



**Operations for Citizens Broadband Radio
Service (CBRS):
Priority Access License (PAL) Database
Technical Specification**

Document WINNF-16-S-0245

Version V1.0.0
3 April 2017



TERMS, CONDITIONS & NOTICES

This document has been prepared by Working Group 3 of the Spectrum Sharing Committee to assist The Software Defined Radio Forum Inc. (or its successors or assigns, hereafter “the Forum”). It may be amended or withdrawn at a later time and it is not binding on any member of the Forum or of the Spectrum Sharing Committee.

Contributors to this document that have submitted copyrighted materials (the Submission) to the Forum for use in this document retain copyright ownership of their original work, while at the same time granting the Forum a non-exclusive, irrevocable, worldwide, perpetual, royalty-free license under the Submitter’s copyrights in the Submission to reproduce, distribute, publish, display, perform, and create derivative works of the Submission based on that original work for the purpose of developing this document under the Forum's own copyright.

Permission is granted to the Forum’s participants to copy any portion of this document for legitimate purposes of the Forum. Copying for monetary gain or for other non-Forum related purposes is prohibited.

THIS DOCUMENT IS BEING OFFERED WITHOUT ANY WARRANTY WHATSOEVER, AND IN PARTICULAR, ANY WARRANTY OF NON-INFRINGEMENT IS EXPRESSLY DISCLAIMED. ANY USE OF THIS SPECIFICATION SHALL BE MADE ENTIRELY AT THE IMPLEMENTER'S OWN RISK, AND NEITHER THE FORUM, NOR ANY OF ITS MEMBERS OR SUBMITTERS, SHALL HAVE ANY LIABILITY WHATSOEVER TO ANY IMPLEMENTER OR THIRD PARTY FOR ANY DAMAGES OF ANY NATURE WHATSOEVER, DIRECTLY OR INDIRECTLY, ARISING FROM THE USE OF THIS DOCUMENT.

Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the specification set forth in this document, and to provide supporting documentation.

This document was developed following the Forum's policy on restricted or controlled information (Policy 009) to ensure that that the document can be shared openly with other member organizations around the world. Additional Information on this policy can be found here: http://www.wirelessinnovation.org/page/Policies_and_Procedures

Although this document contains no restricted or controlled information, the specific implementation of concepts contain herein may be controlled under the laws of the country of origin for that implementation. Readers are encouraged, therefore, to consult with a cognizant authority prior to any further development.

Wireless Innovation Forum TM and SDR Forum TM are trademarks of the Software Defined Radio Forum Inc.

Table of Contents

TERMS, CONDITIONS & NOTICES	i
1 Introduction	1
2 References	1
2.1 Normative references	1
3 Definitions and Abbreviations	2
3.1 Definitions.....	2
3.2 Acronyms.....	2
4 PAL Database Creation and Use.....	2
4.1 PAL Auction Results	2
4.2 PAL Channel Assignment.....	2
4.3 Use of the PAL Database	3
4.4 Leasing information in the PAL Database.....	3
5 Record Encoding for the PAL Database	3
5.1 PAL Database Records	4
6 PAL Database Schema Definition	4
6.1 PAL Database Info Record.....	5
6.1.1 RegistrationInformation object	5
6.1.2 LicenseInformation object	6
6.1.3 ChannelAssignment object:	6
7 Document History	7

Operations for Citizens Broadband Radio Service (CBRS): Priority Access License (PAL) Database Technical Specification

1 Introduction

This document specifies the Priority Access License (PAL) Database schema as per requirement (R2-SPU-03) [N.1]. The PAL Database is populated and maintained through cooperation between SAS Administrators. The Database represents the results of PAL auctions for the purposes of vetting a PAL Protection Area (PPA) claim, creating a PPA-ID, and approving CBSD spectrum grant requests under those licenses. In addition, the PAL Database records the results of agreements for PAL channel assignments, and when possible, the evolution of those agreements within each census tract when incumbent activity affects specific frequency allocations.

