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Re:	The document supports a comment at Sponsor Ballot on 802.16e/D6 document	
Abstract	The documents suggests text changes to clarify MBS.	
Purpose	The document is for consideration during Sponsor Ballot comments resolution	
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MBS Clarification

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Introduction

In Single-BS MBS, DL_MAP_IE or MBS_MAP_IE may be used for transmitting MBS data.
However, current MBS_MAP_IE defines only macro-diversity enhanced case, and DL_MAP_IE has no considerations about MS in Idle Mode receiving MBS data.
Because DL_MAP_IE does not include information about next MBS data scheduling, MS in Idle Mode should listen all DL frames and decode all DL-MAP messages to receive MBS data with DL_MAP_IE.
And there is no description about MBS burst profile management in Single-BS MBS. If a BS changes MBS burst profile based on DL burst profile of each MS receiving MBS data, it can use radio resource more efficiently and guarantee MS' performance for receiving MBS data at the same time. In order to manage MBS burst profile, Idle Mode MSs should be considered.
Therefore, current Single-BS MBS section needs more clarification and modification for Idle Mode MSs receiving MBS data, and to support MBS burst profile management.

In Multi-BS MBS, all BSs in a MBS zone should always transmit MBS data regardless of presence of MS participating the MBS connection in BS' coverage. This can increase receiving performance and provide MBS to all MSs regardless of their operational mode. It causes waste of BS' radio resource in case that there is no MS receiving MBS data in the BS.
If there is a method for BS to check presence of MS receiving MBS data in its coverage and transmit MBS data only when there is one or more MSs receiving MBS data, it can use radio resource more efficiently.

So, we propose two remedies :

- Method for MBS burst profile management in Single-BS MBS
- Method to update the presence of MS participating MBS connection in a BS

Proposed text change

Remedy 1 : Add the text related to MBS burst profile management.

[Modify the text in 6.3.13.1 Single-BS-MBS, page 127, line 19, as follows :]

6.3.13.1 Single-BS-MBS

The BS may establish a downlink multicast service for MBS by creating a connection with each SS to be associated with the service. Any available traffic CID value may be used for the service (i.e. there are no dedicated CIDs for multicast transport connections). To ensure proper multicast operation, the CID used for the service is the same for all SSs on the same channel that participate in the connection. The data transmitted on the connection with the given CID shall be received and processed by the MAC of each involved SS.

Thus each multicast MAC SDU is transmitted only once per BS channel. Since a multicast connection is associated with a service flow, it is associated with the QoS and traffic parameters for that service flow.

If a downlink multicast connection is to be encrypted, each SS participating in the connection shall have an additional security association (SA), allowing that connection to be encrypted using keys that are independent of those used for other encrypted transmissions between the SSs and the BS. For single-BS-MBS data, ~~DL_MAP_IE or~~ MBS_MAP_IE may be used. ~~The difference of usage of DL_MAP_IE and MBS_MAP_IE for single-BS-MBS data is whether MBS zone identifier is assigned.~~ If there is an logical controller (it may be named as MBS server) to handle MBS service regardless of single-BS-MBS or multi-BS-MBS, by the decision of the controller, BS may assign MBS zone identifier.

MBS DIUC may be changed based on downlink burst profile of MSs participating in the MBS connection and preferred MBS DIUC from Idle Mode MSs. A BS may select the most robust burst profile as an MBS DIUC among downlink burst profile of MSs receiving the MBS data and preferred MBS DIUC from Idle Mode MSs. In the case supporting adaptive change of MBS DIUC, Idle Mode MSs shall report preferred MBS DIUC when MBS DIUC is different from the MS' downlink CINR threshold level. If Idle Mode MS receiving MBS data moves into another BS, it shall perform Location Update process by sending RNG-REQ message including MBS Location Update TLV to notify its movement to previous BS. A BS shall update the list of MS participating in the MBS connection including Idle Mode MSs. If there is no MS participating in the MBS connection in a BS, the BS may not transmit the MBS data on the connection.

Remedy 2 : Add the text related to Idle Mode MS MBS Location Update and MBS DIUC change request

[Modify the text in 6.3.21.9.1 Location Update Conditions, page 168, line 50, as follows :]

6.3.21.9.1 Location Update Conditions

An MS in Idle mode shall perform a Location Update process operation if any Location Update condition is met. There are ~~four~~ five location update evaluation conditions: Zone Update, Timer Update, Power Down Update, MAC Hash Skip Threshold Update, and MBS Location Update. MS may also perform Location Update process at will.

