

[Multimedia Broadcast Service in 802.16]

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MBS (Multimedia Broadcast Service) for 802.16

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- General Requirements
- Message based MBS Framework on IEEE802.16e
 - MAC Management Message Formats
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- Non-message based MBS Framework on IEEE802.16e

Multimedia Broadcast Service ?

- Efficiency
 - MBS is an efficient mechanism to send multimedia broadcast information.
- Power saving
 - MBS should be provided in both Awake & Idle Mode.
- Mobility
 - MBS should provide seamless connection for mobile SS.
- MBS Zone
 - MBS content may be transmitted to all or some selected MBS zone of the network.
- Security
 - MBS contents may be securely delivered to the only authorized users.

SS Requirements

- SS shall discover the address of MBS content server.
- SS may use HTTP for MBS information acquisition from MBS server.
- When SS requests for a MBS content, SS should include some fields for the authorization.
- SS shall store Key for MBS and be able to check the validness of the Key.
- Regardless of SS's state, SS shall receive packets for MBS content.
- SS shall determine the zone that the information for a MBS content is valid through.
- SS shall reduce the power consumption for receiving MBS packets.
- SS shall decrypt an encrypted MBS payload by using Key from MBS server and nonce from BS.

BS Requirements

- BS shall provide the information for SS to receive MBS packets regardless of SS's state.
- BSs shall synchronize the transmission of MBS packets to provide the macro diversity reception.
- BS shall encrypt MBS payload by using Key for MBS content from MBS server and nonce.
- BS should generate and distribute nonce for SS to decrypt encrypted MBS packets.

MBS Content Server Requirements

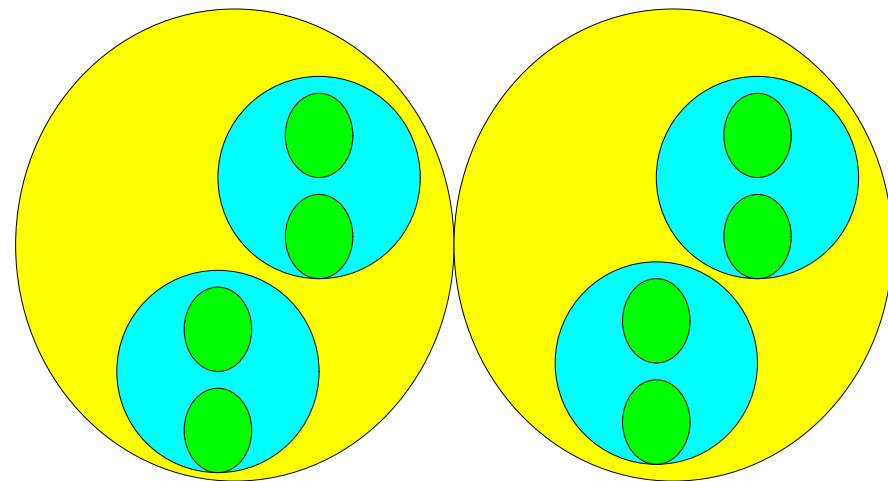
- MBS content server shall manage MBS information for MBS content.
- MBS content server should use HTTP for MBS information acquisition.
- MBS content server shall perform the authorization and the accounting.
- MBS content server shall manage Keys for MBS content.
- MBS content server shall deliver Key for MBS content to the authorized user.
- MBS content server shall distribute MBS information to BSs.
- MBS content server shall distributes MBS packets to BSs.

Features

- Macro diversity shall be provided.
 - The transmission shall be synchronized between BSs in the same macro diversity region.
- MBS ID
 - MBS ID is an identifier of MBS content.
 - MBS ID is uniquely determined in a service provider region or in a global region.
- CID for MBS (MBS CID)
 - MBS CID is a kind of transport CID.
 - MBS CID shall be managed and shall not be changed in the macro diversity region.
- MBS zone identifier
 - If MBS zone is changed, MBS ID and its related service information (e.g. security key) may be changed.
 - If MBS zone is changed, SS may be necessary to reaccess a MBS server in the new MBS zone.