2 References

2.1 Normative references

- [N.1]. “Requirements for Commercial Operation in the U.S. 3550-3700 MHz Citizens Broadband Radio Service Band”, Wireless Innovation Forum Technical Specification WINNF-15-S-0112, v2.0.0.
- [N.2]. “The application/json Media Type for JavaScript Object Notation (JSON)” RFC 4627.
- [N.3]. “Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS); Spectrum Access System (SAS) – SAS Interface Technical Specification”, Wireless Innovation Forum Technical Specification WINNF-16-S-0096, v1.0.0.
- [N.4]. “Signaling Protocol and Procedures for Citizens Broadband Radio Service (CBRS); Spectrum Access System (SAS) to Citizens Broadband Radio Service Device (CBSD) Interface Technical Specification”, Wireless Innovation Forum Technical Specification WINNF-16-S-0016, v1.0.0.
- [N.5]. Electronic Code of Federal Regulations, Title 47, Chapter I, Subchapter D, Part 96, <http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=0076fe7586178336d9db4c5146da8797&mc=true&n=pt47.5.96&r=PART&ty=HTML>.
- [N.6]. [RFC-3339](#), "Date and Time on the Internet: Timestamps", Klyne, Newman, July 2002.

3 Definitions and Abbreviations

3.1 Definitions

See [N.1] for definitions of terms used in this document.

3.2 Acronyms

Abbreviation	Description
CBSD	Citizens Broadband Radio Service Device
FCC	Federal Communications Commission
FRN	FCC Registration Number
HTTPS	Secure HTTP (e.g. with TLS)
JSON	Javascript Object Notation
PAL	Priority Access License
PPA	PAL Protection Area
SAS	Spectrum Access System

4 PAL Database Creation and Use

SAS Administrators shall engage in a reconciliation of the outcomes of FCC auctions and other actions resulting in PALs being issued to licensees within the CBRS band. This process shall consolidate information about the auctions from the FCC, and subsequently construct or update the PAL Database following any relevant activity (including any needed error resolution) around the state of a PAL, such as issuance, termination, or sale.

4.1 PAL Auction Results

This specification presumes that official results of PAL issuance by the FCC will include information about the licensee (referenced by name and FRN), the geographical area (a census tract) of the PAL, and a reference to a FCC frequency channel identity (identification numbers, i.e. use letters ‘A’ through ‘G’ or other designations as used by FCC) that represents the rights to use an unspecified channel of 10 MHz of spectrum. A maximum of seven PAL channels may be issued for any particular geographical area. It is possible for a census tract to have no licenses issued due to lack of bidders.

4.2 PAL Channel Assignment

All SASs shall utilize identical quasi-stable channel assignments for CBSDs exercising their PAL rights. The process of making such channel assignments is still under study and shall have a first priority of mapping each granted PAL in a census tract to a 10 MHz channel of spectrum in order that channel assignments to Priority Access Licensees are protected from interference caused by other PALs and from General Authorized Access Users consistent with

section 96.25, 96.63, and [N.1]. PAL channels are assigned such that impairments from FSS incumbent protection are minimized.

4.3 Use of the PAL Database

SAS Administrators shall ensure their own SASs are synchronized with the PAL Database on a daily basis. SAS Administrators shall make use of the PAL Database to perform verification of PAL holder rights to the relevant license areas during the separate process for registering PAL Protection Areas (PPAs) [See N.1, R2-SPU-04], and to make consistent channel assignments to CBSDs in the cluster list of that PPA [See N.1, R2-SPU-09].

4.4 Leasing information in the PAL Database

Reflection in the PAL Database of any leasing arrangements made by Priority Access Licensees is for future study, subject to the requirements in [N.1].

5 Record Encoding for the PAL Database

The records in the PAL Database shall be encoded using JSON (JavaScript Object Notation), a widely accepted network data representation and exchange protocol. JSON encoded data is in the form of human readable single or multiple of “name”/“value” pair(s), where the “name” is typically a self-descriptive unique string tag identifying the information to be represented and the “value” is the information to be carried [N.2]. JSON allows a “value” be one of the four primitive types (respectively, string, number, boolean and null) and two structured types (JSON object and array). Brief definitions of all above primitive and structured data types are as follows:

- String: a readable string begins and ends with double quotation marks. All Unicode characters can be placed within the quotation marks. Double quotation mark, backslash and control characters must be preceded by an escape character (\ i.e. backslash).
- Number: a signed integer or a floating number. A floating number can be represented using regular decimal format or scientific exponential format.
- Boolean: a Boolean value this indicates either true or false.
- Null: a null value representation of the value of a string or an object or an array type when the required value is not available.
- Object: A self-contained JSON object enclosed in a pair of curly brackets.
- Array: a value array of any one of the String, number, boolean, object and array types, enclosed by square brackets.

