WiMAX Forum™ Mobile System Profile

Release 1.0 Approved Specification

(Revision 1.2.2: 2006-11-17)

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Abstract

This document is prepared by the Technical Working Group (TWG) to provide the descriptions of the OFDMA based system profiles of Mobile WiMAX.

1. Scope

The main objective of this document is to provide OFDMA System Profile specification of mobile network, complementary to 802.16-2004 as amended by 802.16e-2005 standard, primarily for the purpose of certification of conformant Subscriber Stations and Base Stations.

2. References

[1] **IEEE Standard 802.16-2004**, IEEE Standard for Local and Metropolitan Area Networks - Part 16: Air Interface for Fixed Wireless Access Systems.

[2] **IEEE Standard 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] **WiMAX Forum™ Mobile Certification Profile**, WiMAX, Certification Working Group, April 2006

[4] **IEEE 802.16-2004/Cor2 Ballot Commentary 80216-06_066r2.cmt,** IEEE 802.16 Working Group, November 2006

3. Definitions

For the purposes of the present document, the following terms and definitions apply:

3.1 *Abbreviations*

3.2 *Definitions of system profiles*

Profile definitions of different devices/usage models and releases are provided in this subsection.

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 [1] and [2] from which the requirement for the item is derived.

3.3.4 Status column

The following notations are used in the status column to indicate whether each item is mandatory or optional in IEEE standard based on 802.16-2004 [1] as amended by 802.16e-2005 [2].

Table 1. Status Column Entries

m	Explicitly shown as mandatory in the standard. It is required to implement
pm	Potentially mandatory, required for the system to perform basic operations (Not explicitly shown as mandatory in the standard). It is required to implement.
o	Explicitly mentioned as optional in the standard or is not explicitly mentioned but has capability negotiations. It may or may not be implemented.
oi	Qualified option – for mutually exclusive or selectable options from a set. One or more of the options from the set shall be supported.
po	Potentially optional. Not explicitly mentioned as mandatory, but from the standard we may conclude it is, though not really required for the system to perform basic operations. We have to decide whether it should be defined as optional
n/a	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 every BS/MS to implement for WiMAX certification purposes.

Table 2. Required Column Entries

Y or **y**.	Required to implement
N or **n**	Not required to implement.
IO-NNNN	Inter-operable Options: Item belongs to NNNN group of features for which it is requested to provide testing procedure and distinct labeling of BS equipment. More specifically ▪ The item is not required to get general "WiMAX certified" label and ▪ Is required to get distinct "WiMAX certified with NNNN capability" label.
n/a	Not applicable

The following Inter-operable Options are defined and used in this document.

1. IO-MIMO: Group of Inter-operable Option features related to Multiple Input Multiple Output (MIMO) operation.
2. IO-BF: Group of Inter-operable Option features related to Beam Forming (BF) operation.
3. IO-MBS: Group of Inter-operable Option features related to Multicast and Broadcast Services (MBS) operation.
4. IO-ETHx (x = 1, 2, 3): Groups of Inter-operable Option features related to Ethernet CS

3.3.6 BS/MS Values column

This column indicates the specific value or range of values for each BS/MS to implement for WiMAX certification purposes.

Table 3. Value Column Entries

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

3.3.7 Comment column

This column provides additional clarification and reasoning for each item.

4. PHY Profile

4.1 *Profiles of BS and MS*

4.1.1 System Parameters

4.1.1.1 *PHY Mode*

Table 4. 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 Band Class Index

System profile requirements of this document are applied to the following band class indices. Each index shall specify one frequency range and one or more combinations of channel bandwidth, FFT size, channel raster and duplexing mode.

BS support for a particular band class requires support of a frequency range that is a subset of the complete frequency range defined by the band-class. The BS vendor shall provide a declaration of the supported frequency range. The supported frequency range shall be a minimum of three (3) times the largest supported channel bandwidth. MS must support the entire range of frequency defined by a band class (or sub-bands) while the BS is required to support only sub-range of the band class declared by vendor.

