

# **Attachment 3-2-1**

## **WiMAX Forum<sup>TM</sup> Mobile System Profile**

**Release 1.5 Common Part**

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# **WiMAX Forum™ Mobile System Profile Specification**

Release 1.5 Common Part

WMF-T23-001-R015v01

WiMAX Forum Approved  
(2009-08-01)

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## Revision History

**Table 1. Change Control Revision History**

Version	Date	Comment
v01	2009-08-01	WiMAX Forum Approved

## **Abstract**

*This document specifies the aspects of WiMAX Forum Mobile System Profile Release 1.5 that are common to FDD and TDD.*

## **1. Scope**

This document provides the aspects of the WiMAX Forum Mobile System Profile Release 1.5 air interface specification common to FDD and TDD. It serves primarily for the purpose of certification of conformant Subscriber Stations and Base Stations.

This document is complimented by FDD-specific [5] and TDD-specific [6] elements of the WiMAX Forum Mobile System Profile Release 1.5.

This specification makes use of IEEE Std 802.16 as a normative reference.

## 2. References

The following documents contain provisions that, through reference in this text, constitute provisions of the present document. References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For a specific reference, subsequent revisions do not apply. For a non-specific reference, the latest version applies.

- [1] **IEEE Std 802.16-2004**, IEEE Standard for Local and Metropolitan Area Networks - Part 16: Air Interface for Fixed Broadband Wireless Access Systems
- [2] **IEEE Std 802.16e-2005**, Amendment to IEEE Standard for Local and Metropolitan Area Networks - Part 16: Air Interface for Fixed Broadband Wireless Access Systems- Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands
- [3] **IEEE P802.16-2004/Cor2/D3**, Draft Corrigendum to IEEE Std 802.16 - Local and metropolitan area networks, Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems
- [4] **IEEE Std 802.16-2009**, IEEE Standard for Local and metropolitan area networks - Part 16: Air Interface for Broadband Wireless Access Systems.
- [5] **WiMAX Forum WMF-T23-003-R015v01**, WiMAX Forum® Mobile System Profile Specification, Release 1.5 FDD Specific Part, (2009-08-01)
- [6] **WiMAX Forum WMF-T23-002-R015v01**, WiMAX Forum® Mobile System Profile Specification, Release 1.5 TDD Specific Part, (2009-08-01)

## 3. Definitions

### 3.1 Abbreviations

### 3.2 Definitions of system profiles

### 3.3 Conventions

#### 3.3.1 Item column

The *Item* column contains a number that identifies each description in the table.

#### 3.3.2 Description column

The *Description* column describes in free text each respective item (e.g., parameters, timers, etc.).

#### 3.3.3 Reference column

The *Reference* column indicates the section of the referenced standard from which the requirement for the item is derived.

Unless stated otherwise in the corresponding reference column, the referenced standard is IEEE Std 802.16™-2004 [1] as amended and corrected by IEEE Std 802.16e™-2005 [2] and IEEE P802.16-2004/Cor2/D3 [3].

#### 3.3.4 Status column

The following notations are used in the *Status* column to indicate whether each item is mandatory or optional in the referenced standard, per the *Reference* column.

Unless stated otherwise in the corresponding status column, the status is based on the IEEE Standard 802.16™-2004 [1] as amended and corrected by IEEE Std 802.16e™-2005 [2] and IEEE 802.16-2004/Cor2/D3 [3].

**Table 2. Status Column Entries**

<b>m</b>	Explicitly shown as mandatory in the standard. Mandatory items are automatically required in the profile for implementation.
<b>pm</b>	Potentially mandatory. Essential for the system to perform basic operations, although not explicitly mandatory in the standard. Potentially mandatory items are required in the profile for implementation.
<b>o</b>	Explicitly mentioned as optional in the standard or is not explicitly optional but has capability negotiations. These items may or may not be required in the profile for implementation.
<b>oi</b>	Qualified option – for mutually exclusive or selectable options from a set. One or more of the options from the set shall be supported.
<b>po</b>	Potentially optional. Not explicitly mentioned as mandatory in the standard and not required for the system to perform basic

	operations.
<b>n/a</b>	Not applicable – in the given context, it is impossible to use the capability.

### 3.3.5 BS/MS Required column

The *Required* column indicates whether the item is required for compliance to this specification.

**Table 3. Required Column Entries**

<b>Y or y.</b>	Required for compliance to this specification
<b>N or n</b>	Not required for compliance to this specification
<b>IO-NNNN</b>	Interoperable Options for BS: Item belongs to NNNN group of features for BS equipment. More specifically <ul style="list-style-type: none"> <li>The item is not required for compliance to this specification and</li> <li>The item is required for compliance with the IO-NNNN capability.</li> </ul>
<b>IOMS-NNNN</b>	Interoperable Options for MS: Item belongs to NNNN group of features for MS equipment. More specifically <ul style="list-style-type: none"> <li>The item is not required for compliance to this specification and</li> <li>The item is required for compliance with the IOMS-NNNN capability.</li> </ul>
<b>n/a</b>	Not applicable

The following Interoperable Options are defined and used in this document.

- IO-MIMO: Group of Interoperable Option features related to Multiple Input Multiple Output (MIMO) operation.
- IO/IOMS-MIM1: Group of Interoperable Option features related to DL MIMO AMC
- IO/IOMS-MIM2: Group of Interoperable Option features related to Collaborative SM for two MS with single transmit antenna in AMC
- IO/IOMS-MIM3: Group of Interoperable Option features related to Closed Loop MIMO
- IO/IOMS-MIM4: Group of Interoperable Option features related to 2 Tx UL MIMO
- IO-BF: Group of Interoperable Option features related to Beam Forming (BF) operation.
- IO-MBS: Group of Interoperable Option features related to Multicast and Broadcast Services (MBS) operation.
- IO/IOMS-MBS2: Group 2 of Interoperable Option features related to Multicast and Broadcast Services (MBS) operation.
- IO/IOMS-MBS3: Group 3 of Interoperable Option features related to Multicast and Broadcast Services (MBS) operation.
- IO/IOMS-MBS4: Group 4 of Interoperable Option features related to Multicast and Broadcast Services (MBS) operation.
- IO-ETHx (x = 1, 2, 3): Groups of Interoperable Option features related to Ethernet CS
- IO-QoS: Interoperable Option related to QoS features with SS-initiated service flow transactions
- IO/IOMS-64QM: Group of Interoperable Option features related to 64QAM
- IO/IOMS-CDD: Group of Interoperable Option features related to Cyclic Delay Diversity
- IO/IOMS-ERTB: Group of Interoperable Option features related to ertPS resumption bitmap extended subheader support
- IO/IOMS-SLHO: Group of Interoperable Option features related to Seamless HO support
- IOMS-FFDD: Group of Interoperable Option features related to Full Duplex FDD
- IO/IOMS-MR: Group of Interoperable Option features related to Sleep mode following MAP relevance for H-FDD
- IO-PA: Support for Persistent Allocation



**3.3.6 BS/MS Values column**

This column indicates the specific value or range of values for each BS/MS to implement for compliance to this specification.

**Table 4. Value Column Entries**

<b>xx</b>	Set to value xx
<b>aa - bb</b>	Set to range aa - bb
<b>n/a</b>	Not applicable

**3.3.7 Comment column**

This column provides additional clarification and explanation.

## 4. PHY Profile

### 4.1 Profiles of BS and MS

#### 4.1.1 System Parameters

##### 4.1.1.1 PHY Mode

**Table 5. PHY Mode**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	OFDMA	8.4	m	Y	Y	OFDMA is the sole PHY mode within the scope of this document.

##### 4.1.1.2 Channel bandwidths and corresponding FFT sizes

Table 6 specifies the FFT sizes corresponding to various channel bandwidths.

**Table 6. FFT Sizes**

Channel Bandwidth (MHz)	FFT Size
3.5	512
5	512
7	1024
8.75	1024
10	1024

##### 4.1.1.3 Sampling Factor

**Table 7. Sampling Factor**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	If channel bandwidth is a multiple of 1.75MHz then n=8/7 else if channel bandwidth is a multiple of any of 1.25, 1.5, 2 or 2.75 MHz then n=28/25 else if not otherwise specified then n=8/7.	8.4.2.3	m	Y	Y	

#### 4.1.1.4 *Cyclic Prefix*

**Table 8. Cyclic Prefix**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	1/4	8.4.2.3	oi	N	N	
2	1/8	8.4.2.3	oi	Y	Y	
3	1/16	8.4.2.3	oi	N	N	
4	1/32	8.4.2.3	oi	N	N	

#### 4.1.1.5 *Frame Configuration*

**Table 9. Frame Length**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	20 ms	8.4.5.2	oi	N	N	
2	12.5	8.4.5.2	oi	N	N	
3	10	8.4.5.2	oi	N	N	
4	8	8.4.5.2	oi	N	N	
5	5	8.4.5.2	oi	Y	Y	
6	4	8.4.5.2	oi	N	N	
7	2.5	8.4.5.2	oi	N	N	
8	2	8.4.5.2	oi	N	N	

#### 4.1.1.6 *TTG/RTG*

#### 4.1.1.7 *Frame and Sub-frame Parameters*

### 4.1.2 *Subcarrier Allocation*

#### 4.1.2.1 *DL Subcarrier Allocation*

**Table 10. DL Subcarrier Allocation**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	PUSC	8.4.6.1.2.1	m	Y	Y	
2	PUSC w/ all subchannels	8.4.6.1.2.1	po	Y	Y	
3	PUSC w/ dedicated pilots	8.4.6.1.2.1 and 8.4.5.3.4	po	IO-BF	Y	
4	FUSC	8.4.6.1.2.2	po	Y	Y	
5	FUSC w/ dedicated pilots	8.4.6.1.2.2 and 8.4.5.3.4	po	N	N	
6	Optional FUSC	8.4.6.1.2.3	o	N	N	
7	O-FUSC w/ dedicated pilots	8.4.6.1.2.3 and 8.4.5.3.4	o	N	N	
8	AMC 1x6	8.4.6.3	o	N	N	
	AMC 2x3	8.4.6.3	o	Y	Y	
	AMC 3x2	8.4.6.3	o	N	N	

	Default Type	8.4.6.3 and 6.3.2.3.43.2	o	N	N	Only applicable with HARQ_MAP
9	AMC 1x6 w/ dedicated pilots	8.4.6.3 and 8.4.5.3.4	o	N	N	
	AMC 2x3 w/ dedicated pilots	8.4.6.3 and 8.4.5.3.4	o	IO-BF	Y	
	AMC 3x2 w/ dedicated pilots	8.4.6.3 and 8.4.5.3.4	o	N	N	
10	PUSC-ASCA	8.4.6.4.1	o	N	N	

#### 4.1.2.2 UL Subcarrier Allocation

**Table 11. UL Subcarrier Allocation**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	PUSC	8.4.6.2.1	po	Y	Y	
2.	PUSC w/o subchannel rotation	8.4.5.4.7, 11.3.1, 11.8.3.5.14 [4]	o [4]	Y	Y	
3.	Optional PUSC	8.4.6.2.5	o	N	N	
4.	AMC 1x6	8.4.6.3	o	N	N	
	AMC 2x3	8.4.6.3	o	Y	Y	
	AMC 3x2	8.4.6.3	o	N	N	
5.	Mini-subchannel	8.4.6.2.4	o	N	N	Only for PUSC & O-PUSC

#### 4.1.2.3 Common SYNC Symbol

**Table 12. Common SYNC Symbol**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Support of the Common SYNC Symbol	8.4.6.1.1.1	o	N	N	

#### 4.1.2.4 UL Sounding

**Table 13. UL Sounding 1**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Type A w/ Cyclic shift - support for P values other than 9 and 18	8.4.6.2.7.1	o	IO-BF	Y	
2	Type A w/ Cyclic shift – Support P values of 9 and 18	8.4.6.2.7.1	o	IO-BF	Y	
3	Type A w/ Decimation	8.4.6.2.7.1	o	IO-BF	Y	
4	Type B	8.4.6.2.7.1	o	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
5	Send Sounding Report Flag	8.4.6.2.7.1	o	N	N	
6	Direct transmission of DL channel coefficients (Include additional feedback, option 0b01)	8.4.6.2.7.1 and 8.4.6.2.7.3	o	N	N	
7	Decimation with randomization	8.4.6.2.7.1	o	N	N	
8	Power Assignment Method: Equal Power (0b00)	8.4.6.2.7.1 and 8.4.6.2.7.	oi	IO-BF	Y	
9	Power Assignment Method: Interference dependent. Per subcarrier power limit; (0b10)	8.4.6.2.7.1 and 8.4.6.2.7.2	oi	N	N	
10	Power Assignment Method: Interference dependent. Total power limit.; (0b11)	8.4.6.2.7.1 and 8.4.6.2.7.2	oi	N	N	
11	Power Boost	8.4.6.2.7.1 and 8.4.6.2.7.2	o	N	N	
12	Feedback of Received Pilot Coefficients (include additional feedback option = 0b10)	8.4.6.2.7.1 and 8.4.6.2.7.4	o	N	N	
13	Feedback of message (include additional feedback option = 0b11)	8.4.6.2.7.1	o	N	N	

**Table 14. UL Sounding 2**

Item	Description	Reference	Status	MS Required	MS Value	Comment
1	Sounding response time capability	8.4.6.2.7.1 and 11.8.3.7.14	o	Y	Next Frame	
2	maximum number of simultaneous sounding instructions	8.4.6.2.7.1 and 11.8.3.7.14	o	Y	2	This parameter specifies the max number of sounding transmissions by MS in a frame. 1 sounding instruction is used for a single uplink sounding symbol and up to 2 transmit antennas. Maximum number of sounding symbols per frame per MS is 2.

