Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): Extensions to Spectrum Access System (SAS) - SAS Interface Technical Specification (Release 2)

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Extensions to Spectrum Access System (SAS) - SAS Interface Technical Specification (Release 2)

1 Scope

This document is a Technical Specification that extends the SAS-SAS interface [n.1] to support Release 2 features and procedures. Some features, data objects and parameters defined in [n.1] are deprecated in the Release 2 SAS-SAS interface, including

- Time-range request support (Section 6.1 in [n.1])
- By-ID request support (Section 6.2 in [n.1])
- Push support (Section 6.3 in [n.1])
- *SasAdministrator* object (Section 8.1 in [n.1])
- *SasImplementation* object (Section 8.2 in [n.1])
- *terminated* parameter (Section 8.3 and 8.5 in [n.1])
- *groupingParam* parameter (Section 8.3.1 in [n.1])

The key words "required", "shall", "shall not", "should", "should not", "recommended", "may", and "optional" in this document are to be interpreted as described in RFC 2119 [n.2]. In addition, the key word "conditional" shall be interpreted to mean that the definition is an absolute requirement of this specification only if the stated condition is met.

2 References

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

[n.1]   WINNF-TS-0096 V1.3.1, "Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): Spectrum Access System (SAS) - SAS Interface Technical Specification", Wireless Innovation Forum

[n.2]   RFC-2119, "Key words for use in RFCs to Indicate Requirement Levels", March 1997

[n.3]   WINNF-SSC-0011, "Spectrum Sharing Committee Policy and Procedure SSC Abbreviations and Definitions", Wireless Innovation Forum

[n.4]   WINNF-SSC-0008, "Coordinated Periodic Activities Policy", Wireless Innovation Forum

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

[n.6]   RFC-2616, Hypertext Transfer Protocol -- HTTP/1.1, Fielding, Gettys, Mogul, Frystyk, Masinter, Leach and Berners-Lee, June 1999

[n.7]   WINNF-TS-0112, "Requirements for Commercial Operation in the U.S. 3550-3700 MHz Citizens Broadband Radio Service Band", Wireless Innovation Forum

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

[n.9]   WINNF-TS-0016 V1.2.4, "Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): Spectrum Access System (SAS) - Citizens Broadband Radio Service Device (CBSD) Interface Technical Specification", Wireless Innovation Forum

[n.10] RFC-7946, The GeoJSON Format, Butler et. al., August 2016

[n.11] WINNF-TS-0245, "Operations for Citizens Broadband Radio Service (CBRS): Priority Access Licensee (PAL) Database Technical Specification", Wireless Innovation Forum

[n.12] NGA.STND.0036_1.0.0_WGS84 (Version 1.0.0 - July 8, 2014): Department of Defense (DoD) World Geodetic System (WGS) 1984

[n.13] RFC 7233, "Hypertext Transfer Protocol (HTTP/1.1): Range Requests", June 2014

[n.14] RFC-4627, The application/json Media Type for JavaScript Object Notation (JSON), Crockford, July 2006

[n.15] WINNF-SSC-0012, "WInnForum Registry of Third-Party Proprietary Features", Wireless Innovation Forum

[n.16] WINNF-SSC-0010, "WInnForum Recognized CBRS Grouping Parameters Document", Wireless Innovation Forum

[n.17] WINNF-TS-3002, "Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): Extensions to Spectrum Access System (SAS) - Citizens Broadband Radio Service Device (CBSD) Interface Technical Specification (Release 2)", Wireless Innovation Forum

3   Definitions and abbreviations

3.1   Definitions

In addition to definitions in [n.3], the following definitions are also used in this document.

Feature ID: A string identifying the name of a Release 2 feature.

Feature Capability List: A list of Feature IDs, defined in this document or WINNF-SSC-0012 [n.15], which a SAS supports for its operation.

3.2   Abbreviations

In addition to abbreviations specified in [n.3], the following abbreviations are also used in this document.

