



## **WiMAX Forum® Air Interface Specification**

WiMAX Forum® Mobile System Profile

**WMF-T23-001-R010v11**

WMF Approved

**(2012-04-16)**

**WiMAX Forum Proprietary**

Copyright © 2012 WiMAX Forum. All Rights Reserved.

1   **Copyright Notice, Use Restrictions, Disclaimer, and Limitation of Liability**

2   Copyright 2012 WiMAX Forum. All rights reserved.

3  
4  
5   The WiMAX Forum® owns the copyright in this document and reserves all rights herein. This document is available for  
6   download from the WiMAX Forum and may be duplicated for internal use by the WiMAX Forum members, provided that all  
7   copies contain all proprietary notices and disclaimers included herein. Except for the foregoing, this document may not be  
8   duplicated, in whole or in part, or distributed without the express written authorization of the WiMAX Forum.

9  
10   Use of this document is subject to the disclaimers and limitations described below. Use of this document constitutes acceptance  
11   of the following terms and conditions:

12  
13   **THIS DOCUMENT IS PROVIDED “AS IS” AND WITHOUT WARRANTY OF ANY KIND. TO THE GREATEST  
14   EXTENT PERMITTED BY LAW, THE WiMAX FORUM DISCLAIMS ALL EXPRESS, IMPLIED AND  
15   STATUTORY WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF TITLE,  
16   NONINFRINGEMENT, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WiMAX  
17   FORUM DOES NOT WARRANT THAT THIS DOCUMENT IS COMPLETE OR WITHOUT ERROR AND  
18   DISCLAIMS ANY WARRANTIES TO THE CONTRARY.**

19  
20   Any products or services provided using technology described in or implemented in connection with this document may be  
21   subject to various regulatory controls under the laws and regulations of various governments worldwide. The user is solely  
22   responsible for the compliance of its products and/or services with any such laws and regulations and for obtaining any and all  
23   required authorizations, permits, or licenses for its products and/or services as a result of such regulations within the applicable  
24   jurisdiction.

25  
26   **NOTHING IN THIS DOCUMENT CREATES ANY WARRANTIES WHATSOEVER REGARDING THE  
27   APPLICABILITY OR NON-APPLICABILITY OF ANY SUCH LAWS OR REGULATIONS OR THE SUITABILITY  
28   OR NON-SUITABILITY OF ANY SUCH PRODUCT OR SERVICE FOR USE IN ANY JURISDICTION.**

29  
30   **NOTHING IN THIS DOCUMENT CREATES ANY WARRANTIES WHATSOEVER REGARDING THE  
31   SUITABILITY OR NON-SUITABILITY OF A PRODUCT OR A SERVICE FOR CERTIFICATION UNDER ANY  
32   CERTIFICATION PROGRAM OF THE WiMAX FORUM OR ANY THIRD PARTY.**

33  
34   The WiMAX Forum has not investigated or made an independent determination regarding title or noninfringement of any  
35   technologies that may be incorporated, described or referenced in this document. Use of this document or implementation of any  
36   technologies described or referenced herein may therefore infringe undisclosed third-party patent rights or other intellectual  
37   property rights. The user is solely responsible for making all assessments relating to title and noninfringement of any technology,  
38   standard, or specification referenced in this document and for obtaining appropriate authorization to use such technologies,  
39   technologies, standards, and specifications, including through the payment of any required license fees.

40  
41   **NOTHING IN THIS DOCUMENT CREATES ANY WARRANTIES OF TITLE OR NONINFRINGEMENT WITH  
42   RESPECT TO ANY TECHNOLOGIES, STANDARDS OR SPECIFICATIONS REFERENCED OR INCORPORATED  
43   INTO THIS DOCUMENT.**

44  
45   **IN NO EVENT SHALL THE WiMAX FORUM OR ANY MEMBER BE LIABLE TO THE USER OR TO A THIRD  
46   PARTY FOR ANY CLAIM ARISING FROM OR RELATING TO THE USE OF THIS DOCUMENT, INCLUDING,  
47   WITHOUT LIMITATION, A CLAIM THAT SUCH USE INFRINGES A THIRD PARTY’S INTELLECTUAL  
48   PROPERTY RIGHTS OR THAT IT FAILS TO COMPLY WITH APPLICABLE LAWS OR REGULATIONS. BY  
49   USE OF THIS DOCUMENT, THE USER WAIVES ANY SUCH CLAIM AGAINST THE WiMAX FORUM AND ITS  
50   MEMBERS RELATING TO THE USE OF THIS DOCUMENT.**

51  
52   The WiMAX Forum reserves the right to modify or amend this document without notice and in its sole discretion. The user is  
53   solely responsible for determining whether this document has been superseded by a later version or a different document.

54  
55   “WiMAX,” “Mobile WiMAX,” “Fixed WiMAX,” “WiMAX Forum,” “WiMAX Certified,” “WiMAX Forum Certified,” the  
56   WiMAX Forum logo and the WiMAX Forum Certified logo are trademarks or registered trademarks of the WiMAX Forum. All  
57   other trademarks are the property of their respective owners.

## Table of Contents

2	<b>1.</b>	<b>SCOPE .....</b>	<b>1</b>
3	<b>2.</b>	<b>REFERENCES.....</b>	<b>2</b>
4	<b>3.</b>	<b>DEFINITIONS .....</b>	<b>3</b>
5	3.1	Abbreviations .....	3
6	3.2	Definitions of system profiles.....	3
7	3.3	Conventions.....	3
8	3.3.1	<i>Item column</i> .....	3
9	3.3.2	<i>Description column</i> .....	3
10	3.3.3	<i>Reference column</i> .....	3
11	3.3.4	<i>Status column</i> .....	3
12	3.3.5	<i>BS/MS Required column</i> .....	3
13	3.3.6	<i>BS/MS Values column</i> .....	4
14	3.3.7	<i>Comment column</i> .....	5
15	<b>4.</b>	<b>PHY PROFILE .....</b>	<b>6</b>
16	4.1	Profiles of BS and MS .....	6
17	4.1.1	<i>System Parameters</i> .....	6
18	4.1.2	<i>Subcarrier Allocation</i> .....	9
19	4.1.3	<i>UL Control Channels</i> .....	11
20	4.1.4	<i>Channel Coding</i> .....	14
21	4.1.5	<i>H-ARQ Support</i> .....	15
22	4.1.6	<i>Control Mechanism</i> .....	17
23	4.1.7	<i>Channel Measurement</i> .....	19
24	4.1.8	<i>Modulation</i> .....	21
25	4.1.9	<i>MAP Support</i> .....	22
26	4.1.10	<i>AAS</i> .....	24
27	4.1.11	<i>STC/MIMO</i> .....	27
28	4.1.12	<i>HO Support in PHY</i> .....	34
29	4.2	Performance/Fidelity Requirements .....	35
30	4.2.1	<i>MS Minimum Performance</i> .....	35
31	4.2.2	<i>Transmit Requirements</i> .....	37
32	4.2.3	<i>Receiver Requirements</i> .....	39
33	4.2.4	<i>Frequency and Time Synchronization Requirements</i> .....	40
34	<b>5.</b>	<b>MAC PROFILE .....</b>	<b>42</b>
35	5.1	Profiles of BS and MS .....	42
36	5.1.1	<i>PHS</i> .....	42
37	5.1.2	<i>CS Options</i> .....	42
38	5.1.3	<i>MAC PDU formats</i> .....	44
39	5.1.4	<i>MAC Support of PHY layer</i> .....	45
40	5.1.5	<i>Multicast connection</i> .....	45
41	5.1.6	<i>Network Entry</i> .....	45
42	5.1.7	<i>ARQ</i> .....	46
43	5.1.8	<i>MAC support for H-ARQ</i> .....	46
44	5.1.9	<i>QoS</i> .....	47
45	5.1.10	<i>Data delivery services for mobile network</i> .....	47
46	5.1.11	<i>Request-Grant mechanism</i> .....	48
47	5.1.12	<i>Neighbor Advertisement</i> .....	49
48	5.1.13	<i>Scanning and Association</i> .....	49

