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Re:	The document supports a comment at Sponsor Ballot on 802.16e/D5a document
Abstract	The document suggests text changes to provide MBS Feedback
Purpose	The document is for consideration during Sponsor Ballot comments resolution
Notice	
Release	
Patent Policy and Procedures	

Method of providing MBS Feedback

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Problem Statement

In IEEE P802.16e/D5a, multicast data is delivered with specific downlink burst profile. It is required in the MBS service that MBS data with the selected downlink burst profile should be delivered to the all MSSs which subscribe the MBS service. In order to achieve the service availability of all MBS users, depending on channel conditions and distribution of MBS users in the cell, the BS should change downlink burst profile.

In the current draft, IEEE P802.16e/D5a, there is a method to change downlink burst profile for MBS MAP message and MBS data but no mechanism to estimate and validate the MBS users' channel condition and MBS data reception status. Therefore, it is hard for the BS to decide the downlink burst profile for MBS.

In this contribution, we propose the new feedback mechanism for MBS with Feedback Polling IE and MBS Feedback header, in order to provide the MBS data reception status and preferred downlink burst profile information which help the BS making a decision. Based on the preferred DIUC value in the MBS Feedback headers which are transmitted by the MSSs subscribing the MBS service, the BS can change the downlink burst profile for MBS data.

Proposed text change

Introduce a method for the MSS to provide the feedback information related to MBS. The BS uses the MBS feedback information from the MSSs to make decision of downlink burst profile for next MBS data transmission.

Remedy 1.

Using the existing Feedback header for an MSS to transmit MBS Feedback information

[Insert the following at line 42, Page 113 :]

In case MSSs subscribing the MBS service is not able to receive the MBS data correctly, the MSSs shall send the Feedback header to inform the BS of the preferred DIUC value for the MBS burst. The duration, when MSSs shall send Feedback header, is notified with the Feedback_polling IE by the BS. The BS may consider the delivered DIUC values to select the proper downlink burst profile for MBS data.

[Modify 6.3.2.1.4.1 Feedback header at line 5, Page 16, as follows :]

6.3.2.1.4.1 Feedback header

The Feedback PDU shall consist of the Feedback header alone and shall not contain a payload. The Feedback header with and without CID field are is illustrated in Figure 20b.

HT = 1 (1)	EC = 1 (1)	N/M flag=0(1)	CII=1(1)	Feedback Type (4)	Feedback Content (8)
Content (8) Feedback					~~Basic~~ CID (8)
~~Basic~~ CID (8)					HCS (8)

a)Feedback header with CID field

The Feedback header shall have the following properties:

a) The length of the header shall always be 6 bytes.
b) The HT field is set to 1 and the EC field is set to 1, which indicates the feedback header type.
c) The N/M field (Normal feedback header/Mini feedback header indication) shall be set to 0 to indicate that this is a normal size Feedback header.
d) The Feedback type field shall be set according to Table 7b.
e) The CII field (CID Inclusion Indication) shall be set to 1 for the header with CID field and set to 0 for the header without CID field.
f) The Feedback Content field shall be set accordingly based on the value of the feedback type field.
g) The CID field shall be set to the value of the Basic CID except when Feedback type is MBS Feedback. In the case of MBS Feedback, the CID field shall be set to the value of CID for MBS.

The Feedback header shall be used by the MSS to provide its feedback(s). An MSS receiving a Feedback header on the downlink shall discard the PDU.

[Modify Table 7b at line 13, page 17, as follows :]

Table 7b. Feedback Type and feedback content.

Feedback Type	Feedback contents	Decsription
0b0000	Set as described in table 296d.	MIMO mode and permutation feedback
0b0001	DL average CQI (5bits)	5 bits CQI feedback

0b0010	Number of index, *L*(2 bits) + *L* occurrences of Antenna index (2 bits) + MIMO coefficients (5 bits, 8.4.5.4.10.6)	MIMO coefficients feedback
0b0011	Preferred-DIUC (4 bits)	Preferred DL channel DIUC feedback
0b0100	UL-TX-Power (7 bits) (see table 7a)	UL transmission power
0b0101	Preferred DIUC(4 bits) + UL-TX-Power(7 bits) + UL-headroom (6 bits) (see Table 7a)	PHY channel feedback
0b0110	Number of groups, *M*(2 bits) + *M* occurrences of 'group index (2 bits) + CQI (5 bits)'	CQIs of antenna groups
0b0111	Number of bands, *N*(2 bits) + *N* occurrences of 'band index (6 bits) + CQI (5 bits)'	
0b1000	Number of feedback types, *O*(2 bits) + *O* occurrences of 'feedback type (4bits) + feedback content (variable)'	Multiple types of feedback
0b1001	CCC (4 bits) + Preferred DIUC (4 bits)	MBS feedback
~~0b1001~~-0b1002-0b1111	Reserved for future use	

