Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**	
Title	**Enhancement of the SLPID bit-map in the MOB-TRF-IND message in IEEE P802.16e**	
Date Submitted	**2004-06-25**	
Source(s)	Yongjoo Tcha, Min-Sung Kim, Seong-Choon Lee KT 17 Woomyeon-dong, Seocho-gu, Seoul, 137-792, Korea	Voice: +82-2-526-6155 Fax: +82-2-526-5200 mailto: yjtcha@kt.co.kr
	Sang-Yun Han, Jae-Hak(Steve) Lee SOLiD Tech., Inc. 78 Garak-dong, Songpa-gu, Seoul, 138-803, Korea	Voice: +82-2-2142-3881 Fax: +82-2-2142-3999 mailto: syhan@st.co.kr
Re:	IEEE P802.16e/D3 Letter Ballot	
Abstract	This document suggests the SLPID bit-map enhancement in the MOB-TRF-IND message in IEEE P802.16e.	
Purpose	The document is contributed to support certain comment on IEEE P802.16e/D3 Letter Ballot.	
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>.	

Enhancement of the SLPID bit-map in the MOB_TRF-IND message in IEEE P802.16e

Yongjoo Tcha, Min-Sung Kim, Seong-Choon Lee
KT

Sang-Yun Han, Jae-Hak(Steve) Lee
SOLiD Tech., Inc.

1. Problem Statements

In IEEE802.16e/D3-2004, MOB_TRF-IND message is sent from BS to MSS on the broadcast CID. The message is intended for MSS's that are in sleep-mode, and is sent during those MSS's listening-intervals. The message indicates whether there has been traffic addressed to each MSS that is in sleep-mode and whether Periodic Ranging opportunity for each MSS exists or not within its own sleep interval. An MSS that is in sleep-mode during its listening-interval shall decode this message to seek an indication addressed to itself.

After an MSS is awaked, it will read the two-bit SLPID indicator assigned to it. However, SLPID bit-map in MOB_TRF-IND message is not efficient for MSSs which have higher SLPID. For example, when we want to wake the MSS with SLPID "1000", we must search the whole bit-map from SLPID "1" to SLPID "999" even though there is no MSS which should be awaken before the MSS with SLPID "1000".

2. Proposal

In order to increase the efficiency in the MOB_TRF-IND message, we propose three types of modified SLPID bit-maps in the MOB_TRF-IND message.

Remedy 1.

Insert a "Start SLPID" field which indicates the first bit with non zero value. It will shorten the length of bit-map because bitmaps with "00" can be omitted.

Syntax	Size	Notes
TRF-IND_Message_Format( ) {		
Management Message Type = 52	8 bits	
FMT	1bit	0=SLPID based format, 1=CID based format
If(FMT == 0) {		
Byte of SLPID bit-map	8 bit	
Start SLPID	10 bit	First non zero bit-map in the SLPID.
SLPID bit-map	Variable Consecutive "00"s in the first part of	Two bits are allocated to one MSS 00 : No Periodic Ranging opportunity and No PDUs such as DL Traffic

	the bit-map will be omitted.	01 : No Periodic Ranging opportunity but PDUs such as DL Traffic 10 : Periodic Ranging opportunity and No PDUs such as MAC Management message (the MSS may return to sleep mode after periodic ranging operation) 11 : Periodic Ranging opportunity and PDUs such as MAC Management message (the MSS shall maintain Awake mode after Periodic Ranging operation)
NUM_of_MSS_Periodic_Ranging	8 bit	
For(i=0; i<NUM_of_MSS_Periodic_Ranging; i++) {		
Ranging Frame Offset	10 bit	Frame Offset for case where SLPID bit map indicator is set to '10' or '11'
}		
While(!(byte_boundary)) {		
Padding bits		Padding for byte alignment
}		
} else {		
Num-pos	7bit	Number of CIDs on the positive indication list
For(i=0; i<Num-pos;i++) {		
Short Basic CID	12 bits	Basic CID
}		
While(!(byte_boundary)) {		
Padding bits	1	Padding for byte alignment
}		
}		
}		

Remedy 2

Bit-map will be divided into several blocks. It will be called as bit-map of SLPID Block. If all the bits in the block are zero, the value of that block will be "0". Otherwise it will be "1". In SLPID bit-map, blocks with the value "0" will be omitted and blocks with the value "1" will only be shown. Therefore, the length of the bitmap can be significantly reduced..

Syntax	Size	Notes

TRF-IND_Message_Format( ) {		
Management Message Type = 52	8 bits	
FMT	1bit	0=SLPID based format, 1=CID based format
If(FMT == 0) {		
Byte of SLPID bit-map	8 bit	
Bit-map of SLPID Block	16 bit	SLPID bit-map will be divided into 64 MSS units(As Two bits in bit-map are assigned to one MSS, the length of the block is 128bits). Only one bit is required for the bit-map information of each block. 0 : all the bits in the block are zero. 1 : else
SLPID bit-map	Variable The length of the bit-map is reduced by the number of the blocks with all “00”s.	Two bits are allocated to one MSS Blocks in which all bits are “00” are not included in the bit-map. 00 : No Periodic Ranging opportunity and No PDUs such as DL Traffic 01 : No Periodic Ranging opportunity but PDUs such as DL Traffic 10 : Periodic Ranging opportunity and No PDUs such as MAC Management message (the MSS may return to sleep mode after periodic ranging operation) 11 : Periodic Ranging opportunity and PDUs such as MAC Management message (the MSS shall maintain Awake mode after Periodic Ranging operation)
NUM_of_MSS_Periodic_Ranging	8 bit	
For(i=0; i<NUM_of_MSS_Periodic_Ranging; i++)		

{		
Ranging Frame Offset	10 bit	Frame Offset for case where SLPID bit map indicator is set to '10' or '11'
}		
} else {		
Num-pos	7bit	Number of CIDs on the positive indication list
For(i=0; i<Num-pos;i++) {		
Short Basic CID	12 bits	Basic CID
}		
While(!(byte_boundary)) {		
Padding bits	1	Padding for byte alignment
}		
}		
}		

Remedy 3

Shows SLPID and information of the MSSs of which bit-map indicator is not set "00".

Syntax	Size	Notes
TRF-IND_Message_Format( ) {		
Management Message Type = 52	8 bits	
FMT	1bit	0=SLPID based format, 1=CID based format
If(FMT == 0) {		
NUM of SLPID	10 bit	The number of MSSs of which bit-map indicator is not set "00"
For (i=0, i<NUM of SLPID, i++) {		
SLPID	10 bit	
SLPID bit-map	1 bit	0 : No Periodic Ranging opportunity but PDUs such as DL Traffic 1 : Periodic Ranging opportunity
}		
NUM_of_MSS_Periodic_Ranging	8 bit	
For(i=0; i<NUM_of_MSS_Periodic_Ranging; i++) {		
Ranging Frame Offset	10 bit	Frame Offset for case where SLPID bit map indicator is set to '10' or '11'
}		

} else {		
Num-pos	7bit	Number of CIDs on the positive indication list
For(i=0; i<Num-pos;i++) {		
Short Basic CID	12 bits	Basic CID
}		
While(!(byte_boundary)) {		
Padding bits	1	Padding for byte alignment
}		
}		
}		