FID   Feature ID

4   Release 2 Procedures and Features

4.1   Feature Capability Exchange

This section defines feature capability exchange procedure which ensures backward and forward compatibility between operations between different releases of SASs. Section 4.1.1 provides backward and forward compatibility principles of inter-release operation. Section 4.1.2 describes how a SAS should treat feature-specific parameters received from a peer SAS. Feature Capability Exchange shall facilitate the exchange of both WInnForum defined Feature IDs and proprietary Feature IDs. WInnForum defined Feature IDs (starting with "WF_") are specified in

this document starting with section 4.2. Proprietary Feature IDs are included in WINNF-SSC-0012 [n.15].

4.1.1   Backward and Forward Compatibility Principles of Inter-Release Operation

To allow predictable operation between SASs supporting different releases of SAS-SAS protocols, the SAS-SAS protocol in this specification is designed to be backward and forward compatible. To ensure backward compatibility, any SAS beyond Release 1 shall exchange Feature Capability List in the synchronization process as described in Section 5. A SAS shall ignore unrecognized feature names in the Feature Capability List and unrecognized parameters associated with features it doesn't support received from a peer SAS. If a SAS does not receive the Feature Capability List from a peer SAS, the peer SAS shall be treated as a Release 1 SAS.

4.1.2   Inclusion of Feature-Specific Parameters

Feature specific parameters are always Conditional or Optional and are identified with the corresponding feature names. A SAS shall ignore a parameter received from a peer SAS if the parameter name is unrecognized or the SAS does not support the feature associated with the parameter.

4.2   Enhanced CBSD Group Handling (FID: WF_ENHANCED_GROUP_HANDLING)

This feature supports CBSD grouping information exchange using the SAS-CBSD and the SAS-SAS interfaces.

This feature does not define how to use CBSD grouping information but only allows the exchange of grouping information. Depending on specific grouping information, it may be necessary for a SAS to share the information with peer SASs through the SAS-SAS interface. By using this feature, a SAS may optionally share the CBSD grouping information with peer SASs by including the *GroupParam* object and/or the *GroupConfig* object in the *CbsdData* Object, as defined in Table 4.

5   SAS-SAS Synchronization

5.1   Full Activity Dump

At a period specified in [n.4], the SAS shall generate a Full Activity Dump comprised of activity dump files corresponding to the SAS Feature Capability Record, qualifying CBSD Data Records, Zone Data Records, and ESC Sensor Records. A SAS shall provide information on accessing activity dump files through the URL in Table 1.

In particular, records in Full Activity Dump shall include:

- SAS Feature Capability Record, which includes the SAS Feature Capability List;

- CBSD Data Records for CBSDs which have at least one Grant. For those CBSDs, all Grants shall be included.;

- Zone Data Records including PPA data;

- ESC Sensor Records which include information of ESC sensors affiliated with the SAS;

- Coordination Event Records which include coordination information that shall be shared among SASs.

The dump data itself shall also be made available for at least 14 days.

Release 2 compliant SASs shall always include the SAS Feature Capability Record in Full Activity Dump data. If Full Activity Dump data retrieved from a peer SAS does not include the SAS Feature Capability Record, the peer SAS shall be considered a Release 1 SAS.

6 Record Encoding and Transport

6.1 Record Encoding

SAS-SAS Records shall be encoded using JSON (JavaScript Object Notation) as defined in RFC-7159 [n.5].

6.2 Record Transport

The HTTP GET method shall be used for all SAS-SAS requests. The URL endpoints for SAS-SAS requests are described in Table 1. A SAS administrator may choose to use the same or different `$BASE_URL` in Table 1 for transporting records defined in different releases of SAS-SAS protocols. A SAS administrator shall ensure that all operational URLs are able to properly receive and respond to requests from peer SASs supporting different releases of SAS-SAS protocols pursuant to the backward and forward compatibility principles described in section 4.1.1.

