

The use of Television White Spaces in South Africa - ICASA Ruleset (ICASA-TVWS-2018): S-GLSD Access

Webinar on Ruleset Implementation Guidelines for OEMs

By:

Mofolo Mofolo - CSIR

Dr. Luzango Mfupe - CSIR

Contributor: Siyanda Nkamisa - ICASA

23 June 2020

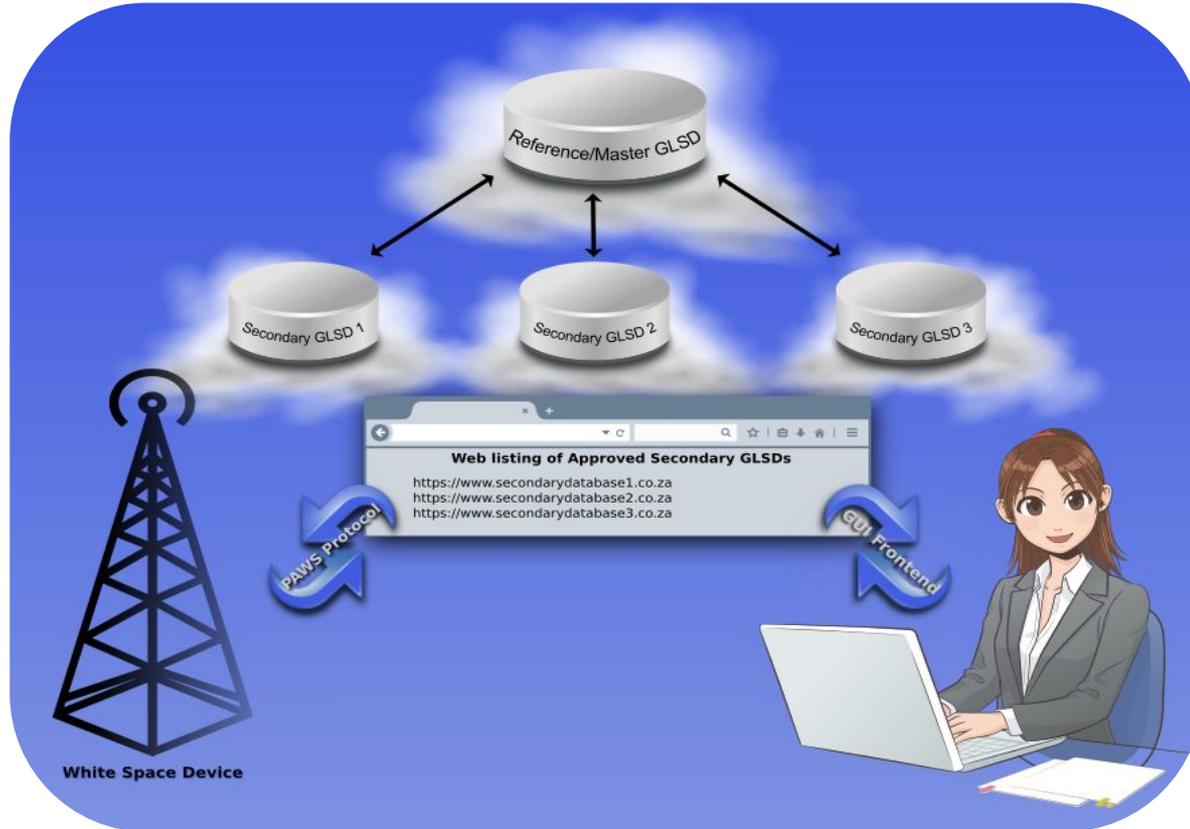
Webinar Outline

1. Opening Remarks
2. Overview of the WSD Type Approval Process
3. PAWS Compliance: RFC 7545 with Amendments to support ICASA Ruleset
4. Object Type Amendments for ICASA Ruleset
5. PAWS Messages - Applicable Cases & Dependencies
6. Harmonized Configuration of ICASA Ruleset
7. Assessment & Test Cases
8. Q&A
9. Closing Remarks
10. AoB