[Modify 8.4.5.3.19 Feedback polling IE at line 4, page 254, as follows :]

8.4.5.3.19 Feedback polling IE

This IE is used by BS to allocate dedicated UL resource for the purpose to obtain certain type of feedback from one or more MSS.

Syntax	Size	Notes
Feedback_polling IE () {		
Extended UIUC	4 bits	0x0F
Length	4 bits	Length in bytes of following fields
for (i=0; i < Num_Allocations; i++){		
~~Basic~~ CID	16 bits	
UIUC	4 bits	
Feedback_type	6 bits	See Table 7b
Duration	10 bits	In OFDMA slots (see 8.4.3.1)
Allocation_offset	3 bits	The UL feedback shall be transmitted in the frame which is 0-8 frame delay relative to the current frame.
Period (p)	2 bits	The UL resource region is dedicated to the MSS in every 2pframe
Allocation Duration (d)	3 bits	The allocation is valid for 10 x 2d frame starting from the frame defined by Allocation_offset 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

}		
Padding bits	Variable	To align octet boundary
}		

CID

Basic CID shall be set except when Feedback type is MBS Feedback. CID for MBS shall be set in the case of MBS Feedback.

Feedback_type

See Table 7b.

Allocation_offset

The UL feedback shall be transmitted in the frame which is 0-8 frame delay relative to the current frame. If Feedback type is MBS Feedback, this field shall be omitted.

Duration

In OFDMA slots (see 8.4.3.1)

Period (p)

The DL resource region is dedicated to a MSS in every 2p frame. If Feedback type is MBS Feedback, this field shall be omitted.

Allocation Duration (d)

The allocation is valid for 10 x 2d frame starting from the frame defined by Allocation_offset

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

If Feedback type is MBS Feedback, this field shall be omitted.

Remedy 2.
Introduce a new MBS Feedback header for the MSS to transmit MBS feedback information.

[Insert the following at line 42, Page 113 :]

In case MSSs subscribing the MBS service is not able to receive the MBS data correctly, the MSSs shall send the MBS Feedback header to inform the BS of the preferred DIUC value. The duration, when MSSs shall send MBS Feedback header, is notified with the Feedback_polling IE by the BS. The BS may consider the delivered DIUC values to select the proper downlink burst profile for MBS data.

[Insert the following at line 42, Page 22 :]

6.3.2.1.8 MBS Feedback header

The MBS Feedback header shall consist of CCC, Preferred DIUC, and Multicast CID, and shall not contain a payload. The MBS Feedback header is illustrated in Figure 20e.

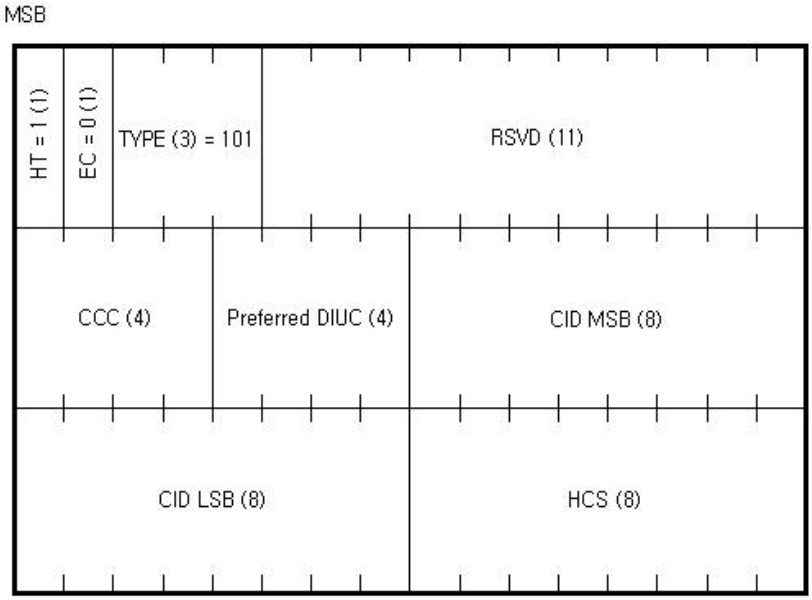

Figure 20e—MBS Feedback header format

The MBS Feedback header shall have the following properties ;

