



National Information & Communications Technology Authority

TECHNICAL GUIDELINES FOR MOBILE WIMAX TECHNOLOGY

Issue:

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Engineering & Resource Planning Department

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Frangipani Street
Hohola, National Capital District
Port Moresby

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[Note: This guideline shall be reviewed overtime.]

Contents

I. Introduction.....	2
II. Overview of Mobile WiMAX.....	2
III. Scope & Purpose.....	3
IV. Objectives.....	3
V. Abbreviation.....	4
VI. Definitons.....	5
PART 1: General Requirements.....	6
1.1: RF Power.....	6
1.2: Power Supply or E.I.R.P.....	6
1.3: Equipment Identification.....	6
1.4: Security.....	6
1.5: Keypad.....	6
PART 2: Technical Requirements.....	7
2.1: Power & Emission Limits.....	7
2.2: Operating Frequency.....	7
2.3: Electromagnetic Compatibility.....	7
2.4: Specific Absorption Rate.....	7
2.5: Health & Safety Requirements.....	8
2.6: Testing for Compliance.....	8
2.7: Licensing.....	9
2.8: System Profiles	9
PART 3: Radio Interface Requirements.....	9
3.1: Standards.....	9
3.2: Inteoperability.....	10
3.3: Connectivity.....	10
3.4: Service Quality.....	10
3.5: IMT-Advanced Requirements.....	10
PART 4: Other Considerations.....	11
4.1: Spectrum Consideration.....	11
4.2: Frequency Interference.....	11
PART 5: Type Approval and Inspection.....	11
PART 6: Complaints.....	12
PART 7: Document Administration.....	12
7.1: Consistency.....	12
7.2: Ammendments.....	12
7.3: Enforcement.....	12
7.4: Publication.....	12
Reference.....	13
Annex 1: Table A-1: HS Requirements and conformance Test specifications Table (HS-RTT).....	14

1. Introduction

1. The National Information & Communications Technology Authority (NICTA) is a statutory authority established under the NICT Act, 2009. NICTA as an ICT regulator is responsible for developing standards and guidelines, including minimum regulatory requirements for ICT services and equipment in Papua New Guinea (PNG).
2. This instrument is developed in accordance to Part XI-Division 4, Section 218 of the NICT Act 2009, which mandates NICTA to regulate the Information and Communication Technology Industry by making rules and guidelines pertaining to the use or provision of ICT equipment or services in Papua New Guinea.
3. The guidelines in this instrument are intended for mobile operators, service providers and individuals dealing with mobile WIMAX to comply with the requirements and standards as stipulated. This guideline also serves to regulate mobile WiMAX vendors to comply with and to operate in their specified licensed bands so as to prevent interference and cross-communication between various operators of this technology.
4. This guideline is prepared by the ICT Standards & Policy Section under the Engineering & Resource Planning Branch of NICTA.

2. Overview of Mobile WiMAX

1. Mobile WiMAX provides the missing link for the "last mile" connection in metropolitan area networks where DSL, Cable and other broadband access methods are not available or are too expensive. It also offers an alternative to satellite Internet services for rural areas and allows mobility of the customer equipment.
2. The IEEE 802.16e-2005 forms the basis for mobile WiMAX solutions for nomadic and mobile applications and works on the licensed spectrum allocated in the 2.3, 2.5, 3.3 and 3.5 GHz frequency bands.
3. Mobile WiMAX supports all IP services such as VOIP, email, online gaming, video conferencing and other mandated regulatory services such as emergency services, fire service, lawful interception and access to independent ASP networks in a non-discriminatory manner. It supports interfacing with various interworking and media gateways permitting delivery of incumbent/legacy services transmitted over IP (for example, SMS over IP, MMS, WAP) to WiMAX access networks. It also provides delivery of IP Broadcast and Multicast services over WiMAX access networks.
4. Mobile WIMAX offers distinctive benefits to both the user and the network operator of this service. Some of these benefits include;
 - Multi-spectrum standard with better broadband technology concept that can significantly reduce costs, improve spectral efficiency and deliver profitable services.
 - High data rates, quality of service (QoS), scalability, security enhancement and mobility.
 - Ease of installation and activation, convenience and interoperability of CPE's to other networks and devices within the same network.
 - Reliability in maintaining the communication process between two devices. This is achieved through redundant backhaul links installed to ensure consistency during unlikely events, as the link automatically and seamlessly connects to each device.