Key References - Must Know

- Protocol to Access White-Space (PAWS) Databases
<https://tools.ietf.org/html/rfc7545>
- Document on amendments of the IETF PAWS (RFC 7545) to Include ICASA Ruleset
- Regulations On The Use Of Television White Spaces 2018
<https://www.icasa.org.za/legislation-and-regulations/regulations-on-the-use-of-television-white-spaces-2018>

TVWS Regulatory Framework - ICASA Ruleset (1/2)



TVWS Regulatory Framework - ICASA Ruleset (2/2)

STAATSKOERANT, 23 MAART 2018

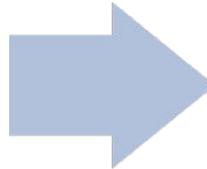
No. 41512 1913

INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA
NOTICE 147 OF 2018



ELECTRONIC COMMUNICATIONS ACT 2005, (ACT NO. 36 OF 2005)

REGULATIONS ON THE USE OF TELEVISION WHITE SPACES



TVWS Frequency Range: 470 MHz to 694MHz
Excluding the Radio Astronomy sub-band (606-
614MHz),
a.k.a Channel 38

Highlights:

Reg 3: Characteristics of WSDs

3(1)(1):Types - Fixed & Nomadic

3(1)(2):Category - Master & Client

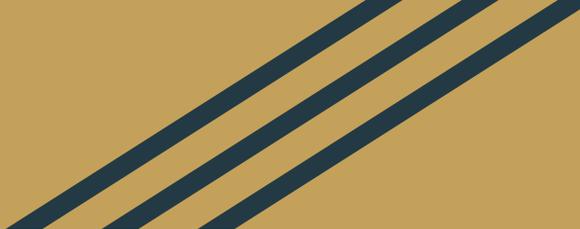
Reg 4: WSD Authorisation

4(1),4(2),4(3), 4(4):**Type Approval**

Reg 5: Avoidance of Harmful
Interference

Reg 8: Location Specific EIRPS (i.e.,
Urban/Rural Classifications)

Reg 10: S-GLSD Access



Overview - Type Approval of WSDs

Type Approval Process

The Authority performs type approval of television white space devices (WSDs) inline with the Type Approval Regulation of 2013, and the 2018 Regulations on the use of Television White Spaces; as well as other applicable Regulations and standards.

The process of type approving WSDs is in two parts:

- Electromagnetic Compatibility & Conformance Assessment [RF Emissions]
- Database Access & Behavioral Tests [Software]

Electromagnetic Compatibility & Conformance Assessment [RF Emissions] (1/2)

- Electromagnetic compatibility (EMC) and radio emissions in compliance with the latest version of ETSI EN 301 598 standard, or successor directives;
- WSD is strictly REQUIRED to operate within the radio frequency band 470 MHz to 694 MHz (excluding the Radio Astronomy sub-band 606 MHz to 614 MHz), without causing harmful interference;
- Any accredited test laboratory can assess the WSD and issue ETSI EN 301 598 compliance certificate.

Electromagnetic Compatibility & Conformance Assessment [RF Emissions] (2/2)

Submission of a WSD for a compliance certificate:

- ❖ A test report from an accredited test laboratory in accordance with the following technical standards:
 - Efficient use of RF Spectrum- EN 301 598
 - EMC - EN 301 489
 - Electrical Safety - IEC/EN 60950 or IEC/EN 62368-1.

Database Access & Behavioral Tests [Software] (1/2)

- Compliance with RFC 7545 with amendments to support ICASA Ruleset (ICASA-TVWS-2018)
- Master and Client WSD Relationship Conformance as per the Regulations on the use of Television White Spaces, 2018
- Correct use of dynamic configurations
- Verification of WSD operational modes {test, automated}.
Test mode should be secured to avoid misuse, if supported.

