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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>** | |
| Title | Enhanced Resource Allocation for Deterministic Traffic | |
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| Re: | IEEE P802.16e/D5-2004 | |
| Abstract | This contribution proposes to enhance the DL and UL access allocation for UGS and RT-VR traffic, to reduce overhead | |
| Purpose | Review and Adopt the suggested changes into P802.16e/D5 | |
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# 1 Introduction

In the current p802.16e/D5 text, the DL/UL access allocations are performed on a frame-by-frame basis using DL/UL-MAP IE.
For services, like unsolicited grant service (UGS) and real-time variable rate (RT-VR) service, the data arriving has certain deterministic pattern and in certain case also stream-like. For these types of traffic, if resource assignment has to be performed on a frame-by-frame basis, unnecessarily large amount of MAC overhead will be incurred.

# 2 Proposed Solution

We propose to simplify the DL/UL resource assignment for UGS and RT-VR services, to reduce unnecessary MAC overhead.

We propose to introduce

- One new DL MAP IE – The Dedicated resource allocation IE to allocate dedicated DL resource for certain period of time. Such a assignment can be de-allocated or modified at any time
- One new UL MAP IE – The Dedicated resource allocation IE to allocate dedicated UL resource for certain period of time. Such a allocation can be de-allocated and modified at any time

If a dedicated DL resource is defined as a DL region in every $N^{th}$ frame and assigned to a MSS, the MSS shall decode this dedicated region until the end of the assignment period or at receiving Dedicated resource allocation IE for the de-allocation, or at receiving Dedicated resource allocation IE with new allocation information (e.g. new period, new DIUC, new Allocation Duration). In addition to the dedicated resource, some extra DL resource can also be allocated by using normal DL MAP IE if the dedicated resource is not enough to send the buffered data.

If a dedicated UL resource is defined as a UL region in every $N^{th}$ frame and assigned to a MSS, the MSS shall transmit UL data on this dedicated channel until the end of the assignment period or at receiving Dedicated resource allocation IE for the de-allocation, or at receiving Dedicated resource allocation IE with new allocation information (e.g. new period, new UIUC, new Allocation Duration). In addition to the dedicated resource, some extra UL resource can also be allocated by using normal DL MAP IE if the MSS requires some extra UL resource.

The DIUC and UIUC associated with the assigned dedicated resource can be updated in a slower fashion (by sending new Dedicated resource IE) based on long term C/I statistics.

# 3 Proposed Text Change

**Remedy 1:**
We introduce a new IE called the Dedicated resource allocation IE for DL-MAP

*[Insert the following at the end of Section 8.4.5.3.19]*

8.4.5.3.19 Dedicated resource allocation IE

This DL MAP IE is used for BS to allocate dedicate DL resource to one or more MSSes and to de-allocate or modify an existing allocation.

Table 284j – Dedicated resource allocation IE format.

| Syntax | Size | Notes |
|---|---|---|
| Dedicated_resource_allocation_IE() | | |
| Extended DIUC | 4 bits | 0x09 |
| Length | 4 bits | Length in bytes |
| Num_Allocations | 4 bits | Number of allocations in this IE |
| For (i=0; i<Num_Allocations;i++) | | |

| | | |
|---|---|---|
| { | | |
| CID | 16 bits | |
| Allocation Duration(d) | 3 bits | The allocation is valid for 10 x $2^d$ frame starting from the next frame<br>If d ==0b000, the dedicated allocation is de-allocated<br>If d == 0b111, the dedicated resource shall be valid until the BS commands to de-allocate the dedicated allocation |
| If (d!=000) | | |
| { | | |
| DIUC | 4 bits | |
| OFDMA_symbol_offset | 8 bits | |
| Subchannel_offset | 6 bits | |
| Boosting | 3 bits | |
| No. OFDMA symbols | 8 bits | |
| No. subchannels | 6 bits | |
| Repetition Coding Indication | 2 bits | |
| Period(p) | 2 bits | The DL resource region is dedicated to a MSS in every $2^p$th frame |
| Dedicated_CH_ID | 1 bits | Channel ID assigned to this allocation |
| } | | |
| else | | |
| { | | |
| Dedicated_CH_ID | | |
| } | | |
| } | | |
| } | | |

**Num_Allocations**

Number of allocations in this IE

**Allocation Duration(d)**

The allocation is valid for 10 x $2^d$ frames starting from the next frame

If d ==0b000, the dedicated allocation is de-allocated

If d == 0b111, the dedicated resource shall be valid until the BS commands to de-allocate the dedicated allocation

**Period(p)**

The DL resource region is dedicated to a MSS in every $2^p$th frame

**Dedicated_CH_ID**

**The channel ID assigned to this allocation.**

**Remedy 2:**

We introduce a new IE called the Dedicated resource allocation IE for UL-MAP

*[Insert the following at the end of Section 8.4.5.4.23]*

8.4.5.4.23 Dedicated resource allocation IE

This UL MAP IE is used for BS to allocate dedicate UL resource to one or more MSSes and to de-allocation or modify an existing allocation.

Table 298j – Dedicated resource allocation IE format.

| Syntax | Size | Notes |
|---|---|---|
| Dedicated_resource_allocation_IE() | | |
| Extended UIUC | 4 bits | 0x09 |
| Length | 4 bits | Length in bytes |
| Num_Allocations | 4 bits | Number of allocations in this IE |
| For (i=0; i<Num_Allocations;i++) | | |
| { | | |
| CID | 16 bits | |
| Allocation Duration(d) | 3 bits | The allocation is valid for 10 x $2^d$ frame starting from the next frame<br>If d ==0b000, the dedicated allocation is de-allocated<br>If d == 0b111, the dedicated resource shall be valid until the BS commands to de-allocate the dedicated allocation |
| If (d!=000) | | |
| { | | |
| UIUC | 4 bits | |
| Duration | 10 bits | In OFDMA slot |
| Repetition Coding Indication | 2 bits | |
| Period(p) | 2 bits | The UL resource region is dedicated to a MSS in every $2^p$th frame |
| Dedicated_CH_ID | 1 bit | Channel ID assigned to this allocation |
| } | | |
| else | | |
| { | | |
| Dedicated_CH_ID | | |
| } | | |

**Num_Allocations**

Number of allocations in this IE

**Allocation Duration(d)**

The allocation is valid for 10 x $2^d$ frames starting from the next frame

If d ==0b000, the dedicated allocation is de-allocated

If d == 0b111, the dedicated resource shall be valid until the BS commands to de-allocate the dedicated allocation

**Period(p)**

The UL resource region is dedicated to a MSS in every $2^p$th frame

**Dedicated_CH_ID**

**The channel ID assigned to this allocation.**