Telecommunications Standards Advisory Committee (TSAC)

Technical Specification

Wireless Broadband Access Equipment

IMDA TS WBA
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Info-communications Media Development Authority
Resource Management & Standards
10 Pasir Panjang Road
#10-01 Mapletree Business City
Singapore 117438

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Telecommunications Standards Advisory Committee (TSAC)

The TSAC advises IMDA on the setting of ICT standards as well as on the development and recommendation of specifications, standards, information notes, guidelines and other forms of documentation for adoption and advancement of the standardisation effort of the Singapore ICT industry (hereafter termed "IMDA Standards").

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Content

Technical Specification for Wireless Broadband Access Equipment

1. Scope

1.1. This Specification defines the minimum technical requirements for wireless broadband access (WBA) equipment operating in the 2.3 and 2.5 GHz licensed frequency bands where line-of-sight is not essential. The term WBA equipment refers to the base stations or subscriber stations which provide the broadband wireless connectivity, as well as the fixed or mobile devices which require the connectivity.

1.2. The Specification does not restrict the type of WBA technology to be employed. It mainly defines the operating frequency bands, emission and output power limits, and electromagnetic compatibility and electrical safety requirements where relevant. Applications may include: point to multipoint backhaul (e.g. E1/T1 services for business), point to point backhaul (e.g. connecting to Internet backbone), and consumer last mile and portable wireless broadband Internet connection.

1.3. The Specification includes, as examples, references to the interoperable standards that have been created by the WiMAX Forum, based on the IEEE Standards 802.16 and 802.16.1, ETSI HIPERMAN standards, IMT-2000 OFDMA TDD WMAN and IMT-Advanced WirelessMAN-Advanced.

1.4. The Specification does not define a standard for WBA network compatibility and equipment interoperability. As such, suppliers of WBA fixed or mobile devices are required to ascertain to which WBA network equipment and operator their WBA devices are intended for interoperating.

2. References

For the technical requirements captured in this Specification, reference has been made to the following standards. Where versions are not indicated, implementation of this Specification shall be based on current and valid versions of these standards published by the respective Standards Development Organisations.

ETSI TS 102 177	Broadband Radio Access Networks (BRAN); HIPERMAN; Physical (PHY) Layer
ETSI TS 102 178	Broadband Radio Access Networks (BRAN); HIPERMAN; Data Link Control (DLC) Layer
ETSI TS 102 210	Broadband Radio Access Networks (BRAN); HIPERMAN; System profiles
IEEE Std 802.16-2012	IEEE Standard for Air Interface for Broadband Wireless Access Systems
IEEE Std 802.16.1-2012	IEEE Standard for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems
ETSI TS 102 210	Broadband Radio Access Networks (BRAN); HIPERMAN; System profiles
ETSI EN 300 440-1	Short Range Devices (WBA EQUIPMENT); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU
ETSI EN 301 489-1	EMC standard for radio equipment and services; Harmonised Standard covering essential requirements of article 3.1(b) of the Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU; Part 1: Common technical requirements

ETSI EN 301 908-19	IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 19: OFDMA TDD WMAN (Mobile WiMAX™) TDD User Equipment (UE)
ETSI EN 301 908-20	IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 20: OFDMA TDD WMAN (Mobile WiMAXTM) TDD Base Stations (BS)
FCC Part 27 § 27.50 § 27.53	Miscellaneous Wireless Communications Services Power limits Emission limits
ITU-R M.1457-12	Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)
ITU-R M.2012-2	Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunication-Advanced (IMT-Advanced)
ITU-T K.116	EMC requirements and test methods for radio telecommunication terminal equipment
IEC CISPR 32	Electromagnetic compatibility of multimedia equipment – Emission requirements Note: Validity of the IEC CISPR 22, EMC standard for information technology equipment, will lapse by 31 March 2017, in sync with IEC's timeline for withdrawing this CISPR standard, and replacing it with the CISPR 32 standard.
IEC CISPR 24	Information technology equipment – Immunity characteristics – Limits and methods of measurement
IEC 60950-1	Information technology equipment – Safety – Part 1: General requirements
IEC 62368-1	Audio/video, information and communication technology equipment – Part 1: Safety requirements