Database Access & Behavioral Tests [Software] (2/2)

- Assessment on database access is performed by the CSIR S-GLSD - **at an agreed cost with a respective OEM**, (i.e., the CSIR S-GLSD is already compliant with TVWS Regulations of 2018);
- **Assessment reports - Upon Completion of the assessment, the OEM and the CSIR (S-GLSD provider) shall write separate reports to submit to the Authority;**
- Successful completion of the assessment on database access means WSDs supplied by the OEM will seamlessly connect to any other certified secondary GLSD in South Africa

Type Approval Identifier (1/2)

- Temporary type approval identifier is issued to be used during the assessment period;
- Type Approval Certificate - Authority will then issue a permanent type approval identifier
- OEM shall replace a temporary type approval identifier with a permanent one

Type Approval Identifier (2/2)

Information associated with Type Approval identifier:

- Maximum EIRP of a WSD: *Configurable Tx Power + Max Antenna Gain*
- Emission Class as per ETSI-EN-301-598
- Name of OEM
- Specific device model
- Device Type - Whether Fixed or Nomadic
- All frequency ranges that are supported by the hardware, not only permitted for TVWS



PAWS Compliance - RFC 7545 with Amendments to Support ICASA Ruleset

PAWS Messages - Amendments to Support ICASA Ruleset

- RFC 7545 requirement specifications are still applicable; it is therefore a must know
- **REQUIRED** parameters as per RFC 7545 remain unchanged
- Some **OPTIONAL** parameters as per RFC 7545 are **REQUIRED** by ICASA Ruleset
- **Additional** parameters maybe **REQUIRED** by ICASA Ruleset

PAWS Messages - Interpretation of Requirements

Message Type	
Parameter: Type	Requirement

- **Message Type**: PAWS message of specific type
- **Parameter**: The name of a parameter that is part a specific message
- **Type**: A valid type as per JSON [RFC 7159]
- **Requirement**: Keyword indicating a Requirement Level as per [RFC 2119], e.g. REQUIRED, OPTIONAL

PAWS Messages - Purpose

Message	Purpose as per RFC 7545
INIT	WSD initiate exchange of capabilities with GLSD
REGISTRATION	Master WSD is required to send its registration information to the GLSD before requesting operational parameters
AVAIL_SPECTRUM	Master WSD obtains the available spectrum (operational parameters) from GLSD, on its behalf and associated Clients
AVAIL_SPECTRUM_BATCH	
SPECTRUM_USE	Master WSD sends notification to GLSD to indicate anticipated use of spectrum, by itself or associated Clients.

INIT_REQ: WSD → GLSD

RFC 7545 [Page 13]

Parameter	Type	Requirement
deviceDesc	DeviceDescriptor	REQUIRED
location	GeoLocation	REQUIRED
*other	*any	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
deviceDesc	REQUIRED
location	REQUIRED

- ICASA Ruleset has specific parameters and requirements on object types {DeviceDescriptor, GeoLocation} ... **details to follow later on**

INIT_RESP: GLSD → WSD

RFC 7545 [Page 14]

Parameter	Type	Requirement
rulesetInfos	list → RulesetInfo	REQUIRED
databaseChange	DbUpdateSpec	OPTIONAL
*other	*any	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
rulesetInfos	REQUIRED

- ICASA Ruleset has specific requirements on object type RulesetInfo ...
details to follow later on

REGISTRATION_REQ: WSD → GLSD

RFC 7545 [Page 16]

Parameter	Type	Requirement
deviceDesc	DeviceDescriptor	REQUIRED
location	GeoLocation	REQUIRED
deviceOwner	DeviceOwner	OPTIONAL
antenna	AntennaCharacteristics	OPTIONAL
*other	*any	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
deviceDesc	REQUIRED
location	REQUIRED
deviceOwner	REQUIRED
antenna	REQUIRED
masterDeviceDesc	REQUIRED

- ICASA Ruleset requires Client WSD to provide DeviceDescriptor for associated Master WSD

REGISTRATION_RESP: GLSD WSD

RFC 7545 [Page 17]

Parameter	Type	Requirement
rulesetInfos	list → RulesetInfo	REQUIRED
databaseChange	DbUpdateSpec	OPTIONAL
*other	*any	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
rulesetInfos	REQUIRED

- databaseChange is not applicable since GLSD details should be auto discovered
- ICASA Ruleset has specific requirements on object type RulesetInfo ...
details to follow later on

AVAIL_SPECTRUM_REQ: WSD → GLSD

RFC 7545 [Page 21]