1	5.1.14	<i>MAC layer HO procedures</i> .....	52
2	5.1.15	<i>HO Optimization</i> .....	53
3	5.1.16	<i>CID and SAID Update</i> .....	55
4	5.1.17	<i>Fast BS Switching</i> .....	56
5	5.1.18	<i>Macro Diversity Handover</i> .....	58
6	5.1.19	<i>Sleep Mode</i> .....	60
7	5.1.20	<i>Idle Mode</i> .....	62
8	5.1.21	<i>Expedited Network Re-entry from Idle Mode</i> .....	64
9	5.1.22	<i>MBS</i> .....	65
10	5.1.23	<i>AAS</i> .....	67
11	5.1.24	<i>MS's Network Entry issued by BS restart</i> .....	67
12	5.1.25	<i>NSP Selection</i> .....	67
13	5.1.26	<i>Cell TYPE</i> .....	68
14		<i>Note: Cell Type TLV shall not affect general Release 1.0 MS. General Release 1.0 MS may neglect "Cell Type TLV", while Release 1.0 MS with IOMS-FMT support shall decode the "Cell Type TLV".</i> .....	68
15	5.1.27	<i>Load Balancing</i> .....	68
16	5.1.28	<i>Soft combining of RNG-REQ/SBC-REQ/BR Header</i> .....	69
17	5.2	<i>Parameters</i> .....	70
18	6.	<b>SECURITY</b> .....	<b>76</b>
19	6.1	Authorization Policy Support .....	76
20	6.2	PKM Version Support .....	76
21	6.3	PKMv2 Authorization policy support – initial network entry .....	76
22	6.4	PKMv2 Authorization policy support – network re-entry .....	77
23	6.5	Supported cryptographic suites.....	77
24	6.6	Message Authentication Code Mode.....	78
25	6.7	Security Association .....	79
26	6.8	SA Service Type.....	79
27	6.9	EAP Authentication methods .....	79
28	6.10	Certificate profile .....	79
29	6.11	Multicast Broadcast Re-keying Algorithm (MBRA).....	80
30	7.	<b>RADIO PROFILE</b> .....	<b>81</b>
31	8.	<b>POWER CLASS PROFILE</b> .....	<b>82</b>
32			
33			
34			

1

## 2 List of Tables

3 TABLE 2. STATUS COLUMN ENTRIES.....	3
4 TABLE 3. REQUIRED COLUMN ENTRIES.....	4
5 TABLE 4. VALUE COLUMN ENTRIES .....	4
6 TABLE 5. PHY MODE.....	6
7 TABLE 6. FFT SIZES.....	6
8 TABLE 7. SAMPLING FACTOR.....	6
9 TABLE 8. CYCLIC PREFIX.....	7
10 TABLE 9. FRAME LENGTH.....	7
11 TABLE 10. TTG/RTG .....	7
12 TABLE 11. NUMBER OF OFDM SYMBOLS IN DL AND UL.....	8
13 TABLE 12. DL SUBCARRIER ALLOCATION .....	9
14 TABLE 13. UL SUBCARRIER ALLOCATION .....	9
15 TABLE 14. COMMON SYNC SYMBOL.....	10
16 TABLE 15. UL SOUNDING 1 .....	10
17 TABLE 16. UL SOUNDING 2 .....	11
18 TABLE 17. INITIAL RANGING .....	11
19 TABLE 18. HO RANGING .....	12
20 TABLE 19. PERIODIC RANGING.....	12
21 TABLE 20. BW REQUEST .....	12
22 TABLE 21. FAST-FEEDBACK/CQI CHANNEL ENCODING.....	13
23 TABLE 22. FAST-FEEDBACK/CQI CHANNEL ALLOCATION METHOD.....	13
24 TABLE 23. REPETITION .....	14
25 TABLE 24. RANDOMIZATION .....	14
26 TABLE 25. CONVOLUTIONAL CODE .....	14
27 TABLE 26. CONVOLUTIONAL TURBO CODE.....	14
28 TABLE 27. BLOCK TURBO CODE.....	14
29 TABLE 28. LOW DENSITY PARITY CHECK CODE.....	15
30 TABLE 29. INTERLEAVING .....	15
31 TABLE 30. CHASE COMBINING H-ARQ.....	15
32 TABLE 31. HARQ PARAMETERS FOR CHASE WITH CTC .....	16
33 TABLE 32. INCREMENTAL REDUNDANCY H-ARQ .....	17
34 TABLE 33. ACK CHANNEL .....	17
35 TABLE 34. SYNCHRONIZATION .....	17
36 TABLE 35. CLOSED-LOOP POWER CONTROL .....	18
37 TABLE 36. OPEN-LOOP POWER CONTROL.....	18
38 TABLE 37. MS MAXIMUM TRANSMISSION POWER LIMITATION CONTROL.....	18
39 TABLE 38. CINR MEASUREMENT.....	19
40 TABLE 39. RSSI MEASUREMENT.....	20
41 TABLE 40. PRBS.....	21
42 TABLE 41. DOWNLINK MODULATION.....	21
43 TABLE 42. UPLINK MODULATION.....	21
44 TABLE 43. PILOT MODULATION .....	21
45 TABLE 44. PREAMBLE MODULATION .....	22
46 TABLE 45. RANGING MODULATION .....	22
47 TABLE 46. NORMAL MAP .....	22
48 TABLE 47. COMPRESSED MAP .....	22
49 TABLE 48. SUB-DL-UL MAP .....	23
50 TABLE 49. H_ARQ MAP MESSAGE .....	23
51 TABLE 50. EXTENDED H-ARQ IE IN NORMAL MAP .....	23
52 TABLE 51. DL REGION DEFINITION SUPPORT .....	23
53 TABLE 52. AAS ZONE SUPPORT .....	24

