FCC ULS Priority Access License (PAL) Sales and Leasing Agreements Data Recommendations

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1 Introduction

47 C.F.R Part 96 allows SAS administrators to support PAL Secondary Market transactions after the initial FCC PAL auctions. These transactions can be sales as well as leasing agreements. A SAS Administrator that chooses to support PAL Secondary Market transactions must establish a process for acquiring and storing the sales and leasing notification information among other requirements laid out in §96.66[n.1]. To facilitate CBRS operation with the PAL Secondary Market and such sales and leasing transactions, the FCC ULS PAL Sales and Leasing Agreement Database serves as the central place to store all PAL sales and leasing information. The SAS administrators supporting PAL secondary market transactions can access the sales and leasing information from the database and perform PAL rights ownership validation according to R2-SPU-07 [n.2].

WInnForum proposes the following data elements, contents, and formats be included in the FCC's ULS database that records such secondary market transfers of PAL rights.

WInnForum proposes that one ULS database contain information for both lease transactions and sales transaction.

WInnForum proposes that this ULS database be able to accommodate all different types of area and geographic partitioning agreements regardless of whether the transaction is for a whole PAL county or a portion thereof, or whether the transfer of PAL rights is temporary (a lease) or permanent (a sale).

WInnForum proposes no mechanisms for spectrum disaggregation, where a PAL rights for a slot narrower than 10 MHz are disaggregated from an original 10 MHz PAL license.

Such information can be recorded using automated processes via the managing SAS and electronic records, where these data are entered into the FCC ULS Database by the managing SAS. This supports the concept of automated micro transactions. Alternatively, for leasing or sub-leasing transactions, such SMT leasing data can be entered manually by filing Form 608 with the FCC.

2 Scope

The scope of this proposed Recommendation is to provide guidance on the schema of the ULS to best enable support of a FCC ULS PAL Sales and Leasing Agreements Database. The following is outside the scope of this document: mechanics of PAL sales transactions, mechanics of PAL leasing transactions, secondary market sales agreements creation, secondary market leasing agreements (SMLA) creation, and communications protocols for the

interface between the PAL Sales and Leasing Agreements Database and the entities accessing the database.

In this document, "SAS administrators" and "SAS" refer to those supporting PAL secondary market transactions unless otherwise specified.

3 References

[n.1] Electronic Code of Federal Regulations, Title 47, Chapter I, Subchapter D, Part 96 Citizens Broadband Radio Service, https://www.ecfr.gov/cgi-bin/text-idx?node=pt47.5.96

[n.2] WINNF-TS-0112, "Requirements for Commercial Operation in the U.S. 3550-3700 MHz Citizens Broadband Radio Service Band", Wireless Innovation Forum

[n.3] RFC-2119, "Key words for use in RFCs to Indicate Requirement Levels", March 1997.

[n.4] WINNF-SSC-0011, "Spectrum Sharing Committee Policy and Procedure SSC Abbreviations and Definitions", Wireless Innovation Forum

[n.5] RFC-7159, "The JavaScript Object Notation (JSON) Data Interchange Format", March 2014

[n.6] RFC-7946, The GeoJSON Format, Butler et. al., August 2016.

[n.7] WINNF-TS-0245, "Priority Access License (PAL) Database Technical Specification", Wireless Innovation Forum Technical Specification

[n.8] RFC-3339, "Date and Time on the Internet: Timestamps", July 2002

[n.9] WINNF-TS-5004 PAL Leasing Agreements Database Technical Specification v 0.0.0-r 1.0.

4 Definitions and Abbreviations

Any previously undefined terms and abbreviations first used in the current version of this document are defined below. All previously defined terms and abbreviations are available at [n.3].

4.1 Definitions

FCC ULS PAL Sales and Leasing Agreements Database: The FCC database that records all PAL secondary market sales and leasing agreements. This is expected to be contained within the ULS.

PAL County (PAL areas): The FCC auctioned Priority Access Licenses by county, but in some areas these are replaced by other county-equivalents (such as Alaska boroughs, Louisiana parishes, and Puerto Rico municipios.)

