Telecommunications Standards Advisory Committee (TSAC)

Technical Specification

Television White Space Devices

IDA TS WSD
Issue 1, March 2016

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Content

1 Scope of Specification

1.1 This Specification defines the technical requirements of Television ("TV") Band or White Space Devices ("WSD") that may be permitted to operate on any available TV channels of the broadcast TV frequency bands as shown in Table 1.

1.2 This Specification is applicable to the following types of radio equipment:

a. A fixed WSD which may be a master WSD, capable of communicating directly with a Geo-location Database, and operating as a network, transmitting to and receiving from one or more fixed WSDs and/or personal/portable WSDs. A fixed WSD is geo-located and operates from a fixed location.

b. A personal/portable mode II WSD, which may also be a master WSD, capable of communicating directly with a Geo-location Database, and operating as a network, transmitting to and receiving from one or more fixed WSDs or personal/portable WSDs. A mode II WSD operates with a geo-location capability.

c. A personal/portable mode I WSD is a client WSD, capable of only communicating with other WSDs under the control of a serving master WSD. A mode I WSD does not operate with a geo-location capability.

2 References

In establishing the technical requirements of this Specification, reference has been made to the following documents:

[1] ETSI EN 301 489-1 V1.9.2 (2011-9), Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

[2] IEC CISPR 22 (2008), Information Technology Equipment - Radio disturbance characteristics – Limits and methods of measurement

[3] IEC 60950-1(2005-12), International Electrotechnical Commission – Safety of Information Technology Equipment

[4] ITU-R SM.1541-5 (08/2013), Unwanted emissions in the out-of-band domain

[5] ITU-R SM.329-12 (09/2012), Unwanted emissions in the spurious domain

[6] ETSI EN 301 598 V1.0.9 (2014-02), White Space Devices (WSD); Wireless Access Systems operating in the 470 MHz to 790 MHz TV broadcast band; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

[7] FCC Title 47 CFR Ch. I (10–1–10 Edition), Part 15 - Radio Frequency Devices
Subpart C – Intentional Radiators, §15.209 Radiated emission limits
Subpart H – Television Band Devices

[8] 416721 D01 White Space Test Procedures v02, FCC OET Lab Div (6/25/2012), Certification Test Procedures for TV Band (White Space) Devices Authorized under Subpart H of the Part 15 Rules

3 Abbreviations

ACLR	Adjacent Channel Leakage Ratio
CISPR	International Special Committee on Radio Interference
EIRP	Equivalent Isotropically Radiated Power
EMC	Electromagnetic Compatibility
EMF	Electromagnetic Field
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
GLDB	Geo-location Database
ICNIRP	International Commission on Non-Ionising Radiation Protection
IEC	International Electrotechnical Commission
OOB	Out-of-Band
OUI	IEEE Organisationally Unique Identifier
PSD	Power Spectral Density
RF	Radio Frequency
TV	Television
TVWS	Television White Space
UHF	Ultra High Frequency
UUID	IETF Universally Unique Identifier
VHF	Very High Frequency
WSD	White Space Devices

4 General Requirements

4.1 Design of WSD

The WSD shall be designed to meet the following requirements:

a. The WSD shall not cause harmful interference to radio-communication services operating in allocated frequency bands, and cannot claim protection from these radio-communication services;

b. The personal/portable Mode I or mode II WSD shall be fixed with an integral or a dedicated antenna that has been assessed with the WSD for compliance with the requirements of this Specification;

c. The fixed WSD may have an external antenna, with the antenna connector;

d. The WSD 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; and

e. The WSD shall be marked with the supplier/manufacturer's name or identification mark, and the supplier/manufacturer's model or type reference. The markings shall be legible, indelible and readily visible.

4.2 Safety Requirements

4.2.1 Where appropriate, the WSD shall be tested according to measurement methods and limits for:

a. Electromagnetic Compatibility ("EMC") emissions from the direct DC power or AC mains power input/output ports defined in ETSI EN 301 489-1 [1] or IEC CISPR 22 [2]; and

b. Electrical safety defined in the IEC 60950-1 [3].

