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| Source(s) | Sunny Chang, Changhoi Koo Taein Hyon, Yunsang Park  Samsung Electronics 416, Maetan-3dong, Paldal-gu Suwon-si, Gyeonggi-do Korea | Voice: [Telephone Number] Fax: [Fax Number] sunny94@samsung.com, chkoo@samsung.com, taein.hyon@samsung.com, yunsang.park@samsung.com |
| Re: | |
| Abstract | This contribution proposes method for shortening the MOB_TRF_IND message in IEEE 802.16e/D2-2004. |
| Purpose | Discuss and adopt enhanced feature of 802.16e/D2. |
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# Method for shortening the MOB_TRF_IND message through reducing size of the CID field by replacing it with a Short Basic CID

*Sunny Chang, Changhoi Koo, Taein Hyon, Yunsang Park*
*Samsung Electronics*

## 1. Problem Statement

The MOB_TRF-IND message is structured as follows. MOB_TRF-IND message can be formed based on either the SLPID or Basic CID. This document proposes a message reduction method which can be applied to the MOB_TRF-IND message, which is based on Basic CID.

The following figure appears MOB_TRF-IND message in IEEE802.16e system.

| Syntax | Size | Notes |
|---|---|---|
| MOB-MOB_TRF-IND_Message_Format(){ | | |
| Management message type = 48 | 8 bits | |
| FMT | 1 bit | 0=SLPID based format, 1=CID based format |
| if(FMT==0){ | | |
| SLPID bit-map | Variable | |
| }else{ | | |
| Num-pos | 7 bits | Number of CIDs on the positive indication list |
| for(i=0; i<Num-pos; i++){ | | |
| CID | 16 bits | Basic CID of the SS |
| } | | |
| } | | |
| } | | |

Fig. 1 MOB_TRF-IND message

When forming an MOB_TRF-IND message based on CID (FMT=1), the BS includes the Basic CID in the message to notify whether new traffic is generated for the corresponding SS.

The following figure depicts the range of the CID according to their usage.

| Connection Identifier | Value | Description |
|---|---|---|
| Initial Ranging | 0x0000 | Used by an SS during initial ranging as part of initial ranging process |
| Basic CID | 0x0001 ~ m | |
| Primary management | m+1 ~ 2m | |

| Transport CIDs and Secondary Mgt CIDs | 2m+1 ~ 0xFEFF | |
|---|---|---|
| Multicast Polling CIDs | 0xFF00 ~ 0xFFFD | An SS may be included in one or more multicast groups for the purposes of obtaining bandwidth via polling. These connections have no associated Service Flow. |
| Padding CID | 0xFFFE | Used for transmission of padding information. |
| Broadcast CID | 0xFFFF | Used for broadcast information that is transmitted on a downlink to all SS. |

Fig. 2 Connection Identifiers

## 2. Proposed Remedy

The length of each Basic CID is 16 bits and its range is between 0x0001 and m, where m is the maximum number of SS's that can be supported.  m may assume different values for each BS and the range is usually between 200 and 1000.  For example, if m is 255 the range of Basic CID can be represented by values between 0x0001 and 0x00ff, which means that the Basic CID's can be distinguished by using only the lower 8 bits.  Thus, instead of using all 16 bits to represent the Basic CID, it would be possible to express the whole range by using a Short Basic CID that uses only the lower 8 bits. By reducing the lengths of the Basic CID's the total message size has the potential to be reduced significantly.

 However, since the value of m can differ from BS to BS, the number of bits needed to represent a Short Basic CID may vary. To indicate the length of the Short Basic CID, a 4-bit CID_length field is necessary. Since the CID_length field is 4 bits, it can assume values from 0 to 15, where the value '0' means that the Short Basic CID can be represented with 1 bit, '1' means that the Short Basic CID can be represented with 2 bits, and '15' means that the Short Basic CID can be represented with 16 bits.

The following figure describes the proposed MOB_TRF-IND message format.

| Syntax | Size | Notes |
|---|---|---|
| MOB-MOB_TRF-IND_Message_Format(){ | | |
| Management message type = 48 | 8 bits | |
| FMT | 1 bit | 0=SLPID based format, 1=CID based format |
| if(FMT==0){ | | |
| SLPID bit-map | Variable | |
| }else{ | | |
| Num-pos | 7 bits | Number of CIDs on the positive indication list |
| CID_length | 4 bits | Short Basic CID length = CID_length + 1 |
| for(i=0; i<Num-pos; i++){ | | |
| Short Basic CID | (CID_length +1) bits | Short Basic CID value obtained from the lower  CID_length+1 bits of the Basic CID (i.e. BCID[CID_length:0]) |

| | | |
|---|---|---|
| } | | |
| while(!(byte boundary)){ | | |
| Padding bits | 1 bit | padding for byte align |
| } | | |
| } | | |

Fig. 3 Proposed MOB_TRF-IND message

# 3. Proposed text changes

**Table 92c- Table 92c—Traffic-Indication (MOB-TRF-IND) message format**

| Syntax | Size | Notes |
|---|---|---|
| MOB-MOB_TRF-IND_Message_Format(){ | | |
| Management message type = 48 | 8 bits | |
| FMT | 1 bit | 0=SLPID based format, 1=CID based format |
| if(FMT==0){ | | |
| SLPID bit-map | Variable | |
| }else{ | | |
| Num-pos | 7 bits | Number of CIDs on the positive indication list |
| CID_length | 4 bits | Short Basic CID length = CID_length + 1 |
| for(i=0; i<Num-pos; i++){ | | |
| Short Basic CID | (CID_length +1) bits | Short Basic CID value obtained from the lower CID_length+1 bits of the Basic CID (i.e. BCID[CID_length:0]) |
| } | | |
| while(!(byte boundary)){ | | |
| Padding bits | 1 bit | padding for byte align |
| } | | |
| } | | |