5. WiMAX technology was first introduced in Papua New Guinea by PNG'S only fixed operator-Telikom (PNG) in June, 2009. It was setup in Port Moresby by Alvarion and its local partner Telrad Networks.
6. During deployment, WiMAX provided network coverage of 1,500 users and operates in the 2.3GHz spectrum band. The network was later extended to regional centres using the vendor's end-to-end mobile WiMAX 4Motion solution in the 2.3GHz frequency band providing a nation-wide coverage of 55,000 end users.
7. WiMAX service is currently provided by Telikom PNG. The network coverage has increased throughout PNG since 2009 with more users using and enjoying the benefits of the service.

3. Scope and Purpose

1. The purpose of this guideline is to provide regulatory guidelines in the deployment of mobile WiMAX networks in Papua New Guinea. This guideline provides an overview of equipment specifications and compliance requirements for potential and existing WiMAX operators and users to comply with.
2. The scope of this instrument is limited to mobile services based on best effort Internet Protocol (IP) connectivity. It provides the regulatory and technical guidelines for mobile WiMAX service providers in Papua New Guinea and the NICTA's responsibility towards determining the best outcome and ensuring that equipment & services provided to the people of PNG are in compliance with the international standard.
3. The guidelines in this instrument do not restrict the type of mobile WiMAX technology to be employed. They mainly define 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. wireless internet and IP Telephony services for business), point-to-point backhaul (e.g. connecting to Internet backbone), and consumer "last mile" and portable wireless broadband Internet connection.

4. Objective

The objective of this instrument is mainly to:

- Ensure that interoperability between various wireless systems is obtained and maintained with desired end-to-end optimal performance.
- Ensure that all technical compliance requirements are achieved and that equipment employed to deploy the service coincides with NICTA's guidelines and standards or more so the ITU-IMR standards.
- Make sure that a quality service is being offered to the users of mobile WiMAX technology.
- Make sure that all mobile WiMAX network performance standards & requirements are met and thus ensuring customers or users satisfaction.
- To prevent RF interference between equipment and equipment operating in other wireless networks and also to minimize harmful RF interferences.
- To protect the health & safety of users and/or general public exposure and also other equipment or networks at risk of cross-communication or interfacing between them.

- To facilitate access to emergency services, and
- To protect the integrity of public network.

5. Abbreviations

AC	- Alternating Current
AS/NZS	- Australian Standard/New Zealand Standard
ASP	- Application Service Provider
BRAN	- Broadband Radio Access Network
BTS	- Base Transmitting Station
BWA	- Broadband Wireless Access
CDMA	- Code Division Multiple Access
CISPR	- Comité International Spécial des Perturbations Radioélectriques (CISPR; in English means Special international Committee on radio interference)
CPE	- Customer Premise Equipment
DC	- Direct Current
DSL	- Digital Subscriber Line
EIRP	- Effective Isotropic Radiated Power
EMC	- Electromagnetic Compatibility
ETSI	- European Telecommunications Standards Institute
E-UTRA	- Evolved Universal Terrestrial Radio Access
FCC	- Federal Communications Commission
HS-RTT	- Harmonized Standards – Radio Transmission Technologies
FDD	- Frequency Division Duplex
IEEE	- Institute of Electrical and Electronic Engineers
ICNIRP	- International Commission on Non-Ionizing Radiation Protection
IEC	- International Electro-technical Commission
IMEI	- International Mobile Equipment Identity
IMT/IMT-2000	- International Mobile Telecommunication/-2000
IMT-IMR	- IMT-International Mobile Roaming
ITU	- International Telecommunication Union
LTE	- Long Term Evolution
MMS	- Multimedia Message Service
NICT	- National Information and Communications Technology
NICTA	- National Information & Communications Technology Authority
NNP	- National Numbering Plan
OFDMA	- Orthogonal Frequency Division Multiple Access
QoS	- Quality of Service
RF	- Radio Frequency
R&TTE	- Radio Equipment and Telecommunications Terminal Equipment
SAR	- Specific Absorption Rate
SMS	- Short Message Service
TE	- Terminal Equipment
TDD	- Time Division Duplex
ETSI TS	- ETSI Technical Specification
UE	- User Equipment
UTRA-FDD	- Evolved Universal Terrestrial Radio Access-Frequency Division Duplex
VoIP	-Voice over Internet Protocol
WAP	-Wireless Application Protocol
WMAN	-Wireless Metropolitan Area Network
WIMAX	-Wide Interoperability for Microwave Access

