Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Correction for definitions of AMC subchannels
Date Submitted	**2004-11-17**
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Re:	IEEE P802.16REVd/D5-2004
Abstract	Correct definitions of AMC tiles
Purpose	Adopt changes
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Correction for definitions of AMC subchannels

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1. Motivation

The structure of AMC subchannels referenced by the normal DL-MAP and UL-MAP is ambiguous and undefined. Various sections in the standard assume different structures without specifying them. We propose to define a mapping of subchannels to AMC bins for the regular MAPs. This doesn't affect the structure of band-AMC which is supported only by the H-ARQ map.

2. Details

The structure of the basic AMC tile is not defined. Implicitly, there are 4 options to define the AMC tile (1x6, 2x3, 3x2, 6x1 (bins x symbols)), but there are contradicting references:

1. p.498,line 45: "For uplink and downlink using the adjacent subcarrier permutation (defined in 8.4.6.3), one slot is one subchannel by one OFDMA symbol". According to this, the only possible AMC structure is 6x1, but it is not written explicitly (as opposed to other permutations where basic tile/cluster is specified).
2. p.578, line 24: "AMC subchannel consists of 6 contiguous bins in a same band.", according to this, since a band is 4 bins, the number of bins in an AMC slot is nor more than 4, i.e. AMC structure of 6x1 is not possible, therefore contradicts (1).
3. in 8.4.5.3 DL-MAP IE format , p. 523, line 43, 6 bits are allocated for subchannel index. Therefore, only AMC tiles of 3x2 and 6x1 are supported by the DL-MAP (in 1x6 and 2x3 there are 192 and 96 subchannels, respectively).
4. AAS-DLFP, p.507, line 56-57: "For AMC permutation, each subchannel for the AAS diversity MAP consists of 3 bins by 2 symbols". This contradicts (1).
5. AAS-DLFP2 uses 1x6 or 2x3 (see 8.4.4.7.8 AMC Subchannel definition). Both are not supported by regular DL-MAP.
6. H-ARQ MAP defines a different method of AMC bin allocation. The distinction between the allocation method used by regular MAP and H-ARQ MAP is not made anywhere.

3. Suggested change

- Define AMC tile structure in ZoneSwitch IE. All possible tile structures are supported except for 6x1 (6x1 creates a problem with the H-ARQ map because the tile exceeds the band size of 4 subcarriers).
- SS will indicate support of each AMC tile in SBC-RSP
- In order not to increase number of bits in DL-MAP_IE to support extra AMC subchannels (up to 192), we propose different field lengths for DL-MAP_IE that will be used only for AMC, and extend the DL-MAP_IE by 1 nibble (10%) for AMC only.
- Give a specific definition for the subchannels in AMC. For AAS zone AMC tile will be 2x3 for UL and DL (symmetric). The reason for choosing this tile is that in the UL it matches the symbol periodicity of all other permutations (3 symbols), and provides a good tradeoff between the granularity in time domain and in frequency domain.

- Rev1 of this contribution incorporates the text from Samsung comment #243 clarifying AMC allocations using H-ARQ map.

4. Specific text changes

4.1. Definitions of AMC subchannels for normal maps

8.4.3.1 Slot and Data Region

[Change the text in p.498,line 45 to read]

For ~~uplink and downlink using~~ the adjacent subcarrier permutation (defined in 8.4.6.3), one slot is one subchannel by ~~one~~ two, threee or six OFDMA symbols as indicated by the AMC type.

8.4.6.3 Optional permutations for AAS and AMC subchannels

[Change the last paragraph, in p.578, line 24]

AMC allocations can be made by two mechanisms: by subchannel index reference in UL-MAP and DL-MAP, or by subchannel allocation in a band using H-ARQ map (defined in 6.3.2.3.43). Each UL or DL zone may include allocations from H-ARQ and normal map. For regular AMC allocations made by the DL-MAP or UL-MAP, and AMC subchannel of type NxM (where N·M=6) is defined as N contiguous bins (a slot consists of N bins by M symbols). The subchannels are numbered from the lowest (0) to the highest frequency, such that subchannel k (k=0-192/N) consists of bins $N \cdot k$ to $N \cdot k+N-1$.

A group of 4 rows of bins is called a physical band. ~~An AMC subchannel consists of 6 contiguous bins in a same band.~~ For band-AMC allocations made by H-ARQ map message, an AMC slot consists of 6 contiguous bins in a same logical band defined in format configuration IE (6.3.2.3.43.2). There are four types of AMC subchannels which are different in the collection of 6 bins in a band. In the first type(default type), the available bins in a band are enumerated by starting from the lowest bin in the first symbol to the last bin in the symbol and then going to the lowest bin in the next symbol and so on. In the first type of AMC subchannel, a slot consists of 6 consecutive bins in this enumeration. In the second type of AMC subchannel, a slot is defined as 2 bins by 3 symbols. In the third type, a slot is defined as 3 bins by 2 symbols and in the fourth type a slot is defined as 1 bin by 6 symbols. In the last three types of AMC subchannel, enumeration of bins in a slot is the same as in the first type.

