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Title	Enabling SDMA in H-ARQ Map IE's	
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Re:	IEEE P802.16-REVe/D5-2004	
Abstract	Modifications to H-ARQ Map IEs to enable SDMA allocations	
Purpose	Adoption of proposed changes into P802.16e	
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Enabling SDMA in H-ARQ Map IE's

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1 Introduction

Spatial Division Multiple Access (SDMA) requires the ability to allocate the same subchannels to two or more SS's. Currently, SDMA cannot be used with H-ARQ because the H-ARQ Map IE's do not support the allocation of a subchannel to more than one SS. The main reason is that the time/frequency resource allocations made using H-ARQ based IE's are relative and cumulative in nature. Before any allocations are made, a starting point is defined in the OFDMA frame. Then, the first allocation is assumed to begin at the previously defined starting point, and the second allocation begins at the end of the first allocation, and so forth. Therefore, there is no way to assign the same set of resources to a multiple SS's.

This contribution provides a solution for the downlink by introducing an SDMA-Compact-DL-MAP IE and an SDMA Compact UL-MAP IE patterned after the MIMO-Compact-DL-MAP IE / MIMO-Compact-UL-MAP IE so that the same allocation can be given to multiple SS's.

2 Specific Text Changes

----- Beginning of Text Changes -----

[In Section 6.3.2.3.43.6.7, add new Table 97b and add text after it as follows:]

Table 97b—**SDMA** Compact DL-MAP IE format

Syntax	Size (bits)	Notes
SDMA_Compact_DL-MAP_IE() {		
Compact DL-MAP Type	3	Type = 7
DL-MAP Sub-type	5	SDMA = 0x03
Length	4	Length of the IE in Bytes
Num_layers	2	Number of multiple coding/modulation layers 00 – 1 layer 01 – 2 layers 10 – 3 layers 11 – 4 layers
<u>Padding</u>	<u>2</u>	
for (j=1;j<Num_layer;j++) {		This loop specifies the Nep for layers 2 and above when required for STC. The same Nsch and RCID applied for each layer

<u>RCID</u>	<u>Variable</u>	<u>SS identifier for the current layer of the SDMA allocation</u>
if (H-ARQ Mode =CTC Incremental Redundancy) { Nep } elseif (H-ARQ Mode = Generic Chase) { DIUC } }	4	H-ARQ Mode is specified in the H-ARQ Compact_DL-MAP IE format for Switch H-ARQ Mode.
CQI Feedback_type	3	Type of contents on CQICH for this SS 000 = Default feedback 001 = Precoding weight matrix W 010 = Channel matrix H 011 = MIMO mode and permutation zone 100 -111 = Reserved
CQICH_Num	2	Total number of CQICHs assigned to this SS is (CQICH_Num +1)
for (i=1;i<CQICH_Num;i++) {		
Allocation index	6	Index to uniquely identify the additional CQICH resources assigned to the SS
}		
Padding	variable	The padding bits are used to ensure the contents within each layer loop are an integer number of bytes
}		
}		

SDMA transmissions may be allocated on the downlink with the SDMA Compact DL-MAP IE (Table 97c). Num_layer means the number of SDMA layers (2, 3, or 4) being allocated. The number of SDMA layers also sets the pilot format (e.g., for 2 SDMA users, the two-antenna pilot and subchannel format is used for the allocation).

[In Section 6.3.2.3.43.7.5, add the following text):]

Whenever HARQ enabled DL-SDMA allocations are made within a frame, the ACKs for the SDMA users allocated on the second layer shall be appended to the ACKs for the non-SDMA and first-layer SDMA users.

[In Section 6.3.2.3.43.7.8, Add Table 14c and add subsequent text:]

Table 14c —SDMA Compact UL-MAP IE format

Syntax	Size (bits)	Notes
MIMO Compact UL-MAP IE() {		

Compact UL-MAP Type	3	Type = 7
UL-MAP Sub-type	5	SDMA = 0x03
Length	4	Length of the IE in Bytes
Matrix indicator	1	UL STC matrices (see 8.4.8.4) For 2-antenna SS, 0 = Matrix A 1 = Matrix B
Num layer	1	Number of multiple coding/modulation layers 00 – 1 layer 01 – 2 layers
Padding	2	For byte alignment
For (j=1;j<Num_layer; j++) {		This loop specifies the Nep for layer 2 when required for STC.
RCID	variable	SS identifier for the current layer of the SDMA allocation
if (H-ARQ Mode =CTC Incremental Redundancy) { Nep } elseif (H-ARQ Mode = Generic Chase) { UIUC }	4	H-ARQ Mode is specified in the HARQ Compact_UL-MAP IE format for Switch HARQ Mode.
Padding	variable	The padding bits are used to ensure the contents within the layer loop are an integer number of bytes
}		
}		

[SDMA transmissions may be allocated in the uplink with the SDMA Compact UL-MAP IE \(Table 14c\). Num_layer means the number of SDMA layers, and the first layer/user will use pilot pattern A and the second layer/user will use pilot pattern B.](#)

[In Section 6.3.2.3.43.6.5, add the following text:]

[Whenever HARQ enabled UL-SDMA allocations are made within a frame, the ACK BITMAP Length shall be large enough to carry the ACKs for the both the SDMA and non-SDMA allocations. Also, the ACKs for the SDMA users allocated on the second layer shall be appended to the ACKs for the non-SDMA and first-layer SDMA users.](#)

----- End of Text Changes -----