6. Definitions

Act – is the NICTA ACT, 2009.

base station – a common name for all the radio equipment located at one and the same place used for serving one or several cells.

mobile carrier - means the holder of a public mobile licence. A mobile carrier or a mobile operator is used inter-changeably in this document.

mobile station - A station in the mobile service intended to be used while in motion or during halts at unspecified points.

mobile WiMAX – is a wireless broadband technology that is based on the IEEE 802.16e – 2005 and operates in the licensed spectrum allocated in the 2.3, 2.5, 3.3 and 3.5 GHz frequency bands.

NICTA – National Information and Communications Technology Authority.

Quality of service (QoS) – The collective effect of service performance which determines the degree satisfaction of a user of a service. It is characterized by the combined aspects of performance factors applicable to services, such as:

- service operability performance;
- service accessibility performance;
- service retainability performance;
- service integrity performance; and
- other factors specific to each service.

Supplier (or radio dealer) – means a person who manufactures, imports for sale, hires, sells, or offers or possesses for sale any equipment which is capable of being used for the purpose of communication.

terminal equipment – A device or functionality which provides the capabilities for user applications, e.g. telephony, including the user interface.

User – means any person or legal entity making use of public telecommunication services.

user equipment – Terminal equipment that allows access to network services.

WiMAX - is a WMAN communication technology that is largely based on the wireless interface defined in the IEEE 802.16 standard.

PART 1: General Requirements

1.1. RF Power

1. The mobile WiMAX equipment shall comply with the specified output power and emission limits and its intended operating frequency bands as determined in this instrument.
2. The Mobile WiMAX equipment shall not have any external or readily accessible control which permits the adjustment of its operation in a manner that is inconsistent with this instrument.

1.2: Power Supply

1. The equipment employed may be AC powered or DC powered. For AC powered, the mobile WiMAX equipment must comply with the following power rating: 240V+10%, - 6% tolerance at frequency of 50 Hz \pm 1% tolerance.
2. Where external power supply is used, e.g. AC adaptor, it shall not affect the capability of the equipment.

1.3. Equipment Identification

1. The mobile WiMAX equipment shall be marked with the supplier/manufacturer's name or identification mark, model or type reference and other markings as required by the relevant standards. The markings shall be legible, indelible and readily visible.
2. Each individual Mobile Terminal shall have a unique International Mobile Station Equipment Identity (IMEI). The supplier shall ensure that adequate security measures have been taken to protect the IMEI against duplication, unauthorised removal or change.
3. All markings and related documents shall be prescribed in the English language.

1.4: Security

1. Like any system, security is a key element within the overall mobile WiMAX system. Service Providers of mobile WiMAX must ensure that security is implemented in a way that provides sufficient protection against intrusion and other forms of unauthorised access without hindering the overall operation of the service.