Table 1: SAS Record Types and URL constructions

SAS Record Type	`sas_record_type`	URL construction
SAS Feature Capability	`sas_feature`	Not applicable
CBSD Data	`cbsd`	Not applicable
ESC Sensor Data	`esc_sensor`	Not applicable
Zone Data	`zone`	Not applicable
Coordination events	`coordination`	Not applicable
Full Activity Dump	`dump`	HTTP request: `GET $BASE_URL/dump` Return type: *FullActivityDump* object (See 7.6)

7 Baseline Parameters of SAS-SAS Records and Extensions

In this section, parameters of SAS-SAS records are described in more detail. A parameter value can be one of the primitive JSON data types (string, number, boolean, array, or object). If a parameter is an object, a name for the object is given and a separate table describes parameters in the object.

Each parameter is indicated as "Required", "Optional" or "Conditional". The definitions of these indicators are as follows:

> **"Required":**   The parameter shall always be included in the object it belongs to.
>
> **"Optional":**   The parameter may be included in the object it belongs to.
>
> **"Conditional":**   The parameter shall be included in the object it belong to, if and only if the specified conditions are satisfied.

The tables of parameters in this section have a column marked R/O/C that indicates whether the particular parameter is "Required", "Optional", or "Conditional".

The JSON objects specified in the following subsections are conformant with RFC-4627 [n.14]. Note that this means that Unicode characters are used and have a default encoding of UTF-8.

Feature-specific parameters shall be described with the following column format:

Table 2: Column Format for Release 2 Parameters

Parameter
NAME: [Name of extension parameter]
DATA TYPE: [One of JSON Data Types specified in section 7]
FEATURE ID: [Feature ID(s) or *Mandatory*]

The label "**FEATURE ID**" describes in which specific features this parameter is used. The values are WInnForum defined FIDs or "*Mandatory*", where "*Mandatory*" means that the parameter does not depend on specific-features and shall be supported for Release 2 operation.

Any parameter which does not have the "FEATURE ID" label is specified in WINNF-TS-0096 [n.1] and its description is reproduced here <u>for information only.</u>

7.1   SAS Feature Capability Record

Table 3: *SasFeatureCapability* Object Definition

Parameter	R/O/C	Parameter Information
NAME: *id* **DATA TYPE**: string **FEATURE ID**: *Mandatory*	Required	• **Format**: sas_feature/$ADMINISTRATOR_ID **$ADMINISTRATOR_ID** is a unique SAS administrator identifier.

Parameter	R/O/C	Parameter Information
NAME: *featureCapabilityList* **DATA TYPE**: array of string **FEATURE ID**: *Mandatory*	Required	This parameter represents SAS's Feature Capability List which may contain zero or more FIDs. FIDs shall be conformant with those described in the headings of sections specifying features in Section 4 of this document or in [n.15].

7.2   CBSD Data Record

This section defines *CbsdData* Object for Release 2 CBSDs. See details in WINNF-TS-0016 [n.9] for creation of Release 1 CBSD Data Record.

Table 4: *CbsdData* Object Definition

Parameter	R/O/C	Parameter Information
NAME: *id* **DATA TYPE**: string	Required	• **Format**: cbsd/$CBSD_REFERENCE_ID **$CBSD_REFERENCE_ID** is defined as $FCC_ID + "/" + sha1($SERIAL_NUMBER). $FCC_ID and $SERIAL_NUMBER are the unescaped *fccId* and *cbsdSerialNumber* strings of the CBSD registered during the CBSD Registration Procedure [n.9]. SHA-1 is applied to the unescaped *cbsdSerialNumber* string with no additional line termination characters.
NAME: *registration* **DATA TYPE**: object: *RegistrationInformation*	Required	This parameter contains the registration information of the CBSD associated with the *id* parameter.
NAME: *grants* **DATA TYPE**: array of object: *GrantData*	Required	An array of one or more data object that contains the information of Grants of the CBSD associated with the *id* parameter.
NAME: *groupingParam* **DATA TYPE**: array of object: *GroupParam* **FEATURE ID**: WF_ENHANCED_GROUP_H ANDLING	Optional	An array of data objects that contains the information about the Group(s) currently associated with that CBSD. See details of *GroupParam* object definition in WINNF-TS-3002 [n.17].