Table 5. Band Class Index

Band Class Index	Frequency Range (GHz)	Channel Frequency Step (kHz)	Channel Bandwidth(s) (MHz)	FFT Size	Duplexing Mode	Comments
1	2.3-2.4	250	5	512	TDD	Both bandwidths must be supported by the MS
			10	1024	TDD	
			8.75	1024	TDD	
2	2.305-2.320, 2.345-2.360	250	3.5	512	TDD	
			5	512	TDD	
			10	1024	TDD	
3	2.496-2.69	250 (200 KHz step size is also	5	512	TDD	Both bandwidths must be supported
			10	1024	TDD	

		recommended for band class 3 in Europe)				to by the MS
4	3.3-3.4	250	5	512	TDD	
			7	1024	TDD	
			10	1024	TDD	
5	3.4-3.8	250	5	512	TDD	
			7	1024	TDD	
			10	1024	TDD	
	3.4-3.6	250	5	512	TDD	
			7	1024	TDD	
			10	1024	TDD	
	3.6-3.8	250	5	512	TDD	
			7	1024	TDD	
			10	1024	TDD	

4.1.1.3 *Sampling Factor*

Table 6. 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 7. 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 Length*

Table 8. 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*

This parameter shall be applicable only to TDD mode.

Table 9. TTG/RTG

Item	Description	Reference	Status	BS Required	BS Values	MS Required	Comment
1	TTG	8.4.5.2	m	Y	296 PS for 10 MHz, 218 PS for 8.75 MHz, 376 PS for 7 MHz, 148 PS for 5 MHz and 188 PS for 3.5 MHz	n/a	5 us minimum specified in the referred section. The requirement is equivalent to "5 msec - (RTG+ Number of OFDM symols x symbol duration)" where "Number of OFDM symols" = 47 for 10 and 5 MHz, 42 for 8.75 MHz and 33 for 7 MHz.
2	RTG	8.4.5.2	m	Y	168 PS for 10 MHz, 186 PS for 8.75 MHz, 120 PS for 7 MHz, 84 PS for 5 MHz and 60 PS for 3.5 MHz	n/a	5 us minimum specified in the referred section. The requirement is equivalent to 60 us for 5, 10 and 7 MHz BW and 74.4 us for 8.75 MHz BW.

4.1.1.7 *Number of OFDM Symbols in DL and UL*

This feature shall be applicable to TDD operation only and specifies number of OFDM symbols in DL and UL subframes.

Table 10. Number of OFDM Symbols in DL and UL

Item	Description	Reference	Status	BS Required	BS Values	MS Required	MS Values	Comment

Item	Description	Reference	Status	BS Required	BS Values	MS Required	MS Values	Comment
1	Number of OFDM Symbols in DL and UL for 5 and 10 MHz BW	8.4.4.2	oi	Y	(35, 12), (34, 13), (33, 14), (32, 15), (31, 16), (30, 17), (29, 18), (28, 19), (27, 20), (26, 21)	Y	The same as BS values	
2	Number of OFDM Symbols in DL and UL for 8.75 MHz BW	8.4.4.2	oi	Y	(30, 12), (29, 13), (28, 14), (27, 15), (26, 16), (25, 17), (24, 18)	Y	The same as BS values	
3	Number of OFDM Symbols in DL and UL for 7 and 3.5 MHz BW	8.4.4.2	oi	Y	(24, 09), (23, 10), (22, 11), (21, 12), (20, 13), (19, 14), (18, 15)	Y	The same as BS values	

4.1.2 Subcarrier Allocation

4.1.2.1 *DL Subcarrier Allocation*

Table 11. 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	Also refer [4]
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	Also refer [4]
	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 12. 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		o	IO-BF	Y	Also refer [4]
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	Also refer [4]
	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 13. 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 14. 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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	
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 15. 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	max number of simultaneous sounding	8.4.6.2.7.1 and 11.8.3.7.14	o	Y	2	This parameter specifies the max number of sounding transmutations

	instructions					by MS in a frame.