SMLA: Secondary Market Leasing Agreement

SMT: A Secondary Market Transaction. This may be a sales transaction (sales agreement) or a leasing transaction (leasing agreement).

5 Descriptions of FCC ULS PAL Sales and Leasing Agreements Database and Data

5.1 General

This section describes and makes proposals for the following items concerning the FCC ULS PAL Sales and Leasing Agreements Database.

- Recorded information

- Record creation and update

- Use of the records

5.2 Information in the FCC ULS PAL Sales and Leasing Agreements Database

Generally, when a secondary market transaction occurs, there are three areas associated with such a transaction:

1) The first is the original precursor PAL rights area where the seller or lessor originally had or obtained PAL rights, either from the original FCC auction (the whole PAL over the whole county and with an original PAL_ID) or via a previous precursor secondary market sales or leasing transaction (identified by a precursor FN_ID (File Number Identifier)).

2) The second is the transacted sub-area (the whole entire PAL rights area identified above, or a partitioned geographic sub-area portion of the PAL rights area). This transacted sub-area may be sold (permanently transferred from the seller to the buyer in a sales agreement) or may be leased (temporarily leased from the lessor to the lessee in a leasing agreement). This transacted area is identified by a newly assigned FN_ID and a newly created polygon.

3) The third is the retained sub-area (if any) (some partitioned geographic sub-area portion of the PAL rights area that is not being transferred to a buyer or lessee). This retained sub-area is retained by the seller (sales agreement) or by the lessor (leasing agreement). This retained sub-area is identified by a newly assigned FN_ID and a newly created polygon.

Each record in the FCC ULS PAL Sales and Leasing Agreements Database should be able to handle the case of either a secondary market sales agreement (sales transaction) or a secondary market leasing agreement (lease transaction). Sales are between one seller and one buyer. Leases are between one lessor and one lessee. WInnForum proposes that the following information be included in these records.

Table 1: List of Recorded Information in the FCC ULS PAL Sales and Leasing Agreements Database

Information	Description
File Number Identifier or FN_ID (formerly known as the Sales or Leasing Agreement ID)	A unique ID (FN_ID) of a SMT transaction between a seller and a buyer (sale) or between a lessor and a lessee (lease). This is the record identifier.
Record Creator ID	A unique ID for the creator of a record in the FCC ULS PAL Sales and Leasing Agreements Database. A record creator can be a PAL secondary market maker or its delegate.
Sales-vs-Lease	An indicator as to whether the transaction is a sale or a lease.

Seller ID	In the case of a sale: an identity used to uniquely identify the Seller.
Lessor ID	In the case of a lease: An identity used to uniquely identify the Lessor.
Buyer ID	In the case of a sale: An identity used to uniquely identify the Buyer.
Lessee ID	In the case of a lease: An identity used to uniquely identify the Lessee.
Original PAL_ID	In the case of the first secondary market transaction: The original PAL ID whose corresponding PAL right, as defined in the PAL Database, applies to this first sale or first lease.
Original FN_ID (the Seller's or Lessor's PAL Right)	In the case of all subsequent secondary market transactions: The original FN_ID from a previous SMT transaction whose corresponding PAL right, as defined in the FCC ULS PAL Sales and Leasing Agreements Database, applies to this sales or leasing record. The FN_ID of the previous (precursor) sales or leasing agreement where the seller or lessor gets its PAL right to sell or lease in the current recorded transaction. If left blank, the seller or lessor is expected to be the original PAL holder
Transferred FN_ID	In the case of a sale: the newly created FN_ID that refers to that portion (geographic partition of PAL rights) of the PAL (or portion) that is being sold and transferred to the buyer.
Area included in the Sale	In the case of a sale: Boundaries of the area within the county that is being sold and transferred by the seller to the buyer in the SMT sales agreement. In the case of a sale, this transferred sub-area becomes a new sub-area PAL with a new smaller boundary and a newly assigned FN_ID.
Retained FN_ID	The newly created FN_ID that refers to that portion of the PAL right that is being retained by the seller. This requires a new