Parameter	R/O/C	Parameter Information
NAME: *groupingConfig* **DATA TYPE**: array of object: *GroupConfig* **FEATURE ID**: WF_ENHANCED_GROUP_HANDLING	Optional	An array of data objects that includes information concerning group configuration currently associated with the CBSD. See details of *GroupConfig* object definition in WINNF-TS-3002 [n.17].

Table 5: *RegistrationInformation* Object Definition

Parameter	R/O/C	Parameter Information
NAME: *userId* **DATA TYPE**: string	Optional	This parameter contains a User Registration ID (UR-ID) of the CBSD that was registered to the SAS Implementation.
NAME: *fccId* **DATA TYPE**: string	Required	This parameter contains a FCC ID of the CBSD that was registered to the SAS Implementation.
NAME: *cbsdSerialNumber* **DATA TYPE**: string	Optional	This parameter contains a serial number of the CBSD that was registered to the SAS Implementation.
NAME: *callSign* **DATA TYPE**: string	Optional	This parameter contains a call sign of the CBSD User of the CBSD that was registered to the SAS Implementation.
NAME: *cbsdCategory* **DATA TYPE**: string	Required	This parameter contains the category of the CBSD that was registered to the SAS Implementation.
NAME: *cbsdInfo* **DATA TYPE**: object: *CbsdInfo*	Optional	A data object that contains CBSD model information that was registered to the SAS Implementation. See details of *CbsdInfo* object definition in WINNF-TS-3002 [n.17].

Parameter	R/O/C	Parameter Information
NAME: *installationParam* **DATA TYPE**: object: *InstallationParam*	Required	A data object that contains all the installation parameters of the CBSD that were registered to the SAS Implementation. All of the parameters, specified in the *InstallationParam* object, that were registered to the SAS Implementation shall be included in this object. See details of *InstallationParam* object definition in WINNF-TS-3002 [n.17].
NAME: *airInterface* **DATA TYPE**: object: *AirInterface*	Required	A data object that contains air interface information of the CBSD that were registered to the SAS Implementation. All of the parameters, specified in the *AirInterface* object, that were registered to the SAS Implementation shall be included in this object. See details of *AirInterface* object definition in WINNF-TS-3002 [n.17].
NAME: *measCapability* **DATA TYPE**: array of string	Required	This parameter contains the measurement capability of the CBSD that were registered to the SAS Implementation.

Table 6: *GrantData* Object Definition

Parameter	R/O/C	Parameter Information
NAME: *id* **DATA TYPE**: string	Required	A Grant identifier unique to this Grant and CBSD allowing peer SASs to identify the Grant.
NAME: *operationParam* **DATA TYPE**: object: *OperationParam*	Required	This data object includes operation parameters associated with the approved Grant. See details of *OperationParam* object definition in WINNF-TS-3002 [n.17].

Parameter	R/O/C	Parameter Information
NAME: *requestedOperationParam* **DATA TYPE**: object: *OperationParam*	Required	This data object includes operation parameters that were requested for the Grant by the CBSD during the CBSD Grant Procedure. See details of *OperationParam* object definition in WINNF-TS-3002 [n.17].
NAME: *channelType* **DATA TYPE**: string	Required	Channel type of the Grant. The acceptable values are: ▪ "PAL": the channel is a PAL channel. ▪ "GAA": the frequency range is for GAA use.
NAME: *grantExpireTime* **DATA TYPE**: string	Required	Indicates the UTC time when the Grant expires. **Format**: YYYY-MM-DDThh:mm:ssZ [n.8]

7.3   ESC Sensor Record

Table 7: *EscSensorData* Object Definition

Parameter	R/O/C	Parameter Information
NAME: *id* **DATA TYPE**: string	Required	• **Format**: esc_sensor/$ADMINISTRATOR_ID/$SENSOR_ID **$ADMINISTRATOR_ID** is the a unique SAS Administrator identifier. **$SENSOR_ID** is a unique identifier for the referenced ESC Sensor created by the ESC Operator.
NAME: *installationParam* **DATA TYPE**: object: *EscInstallationParam*	Required	Contains ESC Sensor installation parameters
NAME: *protectionLevel* **DATA TYPE**: number	Optional	The protection level to be applied to this ESC Sensor in units of dBm/MHz. If not present, the default value of the protection level specified in [n.7] shall be applied to the ESC Sensor associated with the *id* parameter.