4.1.3 UL Control Channels

4.1.3.1 *Initial Ranging*

Table 16. 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 17. 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 18.Periodic Ranging

Item	Description	Reference	Status	BS Required	MS Required	Comment

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	
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 19. 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 20. 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 21. Fast-Feedback/CQI Channel Allocation Method

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	
3	Fast feedback channel allocation using CQICH Enhanced Allocation IE	8.4.5.4.16	o	N	N	

4.1.4 Channel Coding

4.1.4.1 *Repetition*

Table 22. 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 23. 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 24. 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 25. 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 26. 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 27. 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 28. 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 29. 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 30. 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 oi, that is support for values of items 1-4 and 7-8 corresponding to one or more of the categories from the set shall be supported.
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)	Status for the four categories is oi, that is support for values of items 1-4 and 7-8 corresponding to one or more of the categories from the set shall be supported.
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	Status for the four categories is oi, that is support for values of items 1-4 and 7-8 corresponding to one or more of the categories from the set shall be supported.
4	UL Aggregate flag for HARQ buffer	11.8.3.7.19	Category 1 = OFF, Category 2 = ON, Category 3 = ON, Category 4 = ON	Status for the four categories is i.o, that is support for values of items 1-4 and 7-8 corresponding to one or more of the categories from the set shall be supported.
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	

Item	Parameter Description	Reference	Values	Comment
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	Status for the four categories is oi, that is support for values of items 1-4 and 7-8 corresponding to one or more of the categories from the set shall be supported.
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	Status for the four categories is oi, that is support for values of items 1-4 and 7-8 corresponding to one or more of the categories from the set shall be supported.

Note that the HARQ buffer size shall be interpreted as softbits buffer size, i.e. relating to coded data bits and not un-coded. 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.

$$\text{Buffer size} = floor\left[512 * 2^{(K/4)}\right]$$

4.1.5.2 *Incremental Redundancy*

Table 31. 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 32. ACK Channel

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	ACKCH	8.4.5.4.13	m	Y	Y	Conditioned by H-ARQ" support

4.1.6 Control Mechanism

4.1.6.1 *Synchronization*

Table 33. 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 34. 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 35. 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	

4.1.7 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	
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	Also refer [4]
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.

Item	Description	Reference	Status	BS Required	MS Required	Comment
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. Also refer [4]
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.
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	

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	o	N	N	

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. Also refer [4]

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 & 8.4.5.3.22 & 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
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	o	IO-MIMO	Y	
4	2-antenna, matrix B, horizontal encoding	8.4.8.1.4	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	o	N	N	
4	2-antenna, matrix B, horizontal encoding	8.4.8.1.4	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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	o	N	N	
3	2-antenna, matrix B, horizontal encoding	8.4.8.3.1.2.2 8.4.8.3.3	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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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
1	2-antenna, matrix A	8.4.8.3.1.1 8.4.8.3.1.2.1 8.4.8.3.3	o	N	N	2 bins over 6 OFDMA symbols
2	2-antenna, matrix B, vertical encoding	8.4.8.3.1.2.1 8.4.8.3.3	o	N	N	Figure 251i
3	2-antenna, matrix B, horizontal encoding	8.4.8.3.1.2.1 8.4.8.3.3	o	N	N	Figure 251i
4	2-antenna, matrix C	8.4.8.3.1.2.1 8.4.8.3.3	o	N	N	
5	3-antenna, matrix A	8.4.8.3.1.1 8.4.8.3.1.2.1 8.4.8.3.4	o	N	N	2 adjacent subcarriers over 2 consecutive symbols
6	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	
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 adjacent 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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	

4.1.11.5 *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	o	N	N	
2	2-antenna, matrix B, vertical encoding	8.4.8.1.5	o	N	N	
3	2-antenna, matrix B, horizontal encoding	8.4.8.1.5	o	N	N	pp. 574 in [2]
4	Collaborative SM for two MS with single transmit antenna	8.4.8.1.5	o	IO-MIMO	Y	
5	Collaborative SM for two MS with two transmit antennas	8.4.8.1.5	o	N	N	Pilot pattern C and D defined in[2]

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

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	
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	2-antenna, matrix A	8.4.8.4.1 8.4.8.4.2 8.4.8.4.3	o	N	N	Same AMC pilots as in DL 1x6 format
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	
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	