MBS Zone & Diversity

- MBS Zone
 - Area covered by a contents server
 - Same MBS encryption key management
 - Same Multicast IP address/port for the same MBS content
- Diversity Zone
 - Unique CID for a broadcast channel
 - Synchronized BS scheduling



- : MBS Zone
- : Diversity Zone
- : BS region

Message based MBS Framework on IEEE802.16e

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Identifier Mapping

MBS Zone identifier = 0x01

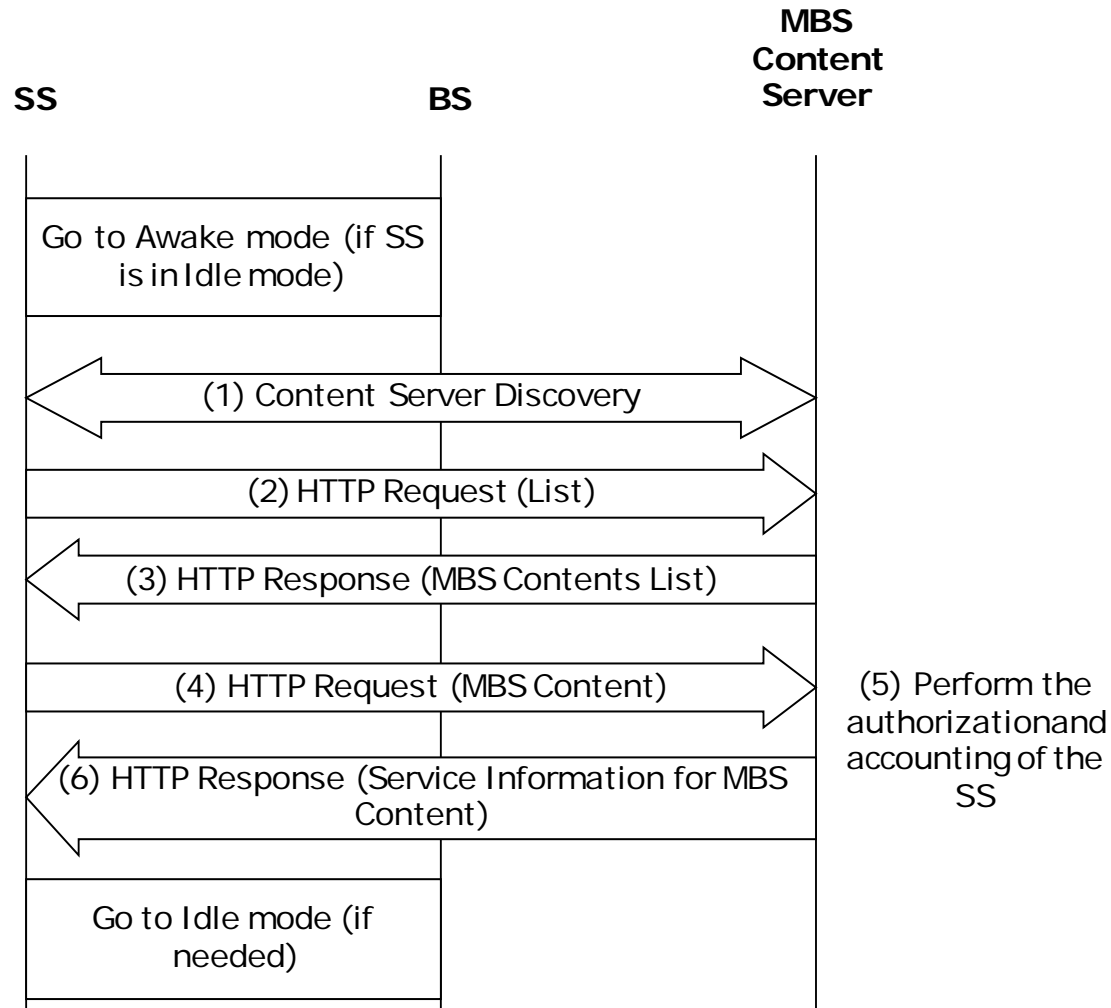
Content Name	MBS ID	Multicast IP Address	MAK ID	BS ID	MBS CID
CNN1	0x00000005	225.34.56.32	0x001	0x0...001	0x0100
				0x0...002	0x0200
HBO1	0x00000010	230.11.128.54	0x011	0x0...001	0x0200
				0x0...002	0x0102