	FN_ID to refer to this smaller retained sub-area.
Retained area excluded from the Sale	Boundaries of the area within the county that is being retained by the seller in the SMT sales agreement.
	In the case of a sale, this retained sub-area becomes a new sub-area PAL with a new smaller boundary and a newly assigned FN_ID.
Sale Start Date and Time	In the case of a sale, the date and time identifying start of the secondary market transaction of the sale.
	A sale is considered a permanent transaction until the end date of the original PAL right expires.
Leased FN_ID	In the case of a lease: the newly created FN_ID that refers to that portion (partition of the PAL rights) that is being leased and transferred to the lessee.
Area included in the Lease	In the case of a lease, the boundaries of the area within the county that is being leased by the lessor to the lessee under the SMLA.
Area excluded from the Lease	In the case of a lease, the boundaries of areas within the county that are explicitly excluded from the lease under the SMT leasing agreement.
Lease Start Date and Time	In the case of a lease, the date and time identifying the start date of the secondary market leasing agreement.
Lease End Date and Time	In the case of a lease, the date and time identifying expiry of the secondary market leasing agreement.
Record Time Stamp	This is used to record the day and time a particular entry and record was first created in the database.

5.3   Record Creation and Update

Once a secondary market transaction is successfully created between a seller and a buyer or between a lessor and lessee, the PAL sale or lease transaction record is created containing the

details as proposed in sections 5.2 and 7, and this information is recorded in the FCC ULS PAL Sales and Leasing Agreements Database.

5.4 Use of the FCC ULS PAL Sales and Leasing Agreements Database

The records of the FCC ULS PAL Sales and Leasing Agreements Database support the managing SAS for the following purposes:

- To verify PAL rights;

- To verify that the area to be sold or leased is within the Priority Access Licensee's Service Area and, if leased, is outside of the Priority Access Licensee's PPA (as per §96.66(a)(4)).

- In the case of a sale:

    o To define the sub-area of original PAL that is being sold and transferred to a new owner (buyer); this includes establishing the boundary of the new transferred area and establishing a new FN_ID for this portion;

    o To define the sub-area of original PAL that is being retained by the seller; this includes establishing the boundary of the retained area and establishing a new FN_ID for this retained portion;

- To verify that the sale or the lease will not result in the buyer or the lessee holding more than the 40 megahertz of Priority Access spectrum in a given License Area (as per §96.66(a)(3));

- To vet the validity of the PPA claims of lessees (as per §96.66(b));

- To verify that the start date associated with a sale is appropriate;

- To verify that the start and end date associated with the lease is appropriate (as per §96.66(a)(2), and §96.66(b));

- To approve PAL Grant requests from the CBSDs operated by the lessees.

The managing SAS must obtain an updated copy of the FCC ULS PAL Sales and Leasing Agreements Database records at least once per day and use the updated copy.

6 Suggested Record Encoding for the FCC ULS PAL Sales and Leasing Agreements Database

WInnForum proposes that the records in the FCC ULS PAL Sales and Leasing Agreements Database be encoded using JSON (JavaScript Object Notation) [n.5] by the eligible record creators.

JSON allows a "value" be one of the four primitive types (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 proceeded 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.

7   Schema Definition of the FCC ULS PAL Sales and Leasing Agreements Database

The FCC ULS PAL Sales and Leasing Agreements Database contains records of secondary market transactions. These transactions involve one seller and one buyer (in the case of a sale) or involve one lessor and one lessee (in the case of a lease) and one original precursor PAL_ID [n.7] or precursor FN_ID. Each transaction has a corresponding FN_ID record in the FCC ULS PAL Sales and Leasing Agreements Database, represented in the form of a JSON object, *SalesOrLeasingAgreementRecord*, as defined in the following section.

WInnForum proposes these parameters and these formats for this data.