4.2.2 Where appropriate, the WSD shall comply with the International Commission on Non-Ionising Radiation Protection ("ICNIRP") guidelines for limiting exposure to time-varying electromagnetic field ("EMF") in the frequency range up to 300 GHz.

4.2.3 It should be noted that compliance with any radiation safety standard does not by itself confer immunity from legal obligations and requirements imposed by national health or safety authorities.

5 Radio Frequency Interface Requirements

5.1 Permissible Channels of Operation and Channel Bandwidth

5.1.1 A nominal channel is defined as one (or more contiguous) TV channel(s) specified by an authorised Geo-location Database for its permitted transmissions. The nominal channel bandwidth shall be 7 MHz (or multiple of 7 MHz) for WSD operating in the Very High Frequency ("VHF") band; or 8 MHz (or multiple of 8 MHz) for WSD operating in the Ultra High Frequency ("UHF") band.

5.1.2 Fixed and mode II WSD shall operate only on available TV channels as identified in Table 1, and as specified by an authorised Geo-location Database.

5.1.3 Mode I WSD shall operate only on available TV channels as identified in Table 1, provided by a fixed or mode II WSD.

5.1.4 Available TV channels and frequencies for Television White Space ("TVWS") operations are as shown in Table 1.

TV Band	Frequencies / Channel(s)	Channel Bandwidth	Total Bandwidth / No. of Channels Note 1	
			Before ASO	After ASO
VHF III	174 – 181 MHz (Channel 5) Note 1a	7 MHz	21 MHz (3 channels)	42 MHz (6 channels)
	181 – 188 MHz (Channel 6)			
	195 – 202 MHz (Channel 8) Note 1a			
	209 – 223 MHz (Channel 10 and 11)			
	223 – 230 MHz (Channel 12) Note 1a			
UHF V	470 – 534 MHz (Channel 21 to 28) Note 1a and 2	8 MHz	168 MHz (21 channels)	144 MHz (18 channels)
	614 – 622 MHz (Channel 39)			
	622 – 630 MHz (Channel 40) Note 1a			
	630 – 694 MHz (Channel 41 to 48) Note 3			
	694 – 710 MHz (Channel 49 to 50) Note 1b			
	718 – 742 MHz (Channel 52 to 54) Note 1b			
	750 – 774 MHz (Channel 56 to 58) Note 1b			
	790 – 806 MHz (Channel 61 and 62) Note 1b			

Note 1: When Analogue Switched Off ("ASO") occurs (which will likely take place by 2020), there will be changes to the availability of TV channels for the TVWS usage as indicated. Industry will be duly notified.

a. Channel 5, 8, 12, 21 to 24, 27, 28 and 40 will be made available for TVWS usage after ASO.

b. When the 700 MHz band (694 – 806 MHz) has been harmonized and allocated for the International Mobile Telecommunications ("IMT") services, 10 channels (Channel 49 to 50, 52 to 54, 56 to 58, and 61 to 62) will be removed from the TVWS usage.

Note 2: Channel 25 and 26 shall be blocked from TVWS operations by the Geo-location Database until further field tests have been conducted on adjacent channel interference.

Note 3: Channel 47 shall also be blocked from TVWS operations by the Geo-location Database, as Channel 25 and 47 will be utilised for safe harbour operations of wireless microphones, operating in permitted frequency bands defined in the IDA Technical Specification for Short Range Devices ("IDA TS SRD").

Table 1: TV Channels for TVWS Operations

5.2 RF Power and RF Power Spectral Density

5.2.1 The Radio Frequency ("RF") power within the nominal channel shall not exceed the level as determined by an authorised Geo-location Database; or as indicated by a master WSD (which is a fixed or mode II WSD) to the client WSD (mode I WSD) for operations in that channel. The equivalent isotropically radiated power ("EIRP") over the 7 MHz channel bandwidth or 8 MHz channel bandwidth on which the type of WSD is permitted to operate, shall be within the limits as specified in Table 2.