1.5. Keypad

1. Any keypad used in the Mobile Terminal shall be alphanumeric and the relationships between the letters and digits shall comply with the National Numbering Plan, revision 5, document number 1260.1.B or ITU-T Recommendation E.161 (02/2001), sections 2.2, 3.1.1 and 3.6.

PART 2: Technical Requirements

2.1: Power and Emission Limits

The mobile WiMAX equipment shall comply with either (a) the relevant FCC rules; (b) the ITU Recommendations or (c) the ETSI HIPERMAN standards, relating to power and emission limits, given below:

- i. The measured maximum and minimum output power of the User Equipment shall be as prescribed according to the ETSI HIPERMAN standards (**ETSI EN 301 908 22** and **ETSI EN 301 908 20**).
- ii. **RECOMMENDATION ITU-R SF.406-8** - Maximum Equivalent Isotropically Radiated Power of Radio-Relay System Transmitters Operating in the Frequency Bands shared with the Fixed-Satellite Service.
- iii. Spurious Emissions requirements for User Equipment shall be consistent with the ETSI HIPERMAN standards (**ETSI EN 301 20** and **ETSI EN 301 908 20**).

2.2: Operating Frequency

1. Mobile WiMAX Terminals shall operate within the following frequency bands:

Operating Frequency (GHz)	1.492 -1.525	2.3 -2.36	3.3 -3.8	5.15 -5.725
Service Types	WiMAX System	BWA/WiMAX systems	WiMAX System	WiMAX system

(Note: Reference is made with respect to the Spectrum Identification by NICTA for BWA/WiMAX Applications in PNG and the Table of Frequency Allocations in Papua New Guinea).

2.3: Electromagnetic Compatibility (EMC)

1. The equipment must show compliance with NICTA's specification on "Electromagnetic Compatibility & Safety Requirements for TE" Document Ref: 1261.00 and the AS/NZS CISPR 11; 2004 2nd ed. and AS /NZS CISPR 11; 2011. More so, the equipment must comply with the safety requirements defined in IEC 60950-1; 2011 safety standard and the ETSI standard for User Equipment.

2.4: Specific Absorption Rate (SAR)

1. The equipment shall comply with the Specific Absorption Rate limits for general public health and safety as defined in NICTA's "EMC & Safety Requirements for Radiocommunication and Telecommunication Equipment" document, sub-clauses 4.2.1. & 4.2.2.
2. Suppliers shall prove to NICTA that the mobile WiMAX equipment has been tested and certified for conformity with the following International Commission on Non-Ionizing Radiation Protection (ICNIRP) recommendations:
 - **BS IEC 62232:2011** - Determination of RF field strength and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure.

- **EN 62209-2: 2010** - Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body.
- **EN 50360:2001 + A1: 2012** - Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz).
- **EN 50361:2001+ A1: 2012** - Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz).

2.5: Health & Safety Requirements

1. Service providers shall observe and build adequate safety measures within the network in accordance with accepted industry practice to ensure that the safety of operation of the network and the users is not compromised.
2. All devices/interfaces employed must comply with the Electrical and Radiation Protection indicated in NICTA's EMC & Safety Requirements for Radiocommunication and Telecommunication Equipment, sub-clauses 4.1, 4.2 & 4.3 for optical devices.
3. Compliance with the radiation safety standards specified in clause 2.4 does not by itself confer immunity from legal obligations and requirements imposed by national health or safety authorities. NICTA may invalidate the equipment registration if so requested by the relevant authority for reasons of safety or hazards that would likely be caused to users.
4. The Mobile WiMAX terminal equipment shall also comply with the recommended standards for health and safety purposes for general public exposure as described in "Safety of ICT Equipment Standards", AS/NZS 60950.1; 2011. This standard also expounds on the protection of network operation from a hazardous condition that may result from the equipment employed in the network.
5. The equipment supplier shall provide the SAR information in printed form or in other appropriate form such as in the user guide or as a leaflet or brochure in the equipment package. Furthermore, the supplier shall provide each unit of approved Mobile Terminal with advisory information pertaining to electrical safety and non-ionising radiation hazards and on the safe operation of the Mobile Terminal at potentially hazardous areas such as in moving vehicles, in aircrafts and at fuel depots or chemical plants.

