# Test and Certification for Citizens Broadband Radio Service (CBRS); CBRS Release 2 Non-Regulatory Impacting (NRI) Test Specification for SAS as UUT

**Document WINNF-TS-4003**
Version V1.1.0

22 December 2023

# TERMS, CONDITIONS & NOTICES

This document has been prepared by the CBRS Committee Work Group 4 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 It may be amended or withdrawn at a later time and it is not binding on any member of the Forum or of the CBRS Committee Work Group 4

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

# Table of Contents

# List of Tables

# Contributors

The following individuals made significant contributions to this document:

Editor: Masoud Olfat Federated Wireless

Group Chair:  Masoud Olfat, Federated Wireless

Other Member Representatives:

- CommScope:Navin Srinivasan

- Ericsson: Virgil Cimpu

- Google: Ariful Hannan, Kate Harrison, Yi Hsuan

- RED Technologies: Christophe Le Thierry, Minh Le

- Sony: Sho Furuichi, Naotaka Sato

# Test and Certification for CBRS;
# Conformance and Performance Test Technical Specification
# for Release 2 NRI; SAS as Unit Under Test (UUT)

## 1   Introduction

The present document contains the Protocol Implementation Conformance Statement (PICS), test cases to ensure conformance *to CBRS Release 2 NRI features* developed by Wireless Innovation Forum (WInnForum).

## 2   Scope

The scope of this present document is to specify test procedures to demonstrate conformance of the CBRS Release 2 requirements and protocols concerning Non-Regulatory Impacting (NRI) features defined in section 4.2 and the included conformance tests address only those features.

NOTE: For information on NRI features and their definitions please refer to section 4.2.

Not all components and interfaces in [n.3] are covered by the Release 2 certification and test cases defined in this document. Development of some of the interfaces and components are out of the scope of WInnForum, and therefore no test and certification process are provided for them.

The functionalities of Radio Access Network (RAN) or radio device operations and functions are outside the scope of this document.

More generally, tests are only applicable to those components that are intended to support the appropriate functionality. To indicate the circumstances in which tests apply, this is noted in the "*definition and applicability*" part of the test.

This document only covers the NRI test cases required for Release 2 certification of the SAS to attest conformance to WInnForum-defined Release 2 features marked as NRI and does not include any conformance tests for 3rd Party Proprietary Features.

Moreover, this document only covers the test specifications and test cases for the CBRS Architecture components and does not include the test software. The process and policies regarding test code development and test procedures are captured in [n.16].

Certain elements of this published WINNF specifications are subject to change and update in this release.

# 3    References

## 3.1    Normative references

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

[n.1]    FCC Report and Order 15-47A1: "Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band", FCC, April 17 2015, https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-47A1.pdf

[n.2]    FCC Report and Order 16-55A1: "Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band", FCC, May 2 2016, https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-55A1.pdf

[n.3]    SSC- Wireless Innovation Forum, WG1&3 Task Group: "SAS Functional Architecture ", Working Document WINNF-15-P-0047 Version V1.0.0

[n.4]    SSC-Wireless Innovation Forum, "Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): Spectrum Access System (SAS) - Citizens Broadband Radio Service Device (CBSD) Interface Technical Specification", WINNF-TS-0016 V1.2.2

[n.5]    SSC-Wireless Innovation Forum, "Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS); Spectrum Access System (SAS) - SAS Interface Technical Specification", WINNF-TS-0096 V1.3.0

[n.6]    SSC-Wireless Innovation Forum, "Requirements for Commercial Operation in the U.S. 3550-3700 MHz Citizens Broadband Radio Service Band", WINNF-15-S-0112 V1.6.0

[n.7]    SSC-Wireless Innovation Forum, "Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; CBSD as Unit Under Test (UUT)", WINNF-TS-0122 V1.1.1

[n.8]    FCC Report and Order 18-149A1: "Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band", FCC, Oct 24 2018, FCC-18-149A1.pdf

[n.9]     SSC-Wireless Innovation Forum, "Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): WInnForum Recognized CBRS Air Interfaces and Measurements", WINNF-SSC-0002

[n.10]    RFC-2119, "Key words for use in RFCs to Indicate Requirement Levels", March 1997.  Available at:  https://tools.ietf.org/html/rfc2119

[n.11]    SSC-Wireless Innovation Forum, "Extensions to SAS-CBSD Interface Technical Specification (Release 2)", WINNF-TS-3002 V1.0.0

[n.12]    SSC-Wireless Innovation Forum, "Extensions to Spectrum Access System (SAS) - SAS Interface Technical Specification (Release 2)", WINNF-TS-3003 V1.0.0

[n.13]    SSC-Wireless Innovation Forum, "Technical Specification; SAS as Unit Under Test (UUT)", WINNF-TS-0061 V1.5.1

[n.14]    SSC-Wireless Innovation Forum, "Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): WInnForum Recognized CBRS Grouping Information", WINNF-SSC-0010

[n.15]    SSC-Wireless Innovation Forum, "CBRS Operational and Functional Requirements (Release 2)", WINNF-TS-1001 V1.2

[n.16]    SSC-Wireless Innovation Forum, "CBRS Release 2 Self-Testing Policy", WINNF-TS-4005

[n.17]    SSC-Wireless Innovation Forum, "Test and Certification for Citizens Broadband Radio Service (CBRS); CBRS Release 2 Non-Regulatory Impacting (NRI) Test Specification for CBSD as UUT", WINNF-TS-4004, "https://winnf.memberclicks.net/assets/CBRS/WINNF-TS-4004.pdf"

[n.18]    SSC-Wireless Innovation Forum, "CBSD antenna pattern database", WINNF-TS-5006

[n.19]    SSC-Wireless Innovation Forum, "Test and Certification for Citizen Broadband Radio Service (CBRS); CBRS Release 2 Regulatory Impacting (RI) Test Specification for SAS as UUT", WINNF-TS-4006

## 3.2   Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

# 4    Definitions and Abbreviations

## 4.1    Abbreviations

**CBRS**: Citizens Broadband Radio Service

**CBSD**: Citizens Broadband Radio Service Device

**CPAS**: Coordinated Periodic Activities among SASs

**CPI**: Certified Professional Installer

**DOD:** Department of Defense

**DPA:** Dynamic Protection Area

**EAP:** Enhanced Antenna Pattern**EIRP**: Effective Isotropic Radiated Power

**ESC:** Environmental Sensing Capability

**FCC:** Federal Communications Commission

**FSS**: Fixed Satellite Service

**GAA**: General Authorized Access

**IAP:** Iterative Allocation Process

**IOT:** Inter-Operability Test

**PAL:** Priority Access License

**PPA:** PAL Protection Area

**RAN**: Radio Access Network

**SAS**: Spectrum Access System

**UUT**: Unit Under Test

## 4.2   Definitions

***Main NRI Test Harness:*** A collection of routines that can be configured by the NRI test operator to interact with the SAS NRI UUT in order to execute the test cases described in this document. It includes Admin NRI Test Harness, SAS NRI Test Harnesses, DP NRI Test Harnesses, CBSD NRI Test Harnesses, and all other test harnesses defined in this document. The Main NRI Test Harness software for testing NRI features is vendor-specific.

***SAS Under NRI Test:*** A Spectrum Access System (SAS) to which the sequence of steps listed in the test specifications in this document is applied via the SAS and CBSD NRI Test Harnesses, the SAS Under NRI Test exchanges sequences of simulated messages with simulated Spectrum Access Systems, simulated CBSDs, and simulated ESCs according to the test specifications in this document. In this document, it is referred to as SAS NRI UUT (Unit Under NRI Test). Unless otherwise specified, SAS NRI UUT, or UUT in this document refers to SAS NRI UUT.

***SAS NRI Test Harness:*** A collection of routines that can be configured by the NRI test operator to interact with the SAS NRI UUT via interfaces specified in [n.5, n.12], and automates critical test sequences and procedures in this document and [n.7, n.17]. Via these interfaces and following the specified test procedures, the SAS NRI Test Harness emulates the SAS-SAS Messages specified in [n.5, n.12] that would be generated by one SAS. The software without SAS certificate for testing NRI features is vendor-specific.

***CBSD NRI Test Harness:*** A collection of routines that can be configured by the NRI test operator to interact with the SAS NRI UUT via interfaces specified in [n.4, n.11] and automates critical test sequences and procedures in this document and [n.7, n.17].  Via these interfaces and following the specified test procedures, the CBSD NRI Test Harness emulates the Release 2 SAS-CBSD Request Messages specified in [n.4, n.11] that would be generated by one CBSD, using a TLS connection with CBSD certificate to the SAS NRI UUT.  If multiple CBSD NRI Test Harnesses are directly connected to the SAS NRI UUT, each has its own TLS connection to the SAS NRI UUT. The software without CBSD certificate for testing NRI features is vendor-specific.

***DP NRI Test Harness:***  A collection of routines that can be configured by the NRI test operator to interact with the SAS NRI UUT via interfaces specified in [n.4, n.11] and automates critical test sequences and procedures in this document and [n.7, n.17].  Via these interfaces and following the specified test procedures, the DP NRI Test Harness emulates the Release 2 SAS-CBSD Request Messages specified in [n.4. n.11] that would be generated by one or more CBSDs, using a TLS connection with DP certificate to the SAS NRI UUT. If multiple DP NRI Test Harnesses are connected to the SAS NRI UUT, each has its own TLS connection to the SAS NRI UUT. The DP function within the DP NRI Test Harness merely aggregates the Request Messages of multiple single CBSDs and disaggregates the respective Response Messages of the SAS NRI UUT and does nothing else (i.e., does not have any other unique functionality of a real Domain Proxy). The software without DP certificate for testing NRI features is vendor-specific.

***Admin NRI Test Harness:*** A collection of routines that can be configured by the NRI test operator to inject data that is required for the purpose of the test cases, including SAS operationally supported FIDs, into the SAS NRI UUT. The Admin NRI Test Harness also has the ability to recognize the completion of CPAS executed by the SAS NRI UUT. The Admin NRI Test Harness software for testing NRI features is vendor-specific.

***Non-Regulatory Impacting (NRI):*** The features defined by WInnForum used for operation not impacting Part 96 regulatory compliance [n.15]

***Regulatory Impacting (RI):*** The features defined by WInnForum used for operation impacting Part 96 regulatory compliance [n.15]

The following terms are used within this document and should be interpreted as described in [n.10]:
- ***SHALL*** is a mandatory requirement (negative is ***SHALL NOT***)
- ***SHOULD*** is recommended requirement /best practice (negative is ***SHOULD NOT***)
- ***MAY*** is an optional requirement, i.e. something that is allowed (negative is ***NEED NOT***)

# 5 General Principles of Certification Test Cases

The requirements, protocols, specifications, and interfaces are defined by SSC-Wireless Innovation Forum Work Groups 1, 2, 3 and 5. The specifications are derived from FCC, NTIA, and DOD requirements. According to requirements and specifications defined by other work groups, Work Group 4 develops the test cases. The certification test cases can be classified in three classes as follows:

- **Functional Test (FT):** Test to validate the conformance of the Protocols and functionalities implemented in the SAS NRI UUT to the requirements developed by WInnForum and supporting FCC/DoD requirements.

- **Interoperability Test (IOT):** Test to validate the interoperability between the components developed by different vendors, compliant to WInnForum Requirements.

- **Field/Performance Test (PT):** Test to check the capability of the SAS NRI UUT to support various traffic models and actual operations in the field.

The Protocol and Functional test cases are converted to test scripts, which have to be validated through a process defined by WInnForum and FCC. The lab and performance testing require traffic/capacity modeling and measurement equipment.

Vendor testing could be either considered as a pre-requisite for certification process, or, by discretion of the certification management entity, they could be partially or fully considered as part of certification plan.

Certification is governed either directly by, or through a certification body designated by, the FCC, DOD, and WInnForum.

## 5.1 Test ID Definition

Each test case specified in this document has an associated test ID. A test ID shall be defined in the following format.

{*TestRequirement*}.{*TestCategory*}.{*UnitUnderTest*}.REL{*X*}.NRI.{*TestFunction*}.{*SubTestNumber*}

*Test Requirement* indicates the test is to verify if the Unit Under Test meets the CBRS Release 2 Technical Specifications provided by WInnForum. The category of a test, which can be functional, interoperability, or performance, is shown in *TestCategory*. *UnitUnderTest* represents the entity under test, which can be SAS, CBSD, Domain Proxy, ESC or a combination of those entities. REL *X* indicates the test as designated is for SAS Release *X* certification testing. *TestFunction* indicates a particular function or requirement a test intends to verify. *SubTestNumber* is an integer larger than 0 to number different test cases in a group of tests performing similar test functions.

In the above Test ID format, the strings in the curly braces are replaced by values in the following tables depending on the characteristics of each test.

**Table 5-1 The values of TestRequirement in Test ID**

| Value | Description |
|-------|-------------|
| WINNF | This test is to verify a Technical Specifications provided by Wireless Innovation Forum |

**Table 5-2 The values of TestCategory in Test ID**

| Value | Description |
|-------|-------------|
| FT | This test is a functional test |
| IT | This test is an interoperability test |
| PT | This test is a performance test |

**Table 5-3 The values of UnitUnderTest in Test ID**

| Value | Unit under test |
|-------|-----------------|
| S | SAS |
| C | CBSD/DP |
| E | ESC |
| SC | SAS and CBSD |
| SS | SAS and SAS |

**Table 5-4 The values of TestFunction in Test ID**

| Value | Description |
|-------|-------------|
| EXZ | Exclusion Zone enforcement test |
| REG | CBSD Registration procedure |
| SIQ | CBSD Spectrum inquiry procedure |

| GRA | CBSD Grant procedure |
|-----|-----|
| HBT | CBSD Heartbeat procedure |
| MES | CBSD Measurement report |
| RLQ | CBSD Grant Relinquishment procedure |
| DRG | CBSD Deregistration procedure |
| SCS | SAS-CBSD Security validation |
| EPR | ESC Protection |
| IPR | Federal Incumbent Protection |
| FPR | FSS Protection |
| GPR | GWPZ Protection |
| PPR | PPA Protection |
| MCP | Multi-Constraint Protection |
| BPR | Border Protection |
| PCR | PPA Creation |
| FDB | Federal Government Database |
| WDB | WINNF Database |
| PAT | Propagation Model and Antenna gain |
| SSS | SAS-SAS Security, Authentication and Encryption Protocols |
| FAD | Full Activity Dump Message |
| FCE | Feature Capability Exchange |
| EGH | Enhanced CBSD Group Handling |
| EAP | Enhanced Antenna Pattern |
| CPE | CPE-CBSD Indicator |

| PDG | Passive DAS Group |
|-----|-------------------|
| PSSFG | Principal-Subordinate Single Frequency Group |
| GRU | Grant Update |

**Table 5-5 The values of X in Test ID**

| Value | Description |
|-------|-------------|
| 2 | Release 2 |

## 5.2 Test Triggers

Different from Release 1 testing as specified in WINNF-TS-0061 [n.13], Release 2 NRI testing needs to be performed on per-feature basis. The sub-section "*Definition, Applicability, and Scope of the Test Case*" of section 6 defines test triggers for each feature.

It is assumed that SAS NRI UUT has already passed all the tests defined in [n.13] and has been certified by FCC for Release 1 CBRS operation.