Transmission Power (EIRP) over a TV channel	Fixed WSD	Mode II WSD	Mode I WSD
	4 W (36 dBm)	100 mW (20 dBm)	100 mW (20 dBm)
Note: EIRP is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna.			

Table 2: Power Limits for WSD

5.2.2 The WSD should incorporate transmit power control feature to limit the transmission power to the minimum possible for successful communication.

5.2.3 The RF power spectral density from the WSD shall not exceed the following values when measured in any 100 kHz bandwidth within the TV channel specified by an authorised Geo-location Database or provided by a master WSD:

a. For fixed WSD, the transmission power shall not exceed 17.5 dBm EIRP (PSD in 100 kHz) transmitting in 7 MHz channel bandwidth; or 17 dBm EIRP (PSD in 100 kHz) operating in 8 MHz channel bandwidth.

b. For mode I or mode II WSD, the transmission power shall not exceed 1.55 dBm EIRP (PSD in 100 kHz) transmitting in 7 MHz channel bandwidth; or 0.97 dBm EIRP (PSD in 100 kHz) transmitting in 8 MHz channel bandwidth.

5.3 Transmitter Unwanted Emissions[1]

5.3.1 Out-of-band Emissions

OOB emissions from the WSD shall not exceed – 56.8 dBm EIRP in a resolution bandwidth of 100 kHz when measured in the local broadcast TV channels that are adjacent to the channel in which the WSD is operating (ITU-R SM.1541-5 [4]).[2]

5.3.2 Spurious Emissions

Spurious emissions from the WSD shall not exceed – 54 dBm in 470 – 862 MHz (ITU-R SM.329-12 [5]); or – 61 dBm (FCC Regulations §15.209 on radiated emission limits [7]). Spurious emissions predominate in the frequency range beyond the OOB domain, and shall be measured within the range of 30 MHz to 4 GHz.

[1] Unwanted emissions consist of out-of-band emissions and spurious emissions [5].

[2] Any emission outside the necessary bandwidth which occurs in the frequency range separated from the assigned frequency of the emission by less than 250% of the necessary bandwidth of the emission will generally be considered an OOB emission [4]. In the case of TVWS, when the WSD operates in the bandwidth of TV channel n, the OOB domain shall include the bandwidths of the adjacent TV channels n-1, n+1, n-2 and n+2.

6 Geo-location Database Interface Requirements

6.1 Control and Monitoring Requirements

The control and monitoring requirements ensure that:

a. The WSD shall not transmit in the absence of communications with an authorised Geo-location Database ("GLDB"), or a master WSD.

b. The WSD shall transmit in accordance with the parameters provided by an authorised GLDB.

c. The WSD shall not obtain parameters from an unauthorised GLDB.

Note: The protocol used for data transfer between client WSDs, master WSDs and GLDBs are outside the scope of this Specification.

6.1.1 Geo-location Database Identification

6.1.1.1 At start up and before initiating any transmissions in the TV frequency bands, the master WSD (mode II or fixed WSD) shall ensure that the GLDB which it queries is authorised by IDA. Development and availability of the GLDB will be updated.

Note: A fixed WSD equipped with spectrum sensing capability may also use spectrum sensing as a complementary method, as long as no interference is caused to users of radio-communication services.

6.1.1.2 The master WSD shall not request operational parameters from a GLDB that is not approved by IDA.

6.1.2 Transmitting in Compliance with Parameters

Parameter sets are outlined in Table 3 (Note 1).