4.1.11.9 *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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	
8	Quantized Weight Feedback	8.4.5.4.10.2	o	N	N	4-bit CQICH
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	

4.1.11.11 *MIMO Midamble*

Table 70. MIMO Midamble

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	2 Tx	8.4.8.5.2.1	o	N	N	
2	3 Tx	8.4.8.5.2.2	o	N	N	
3	4 Tx	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/	8.4.8.2.4	o	N	N	

	MIMO_in_another_BS_IE()					
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	

4.1.12 HO Support in PHY

4.1.12.1 *FBSS*

Table 74. 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 75. 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 76. UL Macro Diversity

Item	Description	Reference	Status	BS Required	MS Required	Comment

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	

4.2 *Performance/Fidelity Requirements*

4.2.1 MS Minimum Performance

4.2.1.1 *SSTTG/SSRTG*

Table 77. SSTTG/SSRTG

Item	Description	Reference	Status	MS Required	MS Values	Comment
1	SSTTG	8.4.4.2	m	Y	50 usec	
2	SSRTG	8.4.4.2	m	Y	50 usec	

4.2.1.2 *Max DL Concurrent Bursts*

Table 78. 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 79. Max Bursts in DL Subframe

Item	Description	Reference	Status	MS Required	MS Values	Comment
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 80. 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 81. 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 82. 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 with H-ARQ	8.4.4.2, 8.4.15.1.3, 11.8.3.7.15	o	Y	Category 1 = 2, Category 2 = 2, Category 3 = 2, Category 4 = 2	

4.2.2 Transmit Requirements

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

Table 83. 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	± 0.5 dB	± 0.5 dB
5.	Spectral flatness	8.4.12.2	≤ ±2 dB for spectral lines from $-N_{used}/4$ to –1 and +1 to $N_{used}/4$ Within +2/-4 dB for spectral lines from $-N_{used}/2$ to $-N_{used}/4$ and $+N_{used}/4$ to $N_{used}/2$	≤ ±2 dB for spectral lines from $-N_{used}/4$ to –1 and +1 to $N_{used}/4$ Within +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	≤ 0.1 dB	≤ 0.1 dB

Item	Requirement	Reference	Values Specified		Values Required
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 usec
8.	Tx relative constellation error	8.4.12.3.1 for BS and 8.4.12.3.2 for MS	QPSK-1/2	≤ -15.0 dB	≤ -15.0 dB
			QPSK-3/4	≤ -18.0 dB	≤ -18.0 dB
			16QAM-1/2	≤ -20.5 dB	≤ -20.5 dB
			16QAM-3/4	≤ -24.0 dB	≤ -24.0 dB
			64QAM-1/2 (if 64-QAM supported)	≤ -26.0 dB	≤ -26.0 dB
			64QAM-2/3 (if 64-QAM supported)	≤ -28.0 dB	≤ -28.0 dB
			64QAM-3/4 (if 64-QAM supported)	≤ -30.0 dB	≤ -30.0 dB

4.2.3 Receiver Requirements

Table 84. Receiver Requirements

Item	Requirement	Reference	Values Specified	Values Required

Item	Requirement	Reference	Values Specified		Values Required
1.	Min SNR requirements for BER=10^{-6} 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		2.9 dB
			QPSK-3/4 with 54 bytes block size		6.3 dB
			16QAM-1/2 with 60 bytes block size		8.6 dB
			16QAM-3/4 with 54 bytes block size		12.7 dB
			64QAM-1/2 with 54 bytes block size (if 64-QAM supported)		13.8 dB
			64QAM-2/3 with 48 bytes block size (if 64-QAM supported)		16.9 dB
			64QAM-3/4 with 54 bytes block size (if 64-QAM supported)		18 dB
			64QAM-5/6 with 60 bytes block size (if 64-QAM supported)		19.9 dB
2.	MS Rx max input level on-channel reception tolerance	8.4.13.3.1	-30 dB		-30 dB
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 dB		0 dB
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^{-6} for 3 dB degradation C/I	8.4.13.2	16QAM-3/4 64QAM-2/3 (if 64-QAM supported)	11 dB 4 dB	11 dB 4 dB
7.	Min alternate channel rejection at BER=10^{-6} for 3 dB degradation C/I	8.4.13.2	16QAM-3/4 64QAM-2/3 (if 64-QAM supported)	30 dB 23 dB	30 dB 23 dB