Parameter	Type	Requirement
deviceDesc	DeviceDescriptor	REQUIRED
location	GeoLocation	REQUIRED
antenna	AntennaCharacteristics	OPTIONAL
masterDeviceDesc	DeviceDescriptor	OPTIONAL
*other:any		OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
deviceDesc	REQUIRED
location	REQUIRED
antenna	REQUIRED
masterDeviceDesc	REQUIRED

- Client WSD must provide DeviceDescriptor for associated Master WSD
- Client WSD can only request if associated Master WSD already has active/valid Operational Parameters, i.e. Master has already notified used of spectrum

AVAIL_SPECTRUM_RESP: GLSD WSD

RFC 7545 [Page 23]

Parameter	Type	Requirement
timestamp	string	REQUIRED
deviceDesc	DeviceDescriptor	REQUIRED
spectrumSpecs	list → SpectrumSpec	REQUIRED
databaseChange	DbUpdateSpec	OPTIONAL
*other	*any	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
timestamp	REQUIRED
deviceDesc	REQUIRED
spectrumSpecs	REQUIRED

AVAIL_SPECTRUM_BATCH_REQ: WSD → GLSD

RFC 7545 [Page 26]

Parameter	Type	Requirement
deviceDesc	DeviceDescriptor	REQUIRED
locations	list → GeoLocation	REQUIRED
owner	DeviceOwner	OPTIONAL
antenna	AntennaCharacteristics	OPTIONAL
*other	*any	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
deviceDesc	REQUIRED
locations	REQUIRED
antenna	REQUIRED

- Master can request spectrum for itself together with Client WSDs at once
- Master provides its AntennaCharacteristics, DeviceDescriptor and list of its location plus locations of Client WSDs

AVAIL_SPECTRUM_BATCH_RESP: GLSD ⇨ WSD

RFC 7545 [Page 28]

Parameter	Type	Requirement
timestamp	string	REQUIRED
deviceDesc	DeviceDescriptor	REQUIRED
geoSpectrumSpecs	list → GeoSpectrumSpec	REQUIRED
databaseChange	DbUpdateSpec	OPTIONAL
*other	*any	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
timestamp	REQUIRED
deviceDesc	REQUIRED
GeoSpectrumSpec	REQUIRED

SPECTRUM_USE_NOTIFY: WSD GLSD

RFC 7545 [Page 29]

Parameter	Type	Requirement
deviceDesc	DeviceDescriptor	REQUIRED
location	GeoLocation	REQUIRED
spectra	list → Spectrum	REQUIRED
antenna	AntennaCharacteristics	OPTIONAL
*other:any		OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
deviceDesc	REQUIRED
location	REQUIRED
spectra	REQUIRED

SPECTRUM_USE_RESP: GLSD \Rightarrow WSD

RFC 7545 [Page 31]

Parameter	Type	Requirement
databaseChange	DbUpdateSpec	OPTIONAL
*other:any		OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
rulesetInfos	REQUIRED

- databaseChange is not applicable since GLSD details should be auto discovered

PAWS Messages - Error Handling

- Requirements for Error handling remains as per RFC 7545
- Details of an error are provided as part of data parameter of the error message.
- If no Error code is defined in RFC 7545, default JSON-RPC 2.0 error codes may be used

```
{  
  "jsonrpc": "2.0",  
  "id": "93456",  
  "error": {  
    "code": -301,  
    "message": "UNAUTHORIZED",  
    "data": {  
      "details": "Unknown device owner: contact  
details do not match any of the authorized  
profiles in this GLSD."  
    }  
  }  
}
```



Object Type Amendments for ICASA Ruleset



GeoLocation

RFC 7545 [Section 5.1]

Parameter	Type	Requirement
point	Ellipse	REQUIRED
region	Polygon	REQUIRED
confidence	int	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
point	REQUIRED
region	REQUIRED
confidence	REQUIRED

- Point and region are mutually exclusive. Only one must be present
- Which one should be adopted - point or region?