MBS Zone identifier = 0x02

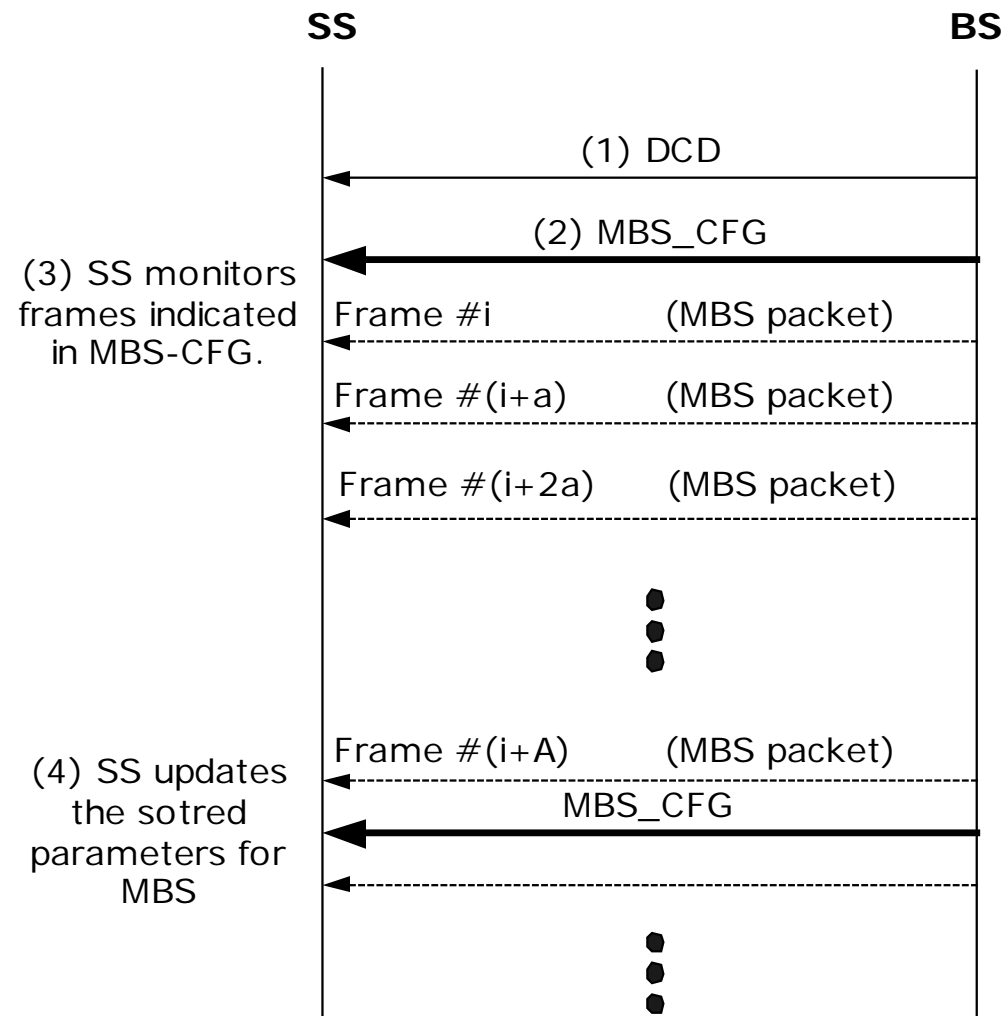
Content Name	MBS ID	Multicast IP Address	MAK ID	BS ID	MBS CID
CNN2	0x00000006	225.34.56.35	0x020	0x0...015	0x0100
				0x0...016	0x0202
HBO2	0x00000011	230.11.128.53	0x100	0x0...015	0x0206
				0x0...016	0x0104

Assumption : BSs below are located in different macrodiversity regions.

Service Scenario for MBS Information Acquisition



Service Scenario for MBS Packet Receiving (I)



Service Scenario for MBS Packet Receiving (II)

- SS's procedures
 - DCD message indicates the MBS support of BS.
 - SS periodically receives MBS-CFG message.
 - MBS-CFG message includes
 - Scheduling information of MBS packets (frame and MAP information)
 - Next MBS-CFG message transmission time
 - SS checks MBS zone.
 - SS receives MBS packets at the scheduled time
- BS's procedures
 - BS shall configure and send MBS-CFG message by using broadcast CID at pre-configured time.
 - BS shall send MBS packets at pre-configured time.