Item	Requirement	Reference	Values Specified	Values Required
8.	“Implementation loss plus Noise Figure" (dB) value assumed for MS for deriving receiver minimum sensitivity (equation 149b)	8.4.13.1	The min requirement for 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 (equation 149b)	8.4.13.1	The min requirement for 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.

4.2.4 Frequency and Time Synchronization Requirements

Table 85. Frequency and Time Synchronization Requirements

Item	Requirement	Reference	Values Specified	Values Required	Comment
1.	MS UL symbol timing accuracy	8.4.10.1.2	≤ ± (Tb/8)/4	≤ ± (Tb/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	≤ $\pm 2*10^{-6}$	≤ $\pm 2*10^{-6}$	
3.	BS to BS frequency synchronization accuracy for Hand Over	6.3.2.3.47	1% of OFDMA carrier spacing	1% of OFDMA subcarrier spacing	

4.	MS to BS frequency synchronization tolerance	8.4.14.1	≤ 2% of the subcarrier spacing	≤ 2% of the subcarrier spacing	

5. MAC Profile

5.1 *Profiles of BS and MS*

5.1.1 PHS

Table 86. 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 87. 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 certified label, 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 certified label, 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 certified label, 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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
10.	Packet, IPv4 with Header Compression (ROHC)	5.2.6, 11.13.19	oi	Y	Y	
11.	Packet, IPv4 with Header Compression (ECRTP)	5.2.6, 11.13.19	oi	N	N	
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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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

Table 88. 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

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	See [2] negotiated during SBC, 11 bits is default

5.1.4 MAC Support of PHY layer

5.1.4.1 *Feedback Mechanism*

Table 89. 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 extended subheader	6.3.2.2.7.3	o	N	N	
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 90. 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 91. 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 92. 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)
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)

5.1.8 MAC support for H-ARQ

Table 93. 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.

Item	Description	Reference	Status	BS Required	MS Required	Comment
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 94. 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	Y	Y	
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	Y	Y	
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 95. 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	

5.1.11 Request-Grant mechanism

Table 96. 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 97. 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
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/RSPas 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 98. 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 99. 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 100. 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 101. 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 102. 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 103. MAC Layer HO Procedures

Item	Description	Reference	Status	BS Required	MS Required	Comment
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 104. 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	
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.

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	Y	Y	
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	Y	Y	
15.	Unsolicited REG-RSP in same frame as RNG-RSP message	6.3.2.3.6, 6.3.21.2.7	o	N	N	
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, 6.3.21.2.7, 11.6	o	Y	Y	Requires support of SDU SN extended subheader and SN_REPORT header

Item	Description	Reference	Status	BS Required	MS Required	Comment
18.	Support continuation of non-ARQ connection using SDU SN extended sub-header before handover and using SN report header after NW re-entry			Y	Y	
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	

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 105. 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 106. 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
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.

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	
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

Item	Description	Reference	Status	BS Required	MS Required	Comment
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 107. 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.
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.

Item	Description	Reference	Status	BS Required	MS Required	Comment
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.
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.

Item	Description	Reference	Status	BS Required	MS Required	Comment
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.