### 4.1.3 UL Control Channels

#### 4.1.3.1 Initial Ranging

**Table 15. Initial Ranging**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Initial Ranging in PUSC zone w/ 2 symbols	8.4.7.1	oi	Y	Y	
2	Initial Ranging in PUSC zone w/ 4 symbols	8.4.7.1	oi	N	N	
3	Initial Ranging in Optional PUSC zone w/ 2 symbols	8.4.7.1	oi	N	N	
4	Initial Ranging in Optional PUSC zone w/ 4 symbols	8.4.7.1	oi	N	N	
5	Initial Ranging in AMC zone w/ 2 symbols	8.4.7.1	oi	N	N	
6	Initial Ranging in AMC zone w/ 4 symbols	8.4.7.1	oi	N	N	

#### 4.1.3.2 HO Ranging

**Table 16. HO Ranging**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	HO Ranging in PUSC zone w/ 2 symbols	8.4.7.1	o	Y	Y	
2	HO Ranging in PUSC zone w/ 4 symbols	8.4.7.1	o	N	N	
3	HO Ranging in Optional PUSC zone w/ 2 symbols	8.4.7.1	o	N	N	
4	HO Ranging in Optional PUSC zone w/ 4 symbols	8.4.7.1	o	N	N	
5	HO Ranging in AMC zone w/ 2 symbols	8.4.7.1	o	N	N	
6	HO Ranging in AMC zone w/ 4 symbols	8.4.7.1	o	N	N	

#### 4.1.3.3 Periodic Ranging

**Table 17. Periodic Ranging**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Periodic Ranging in PUSC zone w/ 1 symbols	8.4.7.2	oi	Y	Y	
2	Periodic Ranging in PUSC zone w/ 3 symbols	8.4.7.2	oi	N	N	
3	Periodic Ranging in Optional PUSC zone w/ 1 symbols	8.4.7.2	oi	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
4	Periodic Ranging in Optional PUSC zone w/ 3 symbols	8.4.7.2	oi	N	N	
5	Periodic Ranging in AMC zone w/ 1 symbols	8.4.7.2	oi	N	N	
6	Periodic Ranging in AMC zone w/ 3 symbols	8.4.7.2	oi	N	N	

#### 4.1.3.4 BW Request

**Table 18. BW Request**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	BW Request in PUSC zone w/ 1 symbols	8.4.7.2	oi	Y	Y	
2	BW Request in PUSC zone w/ 3 symbols	8.4.7.2	oi	N	N	
3	BW Request in Optional PUSC zone w/ 1 symbols	8.4.7.2	oi	N	N	
4	BW Request in Optional PUSC zone w/ 3 symbols	8.4.7.2	oi	N	N	
5	BW Request in AMC zone w/ 1 symbols	8.4.7.2	oi	N	N	
6	BW Request in AMC zone w/ 3 symbols	8.4.7.2	oi	N	N	

#### 4.1.3.5 Fast-Feedback/CQI Channel Encoding

**Table 19. Fast-Feedback/CQI Channel Encoding**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	4 bits	8.4.5.4.10	po	N	N	
2	6 bits	8.4.5.4.10.5	o	Y	Y	This feature is needed for FBSS.
3	3 bits	8.4.5.4.10.5	o	N	N	
4	Primary/Secondary	8.4.5.4.10.12	o	N	N	

Note on Item 2: If the "Feedback Type" in CQICH\_Alloc\_IE() is set to "0b01 = Effective CINR Feedback" and the MS negotiation capability "Type 173, bit#1 = Enhanced FAST\_FEEDBACK" is enabled which indicates support for "6-bit CQI", the reported effective CINR shall be in the 0b00xxxx format where the 4 LSBs is described in Table 298b of Section 8.4.5.4.10.4 in [2].

#### 4.1.3.6 Fast-Feedback/CQI Channel Allocation Method

**Table 20. Fast-Feedback/CQI Channel Allocation Method**

Item	Description	Reference	Status	BS Required	MS Required	Comment

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Fast-Feedback Allocation Subheader support	6.3.2.2.6	o	N	N	
2	Fast feedback channel allocation using CQICH Allocation IE	8.4.5.4.12	o	Y	Y	

#### 4.1.4 Channel Coding

##### 4.1.4.1 Repetition

**Table 21. Repetition**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Repetition	8.4.9	m	Y	Y	FCH uses repetition coding (8.4.4.4)

##### 4.1.4.2 Randomization

**Table 22. Randomization**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Randomization	8.4.9.1	m	Y	Y	

##### 4.1.4.3 Convolutional Code

**Table 23. Convolutional Code**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Tail Biting	8.4.9.2.1	m	Y	Y	
2	Zero Tail	8.4.9.2.4	o	N	N	

##### 4.1.4.4 Convolutional Turbo Code

**Table 24. Convolutional Turbo Code**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	CTC	8.4.9.2.3 excluding 8.4.9.2.3.5	o	Y	Y	



#### 4.1.4.5 *BTC*

**Table 25. Block Turbo Code**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	BTC	8.4.9.2.2	o	N	N	

#### 4.1.4.6 *LDPC*

**Table 26. Low Density Parity Check Code**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	LDPC	8.4.9.2.5	o	N	N	

#### 4.1.4.7 *Interleaving*

**Table 27. Interleaving**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Interleaving	8.4.9.3	m	Y	Y	The interleaving subject of this section should not be applied to CTC mode.
2	Optional interleaver for CC	8.4.9.3.1 and 11.8.3.7.3	o	N	N	This interleaver mode is only applicable to Convolutional Encoding

### 4.1.5 *H-ARQ Support*

#### 4.1.5.1 *Chase Combining*

**Table 28. Chase Combining H-ARQ**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Chase w/ CC	8.4.15.1	o	N	N	
2	Chase w/ CTC	8.4.15.1	o	Y	Y	
3	Chase with LDPC	8.4.15.1	o	N	N	

**Table 29. HARQ Parameters for Chase with CTC**

Item	Parameter Description	Reference	Values	Comment
1	H-ARQ DL Buffer size per channel	11.8.3.7.19	Category 1 = 16,384 (K=20), Category 2 = 8192 (K=16), Category 3 = 16,384 (K=20), Category 4 = 23,170 (K=22)	Status for the four categories is optional; i.e., support of at least one of the four Categories is Required.
2	H-ARQ UL Buffer size per channel	11.8.3.7.19	Category 1 = 16,384 (K=20), Category 2 = 16,384 (K=20), Category 3 = 16,384 (K=20), Category 4 = 16,384 (K=20)	
3	DL Aggregate flag for HARQ buffer	11.8.3.7.19	Category 1 = ON or OFF, Category 2 = ON, Category 3 = ON, Category 4 = ON	
4	UL Aggregate flag for HARQ buffer	11.8.3.7.19	Category 1 = OFF, Category 2 = ON, Category 3 = ON, Category 4 = ON	
5	HARQ ACK Delay for DL Burst	6.3.17.1, 11.3.1	1	
6	HARQ ACK Delay for UL Burst	6.3.17.1, 11.4.1	N/A	
7	Number of DL H-ARQ Channels supported by MS	11.8.3.7.2 and 7.3 D5	Category 1 = 4, Category 2 = 16, Category 3 = 16, Category 4 = 16	
8	Number of UL H-ARQ Channels supported by MS	11.8.3.7.2 and 7.3 D5	Category 1 = 4, Category 2 = 8, Category 3 = 8, Category 4 = 8	

Note that the HARQ buffer size shall be interpreted as softbits buffer size; i.e., related to coded rather than uncoded data bits. This means the buffer size refers to both the systematic and parity bits transmitted over the air. It is left to vendor's implementation to determine the amount of memory space for each bit of transmitted information. The buffer size is related to buffer size parameter K according to the following equation.

$$\text{Buffersize} = \text{floor}[512 * 2^{(K/4)}]$$

#### 4.1.5.2 *Incremental Redundancy*

**Table 30. Incremental Redundancy H-ARQ**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	IR w/ CC	8.4.9.2.1.1	o	N	N	
2	IR w/ CTC	8.4.9.2.3.5	o	N	N	

#### 4.1.5.3 *ACK Channel*

**Table 31. ACK Channel**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	ACKCH	8.4.5.4.13	m	Y	Y	

#### 4.1.6 *Control Mechanism*

##### 4.1.6.1 *Synchronization*

**Table 32. Synchronization**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	BS Synchronization in time /slot	8.4.10.1.1, 6.3.2.3.47	o	Y	N/A	Refer to "Time/Frequency Synchronization Indicator" in Table 108h of the referred section.
2	BS Synchronization in frequency	8.4.10.1.1	o	Y	N/A	
3	BS to Neighbor BS Synchronization in frequency	6.3.2.3.47	o	Y	N/A	Refer to "Time/Frequency Synchronization Indicator" in Table 108h of the referred section.
4	SS Synchronization	8.4.10.1.2	m	N/A	Y	

##### 4.1.6.2 *Closed-loop Power Control*

**Table 33. Closed-loop Power Control**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	CL Power Control	8.4.10.3.1	m	Y	Y	

### 4.1.6.3 Open-loop Power Control

**Table 34. Open-loop Power Control**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	OL Power Control	8.4.10.3.2	o	Y	Y	
2	Passive Uplink open loop power control	8.4.10.3.2	o	Y	Y	
3	Active Uplink open loop power control	8.4.10.3.2	o	N	N	
4	UL Tx power and Headroom transmission condition using bandwidth request and UL Tx Power Report header	8.4.10.3.2.1 and 6.3.2.1.2.1.2	o	Y	Y	
5	UL Tx power and Headroom transmission condition using PHY channel report header	8.4.10.3.2.1 and 6.3.2.1.2.1.5	o	N	N	
6	UL Tx power and Headroom transmission condition using Tx power report extended subheader	8.4.10.3.2.1 and 6.3.2.2.7.5	o	N	N	

### 4.1.6.4 MS Transmit Power Limitation Control Using UCD TLV

**Table 35. MS Transmit Power Limitation Control**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	MS Power Limit	11.3.1 [4]	M	O	Y	

## 4.1.7 Channel Measurement

### 4.1.7.1 CINR Measurement

**Table 36. CINR Measurement**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Physical CINR measurement from the preamble for frequency reuse==1 (feedback type=0b00 and report type=0 and CINR preamble report type=0)	6.3.18, 8.4.5.4.12, 8.4.11.3 and 11.8.3.7.9	oi	Y	Y	

Item	Description	Reference	Status	BS Required	MS Required	Comment
2	Physical CINR measurement from the preamble for frequency reuse==3 (feedback type=0b00 and report type=0 and CINR preamble report type=1)	6.3.18, 8.4.5.4.12, 8.4.11.3 and 11.8.3.7.9	oi	Y	Y	
3	Physical CINR measurement for a permutation zone from pilot subcarriers (feedback type=0b00 and report type=1 and CINR zone measurement type=0)	6.3.18, 8.4.5.4.12, 8.4.11.3 and 11.8.3.7.9	oi	Y	Y	
4	Physical CINR measurement for a permutation zone from data subcarriers (feedback type=0b00 and report type=1 and CINR zone measurement type=1)	6.3.18, 8.4.5.4.12, 8.4.11.3 and 11.8.3.7.9	oi	N	N	
5	Effective CINR measurement from the preamble for frequency reuse==1 (feedback type=0b01 and report type=0 and CINR preamble report type=0)	6.3.18, 8.4.5.4.12, 8.4.11.3 and 11.8.3.7.9	oi	N	N	This option provides capability to the MS to report MCS preference to BS.
6	Effective CINR measurement from the preamble for frequency reuse==3 (feedback type=0b01 and report type=0 and CINR preamble report type=1)	6.3.18, 8.4.5.4.12, 8.4.11.3 and 11.8.3.7.9	oi	N	N	This option provides capability to the MS to report MCS preference to BS.
7	Effective CINR measurement for a permutation zone from pilot subcarriers (feedback type=0b01 and report type=1 and CINR zone measurement type=0)	6.3.18, 8.4.5.4.12, 8.4.11.3 and 11.8.3.7.9	oi	Y	Y	This option provides capability to the MS to report MCS preference to BS.
8	Effective CINR measurement for a permutation zone from data subcarriers (feedback type=0b01 and report type=1 and CINR zone measurement type=1)	6.3.18, 8.4.5.4.12, 8.4.11.3 and 11.8.3.7.9	oi	N	N	This option provides capability to the MS to report MCS preference to BS.

Item	Description	Reference	Status	BS Required	MS Required	Comment
9	Support for 2 concurrent CQI channels with effective CINR reports	6.3.18, 8.4.5.4.12 and 11.8.3.7.9	o	N	N	This feature only addresses two concurrent CQI channels reporting Effective CINR measurements.
10	Frequency selectivity characterization report	8.4.5.4.12, 8.4.11.4 and 11.8.3.7.9	o	N	N	
11	Major group indication (applicable to PUSC zone only)	8.4.5.4.12	o	IO-BF	Y	
12	MIMO permutation feedback cycle (applicable to MIMO only)	8.4.5.4.12	o	IO-MIMO	Y	

#### 4.1.7.2 RSSI Measurement

**Table 37. RSSI Measurement**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	RSSI Measurement	8.4.11.2 and 6.3.2.3.50	m	N/A	Y	Processing of RSSI measurements in the BS is specified in Section 6.3.2.3.33.

#### 4.1.8 Modulation

##### 4.1.8.1 PRBS (Subcarrier Randomization)

**Table 38. PRBS**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	PRBS	8.4.9.4.1	m	Y	Y	

##### 4.1.8.2 Downlink

**Table 39. Downlink Modulation**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	QPSK	8.4.9.4.2	m	Y	Y	
2	16-QAM	8.4.9.4.2	m	Y	Y	

3	64-QAM	8.4.9.4.2	o	Y	Y	
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#### 4.1.8.3 Uplink

**Table 40. Uplink Modulation**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	QPSK	8.4.9.4.2	m	Y	Y	
2	16-QAM	8.4.9.4.2	m	Y	Y	
3	64-QAM	8.4.9.4.2, 8.4.13.3, 11.3.1.1, 11.8.3.2, 11.8.3.5.3 [4]	o [4]	IO-64QM	IOMS- 64QM	MCS steps (coding rates): 64QAM-1/2, 64QAM-2/3, 64QAM-3/4, and 64QAM- 5/6.

#### 4.1.8.4 Pilot Modulation

**Table 41. Pilot Modulation**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Pilot Modulation	8.4.9.4.3	m	Y	Y	

#### 4.1.8.5 Preamble Modulation

**Table 42. Preamble Modulation**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Preamble Modulation	8.4.9.4.3.1	m	Y	N/A	MS shall demodulate the preamble

#### 4.1.8.6 Ranging Modulation

**Table 43. Ranging Modulation**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Ranging Modulation	8.4.7.3	m	N/A	Y	BS shall demodulate the ranging signal.

#### 4.1.9 MAP Support

#### 4.1.9.1 Normal MAP

**Table 44. Normal MAP**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Normal MAP	6.3.2.3.2 and 6.3.2.3.4	m	Y	Y	

#### 4.1.9.2 Compressed MAP

**Table 45. Compressed MAP**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Compressed MAP	8.4.5.6	po	Y	Y	

#### 4.1.9.3 Sub-DL-UL MAP

**Table 46. Sub-DL-UL MAP**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Sub-DL-UL MAP	6.3.2.3.60	o	Y	Y	See 11.8.3.7.12 OFDMA MAP Capability of [2]. Support for Extended HARQ IE in Normal MAP mandates a support for Sub MAP for first zone.