## 5.3 Test Tools Required

In addition to test tools defined in [n.13], the following modules and functionality shall be used for the conformance tests specified in this document:

- Admin Test Harness
  - Ability to configure a SAS NRI UUT's operationally supported features that require re-registration (see section 6.2)
  - Ability to configure a SAS NRI UUT's operationally supported features that does not require re-registration (see section 6.2)
  - Ability to inject supported Group types and/or combinations of Group types and ID.
  - Ability to inject a list of unacceptable combinations of Group types and/or combinations of Group type and ID.
  - 
- As the Main NRI Test Harness software for testing NRI features is vendor-specific, the process and policies regarding test code development and test procedures are captured in [n.16].

## 5.4 Baseline State of the SAS NRI UUT

Unless explicitly stated otherwise as part of the test procedure, the SAS NRI UUT will be reset to the Baseline State at the beginning of every test case. Baseline State of SAS NRI UUT defined in [n.13] applies to the Baseline State of SAS NRI UUT. In addition to the data defined in [n.13], the following data shall be deleted by the Reset functionality:

- SAS's operationally supported features configured by Admin NRI Test Harness
- Other SAS's Feature Capability Records
- All CBSD feature capabilities.
- List of supported and non-supported Group types/IDs injected by Admin NRI Test Harness

## 5.5 Mapping between Test Cases and Release 2 Features

This section includes all the test cases required for ensuring the Protocol and Functional conformance of SAS NRI UUT to the specifications defined by WInnForum and directed by the requirements established by the FCC. The tables in this section identify and categorize the test cases for conformance testing.

All the test cases appearing in this document are NON-Regulatory Impacting (NRI).

Table 5.6 indicates the legend for test case classification in Table 5.7.

**Table 5-6: Test Case Classification (for Table 5.7)**

| | |
|---|---|
| REL2.M | Mandatory for WInnForum Release 2 Compliance |
| REL2.O | Optional. Not required for WInnForum Release 2 Compliance |
| REL2.C | Conditional.  Required to execute the test case if SAS NRI UUT supports relevant functionality.  See Table 5.7 for definition of conditional notation. |
| REL2.D | Deprecated.  Test no longer required. |

Table 5.7 lists all test cases in this document and applicability to SAS with indication of compliance status (REL2.M/O/C – see Table 5-6). This table identifies all test cases required or optional to certify the conformance of a Release 2 SAS to a particular Release 2 feature.

**Table 5-7: Test Cases Required or Optional for Release 2 Features**

| Rel 2 Feature | Feature Reference Section | Test Case ID | Test Case Title | Section |
|---|---|---|---|---|
| Feature Capability Exchange [n.15], [n.11] | 6 [n.15] 6.2, 8.2, 8.3, 8.4, 8.5- 8.15 [n.11] | WINNF.PT.S.REL2.NRI.REG.1 | Array Multi-Step for a combination of Release 1 and Release 2 CBSDs | 6.1.4.1 |
| | | WINNF.PT.S.REL2.NRI.REG.2 | Array Single-Step Registration for a combination of Release 1 and Release 2 CBSDs | 6.1.4.2 |
| | | WINNF.PT.S.REL2.NRI.REG.3 | Invalid cbsdFeatureCapabilityList in Array Registration Request (responseCode 103) | 6.1.4.3 |
| | | WINNF.PT.S.REL2.NRI.REG.4 | [Configurable] CBSD Feature Capability List cbsdFeatureCapabilityList exchange | 6.1.4.4 |
| | | Deprecated | | 6.2.4.1 |
| | | | | 6.2.4.2 |
| | | | | 6.2.4.3 |
| Enhanced CBSD Group Handling [n.15] WF_ENH_GROUP_HANDLING [n.11] | Annex 1, [n.15], 6.3, 8, [n.11] | WINNF.PT.S.REL2.NRI.EGH.1 | Release 2 CBSDs exchange messages with Group types that are supported and not supported by SAS | 6.3.4.1 |
| | | Deprecated | | 6.3.4.2 |
| | | WINNF.PT.S.REL2.NRI.EGH.3 | Release 2 CBSD changes the Group it belongs to on the messages | 6.3.4.3 |
| | | Deprecated | | 6.3.4.4 |
| | | WINNF.PT.S.REL2.NRI.EGH.5 | Release 1 based Grouping Information Exchange with Release 1 CBSD and Release 2 CBSD not supporting Enhanced CBSD Group Handling feature | 6.3.4.5 |
| | | WINNF.PT.S.REL2.NRI.EGH.6 | Release 2 CBSDs send incomplete groupingParam parameter | 6.3.4.6 |

| | | | | |
|---|---|---|---|---|
| Enhanced Antenna Patterns [n.15], WF_ENH_ANTENNA_PATTERN [n.11] | Annex 5, [n.15], 6.4, 8.2-8.3, [n.11] | WINNF.FT.S.REL2.NRI.EAP.1 | Antenna gain calculation using the release 2 EAP methods | 6.4.4.1 |
| | | Deprecated | | 6.4.4.2 |
| | | Deprecated | | 6.4.4.3 |
| | | Deprecated | | 6.4.4.4 |
| CPE-CBSD Indicator WF_CPE_CBSD_INDICATOR [n.11] | Annex 6, [n.15], 6.5, 8.2-8.3, [n.11] | WINNF.PT.S.REL2.NRI.CPE.1 | Registration and Feature Capability Exchange of Release 2 CBSDs supporting the CPE CBSD Indicator feature | 6.5.4.1 |
| Passive DAS [n.15] PASSIVE_DAS [n.14] | Annex 7, [n.15], 6.5 [n.14] | All test cases required for conformance to "Enhanced CBSD Group Handling [n.15], WF_ENH_GROUP_HANDLING [n.11]" | | |
| | | WINNF.FT.S.REL2.NRI.PDG.1 | [Configurable] Spectrum Assignment to CBSDs in a Passive DAS Group | 6.6.4.1 |
| Principal-Subordinate Single Frequency Group (SFG) [n.15] | Annex 2, [n.15], | All test cases required for conformance to "Enhanced CBSD Group Handling [n.15], WF_ENH_GROUP_HANDLING [n.11]" | | |

| PRINCIPAL_SUBORDINATE_SFG [n.14] | 6.3.1 [n.14] | WINNF.FT.S.REL2.NRI.PSSFG.1 | Frequency Assignment and Reassignment for CBSDs in a Principal Subordinate Single Frequency Group | 6.7.4.1 |
|---|---|---|---|---|
| Feature Capability Exchange [n.15], [n.12] | 6, [n.15] 7.1, [n.12] | WINNF.PT.S.REL2.NRI.FAD.1 | [Configurable] SAS NRI UUT Response to a Full Activity Dump Pull Request | 7.1.4.1 |
| | | WINNF.PT.S.REL2.NRI.FAD.2 | [Configurable] Full Activity Dump Pull Command by SAS NRI UUT | 7.1.4.2 |

# 6 SAS-CBSD Interface Conformance Test Specifications

This Section includes all test cases required to ensure the SAS-CBSD interface conforms to the specifications defined by WInnForum for Release 2.

## 6.1 CBSD Registration Procedure

### 6.1.1 Definition, Applicability, and Scope of the Test Case

This section provides test steps, conditions, and procedures to test the conformance of SAS Release 2 implementation of CBSD Registration Procedure.

### 6.1.2 Test Characteristics

**Table 6-1: CBSD Registration Procedure Test Characteristics**

| 1 | **Test ID** | WINNF.PT.S.REL2.NRI.REG |
|---|---|---|
| 2 | **Title** | CBSD Registration Procedure |
| 3 | **Working Group / Entity** | WG3 |
| 4 | **Test Type** | Protocol |
| 5 | **Test Class** | Certification |
| 6 | **Component / Interface** | SAS / CBSD ← → SAS |
| 7 | **Target Specification** | [n.4, n.11] |

### 6.1.3 Method of test

6.1.3.1  Initial Conditions / Test Pre-conditions

1. All the message exchanges between the SAS NRI UUT and the CBSD/DP NRI Test Harness shall be done by using HTTPS.
2. Unless otherwise specified, CBSDs registered in the course of a test case are assumed to have their FCC IDs and user IDs already whitelisted by the SAS NRI UUT.
3. The SAS NRI UUT must be reset at the beginning of each test case to a baseline state.

### 6.1.4   Test Procedure

#### 6.1.4.1   [WINNF.PT.S.REL2.NRI.REG.1] Array Multi-Step Registration for a combination of Release 1 and Release 2 CBSDs

| Step | Instructions |
|---|---|
| 1 | Ensure no *cbsdId* exists in the SAS for the CBSDs being tested. All REG-Conditional parameters for the three CBSDs (a combination of both Cat A and Cat B) shall already be pre-loaded into the SAS.<br>SAS Administrator configures Admin NRI Test Harness with the SAS Operationally-Supported FIDs offline. |
| 2 | Ensure that the DP NRI Test Harness (containing both Cat A and Cat B CBSDs) sends correct Registration Request in the form of one 3-element Array to the SAS: valid *userId*, *fccId*, *cbsdSerialNumber*, and:<br>• For at least one CBSD, c*bsdFeatureCapabilityList\** is included<br>• For at least one CBSD, c*bsdFeatureCapabilityList\** is missing |
| CHECK | SAS NRI UUT approves the request by sending a CBSD Registration Response in the form of one 3-element Array to the DP NRI Test Harness as follows:<br>• SAS response includes a valid *cbsdId* for each CBSD.<br>• The *responseCode* parameter contained in the *response* parameter is 0 for each CBSD concluding an approved Registration<br>• SAS response for CBSDs that included c*bsdFeatureCapabilityList\** in their requests in Step 2, shall contain *sasFeatureCapabilityList* parameter with one or more SAS Operationally-Supported valid FIDs (FID_1, FID_2, etc), or with one set to [] (for zero FID).<br>• SAS response for CBSDs that did not include c*bsdFeatureCapabilityList\** in their requests in Step 2, shall not contain *sasFeatureCapabilityList* parameter<br><br>*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it PASSES* |

### 6.1.4.2 [WINNF.PT.S.REL2.NRI.REG.2] Array Single-Step Registration for CBSDs (Cat A and Cat B)

| Step | Instructions |
|------|-------------|
| 1 | Ensure no *cbsdId* exists in the SAS for the CBSDs being tested. Ensure that information about a CPI is loaded into the SAS. Use the same CPI information for Step 2.<br>SAS Administrator configures Admin NRI Test Harness with the SAS Operationally-Supported FIDs offline. |
| 2 | Ensure the DP NRI Test Harness (containing two Cat A and two Cat B CBSDs) sends correct Registration Request in the form of one 4-element Array to the SAS: valid *userId*, *fccId*, *cbsdSerialNumber*, and c*bsdFeatureCapabilityList\**, plus all REG-Conditional parameters for Cat A CBSDs. Additionally, for Cat B CBSDs, ensure that:<br>• All REG-Conditional parameters are included except *installationParam* outside *cpiSignatureData*.<br>• For one CBSD, *cbsdFeatureCapabilityList\** is included<br>• For one CBSD, c*bsdFeatureCapabilityList\** is missing |
| CHECK | SAS NRI UUT approves the request by sending a CBSD Registration Response in the form of one 4-element Array to the DP NRI Test Harness as follows:<br>• SAS response includes a valid *cbsdId* for each CBSD.<br>• The *responseCode* parameter contained in the *response* parameter is 0 for each CBSD concluding an approved Registration<br>• SAS response for CBSDs that included c*bsdFeatureCapabilityList\** in their requests in Step 2, shall contain *sasFeatureCapabilityList* parameter with one or more SAS Operationally-Supported valid FIDs (FID_1, FID_2, etc), or with one set to [] (for zero FID).<br>• SAS response for CBSDs that did not include *cbsdFeatureCapabilityList\** in their requests in Step 2, shall not contain *sasFeatureCapabilityList* parameter<br><br>*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it PASSES* |

### 6.1.4.3 [WINNF.PT.S.REL2.NRI.REG.3] Invalid cbsdFeatureCapabilityList in Array Registration Request (responseCode 103)

| Step | Instructions |
|------|-------------|
| 1 | Ensure no *cbsdId* exists in the SAS for the CBSDs being tested. All REG-Conditional parameters for two CBSDs shall already be pre-loaded into the SAS.<br>SAS Administrator configures Admin NRI Test Harness with the SAS Operationally-Supported FIDs offline. |
| 2 | Ensure that the DP NRI Test Harness sends a Multi-Step Registration Request in the form of one 2-element Array to the SAS with the following conditions:<br>• valid *userId*, *fccId*, *cbsdSerialNumber*, and c*bsdFeatureCapabilityList*, for the first CBSD<br>• valid *userId*, *fccId*, and *cbsdSerialNumber*, but a wrongly-formatted c*bsdFeatureCapabilityList* for the second CBSD. Examples of a wrongly-formatted *cbsdFeatureCapabilityList* are providing Boolean not an array, or a nested array |
| CHECK | SAS NRI UUT sends a CBSD Registration Response in the form of one 2-element Array to the DP NRI Test Harness as follows:<br>• SAS response includes a valid *cbsdId* for the first CBSD.<br>• SAS response for the first CBSD shall contain *sasFeatureCapabilityList* parameter with one or more SAS Operationally-Supported valid FIDs (FID_1, FID_2, etc), or with one set to [] (for zero FID).<br>• The *responseCode* parameter contained in the *response* parameter is 0 for the first CBSD concluding an approved Registration<br>• The *responseCode* parameter contained in the *response* parameter is 103 for the second CBSD, concluding failed Registrations.<br><br>*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it PASSES.* |

### 6.1.4.4 [WINNF.PT.S.REL2.NRI.REG.4] [Configurable] CBSD Feature Capability List cbsdFeatureCapabilityList exchange

This configurable test covers tests for both single-step and multi-step Registration (and pending Registrations) for CBSDs (Cat A and/or Cat B) with no existing cbsdId, and with varying combinations of supported, missing, and invalid required parameters, and Reg Conditional parameters, as specified in input configuration files. All Registration Requests shall include cbsdFeatureCapabilityList parameter. The test will check the number of and value of the SAS NRI UUT responseCode(s) to verify if they match the expected respondCode(s) as specified in the respective input configuration file.

| Step | Instructions |
|------|-------------|
| 1 | Configure the SAS NRI UUT to whitelist N1 >= 0 FCC IDs and N2 >= 0 user IDs. |
| 2 | Pre-load the SAS NRI UUT with conditional Registration data for N3 >= 0 CBSDs. SAS Administrator configures Admin NRI Test Harness with the SAS Operationally-Supported FIDs offline. |
| 3 | Using a DP NRI Test Harness, send a Registration Request Message for N4 > 0 CBSDs to the SAS NRI UUT. The Registration Request Message shall: <ul><li>Be syntactically correct according to the SAS-CBSD specification but need not meet all application-level requirements (e.g. required fields may be missing).</li><li>contain *cbsdFeatureCapabilityList* parameter with one set to [] (for zero FID), or one with one or more supported FIDs (FID_1, FID_2, etc)</li></ul> |
| CHECK | The SAS response to the Registration Request Message must satisfy all of the following conditions: <ul><li>The response shall contain N4 *RegistrationResponse* objects.</li><li>For each *RegistrationResponse* object:<ul><li>The *responseCode* parameter contained in the *response* parameter shall match the corresponding expected response code listed in the configuration file.</li><li>If *responseCode* == SUCCESS:<ul><li>verify that the response contains a valid *cbsdId*.</li><li>verify *sasFeatureCapabilityList* is included with SAS Operationally-Supported valid FIDs (FID_1, FID_2, etc), or with one set to [] (for zero FID).</li></ul></li><li>If *responseCode* == FAILURE, verify that the response does *not* contain a *cbsdId*.</li></ul></li></ul> *If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it PASSES.* |

## 6.2 Deprecated

*Note: This section was deprecated in V1.1.0 of this technical specification. Any Release 2 certified SAS against the previous version (i.e., V1.0.0) of this technical specification will not be affected by this change.*

## 6.3 Enhanced CBSD Group Handling Procedure

### 6.3.1 Definition, Applicability, and Scope of the Test Case

This section provides test steps, conditions, and procedures to test the conformance of a SAS that supports the Release 2 feature Enhanced CBSD Group Handling (FID: WF_ENH_GROUP_HANDLING). The section also includes test cases that tests the backward compatibility of a Release 2 SAS, supporting EGH, to support grouping information provided by Release 1 CBSDs.