7.1   Sales or Leasing Agreement Record

Table 2: *SalesOrLeasingAgreementRecord* Object

Parameter	R/O/C	Parameter Information
NAME: *recordCreatorId* DATA TYPE: string	Required	This parameter specifies the system-wide unique ID of the record creator of the sales or leasing agreement record.
NAME: *SalesVsLease* DATA TYPE: string	Required	This parameter specifies whether the transaction is a sale ('sale') or a lease ('lease').

Parameter	R/O/C	Parameter Information
NAME: *SalesOrLeasingId* DATA TYPE: string	Required	The system-wide unique and case insensitive sales or leasing FN_ID is assigned by the record creator and has the following format: $RECORD_CREATOR/$RECORD_ID where $RECORD_CREATOR is the string specified in *recordCreatorId*, and $RECORD_ID is the ID of the transaction assigned by the record creator.
NAME: *palId* DATA TYPE: string	Required	The value of this parameter is the original PAL ID for this transaction.
NAME: *SellerOrLessorId* DATA TYPE: string	Required	This parameter specifies the ID of the seller or lessor of the sales or leasing agreement. The ID is listed in a database for qualified PAL users (to be defined after FCC PAL auction). The seller or lessor of such a transaction can be the original licensee from PAL auction or can be a buyer or lessee of another PAL licensing record from a previous transaction.
NAME: *SellerOrLessorPalRight* DATA TYPE: string	Optional	If this parameter is left blank, the seller or lessor is the original licensee of the PAL ID specified by *palId* from the FCC auction. Otherwise, the value of this parameter is the *SalesOrLeasingId* (FN_ID) of a previous sales or leasing agreement record where the seller or the lessor gets the PAL right.
NAME: *BuyerOrLesseeId* DATA TYPE: string	Required	This parameter specifies the ID of the buyer or lessee of the sales or leasing agreement. The ID is listed in a database for qualified PAL users (to be defined after FCC PAL auction).

Parameter	R/O/C	Parameter Information
Transferred FN_ID	Required (for sales)	TBD format This parameter specifies the newly created unique FN_ID for the sold and transferred geographic sub-area where the buyer now has full PAL rights. The newly created FN_ID that refers to that partitioned portion of the original PAL right that is being sold and transferred to the buyer.
Area included in the Sale	Required (for sales)	TBD This polygon bounded area specifies the newly created unique FN_ID area for the sold and transferred geographic sub-area where the buyer now has full PAL rights. Boundaries of the area within the county that is being sold and transferred by the seller to the buyer in the secondary sales agreement. In the case of a sale, this transferred sub-area becomes a new PAL right with a new smaller boundary and a newly assigned FN_ID.
Retained FN_ID	Required (for sales)	TBD format This parameter specifies the newly created unique FN_ID for the retained geographic sub-area where the seller retains full PAL rights. The newly created FN_ID that refers to that geographic portion of the original PAL that is being retained by the seller. This requires a new FN_ID to refer to this smaller retained sub-area.

Parameter	R/O/C	Parameter Information
Retained area excluded from the Sale	Required (for sales)	This polygon bounded area specifies the newly created unique FN_ID area for the seller's retained geographic sub-area where the seller retains full PAL rights. Boundaries of the retained area. In the case of a sale, this retained sub-area becomes a new PAL right with a new smaller boundary and a newly assigned FN_ID.
Leased FN_ID	Required (for leases)	This parameter specifies the newly created unique FN_ID for the leased and transferred geographic sub-area where the lessee now has full PAL rights. The newly created FN_ID that refers to that portion of the precursor PAL right that is being leased and transferred to the lessee.
Area included in the Lease	Required (for leases)	This polygon bounded area specifies the newly created unique FN_ID for the leased and transferred geographic sub-area where the lessee now has full PAL rights. Boundaries of the area within the county that is being leased and transferred by the lessor to the lessee in the secondary market leasing agreement. In the case of a lease, this transferred sub-area becomes a new PAL right with a new smaller boundary and a newly assigned FN_ID.
Retained FN_ID	Required (for leases)	This parameter specifies the newly created unique FN_ID for the retained geographic sub-area where the lessor retains full PAL rights. The newly created FN_ID that refers to that portion of the precursor PAL right that is being retained by the lessor. This requires a new FN_ID to refer to this smaller retained sub-area.