1	TABLE 53. SUPPORTED PERMUTATION IN DL.....	24
2	TABLE 54. SUPPORTED PERMUTATION IN UL.....	24
3	TABLE 55. AAS DL PREAMBLE.....	25
4	TABLE 56. AAS UL PREAMBLE.....	25
5	TABLE 57. DIVERSITY MAP SCAN .....	25
6	TABLE 58. DL AAS_SDMA PILOTS.....	26
7	TABLE 59. UL AAS_SDMA PILOTS .....	26
8	TABLE 60. AAS PRIVATE MAP .....	26
9	TABLE 61. AAS_FBCX/RSP SUPPORT .....	27
10	TABLE 62. SUPPORTED FEATURES FOR DL PUSC.....	27
11	TABLE 63. SUPPORTED FEATURES FOR DL FUSC.....	27
12	TABLE 64. SUPPORTED FEATURES FOR DL OPTIONAL FUSC.....	28
13	TABLE 65. SUPPORTED FEATURES FOR DL OPTIONAL AMC.....	29
14	TABLE 66. SUPPORTED FEATURES FOR DL PUSC-ASCA.....	30
15	TABLE 67. SUPPORTED FEATURES IN UL PUSC .....	30
16	TABLE 68. SUPPORTED FEATURES IN UL OPTIONAL PUSC .....	31
17	TABLE 69. SUPPORTED FEATURES IN UL OPTIONAL AMC .....	31
18	TABLE 70. CLOSED-LOOP MIMO .....	31
19	TABLE 71. MIMO FEEDBACK .....	32
20	TABLE 72. MIMO MIDAMBLE .....	32
21	TABLE 73. MIMO SOFT-HANDOVER MACRO-DIVERSITY .....	33
22	TABLE 74. H-ARQ DOWNLINK SUPPORT FOR MIMO .....	33
23	TABLE 75. H-ARQ UPLINK SUPPORT FOR MIMO .....	33
24	TABLE 76. FAST BASE STATION SWITCHING .....	34
25	TABLE 77. MIMO SOFT-HANDOVER BASED MACRO-DIVERSITY TRANSMISSION.....	34
26	TABLE 78. UL MACRO DIVERSITY .....	35
27	TABLE 79. SSSTG/SSRTG.....	35
28	TABLE 80. MAXIMUM DL CONCURRENT BURSTS.....	35
29	TABLE 81. MAX BURSTS IN DL SUBFRAME .....	36
30	TABLE 82. MAX NUMBER OF ZONES IN DL AND UL SUBFRAMES .....	36
31	TABLE 83. MEASUREMENT PROCESSES AND CQI CHANNELS.....	36
32	TABLE 84. MAX H-ARQ BURSTS .....	36
33	TABLE 85. TRANSMITTER REQUIREMENTS .....	37
34	TABLE 86. RECEIVER REQUIREMENTS .....	39
35	TABLE 87. FREQUENCY AND TIME SYNCHRONIZATION REQUIREMENTS.....	40
36	TABLE 88. PHS .....	42
37	TABLE 89. CONVERGENCE SUBLAYER OPTIONS .....	42
38	TABLE 90. MAC PDU FORMATS.....	44
39	TABLE 91. FEEDBACK MECHANISM .....	45
40	TABLE 92. MULTICAST CONNECTION .....	45
41	TABLE 93. NETWORK ENTRY .....	45
42	TABLE 94. ARQ .....	46
43	TABLE 95. MAC SUPPORT FOR HARQ .....	46
44	TABLE 96. QOS .....	47
45	TABLE 97. DATA DELIVERY SERVICES FOR MOBILE NETWORK .....	47
46	TABLE 98. REQUEST-GANT MECHANISM .....	48
47	TABLE 99. NEIGHBOR ADVERTISEMENT .....	49
48	TABLE 100. SCANNING .....	49
49	TABLE 101. SCAN REPORTING TYPE SUPPORT .....	50
50	TABLE 102. ASSOCIATION .....	50
51	TABLE 103. ASSOCIATION TYPE SUPPORT .....	51
52	TABLE 104. HO/SCAN/REPORT TRIGGER METRICS .....	51
53	TABLE 105. MAC LAYER HO PROCEDURES .....	52
54	TABLE 106. HO OPTIMIZATION .....	53
55	TABLE 107. CID AND SAID UPDATE .....	55
56	TABLE 108. FAST BASE STATION SWITCHING .....	56

1	TABLE 109. MACRO DIVERSITY HANDOVER .....	58
2	TABLE 110. SLEEP MODE .....	60
3	TABLE 111. IDLE MODE.....	62
4	TABLE 112. EXPEDITED NETWORK RE-ENTRY FROM IDLE MODE .....	64
5	TABLE 113. MBS .....	65
6	TABLE 114. AAS .....	67
7	TABLE 115. MS'S NETWORK ENTRY ISSUED BY BS RESTART.....	67
8	TABLE 116. NSP SELECTION .....	67
9	TABLE 117. CELL TYPE .....	68
10	TABLE 118. LOAD BALANCING.....	68
11	TABLE 119. LOAD BALANCING.....	69
12	TABLE 120. PARAMETERS .....	70
13	TABLE 121. MINIMUM PERFORMANCE REQUIREMENTS .....	75
14	TABLE 122. AUTHORIZATION POLICY SUPPORT.....	76
15	TABLE 123. PKM VERSION SUPPORT .....	76
16	TABLE 124. PKMV2 AUTHORIZATION POLICY SUPPORT-INITIAL NETWORK ENTRY.....	76
17	TABLE 125. PKMV2 AUTHORIZATION POLICY SUPPORT-NETWORK RE-ENTRY.....	77
18	TABLE 126. SUPPORTED CRYPTOGRAPHIC SUITES .....	77
19	TABLE 127. MESSAGE AUTHENTICATION CODE MODE .....	78
20	TABLE 128. SECURITY ASSOCIATION .....	79
21	TABLE 129. SA SERVICE TYPE.....	79
22	TABLE 130. EAP AUTHENTICATION METHODS.....	79
23	TABLE 131. CERTIFICATE PROFILE.....	79
24	TABLE 132. SERVICE TYPE.....	80
25	TABLE 133. EXAMPLE OF APPLICABILITY OF THE FORMULA TO THE 2500 - 2690 MHZ BAND .....	81
26	TABLE 134. POWER CLASSES .....	82

---

## 1. Scope

2 The main objective of this document is to provide OFDMA System Profile specification of mobile network,  
3 complementary to 802.16-2004 as amended by 802.16e-2005 standard, primarily for the purpose of certification of  
4 conformant Subscriber Stations and Base Stations (including WiMAX® Femto Access Point).