5.1.19 Sleep Mode

Table 108. Sleep Mode

Item	Description	Reference	Status	BS Required	MS Required	Comment

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 wakening 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 109. Idle Mode

Item	Description	Reference	Status	BS Required	MS Required	Comment

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
2.	Idle mode initiation by DREG-REQ message from MS	6.3.24.1	oi	Y	Y	One of two Idle mode initiation methods is mandatory.
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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	
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	m	N/A	Y	
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	

5.1.21 Expedited Network Re-entry from Idle Mode

Table 110. Expedited Network Re-entry from Idle Mode

Item	Description	Reference	Status	BS Required	MS Required	Comment

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	
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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	
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 Security

5.1.22.1 *Authorization Policy Support*

Table 111. 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	

5.1.22.2 *PKM Version Support*

Table 112. 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	

5.1.22.3 *PKMv2 Authorization policy support – initial network entry*

Table 113. 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	

5.1.22.4 *PKMv2 Authorization policy support – network re-entry*

Table 114. 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	

5.1.22.5 *Supported cryptographic suites*

"Cryptographic suites" includes Data encryption, Data authentication, TEK encryption algorithm.

Table 115. 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	

5.1.22.6 *Message Authentication Code Mode*

Table 116. 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	

5.1.22.7 *Security Association*

Table 117. 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	

5.1.22.8 *SA Service Type*

Table 118. 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

5.1.22.9 *EAP Authentication methods*

Table 119. EAP Authentication Methods

Item	Description	Reference	BS Required	MS Required	Comments
1.					

5.1.22.10 *Certificate profile*

Table 120. 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

5.1.22.11 *Multicast Broadcast Re-keying Algorithm (MBRA)*

Table 121. Service Type

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

	service					

5.1.23 MBS

Table 122. 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).
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).

5.1.24 AAS

Table 123. AAS

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

5.1.25 MS's Network Entry issued by BS restart

Table 124. 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	

5.2 *Parameters*

A default, maximum and minimum should be provided for all parameters.

Table 125. 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	50msec			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
5.	DCD Transition		BS	50msec			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

Item	Description	Reference	Status	Min	Def	Max	Comments
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 msec 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 msec 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 secs , 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	5sec		35sec	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			1sec	Wait for registration response (copied from [1])
15.	T7		MS/BS			1s	Wait for DSA/DSC/DSD Response timeout (copied from [1])
16.	T8		MS/BS			100 msec	Wait for DSA/DSC Acknowledge timeout (copied from [1])
17.	T12		MS			min (20 sec , 5x UCD Interval maximum value)	Wait for UCD descriptor
18.	T14		MS			100msec	Wait for DSX-RVD Timeout

Item	Description	Reference	Status	Min	Def	Max	Comments
19.	T17		BS	5min	5min		Time allowed for SS to complete SS Authorization and Key Exchange
20.	T18		MS	50ms	50 ms	90 ms	Wait for SBC-RSP timeout
21.	T22		MS/BS			0.5 s	Wait for ARQ-Reset
22.	Idle Mode Timer		MS	128 s	4096 s	65536 s	
23.	T43		MS			100 ms	Time the MS waits for MOB_SLP-RSP
24.	T44		MS			100 ms	Time the MS waits for MOB_SCN-RSP
25.	T46		BS	50 ms		100 ms	Time the BS waits for DREG REQ in case of unsolicited Idle Mode initiation from BS
26.	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.
27.	Paging Interval Length		MS/BS	1 frames	2 frames	5 frames	time duration of Paging Interval of the BS
28.	Max Dir Scan Time		MS			2 sec	Maximum scanning time of neighbor BSs by MS before reporting any results
29.	Maximum SDU size			1522 Bytes			Recommended value to derive Maximum Transmission Unit (MTU) from
30.	Number of transport connections in UL			4			Minimum number of concurrent transport CIDs MS is capable to support in UL.
31.	Number of transport connections in DL			4			Minimum number of concurrent transport CIDs MS is capable to support in DL.
32.	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.