Parameter Set	Information Element	Description
Device Parameters (Note 2) For mode I WSD to communicate with mode II / fixed WSD; and for mode II / fixed WSD to communicate with GLDB	Antenna location	Latitude and longitude coordinates, and altitude (Note 3)
	Antenna location accuracy	Accuracy of ± 50 metres determined by internal geo-location capability or manual entry of geographical coordinates
	Device type	Fixed WSD, Personal/Portable Mode I or Mode II WSD
	Device Emission Class	Class number of which the WSD complies with as outlined in Table 2, § 4.2.4.2 of EN 301 598 [6]
	Unique device identifier, including the serial number	IEEE Organisationally Unique Identifier ("OUI"); IETF Universally Unique Identifier ("UUID") (RFC 4122); or FCC ID
Operational Parameters (Note 4) Use by any WSD to configure its transmissions within the TV channels approved for TVWS operations. All operational parameters are generated by the GLDB and communicated to the mode II / fixed WSD.	List of TV channel edge frequency pairs	This is the list of frequency blocks where the WSD is allowed to transmit.
	Max RF EIRP spectral density for each TV channel edge frequency pair	Power (dBm / 100 kHz) over the frequency band
	Max RF EIRP for each TV channel edge frequency pair	Power (dBm) over the frequency band
	Max total bandwidth	Max total bandwidth (in Hz), may or may not be contiguous
	Time validity start ($T_{VALSTART}$)	Time when operational parameters start being valid.
	Time validity end (T_{VALEND})	Time when operational parameters stop being valid. For client WSD (mode I WSD), the serving master WSD may indicate a permitted duration of operation, specified as T_{DUR}.
	Location validity (L_{VAL})	L_{VAL} is 100 metres from the original position, outside of which operational parameters are not valid.
	Update timer (T_{UPDATE})	This indicates how often the master WSD will check with the GLDB that operational parameters are still valid. T_{UPDATE} is 6 hours, and is configurable.

Note 1: Specific protocol implementations may use different names for the parameter sets or for individual information elements.

Note 2: If any of the device parameters cannot be reported to the GLDB or the master WSD, the WSD shall indicate that the parameter is not available.

Note 3: Height of antenna (or altitude of antenna location) is defined as the height above ground, which will enable a GLDB to general operational parameters based on the altitude of the WSD.

Note 4: The algorithms to calculate operational parameters and the assumptions for these calculations are outside the scope of this Specification.

Table 3: Device and Operational Parameters

6.1.2.1 The WSD shall not start transmissions in the TV frequency bands unless it has received operational parameters from a GLDB; or from a master WSD.

6.1.2.2 The WSD shall, at any point in time, only transmit in accordance with the operational parameters that it has received from a GLDB; or from a master WSD.

Note: Communication between two client WSDs is permitted, provided that each is operating in accordance with the operational parameters given by its serving master WSD.

6.1.2.3 The fixed WSD which requires operational parameters from the GLDB shall first accurately report its own device parameters to the GLDB to obtain a successful registration.

6.1.2.4 The GLDB will indicate a failed registration if any of the following parameter or information provided is invalid:

a. Unique device identifier
b. Device geographic coordinates (latitude and longitude)
c. Height of antenna (altitude)
d. Contact information of the fixed WSD owner

6.1.2.5 A fixed WSD may confirm its registration through a registered fixed WSD on a TV channel indicated as available to that registered fixed WSD.

6.1.2.6 The mode II WSD which requires operational parameters from the GLDB shall accurately report its own device parameters to the GLDB. The mode II WSD may obtain operational parameters for multiple locations in the vicinity of its current location, and use such information to define a geographical area in which it can operate with the same operational parameters.

6.1.2.7 A master WSD (mode II or fixed WSD) shall report to the GLDB its own unique device identifier together with the unique device identifiers of the client WSDs (mode I WSDs) that transmit using a subset of the operational parameters obtained from the GLDB.

6.1.2.8 The mode I WSD which intends to use the operational parameters provided by a master WSD, shall accurately report its unique device identifier to the serving master WSD. Once the mode I WSD (client WSD) receives contact verification signal from the serving master WSD, it can start transmission using the operational parameters received from the master WSD.