---

## 1    2. References

- 2    [1] **IEEE Standard 802.16-2004**, IEEE Standard for Local and Metropolitan Area Networks - Part 16: Air  
3    Interface for Fixed Wireless Access Systems.
- 4    [2] **IEEE Standard 802.16e-2005**, *Amendment to IEEE Standard for Local and Metropolitan Area Networks -*  
5    *Part 16: Air Interface for Fixed Broadband Wireless Access Systems- Physical and Medium Access Control*  
6    *Layers for Combined Fixed and Mobile Operation in Licensed Bands*
- 7    [3] **WiMAX Forum® Mobile Certification Profile**, WiMAX, Certification Working Group, April 2006
- 8    [4] **IEEE P80216/Cor2/D3, Draft Standard for Local and metropolitan area networks Part 16: Air Interface**  
9    **for Fixed and Mobile Broadband Wireless Access Systems Corrigendum 2 D3**, IEEE 802.16 Working  
10   Group, July 2007
- 11   [5] **WMF-T31-123-R016v01**, Requirements for WiMAX Femtocell Systems

---

## 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

<b>m</b>	Explicitly shown as mandatory in the standard. It is required to implement
<b>pm</b>	Potentially mandatory, required for the system to perform basic operations (Not explicitly shown as mandatory in the standard). It is required to implement.
<b>o</b>	Explicitly mentioned as optional in the standard or is not explicitly mentioned but has capability negotiations. It may or may not be implemented.
<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, 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
<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 every BS/MS to implement for WiMAX® certification purposes. For those items listed in “WiMAX Forum Mobile System Profile Release 1.0 Timeline Annex”, the Y or IO status of the required column is valid only after the validation of its corresponding package starts. The timeline of the validation start is provided in the Timeline Annex.

1

**Table 2. Required Column Entries**

<b>Y or y.</b>	Required to implement
<b>N or n</b>	Not required to implement.
<b>IO-NNNN</b>	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 <ul style="list-style-type: none"> <li>▪ The item is not required to get general “WiMAX certified” label and</li> <li>▪ Is required to get distinct “WiMAX certified with NNNN capability” label.</li> </ul>
<b>IOMS-NNNN</b>	Inter-operable Options: Item belongs to NNNN group of features for which it is requested to provide testing procedure and distinct labeling of MS equipment. More specifically <ul style="list-style-type: none"> <li>▪ The item is not required to get general “WiMAX certified” label and</li> <li>▪ It is required to get distinct “WiMAX certified with NNNN capability” label</li> </ul>
<b>n/a</b>	Not applicable

2

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

4

- 5 1. IO-MIMO: Group of Inter-operable Option features related to Multiple Input Multiple Output (MIMO) operation.
- 6 2. IO-BF: Group of Inter-operable Option features related to Beam Forming (BF) operation.
- 7 3. IO/IOMS-MBS: Group of Inter-operable Option features related to Multicast and Broadcast Services (MBS) operation.
- 8 4. IO/IOMS-MBS2: Group 2 of Inter-operable Option features related to Multicast and Broadcast Services (MBS) operation.
- 9 5. IO/IOMS-MBS3: Group 3 of Inter-operable Option features related to Multicast and Broadcast Services (MBS) operation.
- 10 6. IO/IOMS-MBS4: Group 4 of Inter-operable Option features related to Multicast and Broadcast Services (MBS) operation.
- 11 7. IO-ETHx (x = 1, 2, 3): Groups of Inter-operable Option features related to Ethernet CS
- 12 8. IO-QoS: Inter-operable Optional related to QoS features SS-initiated service flow transactions
- 13 9. IO-ROHC: Groups of inter-operable features related to usage of RoHC option in CS.
- 14 10. IOMS-ROHC: Groups of inter-operable features related to usage of RoHC option in CS.
- 15 11. IO-GPSS: Group of Inter-Operable Optional features related to GPS Synchronized WiMAX Femto Access Point (FAP). This IO is applicable to BSs with Cell Types 1, 2 and 3.
- 16 12. IO-NETS: Group of Inter-Operable Optional features related to Network Synchronized WiMAX Femto Access Point (FAP) or Indoor Network Synchronized WiMAX BS. This IO is applicable to BSs Cell Types 4, 5 and 6.
- 17 13. IOMS-FMT: Group of Inter-operable Option features related to the MS support of femtocell.
- 18 14. IO-RNG\_SPLIT: Groups of inter-operable features related to the splitting (“fragmentation”) of the RNG-REQ in case of HO
- 19 15. IOMS-RNG\_SPLIT: Groups of inter-operable features related to the splitting (“fragmentation”) of the RNG-REQ in case of HO
- 20 16. IO-SND: Group of Inter-operable Option features related to sounding.

21

22

23

24

25

26

27

28

29

30

31

32

### 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.

33

**Table 3. 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

1

2 **3.3.7 Comment column**

3 This column provides additional clarification and reasoning for each item.

4

## 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 Channel bandwidths and corresponding FFT sizes

Table 5 specifies the FFT sizes corresponding to various channel bandwidths.

**Table 5. FFT Sizes**

Channel Bandwidth (MHz)	FFT Size
3.5	512
5	512
7	1024
8	1024
8.75	1024
10	1024

##### 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	

1    **4.1.1.4 Cyclic Prefix**

2    **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	

3

4    **4.1.1.5 Frame Length**

5    **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	

6

7    **4.1.1.6 TTG/RTG**

8    This parameter shall be applicable only to TDD mode.

9    **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, 409 PS for 8 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 symbols x symbol duration)" where "Number of OFDM symbols" = 47 for 10 and 5 MHz, 37 for 8 MHz, 42 for 8.75 MHz and 33 for 7 MHz.
2	RTG	8.4.5.2	m	Y	168 PS for 10	n/a	5 us minimum

Item	Description	Reference	Status	BS Required	BS Values	MS Required	Comment
1					MHz, 135 PS for 8 MHz, 186 PS for 8.75 MHz, 120 PS for 7 MHz, 84 PS for 5 MHz and 60 PS for 3.5 MHz		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. 60.27 us for 8 MHz.

#### 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.

5 **Table 10. Number of OFDM Symbols in DL and UL**

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	Number of OFDM Symbols in DL and UL for 8 MHz BW	8.4.4.2	oi	Y	(28, 9), (27, 10), (26, 11), (25, 12), (24, 13), (23, 14), (22, 15), (21, 16), (20, 17)	Y	The same as BS values	

1   **4.1.2 Subcarrier Allocation**

2   **4.1.2.1 DL Subcarrier Allocation**

3   **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	N	N	
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

5   **4.1.2.2 UL Subcarrier Allocation**

6   **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	11.3.1	o	Y	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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
	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

1

#### 2 4.1.2.3 Common SYNC Symbol

3 **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

#### 5 4.1.2.4 UL Sounding

6 **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-SND	Y	
2	Type A w/ Cyclic shift – Support P values of 9 and 18	8.4.6.2.7.1	o	IO-SND	Y	
3	Type A w/ Decimation	8.4.6.2.7.1	o	IO-SND	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-SND	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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	

1

2

**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 instructions	8.4.6.2.7.1 and 11.8.3.7.14	o	Y	2	This parameter specifies the max number of sounding transmutations by MS in a frame.