MAC Management Message Formats (I)

- DCD channel encoding

Name	Type (1 byte)	Length	Value (variable length)
[...]	[...]	[...]	[...]
MBS support	154	1	0 = Not support 1 = Support

MAC Management Message Formats (II)

- MBS-CFG

```
MBS-CFG_Message_Format() {  
    Management Message Type = 71                : 8 bits  
    MBS zone identifier                          : 8 bits  
    Next MBS-CFG transmission frame offset      : 9 bits  
    N_MBS_Configuration                         : 7 bits  
    for (I = 0 ; I < N_MBS_Configuration ; I++) {  
        MBS_Configuration_IE()                  : Variable  
    }  
    if !(byte boundary) {  
        Padding nibble                          : 4bits  
    }  
}
```


MAC Management Message Formats (III)

```
MBS_Configuration_Normal_IE() {  
    MBS Configuration Type = '0000' : 4 bits  
    N_MBS_ID : 4 bits  
    for (I = 0 ; I < N_MBS_ID ; I++) {  
        MBS_ID : 32 bits  
        MBS CID : 16 bits  
        DIUC : 4 bits  
        start subchannel : 8 bits  
        subchannel length : 8 bits  
        MBS Cipher Suites Type : 4 bits  
        if (MBS Cipher Suites Type == '0001' or '0010' or '0011') {  
            MAK identifier : 12 bits  
            MAK sequence number : 4 bits  
        }  
    }  
    Physical Frequency : 32 bits  
    Transmission start frame offset : 8 bits  
    Transmission frame length : 4 bits  
    Transmission frame period index : 8 bits  
}
```

Non-message based MBS Framework on IEEE802.16e

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Contents

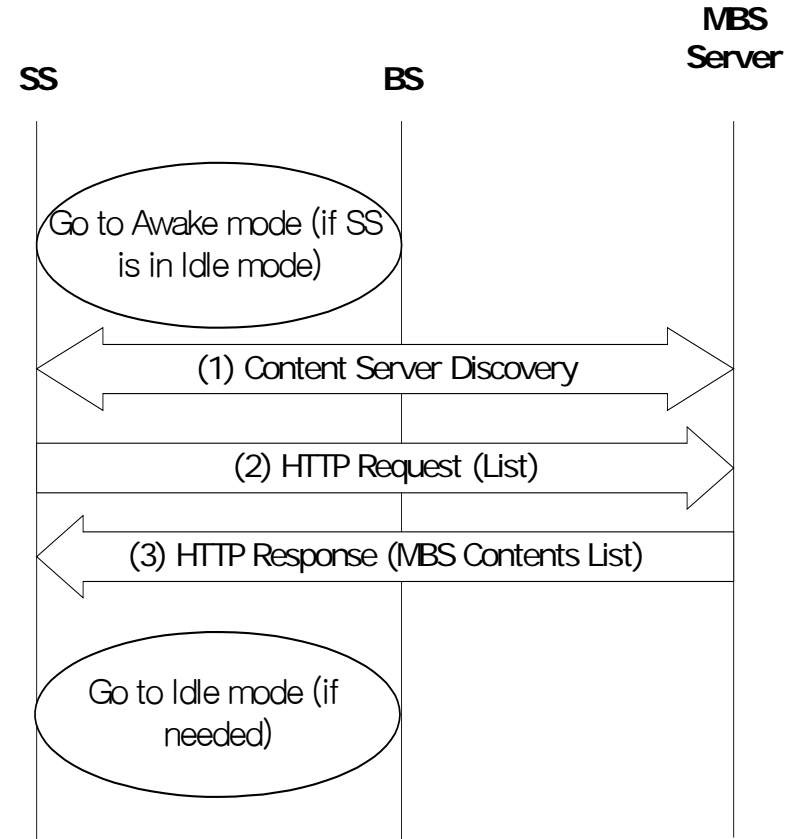
- Introduction
- Service Scenario
- Message Changes