Parameter	R/O/C	Parameter Information
NAME: *SalesOrLeaseStartTime* DATA TYPE: string	Required	This parameter represents the start time of the sales or leasing agreement. It is expressed in UTC using the format, YYYY-MM-DDThh:mm:ssZ, as defined in [n.8].
NAME: *leaseEndTime* DATA TYPE: string	Required	This parameter represents the end time of the leasing agreement. It is expressed in UTC using the format, YYYY-MM-DDThh:mm:ssZ, as defined in [n.8].
NAME: *allowedLeasingArea* DATA TYPE: array of object: *GeoJSON* ([n.6] and Annex A)	Optional	If included, the lessee can claim PPAs within the area(s) specified in *allowedLeasingArea* but outside the area(s) specified in *disallowedLeasingArea*. If this parameter is not included, the lessee may claim PPAs in the original PAL license area corresponding to the FN_ID ~~PAL ID~~ other than the areas specified in *disallowedLeasingArea*.
NAME: *disallowedLeasingArea* DATA TYPE: array of object: *GeoJSON* ([n.6] and Annex A)	Optional	If included, this parameter specifies the geographic areas where the lessee cannot claim the PPAs corresponding to the FN_ID ~~PAL ID~~ in the leasing agreement record. Geographic areas specified by this parameter must contain existing PPAs of the lessor if those lessor's PPAs are within areas specified by *allowedLeasingArea*.
NAME: *recordTimeStamp* DATA TYPE: string	Required	This parameter represents the time when the sales or leasing agreement record is created. It is expressed in UTC using the format, YYYY-MM-DDThh:mm:ssZ, as defined in [n.8].

Annex A (Normative)   Suggested Format: Format of *GeoJSON* Object

WInnForum proposes the use of GeoJSON formats for geospatial data.

This Annex specifies a subset of the *GeoJSON* format [n.6] which may be used by the PAL Sales and Leasing Agreements Database to specify geospatial data.

A.1   GeoJSON format specifications for SAS

The following defines a subset of the *GeoJSON* format which may be used by SAS for geospatial data interchange. Each *GeoJSON* string must have the following properties:
1. A single "FeatureCollection" root node, comprising an array "features".
2. Each item in the "features" array is an object of "type" "Feature" and with a "geometry" field.
3. The "geometry" field is an object of "type" "polygon", which represents a single polygon, with or without holes (see [n.6], section 3.1.6). Polygons pertaining to different "Feature" could have empty intersection.
4. The "geometry" object contains a "coordinates" array, where each item is an array of point coordinates. The first array of coordinates represents the outer boundary of the polygon and could have a counterclockwise orientation, all the other arrays of coordinates, if present, represent the boundaries of the holes and could have a clockwise orientation. The point coordinates will be in **longitude-latitude** order (see [n.6], appendix A.1). The last point in each "coordinates" array must be equal to the first (by *GeoJSON* specification of a LineString, see [n.6] section 3.1.4).

A.2   Example

The example below comprises a GeoJSON string in the format used by SAS, representing two rectangular polygons: the first polygon with a rectangular hole, the second polygon without any holes.

```
{
  "type": "FeatureCollection"
  "features": [{
    "type": "Feature"
    "geometry": {
      "type": "Polygon"
      "coordinates": [
        [ [10.0, 3.0], [15.0, 3.0], [15.0, 6.0], [10.0, 6.0], [10.0, 3.0] ],
        [ [10.1, 3.1], [10.1, 5.9], [14.9, 5.9], [14.9, 3.1], [10.1, 3.1] ]
      ]
    }, {
    "type": "Feature"
    "geometry": {
      "type": "Polygon"
      "coordinates": [
        [ [2.0, 1.5], [7.0, 1.5], [7.0, 4.5], [2.0, 4.5], [2.0, 1.5] ]
      ]
    }
```

```
  }]
}
```

Annex B (Informative) Document History

Document history		
V1.0.0	5 April 2021	Initial Document Balloted and Approved