3

#### 4.1.3 UL Control Channels

##### 5.4.1.3.1 Initial Ranging

6

**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	

7

1    **4.1.3.2 HO Ranging**

2    **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	

3

4

5    **4.1.3.3 Periodic Ranging**

6    **Table 18. 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	
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	

7

8    **4.1.3.4 BW Request**

9    **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	8.4.7.2	oi	N	N	

	PUSC zone w/ 1 symbols					
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	

1

## 2 **4.1.3.5 Fast-Feedback/CQI Channel Encoding**

3 **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	

4

5 Note on Item 2: If the "Feedback Type" in CQICH\_Alloc\_IE() is set to "0b01 = Effective CINR Feedback" and the  
6 MS negotiation capability "Type 173, bit#1 = Enhanced FAST\_FEEDBACK" is enabled which indicates support  
7 for "6-bit CQI", the reported effective CINR shall be in the 0b00xxxx format where the 4 LSBs is described in Table  
8 298b of Section 8.4.5.4.10.4 in [2].

9

## 10 **4.1.3.6 Fast-Feedback/CQI Channel Allocation Method**

11 **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	

12

1   **4.1.4 Channel Coding**

2   **4.1.4.1 Repetition**

3                   **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

5   **4.1.4.2 Randomization**

6                   **Table 23. Randomization**

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

7

8   **4.1.4.3 Convolutional Code**

9                   **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	

10

11   **4.1.4.4 Convolutional Turbo Code**

12                   **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	

13

14   **4.1.4.5 BTC**

15                   **Table 26. Block Turbo Code**

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

16

1    **4.1.4.6 LDPC**

2    **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	

3    **4.1.4.7 Interleaving**

4    **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

5  
6

7    **4.1.5 H-ARQ Support**

8    **4.1.5.1 Chase Combining**

9    **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	

1

**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), Category 5 = 32,768 (K=24), Category 6 = 32,768 (K=24), Category 7 = 46,340 (K=26)	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. Allocation with Cat 7 shall not exceed, per frame, 46,340 x 4= 185,360 coded bits.
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), Category 5 = 16384 (K=20), Category 6 = 23170 (K=22), Category 7 = 23170 (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.
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, Category 5 = ON, Category 6 = ON, Category 7 = 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, Category 5 = ON, Category 6 = ON, Category 7 = 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	
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, Category 5 = 16, Category 6 = 16, Category 7 = 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, Category 5 = 10, Category 6 = 10, Category 7 = 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.

2

1 Note that the HARQ buffer size shall be interpreted as softbits buffer size, i.e. relating to coded data bits and not un-  
2 coded. This means the buffer size refers to both the systematic and parity bits transmitted over the air. It is left to  
3 vendor's implementation to determine the amount of memory space for each bit of transmitted information. The  
4 buffer size is related to buffer size parameter K according to the following Equation.

5

$$6 \quad \text{Buffersize} = \text{floor}\left[512 * 2^{(K/4)}\right]$$

7

8 **4.1.5.2 Incremental Redundancy**

9 **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	

10

11 **4.1.5.3 ACK Channel**

12 **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

13

14 **4.1.6 Control Mechanism**

15 **4.1.6.1 Synchronization**

16 **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	

1

#### 2 4.1.6.2 Closed-loop Power Control

3 **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

#### 5 4.1.6.3 Open-loop Power Control

6 **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	

7

8

#### 9 4.1.6.4 MS Maximum Transmission Power Limitation Control Using UCD TLV

10 **Table 36. MS Maximum Transmission Power Limitation Control**

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

## 4.1.7 Channel Measurement

### 4.1.7.1 CINR Measurement

**Table 37. 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.
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.

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	

1

## 2 4.1.7.2 RSSI Measurement

3

Table 38. 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

5

1   **4.1.8 Modulation**

2   **4.1.8.1 PRBS (Subcarrier Randomization)**

3                   **Table 39. PRBS**

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

4

5   **4.1.8.2 Downlink**

6                   **Table 40. 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	

7

8   **4.1.8.3 Uplink**

9                   **Table 41. 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	

10

11   **4.1.8.4 Pilot Modulation**

12                   **Table 42. Pilot Modulation**

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

13

1    **4.1.8.5 Preamble Modulation**

2                   **Table 43. 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

3

4    **4.1.8.6 Ranging Modulation**

5                   **Table 44. 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.

6

7    **4.1.9 MAP Support**

8    **4.1.9.1 Normal MAP**

9                   **Table 45. 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	

10

11    **4.1.9.2 Compressed MAP**

12                   **Table 46. Compressed MAP**

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

13

1    **4.1.9.3 Sub-DL-UL MAP**

2                   **Table 47. 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]

3

4    **4.1.9.4 H-ARQ MAP Message**

5                   **Table 48. 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	

6

7    **4.1.9.5 Extended HARQ IE in the Normal MAP**

8                   **Table 49. 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	

9

10

11    **4.1.9.6 DL Region Definition**

12                   **Table 50. 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	

1

## 2 **4.1.10 AAS**

### 3 **4.1.10.1 AAS Zone Support**

4 **Table 51. 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	

5

### 6 **4.1.10.2 Supported Permutation in DL**

7 **Table 52. 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	

### 8 **4.1.10.3 Supported Permutation in UL**

9 **Table 53. 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	

1

2 **4.1.10.4 AAS DL Preamble**

3 **Table 54. 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

5 **4.1.10.5 AAS UL Preamble**

6 **Table 55. 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

7

8 **4.1.10.6 Diversity MAP Scan**

9 **Table 56. Diversity MAP Scan**

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

10

1    **4.1.10.7            DL AAS-SDMA Pilots**

2                           **Table 57. 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	

3

4    **4.1.10.8            UL AAS-SDMA Pilots**

5                           **Table 58. 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	

6

7    **4.1.10.9            AAS Private MAP**

8                           **Table 59. 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	

9

1   **4.1.10.10      AAS-FBCK-REQ/RSP support**

2                   **Table 60. 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	

3  
4

5   **4.1.11 STC/MIMO**

6

7   **4.1.11.1      Supported Features for DL PUSC**

8                   **Table 61. 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	

9

10   **4.1.11.2      Supported Features for DL FUSC**

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

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	FHDC		o	N	N	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	

1

2 **4.1.11.3 Supported Features for DL Optional FUSC**

3 **Table 63. 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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	

1

2   **4.1.11.4              Supported Features for DL Optional AMC**

3                           **Table 64. 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, 8.4.8.1.2.1.3	o	N	N	Figure 251i
3	2-antenna, matrix B, horizontal encoding	8.4.8.3.1.2.1 8.4.8.3.3, 8.4.8.1.2.1.3	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

