnykim@lge.com]
	Yigal Leiba Itzik Kitroser Yossi Segal Zion Hadad Runcom Technologies Ltd. 2 Hachoma St. 75655 Rishon Lezion, Israel	Voice: +972-3-9528440 Fax: +972-3-9528805 [mailto:yigall@runcom.co.il] [mailto:itzikk@runcom.co.il] [mailto:yossis@runcom.co.il] [mailto:zionh@runcom.co.il]

Chulsik Yoon	Voice: + 82-42-860-6826
SungCheol Chang	[mailto:csyoon@etri.re.kr]
ETRI	[mailto:scchang@etri.re.kr]
Hang Zhang	Voice: +1-613-765-8983
Mo-Han Fong	Fax: +1-613-765-6717
Peiying Zhu	[mailto:mhfong@nortelnetworks.com]
Wen Tong	
Nortel Networks	
3500 Carling Avenue, Ottawa	
Ontario, Canada K2H 8E9	

Re:	Response to HO Ad-Hoc Call for Contributions on IEEE 80.16e/D3
Abstract	NBR-ADV changes – HO Ad-Hoc Consensus
Purpose	Addition of message elements to NBR-ADV message to provide more needed and useful information for facilitating network entry and HO

NBR-ADV changes

Phillip Barber
Broadband Mobile Technologies

Problem:
The current NBR-ADV message elements do not adequately capture some of the needed and useful information for facilitating network entry and HO—the beneficial goal of providing the information in this message. Addition of message elements must be weighed against the constraint of the poor coding rate likely to be employed when transmitting the NBR-ADV broadcast message and restrict the size of the message to the minimum necessary to accomplish our goals.

Remedy:
Set an overall message loop change counter for the message, to cut down on iterative duplication. As part of the set of overall message change counter, need to establish separate change counters for the DCD and UCD messages. Individual counters for DCD and UCD seems warranted, as we expect the item variance not to correlate.

Change N_NEIGHBOR counter to encompass the full variety of PHY connection permutations for all PHY modes by setting to Neighbor BS ID + Preamble Index + DCD.

Eliminate HMAC Tuple from broadcast message. Will likely use an alternate public shared key feature in the future for broadcast messages, but private key (between a specific MSS and specific BS) is inappropriate use of HMAC Tuple.

Provide clear language that certain message items inside the N_NEIGHBORS loop are required the first time presented in the message, but need not be duplicated in the immediate subsequent N_NEIGHBORS loop iteration.

Establish the length of the items inside the N_NEIGHBORS loop to assist decoding and MSS decision to ignore useless data.

Change to only use least significant 24-bits of Neighbor BS ID. Only need this portion in the loop because we are already presenting the 24 most significant bits as the Operator ID outside of the loop. Can save a lot of bytes with this change, but would require another outside nesting loop in the future to support presenting multiple Operator IDs. But since multiple Operator IDs are out of 16e scope, no problems.

Provide Preamble Index to provide adequate PHY connection unique separation when identifying Neighbor BS. This is necessary for SCa and OFDM PHY mode implementations and is consistent with other changes proposed in other contributions. Also gives information useful for MSS to more speedily synchronize with Neighbor BS.

Establish PHY Profile ID to assist in MSS determination and synchronization with Neighbor BS that may be using varying PHY profile elements: channel size, FFT size, etc….

We can also add HO Process Optimization flag language into NBR-ADV broadcast management message to give indication of likely HO process management messages that may be omitted and optimization of HO.   MSS can use the information to prioritize interest in the HO decision process.

Establish independent change counters for Neighbor BS DCD and UCD reflecting the change counters for those elements at the Neighbor BS.

Changes related to Reply Comments:

[Vladimir] State [in Remedy part] that "Configuration Change Count" [of MOB-NBR-ADV] covers also DCD/UCD parameters

[Vladimir] Delete "TLV specific" [length of TLV Encoded Neighbor information] which explains nothing. "Variable" is enough. BTW it appears in many places in the standard.

