



# WiMAX Forum™ Mobile System Profile Specification

Release 1.5 TDD Specific Part

WMF-T23-002-R015v01

WiMAX Forum Approved

(2009-08-01)

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1 **Participants**

2 This document was developed by the WiMAX Forum® Technical Working Group (TWG).

- 3  
4 Co-chair; Wonil Roh, Samsung  
5 Co-chair: Vladimir Yanover, Alvarion  
6 Vice Chair and Editor: Hassan Yaghoobi, Intel Corp.

7  
8 Following is the list of TWG member companies during the development of this document.

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14 Technologies, Samsung, SEQUANS Communications, SR Telecom, Telecom Italia, Wavesat, ZTE  
15 Corporation

16  
17 **Revision History**

18 **Table 1. Change Control Revision History**

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

19



1 **Abstract**

2 *This document specifies the TDD-specific aspects of WiMAX Forum Mobile System Profile Release 1.5.*  
3

4 **1. Scope**

5 This document provides the TDD-specific aspects of the WiMAX Forum Mobile System Profile Release  
6 1.5 specification. It serves primarily for the purpose of certification of conformant Subscriber Stations and  
7 Base Stations.

8  
9 This document is complementary to WiMAX Forum Mobile System Profile Release 1.5 [2] Common Part  
10 and includes only the additional specifications required for TDD mode. At the beginning of each  
11 subsection of Sections 4 and 5, instructions are provided for inclusion of specifications relevant to  
12 WiMAX Forum Mobile System Profile Release 1.5 Common Part [2].

13  
14 This specification makes use of IEEE Std 802.16 as a normative reference.  
15

## 2. Normative References

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

- [1] **IEEE Std 802.16-2009**, IEEE Standard for Local and metropolitan area networks - Part 16: Air Interface for Broadband Wireless Access Systems
- [2] **WiMAX Forum WMF-T23-001-R015v01**, WiMAX Forum® Mobile System Profile, Release 1.5 Common Part (2009-08-01)

1 **3. Definitions**

2 **3.1 Abbreviations**

3 **3.2 Definitions of system profiles**

4

5 **3.3 Conventions**

6 **3.3.1 Item column**

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

8

9 **3.3.2 Description column**

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

11 **3.3.3 Reference column**

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

14

15 **3.3.4 Status column**

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

18 **Table 2. Status Column Entries**

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

19 **3.3.5 BS/MS Required column**

20 The Required column indicates whether the item is required for every BS/MS to implement for WiMAX  
 21 certification purposes.

22 **Table 3. Required Column Entries**

<b>Y or y</b>	Required for compliance to this specification.
---------------	--

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

1

2 **3.3.6 BS/MS Values column**

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

5

**Table 4. Value Column Entries**

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

6

7 **3.3.7 Comment column**

8 This column provides additional clarification and explanation.

9

10

1 **4. PHY Profile**

2 **4.1 Profiles of BS and MS**

3 **4.1.1 System Parameters**

4 [Add the following text and table as the content of Section 4.1.1 of Reference [2].]

5 The supported uplink-downlink duplexing modes are specified in Table 5.

6 **Table 5. Duplexing Mode**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	TDD	8.4.4.1	oi	Y	Y	

8  
9

10 **4.1.1.1 PHY Mode**

11 **4.1.1.2 Channel bandwidths and corresponding FFT sizes**

12 **4.1.1.3 Sampling Factor**

13 **4.1.1.4 Cyclic Prefix**

14 **4.1.1.5 Frame Configuration**

15 **4.1.1.6 TTG/RTG**

16 **Table 6. TTG/RTG**

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

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Item	Description	Reference	Status	BS Required	BS Values	MS Required	Comment
					for 5 MHz and 60 PS for 3.5 MHz		for 5, 10 and 7 MHz BW and 74.4 μs for 8.75 MHz BW.

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**4.1.1.7 Frame and Subframe Parameters**

Parameters of Table 7 specify number of OFDM symbols in DL and UL subframes.

**Table 7. Number of OFDM Symbols in DL and UL Subframe in TDD Mode**

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	8.4.4.1	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	8.4.4.1	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	8.4.4.1	oi	Y	(24, 09), (23, 10), (22, 11), (21, 12), (20, 13), (19, 14), (18, 15)	Y	The same as BS values	

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**4.1.2 Subcarrier Allocation**

**4.1.2.1 DL Subcarrier Allocation**

**4.1.2.2 UL Subcarrier Allocation**

**4.1.2.3 Common SYNC Symbol**

**4.1.2.4 UL Sounding**

[Add Table 8 to the end of Section 4.1.2.4 [2].]