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	

1

#### 2   **4.1.11.5         Supported Features for DL PUSC-ASCA**

3                   **Table 65. 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

5

#### 6   **4.1.11.6         Supported Features in UL PUSC**

7                   **Table 66. 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]

8

1    **4.1.11.7         Supported Features in UL Optional PUSC**

2                   **Table 67. 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	
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	

3

4    **4.1.11.8         Supported Features in UL Optional AMC**

5                   **Table 68. 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	

6

7    **4.1.11.9         Closed-Loop MIMO**

8                   **Table 69. 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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	
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

1

## 2 4.1.11.10 MIMO Feedback

3 **Table 70. 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

## 5 4.1.11.11 MIMO Midamble

6 **Table 71. 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	

7

1    **4.1.11.12      MIMO Soft-Handover Based Macro-diversity**

2                   **Table 72. 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	

3  
4

5    **4.1.11.13      H-ARQ Downlink Support for MIMO**

6                   **Table 73. 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	

7

8    **4.1.11.14      H-ARQ Uplink Support for MIMO**

9                   **Table 74. 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	
---	-------------	--------------	---	---	---	--

1  
2

### 3 **4.1.12 HO Support in PHY**

#### 4 **4.1.12.1 FBSS**

5 **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

6

#### 7 **4.1.12.2 MIMO Soft-handover based macro-diversity transmission**

8 **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	

9

1    **4.1.12.3        UL Macro diversity**

2                    **Table 77. UL Macro Diversity**

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	

3  
4

5    **4.2 Performance/Fidelity Requirements**

6    **4.2.1 MS Minimum Performance**

7    **4.2.1.1 SSTTG/SSRTG**

8                    **Table 78. 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	

9

10    **4.2.1.2 Max DL Concurrent Bursts**

11                  **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	

12

1   **4.2.1.3 Max Bursts in DL Subframe**

2                   **Table 80. 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	

3   **4.2.1.4 Max Number of Zones in DL/UL Subframe**

4                   **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.

5

6   **4.2.1.5 Measurement Processes and CQI Channels**

7                   **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.

8

9   **4.2.1.6 Max H-ARQ Bursts in DL/UL Subframe**

10                  **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	Status for the four categories is o, i.e. support for values corresponding to one or more

					= 5, Category 3 = 5, Category 4 = 5	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	

1

## 2 4.2.2 Transmit Requirements

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

4 **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	Single step size m   Required relative accuracy  $ m  = 1\text{dB}$   +/- 0.5 dB $ m  = 2\text{dB}$   +/- 1 dB $ m  = 3\text{dB}$   +/- 1.5 dB $4\text{dB} <  m  \leq 10\text{dB}$   +/- 2 dB  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.	Single step size m   Required relative accuracy  $\text{ceil}( m ) = 1\text{dB}$   +/- 0.5 dB $\text{ceil}( m ) = 2\text{dB}$   +/- 1 dB $\text{ceil}( m ) = 3\text{dB}$   +/- 1.5 dB $4\text{dB} < \text{ceil}( m ) \leq 10\text{dB}$   +/- 2 dB  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.
5.	Spectral flatness	8.4.12.2	$\leq \pm 2\text{ dB}$ for spectral lines	$\leq \pm 2\text{ dB}$ for spectral lines from –

Item	Requirement	Reference	Values Specified	Values Required	
			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 $N_{used}/2$	$N_{used}/4$ 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	$\leq 0.4$ dB	$\leq 0.4$ dB	
7.	GPS synchronized BS and 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 not applicable to IO-NETS	
8.	Network synchronized 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 from GPS	2.3 usec with reference to 1pps signal from GPS  The transmit reference timing shall not change by more than 25nsec integrated in absolute value over any 1 sec period.  The transmitted carrier frequency shall not change by more than 10 Hz integrated in absolute value over any 300 msec period.  Applicable only to IO-NETS	
9.	Tx relative constellation error	8.4.12.3.1 for BS and 8.4.12.3.2 for MS	QPSK 1/2  QPSK 3/4  16-QAM 1/2  16-QAM 3/4  64-QAM 1/2 (if 64-QAM supported)  64-QAM 2/3 (if 64-QAM supported)  64-QAM 3/4 (if 64-QAM supported)  64QAM-5/6 (if applicable)	$\leq -15.0$ dB  $\leq -18.0$ dB  $\leq -20.5$ dB  $\leq -24.0$ dB  $\leq -26.0$ dB  $\leq -28.0$ dB  $\leq -30.0$ dB  $\leq -30.0$ dB	$\leq -15.0$ dB  $\leq -18.0$ dB  $\leq -20.5$ dB  $\leq -24.0$ dB  $\leq -26.0$ dB  $\leq -28.0$ dB  $\leq -30.0$ dB  $\leq -30.0$ dB

### 1    4.2.3 Receiver Requirements

2                      **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
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

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.
Comments: [Editor's Note: The Accepted CR #653 calls for above requirements of Items 6 and 7 to be applicable to CC FEC. Considering the fact that TWG members believed that the numbers should be revisited for CTC FEC, it is recommended to consider the same requirements for CTC until an agreement by group is developed for possible update. In the case of CTC, the requirements shall be applied to the most sensitive MCS level for each Modulation order. This means for MS equipments and CTC mode, 64-QAM requirements shall be applied to 64-QAM 5/6 and not to 64-QAM 3/4.]				

1

## 2 4.2.4 Frequency and Time Synchronization Requirements

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

Item	Requirement	Reference	Values Specified	Values Required	Comment
1.	MS UL symbol timing accuracy	8.4.10.1.2	$\leq \pm (\text{Tb}/8)/4$	$\leq \pm (\text{Tb}/32)/4$	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	$\leq \pm 2 \times 10^{-6}$	$\leq \pm 2 \times 10^{-6}$	

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	≤ 2% of the subcarrier spacing	≤ 2% of the subcarrier spacing	

1

2

---

## 1 5. MAC Profile

### 2 5.1 Profiles of BS and MS

#### 3 5.1.1 PHS

4 **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

#### 6 5.1.2 CS Options

7 **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 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	
10.	Packet, IPv4 with Header Compression (ROHC)	5.2.6, 11.13.19	oi	IO-ROHC	IOMS-ROHC	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	IO-ROHC	IOMS-ROHC	
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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
21.	Packet, IPv6 over 802.1Q VLAN with Header Compression (ECRTP)	5.2.6, 11.13.19	oi	N	N	

1

## 2 5.1.3 MAC PDU formats

3 **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	See [2] negotiated during SBC, 11 bits is default

4

1    **5.1.4 MAC Support of PHY layer**

2    **5.1.4.1 Feedback Mechanism**

3                   **Table 90. Feedback Mechanism**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1.	Feedback Header	6.3.2.1.2.2.1	o	N	N	
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	N	N	
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	

4

5    **5.1.5 Multicast connection**

6                   **Table 91. Multicast Connection**

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

7

8    **5.1.6 Network Entry**

9                   **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

10

### 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)
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)

3

### 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 for transport connections	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	11.4.1	o	Y	Y	

Item	Description	Reference	Status	BS Required	MS Required	Comment
	in DL transmission					
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	
9.	HARQ Support for UL MAC management connections after SBC	6.3.17	o	Y	Y	

1

## 2 5.1.9 QoS

3

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 certified label, 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 certified label, 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	

4

## 5 5.1.10 Data delivery services for mobile network

6

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	

1

## 2 5.1.11 Request-Grant mechanism

3

**Table 97. 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	

4

1    **5.1.12 Neighbor Advertisement**

2                      **Table 98. 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/RSP As BS may decide to use the index while MS has to support it.