2.6: Testing for compliance

1. Suppliers shall prove to NICTA that the mobile WiMAX equipment is compliant with the power, emission limits and the permitted range of operating frequencies stipulated in § 2.1 and § 2.2 of this instrument. Measurement methods of conformance to testing shall be as defined in Harmonized Standard (HS) EN 301 908-22, ANNEX 1: Table 1-A, HS Requirements and

Conformance Test Specification Table (HS-RTT), or equivalent methods as specified by the manufacturer.

2. Testing for mobile WiMAX equipment shall be done by NICTA or any other authorities certified and approved by NICTA.

2.7: Licensing

1. A service provider must have an operator licence to install and operate a mobile WiMAX service in Papua New Guinea as specified under the Act.
2. A service provider shall apply to NICTA for a licence to operate the service in a specified spectrum band.

2.8: System Profiles

1. In implementing WirelessMAN compliant systems, the Mobile WiMAX equipment may use a common WirelessMAN standard for wireless metropolitan area networks to achieve multi-vendor equipment interoperability.

PART 3: Radio Interfaces Requirements

3.1: Standards

Suppliers shall demonstrate to NICTA with type-approval documents of Mobile WiMAX terminals that have been tested and certified to operate in the frequency bands stated in this paper and also conform to any or a combination of the following standards and all applicable standards referenced herein:

- i. **ETSI EN 301 908-01** - IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 1: Introduction and common requirements.
- ii. **ETSI EN 301 908-02** - IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE).
- iii. **ETSI EN 301 908-13** - IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE).
- iv. **ETSI EN 301 908-19** - IMT cellular networks; Harmonized EN covering the essential Requirements of article 3.2 of the R&TTE Directive; Part 19: OFDMA TDD WMAN (Mobile WiMAX) TDD User Equipment (UE).
- v. **ETSI EN 301 908-21** - IMT cellular networks; Harmonized EN covering the essential Requirements of article 3.2 of the R&TTE Directive; Part 21: OFDMA TDD WMAN (Mobile WiMAX) FDD User Equipment (UE).

- vi. **ITU-R M.1457-9** - Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2000 (IMT-2000).
- vii. **ETSI TS 102 210** - Broadband Radio Access Networks (BRAN); HIPERMAN; System Profiles.

3.2: Interoperability

1. Mobile WiMAX equipment shall operate with other systems, equipment/devices and applications. The equipment shall also operate with different systems and devices of other networks with minimal or no disturbances.

3.3: Connectivity

1. The Mobile WiMAX equipment shall have the ability to interface with other terminal equipment, programs and software to allow for interoperability.

3.4: Service Quality

1. It is the responsibility of the Mobile WiMAX service provider to ensure that a quality service is offered with minimal disturbances. The services shall be in accordance with the international standards and practices.
2. The integration of mobile WiMAX equipment with other systems or devices and applications in the same network or those of the other network must demonstrate that QoS is maintained at the required level recommended by NICTA or the international standards.
3. NICTA shall monitor mobile WiMAX services provided to ensure that service providers comply with the Operating Licence conditions and Regulations.
4. All mobile WiMAX products must meet the performance requirements outlined by ITU-R/IMT to ensure quality of service (QoS).

3.5: IMT- Advanced Requirements

1. The Mobile WiMAX equipment shall have the capability to meet certain minimum performance requirements for IMT- Advanced systems. This includes requirements to address parameters such as:
 - peak and average channel spectral efficiency,
 - cell-edge user spectral efficiency,
 - VoIP capacity
 - Control and User Plane Latency,
 - Handover
 - Channel bandwidth and Mobility
2. Mobile WiMAX equipment must be able to cater for future applications and services and the expected needs of users and operators including QoS, roaming as well as interworking with other wireless networks.