#### 4.1.9.4 H-ARQ MAP Message

**Table 47. H-ARQ MAP Message**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Compact DL-MAP IE	6.3.2.3.43	o	N	N	
2	Compact UL-MAP IE	6.3.2.3.43	o	N	N	

#### 4.1.9.5 Extended HARQ IE in the Normal MAP

**Table 48. Extended H-ARQ IE in Normal MAP**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Extended HARQ IE in the Normal MAP	8.4.5.3.21 & 8.4.5.4.25 & 8.4.5.4.24	o	Y	Y	



**4.1.9.6 DL Region Definition****Table 49. DL Region Definition Support**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	DL Region Definition Support	8.4.5.3.21, 8.4.5.3.23, 11.8.3.7.12	o	N	N	

**4.1.10 AAS****4.1.10.1 AAS Zone Support****Table 50. AAS Zone Support**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	DL AAS Zone	8.4.4.6	o	N	N	
2	UL AAS Zone	8.4.4.6	o	N	N	

**4.1.10.2 Supported Permutation in DL****Table 51. Supported Permutation in DL**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	PUSC	8.4.4.6.1 and 8.4.6.1.2.1	oi	N	N	Support for all the items in this table is conditional to the support of DL AAS Zone.
2	FUSC	8.4.4.6.1 and 8.4.6.1.2.2	oi	N	N	
3	Optional PUSC	8.4.4.6.1 and 8.4.6.1.2.3	oi	N	N	
4	AMC 2x3	8.4.4.6.1 and 8.4.6.3	oi	N	N	
5	TUSC 1	8.4.4.6.1 and 8.4.6.1.2.4	oi	N	N	
6	TUSC 2	8.4.4.6.1 and 8.4.6.1.2.5	oi	N	N	

**4.1.10.3 Supported Permutation in UL****Table 52. Supported Permutation in UL**

Item	Description	Reference	Status	BS Required	MS Required	Comment

1	PUSC	8.4.4.6.1 and 8.4.6.2.1	oi	N	N	Support for all the items in this table is conditional to the support of AAS Zone.
2	Optional PUSC	8.4.4.6.1 and 8.4.6.2.5	oi	N	N	
3	AMC 2x3	8.4.4.6.1 and 8.4.6.3	oi	N	N	

#### 4.1.10.4 AAS DL Preamble

**Table 53. AAS DL Preamble**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Frequency shifted	8.4.4.6.4.1	o	N	N	
2	Time shifted	8.4.4.6.4.1	o	N	N	
3	PHY Modifier	8.4.5.3.11	o	N	N	
4	DL AAS Preamble Support	8.4.4.6.4.1	o	N	N	Support for 0-3 symbols

#### 4.1.10.5 AAS UL Preamble

**Table 54. AAS UL Preamble**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Frequency shifted	8.4.4.6.4.2	o	N	N	
2	Time shifted	8.4.4.6.4.2	o	N	N	
3	Physical Modifier	8.4.5.4.14	o	N	N	
4	UL AAS Preamble Power Control	8.4.4.6.4	o	N	N	
5	UL AAS Preamble Support	8.4.4.6.4.1	o	N	N	Support for 0-3 symbols

#### 4.1.10.6 Diversity MAP Scan

**Table 55. Diversity MAP Scan**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Diversity-Map Scan	8.4.4.6.2	o	N	N	

#### 4.1.10.7 DL AAS-SDMA Pilots

**Table 56. DL AAS-SDMA Pilots**

Item	Description	Reference	Status	BS Required	MS Required	Comment
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1	AMC AAS-SDMA with All SDMA Pilots	8.4.6.3.3	o	N	N	
2	PUSC AAS-SDMA	8.4.8.1.2.1.1	o	N	N	
3	TUSC1 AAS-SDMA	8.4.6.1.2.6	o	N	N	
4	TUSC2 AAS-SDMA	8.4.6.1.2.6	o	N	N	
5	AMC AAS-SDMA with SDMA pilots A&B only	8.4.6.3.3	o	N	N	

#### 4.1.10.8 *UL AAS-SDMA Pilots*

**Table 57. UL AAS\_SDMA Pilots**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	AMC AAS-SDMA with All SDMA Pilots	8.4.6.3.3	o	N	N	
2	PUSC AAS-SDMA	8.4.8.1.5	o	N	N	
3	Optional PUSC AAS-SDMA	8.4.8.4.1	o	N	N	
4	AMC AAS-SDMA with SDMA pilots A&B only	8.4.6.3.3	o	N	N	

#### 4.1.10.9 *AAS Private MAP*

**Table 58. AAS Private MAP**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	AAS Private MAP	8.4.5.6	o	N	N	
2	Reduced Private MAP	8.4.5.8	o	N	N	
3	Reduced Private MAP Chain Support	8.4.5.8	o	N	N	

#### 4.1.10.10 *AAS-FBCK-REQ/RSP support*

**Table 59. AAS\_FBCK/RSP Support**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	AAS-FBCK-REQ/RSP support	8.4.5.7	o	N	N	

#### 4.1.11 *STC/MIMO*

#### 4.1.11.1 Supported Features for DL PUSC

**Table 60. Supported Features for DL PUSC**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	FHDC	8.4.8.1.3	o	N	N	
2	2-antenna, matrix A	8.4.8.1.2.1.1 8.4.8.1.4	o	IO-MIMO	Y	
3	2-antenna, matrix B, vertical encoding	8.4.8.1.4, 8.4.8.1.2.1.3	o	IO-MIMO	Y	
4	2-antenna, matrix B, horizontal encoding	8.4.8.1.4, 8.4.8.1.2.1.3	o	N	N	two modulation and coding modules
5	4-antenna enhancement using directivity	8.4.8.1.6	o	N	N	
6	4-antenna, matrix A	8.4.8.2.1 8.4.8.2.3	o	N	N	
7	4-antenna, matrix B, vertical encoding	8.4.8.2.3	o	N	N	
8	4-antenna, matrix B, horizontal encoding	8.4.8.2.3	o	N	N	
9	4-antenna, matrix C, vertical encoding	8.4.8.2.3	o	N	N	
10	4-antenna, matrix C, horizontal encoding	8.4.8.2.3	o	N	N	

#### 4.1.11.2 Supported Features for DL FUSC

**Table 61. Supported Features for DL FUSC**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	FHDC		o	N	N	
2	2-antenna, matrix A	8.4.8.1.2.1.2 8.4.8.1.4	o	N	N	
3	2-antenna, matrix B, vertical encoding	8.4.8.1.4, 8.4.8.1.2.1.3	o	N	N	
4	2-antenna, matrix B, horizontal encoding	8.4.8.1.4, 8.4.8.1.2.1.3	o	N	N	
5	4-antenna enhancement using directivity	8.4.8.1.6	o	N	N	
6	4-antenna, matrix A	8.4.8.2.2	o	N	N	
7	4-antenna, matrix B, vertical encoding	8.4.8.2.3	o	N	N	
8	4-antenna, matrix B, horizontal encoding	8.4.8.2.3	o	N	N	
9	4-antenna, matrix C, vertical encoding	8.4.8.2.3	o	N	N	
10	4-antenna, matrix C, horizontal encoding	8.4.8.2.3	o	N	N	

### 4.1.11.3 Supported Features for DL Optional FUSC

**Table 62. Supported Features for DL Optional FUSC**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	2-antenna, matrix A	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.3	o	N	N	2 consecutive OFDMA symbols
2	2-antenna, matrix B, vertical encoding	8.4.8.3.1.2.2 8.4.8.3.3, 8.4.8.1.2.1.3	o	N	N	
3	2-antenna, matrix B, horizontal encoding	8.4.8.3.1.2.2 8.4.8.3.3, 8.4.8.1.2.1.3	o	N	N	
4	2-antenna, matrix C	8.4.8.3.1.2.2 8.4.8.3.3	o	N	N	
5	3-antenna, matrix A	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.4	o	N	N	2 logical subcarriers over 2 consecutive symbols
6	3-antenna, matrix B	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.4	o	N	N	
7	3-antenna, matrix C	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.4	o	N	N	
8	4-antenna, matrix A	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.5	o	N	N	2 logical subcarriers over 2 consecutive symbols
9	4-antenna, matrix B, vertical encoding	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.5	o	N	N	
10	4-antenna, matrix B, horizontal encoding	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.5	o	N	N	
11	4-antenna, matrix C, vertical encoding	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.5	o	N	N	
12	4-antenna, matrix C, horizontal encoding	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.5	o	N	N	

### 4.1.11.4 Supported Features for DL Optional AMC

**Table 63. Supported Features for DL Optional AMC**

Item	Description	Reference	Status	BS Required	MS Required	Comment

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	DL MIMO AMC with dedicated pilots 2 Tx pilot pattern in STC zone with optional AMC permutation: Matrix A support with $(6 + 6 * n)$ symbol per burst allocation granularity	8.4.8.3 8.4.8.3.1.1, 8.4.8.3.1.2.1 [4]	o [4]	IO-MIM1	IOMS-MIM1	
2	DL MIMO AMC with dedicated pilots 2 Tx pilot pattern in STC zone with optional AMC permutation: Matrix B support with $(6 + 3 * n)$ symbol per burst allocation granularity	8.4.8.3.1.1, 8.4.8.3.1.2.1, 11.8.3.5.5 [4]	o [4]	N	N	
3	DL MIMO AMC with dedicated pilots 2 Tx pilot pattern in STC zone with optional AMC permutation: Matrix B support with $(6 + 6 * n)$ symbol per burst allocation granularity	8.4.8.3 8.4.8.3.1.1, 8.4.8.3.1.2.1, 11.8.3.5.5 [4]	o [4]	IO-MIM1	IOMS-MIM1	
4	DL MIMO AMC with dedicated pilots 2 Tx pilot pattern in STC zone with optional AMC permutation: 1 stream with 1 Tx pilot pattern - $(3 + 3 * n)$ symbol per burst allocation granularity	8.4.5.3.21.1 [4]	o [4]	N	N	Note: Support for this subfeature is enabled through setting Num_Streams = 0b00 in Dedicated MIMO DL Control IE
5	MIMO AMC zone with dedicated pilots with $6+6*n$ symbols of zone	8.4.8.3 8.4.5.3.4 [4]	o [4]	IO-MIM1	IOMS-MIM1	
6	Support of mixture of single antenna and 2 Tx antenna dedicated pilot patterns in a single MIMO AMC zone	8.4.5.3.4, 8.4.6.3, 8.4.8.3.1.1 [4]	o [4]	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
7	Concurrent allocation of same rank in MIMO AMC zone with dedicated pilots	11.8.3.5.5 [4]	o [4]	IO-MIM1	IOMS-MIM1	The granularity of a relative symbol offset between same rank concurrent burst is 6 symbols. If the concurrent bursts are HARQ and/or Non-HARQ bursts, the same granularity rule on the offset applies.
8	Concurrent allocation (partial and non-partial) of different rank in MIMO AMC zone with dedicated pilots	11.8.3.5.5 [4]	o [4]	N	N	Rank is the rank of pre-coding matrix.
9	2-antenna, matrix B, horizontal encoding	8.4.8.3.1.2.1 8.4.8.3.3, 8.4.8.1.2.1.3	o	N	N	Figure 251i
10	2-antenna, matrix C	8.4.8.3.1.2.1 8.4.8.3.3	o	N	N	
11	3-antenna, matrix A	8.4.8.3.1.1 8.4.8.3.1.2.1 8.4.8.3.4	o	N	N	2 adjacent subcarriers over 2 consecutive symbols
12	3-antenna, matrix B	8.4.8.3.1.1 8.4.8.3.1.2.1 8.4.8.3.4	o	N	N	
13	3-antenna, matrix C	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.4	o	N	N	
14	4-antenna, matrix A	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.5	o	N	N	2 adjacent subcarriers over 2 consecutive symbols
15	4-antenna, matrix B, vertical encoding	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.5	o	N	N	
16	4-antenna, matrix B, horizontal encoding	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.5	o	N	N	
17	4-antenna, matrix C, vertical encoding	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.5	o	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
18	4-antenna, matrix C, horizontal encoding	8.4.8.3.1.1 8.4.8.3.1.2.2 8.4.8.3.5	o	N	N	

Note: The parameter 'n' - throughout Table 63- is an integer number  $\geq 0$ .

#### 4.1.11.5 Supported Features for DL PUSC-ASCA

**Table 64. Supported Features for DL PUSC-ASCA**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	STC/MIMO for PUSC-ASCA	8.4.8.3.2	o	N	N	

#### 4.1.11.6 Supported Features in UL PUSC

**Table 65. Supported Features in UL PUSC**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	2-antenna, matrix A	8.4.8.1.5, 11.8.3.5.14 [4]	o [4]	IO-MIM4	IOMS-MIM4	
2	2-antenna, matrix B, vertical encoding	8.4.8.1.5, 11.8.3.5.14 [4]	o [4]	IO-MIM4	IOMS-MIM4	
3	Collaborative SM for two MS with two transmit antennas	8.4.8.1.5, 11.8.3.5.14 [4]	o [4]	N	N	
4	2-antenna, matrix B, horizontal encoding	8.4.8.1.5	o	N	N	
5	Collaborative SM for two MS with single transmit antenna	8.4.8.1.5	o	IO-MIMO	Y	

#### 4.1.11.7 Supported Features in UL Optional PUSC

**Table 66. Supported Features in UL Optional PUSC**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	2-antenna, matrix A	8.4.8.4.1 8.4.8.4.2 8.4.8.4.3	o	N	N	2 consecutive slots
2	2-antenna, matrix B, vertical encoding	8.4.8.4.1 8.4.8.4.2 8.4.8.4.3	o	N	N	



Item	Description	Reference	Status	BS Required	MS Required	Comment
3	2-antenna, matrix B, horizontal encoding	8.4.8.4.1 8.4.8.4.2 8.4.8.4.3	o	N	N	
4	Collaborative SM for two MS with single transmit antenna	8.4.8.4.1 8.4.8.4.2 8.4.8.4.3	o	N	N	

#### 4.1.11.8 Supported Features in UL Optional AMC

**Table 67. Supported Features in UL Optional AMC**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Collaborative SM for two MS with single transmit antenna	8.4.8.4 [4]	o [4]	IO-MIM2	IOMS-MIM2	
2	2-antenna, matrix A	8.4.8.4, 11.8.3.5.14 [4]	o [4]	IO-MIM4	IOMS-MIM4	
3	2-antenna, matrix B, vertical encoding	8.4.8.4, 11.8.3.5.14 [4]	o [4]	IO-MIM4	IOMS-MIM4	
4	Collaborative SM for two MS with two transmit antennas	8.4.8.4, 11.8.3.5.14 [4]	o [4]	N	N	
5	2-antenna, matrix B, horizontal encoding	8.4.8.4.1 8.4.8.4.2 8.4.8.4.3 [4]	o [4]	N	N	

#### 4.1.11.9 Closed-Loop MIMO

**Table 68. Closed-loop MIMO**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Antenna Grouping w/ 3 Tx matrix A	8.4.5.4.10.3 8.4.8.3.4.1	o	N	N	Table 298
2	Antenna Grouping w/ 3 Tx matrix B	8.4.5.4.10.3 8.4.8.3.4.2	o	N	N	
3	Antenna Selection w/ 3 Tx matrix C	8.4.5.4.10.3, 8.4.8.3.4.3	o	N	N	Table 298a Table 317f
4	Antenna Grouping w/ 4 Tx matrix A	8.4.5.4.10.3 8.4.8.3.5.1	o	N	N	Table 298
5	Antenna Grouping w/ 4 Tx matrix B	8.4.5.4.10.3 8.4.8.3.5.2	o	N	N	
6	Antenna Selection w/ 4 Tx matrix C	8.4.5.4.10.3, 8.4.8.3.5.3	o	N	N	Table 298a Table 317g
7	Codebook Based Precoding	8.4.8.3.6, 8.4.5.4.11	o	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
9	Quantized Weight Feedback	8.4.5.4.10.6	o	N	N	6-bit CQICH