Introduction

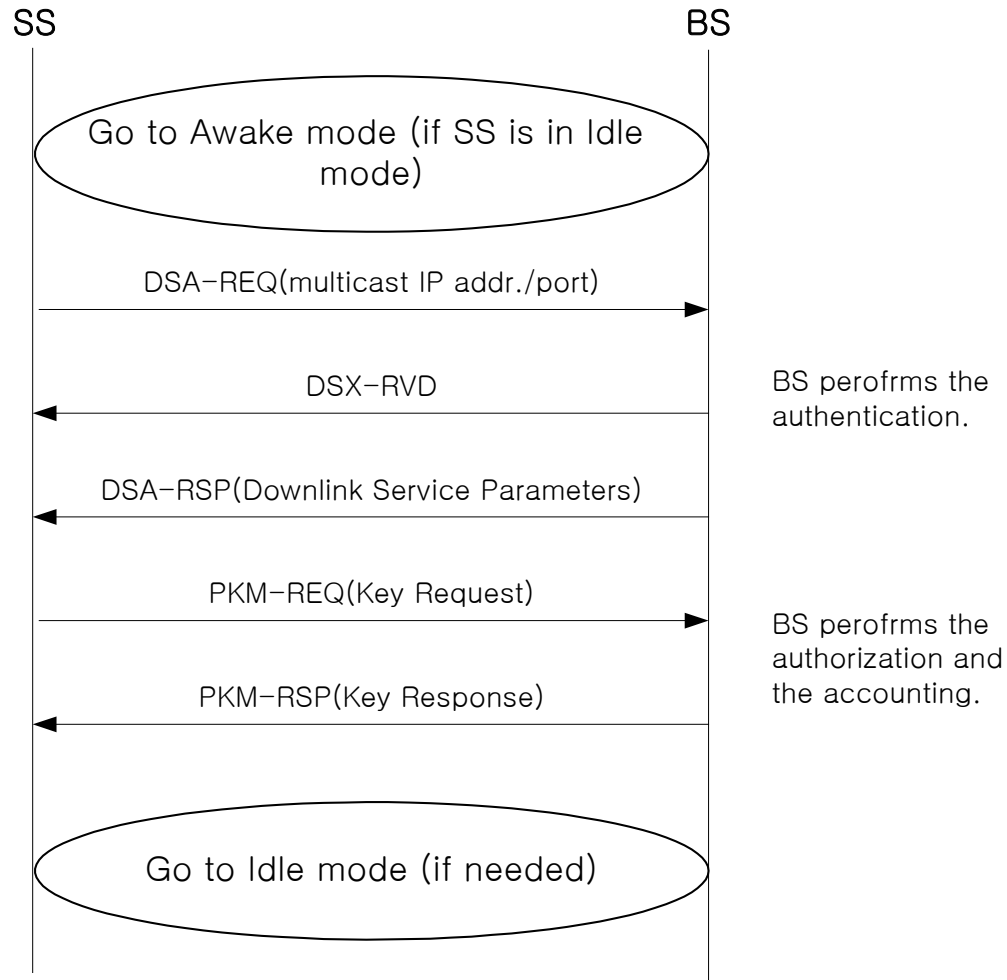
- This is a simple approach to provide MBS service with power saving on the minimal change of current specification.

MBS Information Acquisition Scenario

- Operation
 - If SS is in idle mode, SS transits into awake mode.
 - SS sends a HTTP Request for MBS list to MBS Content Server.
 - MBS Content Server sends a HTTP Response including MBS contents list, which includes some lists of
 - MBS content name
 - Multicast IP addr./port no. (If MBS packets are delivered in IP packet)
 - MBS_SAID and Cryptographic Suite
 - Etc.