6.1.3 Master WSD Update

6.1.3.1 The master WSD (mode II or fixed WSD) update is a process to be initiated by the master WSD to check with the GLDB whether its operational parameters, and those of its attached client WSDs, are still valid. The update may also be initiated by the GLDB. The master WSD shall support this WSD update function.

6.1.3.2 The master WSD shall cease transmission, and instruct the client WSDs attached to it to cease transmission, if it receives update from the GLDB that the parameters are no longer valid.

6.1.3.3 A master WSD shall cease transmission, and instruct the client WSDs attached to it to cease transmission, if it fails to connect with the GLDB for a period which exceeds T_{UPDATE}. T_{UPDATE} is one of the operational parameters defined in Table 3.

6.1.3.4 A master WSD shall support an update every T_{UPDATE}.

6.1.3.5 A mode II WSD using operational parameters for multiple locations shall initiate update with the GLDB when it moves beyond the boundary of the area where the operational parameters are valid. Regardless, such mode II WSD shall verify the validity of the operational parameters with the GLDB on a daily basis.

6.1.3.6 A WSD is allowed to enter a sleep mode, i.e. inactive but not powered down. A master WSD which is in sleep mode does not need to be reachable by the GLDB, nor need to contact the GLDB, while it remains in sleep mode.

6.1.3.7 A master WSD which has been in sleep mode for longer than T_{UPDATE} shall not restart transmissions according to the operational parameters obtained before going into sleep mode. It shall only restart transmissions after its operational parameters have been updated by the GLDB.

6.1.4 Client WSD update

6.1.4.1 The client WSD (mode I WSD) update is the process by which a master WSD informs a client WSD that its operational parameters are still valid or are no longer valid. The update can be initiated by either the client WSD or the master WSD. The client WSD shall support this WSD update function.

6.1.4.2 A client WSD shall cease transmission when the master WSD informs the client WSD that its operational parameters are no longer valid.

6.1.4.3 A client WSD shall cease transmission if it fails to receive an update (or a contact verification signal from), or fails to re-establish the operational parameters with its serving master WSD every 60 seconds.

6.1.4.4 A WSD is allowed to enter a sleep mode, i.e. inactive but not powered down. A client WSD which is in sleep mode does not need to be reachable by the master WSD, nor need to contact the master WSD while it remains in sleep mode.

6.1.4.5 A client WSD that has been in sleep mode for more than 60 seconds shall not restart transmissions until it has re-confirmed its operational parameters with the serving master WSD.

6.2 Geo-location Capability

6.2.1 Geo-location capability is the capability of a WSD to determine and report its latitude and longitude (i.e. horizontal geo-location capability) and altitude (i.e. vertical geo-location) coordinates of its antenna. A fixed WSD may have a horizon geo-location capability, a mode II WSD shall have a horizon geo-location capability, and a mode I WSD does not require a horizon geo-location capability. A WSD with a horizon geo-location capability may also have a vertical geo-location.

6.2.2 A WSD which has geo-location capability and is able to determine its location:

a. WSD shall report its geo-location coordinates of its antenna(s), as part of its device parameters; and
b. WSD shall report its geo-location accuracy (in metres), as part of its device parameters.

6.2.3 At the time of installation and first activation from a power-off condition, the fixed WSD shall determine its geo-location and accuracy, and store this information in the WSD, either by means of its incorporated geo-location capability or manual entry. If the fixed WSD is moved to another location, registration with the GLDB based on its new geo-location and accuracy shall be required.

6.2.4 A client WSD (mode I WSD) does not require a geo-location capability as it is relying on its serving master WSD (mode II or fixed WSD) to determine its operational parameters.

6.2.5 A mode II WSD whose location is more than L_{VALUE} away from the location reported to the GLDB shall not transmit according to the operational parameters determined for that reported location.

Note: L_{VALUE} is part of the set of operational parameters.