#### 4.1.11.10 MIMO Feedback

**Table 69. MIMO Feedback**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Fast MIMO Feedback (complex weights) w/ 4 bits	8.4.5.4.10.2	o	N	N	
2	Mode Selection Feedback w/ 4 bits	8.4.5.4.10.3	o	N	N	
3	3-bit MIMO Fast Feedback	8.4.5.4.10.4	o	N	N	
4	Fast DL measurement feedback w/ more than one Rx antennas	8.4.5.4.10.5 8.4.5.4.10.6 8.4.5.4.10.1	o	IO-MIMO	Y	
5	Fast MIMO Feedback (complex weights) w/ 6 bits	8.4.5.4.10.7	o	N	N	
6	Mode Selection Feedback w/ 6 bits	8.4.5.4.10.8	o	IO-MIMO	Y	
7	Feedback Mechanism: Feedback Header type 0110 for bitmap, rank and CQI for the 3 selected best bands ( (12 bits) bitmap , (3X1 bits) rank, (3X5 bits) CQI)	6.3.2.1.2.2.1, 8.4.5.4.26 11.3.1 11.7.21 [4]	o [4]	IO-MIM1	IOMS-MIM1	

#### 4.1.11.11 MIMO Midamble

**Table 70. MIMO Midamble**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	MIMO Midamble with 3 antennas	8.4.8.5.2.2	o	N	N	

#### 4.1.11.12 MIMO Soft-Handover Based Macro-diversity

**Table 71. MIMO Soft-Handover Macro-diversity**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Macro MIMO w/ MIMO_in_another_BS_IE()	8.4.8.2.4	o	N	N	
2	Macro MIMO w/ Macro_MIMO_DL_Basic_IE()	8.4.8.2.4	o	N	N	

**4.1.11.13 H-ARQ Downlink Support for MIMO****Table 72. H-ARQ Downlink Support for MIMO**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	MIMO DL Chase	8.4.5.3.21	o	IO-MIMO	Y	MIMO DL Chase is applicable to CC, CTC or LDPC from the perspective of IEEE 802.16. In this document, the feature is only used in CTC mode.
2	MIMO DL IR	8.4.5.3.21 8.4.8.3.1.2.3	o	N	N	w/ CTC
3	MIMO DL IR for Convolutional Code	8.4.5.3.21	o	N	N	
4	MIMO DL STC	8.4.5.3.21.1	o	N	N	

**4.1.11.14 H-ARQ Uplink Support for MIMO****Table 73. H-ARQ Uplink Support for MIMO**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	MIMO UL Chase	8.4.5.4.24	o	IO-MIMO	Y	MIMO DL Chase is applicable to CC, CTC or LDPC from the perspective of IEEE 802.16. In this document, the feature is only used in CTC mode.
2	MIMO UL IR	8.4.5.4.24	o	N	N	
3	MIMO UL IR for Convolutional Code	8.4.5.4.24	o	N	N	
4	MIMO UL STC	8.4.8.4.24.2	o	N	N	

**4.1.11.15 STC/MIMO Parameters****Table 74. STC/MIMO Parameters**

Item	Description	Reference	Status	BS Required	BS Values	MS Required	Comment
1	DL MIMO in Optional AMC: Maximum number of rank switches per user per STC	8.4.8.3 8.4.5.3.4 8.4.8.3.1.1 8.4.8.3.1.2 [4]	o [4]	Y	0	Y	0

	zone						
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## 4.1.12 HO Support in PHY

### 4.1.12.1 FBSS

**Table 75. Fast Base Station Switching**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Anchor BS Report for FBSS	8.4.5.4.10.8 and 8.4.5.4.23	o	N	N	Anchor BS CQI and switch indication via CQICH

### 4.1.12.2 MIMO Soft-handover based macro-diversity transmission

**Table 76. MIMO Soft-handover based macro-diversity transmission**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	MIMO Soft-handover based macro-diversity transmission	8.4.8.2.4	o	N	N	
2	Support Macro Diversity Handover using DL soft combining	8.4.5.3.6	o	N	N	
3	Support Macro Diversity Handover using DL burst in another segment in PUSC mode	8.4.5.3.13	o	N	N	
4	Support anchor BS indication of DL data burst in active BS	8.4.5.3.14	o	N	N	
5	Support of active BS indication of DL data burst in anchor BS	8.4.5.3. 15	o	N	N	
6	Support of CID translation between Anchor BS and Active BS	8.4.5.3.16	o	N	N	

### 4.1.12.3 UL Macro diversity

**Table 77. UL Macro Diversity**

Item	Description	Reference	Status	BS Required	MS Required	Comment
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Item	Description	Reference	Status	BS Required	MS Required	Comment
1	UL Macro diversity	8.4.5.4.17	o	N	N	To be used with UL PUSC Burst Allocation in Other Segment IE
2	Support of Macro Diversity Handover using UL transmission in another segment in PUSC mode	8.4.5.4.17	o	N	N	
3	Support of anchor BS indication of UL data burst in active BS	8.4.5.4.18	o	N	N	
4	Support of active BS indication of UL data burst in anchor BS	8.4.5.4.19	o	N	N	

#### 4.1.13 Cyclic Delay Diversity

**Table 78. Cyclic Delay Diversity**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Cyclic Delay Diversity (explicit CDD announcement)	8.4.8.7, 11.4.1 [4]	o [4]	IO-CDD	n/a	

## 4.2 Performance/Fidelity Requirements

### 4.2.1 MS Minimum Performance

#### 4.2.1.1 SSTG/SSRTG

#### 4.2.1.2 Max DL Concurrent Bursts

**Table 79. Maximum DL Concurrent Bursts**

Item	Description	Reference	Status	MS Required	MS Values	Comment
1	Max Concurrent Burst	8.4.4.2 and 11.7.8.13	m	Y	10	

#### 4.2.1.3 Max Bursts in DL Subframe

**Table 80. Max Bursts in DL Subframe**

Item	Description	Reference	Status	MS	MS Values	Comment
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				Required		
1	Max Burst in Frame	8.4.4.2	m	Y	16	

#### 4.2.1.4 Max Number of Zones in DL/UL Subframe

**Table 81. Max Number of Zones in DL and UL Subframes**

Item	Description	Reference	Status	MS Required	MS Values	Comment
1	Maximum numbers of zones UL			Y	3	The number is the same as the number of Zone Switch IEs plus 1.
2	Maximum numbers of zones DL	8.4.4.2	Max 8	Y	5	The number is the same as the number of Zone Switch IEs plus 1.

#### 4.2.1.5 Measurement Processes and CQI Channels

**Table 82. Measurement Processes and CQI Channels**

Item	Description	Reference	Status	MS Required	MS Values	Comment
1	Maximum numbers of CQI Channels transmitted by an MS per frame			Y	2	
2	Maximum number of concurrent CINR measurement processes			Y	2	Maximum number of CINR measurement processes (for physical or effective CINR) that are active concurrently. A CINR measurement process is active from the frame in which it was allocated by a CQICH_Alloc_IE() until the frame in which the last CQI periodic transmission is sent or in which the CQI was de-allocated by the BS.

#### 4.2.1.6 Max H-ARQ Bursts in DL/UL Subframe

**Table 83. Max H-ARQ Bursts**

Item	Description	Reference	Status	MS Required	MS Values	Comment
1	Max Burst in DL Subframe with H-ARQ	8.4.4.2, 8.4.15.1.3, 11.8.3.7.15	o	Y	Category 1 = 2, Category 2 = 5, Category 3 = 5, Category 4 = 5	Status for the four categories is oi, i.e. support for values corresponding to one or more of the categories from the set shall be supported in correlation to the categories of Section 4.1.5.1.
2	Max Burst in UL Subframe	8.4.4.2, 8.4.15.1.3,	o	Y	Category 1 = 2,	

	with H-ARQ	11.8.3.7.15			Category 2 = 2, Category 3 = 2, Category 4 = 2	
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## 4.2.2 Transmit Requirements

*Note: unless specified otherwise, requirement applies to both BS and MS.*

**Table 84. Transmitter Requirements**

Item	Requirement	Reference	Values Specified	Values Required
1.	BS Tx dynamic Range	8.4.12.1		10 dB
2.	MS Tx dynamic Range	8.4.12.1		45 dB
3.	MS Tx power level min adjustment step	8.4.12.1	1 dB	1 dB
4.	MS Tx power level min relative step accuracy	8.4.12.1	<div>Single step size m   Required relative accuracy</div> <div><div><div><div><div> m  = 1dB</div><div> m  = 2dB</div><div> m  = 3dB</div><div>4db&lt;  m &lt;= 10dB</div></div><div><div>+/- 0.5 dB</div><div>+/- 1 dB</div><div>+/- 1.5 dB</div><div>+/- 2 dB</div></div></div></div><div>Two exception points of at least 10 dB apart are allowed over the 45 dB range, where in these two points an accuracy of up to +/- 2 dB is allowed for any size step.</div></div> <div><div>Single step size m   Required relative accuracy</div><div><div><div><div><div>ceil( m ) = 1dB</div><div>ceil( m ) = 2dB</div><div>ceil( m ) = 3dB</div><div>4dB&lt; ceil( m )&lt;= 10dB</div></div><div><div>+/- 0.5 dB</div><div>+/- 1 dB</div><div>+/- 1.5 dB</div><div>+/- 2 dB</div></div></div></div><div>Two exception points of at least 10 dB apart are allowed over the 45 dB range, where in these two points an accuracy of up to +/- 2 dB is allowed for any size step.</div></div></div>	
5.	Spectral flatness	8.4.12.2	$\leq \pm 2$ dB for spectral lines from $-N_{used}/4$ to $-1$ and $+1$ to $N_{used}/4$ Within $\pm 2/4$ dB for spectral lines from $-N_{used}/2$ to $-N_{used}/4$ and $+N_{used}/4$ to $N_{used}/2$	$\leq \pm 2$ dB for spectral lines from $-N_{used}/4$ to $-1$ and $+1$ to $N_{used}/4$ Within $\pm 2/4$ dB for spectral lines from $-N_{used}/2$ to $-N_{used}/4$ and $+N_{used}/4$ to $N_{used}/2$
6.	Power difference between adjacent subcarriers	8.4.12.2	$\leq 0.4$ dB	$\leq 0.4$ dB
7.	BS Tx reference timing accuracy	8.4.12.4, 8.4.10.1.1	Tx downlink radio frame shall be time-aligned with the 1pps timing pulse	1 $\mu$ s
8.	Tx relative constellation error	8.4.12.3.1 for BS and 8.4.12.3.2 for MS	<div><div>QPSK 1/2</div><div>QPSK 3/4</div><div>16-QAM 1/2</div><div>16-QAM 3/4</div><div>64-QAM 1/2 (if 64-QAM supported)</div><div>64-QAM 2/3 (if 64-QAM supported)</div><div>64-QAM 3/4 (if 64-QAM supported)</div><div>64QAM-5/6 (if applicable)</div></div> <div><div><math>\leq -15.0</math> dB</div><div></div><div><math>\leq -18.0</math> dB</div><div></div><div><math>\leq -20.5</math> dB</div><div><math>\leq -24.0</math> dB</div><div><math>\leq -26.0</math> dB</div><div><math>\leq -28.0</math> dB</div><div><math>\leq -28.0</math></div></div>	<div><div><math>\leq -15.0</math> dB</div><div><math>\leq -18.0</math> dB</div><div><math>\leq -20.5</math> dB</div><div><math>\leq -24.0</math> dB</div><div><math>\leq -26.0</math> dB</div><div><math>\leq -28.0</math> dB</div><div><math>\leq -30.0</math> dB</div></div>

Item	Requirement	Reference	Values Specified	Values Required
			dB  ≤ -30.0 dB	≤ -30.0 dB

### 4.2.3 Receiver Requirements

**Table 85. Receiver Requirements**

Item	Requirement	Reference	Values Specified	Values Required
1.	Min SNR requirements for BER=10 <sup>-6</sup> with CTC in AWGN channel (The Min SNR requirements are used along with Eq. 149b to define sensitivity specifications for CTC.)	8.4.13.1	QPSK 1/2 with 60 bytes block size  QPSK 3/4 with 54 bytes block size  16-QAM 1/2 with 60 bytes block size  16-QAM 3/4 with 54 bytes block size  64-QAM 1/2 with 54 bytes block size (if 64-QAM supported)  64-QAM 2/3 with 48 bytes block size (if 64-QAM supported)  64-QAM 3/4 with 54 bytes block size (if 64-QAM supported)  64-QAM 5/6 with 60 bytes block size (if 64-QAM supported)	2.9 dB  6.3 dB  8.6 dB  12.7 dB  13.8 dB  16.9 dB  18 dB  19.9 dB
2.	MS Rx max input level on-channel reception tolerance	8.4.13.3.1	-30 dBm	-30 dBm
3.	BS Rx Max input level on-channel reception tolerance	8.4.13.3.2	-45 dBm	-45 dBm
4.	MS Rx max input level on-channel damage tolerance	8.4.13.4.1	0 dBm	0 dBm



Item	Requirement	Reference	Values Specified		Values Required
5.	BS Rx Max input level on-channel damage tolerance	8.4.13.4.2	-10 dBm		-10 dBm
6.	Min adjacent channel rejection at BER=10 <sup>-6</sup> for 3 dB degradation C/I	8.4.13.2	16-QAM 3/4 64-QAM 3/4 (if 64-QAM supported)	10 dB 4 dB	10 dB 4 dB
7.	Min alternate channel rejection at BER=10 <sup>-6</sup> for 3 dB degradation C/I	8.4.13.2	16-QAM 3/4 64-QAM 3/4 (if 64-QAM supported)	29 dB 23 dB	29 dB 23 dB
8.	"Implementation loss plus Noise Figure" (dB) value assumed for MS for deriving receiver minimum sensitivity (Eq. 149b)	8.4.13.1	The assumed Implementation Loss and Noise Figure in [2] are 5 and 8 dB respectively.		13 dB  Note: Eq. 149b of [2] shall be used for calculation of Rx sensitivity requirements where min SNR values for CC are given in Table 338 of [2] and the min SNR values for CTC mode are specified in the item 1 of this table.
9.	"Implementation loss plus Noise Figure" (dB) value assumed for BS for deriving receiver minimum sensitivity (Eq. 149b)	8.4.13.1	The assumed Implementation Loss and Noise Figure in [2] are 5 and 8 dB respectively.		13 dB  Note: Eq. 149b of [2] shall be used for calculation of Rx sensitivity requirements where min SNR values for CC are given in Table 338 of [2] and the min SNR values for CTC mode are specified in the item 1 of this table.
Comments:					