3

4    **5.1.13 Scanning and Association**

5

6    **5.1.13.1         Scanning**

7                      **Table 99. 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	

1

2 **5.1.13.2 Scan Reporting Type Support**

3 **Table 100. 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	

4

5 **5.1.13.3 Association**

6 **Table 101. 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	
----	---	-------	---	---	---	--

1

2 **5.1.13.4 Association Type Support**

3 **Table 102. 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

4

5 **5.1.13.5 HO/Scan/Report Trigger Metrics**

6 **Table 103. 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

7

1    **5.1.14 MAC layer HO procedures**

2                   **Table 104. 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	N	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.

3

## 1    5.1.15 HO Optimization

2                      **Table 105. 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.
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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	
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	

**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 106. 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	N	N/A	
4.	CID update in MS by REG-RSP	11.7.9	pm	N/A	N	
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	N	N/A	
8.	Compressed CID update in MS by REG-RSP	11.7.9.1	pm	N/A	N	
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

6

1    **5.1.17 Fast BS Switching**

2                   **Table 107. 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.
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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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
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.

1    **5.1.18 Macro Diversity Handover**

2    **Table 108. 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.
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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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.
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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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.

1

## 2 5.1.19 Sleep Mode

3

Table 109. 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

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	
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	

Item	Description	Reference	Status	BS Required	MS Required	Comment
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.

1

2

### 3 5.1.20 Idle Mode

4

**Table 110. 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
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

Item	Description	Reference	Status	BS Required	MS Required	Comment
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	
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	

1

2 **5.1.21 Expedited Network Re-entry from Idle Mode**

3 **Table 111. 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	
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	N	N	
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	N	N	
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	

1

## 2 5.1.22 MBS

3

**Table 112. MBS**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	MBS without Macro Diversity within a Zone	6.3.13	o	IO-MBS	IOMS-MBS	If MBS is supported, either MBS without Macro Diversity or MBS with Macro Diversity is required.

Item	Description	Reference	Status	BS Required	MS Required	Comments
2.	MBS with Macro-diversity within a zone	6.3.13	o	IO-MBS	IOMS-MBS	If MBS is supported, either MBS without Macro Diversity or MBS with Macro Diversity is required.
3.	Time diversity scheme in Multi-BS-MBS	6.3.2.3.52	o	N	N	Conditioned by items 1 or 2
4.	Logical channel ID scheme in Multi-BS-MBS	6.3.2.3.52	o	N	N	Conditioned by items 1 or 2
5.	Support for MBS_MAP-IE	8.4.5.3.12	pm	IO-MBS	IOMS-MBS	
6.	MS initiated MBS request using DSA-REQ	11.13.22	oi	N	N	At least one is required. Dependent on MBS implementation (either item 1 or item 2).
7.	BS initiated MBS request using DSA-REQ, DSC-REQ and DSD-REQ	11.13.22	oi	IO-MBS	IOMS-MBS	Dependent on MBS implementation (either item 1 or item 2).
8.	BS initiated MBS request using Group DSA-REQ and DSC-REQ,	11.13.39	o	IO-MBS2	IOMS-MBS2	
9.	Update of MBS configuration using MCID_Preallocation and Transmission Info. TLV (upon traversing MBS zone boundary)	6.3.22, 11.1.12.1	o	IO-MBS3	IOMS-MBS3	
10.	Update of MBS configuration using MCID_Continuity and Transmission Info. TLV (upon traversing MBS zone boundary)	6.3.22, 11.1.12.2	o	IO-MBS3	IOMS-MBS3	

Item	Description	Reference	Status	BS Required	MS Required	Comments
11.	Location Update for MBS Update	6.3.23.8.1.5, 6.3.2.3.5	o	IO-MBS4	IOMS-MBS4	

1

## 2 **5.1.23 AAS**

3 **Table 113. AAS**

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

4

## 5 **5.1.24 MS's Network Entry issued by BS restart**

6 **Table 114. 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	

7

## 8 **5.1.25 NSP Selection**

9 **Table 115. NSP Selection**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	NSP Selection	802.16 Rev2/D2: 11.1.11.1-2, 11.4.1, 11.8.9, 11.8.11, 11.8.13, 11.8.14, 6.3.2.3.63	o	Y	Y	Support of NSP list by both SII-Adv. and SBC-RSP message shall be supported.  This change is conditioned on the approval of the BOD to this exception to the certification reference.

1    **5.1.26 Cell TYPE**

2    **Table 116. Cell TYPE**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	Support for Cell Type TLV	IEEE Std 802.16-2009, 11.4.1	o	IO-GPSS IO-NETS	IOMS-FMT	This TLV is transmitted only by Base Stations with Cell Types 1, 2, 3, 4, 5 and 6.

3    **5.1.27 Note: Cell Type TLV shall not affect general Release 1.0 MS. General Release 1.0 MS may neglect “Cell Type TLV”, while Release 1.0 MS with IOMS-FMT support shall decode the “Cell Type TLV”. Load Balancing**

6    **Table 117. Load Balancing**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	DL frequency override for initial network entry, NW re-entry from idle mode and handover	6.3.2.3.6	o	Y	Y	In RNG-RSP message,  It is not applicable to RNG-RSP message sent in response to a CDMA code.
2.	Preamble index override for initial network entry, NW re-entry from idle mode and handover	6.3.2.3.6	o	Y	Y	In RNG-RSP message,  It is not applicable to RNG-RSP message sent in response to a CDMA code.
3.	Combination of DL frequency override and preamble index override for initial network entry, NW re-entry from idle mode and handover	6.3.2.3.6	o	Y	Y	In RNG-RSP message,  It is not applicable to RNG-RSP message sent in response to a CDMA code.
4.	Ranging abort timer for initial network entry, NW re-entry from idle mode and un-coordinated/un-controlled handover	6.3.2.3.6	o	Y	Y	In RNG-RSP message,  It is not applicable to RNG-RSP message sent in response to a CDMA code.