PART 4: Other Considerations

4.1: Spectrum Consideration

1. Mobile WiMAX systems shall be deployed in TDD mode with large channel bandwidths, flexible frequency re-use and with minimal spectral inefficiencies for guard bands to facilitate co-existence with adjacent operators.

4.2: Frequency Interference

1. Service providers must ensure that all mobile WiMAX equipment operates within the specified frequency bands, to avoid causing interference to other service providers and equipment.

PART 5: Type Approval and Inspection

1. Type Approval is necessarily conducted on all transmitting equipment or devices to ensure that compliance with respective standards is not compromised - such as power levels, frequency band of operation, inter-modulation products, spurious emissions and other parameters. Therefore all equipment of mobile WiMAX networks intended for use in Papua New Guinea shall be subjected to the Type Approval process. (More information on type approval processes can be obtained from NICTA's Type Approval Guidelines for ICT apparatus in Papua New Guinea.
2. Inspection of network based mobile WIMAX systems is also a mandatory responsibility of NICTA and is conducted to confirm or otherwise that networks or systems are installed in accordance with accepted technical standards and regulatory practices. NICTA shall be allowed access to network installations sites for inspection purposes.
3. NICTA shall conduct site inspections on installations of mobile WiMAX networks as and when necessary including in the case of routine site visitations and NICTA shall be accorded access to such installations.
4. In the course of installation and type approval checks, installations or any equipment found to be non-compliant with type approval specifications or requirements shall be prevented from being installed for service provision purposes.
5. NICTA shall charge a type approval fee for registration of mobile WiMAX equipment at rates approved by NICTA as and when necessary.

PART 6: Complaints

1. Service providers and individuals may lodge complaints to NICTA in respect of any issue pertaining to mobile WIMAX technology or other concerns relating to interference, negative impacts caused by network operators and other concerns of a technical nature.
2. Any complaints shall be forwarded to the equipment supplier or write directly to;

DIRECTOR
LICENSING & ENFORCEMENT DEPARTMENT
NICTA
PO BOX 8444, BOROKO, NCD
PHONE: 3033209
FAX: 3004825

PART 7: Document Administration

7.1: Consistency

All mobile carriers, service providers, equipment suppliers and/or dealers shall comply with this instrument.

7.2: Amendments

NICTA, in consultation with the industry, may from time-to-time review, update or modify this instrument to ensure its continued service relevance and international service performance requirements as necessary.

7.3: Enforcement

This instrument is in force and effective from the date the NICTA Board approve it and is subject to the appropriate provisions of the NICT Act, 2009.

7.4: Publication

This instrument is also available on the NICTA website <http://www.nicta.gov.pg> for public consumption. The instrument shall also be made available to relevant authorities and Government departments for reference and compliance.

References

For the technical requirements captured in this Specification, reference has been made to the following documents:

1. NICT Act, 2009-Part XI-Division 4, Section 218
2. Mobile WiMAX – Part I: A Technical Overview and Performance Evaluation, August 2006, WiMAX Forum
(http://www.wimaxforum.org/news/downloads/Mobile_WiMAX_Part1_Overview_and_Performance.pdf)
3. IEEE Std 802.16e-2005, Amendment for Combined Fixed and Mobile Broadband Wireless Access Systems, December 2005
(<http://standards.ieee.org/getieee802/download/802.16e-2005.pdf>)
4. Overview of Mobile WiMAX Technology and Evolution
5. ITU global standard for international mobile telecommunications ‘IMT-Advanced’, (accessed 19.2.2010)
6. Module 2:IEEE mobile broadband: Mobile WiMAX
7. Mobile Tariff Regulation in a Transition Market Environment- The Papua New Guinea Experience
8. ETSI EN 301 908-02 - IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE).
9. ETSI EN 301 908-21 - IMT cellular networks; Harmonized EN covering the essential Requirements of article 3.2 of the R&TTE Directive; Part 21: OFDMA TDD WMAN (Mobile WiMAX) FDD User Equipment (UE).
10. ETSI EN 301 908-19 - IMT cellular networks; Harmonized EN covering the essential Requirements of article 3.2 of the R&TTE Directive; Part 19: OFDMA TDD WMAN (Mobile WiMAX) TDD User Equipment (UE).
11. Technical Specification for Wireless Broadband Access Equipment: ITA TS WBA Issue 1, June 2005