### 6.3.2 Test Characteristics

**Table 6-2: Enhanced CBSD Group Handling Procedure Test Characteristics**

| 1 | Test ID | WINNF.PT.S.REL2.NRI.EGH |
|---|---|---|
| 2 | Title | Enhanced CBSD Group Handling |
| 3 | Working Group / Entity | WG3 |
| 4 | Test Type | Protocol |
| 5 | Test Class | Certification |
| 6 | Component / Interface | SAS / CBSD ← → SAS |
| 7 | Target Specification | [n.4, n.11] |

### 6.3.3 Method of test

#### 6.3.3.1 Initial Conditions / Test Pre-conditions

1. All the message exchanges between the SAS NRI UUT and the CBSD/DP NRI Test Harness shall be done by using HTTPS.
2. Unless otherwise specified, CBSDs registered in the course of a test case are assumed to have their FCC IDs and user IDs already whitelisted by the SAS NRI UUT.
3. The SAS NRI UUT must be reset at the beginning of each test case to a baseline state.

### 6.3.4   Test Procedure

#### 6.3.4.1   [WINNF.PT.S.REL2.NRI.EGH.1]: Release 2 CBSDs exchange messages with Group types that are supported and not supported by SAS

This test case aims to test the conformance of a Release 2 SAS to successfully exchange messages consisting Grouping information with a Release 2 CBSD.  The Group membership for the CBSDs would be a mix of SAS supported and not supported Group Types, where not supported Group Types may include non-standard Group types which are not captured in WINNF-SSC-0010 [n.14]. In this test case, contents of *groupConfigInfo* parameter, which is optionally be returned by the SAS NRI UUT, will not be tested.

| Step | Instructions |
|------|-------------|
| 1 | • Ensure that no *cbsdId* nor *grantId* for the 4 CBSDs being tested exists in the SAS.<br>• All REG-Conditional parameters for the CBSDs shall already be pre-loaded into the SAS NRI UUT.<br>• Ensure that no Protected Entity is present.<br>• The SAS Administrator configures Admin NRI Test Harness with the Group Types supported by the SAS NRI UUT.<br>    o Let the set of supported Group types and/or a combination of Group types and IDs be $L_{Supported}$.<br>    o Let the group types be denoted as $G_1$, $G_2$, $G_3$, and $G_4$.<br>    o For only the purpose of this test case, $G_1$, $G_2$ and $G_3$ and their Group IDs (to be denoted as $GID_{xy}$ in the subsequent steps) shall be included in $L_{Supported}$.<br>• In addition, if necessary, the SAS Administrator configures Admin NRI Test Harness with the list of its unacceptable combinations of different Group types and/or IDs. Let this list be denoted as $L_{Unacceptable}$. Otherwise, the list would be empty.<br>• Supported Group types as registered in WINNF-SSC-0010 [n.14], provisioned by the SAS NRI UUT |
| 2 | The  CBSD/DP NRI Test Harness sends Registration Requests for the 4 CBSDs to the SAS NRI UUT, , where each of *RegistrationRequest* objects is configured as follows:<br>•<br>For CBSD1:<br>• *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING<br>• *groupingParam* is an array of objects consisting of only one *GroupParam* object, where the *GroupParam* object is configured as follows:<br>    o *groupType* is set to $G_1$<br>    o *groupId* is set to $GID_{11}$ |

- All other parameters of the *RegistrationRequest* object are in proper format and within acceptable ranges.


For CBSD2:

- *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING
- *groupingParam* is an array of objects consisting of only one *GroupParam* object, where the *GroupParam* object is configured as follows:
- 
    - *groupType* is set to $G_2$
    - *groupId* is set to $GID_{24}$
- All other parameters of the *RegistrationRequest* object are in proper format and within acceptable ranges.


For CBSD3:

- *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING
- *groupingParam* is an array of objects consisting of two *GroupParam* objects, where each *GroupParam* object is configured as follows:
    - *GroupParam Object 1: groupType* is set to $G_2$ and *groupId* is set to $GID_{32}$
    - *GroupParam Object 2: groupType* is set to $G_3$ and *groupId* is set to $GID_{33}$
- All other parameters of the *RegistrationRequest* object are in proper format and within acceptable ranges.


For CBSD4:

- *cbsdFeatureCapabilityList* does **NOT** include the FID: WF_ENH_GROUP_HANDLING
- *groupingParam* is an array of objects consisting of only one *GroupParam* object, where the *GroupParam* object is configured as follows:
    - *groupType* is set to $G_2$
    - *groupId* is set to $GID_{42}$
- All other parameters of the *RegistrationRequest* object are in proper format and within acceptable ranges.

| CHECK #1 | SAS NRI UUT returns a Registration Response Message, where each of *RegistrationResponse* objects is configured as follows: <br> • For CBSD 1 <br>  o *cbsdId:* |
| --- | --- |

- ▪ Shall be included.
  - o *sasFeatureCapabilityList:*
    - ▪ Shall be included with at least "WF_ENH_GROUP_HANDLING";
  - o *groupingConfig* parameter includes at least one *GroupConfig* object for Group Type $G_1$, where:
    - ▪ *groupType* is set to $G_1$
    - ▪ *groupId* is set to $GID_{11}$
    - ▪ *supportedBySas* = true.
    - ▪ *groupConfigInfo* may optionally be included.
    - ▪
  - o *responseCode:*
    - ▪ 0 (SUCCESS)
- • For CBSD 2:
  - o *cbsdId:*
    - ▪ Shall be included if *responseCode* = 0 (SUCCESS);
    - ▪ Otherwise not included.
  - o *sasFeatureCapabilityList:*
    - ▪ Shall be included and set to the array containing at least "WF_ENH_GROUP_HANDLING" if responseCode = 0 (SUCCESS);
  - o *groupingConfig* parameter including one *GroupConfig* object for Group Type $G_2$ shall be included and configured as follows:
    - ▪ *groupType* is set to $G_4$
    - ▪ *groupId* is set to $GID_{24}$
    - ▪ *supportedBySas = false.*
    - ▪ *groupConfigInfo parameter is NOT included.*
  - o *responseCode:*
    - ▪ 0 (SUCCESS) or 201 (GROUP_ERROR)
  - o *responseData:*
    - ▪ Included with PARAM_WARNING if *responseCode* = 0 (SUCCESS).

- • For CBSD 3:
  - o *cbsdId:*
    - ▪ Shall be included if *responseCode* = 0 (SUCCESS);
    - ▪ Otherwise not included.
  - o *sasFeatureCapabilityList:*
    - ▪ Shall be included with at least "WF_ENH_GROUP_HANDLING" if *responseCode* = 0 (SUCCESS);

- o Includes *groupingConfig* parameter with two *GroupConfig* objects :
    - ▪ *GroupConfig* Object 1
        - • *groupType* is set to the G$_2$
        - • *groupId* is set to a *GID$_{32}$*
        - • *supportedBySas = true.*
        - • *groupConfigInfo may optionally be included.*
        - •
    - ▪ *GroupConfig* Object 2
        - • *groupType* is set to G$_3$
        - • *groupId* is set to *GID$_{33}$*
        - • *supportedBySas = true.*
        - • *groupConfigInfo may optionally be included.*
        - •
- o *responseCode:*
    - ▪ 0 (SUCCESS) or 201 (GROUP_ERROR)
- o *responseData:*
    - ▪ Included with MULTI_GROUP_HANDLING_WARNING" if *responseCode* = 0 (SUCCESS) and *L$_{Unacceptable}$* includes the following combinations:
        - • G$_2$ and G$_3$;
        - • G$_2$ + *GID$_{32}$* and G$_3$;
        - • G$_2$ and G$_3$ + *GID$_{33}$*;
        - • G2 + GID32 and G3 + GID33;

- • For CBSD 4
    - o Does not include a *cbsdId*
    - o The *responseCode* parameter is 103 (INVALID_VALUE) or 201 (GROUP_ERROR) indicating a rejected Registration

*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 2 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, proceed to the next step*

| 3 | The CBSD/DP NRI Test Harness sends a Spectrum Inquiry Request for the CBSDs registered in step 2, where each of *SpectrumInquiryRequest* objects is configured as follows:<br><br>•<br>For CBSD1:<br><br>• *groupingParam* is an array of objects containing only one *GroupParam* object, where the *GroupParam* object is configured as follows: |
|---|---|

- $groupType$ is set to $G_1$
- $groupId$ is set to $GID_{11}$
- All other parameters of the *SpectrumInquiryRequest* object are in proper format and within acceptable ranges.
-

For CBSD2 (Included if *responseCode* = 0 in CHECK#1):

- *groupingParam* is an array of objects containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:
- 
  - $groupType$ is set to $G_2$
  - $groupId$ is set to $GID_{22}$
- *All other parameters of the SpectrumInquiryRequest object are in proper format and within acceptable ranges.*

For CBSD3 (Included if *responseCode* = 0 in CHECK#1)::

- *groupingParam* is an array of objects containing two *GroupParam* objects, where each *GroupParam* object is configured as follows:
  - *GroupParam Object 1: groupType* is set to $G_2$ and *groupId* is set to $GID_{32}$
  - *GroupParam Object 2: groupType* is set to $G_3$ and *groupId* is set to $GID_{33}$
- All other parameters of the *SpectrumInquiryRequest* object are in proper format and within acceptable ranges.

| | |
|---|---|
| CHECK #2 | SAS NRI UUT returns a Spectrum Inquiry Response Message, where each of *SpectrumInquiryResponse* objects is configured as follows:<br><br>- For CBSD 1<br>  - *cbsdId*: Included with valid value.<br>  - *availableChannel*: Included<br>  - *responseCode*: 0 (SUCCESS)<br>  - *groupingConfig* parameter includes at least one *GroupConfig* object for Group Type $G_1$, where:<br>    - *groupType* is set to $G_1$<br>    - *groupId* is set to $GID_{11}$<br>    - *supportedBySas* = true.<br>    - *groupConfigInfo* may optionally be included.<br>- For CBSD 2 (if *SpectrumInquiryRequest* for CBSD 2 was sent to the SAS NRI UUT in the step 3) |

- o *cbsdId*: Included with valid value.
- o *availableChannel*: Included
- o *responseCode*: 0 (SUCCESS)
- o *groupingConfig* parameter includes at least one *GroupConfig* object for Group Type $G_1$, where:
  - *groupType* is set to $G_2$
  - *groupId* is set to $GID_{22}$
  - *supportedBySas* = true.
  - *groupConfigInfo* may optionally be included.

- For CBSD 3 (if *SpectrumInquiryRequest* for CBSD 3 was sent to the SAS NRI UUT in the step 3)
  - o *cbsdId*: Included with valid value.
  - o *availableChannel*: Included
  - o Includes *groupingConfig* parameter with two *GroupConfig* objects :
    - *GroupConfig* Object 1
      - *groupType* is set to the $G_2$
      - *groupId* is set to $GID_{32}$
      - *supportedBySas* = true.
      - *groupConfigInfo* may optionally be included.
    - *GroupConfig* Object 2
      - *groupType* is set to $G_3$
      - *groupId* is set to $GID_{33}$
      - *supportedBySas* = true.
      - *groupConfigInfo* may optionally be included.
  - o *responseCode:*
    - 0 (SUCCESS) or 105 (DEREGISTER)
  - o *responseData*:
    - Included with MULTI_GROUP_HANDLING_WARNING" if *responseCode* = 0 (SUCCESS) and $L_{Unacceptable}$ includes the following combinations:
      - $G_2$ and $G_3$;
      - $G_2 + GID_{32}$ and $G_3$;
      - $G_2$ and $G_3 + GID_{33}$;
      - $G_2 + GID_{32}$ and $G_3 + GID_{33}$;

*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 3 shall*

| | |
|---|---|
| | *be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned.Otherwise, proceed to the next step* |
| 4 | The CBSD/DP NRI Test Harness sends a Grant Request message for CBSDs registered in Step 2, where each of *GrantRequest* objects is configured as follows:<br><br>For CBSD1:<br><br>    ○ *groupingParam* is an array of objects containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:*groupType* is set to $G_1$<br>    ○ *groupId* is set to $GID_{11}$<br>  • All other parameters of the *GrantRequest* object are in proper format and within acceptable ranges.<br><br>For CBSD2 (Included if *responseCode* = 0 in CHECK#1):<br>  • *groupingParam* is an array of objects containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:<br>    ○ *groupType* is set to $G_2$<br>    ○ *groupId* is set to $GID_{22}$<br>  • All other parameters of the *GrantRequest* object are in proper format and within acceptable ranges.<br><br>For CBSD3 (Included if *responseCode* = 0 in CHECK#2):<br>  • *groupingParam* is an array of objects containing two *GroupParam* objects, where each *GroupParam* object is configured as follows:<br>    ○ *GroupParam Object 1: groupType* is set to $G_2$ and *groupId* is set to $GID_{32}$<br>    ○ *GroupParam Object 2: groupType* is set to $G_3$ and *groupId* is set to $GID_{33}$<br>  • All other parameters of the *GrantRequest* object are in proper format and within acceptable ranges.<br>    ○ |
| CHECK #3 | SAS NRI UUT returns a Grant Response Message, where each of *GrantResponse* objects is configured as follows:<br>• For CBSD 1<br>  ○ *cbsdId*: Included with valid value.<br>  ○ *grantId*: Included with valid value.<br>  ○ *responseCode*: 0 (SUCCESS)<br>  ○ *groupingConfig* parameter includes at least one *GroupConfig* object for Group Type $G_1$, where:<br>    ▪ *groupType* is set to $G_1$ |