1    **5.1.28 Soft combining of RNG-REQ/SBC-REQ/BR Header**

2    **Table 118. Load Balancing**

Item	Description	Reference	Status	BS Required	MS Required	Comments
1.	Soft combining of RNG-REQ message during Initial Network Entry		m	Y	Y	
2.	HARQ support for SBC-REQ message during Initial Network Entry		m	Y	Y	
3.	Soft combining of RNG-REQ message during network Re-Entry (i.e. HO or Network Re-Entry from Idle Mode) and Location Update		m	Y	Y	
4.	HARQ support for SBC-REQ message during Network Re-Entry (i.e. HO or Network Re-Entry from Idle Mode)		m	Y	Y	
5.	Soft combining of BR header		m	Y	Y	
6.	Transmission of 2 <sup>nd</sup> RNG-REQ message on Primary Management Connection during Network Re-Entry(i.e. HO or Network Re-Entry from Idle Mode)		o	IO-RNG_SPLIT	IOMS-RNG_SPLIT	Related to the second RNG-REQ that is sent on the primary.
7.	Transmission of SBC-REQ message on Primary Management Connection		m	Y	Y	
8.	Fragmentation of RNG-REQ in case of Network Re-entry (i.e. HO or Network Re-Entry from Idle Mode) and Location Update and Location Update		o	IO-RNG_SPLIT	IOMS-RNG_SPLIT	
9.	Fragmentation of SBC-REQ		m	Y	Y	
10.	HARQ support for		o	IO-	IOMS-	Related to the

	2nd RNG-REQ message during Network Re-Entry(i.e. HO or Network Re-Entry from Idle Mode) and Location Update			RNG_SPLIT	RNG_SPLIT	second RNG-REQ
11.	Segmentation of RNG-REQ message, based on GMSH during Network Re-Entry(i.e. HO or Network Re-Entry from Idle Mode) and Location Update	o	IO-RNG_SPLIT	IOMS-RNG_SPLIT		

1

## 2 5.2 Parameters

3 The parameters in subclause 10.1 of the IEEE 802.16-2004 standard, as modified by corrigendum 802.16/Cor2 and  
4 802.16e-2005 amendment, relevant to the features required by this profile apply to this section. However the  
5 following parameters listed in table 127 below supersede the whole information of the parameters in 10.1.

6

**Table 119. 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

Item	Description	Reference	Status	Min	Def	Max	Comments
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
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) where 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	30 s (after initial network entry) )	600m (during initial network entry), 120 s (after initial network entry)		Time since last received DL-MAP message before downlink synchronization is considered lost

Item	Description	Reference	Status	Min	Def	Max	Comments
10.	Lost UL-MAP Interval		MS		30 s (after initial network entry), 120 s (after initial network entry)	600m (during initial network entry), 120 s (after initial network entry)	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
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

Item	Description	Reference	Status	Min	Def	Max	Comments
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	10 msec		3sec	Wait for registration response
15.	T7		MS/BS	10 msec		1s	Wait for DSA/DSC/DSD Response timeout
16.	T8		MS/BS	10 msec		300 msec	Wait for DSA/DSC Acknowledge timeout
17.	T10		MS/BS	600 msec		3 sec	Wait for Transaction end timeout
18.	T12		MS			min (20 sec , 5x UCD Interval maximum value)	Wait for UCD descriptor
19.	T14		MS			100msec	Wait for DSX-RVD Timeout
20.	T17		BS	5min	5min		Time allowed for SS to complete SS Authorization and Key Exchange
21.	T18 short		MS	50ms		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

Item	Description	Reference	Status	Min	Def	Max	Comments
25.	Idle Mode Timer		MS	128 s	4096 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 sec	Maximum scanning time of neighbor BSs by MS before reporting any results
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	20ms		1.3s	Used in DSA-REQ and DSA-RSP to indicate the ARQ_Retry_Timeout value. 5msec granularity.
39.	ARQ_RETRY_TIME OUT 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.

Item	Description	Reference	Status	Min	Def	Max	Comments
40.	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.
41.	ARQ_RX_PURGE_T IMEOUT 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.
42.	ARQ_RX_PURGE_T IMEOUT for H-ARQ connections	11.13.18.7					Used in DSA-REQ and DSA-RSP to indicate timeout for ARQ. 5msec granularity.
43.	ARQ_BLOCK_LIFET IME granularity	11.13.18.4					5msec 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.
45.	Power_control_IE:: Power measurement frame relevance		BS/MS			10 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>	P802.16 (Rev2/D7) 6.3.21.1.1	MS	32			The MS must be able to process at least N <sub>MS_max_neighbors</sub> in a MOB_NBR-ADV message.
47.	Contention Ranging Retries		MS	8			

1

**Table 120. 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

2

3

---

## 1    6. Security

2

3    6.1 Authorization Policy Support

4                   **Table 121. 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

6

7    6.2 PKM Version Support

8                   **Table 122. 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	

9

10    6.3 PKMv2 Authorization policy support – initial network entry

11                  **Table 123. 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	

1

## 2 **6.4 PKMv2 Authorization policy support – network re-entry**

3 **Table 124. 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	

4

5

## 6 **6.5 Supported cryptographic suites**

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

8 **Table 125. 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	

Item	Description	Reference	Status	BS Required	MS Required	Comments
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	
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

## 2 6.6 Message Authentication Code Mode

3 Table 126. 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	

4

## 1    6.7 Security Association

2            **Table 127. 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	N	N	
3.	Support of Primary SA	7.2.1.1	m	Y	Y	

3

## 4    6.8 SA Service Type

5            **Table 128. 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

## 7    6.9 EAP Authentication methods

8            **Table 129. EAP Authentication Methods**

Item	Description	Reference	BS Required	MS Required	Comments
1.					

9

10

## 11    6.10 Certificate profile

12            **Table 130. 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

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

1  
2

3 **6.11 Multicast Broadcast Re-keying Algorithm (MBRA)**

4

**Table 131. 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 service	7.9	o	N	N	

---

## 1      7. Radio Profile

2      Table 132 shows an example of the RF channels to be calculated using the following formula:

3

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

5

6      Where:

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

8             $\Delta F_c$         is the center frequency step,

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

10     **Table 132. Example of applicability of the formula to the 2500 - 2690 MHz band**

Channel BW (MHz)	Center Frequency Step (kHz)	$F_{start}$ (MHz)	$N_{range}$	Comment
5	250	2498.5	{16, ..., 756}	.
10		2501	{16, ..., 736}	

11

12

---

## 1    8. Power Class Profile

2    The Power Classes listed in following table is developed to cover the complete target range of power levels while  
3    different interpretation of applicable modulation levels is addressed through a dual range requirement for QPSK and  
4    16-QAM per Power Class.

5

6

**Table 133. Power Classes**

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

7  
8    NOTE: The maximum MS output power may be limited by the value included in a MS Maximum Transmission  
9    Power Limitation Control TLV that may be included in the UCD.

10

11