#### 4.2.4 Frequency and Time Synchronization Requirements

**Table 86. Frequency and Time Synchronization Requirements**

Item	Requirement	Reference	Values Specified	Values Required	Comment
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1.	MS UL symbol timing accuracy	8.4.10.1.2	$\leq \pm (T_b/8)/4$	$\leq \pm (T_b/32)/4$	This requirement includes only the timing error due to MS component and not the effect of inaccuracy of the BS ranging feedback.
2.	BS reference frequency accuracy	8.4.14.1	$\leq \pm 2 \cdot 10^{-6}$	$\leq \pm 2 \cdot 10^{-6}$	
3.	BS to BS frequency synchronization accuracy for Hand Over	6.3.2.3.47	1% of OFDMA subcarrier spacing	1% of OFDMA subcarrier spacing	
4.	MS to BS frequency synchronization tolerance	8.4.14.1	$\leq 2\%$ of the subcarrier spacing	$\leq 2\%$ of the subcarrier spacing	

1  
2  
3

## 5. MAC Profile

### 5.1 Profiles of BS and MS

#### 5.1.1 PHS

**Table 87. PHS**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	PHS	5.2.3 5.2.3.1 5.2.3.2	o	Y	Y	

#### 5.1.2 CS Options

**Table 88. Convergence Sublayer Options**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Packet, IPv4	5.2.6, 11.13.19	oi	Y	Y	
2.	Packet, IPv6	5.2.6, 11.13.19	oi	Y	Y	
3.	Packet, 802.3/Ethernet	5.2.4, 11.13.19	oi	IO-ETH1	N*	* For MS, not required for WiMAX certification, only optionally certified
4.	Packet, 802.1Q VLAN	5.2.5, 11.13.19	oi	N	N	
5.	Packet, IPv4 over 802.3/Ethernet	5.2.6, 11.13.19	oi	IO-ETH2	N*	* For MS, not required for WiMAX certification, only optionally certified
6.	Packet, IPv6 over 802.3/Ethernet	5.2.6, 11.13.19	oi	IO-ETH3	N*	* For MS, not required for WiMAX certification, only optionally certified
7.	Packet, IPv4 over 802.1Q VLAN	5.2.6, 11.13.19	oi	N	N	
8.	Packet, IPv6 over 802.1Q VLAN	5.2.6, 11.13.19	oi	N	N	
9.	ATM	5.2.6, 11.13.19	oi	N	N	
10.	Packet, IPv4 with Header Compression (ROHC)	5.2.6, 11.13.19	oi	Y	Y	
11.	Packet, IPv4 with Header Compression (EC RTP)	5.2.6, 11.13.19	oi	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
12.	Packet, IPv6 with Header Compression (ROHC)	5.2.6, 11.13.19	oi	Y	Y	
13.	Packet, IPv6 with Header Compression (ECRTP)	5.2.6, 11.13.19	oi	N	N	
14.	Packet, IPv4 over 802.3/Ethernet with Header Compression (ROHC)	5.2.6, 11.13.19	oi	N	N	
15.	Packet, IPv4 over 802.3/Ethernet with Header Compression (ECRTP)	5.2.6, 11.13.19	oi	N	N	
16.	Packet, IPv6 over 802.3/Ethernet with Header Compression (ROHC)	5.2.6, 11.13.19	oi	N	N	
17.	Packet, IPv6 over 802.3/Ethernet with Header Compression (ECRTP)	5.2.6, 11.13.19	oi	N	N	
18.	Packet, IPv4 over 802.1Q VLAN with Header Compression (ROHC)	5.2.6, 11.13.19	oi	N	N	
19.	Packet, IPv4 over 802.1Q VLAN with Header Compression (ECRTP)	5.2.6, 11.13.19	oi	N	N	
20.	Packet, IPv6 over 802.1Q VLAN with Header Compression (ROHC)	5.2.6, 11.13.19	oi	N	N	
21.	Packet, IPv6 over 802.1Q VLAN with Header Compression (ECRTP)	5.2.6, 11.13.19	oi	N	N	

Note: At least one of options shall be implemented.

### 5.1.3 MAC PDU formats

1

**Table 89. MAC PDU Formats**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Reassembly at Rx	6.3.2.2.1, 6.3.3.3.2	m	Y	Y	
2	Fragmentation at Tx	6.3.2.2.1, 6.3.3.3.2	m	Y	Y	Capability is mandatory.
3	Packing of fixed-length MAC SDUs	6.3.2.2.3, 6.3.3.4	o	N	N	
4	Packing of variable-length MAC SDUs at MS	6.3.2.2.3, 6.3.3.4	o	N/A	Y	Unpacking is mandatory. Refer 6.3.3.4.
5	Packing ARQ Feedback Payload	6.3.3.4.3	o	Y	Y	“ARQ Feedback Payload is treated like any other payload” (Refer to 6.3.3.4.3 of [1]) Unpacking of ARQ Feedback Payload is mandatory if ARQ implemented/enabled at the connection
6	Extended subheader support	6.3.2.2.7, 11.7.5	o	Y	Y	Extended subheader support is negotiated
7	Capability of receiving bandwidth requests using Grant management Subheader	6.3.2.2.2	o	Y	N/A	
8	3-bit FSN support		o	N	N	Refer to [2]negotiated during SBC, 11 bits is default

2

**5.1.4 MAC Support of PHY layer**

3

4

**5.1.4.1 Feedback Mechanism**

5

**Table 90. Feedback Mechanism**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Feedback Header	6.3.2.1.2.2.1	o	Y	Y	
2.	FAST-FEEDBACK allocation subheader	6.3.2.2.6	o	N	N	
3.	MIMO mode feedback extended subheader	8.4.5.4.10.3, 6.3.2.2.7.4	o	N	N	
4.	Feedback request	6.3.2.2.7.3	o	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
	extended subheader					
5.	Mini-Feedback extended subheader	6.3.2.2.7.6	o	N	N	
6.	Feedback Polling IE	8.4.5.4.28	o	Y	Y	
7.	PHY channel report header	6.3.2.1.2.1.5	o	N	N	
8.	UL Tx Power Report extended subheader	6.3.2.2.7.5	o	N	N	

## 5.1.5 Multicast connection

**Table 91. Multicast Connection**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Multicast traffic connection	6.3.13	o	Y	Y	

## 5.1.6 Network Entry

**Table 92. Network Entry**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	SS management support	6.3.9.9.1, 6.3.9.10-12, 6.3.2.3.28-29, 11.7.2	o	N	N	
2	IP management mode	11.7.3	o	N	N	Conditional based on item 1

## 5.1.7 ARQ

**Table 93. ARQ**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	ARQ implementation	6.3.4	o	Y	Y	All items below are conditional dependently on ARQ implementation
2	ARQ ACK type 0 - Selective ACK entry	6.3.4.2, 11.7.23	o	N	N	Negotiable over REG-REQ/RSP (11.7.23 ARQ-ACK Type)

Item	Description	Reference	Status	BS Required	MS Required	Comment
3	ARQ ACK type 1 - Cumulative ACK entry	6.3.4.2, 11.7.23	o	Y	Y	Negotiable over REG-REQ/RSP (11.7.23 ARQ-ACK Type)
4	ARQ ACK type 2 - Cumulative with Selective ACK entry	6.3.4.2, 11.7.23	o	Y	Y	Negotiable over REG-REQ/RSP (11.7.23 ARQ-ACK Type)
5	ARQ ACK type 3 - Cumulative ACK with Block Sequence ACK	6.3.4.2, 11.7.23	o	Y	Y	Negotiable over REG-REQ/RSP (11.7.23 ARQ-ACK Type)
6	Extended ARQ feedback	6.3.4.2.1 [4]	o [4]	N	N	

### 5.1.8 MAC support for H-ARQ

**Table 94. MAC Support for HARQ**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	HARQ Support	6.3.17	o	Y	Y	All items below are conditional dependently on HARQ support.
2.	HARQ Buffer Negotiation Capability	11.8.3.7.19	o	Y	Y	
3.	HARQ Channel mapping	6.3.17, 11.13.32	o	Y	Y	Determined by BS
4.	Capability of DL HARQ channels Number negotiation	11.8.3.7.2	o	Y	Y	
5.	Capability of UL HARQ channels Number negotiation	11.8.3.7.3	o	Y	Y	
6.	Capability of HARQ ACK delay negotiation in DL transmission	11.4.1	o	Y	Y	
7.	Capability of HARQ ACK delay negotiation in UL transmission	11.3.1	o	Y	Y	
8.	PDU SN extended subheader for HARQ reordering	11.13.33	o	Y	Y	

### 5.1.9 QoS

**Table 95. QoS**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Dynamic service flow creation - BS-initiated	6.3.14.7.1.2	m	Y	Y	
2	Dynamic service flow creation -SS-initiated	6.3.14.7.1.1	o	IO-QOS	N*	* For MS, not required for WiMAX certification, only optionally certified
3	Dynamic service flow change - BS-initiated	6.3.14.9.4.2	m	Y	Y	
4	Dynamic service flow change -SS-initiated	6.3.14.9.4.1	o	IO-QOS	N*	* For MS, not required for WiMAX certification, only optionally certified
5	Dynamic service flow deletion -BS-initiated	6.3.14.9.5.2	m	Y	Y	
6	Dynamic service flow deletion – SS-initiated	6.3.14.9.5.1	o	Y	Y	

### 5.1.10 Data delivery services for mobile network

**Table 96. Data Delivery Services for Mobile Network**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Unsolicited Grant service (UGS)	6.3.20.1.1, 6.3.5.2.1	o	Y	Y	
2	Real-Time Variable Rate (RT-VR) Service	6.3.20.1.2, 6.3.5.2.2	o	Y	Y	
3	Non-Real-Time Variable Rate (NRT-VR) Service	6.3.20.1.3, 6.3.5.2.3	o	Y	Y	
4	Best Effort (BE) Service	6.3.20.1.4, 6.3.5.2.4	o	Y	Y	
5	Extended Real-Time Variable Rate (ERT-VR) service	6.3.20.1.5, 6.3.5.2.2.1	o	Y	Y	

**Table 97. Multiple ertPS Support**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Multiple ertPS support using CQICH codeword	8.4.11.14 [4]	o [4]	Y	Y	
2	ertPS resumption bitmap extended	6.3.2.2.7.9 [4]	o [4]	IO-ERTB	IOMS-ERTB	



	subheader support					
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### 5.1.11 Request-Grant mechanism

**Table 98. Request-Grant Mechanism**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Incremental bandwidth request using BW request header	6.3.6.1	o	Y	Y	
2.	Aggregate bandwidth request using BW request header	6.3.6.1	pm	Y	Y	[2] mistakenly does not request periodically to transmit aggregate bandwidth requests
3.	Bandwidth request using Grant Management Subheader	6.3.2.2.2	o	Y	Y	
4.	Multicast Polling Assignment Request / response	6.3.2.3.18-19	o	N	N	
5.	Request-Grant mechanism combined with CINR report	6.3.2.1.2.1.3	o	N	N	
6.	Request-Grant mechanism combined with UL Tx power report	6.3.2.1.2.1.2	o	Y	Y	
7.	CQICH allocation request using CQICH allocation request header	6.3.2.1.2.1.4	o	Y	Y	

### 5.1.12 Neighbor Advertisement

**Table 99. Neighbor Advertisement**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Neighbor Advertisement	6.3.2.3.47	o	Y	Y	All items below are conditional dependently on Neighbor Advertisement implementation

Item	Description	Reference	Status	BS Required	MS Required	Comment
2.	Support BS index at the BS (Use BS index instead of BSID) in Scan/HO related messages, as numbered in MOB_NBR-ADV	6.3.2.3.48-51, 6.3.2.3.53	o	Y	N/A	Applicable to MOB_SCN-REQ/RSP, MOB_SCAN-REPORT, MOB_xxHO-REQ/RSP BS may decide not to use the index
3.	Support BS index at the MS (Use BS index instead of BSID) in Scan/HO related messages, as numbered in MOB_NBR-ADV	6.3.2.3.48-51, 6.3.2.3.53	pm	N/A	Y	Applicable to MOB_SCN-REQ/RSP, MOB_SCAN-REPORT, MOB_xxHO-REQ/RSP as BS may decide to use the index while MS has to support it.

## 5.1.13 Scanning and Association

### 5.1.13.1 Scanning

**Table 100. Scanning**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Scanning for cell selection (HO)	6.3.2.3.48-49	o	Y	Y	
2.	MS Requests Scanning Interval Allocations from BS	6.3.2.3.48-49 6.3.21.1.2	o	Y	Y	BS shall respond to MOB_SCN-REQ message from mobile.
3.	Unsolicited Scanning Interval Allocation by BS	6.3.2.3.48-49, 6.3.21.1.2	o	Y	Y	
4.	Event Triggered Scanning based on serving BS metrics	6.3.21.1.2	o	Y	Y	
5.	MS autonomous neighbor cell scanning	8.4.13.1.3	o	N/A	Y	

### 5.1.13.2 Scan Reporting Type Support

**Table 101. Scan Reporting Type Support**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Periodic reporting as indicated in MOB_SCN-RSP message	6.3.2.3.49, 11.4.1	o	Y	Y	
2.	Event triggered reporting based on metric conditions	6.3.2.3.49, 11.4.1	o	Y	Y	

### 5.1.13.3 Association

**Table 102. Association**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Support for association during scanning	6.3.21.1.3, 6.3.2.3.51	o	N	N	It is recommended to implement the following capabilities for MS: When switching to a different Frequency Assignment, the MS should be capable of independently (without ranging) perform timing, power, and frequency adjustments based on both downlink reception quality ("open loop ranging") and information in the DCD/UCD of the target BS.
2.	Support "Ranging Parameters Validity Time" Indication (by MS)	11.20	o	N	N	

#### 5.1.13.4 Association Type Support

**Table 103. Association Type Support**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Uncoordinated Association (Level 0)	6.3.21.1.3.1 and 11.8.8	o	N	N	Conditioned on the support of association
2.	Coordinated Association (level 1)	6.3.21.1.3.2 and 11.8.8	o	N	N	Conditioned on the support of association
3.	NW Assisted Association Reporting (level 2)	6.3.21.1.3.3 and 11.8.8	o	N	N	Conditioned on the support of association This feature includes Reporting of Association Result.
4.	Directed Association	6.3.21.1.3, 11.8.8	o	N	N	Conditioned on the support of association

#### 5.1.13.5 HO/Scan/Report Trigger Metrics

**Table 104. HO/Scan/Report Trigger Metrics**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Mean BS CINR	6.3.2.3.53, 11.8.7	o	Y	Y	Conditioned by HO and Scanning support.
2.	Mean BS RSSI	6.3.2.3.53, 11.8.7	o	Y	Y	Conditioned by HO and Scanning support
3.	Relative Rx Delay	6.3.2.3.53, 11.8.7	o	N	N	Conditioned by HO and Scanning support
4.	BS Round Trip Delay	6.3.2.3.53, 11.8.7	o	Y	Y	Conditioned by HO and Scanning support

#### 5.1.14 MAC layer HO procedures

**Table 105. MAC Layer HO Procedures**

Item	Description	Reference	Status	BS Required	MS Required	Comment
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1.	General HO Support	6.3.21.2, 6.3.2.3.55	o	Y	Y	Following items are conditioned by this item
2.	HO initiated by MS support at MS side		oi	N/A	Y	
3.	HO initiated by MS support at BS side		pm	Y	N/A	
4.	HO initiated by BS support at MS side ,		oi	N/A	Y	
5.	HO initiated by BS support at BS side	6.3.21.2.2	o	Y	N/A	
6.	HO Indication	6.3.21.2.5	o	Y	Y	
7.	Cancellation of HO	6.3.21.2.3	o	Y	Y	Conditioned by support of HO Indication
8.	Metric Triggered HO Requests	11.1.7 (Table 348g)	o	Y	Y	
9.	Resource Retention Support	6.3.2.3.52, 6.3.2.3.54	o	Y	Y	
10.	CDMA HO Ranging	6.3.10.3.3	o	Y	Y	
11.	HO_ID support	6.3.2.3.52, 6.3.2.3.54	o	Y	Y	
12.	Support negotiating of "HO authorization policy" during HO (i.e. between BSs)	6.3.2.3.52, 6.3.2.3.54	o	Y	Y	Using MOB_BSHO- REQ/RSP Does not request support of specific policy, just capability of negotiating.