DeviceDescriptor

RFC 7545 [Section 5.2]

Parameter	Type	Requirement
serialNumber	string	OPTIONAL
manufacturerId	string	OPTIONAL
modelId	string	OPTIONAL
rulesetIds	list → string	OPTIONAL
*other	*any	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
serialNumber	REQUIRED
icasaTypeApproval	REQUIRED
icasaDeviceType	REQUIRED
icasaDeviceCategory	REQUIRED
etsiEnDeviceEmissionsClass	REQUIRED

- **icasaTypeApproval** - contains information about manufacturerId, modelId and the rulesetId is basically the one that the WSD would have been approved for

DeviceDescriptor: RFC 7545 + ICASA Ruleset

Parameter	Type	Requirement	Notes
serialNumber	string	REQUIRED	Specifies a WSD's serial number.
icasaTypeApproval	string	REQUIRED	Specifies a WSD's type approval identifier issued by ICASA.
icasaDeviceType	string	REQUIRED	Specifies WSD type, as defined by the [TVWS-REGULATIONS], Regulation 3 (1). Enumerated valid values are the following: "Fixed" or "Nomadic".
icasaDeviceCategory	string	REQUIRED	Specifies the WSD type, as defined by [TVWS-REGULATIONS], Regulation 3 (1). The following two strings represent the typical values: "Master" or "Client". Enumerated valid values are the following: "Master" or "Client".
etsiEnDeviceEmissionsClass	string	REQUIRED	Specify emission classes that characterise the WSD out-of-band performance as defined by [ETSI-EN-301-598]. The following numeric strings represent the typical values: "1", "2", "3", "4" and "5".
rulesetIds	list → string	OPTIONAL	This is a list of ruleset identifiers that are supported by the particular WSD. The list MUST contain at least one entry, RFC 7545 Section 9.1.

- rulesetIds were initially REQUIRED, but can be OPTIONAL. This can be derived from icasaTypeApproval

AntennaCharacteristics

RFC 7545 [Section 5.3]

Parameter	Type	Requirement
height	float	OPTIONAL
heightType	enum	OPTIONAL
heightUncertainty	float	OPTIONAL
*characteristics	*various	OPTIONAL

- Antenna characteristics:
 - direction (degree) relative to true North on horizontal plane
 - gain (dBi)
 - polarisation - Enum {HOR, VERT}
 - radiation pattern

RFC 7545 + ICASA Ruleset

Parameter	Type	Requirement
height	float	REQUIRED
heightType	string	REQUIRED
direction	int	REQUIRED
gain	float	REQUIRED
polarisation	string	REQUIRED

- ICASA Ruleset only supports AGL value for heightType; so AMSL is not supported

DeviceOwner

RFC 7545 [Section 5.5]

Parameter	Type	Requirement
owner	vcard	REQUIRED
operator	vcard	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
owner	REQUIRED
operator	REQUIRED

- Both owner and operator details are required for the ICASA Ruleset- In most cases these would be the same as a network operator would be owning and operating a TVWS network
- The vCard should not be stringfied, but only JSON encoded as described in "jCard: The JSON format for vCard" [RFC 7095]

Incorrect vCard Implementation [Stringfied]

...

"deviceOwner": {

 "owner":

```
"[\vcard\",[[\"version\",{},\"text\",\"4.0\"],[\"kind\",{},\"text\",\"org\"],[\"fn\",{},\"text\",\"CSIR  
\",[\"adr\",{\"type\": \"work\"},\"text\",[\"Meiring Naude  
Road\",\",\",\",\"Brummeria\",\",\",\"Pretoria\",\",\",\"0184\",\",\",\"South Africa\"]],[\"tel\",{\"type\": \"work\"},\"text\",\",\",\",+27  
12 841 3028\"],[\"email\",{\"type\": \"work\"},\"text\",\",\",\",\"twws@csir.co.za\"]]]\",
```

 "operator":

```
"[\vcard\",[[\"version\",{},\"text\",\"4.0\"],[\"kind\",{},\"text\",\"org\"],[\"fn\",{},\"text\",\"CSIR  
\",[\"adr\",{\"type\": \"work\"},\"text\",[\"Meiring Naude  
Road\",\",\",\",\"Brummeria\",\",\",\"Pretoria\",\",\",\"0184\",\",\",\"South Africa\"]],[\"tel\",{\"type\": \"work\"},\"text\",\",\",\",+27  
12 841 3028\"],[\"email\",{\"type\": \"work\"},\"text\",\",\",\",\"twws@csir.co.za\"]]]\"
```

}

....