- ▪ *groupId* is set to $GID_{11}$
  - ▪ *supportedBySas* = true.
  - ▪ *groupConfigInfo* may optionally be included.
- For CBSD 2 (if GrantRequest for CBSD 2 was sent to the SAS NRI UUT in the step 4)
  - ○ *cbsdId*: Included with valid value.
  - ○ *grantId*: Included with valid value.
  - ○ *responseCode*: 0 (SUCCESS)
  - ○ *groupingConfig* parameter includes at least one *GroupConfig* object for Group Type $G_2$, where:
    - ▪ *groupType* is set to $G_2$
    - ▪ *groupId* is set to $GID_{22}$
    - ▪ *supportedBySas* = true.
    - ▪ *groupConfigInfo* may optionally be included.
- For CBSD 3 (if GrantRequest for CBSD 3 was sent to the SAS NRI UUT in the step 4)
  - ○ *cbsdId*: Included with valid value.
  - ○ *grantId*: Included with valid value.
  - ○ Includes *groupingConfig* parameter with two *GroupConfig* objects :
    - ▪ *GroupConfig* Object 1
      - • *groupType* is set to the $G_2$
      - • *groupId* is set to $GID_{32}$
      - • *supportedBySas* = true.
      - • *groupConfigInfo* may optionally be included.
    - ▪ *GroupConfig* Object 2
      - • *groupType* is set to $G_3$
      - • *groupId* is set to $GID_{33}$
      - • *supportedBySas* = true.
      - • *groupConfigInfo* may optionally be included.
  - ○ *responseCode:*
    - ▪ 0 (SUCCESS) or 105 (DEREGISTER)
  - ○ *responseData*:
    - ▪ Included with MULTI_GROUP_HANDLING_WARNING" if *responseCode* = 0 (SUCCESS) and $L_{Unacceptable}$ includes the following combinations:
      - • $G_2$ and $G_3$;

|   |   |
|---|---|
|   | • G$_2$ + *GID*$_{32}$ and G$_3$; <br> • G$_2$ and G$_3$ + *GID*$_{33}$; <br> • G2 + GID32 and G3 + GID33; <br><br> *If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 4 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, proceed to the next step* |
| 5 | The CBSD/DP NRI Test Harness sends a Heartbeat Request Message for the CBSDs having a Grant as per CHECK#3, where each of *HeartbeatRequest* objects is configured as follows <br><br> For CBSD1: <br><br> • *groupingParam* is an array of objects containing only one *GroupParam* object, where the *GroupParam* object is configured as follows: <br>     o *groupType* is set to G$_1$ <br>     o *groupId* is set to *GID*$_{11}$ <br> • All other parameters of the *HeartbeatRequest* object are in proper format and within acceptable ranges. <br><br> For CBSD2 (Included if *responseCode* = 0 in CHECK#1): <br><br> • *groupingParam* is an array of objects containing only one *GroupParam* object, where the *GroupParam* object is configured as follows: <br>     o *groupType* is set to G$_2$ <br>     o *groupId* is set to *GID*$_{22}$ <br> • All other parameters of the *HeartbeatRequest* object are in proper format and within acceptable ranges. <br><br> For CBSD3 (Included if *responseCode* = 0 in CHECK#3): <br><br> • *groupingParam* is an array of objects containing two *GroupParam* objects, where each *GroupParam* object is configured as follows: <br>     o *GroupParam Object 1: groupType* is set to G$_2$ and *groupId* is set to *GID*$_{32}$ <br>     o *GroupParam Object 2: groupType* is set to G$_3$ and *groupId* is set to *GID*$_{33}$ <br>     o All other parameters of the *HeartbeatRequest* object are in proper format and within acceptable ranges. |
| CHECK #4 | SAS NRI UUT returns a Heartbeat Response Message, where each of *HeartbeatResponse* objects is configured as follows: <br><br> • For CBSD 1 <br>     o *cbsdId*: Included with valid value. <br>     o *grantId*: Included with valid value. |

- o *responseCode*: 0 (SUCCESS) or 501 (SUSPENDED_GRANT)
- o *grantExpireTime* is set to UTC time greater than duration of the test
- o *groupingConfig* parameter includes at least one *GroupConfig* object for Group Type $G_1$, where:
  - *groupType* is set to $G_1$
  - *groupId* is set to $GID_{11}$
  - *supportedBySas* = true.
  - *groupConfigInfo* may optionally be included.
- For CBSD 2 (if HeartbeatRequest for CBSD 2 was sent to the SAS NRI UUT in the step 5)
  - o *cbsdId*: Included with valid value.
  - o *grantId*: Included with valid value.
  - o *responseCode*: 0 (SUCCESS) or 501 (SUSPENDED_GRANT)
  - o *grantExpireTime* is set to UTC time greater than duration of the test
  - o *groupingConfig* parameter includes at least one *GroupConfig* object for Group Type $G_2$, where:
    - *groupType* is set to $G_2$
    - *groupId* is set to $GID_{22}$
    - *supportedBySas* = true.
    - *groupConfigInfo* may optionally be included.
- For CBSD 3 (if HeartbeatRequest for CBSD 3 was sent to the SAS NRI UUT in the step 5)
  - o *cbsdId*: Included with valid value.
  - o *grantId*: Included with valid value.
  - o *grantExpireTime* is set to UTC time greater than duration of the test
  - o Includes *groupingConfig* parameter with two *GroupConfig* objects :
    - *GroupConfig* Object 1
      - *groupType* is set to the $G_2$
      - *groupId* is set to $GID_{32}$
      - *supportedBySas* = true.
      - *groupConfigInfo* may optionally be included.
    - *GroupConfig* Object 2
      - *groupType* is set to $G_3$
      - *groupId* is set to $GID_{33}$
      - *supportedBySas* = true.

- *groupConfigInfo* may optionally be included.
  - *responseCode:*
    - 0 (SUCCESS), 501 (SUSPENDED_GRANT) or 105 (DEREGISTER)
  - *responseData*:
    - Included with MULTI_GROUP_HANDLING_WARNING" if *responseCode* = 0 (SUCCESS) and $L_{Unacceptable}$ includes the following combinations:
      - $G_2$ and $G_3$;
      - $G_2 + GID_{32}$ and $G_3$;
      - $G_2$ and $G_3 + GID_{33}$;

$G_2 + GID_{32}$ and $G_3 + GID_{33}$;

*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 2 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, it PASSES*

## 6.3.4.2 [WINNF.PT.S.REL2.NRI.EGH.2]: Deprecated

6.3.4.3 [WINNF.PT.S.REL2.NRI.EGH.3]: Release 2 CBSD changes the Group it belongs to on the messages

This test case aims to test the conformance of a Release 2 SAS when a Release 2 CBSD changes the Group that it declared that it belongs to, in the Registration Request message, on subsequent messages to the SAS.
- Group types supported by the SAS NRI UUT are denoted as G1 and G2.
- Group type unsupported by the SAS NRI UUT is denoted as G3.
- 9 CBSDs are emulated as described in Table 1 in order to check if the SAS NRI UUT appropriately responds to Group membership update in the procedures other than Registration.

**Table 6-3: CBSD Group Membership Declaration in Each Procedure**

|  | **Registration** | **Spectrum Inquiry** | **Grant** | **Heartbeat** |
|---|---|---|---|---|
| **CBSD 1** | G1 | G2 | *n/a* | *n/a* |
| **CBSD 2** | G1 | G1, G2 | *n/a* | *n/a* |
| **CBSD 3** | G1 | G1, G3 | *n/a* | *n/a* |
| **CBSD 4** | G1 | *n/a* | G2 | *n/a* |
| **CBSD 5** | G1 | *n/a* | G1, G2 | *n/a* |
| **CBSD 6** | G1 | *n/a* | G1, G3 | *n/a* |
| **CBSD 7** | G1 | *n/a* | G1 | G2 |
| **CBSD 8** | G1 | *n/a* | G1 | G1, G2 |
| **CBSD 9** | G1 | *n/a* | G1 | G1, G3 |
| NOTE 1: CBSDs 1-3 update their group membership in Spectrum Inquiry procedure, CBSDs 4-6 update theirs in Grant procedure, and CBSDs 7-9 update theirs in Heartbeat procedure. <br> NOTE 2: "*n/a*" indicates request message is not sent by the CBSD concerned <br> NOTE 3: "Disassociation" from a particular Group is not emulated because it is untestable for the SAS NRI UUT. | | | | |

| Step | Instructions |
|---|---|
| 1 | • Ensure that neither *cbsdId* nor *grantId* for the 9 CBSDs being tested exists in the SAS. <br> • All REG-Conditional parameters for the CBSDs shall already be pre-loaded into the SAS NRI UUT. <br> • Ensure that no Protected Entity is present such that any frequency range indicated in *inquiredSpectrum* (see step 3) is available and Grant requests are approved on GAA basis. <br> • The SAS Administrator configures Admin NRI Test Harness with the Group Types supported by the SAS NRI UUT. |

| | |
|---|---|
| | o Let the set of supported Group types and/or a combination of Group types and IDs be $L_{Supported}$. <br> o Let the group types used for this test case be denoted as $G_1$, $G_2$ and $G_3$ <br> o For only the purpose of this test case, $G_1$, $G_2$ and their Group IDs (to be denoted as $GID_{xy}$ in the subsequent steps) are included in $L_{Supported}$. <br> • |
| 2 | The CBSD/DP NRI Test Harness sends a Registration Request Message for the 9 CBSDs to the SAS NRI UUT, where each *RegistrationRequest* object is configured as follows: <br><br> For all CBSDs: <br><br> • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING <br><br> • *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows: <br><br>     o *groupType*: $G_1$ <br>     o *groupId*: $GID_1$ <br> • All other parameters are in proper format and within acceptable ranges. <br>     o |
| CHECK #1 | SAS NRI UUT returns a Registration Response Message, where each of RegistrationResponse objects is configured as follows: <br><br> • <br> • For all CBSDs: <br>     o *cbsdId: Included and set to the valid value.* <br>     o *sasFeatureCapabilityList*: Included and set to the array containing at least the FID "WF_ENH_GROUP_HANDLING"; <br>     o *groupingConfig* parameter includes at least one *GroupConfig* object for Group Type $G_1$, where: <br>        ▪ *groupType* is set to $G_1$ <br>        ▪ *groupId* is set to $GID_1$ <br>        ▪ *supportedBySas* = true. <br>        ▪ *groupConfigInfo* may optionally be included. <br>     o *responseCode:* <br>        ▪ 0 (SUCCESS) <br><br> *If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 2 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, proceed to the next step* |

| 3 | The  CBSD/DP NRI Test Harness sends a Spectrum Inquiry Request for the CBSDs 1-3 where each *SpectrumInquiryRequest* object is configured as follows: |
|---|---|
|   | • For CBSD 1 (Change to new Group membership, which is supported by the SAS NRI UUT): |
|   |     o *cbsdId: Set to the valid value as provided by the SAS NRI UUT in the step 2* |
|   |     o *groupingParam is an array containing only one GroupParam object, where the GroupParam object is configured as follows:* |
|   |        ▪ *groupType: G2* |
|   |        ▪ *groupId: GID2* |
|   |     o *All other parameters in the SpectrumInquiryRequest object are in proper format and within acceptable ranges.* |
|   | • For CBSD 2 (Addition of new Group membership, which is supported by the SAS NRI UUT): |
|   |     o *cbsdId: Set to the valid value as provided by the SAS NRI UUT in the step 2* |
|   |     o *groupingParam is an array containing two GroupParam objects, where each GroupParam object is configured as follows:* |
|   |        ▪ *GroupParam object for Group G1:* |
|   |           • *groupType*: $G_1$ |
|   |           • *groupId*: $GID_1$ |
|   |        ▪ *GroupParam object for Group G2:* |
|   |           • *groupType: G2* |
|   |           • *groupId: GID2* |
|   |     o All other parameters in the *SpectrumInquiryRequest object are in proper format and within acceptable ranges.* |
|   | • For CBSD 3 (Addition of new Group membership, which is NOT supported by the SAS NRI UUT): |
|   |     o *cbsdId: Set to the valid value as provided by the SAS NRI UUT in the step 2* |
|   |     o *groupingParam is an array containing two GroupParam objects, where each GroupParam object is configured as follows:* |
|   |        ▪ *GroupParam object for Group G1:* |
|   |           • *groupType: G1* |
|   |           • *groupId: GID1* |
|   |        ▪ *GroupParam object for Group G3:* |
|   |           • *groupType: G3* |
|   |           • *groupId: GID3* |

| | |
|---|---|
| | o *All other parameters in the SpectrumInquiryRequest object are in proper format and within acceptable ranges.*<br><br>• |
| CHECK #2 | SAS NRI UUT approves the request and sends a Spectrum Response as follows:<br><br>• CBSD 1<br> o *cbsdId*: Included and set to the valid value as received in step 3;<br> o *availableChannel*: Included.<br> o *groupingConfig*: Contains only one *GroupConfig* object configured as follows:<br>  ▪ *groupType*: G$_2$<br>  ▪ *groupId*: GID$_2$<br>  ▪ *supportedBySas*: true<br>  ▪ *groupConfigInfo*: May optionally be included;<br> o *responseCode*: 0 (SUCCESS)<br><br>• CBSD 2<br> o *cbsdId*: Included and set to the valid value as received in step 3<br> o *availableChannel*: Included<br> o *groupingConfig*: Contains two *GroupConfig* objects, each of which is configured as follows:<br>  ▪ *GroupParam* object for Group G1:<br>   • *groupType*: G$_1$<br>   • *groupId*: GID$_1$<br>   • *supportedBySas*: true<br>   • *groupConfigInfo*: may optionally be included;<br>  ▪ *GroupParam* object for Group G2:<br>   • *groupType*: G$_2$<br>   • *groupId*: GID$_2$<br>   • *supportedBySas*: true<br>   • *groupConfigInfo*: may optionally be included;<br> • *responseCode*: 0 (SUCCESS);<br><br>• CBSD 3<br> o *cbsdId*: Included and set to the valid value as received in step 3<br> o *availableChannel*:<br>  ▪ Included if *responseCode* = 0 (SUCCESS) |

- Otherwise not included.
  - o *groupingConfig*: Contains two *GroupConfig* objects, each of which is configured as follows:
    - *GroupParam* object for Group G1:
      - *groupType*: $G_1$
      - *groupId*: $GID_1$
      - *supportedBySas*: true
      - *groupConfigInfo*: may optionally be included;
    - *GroupParam* object for Group G3:
      - *groupType*: $G_3$
      - *groupId*: $GID_3$
      - *supportedBySas*: false
      - *groupConfigInfo*: Not included;
  - o *responseCode*: Either of the followings
    - 0 (SUCCESS) with *responseData* indicating "PARAM_WARNING"; or
    - 105 (DEREGISTER)

*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 3 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, proceed to the next step*

| 4 | The CBSD/DP NRI Test Harness sends a Grant Request message for CBSDs 4-9, where each *GrantRequest* object is configured as follows: |
|---|---|

- *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in the step 2
- *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:
  - o *groupType*: $G_2$
  - o *groupId*: $GID_2$
- All other parameters in the *GrantRequest* object are in proper format and within acceptable ranges.

For CBSD 5 (Addition of new Group membership, which is supported by the SAS NRI UUT):

- *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in the step 2
- *groupingParam* is an array containing two *GroupParam* objects, where each *GroupParam* object is configured as follows:
  - o *GroupParam* object for Group G1:

- - ▪ *groupType*: $G_1$
    - ▪ *groupId*: $GID_1$
  - o *GroupParam* object for Group G2:
    - ▪ *groupType*: $G_2$
    - ▪ *groupId*: $GID_2$
- All other parameters in the *GrantRequest* object are in proper format and within acceptable ranges.

For CBSD 6 (Addition of new Group membership, which is NOT supported by the SAS NRI UUT):

- *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in the step 2
- *groupingParam* is an array containing two *GroupParam* objects, where each *GroupParam* object is configured as follows:
  - o *GroupParam* object for Group G1:
    - ▪ *groupType*: $G_1$
    - ▪ *groupId*: $GID_1$
  - o *GroupParam* object for Group G3:
    - ▪ *groupType*: $G_3$
    - ▪ *groupId*: $GID_3$
- All other parameters in the *GrantRequest* object are in proper format and within acceptable ranges.

