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Title	DL-MAP and UL-MAP CID Table IEs	
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	Mary Chion Sean Cai Jason Hou Jing Wang Dazi Feng Jun Han Irving Wang	mchion@ztesandiego.com scai@ztesandiego.com jhou@ztesandiego.com
	ZTE San Diego Inc. 10105 Pacific Heights Blvd. San Diego, CA 92121 USA	Voice: 858-554-0387 Fax: 858-554-0894
Re:	Response to Sponsor Ballot on IEEE802.16e/D5a document	
Abstract	The proposed DL-MAP and UL-MAP CID table IEs can be used to not only improve DL subframe efficiency but also significantly reduce unnecessary power consumption.	
Purpose	To incorporate the text changes proposed in this contribution into the 802.16e/D6 draft.	
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DL-MAP and UL-MAP CID Table IEs

Mary Chion, Sean Cai , Jason Hou
Jing Wang, Dazi Feng, Jun Han, Irving Wang

ZTE San Diego, Inc. USA

1. Problem Statement

According to current standard draft IEEE P802.16e-D5a-2004, MAP messages are used to perform DL and UL allocation to the MSSs. The current MAP format for OFDMA mode presents the following two problems:

- **Excessive power consumption:** As defined in the current 802.16e standard, a MSS has to, at the minimum, finish listening to the whole DL-MAP and UL-MAP regardless there is DL traffic or UL traffic for the MSS in the current frame.
- **Extensive overhead on DL for MAP messages:** As defined in the current 802.16e standard, the DL data burst allocation can optionally include the list of CIDs designated. However, if the list of CIDs is not included in the DL MAP, it imposes a high requirement on MSS's processing power and drastically increases the MSS's battery consumption. To reduce MSS processing complexity and prolong battery life, the list of CIDs should always be included in the DL-MAP for the mobile network. However, when the CIDs are included, there can extensive overhead on DL caused by DL MAP transmission since the size of DL-MAP can be very large.

2. Proposed Solutions

To overcome the problems mentioned above, we would like to propose the following solution:

- Introduce an extended DL MAP message for OFDMA mode. This extended DL MAP message should follow the current DL MAP message. The definition of current DL MAP remains the same as defined in IEEE P802.16e-D5a-2004 section 6.3.2.3.2 and 8.4.5.3. The extended DL MAP message should only contain the IEs defined in IEEE P802.16e-D5a-2004 section 8.4.5.3.
- Introduce two new IEs, DL CID Table IE and UL CID Table IE. The CID table contains a list of CIDs for the MSSs with traffic allocated to in the current frame.
- The DL CID table contains list of CIDs for the MSS with DL traffic allocation in the current frame. The DL CID table is composed of multiple CID records. There are two types of CID records:
 - Normal CID Record: Each normal CID record either contains a broadcast indication or a list of CID that is corresponding to an allocated data burst in DL_MAP.
 - Extended IE CID Record: Extended IE CID Record contains the all CIDs that can be included in extended IEs. There is only one Extended IE CID Record in a DL CID table.
- The association of CID records and DL_MAP allocations are shown in Figure 1.

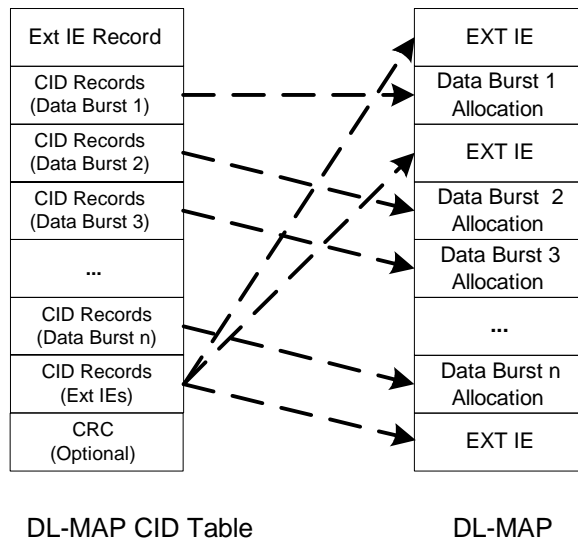


Figure 1. Association for CID Records and DL MAP Data Burst Allocation

3. Specific Text Changes

[Insert the following sections:]

8.4.5.3.20 DL-MAP CID table IE

The association of DL-MAP CID table IE records and DL_MAP allocations are shown in Figure 208c.