Correct vCard Implementation [jCard, RFC 7095]

...

```
"deviceOwner": {  
  "owner": [  
    "Vcard", [ [ "version", {}, "text", "4.0" ], [ "kind", {}, "text", "org" ], [ "fn", {}, "text", "CSIR" ],  
      [ "adr", { "type": "work" }, "text", [ "Meiring Naude Road", "", "Brummeria", "Pretoria", "0184", "South Africa" ] ],  
      [ "tel", { "type": "work" }, "text", "+27 12 841 3028" ],  
      [ "email", { "type": "work" }, "text", "tvws@csir.co.za" ]  
    ]  
  ],  
  "operator": [  
    "Vcard", [ [ "version", {}, "text", "4.0" ], [ "kind", {}, "text", "org" ], [ "fn", {}, "text", "CSIR" ],  
      [ "adr", { "type": "work" }, "text", [ "Meiring Naude Road", "", "Brummeria", "Pretoria", "0184", "South Africa" ] ],  
      [ "tel", { "type": "work" }, "text", "+27 12 841 3028" ],  
      [ "email", { "type": "work" }, "text", "tvws@csir.co.za" ]  
    ]  
  ]  
},
```

....

RulesetInfo

RFC 7545 [Section 5.6]

Parameter	Type	Requirement
authority	string	REQUIRED
rulesetId	string	REQUIRED
maxLocationChange	int	**Depends
maxPollingSecs	int	**Depends
*other	*any	OPTIONAL

RFC 7545 + ICASA Ruleset

Parameter	Requirement
authority	REQUIRED
rulesetId	REQUIRED
maxLocationChange	REQUIRED
maxPollingSecs	REQUIRED
needsSpectrumReport	REQUIRED
maxTotalBwHz	REQUIRED
maxContiguousBwHz	REQUIRED

RulesetInfo: RFC 7545 + ICASA Ruleset

Parameter	Type	Requirement	Description/Notes
authority	string	REQUIRED	This is a two-letter country code according to the International Standard Organisation (ISO) [ISO3166-1]. For ICASA Ruleset, the authority is denoted as "ZA" .
rulesetId	string	REQUIRED	The ID of a ruleset for the specified authority (see Ruleset ID Registry RFC 7545, Section 9.1). The Ruleset identifier for ICASA is "ICASA-TVWS-2018" .
maxPollingSecs	int	REQUIRED	Specifies maximum polling time in seconds between the Master WSD's available spectrum requests as defined by [TVWS-Regulations] is 2880 seconds.
needsSpectrumReport	boolean	REQUIRED	ICASA Ruleset requires that all S-GLSDs MUST set this to TRUE to indicate that the device must notify spectrum use.
maxTotalBwHz	float	REQUIRED	Specifies a constraint on total allowed bandwidth. The default is 8 000 000 Hertz, i.e. 8 MHz.
maxContiguousBwHz	float	REQUIRED	Specifies a constraint on total allowed contiguous bandwidth. The default is 8 000 000 Hertz, i.e. 8 MHz. The [TVWS-Regulations] don't specify any limit.
maxLocationChange	float	REQUIRED	Specifies the maximum location change in meters the WSD is allowed by the S-GLSD within the context of an available spectrum response. For ICASA Ruleset, the maximum location change value is 100 meters.



PAWS Messages - Applicable Cases & Dependencies



PAWS Messages - Applicable Cases (1/2)

Message	Applicable Case
INIT	<p>First communication with a database, sort of a hello message. For example:</p> <ul style="list-style-type: none">● On Master WSD start up;● After a user configured a new/different S-GLSD;● URL of S-GLSD has changed based on the latest discovery
REGISTRATION	<ul style="list-style-type: none">● After configuration of a particular S-GLSD● On changes in configurations such as WSD ownership details, and device particulars (including antenna height)● Location change by more than 100m. Re-registration is not required for location change within 100m● No need to run through INIT unless it is applicable