## 5.1.15 HO Optimization

**Table 106. HO Optimization**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	HO Optimization Support	6.3.2.3.6, 6.3.21.2.7, 11.6	o	Y	Y	1. HO Optimization requires network support 2. All further features are conditioned by this item
2.	Support Omission of SBC-REQ management messages	6.3.2.3.6, 6.3.21.2.7, 11.6	o	Y	Y	
3.	Support Omission of PKM Authentication phase except TEK Phase	6.3.2.3.6, 6.3.21.2.7, 11.6	o	Y	Y	

Item	Description	Reference	Status	BS Required	MS Required	Comment
4.	Support Omission of PKM TEK creation phase during re-entry processing	6.3.2.3.6, 6.3.21.2.7, 11.6	o	Y	Y	
5.	Support of Network Address Acquisition at secondary management connection	6.3.2.3.6, 6.3.21.2.7, 11.6	o	N	N	Meaningful only for managed MS.
6.	Support of Time of Day Acquisition at secondary management connection	6.3.2.3.6, 6.3.21.2.7, 11.6	o	N	N	Meaningful only for managed MS.
7.	Support of TFTP Phase at secondary management connection	6.3.2.3.6, 6.3.21.2.7, 11.6	o	N	N	Meaningful only for managed MS.
8.	Support "Full State Sharing" – No exchange of network re-entry messages after ranging before resuming normal operations	6.3.2.3.6, 6.3.21.2.7, 11.6	o	Y	Y	
9.	Notifying MS of DL data Pending	6.3.2.3.6, 6.3.21.2.7, 11.6	o	N	N	
10.	Unsolicited SBC-RSP management message with updated capabilities information	6.3.2.3.6, 6.3.21.2.7, 11.6	o	N	N	
11.	Unsolicited SBC- RSP message in same frame as RNG-RSP	6.3.2.3.6, 6.3.21.2.7	o	N	N	
12.	Support SBC- RSP TLVs as part of RNG-RSP message	11.6	o	Y	Y	
13.	Support Omission of REG-REQ during NW reentry	6.3.2.3.6, 6.3.21.2.7, 11.6	o	Y	Y	
14.	Unsolicited REG-RSP with updated capabilities information	6.3.2.3.6, 6.3.21.2.7, 11.6	o	N	N	
15.	Unsolicited REG-RSP in same frame as RNG-RSP message	6.3.2.3.6, 6.3.21.2.7	o	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
16.	Support REG-RSP TLV as part of RNG-RSP message	11.6	o	Y	Y	
17.	Support of ARQ continuation using SN report header after NW re-entry	6.3.2.3.6, 6.3.22.2.7, 11.6	o	N	N	Requires support of SN_REPORT header
18.	Support continuation of non-ARQ connection using SDU SN extended sub-header before handover and using SN report header after NW re-entry			N	N	Requires support of SDU SN extended subheader and SN_REPORT header
19.	OFDMA Fast Ranging IE	8.4.5.4.21 6.3.21.2.4	o	Y	Y	
20.	Support sending Bandwidth Request header with zero BR as a notification of MS's successful re-entry registration	6.3.21.2.7, 11.6	o	Y	Y	
21.	Support sending at BS and receiving at MS traffic IP address refresh bit	11.6	o	Y	Y	

**Table 107. Seamless HO**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Seamless HO support	6.3.21.2.11 7.2.2.2.6.1 [4]	o [4]	IO-SLHO	IOMS-SLHO	This feature includes 1. CID pre-update with autonomous derivation, 2. CID pre-update with block allocation, and 3. TEK pre-update
2	Data packet exchange before RNG-REQ/RSP transaction	6.3.21.2.11 [4]	o [4]	IO-SLHO	IOMS-SLHO	

**5.1.16 CID and SAID Update**

CID update encodings (11.7.9) and SAID update encodings (11.7.18) may be used in RNG-RSP for reestablishment of connections.

**Table 108. CID and SAID Update**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	CID update from BS by RNG-RSP	11.7.9, 11.6	o	Y	N/A	
2.	CID update in MS by RNG-RSP	11.7.9	pm	N/A	Y	
3.	CID update from BS by REG-RSP	11.7.9	o	Y	N/A	
4.	CID update in MS by REG-RSP	11.7.9	pm	N/A	Y	
5.	Compressed CID update from BS by RNG-RSP	11.7.9.1	o	Y	N/A	
6.	Compressed CID update in MS by RNG-RSP	11.7.9.1	pm	N/A	Y	
7.	Compressed CID update from BS by REG-RSP	11.7.9.1	o	Y	N/A	
8.	Compressed CID update in MS by REG-RSP	11.7.9.1	pm	N/A	Y	
9.	SAID update from BS by RNG-RSP	11.7.17, 11.6	o	Y	N/A	
10.	SAID update in MS by RNG-RSP	11.7.17, 11.6	pm	N/A	Y	
11.	SAID update from BS by REG-RSP	11.7.17, 11.6	o	N	N/A	
12.	SAID update in MS by REG-RSP	11.7.17, 11.6	pm	N/A	N	
13.	SAID update from BS by SA-TEK-RSP	11.7.20	o	Y	N/A	
14.	SAID update in MS by SA-TEK_RSP	11.7.20	o	N/A	Y	

## 5.1.17 Fast BS Switching

**Table 109. Fast Base Station Switching**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	General FBSS capability	6.3.21.3.2-4	o	N	N	All further features in the table are conditioned by this item



Item	Description	Reference	Status	BS Required	MS Required	Comment
2.	Diversity set Update initiated by MS	6.3.21.3.3	oi	N	N	If FBSS supported, Diversity set update is mandatory
3.	Diversity set Update initiated by BS	6.3.21.3.3	oi	N	N	
4.	Anchor BS Update using HO messages	6.3.21.3.4	oi	N	N	MS and BS supporting MDHO or FBSS shall implement at least one of the two mechanisms to perform Anchor BS update.
5.	Anchor BS Update using fast feedback channel	6.3.21.3.4	oi	N	N	
6.	MS implementation of Fast feedback channel pre-allocated by MOB_BSHO-RSP or MOB_BSHO-REQ	6.3.21.3.4.2	pm	N	N	Fast-feedback channel shall be allocated by one of the following three methods, if fast-feedback channel is supported.
7.	BS implementation of Fast feedback channel pre-allocated by MOB_BSHO-RSP or MOB_BSHO-REQ	6.3.21.3.4.2	oi	N	N	
8.	MS implementation of Fast feedback channel allocation by Anchor_Switch_IE	6.3.21.3.4.2	pm	N	N	
9.	BS implementation of Fast feedback channel allocation by Anchor_Switch_IE	6.3.21.3.4.2	oi	N	N	
10.	MS implementation of Fast feedback channel allocation by UL_MAP of new Anchor BS	6.3.21.3.4.2	pm	N	N	
11.	BS implementation of Fast feedback channel allocation by UL_MAP of new Anchor BS	6.3.21.3.4.2	oi	N	N	
12.	Monitoring of multiple MAPs from active BSs	11.7.11	o	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
13.	MS assisted coordination of DL transmission using SN report	6.3.21.3.5	o	N	N	
14.	Cancellation of Diversity set update by MOB_HO-IND	6.3.21.3.3	o	N	N	
15.	Rejection of Diversity set update by MOB_HO-IND	6.3.21.3.3	o	N	N	
16.	SN report header	6.3.2.1.6	o	N	N	Conditional, dependent on SN feedback support
17.	SDU SN extended subheader	6.3.2.2.7.1	o	N	N	Conditional, dependent on SN feedback support
18.	SN request extended subheader	6.3.2.2.7.7	o	N	N	
19.	SN feedback support	11.13.28	o	N	N	No text on optionality in standard, but it is negotiated on a per-connection basis in DS(A/C)-REQ and disabled by default. So it is effectively optional.
20.	MS autonomous neighbor cell scanning	8.4.13.1.3	m	N	N	This feature is conditioned by implementation of FBSS or MDHO.

## 5.1.18 Macro Diversity Handover

**Table 110. Macro Diversity Handover**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	General MDHO capability	6.3.21.3.1, 6.3.21.3.3-4	o	N	N	Status for all following features is conditional, based on implementation of MDHO capability. Network support may be required to support this feature.
2.	Diversity set Update initiated by MS	6.3.21.3.3	oi	N	N	If MDHO supported, Diversity set update is mandatory.

Item	Description	Reference	Status	BS Required	MS Required	Comment
3.	Diversity set Update initiated by BS	6.3.21.3.3	oi	N	N	If MDHO supported, Diversity set update is mandatory.
4.	Anchor BS Update using HO messages	6.3.21.3.4	oi	N	N	If MDHO supported, at least one of the items 4 and 5 shall be implemented.
5.	Anchor BS Update using fast feedback channel	6.3.21.3.4.2	oi	N	N	If MDHO supported, at least one of the items 4 and 5 shall be implemented.
6.	MOB_BSHO-RSP for acknowledgement for Diversity set update request from MS	6.3.21.3.1	m	N	N	
7.	MDHO DL soft Combining supported with monitoring single MAP from anchor BS	8.4.5.3.14 8.4.5.3.15 8.4.5.4.18 8.4.5.4.19 11.7.11	o	N	N	
8.	MDHO DL RF Combining supported with monitoring MAPs from all active BS	8.4.5.3.14 8.4.5.3.15 8.4.5.4.18 8.4.5.4.19 11.7.11	o	N	N	
9.	MDHO DL soft combining supported with monitoring MAPs from all active BS	8.4.5.3.14 8.4.5.3.15 8.4.5.4.18 8.4.5.4.19 11.7.11	o	N	N	
10.	Recommended BS list in MOB_MSHO-REQ	6.3.21.3.3	po	N	N	MS may provide a list, but BS is not obligated to follow the list.
11.	Recommended BS list in MOB_BSHO-RSP	6.3.21.3.3	po	N	N	BS may provide a list (“the BSs may provide a recommended list of BSs to be included in the MS’ Diversity set.”), but MS is not obligated to follow the list.

Item	Description	Reference	Status	BS Required	MS Required	Comment
12.	MS implementation of Fast feedback channel pre-allocated at the new Anchor BS by MOB_BSHO-RSP or MOB_BSHO-REQ when a BS is added to the Diversity set	6.3.21.3.4.2	pm	N	N	At least one of the following three methods of fast-feedback channel allocation shall be implemented, if fast-feedback channel is supported.
13.	BS implementation of Fast feedback channel pre-allocated at the new Anchor BS by MOB_BSHO-RSP or MOB_BSHO-REQ when a BS is added to the Diversity set	6.3.21.3.4.2	oi	N	N	
14.	MS implementation of Fast feedback channel allocation by Anchor_Switch_IE	6.3.21.3.4.2	pm	N	N	
15.	BS implementation of Fast feedback channel allocation by Anchor_Switch_IE	6.3.21.3.4.2	oi	N	N	
16.	MS implementation of Fast feedback channel allocation by UL_MAP of new Anchor BS	6.3.21.3.4.2	pm	N	N	
17.	BS implementation of Fast feedback channel allocation by UL_MAP of new Anchor BS	6.3.21.3.4.2	oi	N	N	
18.	UL transmission to multiple BS	11.7.11	o	N	N	
19.	MS autonomous neighbor cell scanning	8.4.13.1.3	m	N	N	This feature is conditioned by implementation of FBSS or MDHO.

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## 5.1.19 Sleep Mode

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**Table 111. Sleep Mode**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Sleep Mode Implementation in MS	6.3.20.2	o	N/A	Y	For MS, all items below are conditional based on Sleep Mode implementation
2.	Power Saving Class type 1 support	6.3.20.2	o	Y	Y	
3.	Support of Traffic Indication Message for Power Saving Class type 1	6.3.20.2	o	Y	Y	Status of following items related to SLPID is conditional, depends on support of TRF-IND. Three alternative ways to wake an MS are 1) to use SLP-RSP message, and 2) to use downlink sleep control extended sub-header.
4.	Indicating DL traffic by SLPID bit map in TRF-IND	6.3.20.1	oi	Y	Y	One of the items 4 or 5 shall be implemented. BS may just not use SLPID. BS must support either this or Short Basic CID
5.	Indicating DL traffic by SLPID in TRF-IND	6.3.20.1	oi	Y	Y	BS must support either this or SLPID
6.	Support of SLPID at the MS including SLPID_Update TLV in TRF-IND	6.3.20.1	pm	N/A	Y	MS has no way to signal it does not support SLPID
7.	Support of SLPID_Update TLV at BS in TRF-IND	6.3.20.1	o	Y	N/A	
8.	Traffic triggered waking flag	6.3.2.3.44-45, 6.3.20.2	m (MS) and o (BS)	Y	Y	
9.	Power Saving Class type 2 support	6.3.20.3	o	N	N	
10.	Power Saving Class type 3 support	6.3.20.4	o	N	N	
11.	Activation of Power Saving Class by unsolicited SLP-RSP message from BS	6.3.20.1	o	Y	Y	

Item	Description	Reference	Status	BS Required	MS Required	Comment
12.	Activation of Power Saving Class by RNG-RSP message (type 3 only)	6.3.20.4	o	N	N	
13.	Activation of Power Saving Class by RNG-REQ message with Power_Saving_Class_Parameters TLV	6.3.2.3.5	o	N	N	
14.	DL sleep control extended subheader	6.3.2.2.7.2	o	Y	Y	
15.	Bandwidth request and uplink sleep control header	6.3.2.1.5	o	Y	Y	
16.	Support of periodic ranging in sleep mode	6.3.20.5	pm	Y	Y	
17.	DL Traffic indication by RNG-RSP message	6.3.20.5	o	N	N	
18.	MDHO/FBSS diversity set maintenance during sleep mode at MS	6.3.20.6	m	N/A	N	Conditioned by support of MDHO/FBSS
19.	MDHO/FBSS diversity set maintenance during sleep mode at BS	6.3.20.6	m	N	N/A	Conditioned by support of FBSS/MDHO.
20.	Sleep mode multicast CID support at MS	10.4	m	N/A	Y	MS has to support it as BS can use it.
21.	Sleep mode multicast CID support at BS	10.4	o	Y	N/A	
22.	MS Support of triggered action indicated by Enabled-Action-Triggered TLV	6.3.20.1, 11.5, 11.6, 11.7.3	o	N/A	Y	
23.	BS Support of triggered action indicated by Enabled-Action-Triggered TLV	6.3.20.1, 11.5, 11.6, 11.7.3	o	Y	N/A	If MS transmits the TLV, BS has to respond to it.