6.2.6 A mode II WSD which has previously reported a location to the GLDB, but it is no longer able to determine its location shall stop transmitting in accordance with the existing operational parameters.

6.3 Software, Firmware and User Access Restrictions

6.3.1 Software, firmware and user access restrictions are those measures which are intended to prevent changes, which could adversely affect the compliance of the WSD with the requirements defined in this Specification.

6.3.2 The configuration of the WSD (or equipment) shall not be made dependent of the correct selection by the user of the appropriate country operation, or any other setting to be input by the end-user.

6.3.3 The WSD shall not allow the end-user to have access to any hardware or software settings that can affect:

a. GLDB identification;
b. Exchange of the parameters outlined in Table 3, communicated between a WSD and a GLDB or a master WSD; and
c. Compliance with the requirements defined in this Specification.

6.3.4 Manufacturers who provide their software or firmware as open source code shall prevent modified software from having any impact on the compliance of the WSD with the requirements in this Specification.

6.4 Security

6.4.1 Security is defined as measures to support the concepts of Authentication and Integrity.

6.4.2 Authentication

a. A master WSD shall authenticate the GLDB using a widely accepted Internet authentication mechanism.
b. A master WSD shall not communicate its device parameters or the device parameters of a client WSD to a GLDB that has not been authenticated.
c. A master WSD shall not use operational parameters obtained from a GLDB that has not been authenticated.
d. A master WSD shall not provide operational parameters to a client WSD from a GLDB that has not been authenticated.

6.4.3 Integrity

a. A master WSD shall communicate with the GLDB using a protocol that includes functionality to avoid tampering with the exchange of parameters in transit.
b. A master WSD and a client WSD shall communicate using a protocol that includes functionality to avoid corruption of the parameters in transit.

Annex A

Conformance Testing / Verification Checklist

This Checklist is intended for facilitating Supplier's Declaration of Conformity to the technical requirements defined in the IDA Technical Specification for Television White Space Devices ("IDA TS WSD").

Please note:

"**CR**" indicates that the technical requirement set out in a particular section or sub-section ("§") of the IDA TS WSD is a **Compliance Requirement**.

"**M**" means that it shall be **Mandatory** for the WSD to comply with the technical requirement set out in the IDA TS WSD § cited in this Checklist (Table given below).

"**C**" means that compliance with the technical requirement set out in the IDA TS WSD § cited in this Checklist is **Conditional**. In this case, the need to comply is contingent on the type of WSD as indicated in the remarks column.

"**O**" means that it is an **Optional** requirement.

IDA TS WSD §	Parameter	Reference [n] given in § 2 of TS WSD	CR	Yes /No	Remarks
1.2	Type of device: Fixed; personal/portable mode I; or personal/portable mode II WSD	[6] § 4.2.1.1 or § 4.2.1.2; or [7] § 15.703(c), § 15.703(e) or § 15.703(f)	M		State the type of WSD.
4.1	Design of WSD	[6] § 4.2.1 and § 5.1.2; or [7] § 15.709(b), and [8] Part 1: 2(d)	M		
4.2	Safety requirements		M		
5.1	Permissible channels and channel bandwidth	[8] Part 1: 2(b)i, [7] § 15.711(c), and [8] Part 2: 2(j)	M		Verify that the WSD cannot be tuned to operate on unauthorised TV channels. Confirm WSD channel availability.
5.2.1, Table 1	Transmission power over a TV channel	[6] § 4.2.3.2, § 5.3.2 and § 5.3.3; or [8] Part 1: 2(c)i or 2(c)ii	M		
5.2.2	Transmit power control	[7] § 15.709(a)(3)	O		Provide a description of this mechanism incorporated in the WSD.
5.2.3	RF power spectral density	[6] § 4.2.3.2, § 5.3.2 and § 5.3.3; or [8] Part 1: 2(c)i or 2(c)ii Radiated measurement procedure for fixed WSD may utilise the ANSI C63.4-2009 for guidance.	M		When conducted measurement is used for fixed WSD with external antenna, the sum of the total conducted power within the TV channel bandwidth and the antenna gain shall not exceed 4W EIRP.
5.3.1	Out-of-band emissions[3]	[8] Part 1: 2(e) and (e)ii; or [6] § 4.2.4.2 and § 5.3.5	M		
5.3.2	Spurious emissions	[8] Part 1: 2(e)iii; or [4] § 4.2.4.1 and § 5.3.4	M		