[Fong, Mo-Han] Add 'Scheduling Service Supported' by BS from C80216e-04/224 (agreed name change; referred to as 'Service level supported' in 224) except allow the additional option of 'No information available' set the 4-bit resource available field to '1111'

[Fong, Mo-Han] Add 'Available radio resource' as from C80216e-04/224 except with additional language clarifications and allow the additional option of 'No information available' set the 4-bit resource available field to '1111'.

Following sections specify text changes to the D3 draft:

Remedy 1:
[In 6.3.2.3.50 Neighbor Advertisement (MOB-NBR-ADV) message, page 22, line 46, modify as]:
A BS shall generate MOB-NBR-ADV messages in the format shown in Table 92d. The following parameters shall be included in the MOB-NBR-ADV message unless otherwise noted as an optional item in which case they may be included

Operator ID - the unique network ID shared by an association of BS

Configuration Change Count - Incremented by one (modulo 256) whenever any of the values relating to any included data element changes, including DCD & UCD parameters. If the value of this count in a subsequent MOB-NBR-ADV message remains the same, the MSS can quickly disregard the entire message.

N_ NEIGHBORSNeighbors - Number of advertised neighbor BSThe count of the unique combination of Neighbor BS ID and Preamble Index and DCD

HMAC Tuple (see 11.4.11 in IEEE Standard P802.16-REVd/D3-2004) - The HMAC Tuple Attribute contains a keyed Message digest (to authenticate the sender).

For each advertised N_NEIGHBOR, the following TLV parameters shall be included. Required message items may be omitted if duplicating the immediate previous iteration of N_NEIGHBORS in the same message:

Length - Length of message information within the iteration of N_NEIGHBOR in bytes

3

Neighbor BS-ID - The least significant 24 bits of the Base Station ID parameter in the DL-MAP message of Neighbor BS.

Preamble Index - 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

PHY Profile ID – TBD

HO Process Optimization
     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 - 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 - Percentage of reported average available subchannels and symbols resources per frame, as determined by the BS call admission policy and measured over a vendor defined interval. The BS should take into consideration the average loading occupied by existing non-best-effort MSS as well as loading the BS intends to offer to the existing best-effort MSS, and then evaluate the extra radio resource available that the BS wishes to advertise.
          0000: 0%
          0001: 20%
          0010: 40%
          0011: 60%
          0100: 80%
          0101: 100%
          0110-1110: reserved
          value of '1111' indicates no information on service available

DCD Configuration Change Count - This represents the Neighbor BS current DCD configuration change count

UCD Configuration Change Count - This represents the Neighbor BS current UCD configuration change count

For each advertised Neighbor BS, the following TLV parameters may be included:

Mode Supported : Same with 11.4.2.13.1.

When Mode Supported bit indicate support Idle-mode, following TLV parameters may be included

Paging Group ID (16 bit) : One or more logical affiliation groupings of BS

~~Neighbor BS-ID - Same as the Base Station ID parameter in the DL-MAP message of Neighbor BS~~

~~Physical Frequency - DL center frequency (kHz).~~

~~Configuration Change Count - Incremented by one (modulo 256) whenever any of the values relating to any included data element changes. If the value of this count in a subsequent MOB-NBR-ADV message remains the same, the MSS can quickly disregard the entire message.~~

All other parameters are coded as TLV tuples.

Remedy 2:
[In 6.3.2.3.50 Neighbor Advertisement (MOB-NBR-ADV) message, page 22, line 16, modify Table 92d—MOB-NBR-ADV Message Format]:

Table 92d—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
For (j=0; j< N_NEIGHBORS; j++){		
Length	8 bits	Length of message information within the iteration of N_NEIGHBOR in bytes
Neighbor BS ID	~~48~~ 24 bits	The least significant 24 bits of the Base Station ID parameter in the DL-MAP message of Neighbor BS.
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
~~DL Physical Frequency~~	~~32 bits~~	
PHY Profile ID	16 bits	TBD
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
DCD Configuration Change Count	8 bits	This represents the Neighbor BS current DCD configuration change count~~Incremented each time the information for the associated neighbor BS has changed.~~
UCD Configuration Change Count	8 bits	This represents the Neighbor BS current UCD configuration change count
TLV Encoded Neighbor information	*variable*	~~TLV specific~~
}		
~~HMAC Tuple~~	~~21 bytes~~	~~See 11.4.11~~
}		