Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Optimization of MOB-NBR_ADV message**
Date Submitted	**2004-11-4**
Source(s)	Sungjin Lee, Jungje Son, Changhoi Koo Samsung Electronics Voice: +82 31 279 5248 Email : steve.lee@samsung.com
Re:	This contribution is response to call for contribution about IEEE 802.16e-D5
Abstract	This document proposes the optimized MOB-NBR_ADV message format
Purpose	Discuss and adapt proposed text and message format.
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.
Patent Policy and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <mailto:chair@wirelessman.org> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>.

Optimization of MOB-NBR-ADV

Sungjin Lee, Jungje Son and Changhoi Koo

SAMSUNG Electronics

1. Problem Statement

The MOB_NBR-ADV message that is defined in IEEE P802.16e/D5 specification contains useful information of neighbor BSs. MSS may use the information when it scan or handoff to the neighbor BSs. When it comes to bandwidth consumption, however, the MOB_NBR-ADV message may grow too large with all the fields defined in table 106d of IEEE P802.16e/D5 draft. To cope with the situation, it may beneficial to devise a way to decrease the message size by optionally eliminating some fields based on decisions of Serving BS or network management system.

We propose a Skip-Optional-Fields Bitmap that indicates whether some fields in MOB-NBR_ADV message may be omitted in the MOB_NBR-ADV message. This bitmap is an extended version of Skip-Optional-Fields Flag in IEEE P802.16e/D5.

2. Proposed Remedy

BS may omit the following fields in the MOB-NBR_ADV message.

- Operator ID
- Neighbor BS ID
- HO Process Optimization
- QoS related Fields
  - Scheduling Service Supported
  - Available Radio Resource
  - Handoff Neighbor Preference

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	
Skip-Optional-Fields bitmap	8 bits	Bit [0] : if set to '1',omit Operator ID field Bit [1] : if set to '1', omit NBR BS ID field Bit [2] : if set to '1', omit HO process optimization field Bit [3] : if set to '1', omit QoS related fields Bit [4]-[7] : reserved

If (Skip-Optional-Fields[0]=0) {		
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 Flag**~~	~~1 bits~~	~~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.~~
N_NEIGHBORS	6 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.
}		
if (Skip-Optional-Fields[1]=0) {		
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
if (Skip-Optional-Fields[2]=0) {		
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 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 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 reentry processing Bit #4: Omit Time of Day Acquisition management messages during current reentry 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…)
}		
if (Skip-Optional-Fields-[3]=0) {		
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
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
Padding for byte alignment		
TLV Encoded Neighbor information	Variable	TLV specific
}		
}		

A BS shall generate MOB-NBR-ADV messages in the format shown in Table 106d. 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. This field is present only if bit #0 of Skip-Optional-Fields bitmap is '0'

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-NBRADV message remains the same, the MSS can quickly disregard the entire message.

Fragmentation Index

This field indicates the current fragmentation index. The index for the first fragmentation is 0.

Total Fragmentation

This field set to 1 when no fragmentation exists. Otherwise, neighbor list is fragmented and this field indicates the total number of fragmentations. When the neighbor list is fragmented, the N_NEIGHBORS indicates the number of neighbors in the current fragmentation.

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', BSID is not omitted for any neighbor.

N_NEIGHBORS

The count of the unique combination of Neighbor BS ID, Preamble Index and DCD.

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

Length

Length of message information within the iteration of N_NEIGHBOR in bytes

Neighbor BS-ID

The least significant 24 bits of the Base Station ID parameter in the DL-MAP message of the Neighbor BS. This field is present only if bit #1 of Skip-Optional-Fields bitmap is '0'

Preamble Index

The index for the PHY profile specific preamble. Preamble Index is PHY specific for SCa and OFDMA. For the OFDM PHY, the value of Preamble Index shall be ignored and a value of '0x00'

shall be used.

PHY Profile ID

The PHY Profile ID is the aggregate ID's including the Co-located FA Indicator bit, the FA Configuration indicator bit, Time/Frequency Synchronization Indicator, BS EIRP Indicator, DCD/UCD Reference Indicator, FA Index Indicator, and the FA (Frequency Assignment) number. For systems using OFDMA, the bit-by-bit definition of the PHY Profile ID is shown. The ID for systems using other than OFDMA is . If the Co-located FA Indicator bit is set, the following field of the NBRADV element including Preamble Index, HO Process Optimization, DCD/UCD Configuration Change Count, and TLV Encoded Neighbor Information may be omitted.

FA Index

Only if the FA Index Indicator bit in the PHY Profile ID is set to 1, the FA Index follows the PHY Profile ID. In addition, if the FA Indicator is followed, the DL center frequency shall be omitted in the DCD/UCD difference TLV information. The bit-by-bit definition shall be determined by a service provider or a governmental body like FCC.

BS EIRP

The neighbor BS EIRP is listed in a signed integer form from -128 to 127 in units of dBm. This field shall be omitted if the BS EIRP Indicator bit in PHY Profile ID is set zero.

HO Process Optimization

This field is present only if bit #2 of Skip-Optional-Fields bitmap is '0'. The HO Process Optimization that 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 and 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:

Bit #0: Omit SBC-REQ/RSP management messages during re-entry processing

Bit #1: Omit PKM-REQ/RSP management message during re-entry processing

Bit #2: Omit REG-REQ/RSP management message during re-entry processing

Bit #3: Omit IP address Acquisition management messages during re-entry processing

Bit #4: Omit Time of Day Acquisition management messages during re-entry processing

Bit #5: Omit TFTP management messages during 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

This field is present only if bit #3 of Skip-Optional-Fields is '0'. 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

This field is present only if bit #3 of Skip-Optional-Fields bitmap is '0'. 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.

0b0000: 0%

0b0001: 20%

0b0010: 40%

0b0011: 60%

0b0100: 80%

0b0101: 100%

0b0110-1110: Reserved

value of '1111' indicates no information on service available

Handoff Neighbor Preference

This field is present only if bit #3 of Skip-Optional-Fields bitmap is '0'. It 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).