11.3 UCD management message encodings

[add the following lines in Table 351, p.659, following lines 7-10]

UL AMC Allocated subchannels range.	TBD	2	This parameter specifies the range of sub-channels allocated to the segment in the UL, when using the the AMC permutation with regular MAPs (see 8.4.6.3). The first byte N0 shall correspond to the first subchannel and last byte N1 corresponds to the index of the last subchannel plus 1. Only subchannels in the range N0 ≤ s < N1 shall not be used by the SS on that segment.

8.4.5.3 DL-MAP IE format

[Modify table 273, line 41-50, starting from "OFDMA symbol offset", as follows]

If (Permutation = 0b11)		For adjacent subcarrier permutation
{		

OFDMA Symbol offset	8 bits	
Subchannel offset	8 bits	
Boosting	3 bits	As defined below.
No. OFDMA Symbols	7 bits	
No. Subchannels	8 bits	
}		
Else		
{		
OFDMA Symbol offset	8 bits	
Subchannel offset	6 bits	
Boosting	3 bits	000: normal (not boosted); 001: +6dB; 010: -6dB; 011: +9dB; 100: +3dB; 101: -3dB; 110: -9dB; 111: -12dB;.
No. OFDMA Symbols	7 bits	
No. Subchannels	6 bits	
}		

4.2. Addition of AMC type to ZoneSwitch and AAS_IE in DL and UL

8.4.5.3.4 Transmit diversity (TD)/Zone switch IE format

[Add the following text before the reserved bits (note: the reason not to overrun the reserved bits is forward compatibility - they are used in 802.16e)]

AMC type	2 bits	Indicates the AMC type in case permutation type = 0b11, otherwise shall be set to 0. AMC type (NxM = N bins by M symbols): 0b00 – 1x6 0b01 – 2x3 0b10 – 3x2 0b11 – reserved
Reserved	~~2~~ 4 bits	Shall be set to zero

[increment the length field of Zone switch IE by 1]

8.4.5.3.3 AAS IE format

[Replace the lines "first bin index" and "last bin index" in table 276 as follows]

~~**First bin index**~~	~~6 bits~~	~~When Permutation=0b10, this indicates the index of the first band allocated to this AMC segment~~

~~**Last bin index**~~	~~6 bits~~	~~When Permutation=0b10, this indicates the index of the last band allocated to this AMC segment~~
Reserved	4 bits	Shall be set to zero

[Decrement length field by 1]

[Add the following text after the table]
Following AAS_IE indicating AMC permutation the AMC type shall be 2x3 (2 bins by 3 symbols).

8.4.5.4.6 AAS IE format
[Erase the lines "first bin index" and "last bin index" from table 291]

~~**First bin index**~~	~~6 bits~~	~~When Permutation=0b10, this indicates the index of the first band allocated to this AMC segment~~
~~**Last bin index**~~	~~6 bits~~	~~When Permutation=0b10, this indicates the index of the last band allocated to this AMC segment~~
Reserved	4 bits	Shall be set to zero

[Add the following text after table 291]
Following AAS_IE indicating AMC permutation the AMC type shall be 2x3 (2 bins by 3 symbols).

8.4.5.4.7 UL Zone switch IE format
[Add the following lines at the end of table 291]

AMC type	2 bits	Indicates the AMC type in case permutation type = 0b11, otherwise shall be set to 0. AMC type (NxM = N bins by M symbols): 0b00 – 1x6 0b01 – 2x3 0b10 – 3x2 0b11 – reserved
Reserved	6 bits	Shall be set to 0

[increment the length field of UL Zone switch IE by 1]

4.3. Change AAS-DLFP to 2x3

8.4.4.6 Optional Diversity-Map Scan
[Modify p.507 lines 56-57 as follows]
For AMC permutation, each subchannel for the AAS diversity MAP consists of ~~3~~ 2 bins by ~~2~~ 3 symbols.

4.4. Capability bits

11.8.3.7.5 OFDMA SS Permutation support

[Change the text as follows]

Type	Length	Value	Scope
154	1	Bit# 0: Optional PUSC support Bit# 1: Optional FUSC support Bit# 2: AMC 1x6 support Bit# 3: AMC 2x3 support Bit# 4: AMC 3x2 support Bits# ~~3~~5–7: Reserved, shall be set to zero	SBC-REQ (see 6.3.2.3.23) SBC-RSP (see 6.3.2.3.24)