For CBSDs 7-9 (No change to Group membership):

- *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in the step 2
- *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:
  - o *groupType*: $G_1$
  - o *groupId*: $GID_1$
- All other parameters in the *GrantRequest* object are in proper format and within acceptable ranges.
- 

| CHECK #3 | SAS NRI UUT returns a Grant Response Message, where each *GrantResponse* object is configured as follows:<br><br>• CBSD 4:<br>   o *cbsdId*: Included and set to the valid value as received in step 3;<br>   o *grantId*: Included and set to the valid value.<br>   o *channelType*: GAA<br>   o *grantExpireTime*: UTC time greater than duration of the test<br>   o *heartbeatInterval*: Included with the valid value. |
|---|---|

- o *groupingConfig*: Contains only one *GroupConfig* object configured as follows:
  - *groupType*: $G_2$
  - *groupId*: $GID_2$
  - *supportedBySas*: true
  - *groupConfigInfo*: May optionally be included;
- o *responseCode*: 0 (SUCCESS)

- For CBSD 5:
  - o *cbsdId*: Included and set to the valid value as received in step 3
  - o *grantId*: Included and set to the valid value.
  - o *channelType*: GAA
  - o *grantExpireTime*: UTC time greater than duration of the test
  - o *heartbeatInterval*: Included with the valid value.
  - o *groupingConfig*: Contains two *GroupConfig* objects, each of which is configured as follows:
    - *GroupParam* object for Group G1:
      - *groupType*: $G_1$
      - *groupId*: $GID_1$
      - *supportedBySas*: true
      - *groupConfigInfo*: may optionally be included;
    - *GroupParam* object for Group G2:
      - *groupType*: $G_2$
      - *groupId*: $GID_2$
      - *supportedBySas*: true
      - *groupConfigInfo*: may optionally be included;
  - o *responseCode*: 0 (SUCCESS);

- For CBSD 6:
  - o *cbsdId*: Included and set to the valid value as received in step 3
  - o *grantId*:
    - Included and set to the valid value if *responseCode* = 0 (SUCCESS)
    - Otherwise not included.
  - o *channelType*:
    - Included and set to "GAA" if *responseCode* = 0 (SUCCESS)
    - Otherwise not included.

- o *grantExpireTime*: UTC time greater than duration of the test
  - Included and set to UTC time greater than duration of the test if *responseCode* = 0 (SUCCESS)
  - Otherwise not included.
- o *heartbeatInterval*:
  - Included and set to the valid value if *responseCode* = 0 (SUCCESS)
  - Otherwise not included.
- o *groupingConfig*: Contains two *GroupConfig* objects, each of which is configured as follows:
  - *GroupParam* object for Group G1:
    - *groupType*: $G_1$
    - *groupId*: $GID_1$
    - *supportedBySas*: true
    - *groupConfigInfo*: may optionally be included;
  - *GroupParam* object for Group G3:
    - *groupType*: $G_3$
    - *groupId*: $GID_3$
    - *supportedBySas*: false
    - *groupConfigInfo*: Not included;
- o *responseCode*: Either of the followings
  - 0 (SUCCESS) with *responseData* indicating "PARAM_WARNING"; or
  - 105 (DEREGISTER)

- For CBSDs 7-9:
  - o *cbsdId*: Included and set to the valid value as received in step 3;
  - o *grantId*: Included and set to the valid value.
  - o *channelType*: GAA
  - o *grantExpireTime*: UTC time greater than duration of the test
  - o *heartbeatInterval*: Included with the valid value.
  - o *groupingConfig*: Contains only one *GroupConfig* object configured as follows:
    - *groupType*: $G_1$
    - *groupId*: $GID_1$
    - *supportedBySas*: true
    - *groupConfigInfo*: May optionally be included;
  - *responseCode*: 0 (SUCCESS)

| | |
|---|---|
| | *If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 4 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, proceed to the next step* |
| 5 | The CBSD/DP NRI Test Harness sends a Heartbeat Request Message for the CBSDs 7-9, where each *HeartbeatRequest* object is configured as follows: <br> For CBSD 7 (Change to new Group membership, which is supported by the SAS NRI UUT): <br><br> • *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in the step 2 <br> • *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows: <br>     ○ *groupType*: $G_2$ <br>     ○ *groupId*: $GID_2$ <br> • All other parameters in the *HeartbeatRequest* object are in proper format and within acceptable ranges. <br><br> For CBSD 8 (Addition of new Group membership, which is supported by the SAS NRI UUT): <br><br> • *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in the step 2 <br> • *groupingParam* is an array containing two *GroupParam* objects, where each *GroupParam* object is configured as follows: <br>     ○ *GroupParam* object for Group G1: <br>        ▪ *groupType*: $G_1$ <br>        ▪ *groupId*: $GID_1$ <br>     ○ *GroupParam* object for Group G2: <br>        ▪ *groupType*: $G_2$ <br>        ▪ *groupId*: $GID_2$ <br> • All other parameters in the HeartbeatRequest object are in proper format and within acceptable ranges. <br><br> For CBSD 9 (Addition of new Group membership, which is NOT supported by the SAS NRI UUT): <br><br> • *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in the step 2 <br> • *groupingParam* is an array containing two *GroupParam* objects, where each *GroupParam* object is configured as follows: <br>     ○ *GroupParam* object for Group G1: <br>        ▪ *groupType*: $G_1$ <br>        ▪ *groupId*: $GID_1$ <br>     ○ *GroupParam* object for Group G3: <br>        ▪ *groupType*: $G_3$ <br>        ▪ *groupId*: $GID_3$ |

| | |
|---|---|
| | • All other parameters in the HeartbeatRequest object are in proper format and within acceptable ranges. <br><br> • |
| CHECK #4 | SAS NRI UUT returns a Heartbeat Response Message, where each *HeartbeatResponse* object is configured as follows: <br><br> • For CBSD 7: <br>    o *cbsdId*: Included and set to the valid value as received in step 5; <br>    o *grantId*: Included and set to the valid value as received in step 5. <br>    o *transmitExpireTime*: <br>      ▪ If *responseCode* = 0 (SUCCESS), included and set to the valid UTC time in the future, not later than 240 seconds in the future and not later than the *grantExpireTime*. <br>      ▪ If *responseCode* = 501 (SUSPENDED_GRANT), included and set to the UTC time no later than the current time. <br>    o *groupingConfig*: Contains only one *GroupConfig* object configured as follows: <br>      ▪ *groupType*: $G_2$ <br>      ▪ *groupId*: $GID_2$ <br>      ▪ *supportedBySas*: true <br>      ▪ *groupConfigInfo*: May optionally be included; <br>    o *responseCode: 0 (SUCCESS) or 501 (SUSPENDED_GRANT)* <br><br><br> • For CBSD 8: <br>    o *cbsdId*: Included and set to the valid value as received in step 5 <br>    o *grantId*: Included and set to the valid value as received in step 5. <br>    o *transmitExpireTime*: <br>      ▪ If *responseCode* = 0 (SUCCESS), included and set to the valid UTC time in the future, not later than 240 seconds in the future and not later than the *grantExpireTime*. <br>      ▪ If *responseCode* = 501 (SUSPENDED_GRANT), included and set to the UTC time no later than the current time. <br>    o *groupingConfig*: Contains two *GroupConfig* objects, each of which is configured as follows: <br>      ▪ *GroupParam* object for Group G1: <br>        • *groupType*: $G_1$ <br>        • *groupId*: $GID_1$ <br>        • *supportedBySas*: true |

- *groupConfigInfo*: may optionally be included;
  - *GroupParam* object for Group G2:
    - *groupType*: G2
    - *groupId*: GID2
    - *supportedBySas*: true
    - *groupConfigInfo*: may optionally be included;
  - *responseCode: 0 (SUCCESS) or 501 (SUSPENDED_GRANT);*

- For CBSD 9:
  - *cbsdId*: Included and set to the valid value as received in step 5
  - *grantId*: Included and set to the valid value as received in step 5
  - *transmitExpireTime*:
    - If *responseCode* = 0 (SUCCESS), included and set to the valid UTC time in the future, not later than 240 seconds in the future and not later than the *grantExpireTime*.
    - If *responseCode* = 105 (DEREGISTER) or 501 (SUSPENDED_GRANT), included and set to the UTC time no later than the current time.
  - *groupingConfig*: Contains two *GroupConfig* objects, each of which is configured as follows:
    - *GroupParam* object for Group G1:
      - *groupType*: G1
      - *groupId*: GID1
      - *supportedBySas*: true
      - *groupConfigInfo*: may optionally be included;
    - *GroupParam* object for Group G3:
      - *groupType*: G3
      - *groupId*: GID3
      - *supportedBySas*: false
      - *groupConfigInfo*: Not included;
  - *responseCode*: One of the followings
    - 0 (SUCCESS) with *responseData* indicating "PARAM_WARNING"; or
    - 105 (DEREGISTER); or
    - 501 (SUSPENDED_GRANT)

| | *If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 5 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, it PASSES* |
|---|---|

### 6.3.4.4 [WINNF.PT.S.REL2.NRI.EGH.4]: Deprecated

### 6.3.4.5 [WINNF.PT.S.REL2.NRI.EGH.5]: Release 1 based Grouping Information Exchange with Release 1 CBSD and Release 2 CBSD not supporting Enhanced CBSD Group Handling feature

This test case aims to test the conformance of a Release 2 SAS to successfully exchange messages consisting Grouping information with a Release 1 CBSD and Release 2 CBSD not supporting Enhanced CBSD Group Handling feature.

| Step | Instructions |
|---|---|
| 1 | • Ensure that neither *cbsdId* nor *grantId* for the 2 CBSDs being tested exists in the SAS.<br>• All REG-Conditional parameters for the CBSDs shall already be pre-loaded into the SAS NRI UUT.<br>• *userId* U1 shall be configured to the SAS NRI UUT as a valid UR-ID |
| 2 | The CBSD/DP NRI Test Harness sends a Registration Request Message for the 2 CBSDs to the SAS NRI UUT, where each of *RegistrationRequest* objects is configured as follows:<br><br>For CBSD 1 (as Release 2 CBSD not supporting EGH feature):<br><br>• *userId*: Set to U1<br>• *cbsdFeatureCapabilityList*: Included but the FID "WF_ENH_GROUP_HANDLING" is not contained in the list<br>• *groupingParam* is an array of objects consisting of only one *GroupParam* object, where the *GroupParam* object is configured as follows:<br>    ○ *groupType*: Set to "INTERFERENCE_COORDINATION"<br>    ○ *groupId*: Set to U1<br>• All other parameters of the *RegistrationRequest* object are in proper format and within acceptable ranges according to WINNF-TS-0016.<br><br>For CBSD 2 (as Release 1 CBSD):<br><br>• *userId*: Set to U1<br>• *cbsdFeatureCapabilityList*: Not included |

| | |
|---|---|
| | • *groupingParam* is an array of objects consisting of only one *GroupParam* object, where the *GroupParam* object is configured as follows:<br>  ○ *groupType*: Set to "INTERFERENCE_COORDINATION"<br>  ○ *groupId*: Set to U1<br>• All other parameters of the *RegistrationRequest* object are in proper format and within acceptable ranges according to WINNF-TS-3002.<br>  ○ |
| CHECK | SAS NRI UUT returns a Registration Response Message, where each of *RegistrationResponse* objects is configured as follows:<br>• For CBSD 1:<br>  ○ *cbsdId*: Included and set to the valid value.<br>  ○ *sasFeatureCapabilityList*: Included and set to the array containing at least the FID "WF_ENH_GROUP_HANDLING";<br>  ○ *groupingConfig*: Not included<br>  ○ *responseCode:*<br>    ▪ 0 (SUCCESS);<br>• For CBSD 2:<br>  ○ *cbsdId*: Included and set to the valid value.<br>  ○ *sasFeatureCapabilityList*: Not included;<br>  ○ *groupingConfig*: Not included<br>  ○ *responseCode:*<br>    ▪ 0 (SUCCESS)<br><br>*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for the CBSD 1, step 2 shall be repeated only for the CBSD 1 until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, it PASSES* |

### 6.3.4.6 [WINNF.PT.S.REL2.NRI.EGH.6] CBSDs send incomplete groupingParam parameter.

This test case aims to test the conformance of a Release 2 SAS to appropriately respond to request messages consisting of incomplete Grouping information.
Incomplete Grouping information configured for the CBSDs emulated in this test case is summarized as follows:

**Table 6-4: CBSD Group Membership Declaration in Each Procedure**

|  |  | **Registration** | **Spectrum Inquiry** | **Grant** | **Heartbeat** |
|---|---|---|---|---|---|
| **CBSD 1** | *groupType* | Included | *n/a* | *n/a* | *n/a* |
| | *groupId* | Missing | *n/a* | *n/a* | *n/a* |
| **CBSD 2** | *groupType* | Missing | *n/a* | *n/a* | *n/a* |
| | *groupId* | Included | *n/a* | *n/a* | *n/a* |
| **CBSD 3** | *groupType* | Included | Included | *n/a* | *n/a* |
| | *groupId* | Included | Missing | *n/a* | *n/a* |
| **CBSD 4** | *groupType* | Included | Missing | *n/a* | *n/a* |
| | *groupId* | Included | Included | *n/a* | *n/a* |
| **CBSD 5** | *groupType* | Included | *n/a* | Included | *n/a* |
| | *groupId* | Included | *n/a* | Missing | *n/a* |
| **CBSD 6** | *groupType* | Included | *n/a* | Missing | *n/a* |
| | *groupId* | Included | *n/a* | Included | *n/a* |
| **CBSD 7** | *groupType* | Included | *n/a* | Included | Included |
| | *groupId* | Included | *n/a* | Included | Missing |
| **CBSD 8** | *groupType* | Included | *n/a* | Included | Missing |
| | *groupId* | Included | *n/a* | Included | Included |

| Step | Instructions |
|---|---|
| 1 | <ul><li>Ensure the followings:<ul><li>Neither *cbsdId* nor *grantId* for the 8 CBSDs being tested exists in the SAS.</li><li>No Protected Entity is present such that any frequency range indicated in *inquiredSpectrum* (see step 3) is available and Grant requests are approved on GAA basis.</li></ul></li><li>All REG-Conditional parameters for the CBSDs shall already be pre-loaded into the SAS NRI UUT.</li><li>The SAS Administrator configures Admin NRI Test Harness with the Group Types supported by the SAS NRI UUT.<ul><li>Let the Group type used for this test case be denoted as $G_1$</li><li>Let the Group ID used for this test case be denoted as $GID_1$</li></ul></li><li>Supported Group types as registered in WINNF-SSC-0010 [n.14], provisioned by the SAS NRI UUT</li></ul> |
| 2 | The CBSD/DP NRI Test Harness sends a Registration Request for the CBSDs 1-8, where each *RegistrationRequest* object is configured as follows: |

For CBSD 1:

- *cbsdFeatureCapabilityList*: Includes the FID "WF_ENH_GROUP_HANDLING";
- *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:
  - *groupType*: $G_1$
  - *groupId*: missing
- All other parameters in the *RegistrationRequest* object are in proper format and within acceptable ranges.

For CBSD 2:

- *cbsdFeatureCapabilityList*: Includes the FID "WF_ENH_GROUP_HANDLING";
- *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:
  - *groupType*: Missing
  - *groupId*: $GID_1$
- All other parameters in the *RegistrationRequest* object are in proper format and within acceptable ranges.