Table 8: *EscInstallationParam* **object**

Parameter	R/O/C	Parameter Information
NAME: *latitude* **DATA TYPE**: number	Required	Latitude of the ESC antenna location in degrees relative to the WGS 84 datum [n.12]. The allowed range is from -90.000000 to +90.000000. Positive values represent latitudes north of the equator; negative values south of the equator. Values are specified using 6 digits to the right of the decimal point.
NAME: *longitude* **DATA TYPE**: number	Required	Longitude of the ESC antenna location in degrees relative to the WGS84 datum [n.12]. The allowed range is from -180.000000 to +180.000000. Positive values represent longitudes east of the prime meridian; negative values west of the prime meridian. Values are specified using 6 digits to the right of the decimal point.
NAME: *height* **DATA TYPE**: number	Required	This parameter contains the ESC antenna height in meters that may be expressed as an integer or as a numeric value including a decimal point. When the *heightType* parameter value is "AGL", the antenna height should be given relative to ground level. When the *heightType* parameter value is "AMSL", it is given with respect to WGS84 datum.
NAME: *heightType* **DATA TYPE**: string	Required	The value should be "AGL" or "AMSL". AGL height is measured relative to the ground level. AMSL height is measured relative to the mean sea level.

Parameter	R/O/C	Parameter Information
NAME: *antennaAzimuth* **DATA TYPE**: number	Required	This parameter contains the boresight direction of the horizontal plane of the ESC antenna in degrees with respect to true north. The value of this parameter is an integer with a value between 0 and 359 inclusive. A value of 0 degrees means true north; a value of 90 degrees means east.
NAME: *antennaDowntilt* **DATA TYPE**: number	Required	If present, this parameter contains the ESC antenna down tilt in degrees and is an integer with a value between -90 and +90 inclusive; a negative value means the antenna is tilted up (above horizontal).
NAME: *azimuthRadiationPattern* **DATA TYPE**: array of object: *RadiationPattern*	Required	This parameter specifies an ESC antenna radiation pattern or an effective ESC antenna radiation pattern in any direction in the azimuthal plane, specified at 1 degree increments referenced to the antenna boresight direction.
NAME: *elevationRadiationPattern* **DATA TYPE**: array of object: *RadiationPattern*	Required	If present, this parameter specifies an ESC antenna radiation pattern or an effective ESC antenna radiation pattern in any direction in the elevation plane (orthogonal to the azimuthal plane).

Table 9: *RadiationPattern* **object**

Parameter	R/O/C	Parameter Information
NAME: *angle* **DATA TYPE**: number	Required	This is the radiation angle. **In the azimuth plane:** the value is given in degrees relative to the antenna boresight direction. The value of this parameter is an integer, increasing in the clockwise direction as viewed from above, between 0 and 359 inclusive. **In the elevation plane**: the angle is given in degrees relative to the horizon. The value of this parameter is an integer between -180 and 180 inclusive. Radiation below the horizon has a positive elevation angle and radiation above the horizon has a negative elevation angle.
NAME: *gain* **DATA TYPE**: number	Required	The radiation gain in dBi. This parameter is an integer with a value between -127 and +128 (dBi). The gain provided is the gain in the direction of '*angle*'.