Note:

CISPR	International Special Committee on Radio Interference of the IEC
ETSI HIPERMAN	European Telecommunications Standards Institute High Performance Radio Metropolitan Area Network
FCC	Federal Communications Commission
IEC	International Electrotechnical Commission
IMT	International Mobile Telecommunication
IEEE	Institute of Electrical and Electronic Engineers
ITU	International Telecommunication Union
ITU-R	ITU Radiocommunication Sector
ITU-T	ITU Telecommunication Standardization Sector
WiMAX	Worldwide Interoperability for Microwave Access
OFDMA	Orthogonal Frequency Division Multiple Access
TDD	Time Division Duplexing
WMAN	Wireless Metropolitan Area Network

3. General Requirements

3.1. Design of Wireless Broadband Access (WBA) Equipment

WBA equipment shall be designed to meet the following basic objectives:

(a) The Radio Frequency (RF) carrier of the WBA equipment shall be tuned to operate within the frequency spectrum assigned to its WBA operator.

(b) The WBA equipment shall not be constructed with any external or readily accessible control which permits the adjustment of its operation in a manner that is inconsistent with this Specification.

3.2. Power Supply

The WBA equipment may be ac powered or AC powered. For AC powered equipment, this Specification shall be complied with when operating from an AC mains supply of voltage 230V ± 10% and frequency 50 Hz ± 2%. Where external power supply is used, e.g. AC/DC converter, power adaptor or charger, it shall not affect the capability of the equipment to meet this Specification.

3.3. Electromagnetic Compatibility (EMC) and Safety Requirements

3.3.1. EMC assessment

For EMC assessment, the WBA equipment shall be classified as equipment for fixed or portable/mobile use. This equipment classification is used to determine the applicability of the EMC (emission and immunity) testing requirements based on §5.5 and §7 of ETSI EN 301 489-1; or §7.5 and §9 of ITU-T K.116. The ETSI EN 301 489-1 standard shall be used in conjunction with the ETSI EN 301 489-19 or EN 301 489-20 standard for WBA equipment that may be capable of supporting OFDMA TDD WMAN (Mobile WiMAX™) TDD User Equipment (UE) or Base Stations (BS).

3.3.1.1. Electromagnetic Interference (EMI) or Emission Measurements

The following emissions measurements shall be performed on the WBA equipment, where applicable:

(a) Radiated emissions from associated ancillary equipment not incorporated in the WBA equipment shall be measured to Class B requirements defined in §4 and Tables A.4 and A.5 of CISPR 32; or §8.2 of EN 301 489-1;

(b) Conducted emission at the DC power port of the WBA equipment shall be measured to Class B requirements defined in §4 and Table A10 of CISPR 32; or §8.3 of EN 301 489-1; and

(c) Conducted emission at the AC mains port shall be measured for WBA equipment with dedicated AC/DC power converter to Class B requirements defined in §4 and Table A.10 of CISPR 32; or §8.4 of EN 301 489-1. Equipment with DC power port which is powered by a dedicated AC/DC power converter is defined as AC mains powered equipment (§3.1.1 of CISPR 32).

Note 1: If WBA equipment is a module intended to be marketed and sold separately from a host, it shall be assessed with at least one representative host system. Modules may be internal, mounted, plug-in or external (§6.2 of IEC CISPR 32).

Note 2: Emission measurements performed to FCC Part 15 Subpart B for unintentional radiators (§15.109) may be acceptable as an alternative to IEC CISPR 32.