For CBSDs 3-8:

- *cbsdFeatureCapabilityList*: Includes the FID "WF_ENH_GROUP_HANDLING";
- *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:
  - *groupType*: $G_1$
  - *groupId*: $GID_1$
- All other parameters in the *RegistrationRequest* object are in proper format and within acceptable ranges.

| | |
|---|---|
| CHECK #1 | SAS NRI UUT returns a Registration Response Message, where each *RegistrationResponse* object is configured as follows:<br><br>• For CBSDs 1 and 2:<br>    ○ *cbsdId*:<br>        ▪ Included and set to the valid value if *responseCode* = 0 (SUCCESS);<br>        ▪ Not included otherwise.<br>    ○ *sasFeatureCapabilityList*:<br>        ▪ Included and set to the array containing at least the FID "WF_ENH_GROUP_HANDLING" if *responseCode* = 0 (SUCCESS);<br>        ▪ Not included otherwise. |

- o *groupingConfig*: Included but may be empty array (i.e., "[]").
- o *responseCode*:
    - ▪ 0 (SUCCESS) with *responseData* indicating PARAM_WARNING;
    - ▪ 102 (MISSING_PARAM); or
    - ▪ 201 (GROUP_ERROR);

- For CBSDs 3 to 8
    - o *cbsdId*: Included and set to the valid value
    - o *sasFeatureCapabilityList*: Included and set to the array containing at least the FID "WF_ENH_GROUP_HANDLING";
    - o *responseCode*: 0 (SUCCESS);
    - o *groupingConfig*: Contains only one *GroupConfig* object configured as follows:
        - ▪ *groupType*: $G_1$
        - ▪ *groupId*: $GID_1$
        - ▪ *supportedBySas*: true
        - ▪ *groupConfigInfo*: May optionally be included;

*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 2 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, it proceeds to the next step.*

| 3 | The CBSD/DP NRI Test Harness sends a Spectrum Inquiry Request for the CBSDs 3 and 4, where each *SpectrumInquiryRequest* object is configured as follows:<br><br>For CBSD 3:<br><br>• *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in step 2;<br>• *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:<br>   o *groupType*: $G_1$<br>   o *groupId*: missing<br>• All other parameters in the *SpectrumInquiryRequest* object are in proper format and within acceptable ranges.<br><br>For CBSD 4:<br><br>• *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in step 2;<br>• *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:<br>   o *groupType*: Missing<br>   o *groupId*: $GID_1$ |
|---|---|

| | |
|---|---|
| | • All other parameters in the *SpectrumInquiryRequest* object are in proper format and within acceptable ranges. |
| CHECK #2 | SAS NRI UUT returns a Spectrum Inquiry Response Message, where each *RegistrationResponse* object is configured as follows: <br>• For CBSDs 3 and 4: <br>    ○ *cbsdId*: Included and set to the valid value as sent by the CBSD/DP NRI Test Harness in step 3. <br>    ○ *availableChannel*: <br>       ▪ Included if *responseCode* = 0 (SUCCESS); <br>       ▪ Not included otherwise; <br>    ○ *groupingConfig*: Included but may be empty array (i.e., "[]"). <br>    ○ *responseCode*: <br>       ▪ 0 (SUCCESS) with *responseData* indicating PARAM_WARNING; or <br>       ▪ 102 (MISSING_PARAM); <br><br>*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 3 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, it proceed to the next step* |
| 4 | The CBSD/DP NRI Test Harness sends a Grant Request for the CBSDs 5-8, where each *GrantRequest* object is configured as follows: <br><br>For CBSD 5: <br><br>• *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in step 2; <br>• *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows: <br>    ○ *groupType*: $G_1$ <br>    ○ *groupId*: missing <br>• All other parameters in the *GrantRequest* object are in proper format and within acceptable ranges. <br><br>For CBSD 6: <br><br>• *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in step 2; <br>• *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows: <br>    ○ *groupType*: Missing <br>    ○ *groupId*: $GID_1$ <br>• All other parameters in the *GrantRequest* object are in proper format and within acceptable ranges. |

| | |
|---|---|
| | For CBSDs 7 and 8: <br><br> • *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in step 2; <br> • *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows: <br>     o *groupType*: $G_1$ <br>     o *groupId*: $GID_1$ <br> • All other parameters in the *GrantRequest* object are in proper format and within acceptable ranges. |
| CHECK #3 | SAS NRI UUT returns a Grant Response Message, where each *GrantResponse* object is configured as follows: <br> • For CBSDs 5 and 6: <br>     o *cbsdId*: Included and set to the valid value as sent by the CBSD/DP NRI Test Harness in step 4. <br>     o *grantId*: <br>       ▪ Included and set to the valid value if *responseCode* = 0 (SUCCESS); <br>       ▪ Not included otherwise. <br>     o *groupingConfig*: Included but may be empty array (i.e., "[]"). <br>     o *responseCode*: <br>       ▪ 0 (SUCCESS) with *responseData* indicating PARAM_WARNING; <br>       ▪ 102 (MISSING_PARAM); <br><br> • For CBSDs 7 to 8: <br>     o *cbsdId*: Included and set to the valid value as sent by the CBSD/DP NRI Test Harness in step 4. <br>     o *grantId*: Included and set to the valid value. <br>     o *channelType*: GAA <br>     o *grantExpireTime*: UTC time greater than duration of the test <br>     o *heartbeatInterval*: Included with the valid value. <br>     o *responseCode*: 0 (SUCCESS); <br>     o *groupingConfig*: Contains only one *GroupConfig* object configured as follows: <br>       ▪ *groupType*: $G_1$ <br>       ▪ *groupId*: $GID_1$ <br>       ▪ *supportedBySas*: true <br>       ▪ *groupConfigInfo*: May optionally be included; <br><br> *If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 4 shall* |

| | |
|---|---|
| | *be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, it proceed to the next step* |
| 5 | The CBSD/DP NRI Test Harness sends a Heartbeat Request for the CBSDs 7 and 8, where each *HeartbeatRequest* object is configured as follows:<br><br>For CBSD 7:<br><br>• *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in step 2;<br>• *grantId*: Set to the valid value as provided by the SAS NRI UUT in step 4;<br>• *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:<br>    ○ *groupType*: $G_1$<br>    ○ *groupId*: missing<br>• All other parameters in the *HeartbeatRequest* object are in proper format and within acceptable ranges.<br><br>For CBSD 8:<br><br>• *cbsdId*: Set to the valid value as provided by the SAS NRI UUT in step 2;<br>• *grantId*: Set to the valid value as provided by the SAS NRI UUT in step 4;<br>• *groupingParam* is an array containing only one *GroupParam* object, where the *GroupParam* object is configured as follows:<br>    ○ *groupType*: Missing<br>    ○ *groupId*: $GID_1$<br>• All other parameters in the *HeartbeatRequest* object are in proper format and within acceptable ranges. |
| CHECK #4 | SAS NRI UUT returns a Heartbeat Response Message, where each *HeartbeatResponse* object is configured as follows:<br>• For CBSDs 7 and 8:<br>    ○ *cbsdId*: Included and set to the valid value as sent by the CBSD/DP NRI Test Harness in step 5<br>    ○ *grantId*: Included and set to the valid value as sent by the CBSD/DP NRI Test Harness in step 5<br>    ○ *transmitExpireTime*:<br>        ▪ If *responseCode* = 0 (SUCCESS), included with the valid UTC time in the future, not later than 240 seconds in the future and not later than the *grantExpireTime*.<br>        ▪ If *responseCode* = 102 (MISSING_PARAM) or 501 (SUSPENDED_GRANT), included with the UTC time no later than the current time.<br>    ○ *groupingConfig*: Included but may be empty array (i.e., "[]"). |

o *responseCode*:
  ▪ 0 (SUCCESS) with *responseData* indicating PARAM_WARNING;
  ▪ 102 (MISSING_PARAM);
  ▪ 501 (SUSPENDED_GRANT)

*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. If responseCode 106 (NOT_PROCESSED) is returned for a particular CBSD, step 5 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned.*

## 6.4 Testing for the Enhanced Antenna Pattern Feature

### 6.4.1 Definition, Applicability, and Scope of the Test Case

This section explains test steps, conditions, and procedures to verify that SAS NRI UUT supporting the enhanced antenna pattern (EAP) feature correctly calculates the CBSD antenna gain toward a receiver based on Annex 5 in TS-1001 [n.15].

### 6.4.2 Test Characteristics

**Table 6-5: Enhanced Antenna Pattern Procedure Test Characteristics**

| 1 | **Test ID** | WINNF.FT.S.REL2.NRI.EAP |
|---|---|---|
| 2 | **Title** | Enhanced Antenna Pattern Test |
| 3 | **Working Group / Entity** | WG1, WG3, WG5 |
| 4 | **Test Type** | Functionality |
| 5 | **Test Class** | Certification |
| 6 | **Component / Interface** | SAS / CBSD $\leftarrow \rightarrow$ SAS |
| 7 | **Target Specification / Feature** | [n.4, n.11, n.18] |

### 6.4.3 Method of test

The SAS NRI UUT shall be tested for its ability to calculate CBSD antenna gains in certain directions using the EAP feature. To execute these tests, the Admin NRI Test Harness shall first register a group of CBSDs supporting the EAP feature with the SAS NRI UUT using the SAS-CBSD interface. The group of CBSDs shall be configured with a mixture of the configurations for the EAP parameters, as described in [n.19, Section 6.2.3, Tables 6.2.2, and 6.2.3].

The above CBSDs registered by the DP NRI Test Harness shall support the EAP feature (i.e., *cbsdFeatureCapabilityList* includes the FID: "WF_ENH_ANTENNA_PATTERN") and the mandatory Release 1 antenna parameters shall be complete for the testing purpose.

Note: Since the scenario where the antenna model in the antenna database corresponds to full 3-D antenna pattern is not widely used in the industry, this scenario will not be included in the presented test cases in this Section for this Release.

#### 6.4.3.1 Initial Conditions / Test Pre-conditions

The CBSD Antenna Pattern Database is required for the SAS NRI UUT to access necessary antenna pattern information in the tests. The CBSD Antenna Pattern Database shall be configured to support different CBSD antenna configurations described in the method of test.

## 6.4.3.2 *Test Tools Required*

A special EAP Testing API is used for this test so that the SAS NRI UUT can perform the antenna gain calculation in a certain direction using the EAP feature without exercising the rest of the SAS functions[1]. To execute this test, the Admin NRI Test Harness shall send CBSD IDs of the registered CBSDs and a specific direction and geographic coordinates and the height of a target point to the SAS NRI UUT through the EAP Testing API. After receiving the CBSD IDs from the Admin NRI Test Harness, the SAS NRI UUT shall compute the CBSD antenna gain of the corresponding CBSDs and send the results back to Admin NRI Test Harness through the EAP Testing API. The SAS NRI UUT shall provide the following information:

- CBSD ID,

- The EAP method applied to the CBSD,

- The CBSD antenna gain in a certain direction, calculated by SAS NRI UUT

The Main NRI Test Harness calculates the CBSD antenna gain in a certain direction with the same configurations using the reference implementation. A SAS NRI UUT passes this test if the calculated antenna gain is within certain ranges of the results calculated by the reference implementation.

---

[1] The address of EAP Testing API: https://github.com/Wireless-Innovation-Forum/Spectrum-Access-System

### 6.4.4 Test Procedure

#### 6.4.4.1 [WINNF.FT.S.REL2.NRI.EAP.1] Antenna gain calculation using the release 2 methods

| Step | Instructions |
|---|---|
| 1 | Ensure no *cbsdId* exists in the SAS NRI UUT for the CBSDs being tested. |
| 2 | The Admin NRI Test Harness injects records of CBSD Antenna Pattern Database into the SAS NRI UUT. |
| 3 | The DP RI Test Harness sends the Registration Request Message for Twelve (12) Category A CBSDs each of which are configured as per each row of [n.19, Section 6.2.3, Table 6.2.2], and Twelve (12) Category B CBSDs each of which are configured as per each row of [n.19, Section 6.2.3, Table 6.2.2]. |
| CHECK | The SAS NRI UUT approves the request by sending a Registration Response Message to the DP NRI Test Harness as follows: <br> • SAS response includes a valid *cbsdId* for each CBSD. <br> • The *responseCode* parameter contained in the *response* parameter is 0 for each CBSD concluding an approved Registration. <br><br> *If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, proceed.* |
| 4 | Admin NRI Test Harness sends the CBSD IDs and a specific direction and geographic coordinates and the height of a target point to the SAS NRI UUT through the EAP Testing API and receives the results. |
| 5 | The Main NRI Test Harness calculates the CBSD antenna gain towards the specific direction and geographic coordinates and the height of the target point as provided in Step 4 using the reference implementation with the same configuration in Step 3. |
| CHECK | The information provided by the SAS NRI UUT through the EAP Testing API shall meet the following conditions: <br> • The CBSD IDs provided are the same as those given in step 4, <br> • For each CBSD ID: <br>    o The EAP method applied is the same as the configuration of the CBSD as defined in corresponding Tables ([n.19, Section 6.2.3, Tables 6.2.2, and 6.2.3]) <br>    o The CBSD antenna gain in dBi towards the the specific direction and the target point as provided in Step 4 calculated by the SAS NRI UUT is no less than the CBSD antenna gain calculated by the reference implementation minus 0.2 dB. <br><br> *If the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it PASSES.* |

|  |  |
|---|---|
|  |  |
|  |  |
|  |  |

| | |
|---|---|
| | |
| | |
| | |

[WINNF.FT.S.REL2.NRI.EAP.2] Deprecated

Page  58

[WINNF.FT.S.REL2.NRI.EAP.3] Deprecated

[WINNF.FT.S.REL2.NRI.EAP.4] Deprecated

## 6.5 CPE-CBSD Indicator Handling Procedure

### 6.5.1 Definition, Applicability, and Scope of the Test Case

This section provides test steps, conditions, and procedures to test the conformance of a SAS that supports the Release 2 feature CPE CBSD Indicator (FID: WF_CPE_CBSD_INDICATOR).

### 6.5.2 Test Characteristics

**Table 6-6: CPE-CBSD Indicator Test Characteristics**

| 1 | **Test ID** | WINNF.PT.S.REL2.NRI.CPE |
|---|---|---|
| 2 | **Title** | CPE-CBSD Indicator |
| 3 | **Working Group / Entity** | WG3 |
| 4 | **Test Type** | Protocol |
| 5 | **Test Class** | Certification |
| 6 | **Component / Interface** | SAS / CBSD ← → SAS |
| 7 | **Target Specification** | [n.4] |

### 6.5.3 Method of test

#### 6.5.3.1 Initial Conditions / Test Pre-conditions

1. All the message exchanges between the SAS NRI UUT and the CBSD/DP NRI Test Harness shall be done by using HTTPS.
2. Unless otherwise specified, CBSDs registered in the course of a test case are assumed to have their FCC IDs and user IDs already whitelisted by the SAS NRI UUT.
3. The SAS NRI UUT must be reset at the beginning of each test case to a baseline state.

### 6.5.4   Test Procedure

#### 6.5.4.1   [WINNF.PT.S.REL2.NRI.CPE.1]: Registration and Feature Capability Exchange of Release 2 CBSDs supporting the CPE CBSD Indicator feature.