PAWS Messages - Applicable Cases (2/2)

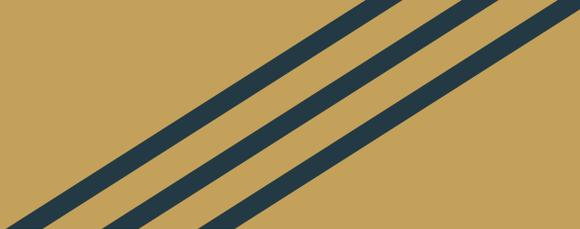
Message	Applicable Case
AVAIL_SPECTRUM	<ul style="list-style-type: none">• After REGISTRATION - New Operational Parameters shall be requested with the latest configurations• After INIT where REGISTRATION is not applicable but INIT was performed• After expiry of Operational Parameters. No need to run through INIT and REGISTRATION, unless applicable
AVAIL_SPECTRUM_BATCH	
SPECTRUM_USE	<ul style="list-style-type: none">• Every time after receiving Operational Parameters from the S-GLSD, a WSD must confirm use of selected Operational parameters, within 60 Seconds; otherwise the S-GLSD would not reserve spectrum for a WSD.

PAWS Messages - Dependencies for Master & Client (1/2)

Message	Requirement	
	Master	Client
INIT	Matching/Supported Ruleset ID, if provided	OPTIONAL, otherwise same requirement as Master if supported
REGISTRATION	Active profile/user account	Active profile/user account
		Associated Master must be registered
AVAIL_SPECTRUM	Operator & Owner should have already approved device registration	
		Associated Master must have active Operational Parameters, i.e. Master should have already notified spectrum use

PAWS Messages - Dependencies for Master & Client (2/2)

Message	Requirement	
	Master	Client
AVAIL_SPECTRUM_BATCH	Operator & Owner should have already approved device registration	N/A
	All locations must be those registered with the S-GLSD, thus that of Master and associated Clients	
SPECTRUM_USE	Confirm within 60 seconds after receiving AVAIL_SPECTRUM_RESP message	
	Matching channels/frequencies and power levels, thus subset of Operational Parameters in the AVAIL_SPECTRUM_RESP message	
		Channels /Frequencies must match subset of the active Operational Parameters for the associated Master



Harmonized Configuration of ICASA Ruleset



Benefits of ICASA Ruleset Support

- Harmonized access to all certified Secondary GLSD providers in South Africa;
- Details of certified Secondary GLSD providers are discoverable on the Reference GLSD; i.e. URIs should not be hardcoded;
- Predefined set of API security - Use of either Bearer Token or API Key (S-GLSD provider shall choose) over HTTPs for communication between Master WSD and S-GLSD;

Web-Listing: Certified S-GLSD Discovery [Auto Config]

- Master WSD must automatically discover a list of certified S-GLSD providers from the Reference GLSD, on start up as well as after every x minutes ("maxRefreshMinutes")
- Link user desired database with the corresponding GLSD from the list

```
{
  "lastUpdateTime": "2020-06-11T16:29:18Z",
  "maxRefreshMinutes": 1440,
  "sglsds": [
    {
      "name": "S-GLSD1",
      "url": "https://localhost:8443/api/paws",
      "active": true
    },
    {
      "name": "S-GLSD2",
      "url": "https://localhost/api/paws-service",
      "active": true
    }
  ]
}
```

Supported Databases [Manual Config]

- Other GLSD in the world plus ICASA Ruleset Support

Supported GLSD ▾

- GLSD xyz
- GLSD yzx
- GLSD zxy
- ICASA Ruleset
- GLSD xzy
- ...

Secondary GLSD Specifics

Name	<input type="text"/>
Security Type	<input type="radio"/> API Key <input type="radio"/> Token
API Key/ Token	<input type="text"/>

Ruleset ID	Read ONLY
------------	------------------

Security Implementation [Auto Config]

Token Request Header (HTTP Auth)

Bearer

Request Body (params)

PAWS
Generic

Ruleset
Specific

API Key: Request Body (params)

PAWS
Generic

Ruleset
Specific

apiKey

Ownership Details [Manual Config]

Owner - vCard

address

email

name

...