### 5.1.20 Idle Mode

**Table 112. Idle Mode**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	General Idle Mode functionality	6.3.24	o	Y	Y	All items below are conditional based on Idle Mode implementation

Item	Description	Reference	Status	BS Required	MS Required	Comment
2.	Idle mode initiation by DREG-REQ message from MS	6.3.24.1	oi	Y	Y	
3.	Idle Mode initiation by unsolicited DREG-CMD from BS	6.3.24.1	oi	Y	Y	
4.	Maintain connection information at BS during Idle Mode initiation process	6.3.24.1	m	Y	Y	
5.	Request for MS to retain service and operational information by DREG-CMD message	6.3.24.1	m	Y	Y	
6.	Request from MS to BS to retain service and operational information by DREG-REQ message	6.3.24.1	m	Y	Y	Mandatory feature see 6.3.2.3.42;
7.	Implementation in MS of the reception of periodic transmission of MS MAC address hash in Paging message	6.3.24.1	m	N/A	N	See 6.3.2.3.5-6. The MS may request BS inclusion of MS MAC Address Hash in MOB_PAG-ADV message at regular intervals, regardless of need for notification
8.	Implementation in BS of Periodic transmission of MS MAC address hash in Paging message for a idle MS	6.3.24.1	o	N	N/A	
9.	BS capability of transmitting Broadcast Control Pointer IE	6.3.24.5	o	Y	N/A	
10.	MS capability of receiving Broadcast Control Pointer IE	6.3.24.5	m	N/A	Y	
11.	BS Capability of providing dedicated ranging region and ranging code allocation for location update or network entry of MS in Idle Mode 6.3.22.8.1	6.3.24.8.1	o	N	N/A	

Item	Description	Reference	Status	BS Required	MS Required	Comment
12.	MS Capability of using dedicated ranging region and ranging code allocation for location update or network entry of MS in Idle Mode	6.3.24.8.1	o	N/A	N	
13.	Paging Group Update at MS	6.3.24.9.1.1	m	Y	Y	
14.	Timer Location Update at MS	6.3.24.9.1.2	m	Y	Y	
15.	Power Down Location Update at MS	6.3.24.9.1.3	m	Y	Y	
16.	MAC Hash Skip Threshold Location Update at MS	6.3.24.9.1.4	m	N/A	N	This is mandatory under the condition that MAC Hash Skip Threshold option is implemented in the MS. This item is conditioned by Item 7 of this table.
17.	Secure Location Update	6.3.24.9.2.1	o	Y	Y	
18.	Un-secure Location Update	6.3.24.9.2.2	m	Y	Y	
19.	Paging Preference	11.13.27	pm	Y	Y	
20.	Idle mode multicast CID support at MS	10.4	m	N/A	Y	MS has to support it as BS can use it.
21.	Idle mode multicast CID support at BS	10.4	o	Y	N/A	
22.	Change of paging cycle via location update	6.3.2.3.5, 11.5 [4]	o [4]	N	N	May be initiated by MS or BS

### 5.1.21 Expedited Network Re-entry from Idle Mode

**Table 113. Expedited Network Re-entry from Idle Mode**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Expedited network re-entry from Idle Mode support	6.3.23.9	o	Y	Y	
2.	Support Omission of SBC-REQ management messages	11.6	o	Y	Y	



Item	Description	Reference	Status	BS Required	MS Required	Comment
3.	Support Omission of PKM Authentication phase except TEK phase	11.6	o	Y	Y	
4.	Support Omission of PKM TEK creation phase during re-entry processing	11.6	o	Y	Y	
5.	Support of Network Address Acquisition at secondary management connection	11.6	o	N	N	
6.	Support of Time of Day Acquisition at secondary management connection	11.6	o	N	N	
7.	Support TFTP Phase at secondary management connection	11.6	o	N	N	
8.	Support "Full State Sharing" - No exchange of network re-entry messages after ranging before resuming normal operations	11.6	o	Y	Y	
9.	Notifying MS of DL data pending	11.6	o	N	N	Not relevant to idle mode.
10.	Unsolicited SBC-RSP management message with updated capabilities information	11.6	o	Y	Y	
11.	Unsolicited SBC-RSP message in same frame as RNG-RSP	11.6	o	N	N	
12.	Support SBC-RSP TLVs as part of RNG-RSP message	11.6	o	Y	Y	
13.	Support Omission of REG-REQ during NW re-entry	11.6	o	Y	Y	
14.	Unsolicited REG-RSP with updated capabilities information	11.6	o	Y	Y	
15.	Unsolicited REG-RSP in same frame as RNG-RSP message	11.6	o	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
16.	Support REG-RSP TLV as part of RNG-RSP message	11.6	o	Y	Y	
17.	MS send Bandwidth Request header with zero BR as a notification of MS's successful re-entry registration.	11.6	o	Y	Y	
18.	MS trigger a higher layer protocol required to refresh its traffic IP address (e.g. DHCP Discover [IETF RFC 2131] or Mobile IPv4 re-registration [IETF RFC 3344]).	11.6	o	Y	Y	

## 5.1.22 MBS

**Table 114. MBS**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	Single-BS-MBS	6.3.13	o	N	N	
2.	Multi-BS-MBS	6.3.13	o	IO-MBS	Y	Synchronization between BSs of mapping of MBS service flow IDs to CIDs throughout MBS_ZONE.
3.	Time diversity scheme in Multi-BS-MBS	6.3.2.3.57	o	N	N	Conditioned by item 2
4.	Logical channel ID scheme in Multi-BS-MBS	6.3.2.3.57	o	N	N	Conditioned by item 2
5.	Support for MBS_MAP-IE	6.3.13.2.3	pm	IO-MBS	Y	This item depends on multi-BS MBS implementation.
6.	MS initiated MBS request using DSA-REQ	11.13.20	oi	IO-MBS	Y	At least one is required. Dependent on MBS implementation (either item 1 or item 2).

Item	Description	Reference	Status	BS Required	MS Required	Comments
7.	BS initiated MBS request using DSA-REQ	11.13.20	oi	IO-MBS	Y	Dependent on MBS implementation (either item 1 or item 2).

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**Table 115. MBS Enhancements**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	MBS with macro-diversity within an MBS Zone	6.3.22 [4]	o [4]	IO-MBS	Y	
2	MBS without macro-diversity within an MBS Zone	6.3.22 [4]	o [4]	IO-MBS	Y	
3	Location Update for MBS Update	6.3.23.8.1.5[7], 11.5, Table 577	o [4]	IO-MBS4	Y	
4	Update of MBS configuration using MCID pre-allocation and Transmission Info. TLV (upon traversing MBS zone boundary)	6.3.22 [4]	o [4]	IO-MBS3	Y	
5	Update of MBS configuration using MCID continuity and Transmission Info. TLV ( upon traversing MBS zone boundary)	6.3.22 [4]	o [4]	IO-MBS3	Y	
6	L2 encryption in MBS	7.2.2.2.8, 7.2.2.3.3 [4]	o [4]	N	N	
7	Add or Modify Multiple SFs in one DSx transaction for MBS connections: For BS-initiated creation of MBS connections	11.13.39, 6.3.2.3.10 [4]	o [4]	IO-MBS2	Y	DSA-REQ from BS
8	Add or Modify Multiple SFs in one DSx transaction for MBS connections: For MS-initiated creation of MBS connections	11.13.39, 6.3.2.3.10 [4]	o [4]	N	N	DSA-REQ from MS

9	Add or Modify Multiple SFs in one DSx transaction for MBS connections: For BS-initiated change of MBS connections	11.13.39, 6.3.2.3.13 [4]	o [4]	N	N	DSC-REQ from BS
10	Add or Modify Multiple SFs in one DSx transaction for MBS connections: For MS-initiated change of MBS connections	11.13.39, 6.3.2.3.13 [4]	o [4]	N	N	DSC-REQ from MS
11	Add or Modify Multiple SFs in one DSx transaction for MBS connections: Common SF encodings for group of MBS connections	11.13.39 [4]	o [4]	IO-MBS2	Y	QoS-related, MBS parameters
12	MBS Logical Channels within an MBS connection	6.3.2.3.52, 11.13.39 [4]	o [4]	N	N	As identified by inclusion of 'MBS Contents IDs' TLV in DSA-REQ /DSA-RSP and DSC-REQ/DSC-RSP from BS. Requires use of Extended_MBS_DATA_IE in MBS MAP messages.

### 5.1.23 AAS

**Table 116. AAS**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	General AAS functionality	6.3.7.6	o	N	N	

### 5.1.24 MS's Network Entry issued by BS restart

**Table 117. MS's Network Entry issued by BS restart**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	MS's Network Entry triggered by BS restart counter change	6.3.9.11, 11.4.1	o	Y	Y	

### 5.1.25 NSP Selection

**Table 118. NSP Selection**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	NSP Selection	11.1.10.1-2, 11.4.1, 11.8.9, 11.8.11, 11.8.13, 11.8.14, 6.3.2.3.59 <b>Error! Reference source not found.</b>	o	Y	Y	Support of NSP list by both SII-Adv. and SBC-RSP message shall be supported.

**5.1.26 Load Balancing****Table 119. Load Balancing**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Load balancing using preamble index and/or DL frequency override	6.3.2.3.6	o	IO-LOBA	Y	
2	Load balancing using ranging abort timer for initial network entry, handover and re-entry from idle mode.	6.3.2.3.6	o	Y	Y	
3	Load balancing using BS initiated HO (includes BS controlled HO indication)	6.3.21.2.2	o	Y	Y	

**5.1.27 Location Based Services****Table 120. Location Based Services**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	LBS support	6.3.2.3.59, 6.3.25	o	IO-LBS	IOMS-LBS	
2	Location information in LBS	6.3.2.3.59, 11.21.1, 11.21.2 and 11.21.3.	o	IO-LBS	IOMS-LBS	
3	Timing information in LBS	6.3.2.3.59, 11.21.4 and 11.21.5	o	IO-LBS	IOMS-LBS	
4	BS Frequency Accuracy information in LBS	6.3.2.3.59, 11.21.5	o	IO-LBS	IOMS-LBS	

**5.1.28 Coexistence Among WiMAX™, Wi-Fi® and Bluetooth® Networks**

**Table 121. Coexistence Among WiMAX™, Wi-Fi® and Bluetooth® Networks**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	PSC-based co-located coexistence mode 1	6.3.20.8	o	Y	IOMS-CO1	
2	PSC-based co-located coexistence mode 2	6.3.20.8	o	IO-CO2	IOMS-CO2	
3	PSC-based co-located coexistence follows the MAP relevance	6.3.20.8, 6.3.20.9	o	IO-CO3	IOMS-CO3	
4	Uplink Band AMC combined with co-located coexistence	6.3.20.8	o	N	N	

All coexistence features are designed in a way to be optional for MS.

### 5.1.29 Capacity Improvements for Feedbacks

**Table 122. Capacity Improvements for Feedbacks**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Mini-feedback extended subheader (UL extended sub header)	6.3.2.2.7	o	N	N	
2	Feedback request extended subheader (DL extended sub header)	6.3.2.2.7	o	N	N	
3	MIMO mode feedback extended subheader	6.3.2.2.7	o	N	N	

### 5.1.30 Persistent Allocation

**Table 123. Persistent Allocation**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Persistent Allocation Support	6.3.26	o	IO-PA	Y	This feature includes non-persistent allocation using same IE.
2	Error Handling Procedures: Allocation/Usage of MAP ACK Channel for persistent allocation	6.3.26.4 6.3.26.4.2	o	IO-PA	Y	
3	Error Handling Procedures: Allocation/Usage of MAP ACK Channel for persistent de-allocation	6.3.26.4 6.3.26.4.2	o	IO-PA	Y	

4	Error Handling Procedures: MAP NACK Channel Allocation/Usage	6.3.26.4 6.3.26.4.3	o	N	N	
5	Error Handling Procedures: Error recovery using Retransmission Flag	6.3.26.4 6.3.26.4.6	o	N	N	
6	Error Handling Procedures: Error recovery using Change Indicator	6.3.26.4 6.3.26.4.5	o	N	N	
7	Error handling procedure using Persistent allocation error event extended sub-header	6.3.2.2.7.10 6.3.26.4.7	o	N	N	
8	Flexible Persistent HARQ Region	6.3.26.1	o	IO-PA	Y	
9	Resource Shifting using Resource Shifting Indicator	6.3.26.2	o	N	N	
10	Power boosting per Sub-burst using boost fields in sub-burst IEs of Persistent HARQ DL MAP Allocation IE	6.3.26, 8.4.5.3.29	o	N	N	Power boost per sub-burst' flag is set to '1' in Persistent HARQ DL MAP Allocation IE.
11	Power boosting per Sub-burst using Power Boosting IE	6.3.26, 8.4.5.3.30	o	N	N	
12	IE size optimization using sub-burst DIUC indicator, duration indicator, allocation period and etc. (conformance devices need to parse IEs with flags set to any combination.)	6.3.26, 8.4.5.3.29, 8.4.5.4.28	o	IO-PA	Y	
13	HARQ retransmission using HARQ DL/UL MAP IE	6.3.26.3, 8.4.5.3.21, 8.4.5.4.22	o	IO-PA	Y	
14	HARQ retransmission using Persistent HARQ DL/UL MAP Allocation IE	6.3.26.3, 8.4.5.3.29, 8.4.5.4.28	o	IO-PA	Y	
15	DL Persistent allocation using Persistent HARQ DL MAP Allocation IE	8.4.5.3.29	o	IO-PA	Y	This feature is applied for all HARQ and MIMO types defined in the System Profile 1.5.
16	DL Persistent de-allocation using Persistent HARQ DL MAP Allocation IE	8.4.5.3.29	o	IO-PA	Y	This feature is applied for all HARQ and MIMO types defined in the System Profile 1.5.

17	UL Persistent allocation using Persistent HARQ UL MAP Allocation IE	8.4.5.4.28	o	IO-PA	Y	This feature is applied for all HARQ and MIMO types defined in the System Profile 1.5.
18	UL Persistent de-allocation using Persistent HARQ UL MAP Allocation IE	8.4.5.4.28	o	IO-PA	Y	This feature is applied for all HARQ and MIMO types defined in the System Profile 1.5.

