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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** |
| Title | **Clarification on Group Resource Allocation for UL** |
| Date Submitted | **2012-03-14** |
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| Re: | Proposed text changes to P802.16.1/D4 by sb01R0 |
| Abstract | The contribution provides the text changes related to MIMO parameter and resource assignment information of GRA for UL. |
| Purpose | To be discussed and adopted the proposed text in next revision as the 802.16.1/D5 by Maintenance Task Group |
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**Clarification on Group Resource Allocation for UL**

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1. **Introduction**

In the current draft standard [1], the MIMO control parameter is used to the numbering of stream index and naming with PSI for UL MU-MIMO (CSM) in GRA section. But, PSI as pilot stream index is a DL MIMO parameter. It can make confusion. The first pilot index, SI is used to distinguish a UL MIMO stream. SI is defined as UL MIMO stream index and the value of SI is starting from 1 and numbering up to 2 according to the number of UL MIMO streams (TNS=2) for UL GRA. Also, there is no any instruction of the stream index SI in UL resource assignment A-MAP of GRA for UL CSM.

Then, this contribution provides the text changes related to MIMO information and resource allocation assignment so that the usage of pilot stream index can be fixed and consistently used over several sections as well as the section of UL GRA.

* MIMO Information of UL GRA
* Instruction of SI in GRA A-MAP IE for UL resource allocation
1. **References**

 [1] IEEE P802.16.1/D4, *“WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems,”* 2012-02-09

1. **Proposed Text Changes**

The blue colored tag is used to represent the inserted texts, figures, or tables using the following INSERT TAG: <insert> </insert>

The red colored tag is used to represent the deleted texts, figures, or tables using the following DELETE TAG: <delete> </delete>

------------------------------------------- Start of Proposed Text Changes --------------------------------------------

***[Remedy #1: Adopt the following modification text in line 1 on page 386 section 6.2.9.4.1 Bitmaps in group resource allocation]***

Table 127—MIMO Bitmap Information for UL

|  |  |  |  |
| --- | --- | --- | --- |
| MIMO Mode Set | Existence of MIMO Bitmap | Length of Bit per Scheduled AMS | MIMO Mode Indication |
| 0b00 | No | N/A | OL SU-MIMO (SFBC with non-adaptive precoder) |
| 0b01 | Yes | 1 | 0b0: OL SU-MIMO (SFBC with non-adaptive precoder) with *Mt* =20b1: OL SU-MIMO (SM with non-adaptive precoder) with *Mt* =2 |
| 0b10 | No | N/A | CL SU-MIMO with *Mt* =1, TNS=1 |
| 0b11 | Yes | 1 | OL MU-MIMO <insert>(CSM with non-adaptive precoder) </insert> with *Mt*=1, TNS=20b0: <delete>PSI=0</delete><insert>SI=1</insert>0b1: <delete>PSI=1</delete><insert>SI=2</insert> |

In the case where UL MIMO mode set ID is 0b11 (Mode3), the resource of N-th scheduled flow is allocated by the following rules. Among flows set to 1 in user bitmap, the <delete>BS</delete><insert>ABS</insert> assigns stream index <delete>0 and 1</delete><insert>1 and 2</insert> to the different flows. The assigned stream index is signaled in the <delete>PSI</delete><insert>SI</insert> bitmap. All <delete>PSI=0</delete><insert>SI=1</insert> flows are assigned contiguous resources in increasing order of their indices starting from resource offset for the group signaled in the group resource allocation A-MAP IE. All <delete>PSI=1</delete><insert>SI=2</insert> flows are also assigned contiguous resources in increasing order of their indices starting from resource offset.

***[Remedy#2: Adopt the following modification text on Figure 61 in page 387 section 6.2.9.4.1 Bitmaps in group resource allocation]***

<delete>PSI</delete><insert>SI</insert> Bitmap

***[Remedy#3: Adopt the following modification text on Table 205 in page 667, section 6.3.5.5.2.4.10 Group resource allocation A-MAP IE]***

|  |
| --- |
| Table 205—Group Resource Allocation A-MAP IEa |
| **Syntax** | **Size (bits)** | **Description/Notes** |
| Group\_Resource\_Allocation\_A-MAP\_IE() { | — | — |
| A-MAP IE Type | 4 | Group Resource Allocation A-MAP IE |
| *…* | *…* | *…* |
| if( Group MIMO mode set ==0b01){ |  |  |
| MIMO Bitmap | *Variable* | Bitmap to indicate MIMO mode for the scheduled AMSs.0b0: Mode 00b1: Mode 1 |
| } |  |  |
|  <insert>else if( Group MIMO mode set ==0b11 && UL Allocation){ |  | </insert> |
|  <insert> SI Bitmap | *Variable* | Bitmap to indicate fist pilot index of UL OL MU-MIMO(CSM) for the scheduled AMSs.0b0: SI = 10b1: SI = 2</insert> |
| <insert> } |  |  </insert> |
| Resource <delete>Assignment</delete><insert>Allocation</insert> Bitmap | *Variable* | Bitmap to indicate burst size/resource size for each scheduled AMS  |
| } | — | — |

**…**

**Resource Offset:** Signals the offset of the LRU where the allocation for the group starts. The offset is with respect to the start of the AAI subframe.

**HFA Offset:** Signals the starting HARQ feedback channel index for scheduled AMSs of the group (as identified by ones in the User bitmap). The exact HARQ feedback allocation for a given AMS is determined by using the mechanism described in 6.3.7.3.3.2 for DL GRA allocations and 6.3.5.3.2.2 for UL GRA allocations

**User Bitmap:** A bitmap that uses 1 bit per flow of the AMS of the group to signal whether the AMS has an allocation in that AAI subframe. The size of the bitmap is determined by BS and can be 4, 8, 16, or 32 bits. This size is signaled to each AMS in the Group configuration MAC control message when the flow of the AMS is added to the group. The AMSs for which the corresponding bit is set to 1 are referred to as scheduled AMSs in that subframe.

**MIMO Bitmap:** This bitmap is included in the group only when the group MIMO mode set is 0b01. The MIMO mode set is signaled to AMS in the Group configuration MAC control message when the user is added to the group. The size of this bitmap is equal to the number of scheduled flows in the group in that subframe. For each scheduled AMS, the value of corresponding bit in this bitmap signals the MIMO mode (mode 0 or mode 1).

<insert>
**SI Bitmap:** This bitmap is included in the group only when the group MIMO mode set is 0b11. The MIMO mode set is signaled to AMS in the Group Configuration MAC control message when the user is added to the group. The size of this bitmap is equal to the number of scheduled flows in the group in that subframe. For each scheduled AMS, the value of corresponding bit in this bitmap signals the first pilot index as the stream index (SI=1 or SI=2) of UL OL MU-MIMO.
</insert>

**Resource Allocation Bitmap:** The resource allocation bitmap uses 5 bits per flow to signal the HARQ burst size and the resource size for the AMS’s allocation in that subframe. The first 2 bits signal the HARQ burst size and the next 3 bits signal the resource size. The 2-bit codes for burst sizes associated with the FID and the 3-bit resource sizes associated with the group are based on the information in the Group Configuration MAC control message.

**…**

----------------------------------------------- Proposed texts end --------------------------------------------------------