[3] The limit of -56.8 dBm /100 kHz has been adopted for the deployment of TVWS technology to ensure that there will not be any adjacent channel interference to local broadcast services.

IDA TS WSD §	Parameter	Reference [n] given in § 2 of TS WSD	CR	Yes /No	Remarks
6.1	Control and monitoring requirements	[6] § 5.3.11 or [7] § 15.709(a)(6)	M		
6.1.1	Geo-location database identification	[6] § 5.3.11.1 or [7] § 15.709(a)(6)	M		
6.1.2	Transmitting in compliance with parameters	[6] § 5.3.11.2 or [7] § 15.713(f)(3), and (g); [7] § 15.711(b)(3)(iv); [7] § 15.707(a); and [8] Part 2: 2(a) to 2(d)	M		
6.1.3	Master WSD update	[6] § 5.3.11.2 or [7] § 15.711(b)(2) [7] § 15.711(b)(3)(i), (ii), and (iii); and [8] Part 2: 2(e) to (f)	M		
6.1.4	Client WSD update	[6] § 5.3.11.2 or [7] § 15.711(b)(3)(iv), § 15.711 (g)	M		
6.2	Geo-location capability	[6] § 5.3.12 or [7] § 15.711(b)(1) and (2)	C		Requirement is optional for fixed WSD; mandatory for Mode II WSD; and need not apply to Mode I WSD.
6.3	Software, firmware and user access restriction		M		Application shall include a high level description of the measures taken.
6.4	Security	[7] § 15.711(b)(3)(vi), (f)	M		Application shall include a high level description of the technologies and measure incorporated in the WSD to comply with the security requirements of this section.

Annex B

Addendum/Corrigendum

Changes to Draft IDA TS WSD Issue 1, March 2015			
Page	**New TS Ref**	**Items Changed**	**Date of Issue**
1	§ 2	Included two ITU-R references: [4] unwanted emissions in the OOB domain; and [5] unwanted emissions in the spurious domain.	Mar 2016
4	§ 5.1.4	Table 1: “TV Channels for TVWS Operations” has been updated with clarity on TV channels that will be made available for TVWS use after the ASO.	
5	§ 5.2.2	Implementation of the transmit power control feature is optional.	
5	§ 5.3.1	Draft § 5.3.2 has been removed, as the same requirement for out-of-band (OOB) emissions from WSD (under § 5.3.1) shall be applied to all types of WSD. Draft 5.3.3 has also been removed, as the requirement has been streamlined with reference to the ITU-R recommendation for OOB emissions [4].	
5	§ 5.3.2	Draft § 5.3.4 has become § 5.3.2 after it has been streamlined with reference to the ITU-R recommendation for spurious emissions [5] and FCC Part 15 regulations on radiated emission limits.	
7	§ 6.1.2	On the device parameters outlined in Table 3, the unique device identifier (including the serial number) shall be either one of the 3 types as listed.	
8	§ 6.1.2.4	Draft § 6.1.2.4, item d, “Licensee contact information” has been replaced with “Contact information of the fixed WSD owner”.	
8	§ 6.1.3.1	For clarity, the master WSD update shall be initiated by the master WSD, and may be initiated by the GLDB.	
8, 9	§ 6.1.3, § 6.1.4	Protocol implementations between WSDs and GLDBs for administrative procedures and updating of operational parameters are outside the scope of this Specification.	
11	Annex A	Draft Annex A has been updated to reflect the above changes.	