Item	Description	Reference	Status	Min	Def	Max	Comments
33.	ARQ_RESET_MAX_RETRIES	6.3.4.6.2, Figures 34, 35			2		The default value must be supported
34.	Min required CS Types per MS		MS		1		Minimum number of simultaneously supported CS options, which is required for MS certification
35.	ARQ_RETRY_TIMEOUT on non H-ARQ connections	11.13.18.3	BS/MS	20ms		1.3s	Used in DSA-REQ and DSA-RSP to indicate the ARQ_Retry_Timeout value. 5msec granularity.
36.	ARQ_RETRY_TIMEOUT on H-ARQ connections	11.13.18.3	BS/MS			1.3s	Used in DSA-REQ and DSA-RSP to indicate the ARQ_Retry_Timeout value. 5msec granularity.
37.	ARQ_SYNC_LOSS_TIMEOUT for non H-ARQ connections	11.13.18.5	BS/MS	100ms			Used in DSA-REQ and DSA-RSP to indicate timeout for ARQ. 5msec granularity.
38.	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. 5msec granularity.
39.	ARQ_RX_PURGE_TIMEOUT for H-ARQ connections	11.13.18.7					Used in DSA-REQ and DSA-RSP to indicate timeout for ARQ. 5msec granularity.
40.	ARQ_BLOCK_LIFETIME granularity	11.13.18.4					5msec granularity.
41.	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.
42.	Power_control_IE::Power measurement frame relevance		BS/MS			4 MS Transmission	

Table 126. Minimum Performance Requirements

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

5.3 *Recommended Configuration*

Table 127. Recommended Configurations

Parameter	Value	Reference
PN window size		MS PN window size for HARQ CID
SAID supported - DL		Maximum number of SAID supported - Downlink
SAID supported - UL		Maximum number of SAID supported - Uplink
Max SDU size for IP CS		
Maximum number of power save class instances supported from class 1 & 2		
Maximum number of power save class instances supported from class 3		

6. Radio Profile

Table 128 defines 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,

ΔF_c is the center frequency step,

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

Table 128. RF Profiles List

	RF Profile Name	Channel BW (MHz)	Center Frequency Step (KHz)	F_{start} (MHz)	N_{range}	Comment
1.	Prof1.A_2.3	8.75	250	2304.5	{0, …, 364)	
2.	Prof1.B_2.3-5	5	250	2302.5	{0, …, 380)	
	Prof1.B_2.3-10	10		2305	{0, …, 360)	
3.	Prof2.A_2.305	3.5	250	2306.75 and 2346.75	{0, …, 46}	
4.	Prof2.B_2.305	5	250	2307.5 and 2347.5	{0, …, 40}	
5.	Prof2.C_2.305	10	250	2310 and 2350	{0, …, 20}	
6.	Prof3.A_2.496 – 5	5	250	2498.5	{0, …, 756}	200 KHz Frequency step is considered for Europe 2.5 GHz extension.
	Prof3.A_2.496 – 10	10		2501	{0, …, 736}	200 KHz Frequency step is considered for Europe 2.5 GHz extension.
7.	Prof4.A_3.3	5	250	3302.5	{0, …, 380)	
8.	Prof4.B_3.3	7	250	3303.5	{0, …, 372)	
9.	Prof4.C_3.3	10	250	3305	{0, …, 360)	
10.	Prof5.A_3.4	5	250	3402.5	{0, …, 1580)	
	Prof5L.A_3.4				{0, …, 780)	
	Prof5H.A_3.4				{800, …, 1580)	
11.	Prof5.B_3.4	7	250	3403.5	{0, …, 1572)	
	Prof5L.B_3.4				{0, …, 772)	
	Prof5H.B_3.4				{800, …, 1572)	
12.	Prof5.C_3.4	10	250	3405	{0, …, 1560)	
	Prof5L.C_3.4				{0, …, 860)	
	Prof5H.C_3.4				{800, …, 1560)	

Note that comprehensive RF raster of Table Table 128 is only for interoperability purposes and not a basis for any performance testing on RF channel scanning and synchronization to network. RF preferred sets are needed to be developed to be considered as basis for scanning time performance requirements.

7. 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 16QAM per Power Class.

Table 129. Power Classes

Class Identifier	Transmit Power (dBm) for 16QAM	Transmit Power (dBm) for QPSK	MS Required
Power Class 1	18 <= PTx,max < 21	20 <= PTx,max < 23	oi
Power Class 2	21 <= PTx,max < 25	23 <= PTx,max < 27	oi
Power Class 3	25 <= PTx,max < 30	27 <= PTx,max < 30	oi
Power Class 4	30 <= PTx,max	30 <= PTx,max	oi

1
2