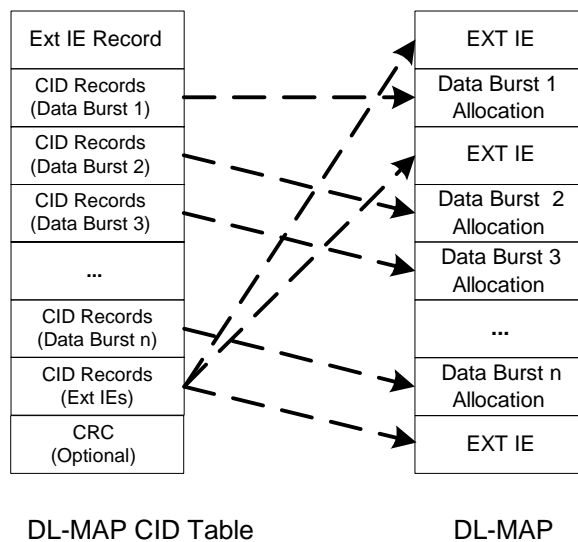


Figure 208c. Association for DL-MAP CID Records and DL/UL MAP Data Burst Allocation

Table 284k—DL-MAP CID Table IE

<u>Syntax</u>	<u>Size</u>	<u>Notes</u>
<u>DL-MAP CID table IE () {</u>		
<u>Extended DIUC</u>	<u>4 bits</u>	<u>0x??</u>
<u>Length</u>	<u>4 bits</u>	<u>Length in bytes of following fields</u>
<u>CID Table Sequence</u>	<u>2 bits</u>	<u>00: First page</u> <u>01: Middle page</u> <u>10: Last page</u> <u>11: Single Page</u>
<u>If ("CID Table Sequence" = "00")</u>		
<u>{</u>		
<u> CID Format</u>	<u>2 bits</u>	<u>00: 16 bits</u> <u>01: 12 bits LSB</u> <u>10: 8 bits LSB</u> <u>11: 4 bits LSB</u>
<u> H-ARQ MAP INC</u>	<u>1 bits</u>	<u>0: H-ARQ MAP Pointer IE not included in DL_MAP</u> <u>1: H-ARQ MAP Pointer IE included In DL_MAP</u>
<u> MBS MAP INC</u>	<u>1 bits</u>	<u>0: MBS Service MAP IE not included in DL_MAP</u> <u>1: MBA Service MAP IE included in DL_MAP</u>
<u>}</u>		
<u>Begin CID records</u>		<u>Each CID record contains the list of CIDs. Two types of CID records:</u> <u>Normal CID Record: Each normal CID record contains a list of CID that is corresponding to a allocated data burst in DL_MAP</u> <u>Extended CID Record: Only one extended CID record, it contains the all CIDs that can be included in extended IE.</u>
<u>for (i=0; i<n; i++)</u>		<u>0 to n records can be included in a DL_MAP CID Table IE. n doesn't need to be defined, it can be deducted based on length field</u>
<u>{</u>		
<u> Broadcast Burst</u>	<u>1 bit</u>	<u>0: not a broadcast burst</u> <u>1: broadcast burst</u>
<u> If (Broadcast Burst = 0)</u>		<u>Number of CIDs left from the last CID Table</u>
<u> {</u>		
<u> Record Type</u>	<u>1 bit</u>	<u>0: Normal CID Record</u> <u>1: Extended IE CID Record</u>
<u> Continuation Flag</u>	<u>1 bit</u>	<u>0: This record will not be continued</u> <u>1: This record will be continued in the first record of next IE</u>
<u> NUM CIDs</u>	<u>6 bits</u>	<u>Number of CIDs in this record</u>
<u> for (i=0; j < NUM CIDs; j++)</u>		
<u> {</u>		
<u> CID</u>	<u>N bits</u>	<u>N = 16 when "CID Format" = "00"</u> <u>N = 12 LSB when "CID Format" = "01"</u> <u>N = 8 when "CID Format" = "10"</u> <u>N = 6 when "CID Format" = "11"</u>
<u> } //end for-loop NUM CIDs</u>		