### 5.1.31 Alternative RAT Advertisement

## 5.2 Parameters

The parameters in subclause 10.1 of the IEEE 802.16-2004 standard, as modified by corrigendum 802.16/Cor2 and 802.16e-2005 amendment, relevant to the features required by this profile apply to this section. However the following parameters listed in table 127 below supersede the whole information of the parameters in 10.1.

**Table 124. Parameters**

Item	Description	Reference	Status	Min	Def	Max	Comments
1.	Number of concurrent outstanding PKM exchanges SS is capable of handling at one time.			2			
2.	Number of transport security associations that SS is capable of supporting simultaneously.			2			
3.	PN window size in PNs	11.8.4.4	pm	128			Conditional, depends on support of AES in CCM mode
4.	UCD Transition		BS	50 ms			The time the BS shall wait after transmitting a UCD message with an incremented Configuration Change Count before issuing a UL-MAP message referring to Uplink_Burst_Profiles defined in that UCD message



Item	Description	Reference	Status	Min	Def	Max	Comments
5.	DCD Transition		BS	50 ms			The time the BS shall wait after transmitting a DCD message with an incremented Configuration Change Count before issuing a DL-MAP message referring to Downlink_Burst_Profiles defined in that DCD message
6.	Tproc		BS	Tf = Frame length			Time provided between arrival of the last bit of a UL-MAP at an SS and effectiveness of that map
7.	RNG-RSP processing time		MS			2.5 ms from the start of the frame (n+1) were frame n is the frame containing the RNG_RSP. If there is an UL allocation to the SS before the 2.5 ms in frame n+1 then the power change shall be applied before the end of the frame n+1.	Time allowed for an SS following receipt of a RNG-RSP before it is expected to apply the corrections instructed by the BS Minimum value
8.	Initial Ranging Interval		BS			250m	Time between Initial Ranging regions allocated by the BS
9.	Lost DL-MAP Interval		MS			600m	Time since last received DL-MAP message before downlink synchronization is considered lost
10.	Lost UL-MAP Interval		MS			600m	Time since last received UL-MAP message before uplink synchronization is considered lost
11.	T1		MS			min (20 s , 5x DCD Interval maximum value)	Wait for DCD timeout

Item	Description	Reference	Status	Min	Def	Max	Comments
12.	T3		MS			60 ms: RNG-RSP after CDMA ranging or RNG-REQ during initial or periodic ranging 50 ms: RNG-RSP after RNG-REQ during HO to negotiated target BS 200 ms: RNG-RSP after RNG-REQ during HO to non-negotiated target BS 200 ms: RNG-RSP after RNG-REQ during location update or re-entry from idle mode	Ranging Response reception timeout following the transmission of a Ranging Request
13.	T4		MS	5 s		35 s	Wait for unicast ranging opportunity. If the pending-until-complete field was used earlier by this SS, then the value of that field shall be added to this interval (copied from [1])
14.	T6		MS	10 ms		3 s	Wait for registration response
15.	T7		MS/BS	10 ms		1 s	Wait for DSA/DSC/DSD Response timeout
16.	T8		MS/BS	10 ms		300 ms	Wait for DSA/DSC Acknowledge timeout
17.	T10		MS/BS	600 ms		3 s	Wait for Transaction end timeout
18.	T12		MS			min (20 sec , 5x UCD Interval maximum value)	Wait for UCD descriptor
19.	T14		MS			100 ms	Wait for DSX-RVD Timeout
20.	T17		BS	5 min	5 min		Time allowed for SS to complete SS Authorization and Key Exchange

Item	Description	Reference	Status	Min	Def	Max	Comments
21.	T18 short		MS	50 ms		100 ms	Wait for SBC-RSP timeout In case of network discovery when SBC-REQ message contains SIQ TLV.  The timer is started when SBC-REQ is transmitted
22.	T18 long		MS	90		200	Wait for SBC-RSP timeout  In case of initial network entry and network re-entry when SBC-REQ message does not contain SIQ TLV.  The timer is started when SBC-REQ is transmitted
23.	T9		BS	300		660	Registration Timeout, the time allowed between the BS sending a RNG-RSP (success) to an SS, and receiving a SBC-REQ from that same SS
24.	T22		MS/BS			0.5 s	Wait for ARQ-Reset
25.	Idle Mode Timer		MS	128 s	40 96 s	65536 s	
26.	T43		MS			100 ms	Time the MS waits for MOB_SLP-RSP
27.	T44		MS			100 ms	Time the MS waits for MOB_SCN-RSP
28.	T46		BS	50 ms		100 ms	Time the BS waits for DREG REQ in case of unsolicited Idle Mode initiation from BS
29.	T47			8 frames	64 frames	128 frames	PMC_RSP Timer: BS shall send the PMC_RSP before $T47 + 1$ frames after BS receives PMC_REQ (confirmation = 0) correctly.
30.	Paging Interval Length		MS/BS	1 frames	2 frames	5 frames	time duration of Paging Interval of the BS
31.	Max Dir Scan Time		MS			2 s	Maximum scanning time of neighbor BSs by MS before reporting any results

Item	Description	Reference	Status	Min	Def	Max	Comments
32.	Maximum SDU size			1522 Bytes			Recommended value to derive Maximum Transmission Unit (MTU) from
33.	Number of transport connections in UL			4			Minimum number of concurrent transport CIDs MS is capable to support in UL.
34.	Number of transport connections in DL			4			Minimum number of concurrent transport CIDs MS is capable to support in DL.
35.	Total number of power save class instances supported from class types 1 & 2	11.8.5		1			Number of power saving class instances supported by the MS sufficient for the conformance with the profile.
36.	ARQ_RESET_MAX_RETRIES	6.3.4.6.2, Figures 34, 35			2		The default value must be supported
37.	Min required CS Types per MS		MS		1		Minimum number of simultaneously supported CS options, which is required for MS certification
38.	ARQ_RETRY_TIME_OUT on non H-ARQ connections	11.13.18.3	BS/MS	20 ms		1.3 s	Used in DSA-REQ and DSA-RSP to indicate the ARQ_Retry_Timeout value. 5 ms granularity.
39.	ARQ_RETRY_TIME_OUT on H-ARQ connections	11.13.18.3	BS/MS			1.3 s	Used in DSA-REQ and DSA-RSP to indicate the ARQ_Retry_Timeout value. 5 ms granularity.
40.	ARQ_SYNC_LOSS_TIMEOUT for non H-ARQ connections	11.13.18.5	BS/MS	100 ms			Used in DSA-REQ and DSA-RSP to indicate timeout for ARQ. 5 ms granularity.
41.	ARQ_RX_PURGE_TIMEOUT for non H-ARQ connections	11.13.18.7	BS/MS	100ms			Used in DSA-REQ and DSA-RSP to indicate timeout for ARQ. 5 ms granularity.
42.	ARQ_RX_PURGE_TIMEOUT for H-ARQ connections	11.13.18.7					Used in DSA-REQ and DSA-RSP to indicate timeout for ARQ. 5 ms granularity.
43.	ARQ_BLOCK_LIFETIME granularity	11.13.18.4					5 ms granularity.
44.	AI_SN value upon init and after HO (HARQ reset)	6.3.2.3.43.4	BS/MS		0		AI_SN is used in HARQ to indicate the sequence number of the ACID. Initial value at the network entry and after HO.

Item	Description	Reference	Status	Min	Def	Max	Comments
45.	Power_control_IE:: Power measurement frame relevance		BS/MS			4 MS Data Transmission	When the MS transmission frame only includes UL-MAP allocations with UIUC = 0, 11 (type =8), 12, 13 and/or 14, that frame shall not be counted for this purpose.
46.	N <sub>MS_max_neighbors</sub>	6.3.21.1.1 [4]	MS	32			The MS must be able to process at least N <sub>MS_max_neighbors</sub> in a MOB_NBR-ADV message.

**Table 125. Minimum Performance Requirements**

Item	Description	Reference	Status	Min	Def	Max	Comments
1.	HO Parameters Processing Time	11.7.24				3 frame	Time in ms the MS needs to process information on connections provided in RNGRSP or REG-RSP message during HO

**Table 126. Minimum Number of MBS Map IEs Concurrently Stored in the MS**

Item	Description	Reference	Status	Min	Def	Max	Comments
1	Minimum number of MBS Map IEs concurrently stored in the MS			16			

## 6. Security

### 6.1 Authorization Policy Support

**Table 127. Authorization Policy Support**

Item	Feature	Reference	Status	BS Required	MS Required	Comments
1	802.16 Authorization policy support	11.7.8.7	o	Y	Y	

## 6.2 PKM Version Support

**Table 128. PKM Version Support**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	PKMv1 Support	11.8.4.1	o	N	N	
2.	PKMv2 Support	11.8.4.1	o	Y	Y	

## 6.3 PKMv2 Authorization policy support – initial network entry

**Table 129. PKMv2 Authorization Policy Support-Initial Network Entry**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	No Authorization	11.8.4.2	o	Y	Y	
2.	EAP-based authorization	11.8.4.2	o	Y	Y	
3.	EAP-based authorization and Authenticated (EIK) EAP-based authorization	11.8.4.2	o	N	N	
4.	RSA-based authorization	11.8.4.2	o	N	N	
5.	RSA-based authorization and Authenticated (EIK) EAP-based authorization	11.8.4.2	o	N	N	
6.	RSA-based authorization and EAP-based authorization	11.8.4.2	o	N	N	

## 6.4 PKMv2 Authorization policy support – network re-entry

**Table 130. PKMv2 Authorization Policy Support-Network Re-entry**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	No Authorization	11.8.4.2	o	Y	Y	
2.	EAP-based authorization	11.8.4.2	o	Y	Y	

3.	EAP-based authorization and Authenticated (EIK) EAP-based authorization	11.8.4.2	o	N/A	N/A	
4.	RSA-based authorization	11.8.4.2	o	N/A	N/A	
5.	RSA-based authorization and Authenticated (EIK) EAP-based authorization	11.8.4.2	o	N/A	N/A	
6.	RSA-based authorization and EAP-based authorization	11.8.4.2	o	N/A	N/A	

1

## 6.5 Supported cryptographic suites

“Cryptographic suites” includes Data encryption, Data authentication, TEK encryption algorithm.

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**Table 131. Supported Cryptographic Suites**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	No data encryption, no data authentication & 3-DES, 128	11.9.14	o	Y	Y	This cryptographic suite means no encryption and no TEK exchange.
2.	CBC-Mode 56-bit DES, no data authentication & 3-DES, 128	11.9.14	o	N	N	
3.	No data encryption, no data authentication & RSA, 1024	11.9.14	o	N	N	
4.	CBC-Mode 56-bit DES, no data authentication & RSA, 1024	11.9.14	o	N	N	
5.	CCM-Mode 128-bit AES, CCM-Mode, 128-bit, ECB mode AES with 128-bit key	11.9.14	o	N	N	
6.	CCM-Mode 128-bit AES, CCM-Mode, AES Key Wrap with 128-bit key	11.9.14	o	Y	Y	

Item	Description	Reference	Status	BS Required	MS Required	Comments
7.	CBC-Mode 128-bit AES, no data authentication, ECB mode AES with 128-bit key	11.9.14	o	N	N	
8.	MBS CTR Mode 128 bits AES, no data authentication, AES ECB mode with 128-bit key	11.9.14	o	N	N	
9.	MBS CTR mode 128 bits AES, no data authentication, AES Key Wrap with 128-bit key	11.9.14	o	N	N	

1

## 6.6 Message Authentication Code Mode

3

**Table 132. Message Authentication Code Mode**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	No message authentication	11.8.4.3	o	Y	Y	
2.	HMAC	11.8.4.3	o	N	N	
3.	CMAC	11.8.4.3	o	Y	Y	
4.	64-bit short-HMAC	11.8.4.3	o	N	N	
5.	80-bit short-HMAC	11.8.4.3	o	N	N	
6.	96-bit short-HMAC	11.8.4.3	o	N	N	

## 6.7 Security Association

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**Table 133. Security Association**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	Support of Static SA	7.2.1.1	o	Y	Y	
2.	Support of Dynamic SA	7.2.1.1	o	Y	Y	
3.	Support of Primary SA	7.2.1.1	m	Y	Y	



## 6.8 SA Service Type

**Table 134. SA Service Type**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	Unicast	11.9.35	o	Y	Y	
2.	Group multicast service	11.9.35	o	N	N	
3.	MBS Services	11.9.35	po	N	N	Conditioned by MBS support

## 6.9 EAP Authentication methods

**Table 135. EAP Authentication Methods**

Item	Description	Reference	BS Required	MS Required	Comments
1.					

## 6.10 Certificate profile

**Table 136. Certificate Profile**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	X.509 MS certificate for device authorization	7.6	pm	N	N	Conditioned by usage of PKM v1 or PKM v2 with RSA authentication
2.	X.509 Manufacturer certificate	7.6	pm	N	N	Conditioned by usage of PKM v1 or PKM v2 with RSA authentication
3.	X.509 BS Cert Profile	7.6	pm	N	N	Conditioned by usage of PKM v1 or PKM v2 with RSA authentication

## 6.11 Multicast Broadcast Re-keying Algorithm (MBRA)

**Table 137. Service Type**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	MBRA for Group	7.9	o	N	N	

	multicast service					
2.	MBRA for MBS service	7.9	o	N	N	

## 7. Radio Profile

Table 138 shows an example of the RF channels to be calculated using the following formula:

$$RFChannel_n = F_{start} + n \cdot \Delta F_c, \forall n \in N_{range}$$

Where:

$F_{start}$  is the start frequency for the specific band,

$\Delta F_c$  is the center frequency step,

$N_{range}$  is the range values for the n parameter

**Table 138. Example of applicability of the formula to the 2500 - 2690 MHz band**

Channel BW (MHz)	Center Frequency Step (kHz)	F <sub>start</sub> (MHz)	N <sub>range</sub>	Comment
5	250	2498.5	{16, ..., 756}	.
10		2501	{16, ..., 736}	

## 8. Power Class Profile

The Power Classes listed in following table is developed to cover the complete target range of power levels while different interpretation of applicable modulation levels is addressed through a dual range requirement for QPSK and 16-QAM per Power Class.

**Table 139. Power Classes**

Class Identifier	Transmit Power (dBm) for 16-QAM	Transmit Power (dBm) for QPSK	MS Required
Power Class 1	$18 \leq P_{Tx,max} < 21$	$20 \leq P_{Tx,max} < 23$	oi
Power Class 2	$21 \leq P_{Tx,max} < 25$	$23 \leq P_{Tx,max} < 27$	oi
Power Class 3	$25 \leq P_{Tx,max} < 30$	$27 \leq P_{Tx,max} < 30$	oi
Power Class 4	$30 \leq P_{Tx,max}$	$30 \leq P_{Tx,max}$	oi

NOTE: The maximum MS output power may be limited by the value included in a MS Maximum Transmission Power Limitation Control TLV that may be included in the UCD.