7.4 Zone Definition Record

Table 10: *ZoneData* Object Definition

Parameter	R/O/C	Parameter Information
NAME: *id* **DATA TYPE**: string	Required	• **Format**: zone/$CREATOR/$ZONE_ID When the *usage* parameter is equal to "PPA", the format of the $CREATOR string is "ppa/$ADMINISTRATOR_ID" and the $ZONE_ID is equal to the PPA-ID string. When the *usage* parameter is equal to "CENSUS_TRACT" the format of the $CREATOR string is "census_tract/census/$YEAR" and the $ZONE_ID is equal to the FIPS code of the census tract. $YEAR is equal to the census year in which the census tract was defined. *Note: this zone type exchange is optional.* When the *usage* parameter is equal to "EXCLUSION_ZONE" the format of the $CREATOR string is "exclusion_zone/ntia/$DATE", and $DATE is a "YYYY_MM_DD" string describing the date on which NTIA issued the definition of the exclusion zone. $ZONE_ID is a unique reference identifier of an exclusion zone.
NAME: *name* **DATA TYPE**: string	Optional	Human-readable local significant string. The name of this zone.

Parameter	R/O/C	Parameter Information
NAME: *creator* **DATA TYPE**: string	Optional	This parameter contains the creator of the Zone Data associated with the $ZONE_ID. The value of this parameter shall be used as $CREATOR in the *id* parameter. The value of $CREATOR shall be ppa/$ADMINISTRATOR_ID if the value of the *usage* parameter is "PPA". The value of $CREATOR shall be exclusion_zone/ntia/$DATE if the value of the *usage* parameter is "EXCLUSION_ZONE", where $DATE is expressed by using the format, YYYY_MM_DD, describing the date on which NTIA issued the definition of the exclusion zone. The value of $CREATOR shall be census_tract/census/$YEAR if the value of the *usage* parameter is "CENSUS_TRACT", where $YEAR is equal to the census year in which the census tract was defined.
NAME: *usage* **DATA TYPE**: string	Required	This parameter describes the usage (i.e. type of zone) of the zone data. One of the following shall be included: • CENSUS_TRACT • PPA • EXCLUSION_ZONE
NAME: *ppaInfo* **DATA TYPE**: object: *PPAInformation*	Conditional	if the *usage* parameter is equal to "PPA", this parameter shall be included.
NAME: *zone* **DATA TYPE**: object: *GeoJSON*	Required	Self-contained geometry description of the addressed zone data [n.10]. See details in Normative Annex B of WINNF-TS-0096 [n.1]

7.4.1 PPA Information object

Table 11: *PPAInformation* Object Definition

Parameter	R/O/C	Parameter Information

NAME: *palId* DATA TYPE: array of string	Required	List of one or more PAL Database Record IDs (ref: [n.11]) upon which the PPA is based. All PALs indicated in this parameter shall have a single PAL Holder.
NAME: *cbsdReferenceId* DATA TYPE: array of string	Required	List of one or more CBSD Reference IDs in the cluster list of the PPA. The format of CBSD Reference ID shall follow the definition of *id* parameter in *CbsdData* object.
NAME: *ppaBeginDate* DATA TYPE: string	Required	Date of the start of the PPA protection period. **Format**: YYYY-MM-DDThh:mm:ssZ [n.5]
NAME: *ppaExpirationDate* DATA TYPE: string	Required	This field represents the PPA expiration date. **Format**: YYYY-MM-DDThh:mm:ssZ [n.5]
NAME: *ppaRegionType* DATA TYPE: string	Required	This field describes the region type of the PPA to be used in calculating the path loss for PPA protection. The field shall be set to one of the following values: • "URBAN" • "SUBURBAN" • "RURAL"

7.5 Coordination Event Record

Table 12: *CoordinationEvent* object

Parameter	R/O/C	Parameter Information
NAME: *id* DATA TYPE: string	Required	• **Format**: coordination/$ADMINISTRATOR_ID/$EVENT_ID **$ADMINISTRATOR_ID** is a SAS Administrator ID. **$EVENT_ID** is Coordination Event record ID created by the originating SAS Administrator.
NAME: *name* DATA TYPE: string	Optional	Human-readable local unique reference to the Coordination Event Record.
NAME: *creator* DATA TYPE: string	Optional	Human-readable string identifying the creator of the Coordination Event Record.
NAME: *creationDate* DATA TYPE: string	Required	This parameter is the date the Coordination Event Record was created. **Format**: YYYY-MM-DDThh:mm:ssZ [n.8]