This test case aims to test the conformance of a Release 2 SAS to successfully perform the Registration procedure and Feature Capability Exchange procedure with a Release 2 CBSD supporting the CPE CBSD Indicator feature.

| Step | Instructions |
|---|---|
| 1 | • Ensure no *cbsdIds* exists in the SAS for the 3 CBSDs being tested.<br>• All REG-Conditional parameters for the CBSDs shall already be pre-loaded into the SAS NRI UUT except *cbsdFeatureCapabilityList*. |
| 2 | The NRI Test Harness sends Registration Requests for 3 CBSDs to the SAS NRI UUT<br>For all CBSDs<br>• The Registration Request is in proper format and parameters are within acceptable ranges.<br>For CBSD1:<br><br>• *cbsdFeatureCapabilityList* is included with FID: WF_CPE_CBSD_INDICATOR<br>• *cpeCbsdIndication* is included with value set to TRUE.<br><br>For CBSD2:<br><br>• *cbsdFeatureCapabilityList* is included with FID: WF_CPE_CBSD_INDICATOR<br>• *cpeCbsdIndication* is included with value set to FALSE.<br>For CBSD3:<br><br>• *cbsdFeatureCapabilityList* is included with FID: WF_CPE_CBSD_INDICATOR<br>• *cpeCbsdIndication* is **not** included |
| CHECK | SAS NRI UUT approves the request and sends a Registration Response as follows:<br>o  For CBSD 1:<br>  • *cbsdId*: Included and set to valid value.<br>  • *responseCode*: 0 (SUCCESS)<br>o  For CBSD 2:<br>  • *responseCode*: 0 (SUCCESS) or 103 (INVALID_VALUE)<br>  • *cbsdId*:<br>    ✧ For *responseCode* = 0 (SUCCESS): Included and set to valid value. |

◇ For *responseCode* = 103 (INVALID_VALUE): Not included.
- *responseData*: may be included for both *responseCode* values. For *responseCode* = 0 (SUCCESS), either FID_WARNING or PARAM_WARNING is indicated against *cpeCbsdIndication*.
o For CBSD 3:
- *responseCode* : 0 (SUCCESS) or 102 (MISSING_PARAM)
- *cbsdId*:
◇ For *responseCode* = 0 (SUCCESS): Included and set to valid value.
◇ For *responseCode* = 102 (MISSING_PARAM): Not included.
- *responseData*: may be included for both *responseCode* values. For *responseCode* = 0 (SUCCESS), either FID_WARNING or PARAM_WARNING is indicated against *cpeCbsdIndication*.

*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it PASSES*

| 3 | *This step was deprecated in V1.1.0 of this technical specification* |
|---|---|
| CHECK | *This CHECK was deprecated in V1.1.0 of this technical specification* SAS NRI UUT |

## 6.6 Passive DAS Group – Functional Tests

### 6.6.1 Definition, Applicability, and Scope of the Test Case

This section provides test steps, conditions, and procedures to test the conformance of a Release 2 SAS that operationally supports the Passive DAS Group using Enhanced CBSD Group Handling feature.

### 6.6.2 Test Characteristics

**Table 6-6: CBSD Registration Procedure Test Characteristics**

| 1 | **Test ID** | WINNF.FT.S.REL2.NRI.PDG |
|---|---|---|
| 2 | **Title** | Enhanced CBSD Group Handling – Passive DAS |
| 3 | **Working Group / Entity** | WG1 |
| 4 | **Test Type** | Functional |
| 5 | **Test Class** | Certification |
| 6 | **Component / Interface** | CBSD ⟵ ⟶ SAS |
| 7 | **Target Specification** | WINNF-TS-1001 CBRS Operational and Functional Requirements (Release 2) |

### 6.6.3 Method of test

6.6.3.1.1 Initial Conditions / Test Pre-conditions

1. All the message exchanges between the SAS NRI UUT and the DP Test Harness shall be done by using HTTPS.
2. The SAS NRI UUT shall be compliant with Enhanced CBSD Group Handling feature based upon this technical specification.
3. Unless otherwise specified, CBSDs (Transmission Points, or TPs) emulated in the course of a test case are configured as follows:SAS NRI UUT
   a. Enhanced CBSD Group Handling is the only feature that is supported by all the CBSDs (TPs);
   b. Passive DAS Group is the only Group type declared by all the CBSDs (TPs) in their Registration Requests;
   c. Group ID format used in this test case is: <FCC ID>:<Serial Number>:<Chain_ID>
4. The SAS NRI UUT must be reset at the beginning of each test case to a baseline state.
5. The SAS NRI UUT must whitelist FCC IDs and User IDs used in the course of a test case

### 6.6.4   *Test Procedure*

#### 6.6.4.1   [WINNF.FT.S.REL2.NRI.PDG.1]: [Configurable] Spectrum Assignment to CBSDs in a Passive DAS Group

The objective of this configurable test case is to check if the SAS NRI UUT complies with REL2-R3-SGN-72200 [n.15], which requires the SAS to assigns the same frequency range to all the CBSDs (Transmission Points, or TPs) belonging to the same Passive DAS Group.

In this test case, a special testing API is used to designate some frequency ranges unavailable to a particular CBSD (TP) for the purpose of emulating the situations concerning REL2-R3-SGN-72200-b and REL2-R3-SGN-72200-c [n.15].
*Note:*
The test case as described is for the scenario where the CBSDs are requesting a single frequency range. The test case can be extended to evaluate the scenario where each of the CBSDs, belonging to a Passive DAS group, is requesting a set of frequencies (multiple Grants).
The Pass/Fail criteria for such a scenario would involve checking the set of frequencies that are assigned to the CBSDs.

For the purpose of this test case, all request parameters for all CBSDs (TPs) emulated are configured as per Table 1. Other required parameters not captured in Table 6-7 can be set to any valid value that is aligned with Passive DAS deployment guideline in WINNF-TR-5001.

**Table 6-7: Passive DAS CBSD Configurations**

| CBSD Configuration | Testing Purpose | Registration | | | Grant Procedure | Testing API |
|---|---|---|---|---|---|---|
| | | FCC ID | Serial Number | Passive DAS Group ID | Requested frequency range | |
| CBSD 1 | REL2-R3-SGN-72200-a | FCC_1 | SN_1 | FCC_1:SN_1:CHAIN_1 | FR1_1 within 3550-3700 MHz range. | No command is provided to the SAS NRI UUT for this Group. |
| CBSD 2 | REL2-R3-SGN-72200-a | FCC_1 | SN_1 | FCC_1:SN_1:CHAIN_1 | FR1_1 within 3550-3700 MHz range. | |
| CBSD 3 | REL2-R3-SGN-72200-a | FCC_1 | SN_1 | FCC_1:SN_1:CHAIN_1 | FR1_1 within 3550-3700 MHz range. | |
| CBSD 4 | REL2-R3-SGN-72200-a | FCC_2 | SN_2 | FCC_1:SN_1:CHAIN_2 | FR2_1 within 3550-3700 MHz range. | No command is provided to the SAS NRI UUT for this Group. |
| CBSD 5 | REL2-R3-SGN-72200-a | FCC_2 | SN_2 | FCC_1:SN_1:CHAIN_2 | FR2_1 within 3550-3700 MHz range. | |
| CBSD 6 | REL2-R3-SGN-72200-a | FCC_2 | SN_2 | FCC_1:SN_1:CHAIN_2 | FR2_2 ($\neq$ FR2_1) within 3550-3700 MHz range. | |
| CBSD 7 | REL2-R3-SGN-72200-b | FCC_3 | SN_3 | FCC_1:SN_1:CHAIN_3 | FR3_1 within 3550-3700 MHz range. | Some frequency ranges including FR3_1 to be made unavailable such that there is no common frequency range available to the CBSDs belonging to this Group. (Step 6) |
| CBSD 8 | REL2-R3-SGN-72200-b | FCC_3 | SN_3 | FCC_1:SN_1:CHAIN_3 | FR3_1 within 3550-3700 MHz range. | |
| CBSD 9 | REL2-R3-SGN-72200-b | FCC_3 | SN_3 | FCC_1:SN_1:CHAIN_3 | FR3_1 within 3550-3700 MHz range. | |
| CBSD 10 | REL2-R3-SGN-72200-c | FCC_4 | SN_4 | FCC_1:SN_1:CHAIN_4 | FR4_1 within 3550-3700 MHz range. | • FR4_1 to be made unavailable to at least one of the CBSDs in this Group. (Step 6)<br>• FR4_2, which does not overlap with, FR4_1, to be made available to all the CBSDs belonging to this Group. (Step 6) |
| CBSD 11 | REL2-R3-SGN-72200-c | FCC_4 | SN_4 | FCC_1:SN_1:CHAIN_4 | FR4_1 within 3550-3700 MHz range. | |
| CBSD 12 | REL2-R3-SGN-72200-c | FCC_4 | SN_4 | FCC_1:SN_1:CHAIN_4 | FR4_1 within 3550-3700 MHz range. | |

| Step | Instructions |
|---|---|

| 1 | • Ensure no *cbsdIds* nor Grants exists in the SAS NRI UUT for the 12 CBSDs being tested.<br>• REG-Conditional parameters for some of the CBSDs shall already be pre-loaded into the SAS NRI UUT. |
|---|---|
| 2 | The DP Test Harness sends Registration Requests for the 12 CBSDs to the SAS NRI UUT according to Table 1<br>○ |
| CHECK | SAS NRI UUT approves the request and sends a Registration Response Message as follows:<br>• All CBSDs<br>  ○ Includes valid *cbsdId* for the CBSD.<br>  ○ The *responseCode* parameter is 0 (SUCCESS) indicating an approved Registration<br>  ○ *sasFeatureCapabilityList* shall be included with FID list containing atleast FID: WF_ENH_GROUP_HANDLING<br>  ○ *groupingConfig:* one *GroupConfig* object configured as follows is included.<br>    ▪ *groupType:* **"PASSIVE_DAS"**<br>    ▪ *groupId:* Set to the same value as included in the *GroupParam* object<br>    ▪ *supportedBySas:* **true**<br><br>*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it shall proceed with the subsequent step.* |
| 3 | The DP Test Harness sends Grant Request Message for the CBSDs registered in step 2, , where requested frequency range is configured according to Table 6-7<br>○ |
| CHECK | The SAS NRI UUT sends a Grant Response Message as follows:<br>• For CBSDs belonging to Group ID "FCC_1:SN_1:CHAIN_1", Group ID "FCC_1:SN_1:CHAIN_3" and Group ID "FCC_1:SN_1:CHAIN_4":<br>  ○ *cbsdId*: Included and set to valid value;<br>  ○ *grantId*: Included and set to valid value;<br>  ○ *grantExpireTime*: Included and set to valid value;<br>  ○ *heartbeatInterval*: Included and set to valid value;<br>  ○ *channelType*: Included and set to "GAA";<br>  ○ *responseCode*: 0 (SUCCESS);<br>• For CBSDs belonging to Group ID "FCC_1:SN_1:CHAIN_2":<br>  ○ *cbsdId*: Included and set to valid value;<br>  ○ *grantId*: Not included; |

| | |
|---|---|
| | o *responseCode*: non-zero response code concluding disapproval of Grant request; <br> o *operationParam*: may be included. If included, *operationFrequencyRange* indicates is exactly the same among the CBSDs. <br> o *operationParamArray*: may be included. If included, all *operationFrequencyRange* parameters indicated by this array parameter are exactly the same among the CBSDs. <br><br> *If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it proceeds with the subsequent step.* |
| 5 | DP Test Harness successfully exchanges Heartbeat with the SAS NRI UUT for the Grants of the CBSDs approved in Step 4 (i.e., Group ID "FCC_1:SN_1:CHAIN_1", Group ID "FCC_1:SN_1:CHAIN_3" and Group ID "FCC_1:SN_1:CHAIN_4") and keeps them in *Authorized* State. |
| 6 | The special Testing API provides a command to the SAS NRI UUT as described in the "Testing API" column of Table 6-7. |
| 7 | DP Test Harness sends a Heartbeat Request Message to the SAS NRI UUT for the Grants of the CBSDs approved in Step 4, where *grantRenew* is not included for all the Grants. |
| CHECK | The SAS NRI UUT sends a Heartbeat Response Message as follows: <br> • For CBSDs belonging to Group ID "FCC_1:SN_1:CHAIN_1": <br>    o *cbsdId*: Included and set to valid value; <br>    o *grantId*: Included and set to valid value; <br>    o *transmitExpireTime*: Included and set to valid value; <br>    o *responseCode*: 0 (SUCCESS); <br> • For CBSDs belonging to Group ID "FCC_1:SN_1:CHAIN_3": <br>    o *cbsdId*: Included and set to valid value; <br>    o *grantId*: Included and set to valid value; <br>    o *responseCode*: 500 (TERMINATED_GRANT) <br>    o *operationParam*: Not included. <br>    o *operationParamArray*: Not included. <br> • For CBSDs belonging to Group ID "FCC_1:SN_1:CHAIN_4": <br>    o *cbsdId*: Included and set to valid value; <br>    o *grantId*: Included and set to valid value; <br>    o *responseCode*: 500 (TERMINATED_GRANT) or 501 (SUSPENDED_GRANT) <br>    o *operationParam*: may be included. If included, *operationFrequencyRange* indicates FR4_2 for all the CBSDs. <br>    o *operationParamArray*: may be included. If included, at least *operationFrequencyRange* indicating FR4_2 is included for all the |

| | |
|---|---|
| | CBSDs. Other frequency ranges, if included, are also exactly the same among all the CBSDs.<br><br>*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it PASSES.* |
| CHECK | The SAS NRI UUT sends a Grant Response Message as follows:<br>• For CBSDs belonging to Group ID "FCC_1:SN_1:CHAIN_1", Group ID "FCC_1:SN_1:CHAIN_3" and Group ID "FCC_1:SN_1:CHAIN_4":<br>    o *cbsdId*: Included and set to valid value;<br>    o *grantId*: Included and set to valid value;<br>    o *grantExpireTime*: Included and set to valid value;<br>    o *heartbeatInterval*: Included and set to valid value;<br>    o *channelType*: Included and set to "GAA";<br>    o *responseCode*: 0 (SUCCESS);<br>• For CBSDs belonging to Group ID "FCC_1:SN_1:CHAIN_2":<br>    o *cbsdId*: Included and set to valid value;<br>    o *grantId*: Not included;<br>    o *responseCode*: non-zero response code concluding disapproval of Grant request;<br>    o *operationParam*: may be included. If included, *operationFrequencyRange* indicates is exactly the same among the CBSDs.<br>    o *operationParamArray*: may be included. If included, all *operationFrequencyRange* parameters indicated by this array parameter are exactly the same among the CBSDs.<br><br>*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it proceed with the subsequent step.* |

## 6.7 Principal Subordinate Single Frequency Group – Functional Tests

### 6.7.1 Definition, Applicability, and Scope of the Test Case

This section provides test steps, conditions, and procedures to test the conformance of a Release 2 SAS that operationally supports the Principal Subordinate SFG using Enhanced CBSD Group Handling feature.

### 6.7.2 Test Characteristics

**Table 6-7: CBSD Registration Procedure Test Characteristics**

| | | |
|---|---|---|
| 1 | **Test ID** | WINNF.FT.S.REL2.NRI.PSSFG |
| 2 | **Title** | Enhanced CBSD Group Handling – Principal Subordinate Single Frequency Group |
| 3 | **Working Group / Entity** | WG1 |
| 4 | **Test Type** | Functional |
| 5 | **Test Class** | Certification |
| 6 | **Component / Interface** | CBSD ← → SAS |
| 7 | **Target Specification** | WINNF-TS-1001 CBRS Operational and Functional Requirements (Release 2) |

### 6.7.3 Method of test

#### 6.7.3.1 Initial Conditions / Test Pre-conditions

1. All the message exchanges between the SAS NRI UUT and the CBSD/DP Test Harness shall be done by using HTTPS.
2. The SAS NRI UUT shall be compliant with Enhanced CBSD Group Handling feature based upon this technical specification.
3. Unless otherwise specified, CBSDs emulated in the course of a test case are configured as follows:
   a. Enhanced CBSD Group Handling is the only feature that is supported by all the CBSDs.
   b. Principal-Subordinate Single Frequency Group is the only Group type declared by all the CBSDs in their Registration Requests.
4. The SAS NRI UUT must be reset at the beginning of each test case to a baseline state.
5. The SAS NRI UUT must whitelist FCC IDs and User IDs used in the course of a test case.