An example of a JSON representation of a PAL Database record is as follows:

```
{
  "palId" : "pal/10-2017/123456789/A",
  "licensee" : "CBSD Operator No.1",
  "userId" : "cbbsdOp1",
  "registrationInformation" : {
    "frn" : "123456-789",
    "registrationDate": "2017-06-01",
  },
  "license": {
    "licenseId": "fccId123456789-1",
    "licenseDate": "2017-07-01T00:00:00Z",
    "licenseExpiration": "2020-07-01T00:00:00Z",
    "licenseAreaIdentifier": "Census Tract 123456789, Long Name",
    "licenseAreaExtent": "zone/census_tract/census/2010/123456789",
    "licenseFrequencyChannelId": "1"
  },
  "licenseStatus": "VALID",
  "channelAssignment": {
    "primaryAssignment": {
      "lowFrequency": 3550000000,
      "highFrequency": 3560000000
    },
    "secondaryAssignment": {
      "lowFrequency": 3580000000,
      "highFrequency": 3590000000
    }
  }
}
```

5.1 PAL Database Records

For convenient sharing of the PAL Database among SAS Administrators, it will be represented as a set of files each containing a JSON list of records following the schema of PAL Database Info Records (see 6.1):

Table 1: PAL Database file contents

Data Type	Field Definition
List of object: <i>PalInfoRecord</i>	A PAL Database file contains a list of PAL Database Info Records.

6 PAL Database Schema Definition

This section contains detailed field-by-field specifications for PAL Database info records.

6.1 PAL Database Info Record

Table 2: *PalInfoRecord* object

Field	Data Type	Field Definition
palId	string	<ul style="list-style-type: none"> Format: pal/\$MO-\$YEAR/\$FIPS/\$CHANNEL <p>The PAL-ID of this PAL database record.</p> <p>The \$MO-\$YEAR is the month and year of the auction or FCC action establishing the PAL.</p> <p>The \$FIPS is the geographic code identifying the area (census tract) of the PAL.</p> <p>The \$CHANNEL is the FCC frequency channel identity of the PAL.</p>
licensee	string	Human-readable name of the PAL licensee
userId	string	A string representing the User Identifier (UR-ID) of the PAL licensee. This string is used by CBSDs requesting PAL spectrum grants from SAS to identify which PAL licensee they are operated by.
registrationInformation	object: <i>RegistrationInformation</i>	Contains various extensible registration information for the PAL licensee
license	object: <i>LicenseInformation</i>	Information regarding the license described in this PAL database record
licenseStatus	string	One of the values “VALID”, “RESCINDED”, “EXPIRED”
channelAssignment	object: <i>ChannelAssignment</i>	The consistent channel assignment information for this PAL.

6.1.1 *RegistrationInformation* object

Table 3: *RegistrationInformation* object

Field	Data Type	Field Definition
frn	string	The FRN of the licensee
registrationDate	string	Date of licensee FCC registration. It is expressed using the format, YYYY-MM-DDThh:mm:ssZ, as defined by [N.6].

licenseConditions	string	Human-readable string or reference annotating the certification
callSign	string	The call sign of the licensee (as assigned by FCC).

This object is extensible and other fields can be added to reflect more needed information about the PAL licensee as reflected in the FCC auction records and needed for SAS verification of PAL licensee identity.

6.1.2 LicenseInformation object

Table 4: LicenseInformation object

Field	Data Type	Field Definition
licenseId	string	The FCC-issued license ID.
licenseDate	string	Date of the start of the license period. It is expressed in UTC using the format, YYYY-MM-DDThh:mm:ssZ, as defined by [N.6].
licenseExpiration	string	Date of license expiration. It is expressed in UTC using the format, YYYY-MM-DDThh:mm:ssZ, as defined by [N.6].
licenseAreaIdentifier	string	Human-readable string or reference denoting the license area (e.g. FIPS census tract code)
licenseAreaExtent	string	Reference to a record in a geographical database represented as a SAS-SAS Zone record (See [N.3]) providing the extents of the license area. (e.g. "zone/census tract/census/\$YEAR/\$FIPS")
licenseFrequencyChannelId	string	The FCC-supplied identifier for the frequency channel for the PAL.

6.1.3 ChannelAssignment object:

Table 5: ChannelAssignment object

Field	Data Type	Field Definition
primaryAssignment	object:FrequencyRange (See N.4)	The primary channel allocation for this PAL.
secondaryAssignment	object:FrequencyRange (See N.4)	The secondary channel allocation for this PAL, if possible to designate. If a PAL is blocked by transient incumbent activity, the PAL CBSDs using those spectrum grants will be relocated by the SAS into this secondary assignment if possible.

7 Document History

Document history		
V1.0.0	3 April 2017	Approved