ANNEX 1:**Table A-1: HS Requirements and conformance Test specifications Table (HS-RTT)**

Harmonized Standard EN 301 908-21						
The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive						
Requirement			Requirement Conditionality		Test Specification	
No	Description	Reference: Clause No	U/C	Condition	E/O	Reference: Clause No
1	Transmitter Spectrum Emission Mask	4.2.2	U		E	5.4.1
2	Transmitter Adjacent Channel Leakage Power Ratio	4.2.3	U		E	5.4.2
3	Transmitter Spurious Emissions	4.2.4	U		E	5.4.3
4	Transmitter Maximum Output Power	4.2.5	U		E	5.4.4
5	Transmitter Minimum Output Power	4.2.6	U		E	5.4.4
6	Receiver Spurious Emissions	4.2.7	U		E	5.4.5
7	Receiver Adjacent Channel Selectivity (ACS)	4.2.8	U		E	5.4.6
8	Receiver Blocking Characteristics	4.2.9	U		E	5.4.7
9	Receiver Intermodulation Characteristics	4.2.10	U		E	5.4.8
10	Receiver Spurious Response	4.2.11	U		E	5.4.9

Key to columns:**Requirement:**

No - A unique identifier for one row of the table which may be used to identify a requirement or its test specification.

Description - A textual reference to the requirement.

Clause Number - Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

U/C - Indicates whether the requirement is to be unconditionally applicable (U) or is conditional upon the manufacturers claimed functionality of the equipment (C).

Condition - Explains the conditions when the requirement shall or shall not be applicable for a technical requirement which is classified "conditional".

Test Specification:

E/O - Indicates whether the test specification forms part of the Essential Radio Test Suite (E) or whether it is one of the Other Test Suite (O).

NOTE: All tests whether "E" or "O" are relevant to the requirements. Rows designated "E" collectively make up the Essential Radio Test Suite; those designated "O" make up the Other Test Suite; for those designated "X" there is no test specified corresponding to the requirement. The completion of all tests classified "E" as specified with satisfactory outcomes is a necessary condition for a presumption of conformity. Compliance with requirements associated with tests classified "O" or "X" is a necessary condition for presumption of conformity, although conformance with the requirement may be claimed by an equivalent test or by manufacturer's assertion supported by appropriate entries in the technical construction file.

Clause Number - Identification of clause(s) defining the test specification in the present document unless another document is referenced explicitly. Where no test is specified (that is, where the previous field is "X") this field remains blank.

The HS Requirements and conformance Test specifications Table (HS-RTT) in table A-1 serves a number of purposes, as follows:

- i. it provides a statement of all the requirements in words and by cross reference to (a) specific clause(s) in the present document or to (a) specific clause(s) in (a) specific referenced document(s);
- ii. it provides a statement of all the test procedures corresponding to those requirements by cross reference to (a) specific clause(s) in the present document or to (a) specific clause(s) in (a) specific referenced document(s);
- iii. it qualifies each requirement to be either:
 - viii. Unconditional: meaning that the requirement applies in all circumstances; or
 - ix. Conditional: meaning that the requirement is dependent on the manufacturer having chosen to support optional functionality defined within the schedule.
- iv. in the case of Conditional requirements, it associates the requirement with the particular optional service or functionality;
- v. it qualifies each test procedure to be either:
 - o Essential: meaning that it is included with the Essential Radio Test Suite and therefore the requirement shall be demonstrated to be met in accordance with the referenced procedures;
 - o Other: meaning that the test procedure is illustrative but other means of demonstrating compliance with the requirement are permitted.