

## **Attachment 3-2-2**

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

**Release 1.5 TDD Part**

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# **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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## Revision History

**Table 1. Change Control Revision History**

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

## Abstract

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

## 1. Scope

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

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

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

## 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)

### 3. Definitions

#### 3.1 Abbreviations

#### 3.2 Definitions of system profiles

#### 3.3 Conventions

##### 3.3.1 Item column

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

##### 3.3.2 Description column

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

##### 3.3.3 Reference column

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

##### 3.3.4 Status column

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

**Table 2. Status Column Entries**

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

##### 3.3.5 BS/MS Required column

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

**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

### 3.3.6 BS/MS Values column

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

**Table 4. Value Column Entries**

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

### 3.3.7 Comment column

This column provides additional clarification and explanation.

## 4. PHY Profile

### 4.1 Profiles of BS and MS

#### 4.1.1 System Parameters

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

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

**Table 5. Duplexing Mode**

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

##### 4.1.1.1 PHY Mode

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

##### 4.1.1.3 Sampling Factor

##### 4.1.1.4 Cyclic Prefix

##### 4.1.1.5 Frame Configuration

##### 4.1.1.6 TTG/RTG

**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 $\mu$ s 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 $\mu$ s minimum specified in the referred section. The requirement is equivalent to 60 $\mu$ s

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 $\mu$ s for 8.75 MHz BW.

#### 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	

#### 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].]



**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**

**4.1.6 Control Mechanism**

**4.1.6.1 Synchronization**

**4.1.6.2 Closed-loop Power Control**

**4.1.6.3 Open-loop Power Control**

**4.1.6.4 MS Maximum Transmission Power Limitation Control Using UCD TLV**

**4.1.7 Channel Measurement**

**4.1.7.1 CINR Measurement**

**4.1.7.2 RSSI Measurement**

**4.1.8 Modulation**

**4.1.8.1 PRBS (Subcarrier Randomization)**

**4.1.8.2 Downlink**

**4.1.8.3 Uplink**

**4.1.8.4 Pilot Modulation**

**4.1.8.5 Preamble Modulation**

**4.1.8.6 Ranging Modulation**

**4.1.9 MAP Support**

**4.1.9.1 Normal MAP**

**4.1.9.2 Compressed MAP**

**4.1.9.3 Sub-DL-UL MAP**

**4.1.9.4 H-ARQ MAP Message**

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

**4.1.9.6 DL Region Definition**

**4.1.10 AAS**

**4.1.10.1 AAS Zone Support**

**4.1.10.2 Supported Permutation in DL**

### 4.1.10.3 *Supported Permutation in UL*

### 4.1.10.4 *AAS DL Preamble*

### 4.1.10.5 *AAS UL Preamble*

### 4.1.10.6 *Diversity MAP Scan*

### 4.1.10.7 *DL AAS-SDMA Pilots*

### 4.1.10.8 *UL AAS-SDMA Pilots*

### 4.1.10.9 *AAS Private MAP*

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

## 4.1.11 *STC/MIMO*

### 4.1.11.1 *Supported Features for DL PUSC*

### 4.1.11.2 *Supported Features for DL FUSC*

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

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

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

### 4.1.11.6 *Supported Features in UL PUSC*

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

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

### 4.1.11.9 *Closed-Loop MIMO*

### 4.1.11.10 *MIMO Feedback*

### 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	

#### 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 SSTTG/SSRTG

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

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

1	<b>4.2.1.2</b>	<b><i>Max DL Concurrent Bursts</i></b>
2	<b>4.2.1.3</b>	<b><i>Max Bursts in DL Subframe</i></b>
3	<b>4.2.1.4</b>	<b><i>Max Number of Zones in DL/UL Subframe</i></b>
4	<b>4.2.1.5</b>	<b><i>Measurement Processes and CQI Channels</i></b>
5	<b>4.2.1.6</b>	<b><i>Max H-ARQ Bursts in DL/UL Subframe</i></b>
6	<b>4.2.2</b>	<b>Transmit Requirements</b>
7		
8	<b>4.2.3</b>	<b>Receiver Requirements</b>
9		
10	<b>4.2.4</b>	<b>Frequency and Time Synchronization Requirements</b>
11		
12		

## 5. MAC Profile

### 5.1 *Profiles of BS and MS*

#### 5.1.1 PHS

#### 5.1.2 CS Options

#### 5.1.3 MAC PDU formats

#### 5.1.4 MAC Support of PHY layer

##### 5.1.4.1 *Feedback Mechanism*

#### 5.1.5 Multicast connection

#### 5.1.6 Network Entry

#### 5.1.7 ARQ

#### 5.1.8 MAC support for H-ARQ

#### 5.1.9 QoS

#### 5.1.10 Data delivery services for mobile network

#### 5.1.11 Request-Grant mechanism

#### 5.1.12 Neighbor Advertisement

#### 5.1.13 Scanning and Association

##### 5.1.13.1 *Scanning*

##### 5.1.13.2 *Scan Reporting Type Support*

##### 5.1.13.3 *Association*

##### 5.1.13.4 *Association Type Support*

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

#### 5.1.14 MAC layer HO procedures

#### 5.1.15 HO Optimization

#### 5.1.16 CID and SAID Update

1		
2	<b>5.1.17</b>	<b>Fast BS Switching</b>
3		
4	<b>5.1.18</b>	<b>Macro Diversity Handover</b>
5		
6	<b>5.1.19</b>	<b>Sleep Mode</b>
7		
8	<b>5.1.20</b>	<b>Idle Mode</b>
9		
10		
11	<b>5.1.21</b>	<b>Expedited Network Re-entry from Idle Mode</b>
12		
13		
14	<b>5.1.22</b>	<b>MBS</b>
15		
16	<b>5.1.23</b>	<b>AAS</b>
17		
18	<b>5.1.24</b>	<b>MS's Network Entry issued by BS restart</b>
19		
20	<b>5.1.25</b>	<b>NSP Selection</b>
21		
22	<b>5.1.26</b>	<b>Load Balancing</b>
23		
24	<b>5.1.27</b>	<b>Location Based Services</b>
25		
26	<b>5.1.28</b>	<b>Coexistence Among WiMAX™, Wi-Fi® and Bluetooth® Networks</b>
27		
28	<b>5.1.29</b>	<b>Capacity Improvements for Feedbacks</b>
29		
30	<b>5.1.30</b>	<b>Persistent Allocation</b>
31		
32	<b>5.1.31</b>	<b>Alternative RAT Advertisement</b>
33		

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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