3.3.1.2. Electromagnetic Susceptibility (EMS) or Immunity Testing

The following immunity tests may be performed on the WBA equipment to requirements defined in CISPR 24, §11 of ITU-T K.116 or §9 of EN 301 489-1, where applicable:

(a) RF electromagnetic field (80 MHz to 1 GHz and 1.4 GHz to 6 GHz) at the enclosure of equipment;

(b) Electrostatic discharge at the enclosure of equipment;

(c) Fast transients (common mode) at DC power and AC main power ports that have cables longer than 3 m;

(d) RF common mode 0.15 MHz to 80 MHz at DC power and AC mains power ports that have cables longer than 3 m;

(e) Voltage dips and interruptions at AC mains power port of equipment with dedicated AC/DC power converter; and

(f) Surges, common and differential mode at AC mains power port of equipment with dedicated AC/DC power converter.

3.3.2. Equipment Safety Testing

3.3.2.1. Equipment safety testing or assessment shall be performed to requirements defined in IEC 60950-1 or IEC 62368-1, based on the following assumptions:

(a) WBA equipment is powered by a dedicated external power supply (AC/DC converter or power adapter/charger); and

(b) WBA equipment operates with SELV in environments where overvoltage from telecommunication networks is not possible. SELV refers to voltages not exceeding 42.4 V peak or 60 V DC.

3.3.2.2. For WBA equipment safety assessment performed with the hazard-based approach, the processes defined in IEC 62368-1 shall be used:

(a) Identify energy sources in the WBA equipment;

(b) Classify energy sources (effect on the body or combustible material, e.g. possibility of injury or ignition);

(c) Identify safeguards for protection against energy sources; and

(d) Consider the effectiveness of safeguards with respect to compliance criteria or requirements defined in the IEC 62368-1 standard.

4. Technical Requirements

The WBA equipment shall comply with the maximum output power and emissions limits, operating in its intended frequency bands. It shall fulfil the requirements of this Specification on all the permitted frequencies which it is intended to operate.

4.1. Frequency Assignments

The WBA equipment shall be tuned or programmed to operate within the frequency spectrum assigned to its WBA operator, located in the 2300 to 2350 MHz and/or 2516 to 2678 MHz frequency bands.

4.2. Power and Emission Limits

4.2.1. Transmitter output power of base stations shall be limited to 100W EIRP while mobile stations shall be limited to 2 W EIRP.

4.2.2. The spurious emissions shall not exceed – 57 dBm in the frequency range 30 MHz to 1 GHz (measurement bandwidth: 100 kHz) and – 50 dBm in the frequency range 1 GHz to 26.5 GHz (measurement bandwidth: 1 MHz).

4.2.3. The base stations shall be set to work in a manner which is safe and does not impair or interfere with the working of any other station or network authorised by IMDA.

4.3. System Profiles

In implementing HIPERMAN compliant systems, the WBA equipment may use a common HIPERMAN system profile to achieve multi-vendor equipment interoperability.

4.4. Compliance with Technical Requirements

The WBA equipment shall be been tested to comply with the power and emission limits, and the permitted range of operating frequencies stipulated in § 4.1 and § 4.2 of this Specification. Measurement methods of the testing shall be as defined in FCC Part 27 or ETSI EN 300 440-1, or equivalent methods as specified by the manufacturer.

Annex

Corrigendum / Addendum

Revised TS		Items Changed	Date of Issue
Page	**Section**		
Changes to IDA TS WBA Issue 1 Rev 2, November 2012			
4	§3.3	The IMDA TS WBA Issue 1 (October 2016) has replaced the IDA TS WBA Issue 1 Rev 7 (April 2013). Changes are largely editorial to provide updates and clarity in the application of EMC and safety requirements, in line with standards development that has taken place in the Standards Development Organisations concerned.	1 Oct 16

Page	TS Ref.	Items Changed	Effective Date
Changes to IDA TS WBA Issue 1 Rev 1, May 2011			
3	**2.2.1**	Maximum transmitter output power is reduced from 2000W to 100W.	Nov 12
5	**4**	Technical References to include IEEE P802.16m, ETSI EN 301 908-19, ETSI EN 301 908-20 to include IMT-Advanced Requirements	Nov 12
Changes to IDA TS WBA Issue 1, June 2005			
		Change of IDA's address at cover page to Mapletree Business City.	1 May 11