*6.7.4   Test Procedure*

6.7.4.1   [WINNF.FT.S.REL2.NRI.PSSFG.1]: Frequency Assignment and Reassignment for CBSDs in a Principal Subordinate Single Frequency Group

The objective of this configurable test case is to check if the SAS NRI UUT complies with the requirements for frequency assignment (i.e., REL2-R3-SGN-22200) and frequency reassignment (i.e., REL2-R3-SGN-22201) [n.15] for the CBSDs belonging to the same Principal-Subordinate SFG Group.
In this test case, a special testing API is used to restrict availability of some frequency ranges for particular CBSDs for the purpose of emulating the situations concerning REL2-R3-SGN-22200 and REL2-R3-SGN-22201 [n.15].

For the purpose of this test case, all request parameters for all CBSDs emulated are configured as per Table 6-8. Other required parameters not captured in Table 6-8 can be set to any valid value.

**Table 6-8: PSSFG CBSD Configurations**

| CBSD Configuration | Testing Purpose | Registration | | | | Grant Procedure | Testing API |
|---|---|---|---|---|---|---|---|
| | | FCC ID | Serial Number | PS-SFG Group ID | Role in PS-SFG | Requested frequency range | |
| CBSD 1 | REL2-R3-SGN-22200 | FCC_1 | SN_1 | PS_SFG_1 | Principal | *n/a* | FR1 to be made available to CBSD 1 (step 3). |
| CBSD 2 | REL2-R3-SGN-22200 | FCC_1 | SN_1 | PS_SFG_1 | Subordinate | *n/a* | |
| CBSD 3 | REL2-R3-SGN-22200 | FCC_1 | SN_1 | PS_SFG_1 | Subordinate | *n/a* | |
| CBSD 4 | REL2-R3-SGN-22201-c, REL2-R3-SGN-22201-d | FCC_2 | SN_2 | PS_SFG_2 | Principal | FR2 within 3550-3700 MHz range. | • FR2 to be made available to |
| CBSD 5 | REL2-R3-SGN-22201-c, REL2-R3-SGN-22201-d | FCC_2 | SN_2 | PS_SFG_2 | Subordinate | FR2 within 3550-3700 MHz range. | |

| CBSD 6 | REL2-R3-SGN-22201-c, REL2-R3-SGN-22201-d | FCC_2 | SN_2 | PS_SFG_2 | Subordinate | FR2 within 3550-3700 MHz range. | CBSD 4 (step 5). • FR2 to be made unavailable to CBSD 4 (step 8). • FR3 to be made available to CBSD 4 (step 5). |
|---|---|---|---|---|---|---|---|
| NOTE: Compliance with REL2-R3-SGN-22201-a and REL2-R3-SGN-22201-b is not tested because those requirements are functionally untestable. | | | | | | | |

| Step | Instructions |
|---|---|
| 1 | • Ensure no *cbsdIds* nor Grants exists in the SAS NRI UUT for the 6 CBSDs being tested. <br> • REG-Conditional parameters for some of the CBSDs shall already be pre-loaded into the SAS NRI UUT. |
| 2 | The DP Test Harness sends Registration Request Message for the 6 CBSDs to the SAS NRI UUT as configured per Table 6-8. <br> ○ |
| CHECK | The SAS NRI UUT approves the request and sends a Registration Response as follows: <br> • All CBSDs <br>   ○ Includes valid *cbsdId* for the CBSD. <br>   ○ The *responseCode* parameter is 0 (SUCCESS) indicating an approved Registration <br>   ○ *sasFeatureCapabilityList* shall be included with FID list containing atleast FID: WF_ENH_GROUP_HANDLING <br>   ○ *groupingConfig:* <br>     ▪ *groupType* is set to "PRINCIPAL_SUBORDINATE_SFG" <br>     ▪ *groupId* is set to **PSSFG₁** <br>     ▪ *supportedBySas* set to **true** <br><br> *If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it proceeds* |
| 3 | The special Testing API provides a command to the SAS NRI UUT, as described in the "Testing API" column of Table 6-8, making only a frequency range FR1 within 3550-3700 MHz available to the CBSD 1. |
| 4 | The DP Test Harness sends a Spectrum Inquiry Request Message to the SAS NRI UUT for the CBSDs belonging to PS_SFG_1. |

| CHECK | The SAS NRI UUT sends a Spectrum Inquiry Response Message as follows:<br>• For all CBSDs belonging to PS_SFG_1:<br> ○ *cbsdId*: Included and set to the valid value;<br> ○ *availableChannel*: One *AvailableChannel* object indicating FR1 is included in this array-type parameter.<br> ○ *responseCode*: 0 (SUCCESS)<br>*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it proceeds* |
|---|---|
| 5 | The special Testing API provides a command to the SAS NRI UUT, as described in the "Testing API" column of Table 6-8, making only a frequency range FR2 within 3550-3700 MHz available to the CBSD 4. |
| 6 | ○ The DP Test Harness sends a Grant Requests Message to the SAS NRI UUT for the CBSDs belonging to PS_SFG_2, where requested frequency range is FR2 for all the CBSDs. |
| CHECK | The SAS NRI UUT sends a Grant Response Message as follows:<br>• For all the CBSDs belonging to PS_SFG_2:<br> ○ *cbsdId*: Included and set to valid value;<br> ○ *grantId*: Included and set to valid value;<br> ○ *grantExpireTime*: Included and set to valid value;<br> ○ *heartbeatInterval*: Included and set to valid value;<br> ○ *channelType*: Included and set to "GAA";<br> ○ *responseCode*: 0 (SUCCESS);<br><br>*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it proceeds* |
| 7 | DP Test Harness successfully exchanges Heartbeat with the SAS NRI UUT for the Grants approved in Step 6 and keeps them in *Authorized* State. |
| 8 | The special Testing API provides a command to the SAS NRI UUT, as described in the "Testing API" column of Table 6-8, as follows:<br>• Make the frequency range FR2 unavailable to the CBSD 4; and<br>• Make the frequency range FR3 available to the CBSD 4; |
| 9 | DP Test Harness sends a Heartbeat Request Message to the SAS NRI UUT for the Grants approved in Step 6, where *grantRenew* is not included for all the Grants. |
| CHECK | The SAS NRI UUT sends a Heartbeat Response Message as follows:<br>• For CBSD 4:<br> ○ *cbsdId*: Included and set to valid value;<br> ○ *grantId*: Included and set to valid value;<br> ○ *responseCode*: 500 (TERMINATED_GRANT)<br> ○ At least either *operationParam* or *operationParamArray* is included, where *operationFrequencyRange* indicates FR3. |

- For CBSD 5 and 6:
  - *cbsdId*: Included and set to valid value;
  - *grantId*: Included and set to valid value;
  - *responseCode*: 500 (TERMINATED_GRANT)
  - *operationParam*: may be included. If included, *operationFrequencyRange* in this parameter indicates FR3 for all the CBSDs.
  - *operationParamArray*: may be included. If included, at least *operationFrequencyRange* indicating FR3 is included for all the CBSDs. Other frequency ranges, if included, are also exactly the same among all the CBSDs.

*If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it PASSES.*

# 7   SAS-SAS Interface Conformance Test Specifications

## 7.1   SAS-SAS Full Activity Dump Message

### 7.1.1   Definition, Applicability, and Scope of the Test Case

This section provides test steps, conditions, and procedures of test cases for SAS Release 2 implementation of the Full Activity Dump exchange procedure.  SAS NRI UUT shall have valid certificates and information to send message to SAS NRI Test Harness, and vice versa.

### 7.1.2   Test Characteristics

**Table 7-1 SAS-SAS Full Activity Dump Test Characteristics**

| 1 | **Test ID** | WINNF.PT.S.REL2.NRI.FAD |
|---|---|---|
| 2 | **Title** | SAS-SAS Full Activity Dump Message |
| 3 | **Working Group / Entity** | WG3 |
| 4 | **Test Type** | Protocol |
| 5 | **Test Class** | Certification |
| 6 | **Component / Interface** | SAS / SAS ← → SAS |
| 7 | **Target Specification / Feature** | [n.4] |

### 7.1.3   Method of test

#### 7.1.3.1   Initial Conditions / Test Pre-conditions

- SAS NRI UUT can establish a TLS session with SAS NRI Test Harness, as well as the other way around.

- The SAS NRI UUT must be reset at the beginning of each test case to a Baseline State.

- Unless otherwise specified, SAS NRI Test Harnesses used in the course of a test case are assumed to be whitelisted with the SAS NRI UUT.

- All SAS Administrators shall adhere to information sharing requirements as described in [n.6, R2-ISC-07]

- Only NRI features defined in WINNF-TS-3003 [n.12] are used in this test case.

### 7.1.4   Test Procedure

#### 7.1.4.1   [WINNF.PT.S.REL2.NRI.FAD.1] [Configurable] SAS NRI UUT Response to a Full Activity Dump Pull Request

This test verifies that a SAS NRI UUT can successfully respond to a Full Activity Dump Request from a SAS NRI Test Harness, and that responses to all SAS NRI Test Harnesses are consistent.

| Step | Instructions |
|---|---|
| 1 | Use Admin NRI Test Harness to configure the SAS NRI UUT to whitelist N1 > 0 FCC IDs and N1 user IDs. |
| 2 | Admin NRI Test Harness injects SAS Feature Capability Record into SAS NRI UUT that includes *SasFeatureCapability* object containing an array of *featureCapabilityList* Operationally-Supported by SAS NRI UUT. |
| 3 | Send a valid Registration Request Message for N1 CBSDs to the SAS NRI UUT. Verify that the SAS NRI UUT *responseCode* for each *registrationRequest* is SUCCESS. |
| 4 | Admin NRI Test Harness injects information about N2 > 0 PPAs into the SAS NRI UUT. |
| 5 | Send a valid Grant Request Message with N1 elements (one per registered CBSD). Verify that the *responseCode* for each is SUCCESS. |
| 6 | Admin NRI Test Harness injects information about N3 > 0 ESC sensors into the SAS NRI UUT. |
| 7 | Notify the SAS NRI UUT about N4 > 0 SAS NRI Test Harnesses |
| 8 | Trigger the SAS NRI UUT to generate a Full Activity Dump. |
| 9 | Send a Full Activity Dump Request to the SAS NRI UUT. |
| CHECK | The SAS NRI UUT response to the request must satisfy all of the following conditions:<br>• HTTP status code shall be 200 (success).<br>• The message includes all required fields and the fields are syntactically correct.<br><br>*If the any of the above conditions is not met, the SAS FAILS this test. Otherwise, PROCEED.* |
| 10 | The first SAS NRI Test Harness retrieves all of the data in the Full Activity Dump. |
| CHECK | The SAS NRI UUT response to each data retrieval request shall be HTTP 200 (success). The SAS responses must collectively satisfy all of the following conditions:<br>• Exactly all Operationally-Supported FIDs are included<br>• Exactly N1 CBSDs are included, each with parameters corresponding to the Registrations and Grants in Steps 2-3.<br>• Exactly N2 PPAs are included, each with parameters corresponding to the information loaded in Step 4.<br>• Exactly N3 ESC sensors are included, each with parameters corresponding to the information loaded in Step 5. |

| | |
|---|---|
| | • All required field exists, and no banned content [n.6, R2-ISC-06, R2-ISC-07] is included.<br><br>*If the any of the above conditions is not met, the SAS FAILS this test. Otherwise, PROCEED.* |
| 11 | If N4 > 1, the remaining SAS NRI Test Harnesses retrieve all of the data in the Full Activity Dump from the SAS NRI UUT. |
| CHECK | The data retrieved by each SAS NRI Test Harness is consistent with the data retrieved in Step 10.<br><br>*If the any of the above conditions is not met, the SAS FAILS this test. Otherwise, it PASSES.* |

### 7.1.4.2 [WINNF.PT.S.REL2.NRI.FAD.2] [Configurable] Full Activity Dump Pull Command by SAS NRI UUT

This test verifies that a SAS NRI UUT can successfully request a Full Activity Dump and utilize the retrieved data.

| Step | Instructions |
|---|---|
| 1 | Configure the SAS NRI UUT to whitelist the FCC IDs and user IDs that will be used in Steps 5 and 9 and the FCC IDs that will be used in Steps 4 and 8. |
| 2 | Configure the SAS NRI Test Harness with an array of Operationally-Supported FIDs |
| 3 | Configure the SAS NRI Test Harness with information about 1 ESC sensor. |
| 4 | Configure the SAS NRI Test Harness with information about 1 CBSD (C1) with 1 Grant (G1). Ensure that the CBSD is in the neighborhood area of the ESC sensor and that the *maxEIRP* for G1 is sufficiently high to support Step 6. |
| 5 | Send a valid Registration Request for 1 CBSD (C2) to the SAS NRI UUT. Ensure that the CBSD is in the neighborhood area of the ESC sensor. Verify that the *responseCode* is SUCCESS. |
| 6 | Send a valid Grant Request Message for CBSD C2 to the SAS NRI UUT. Set *maxEirp* such that that the Grant (G2) is initially accepted but, after exchanging data with the SAS NRI Test Harness and executing IAP, the EIRP will need to be reduced. Verify that the *responseCode* is SUCCESS. |
| 7 | Configure the SAS NRI Test Harness with information about 1 PPA. |
| 8 | Configure the SAS NRI Test Harness with information about 1 CBSD (C3) with 1 Grant (G3). Ensure that the CBSD is in the neighborhood area of the PPA and that its EIRP is sufficiently high to support Step 10. |
| 9 | Send a valid Registration Request Message for 1 CBSD (C4) to the SAS NRI UUT. Ensure that the CBSD is in the neighborhood area of the PPA. Ensure that the Registration Request message is configured in such a way that the *responseCode* is SUCCESS. |
| 10 | Send a valid Grant Request Message for CBSD C4 to the SAS NRI UUT. Set *maxEirp* such that that the Grant (G4) is initially accepted but, after exchanging data with the SAS NRI Test Harness and executing IAP, the EIRP will need to be reduced. Ensure that the Grant Request message is configured in such a way that the *responseCode* is SUCCESS. |
| 11 | Send a valid Heartbeat Request Message for Grants G2 and G4. |
| 12 | Notify the SAS NRI UUT about the SAS NRI Test Harness. |
| 13 | Trigger CPAS in the SAS NRI UUT. Verify that the CPAS have completed. |
| CHECK | The FAD Data retrieved by SAS NRI UUT shall include exactly all Operationally-Supported FIDs in Step 2 for the SAS NRI Test Harness<br><br>*If the any of the above conditions is not met, the SAS FAILS this test. Otherwise, PROCEED.* |
| 14 | Send a valid Heartbeat Request Message for Grants G2 and G4. |
| CHECK | The SAS response must satisfy all of the following conditions:<br>• The response shall contain 2 *HeartbeatResponse* objects. |

- For each *HeartbeatResponse* object:
  - The *responseCode* shall be either GRANT_TERMINATED or INVALID_VALUE, indicating a terminated Grant.

The Data retrieved by SAS NRI UUT shall include exactly all Operationally-Supported FIDs in Step 2

*If the any of the above conditions is not met, the SAS FAILS this test. Otherwise, it PASSES.*

# 8 Appendix A (Informative) Document History

**Table 8-1: Document History**

| Document history | | |
|---|---|---|
| V1.0.0 | 3 May 2021 | Initial release |
| V1.1.0 | 22 Dec 2023 | Implemented WinnF-I-23-00053 r3<br><br>Implemented WinnF-I-23-00085 r1 - FW-CR on EAP NRI Test<br><br>Implemented WinnF-I-23-00070 r1 - CR on CPE and PDG and PSSFG Test Cases in TS-4003 |
| | | |
| | | |