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**Table 8. UL Sounding 3**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	Two Antenna UL Sounding: Multi-Antenna Flag enabled for Cyclic Shift Separation	8.4.6.2.7	o	IO-MIM4	IOMS-MIM4	
2	Two Antenna UL Sounding: Multi-Antenna Flag enabled for Decimation Separation	8.4.6.2.7	o	IO-MIM4	IOMS-MIM4	

**4.1.3 UL Control Channels**

**4.1.3.1 Initial Ranging**

**4.1.3.2 HO Ranging**

**4.1.3.3 Periodic Ranging**

**4.1.3.4 BW Request**

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

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

**4.1.4 Channel Coding**

**4.1.4.1 Repetition**

**4.1.4.2 Randomization**

**4.1.4.3 Convolutional Code**

**4.1.4.4 Convolutional Turbo Code**

**4.1.4.5 BTC**

**4.1.4.6 LDPC**

**4.1.4.7 Interleaving**

**4.1.5 H-ARQ Support**

**4.1.5.1 Chase Combining**

**4.1.5.2 Incremental Redundancy**

**4.1.5.3 ACK Channel**

1	<b>4.1.6</b>	<b>Control Mechanism</b>
2		
3	<b>4.1.6.1</b>	<b><i>Synchronization</i></b>
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5	<b>4.1.6.2</b>	<b><i>Closed-loop Power Control</i></b>
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7	<b>4.1.6.3</b>	<b><i>Open-loop Power Control</i></b>
8		
9	<b>4.1.6.4</b>	<b><i>MS Maximum Transmission Power Limitation Control Using UCD TLV</i></b>
10		
11	<b>4.1.7</b>	<b>Channel Measurement</b>
12		
13	<b>4.1.7.1</b>	<b><i>CINR Measurement</i></b>
14		
15	<b>4.1.7.2</b>	<b><i>RSSI Measurement</i></b>
16		
17	<b>4.1.8</b>	<b>Modulation</b>
18		
19	<b>4.1.8.1</b>	<b><i>PRBS (Subcarrier Randomization)</i></b>
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21	<b>4.1.8.2</b>	<b><i>Downlink</i></b>
22		
23	<b>4.1.8.3</b>	<b><i>Uplink</i></b>
24		
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26	<b>4.1.8.4</b>	<b><i>Pilot Modulation</i></b>
27		
28	<b>4.1.8.5</b>	<b><i>Preamble Modulation</i></b>
29		
30	<b>4.1.8.6</b>	<b><i>Ranging Modulation</i></b>
31		
32	<b>4.1.9</b>	<b>MAP Support</b>
33		
34	<b>4.1.9.1</b>	<b><i>Normal MAP</i></b>
35		
36	<b>4.1.9.2</b>	<b><i>Compressed MAP</i></b>
37		
38	<b>4.1.9.3</b>	<b><i>Sub-DL-UL MAP</i></b>
39		
40	<b>4.1.9.4</b>	<b><i>H-ARQ MAP Message</i></b>
41		
42	<b>4.1.9.5</b>	<b><i>Extended HARQ IE in the Normal MAP</i></b>
43		
44	<b>4.1.9.6</b>	<b><i>DL Region Definition</i></b>
45		
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47	<b>4.1.10</b>	<b>AAS</b>
48		
49	<b>4.1.10.1</b>	<b><i>AAS Zone Support</i></b>
50		
51	<b>4.1.10.2</b>	<b><i>Supported Permutation in DL</i></b>
52		



- 1    **4.1.10.3**     *Supported Permutation in UL*
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- 3    **4.1.10.4**     *AAS DL Preamble*
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- 5    **4.1.10.5**     *AAS UL Preamble*
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- 7    **4.1.10.6**     *Diversity MAP Scan*
- 8
- 9    **4.1.10.7**     *DL AAS-SDMA Pilots*
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- 11   **4.1.10.8**     *UL AAS-SDMA Pilots*
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- 13   **4.1.10.9**     *AAS Private MAP*
- 14
- 15   **4.1.10.10**    *AAS-FBCK-REQ/RSP support*
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- 17   **4.1.11**        **STC/MIMO**
- 18
- 19    **4.1.11.1**     *Supported Features for DL PUSC*
- 20
- 21    **4.1.11.2**     *Supported Features for DL FUSC*
- 22
- 23    **4.1.11.3**     *Supported Features for DL Optional FUSC*
- 24
- 25    **4.1.11.4**     *Supported Features for DL Optional AMC*
- 26
- 27    **4.1.11.5**     *Supported Features for DL PUSC-ASCA*
- 28
- 29    **4.1.11.6**     *Supported Features in UL PUSC*
- 30
- 31    **4.1.11.7**     *Supported Features in UL Optional PUSC*
- 32
- 33    **4.1.11.8**     *Supported Features in UL Optional AMC*
- 34
- 35    **4.1.11.9**     *Closed-Loop MIMO*
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- 37    **4.1.11.10**    *MIMO Feedback*
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- 40    **4.1.11.11**    **MIMO Midamble**

[Append the table in Section 4.1.11.11 of Reference [2] with Table 9.]