Operator - vCard

address

email

name

...

WSD Details [Mixed Config]

- Antenna height and characteristics shall be configured manually based on installation setup.
- Device Category (i.e. Master or Client) may be manually configured
- All other properties in device details shall be auto populated by the firmware and can not be manually altered. However, such details shall be presented to the user as part of the property list for a device.

The diagram illustrates a property list interface within a rounded rectangular container. It consists of four rows, each with a property label on the left and an input field on the right. The labels are 'prop. 1', 'prop. 2', 'prop. 3', and 'Prop. ...'. The input fields for 'prop. 1' and 'prop. 2' are filled with a light blue color, while the fields for 'prop. 3' and 'Prop. ...' are empty white boxes with black borders.

prop. 1	
prop. 2	
prop. 3	
Prop. ...	

WSD Firmware Update

- OEMs are required to provision for firmware updates, i.e. updates of the software module(s) that relate to the ICASA Ruleset. This should be secured to avoid trespassing



Assessment & Test Cases

Main Test Cases

- OEMs shall perform self evaluation as per the provided guidelines and include this evaluation in their reports. The test cases cover the following:
 - S-GLSD Discovery
 - S-GLSD Communication
 - Cease Transmission
 - Continuous Operation
 - Ruleset Configuration
- OEMs shall arrange for shipment of a pair of WSDs {Master, Client} to the Authority (or CSIR) for verification checks prior to issuing of the Type Approval Certificate

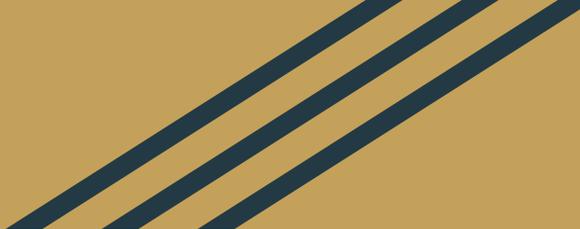
Testing Ruleset Configuration

To enable testing of multi database support and different API security requirements, a virtual S-GLSD will be set up:

- Virtual S-GLSD will be discoverable
- Virtual S-GLSD will have a own PAWS URL
- Virtual S-GLSD will support only Bear Token

Virtual S-GLSD will be linked to the CSIR S-GLSD (“Spectrum Switch”):

- Use same **API key as a token** when testing Bearer Token Authentication
- View all PAWS messages on the main CSIR Spectrum Switch



Closing Remarks



Summary - Main Changes (1/2)

Main changes include the following:

- The Ruleset identifier changes from "ICASATVWS-2018" to "**ICASA-TVWS-2018**";
- The vCard should not be stringfied, but JSON encoded as per jCard [RFC 7095];
- DeviceDescriptor {rulesetIds} were initially REQUIRED, but can be OPTIONAL;

Summary - Main Changes (2/2)

- Antenna characteristics has been introduced as part of ICASA Ruleset requirements - thus WSD must communicate them to S-GLSD
- Common set of WSD configurations - Although the implementation may differ due to proprietary firmware builds;

Summary - Need for Harmonization (1/2)

Harmonization makes it easier for the TVWS-Ecosystem in South Africa:

- OEM has only one implementation for ICASA Ruleset support, yet WSD can communicate with multiple certified Secondary GLSDs;
- Similar configurations enable seamless switching of WSD amongst Secondary Databases with minimum effort;

Summary - Need for Harmonization (2/2)

- Predefined set of API security - Use of either Bearer Token or API Key (S-GLSD provider shall choose) over HTTPs for the communication between Master WSD and S-GLSD;
- Network operators can easily configure various WSDs regardless of the brand - almost in a similar way;

Summary - Already Assessed OEMs

Already Assessed OEMs (completed the type approval assessment) are requested:

- To implement the new changes at no extra cost payable for this updates
- To submit updated reports that included the latest changes

To enable smooth updates, CSIR will temporarily support :

- Two ruleset identifiers {"ICASATVWS-2018", "ICASA-TVWS-2018"}
- Stringfied and jCard format of the deviceOwner's vCards



Thank You...

The End!

Contact: Imfupe@csir.co.za