Parameter	R/O/C	Parameter Information
NAME: *expirationDate* **DATA TYPE**: string	Required	This parameter is the expiration date of the Coordination Event Record. **Format**: YYYY-MM-DDThh:mm:ssZ [n.8]
NAME: *description* **DATA TYPE**: string	Optional	Human-readable description of the Coordination Event Record.
NAME: *coordinationType* **DATA TYPE**: string	Required	This parameter is the type of the Coordination Event Record. One of the following values shall be included: - INTERFERENCE_REPORT - AD_HOC_EXCLUSION_ZONE - ENFORCEMENT_ACTION - ESC_SENSOR_DEPLOYMENT
NAME: *coordinationDevice* **DATA TYPE**: array of string	Conditional	This parameter contains one or more IDs of the device involved in the Coordination Event Record. Acceptable values of the element of this parameter is as follows: - The value of the *id* parameter of the *CbsdData* object - The value of the *id* parameter of the *EscSensorData* object - Identifier of a specific incumbent device This parameter shall be included if the *coordinationType* parameter is set to "ESC_SENSOR_DEPLOYMENT" or "INTERFERENCE_REPORT".
NAME: *coordinationZone* **DATA TYPE**: array of string	Conditional	This parameter contains one or more IDs of the Zone Data involved in the Coordination Event Record. This parameter shall be included if the *coordinationType* parameter is set to "AD_HOC_EXCLUSION_ZONE".
NAME: *coordinationData* **DATA TYPE**: object: *CoordinationData*	Optional	This parameter is an object that contains the event-specific data.

7.5.1 CoordinationData object

Table 13: *CoordinationData* Object Definition

Parameter	R/O/C	Parameter Information
The contents of this object are FFS.		

7.6 Full Activity Dump Record

Table 14: *FullActivityDump* object

Parameter	R/O/C	Parameter Information
NAME: *files* **DATA TYPE**: array of object: *ActivityDumpFile*	Required	Array of one or more objects corresponding to files comprising the Full Activity Dump data.
NAME: *generationDateTime* **DATA TYPE**: string	Required	The date and time at which the Full Activity Dump data was generated. **Format**: YYYY-MM-DDThh:mm:ssZ [n.8]
NAME: *description* **DATA TYPE**: string	Optional	Any additional human-readable description the source SAS may wish to attach.

7.6.1 ActivityDumpFile object

Table 15: *ActivityDumpFile* object

Parameter	R/O/C	Parameter Information
NAME: *url* **DATA TYPE**: string	Required	The retrieval URLs at which the peer SAS can retrieve the activity dump file. Retrieval of the resources at these URLs shall support byte-range requests using the HTTP Content-Range mechanisms [n.13].
NAME: *checksum* **DATA TYPE**: string	Required	The SHA-1 checksum of the contents of the activity dump file referred to by *url*.
NAME: *size* **DATA TYPE**: number	Required	The size of the activity dump file in bytes.
NAME: *version* **DATA TYPE**: string	Required	The version of the SAS-SAS protocol used for generating this file. The value of this string shall be "v2.0".

Parameter	R/O/C	Parameter Information
NAME: *recordType* **DATA TYPE**: string	Required	The type of records contained in the activity dump file The value of this parameter shall be one of the `sas_record_type` values as defined in Table 1. Examples: "sas_feature", "zone", "cbsd", "coordination"

7.6.2 Activity Dump File Format

The activity dump file retrieved from the *url* field specified in the *ActivityDumpFile* object is composed of a *MessageAggregation* Object as defined in Table 16.

Table 16: *MessageAggregation* Object Definition

Parameter	R/O/C	Parameter information
NAME: *recordData* **DATA TYPE**: array of object	Required	An array of zero or more SAS record(s) with the same record type, as specified in *recordType* of the corresponding *ActivityDumpFile* object.

8   History

Document history		
V1.0.0	2 April 2020	Initial version balloted and approved for publication