[Insert new sub-clause 6.3.21.9.1.5 MBS Location Update, page 169, line 60, as follows :]

6.3.21.9.1.5 MBS Location Update Conditions

The MS shall perform Location Update process when the MS receiving MBS data moves into another BS. In single-BS MBS, the MS shall also perform Location Update when MBS DIUC is different from the MS's downlink CINR threshold level. In MBS Location Update, the MS shall include MBS Location TLV to notify its movement to previous BS. In case of single-BS MBS, the MS shall include MBS Feedback TLV to notify its preferred MBS DIUC. BS may use MBS location update to control MBS DIUC considering Idle Mode MS in single-BS MBS and MBS data transmission in multi-BS MBS.

[Add the following text in 6.3.2.3.5 Ranging Request (RNG_REQ) message, page 35, line 46, as follows :]

The following TLV parameter shall be included in the RNG-REQ message when Idle Mode MS receiving MBS data requests MBS DIUC change to the BS in single-BS MBS:

MBS Feedback

Bits 0 : 3 – Preferred DIUC

Bits 4 : 7 – Configuration Change Count of DCD associated with DIUC

Bits 8 : 23 – MBS CID

The following TLV parameter shall be included in the RNG-REQ message to notify its movement to previous BS when Idle Mode MS receiving MBS data moves into another BS:

MBS Location Update

Bits 0 : 15 – MBS CID

Bits 16 : 23 – MBS Zone ID

[Add the following text in 11.5 RNG-REQ message encodings, page 479, line 31, as follows :]

Name	Type (1 byte)	Length	Value (Variable-length)
MBS Feedback		3	Idle Mode MS receiving MBS data requests MBS DIUC change to the BS in single-BS MBS Bits 0 : 3 – Preferred DIUC Bits 4 : 7 – Configuration Change Count of DCD associated with DIUC Bits 8 : 23 – MBS CID
MBS Location Update		3	Idle Mode MS receiving MBS data notifies its movement to previous BS after moving into another BS Bits 0 : 15 – MBS CID Bits 16 : 23 – MBS Zone ID

Remedy 3 : Add the text related to MBS transmission according to presence of MS.

[Add the following text '6.3.13.2.5 Decision of MBS Transmission', page 129, line 38, as follows :]

6.3.13.2.5 Decision of MBS Transmission

A BS may not transmit the MBS data when there is no MS participating in the MBS connection in the coverage. A BS may update list of MSs participating in the MBS connection by DSA, DSD, De-reg, HO message transactions for Normal or Sleep Mode MSs and MBS Location Update for Idle Mode MS. The BS shall transmit MBS-MAP message including MBS_DATA_IE to provide available MBS information to the MS entering from another BS even if it does not transmit the MBS data. When Idle Mode MS receiving the MBS data moves into another BS, it shall perform Location Update process by sending RNG-REQ message including MBS Location Update TLV to notify its movement to the previous BS. If the BS not transmitting the MBS data receives RNG-REQ message including MBS Location Update TLV, it may start transmitting the MBS data in the next MBS frame.

Remedy 4 : Modify MBS_DATA_IE in MBS-MAP message for BS not to transmit the MBS data if there is no MS participating in the MBS connection.

[Modify the text in 6.3.2.3.56 Multicast Broadcast Service Map (MBS-MAP) message, page 116, line 21, as follows :]

Table 108t—MBS_DATA_IE

Syntax	Size	Notes
MBS_DATA_IE{		
MBS_MAP Type = 0	4 bits	
Multicast CID	12 bits	12 LSB of CID for multicast
MBS Traffic Indication	1 bit	0: MBS data is not transmitted 1: MBS data is transmitted
reserved	3 bit	Shall be set to zero
If (MBS Traffic Indication = 1) {		
MBS DIUC	4 bits	
OFDMA Symbol Offset	8 bits	OFDMA symbol offset with respect to start of the MBS portion
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	
Repetition Coding Indication	2 bits	0b00 - No repetition coding 0b01 - Repetition coding of 2 used 0b10 - Repetition coding of 4 used 0b11 - Repetition coding of 6 used
Next MBS frame offset	8 bits	The Next MBS frame offset value is lower 8 bits of the frame number in which the BS shall transmit the next MBS frame.
Next MBS OFDMA Symbol offset	8 bits	The offset of the OFDMA symbol in which the next MBS portion starts, measured in OFDMA symbols from the beginning of the downlink frame in which the MBS-MAP is transmitted.
} else {		
Next MBS MAP frame offset	8 bits	The Next MBS MAP frame offset value is lower 8 bits of the frame number in which the BS shall transmit the next MBS MAP
}		
}-		