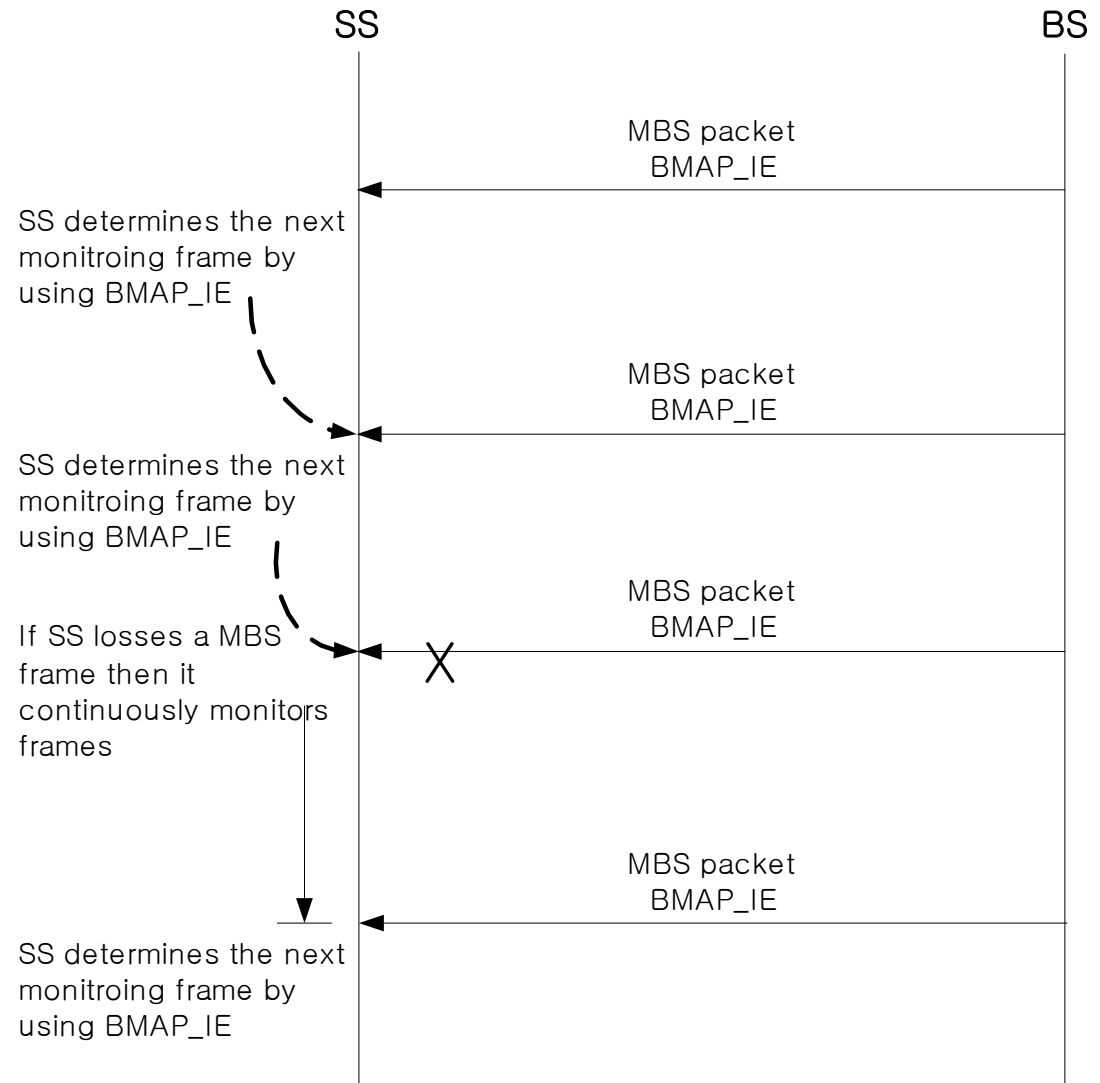


Authentication Scenario



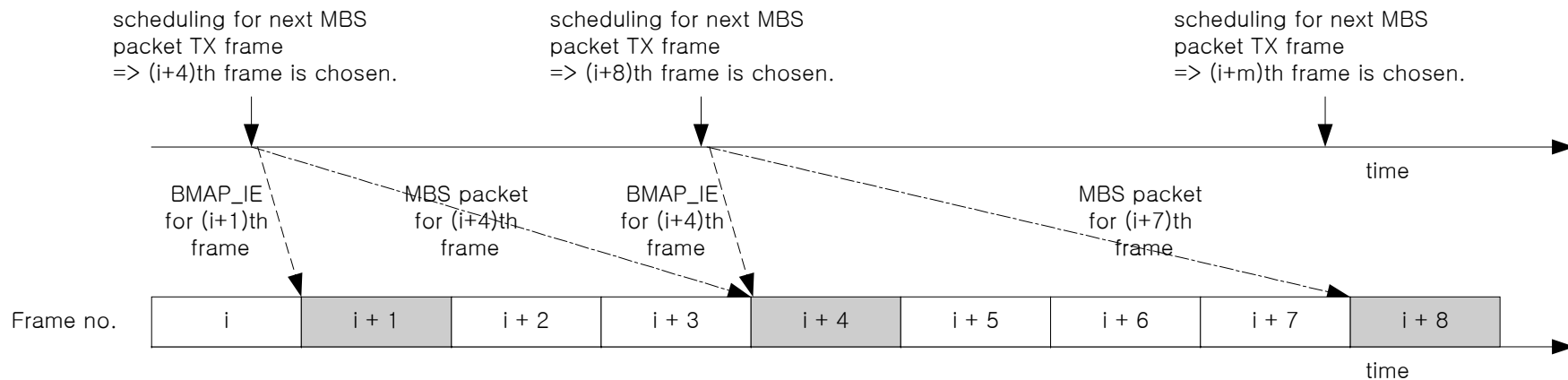
Receiving MBS Packets with Power Saving

- DL-MAP_IE indicates a MBS burst.
- The MBS burst may contain multiple MBS connections.
- BMAP_IE indicates next frame offset for each MBS connection.



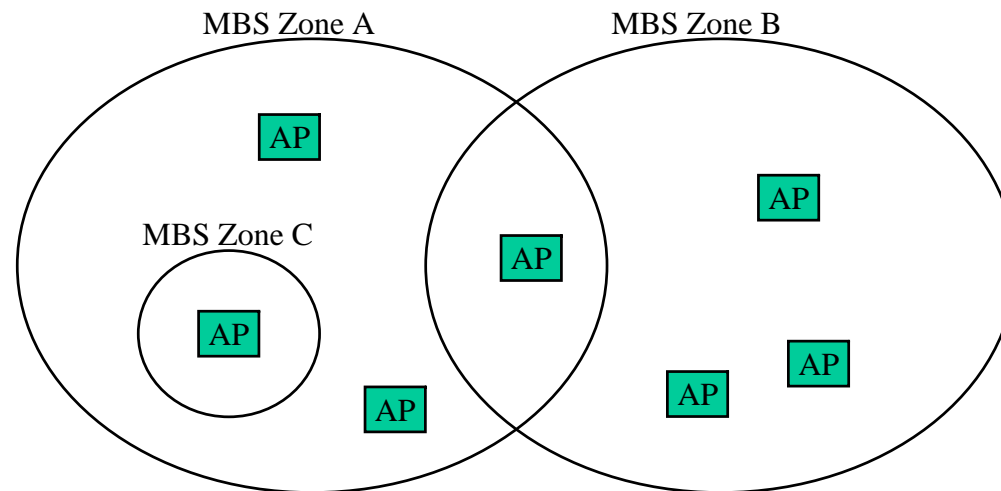
Scheduling Example

- BMAP_IE indicates the next MBS packet transmission frame.
 - E.g.) In the figure, BMAP_IE in (i+1)th frame includes a frame offset(is equal to 3)to (i+4)th frame. But, BMAP_IE in (i+4)th frame includes a frame offset(is equal to 4)to (i+8)th frame.



MBS Zone Detection

- SS receives MBS-Zone_IE in every MBS frame.
- When SS detects new MBS zone, SS acquires the MBS information for the zone .



Specification Change I

- Add new BMAP_IE() in DL-MAP
 - indicates the next MBS packet transmission frame.

Syntax	Size	Notes
BMAP_IE {		
Extended DIUC	4 bits	BMAP = 0x05
Length	4 bits	Length = 3 x nCID
for(i=0;i< nCID;i++){		
CID	16 bits	
Frame offset	8 bits	
}		
}		

Specification Change II

- Add new MBS-Zone_IE() in DL-MAP
 - indicates MBS zones that this BS currently supports

Syntax	Size	Notes
MBS_Zone_IE {		
Extended DIUC	4 bits	MBS-Zone_IE = 0x06
Length	4 bits	Length = nZone
for(i=0;i< nZone;i++){		
MBS zone identifier	8 bits	
}		
}		

Specification Change III

- Add new TLV for service flow encodings (section 11.13)
 - MBS Zone Identifier
 - informs of SS that this dynamic service is valid only in the MBS zone represented by this field.

Type	Length	Value	Scope
[145/146].29	8	MBS zone identifier	DSA-RSP