a) The length of the header shall always be 6 bytes.
b) The HT field is set to 1.
c) The EC field shall be set to 0, indicating no encryption.
d) The CCC field shall be set to 4 LSB of Configuration Change Count value of DCD defining the burst profile associated DIUC.
e) The Preferred DIUC field shall be set to the value of the DIUC preferred by the MSS.
f) The CID field shall be set to the Multicast CID on that MBS data is transmitted.

An MSS receiving a MBS Feedback header on the downlink shall discard the PDU.
The fields of the MBS Feedback header are defined in Table 7e.

Table 7e—Description of fields of the MBS Feedback header

Name	Length (bits)	Description
HT	1	Header Type = 1
EC	1	Always set to zero
Type	3	Type = 101
CCC	4	4 LSB of Configuration Change Count value of DCD
Preferred DIUC	4	Index of the DIUC preferred by the MSS
CID	16	The Multicast CID on that MBS data is transmitted
HCS	8	Header Check Sequence (same usage as HCS entry in Table 5).

[Modify Table 7b at line 13, page 17, as follows :]

Table 7b. Feedback Type and feedback content.

Feedback Type	Feedback contents	Decsription
0b0000	Set as described in table 296d.	MIMO mode and permutation feedback
0b0001	DL average CQI (5bits)	5 bits CQI feedback
0b0010	Number of index, *L*(2 bits) + *L* occurrences of Antenna index (2 bits) + MIMO coefficients (5 bits, 8.4.5.4.10.6)	MIMO coefficients feedback
0b0011	Preferred-DIUC (4 bits)	Preferred DL channel DIUC feedback
0b0100	UL-TX-Power (7 bits) (see table 7a)	UL transmission power
0b0101	Preferred DIUC(4 bits) + UL-TX-Power(7 bits) + UL-headroom (6 bits) (see Table 7a)	PHY channel feedback
0b0110	Number of groups, *M*(2 bits) + *M* occurrences of ‘group index (2 bits) + CQI (5 bits)’	CQIs of antenna groups
0b0111	Number of bands, *N*(2 bits) + *N* occurrences of ‘band index (6 bits) + CQI (5 bits)’	
0b1000	Number of feedback types, *O*(2 bits) + *O* occurrences of ‘feedback type (4bits) + feedback content (variable)’	Multiple types of feedback
0b1001	MBS Feedback header	MBS feedback
~~0b1001~~-0b1002-0b1111	Reserved for future use	

[Modify 8.4.5.3.19 Feedback polling IE at line 4, page 254, as follows :]

Syntax	Size	Notes
Feedback_polling IE () {		
Extended UIUC	4 bits	0x0F
Length	4 bits	Length in bytes of following fields
for (i=0; i < Num_Allocations; i++){		
~~Basic~~ CID	16 bits	
UIUC		
Feedback_type	6 bits	See Table 7b
Duration	10 bits	In OFDMA slots (see 8.4.3.1)
Allocation_offset	3 bits	The UL feedback shall be transmitted in the frame which is 0-8 frame delay relative to the current frame.
Period (p)	2 bits	The UL resource region is dedicated to the MSS in every 2pframe
Allocation Duration (d)	3 bits	The allocation is valid for 10 x 2d frame starting from the frame defined by Allocation_offset 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
}		
Padding bits	Variable	To align octet boundary
}		

CID

Basic CID shall be set except when Feedback type is MBS Feedback. CID for MBS shall be set in the case of MBS Feedback.

Feedback_type

See Table 7b. If Feedback type is MBS Feedback, the MBS Feedback header shall be transmitted on allocated duration.

Allocation_offset

The UL feedback shall be transmitted in the frame which is 0-8 frame delay relative to the current frame. If Feedback type is MBS Feedback, this field shall be omitted.

Duration

In OFDMA slots (see 8.4.3.1)

Period (p)

The DL resource region is dedicated to a MSS in every 2p frame. If Feedback type is MBS Feedback, this field shall be omitted.

Allocation Duration (d)

The allocation is valid for 10 x 2d frame starting from the frame defined by Allocation_offset

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

If Feedback type is MBS Feedback, this field shall be omitted.