<u> </u> } //if !broadcast burst		
}		
If ("CID Table Sequence" = "10")		
{		
<u> CRC INC</u>	<u> 1</u>	<u> 0: CRC is not included</u> <u> 1: CRC is included</u>
<u> CRC</u>	<u> 32 bits</u>	<u> CRC-32 calculation for the DL-MAP CID Table IE (including all pages) is the same as that used for standard MAC messages</u>
}		
<u>Padding bits</u>	<u>Variable</u>	<u>Set to zeros to align octet boundary</u>

[Insert the following section:]

8.4.5.4.23 UL-MAP CID table IE

The association of UL-MAP CID table IE records and UL-MAP allocations are shown in Figure 208d.

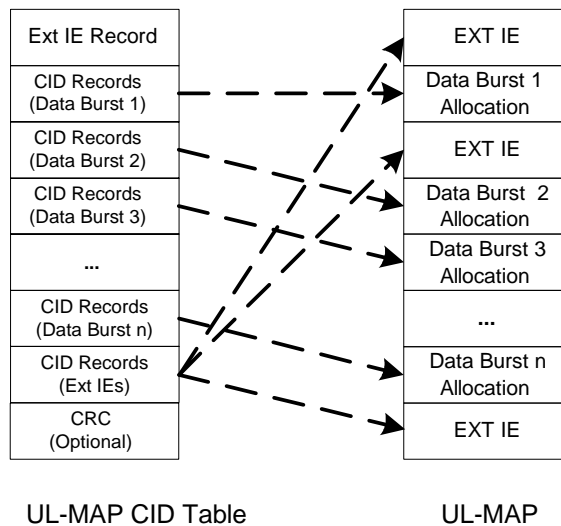


Figure 208d. Association for UL-MAP CID Records and UL MAP Data Burst Allocation

Table 284k—Field description of UL-MAP CID table IE

<u>Syntax</u>	<u>Size</u>	<u>Notes</u>
<u>UL-MAP CID table IE ()</u> {		
<u>Extended DIUC</u>	<u>4 bits</u>	<u>0x??</u>
<u>Length</u>	<u>4 bits</u>	<u>Length in bytes of following fields</u>
<u>CID Format</u>	<u>2 bits</u>	<u>00: 16 bits</u> <u>01: 12 bits LSB</u> <u>10: 8 bits LSB</u> <u>11: 4 bits LSB</u>
<u>CID Table Sequence</u>	<u>2 bits</u>	<u>00: First page</u> <u>01: Middle page</u>

		10: Last page 11: Reserved
NUM CIDs	8 bits	Number of CIDs in this IE
{		
CID	N bits	N = 16 when "CID Format" = "00" N = 12 LSB when "CID Format" = "01" N = 8 when "CID Format" = "10" N = 4 when "CID Format" = "11"
}		
If ("CID Table Sequence" = "10")		
{		
CRC INC	1	0: CRC is not included 1: CRC is included
CRC	32 bits	CRC-32 calculation for the DL-MAP CID Table IE (including all pages) is the same as that used for standard MAC messages
}		
Padding bits	Variable	Set to zeros to align octet boundary

4. References

- [1] IEEE 802.16- 2004 IEEE Standards for local and metropolitan area networks part 16: Air interface for fixed broadband wireless access systems
- [2] IEEE P802.16e-D5a-2004