**Table 9. MIMO Midamble**

Item	Description	Reference	Status	BS Required	MS Required	Comment
1	MIMO Midamble with 2 antennas: MIMO midamble support in STC zone with optional AMC permutation	6.3.2.3.38.6.7 , 8.4.8.5, 11.8.3.5.5 11.11 11.12	o	N	N	

2	MIMO Midamble with 2 antennas: MIMO Midamble support STC zone with PUSC permutation	6.3.2.3.38.6.7 & 8.4.8.5, 11.8.3.5.5 11.11 11.12	o	N	N	
3	MIMO Midamble with 4 antennas: MIMO midamble support in STC zone with optional AMC permutation	6.3.2.3.38.6.7 & 8.4.8.5, 11.8.3.5.5 11.11 11.12	o	N	N	
4	MIMO Midamble with 4 antennas: MIMO Midamble support STC zone with PUSC permutation	6.3.2.3.38.6.7 & 8.4.8.5, 11.8.3.5.5 11.11 11.12	o	N	N	

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

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

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

**4.1.12 HO Support in PHY**

**4.1.12.1 FBSS**

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

**4.1.12.3 UL Macro diversity**

**4.2 Performance/Fidelity Requirements**

**4.2.1 MS Minimum Performance**

**4.2.1.1 SSTG/SSRTG**

**Table 10. SSTG/SSRTG for TDD**

Item	Description	Reference	Status	MS Required	MS Values	Comment
1	SSTG	8.4.4.3	m	Y	50 μs	
2	SSRTG	8.4.4.3	m	Y	50 μs	

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- 1    **4.2.1.2**      ***Max DL Concurrent Bursts***
- 2    **4.2.1.3**      ***Max Bursts in DL Subframe***
- 3    **4.2.1.4**      ***Max Number of Zones in DL/UL Subframe***
- 4    **4.2.1.5**      ***Measurement Processes and CQI Channels***
- 5    **4.2.1.6**      ***Max H-ARQ Bursts in DL/UL Subframe***
- 6    **4.2.2**        **Transmit Requirements**
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- 8    **4.2.3**        **Receiver Requirements**
- 9
- 10 **4.2.4**        **Frequency and Time Synchronization Requirements**
- 11
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1 **5. MAC Profile**

2 **5.1 Profiles of BS and MS**

3 **5.1.1 PHS**

4 **5.1.2 CS Options**

5 **5.1.3 MAC PDU formats**

6 **5.1.4 MAC Support of PHY layer**

7 **5.1.4.1 Feedback Mechanism**

8 **5.1.5 Multicast connection**

9 **5.1.6 Network Entry**

10 **5.1.7 ARQ**

11 **5.1.8 MAC support for H-ARQ**

12 **5.1.9 QoS**

13 **5.1.10 Data delivery services for mobile network**

14 **5.1.11 Request-Grant mechanism**

15 **5.1.12 Neighbor Advertisement**

16 **5.1.13 Scanning and Association**

17 **5.1.13.1 Scanning**

18 **5.1.13.2 Scan Reporting Type Support**

19 **5.1.13.3 Association**

20 **5.1.13.4 Association Type Support**

21 **5.1.13.5 HO/Scan/Report Trigger Metrics**

22 **5.1.14 MAC layer HO procedures**

23 **5.1.15 HO Optimization**

24 **5.1.16 CID and SAID Update**

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- 5.1.17 Fast BS Switching**
- 5.1.18 Macro Diversity Handover**
- 5.1.19 Sleep Mode**
- 5.1.20 Idle Mode**
- 5.1.21 Expedited Network Re-entry from Idle Mode**
- 5.1.22 MBS**
- 5.1.23 AAS**
- 5.1.24 MS's Network Entry issued by BS restart**
- 5.1.25 NSP Selection**
- 5.1.26 Load Balancing**
- 5.1.27 Location Based Services**
- 5.1.28 Coexistence Among WiMAX™, Wi-Fi® and Bluetooth® Networks**
- 5.1.29 Capacity Improvements for Feedbacks**
- 5.1.30 Persistent Allocation**
- 5.1.31 Alternative RAT Advertisement**

- 1 **5.2 Parameters**
- 2 **6. Security**
- 3 **6.1 Authorization Policy Support**
- 4 **6.2 PKM Version Support**
- 5 **6.3 PKMv2 Authorization policy support – initial network entry**
- 6 **6.4 PKMv2 Authorization policy support – network re-entry**
- 7 **6.5 Supported cryptographic suites**
- 8 **6.6 Message Authentication Code Mode**
- 9 **6.7 Security Association**
- 10 **6.8 SA Service Type**
- 11 **6.9 EAP Authentication methods**
- 12 **6.10 Certificate profile**
- 13 **6.11 Multicast Broadcast Re-keying Algorithm (MBRA)**
- 14 **7. Radio Profile**
- 15 **8. Power Class Profile**
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