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

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# Table of Contents

**TERMS, CONDITIONS & NOTICES**...i

Contributors ...v

1 Introduction ..................................................1

2 Scope ..................................................1

3 References ..................................................2

  3.1 Normative references ......................................2

  3.2 Informative references ....................................3

4 Definitions and Abbreviations ..................................5

  4.1 Abbreviations ............................................5

  4.2 Definitions ...............................................6

5 General Principles of Certification Test Cases ..................8

  5.1 Test ID Definition ..........................................8

  5.2 Test Triggers ...............................................11

  5.3 Test Tools Required .........................................11

  5.4 Baseline State of the SAS NRI UUT .........................12

  5.5 Mapping between Test Cases and Release 2 Features ..........12

6 SAS-CBSD Interface Conformance Test Specifications ..........16

  6.1 CBSD Registration Procedure ..............................16

    6.1.1 Definition, Applicability, and Scope of the Test Case ........16

    6.1.2 Test Characteristics ..................................16

    6.1.3 Method of test ..........................................16

    6.1.4 Test Procedure ..........................................17

  6.2 Deprecated ................................................21

  6.3 Enhanced CBSD Group Handling Procedure .....................21

    6.3.1 Definition, Applicability, and Scope of the Test Case ..........21

    6.3.2 Test Characteristics ..................................21

    6.3.3 Method of test ..........................................21

    6.3.4 Test Procedure ..........................................22

  6.4 Testing for the Enhanced Antenna Pattern Feature ............54

    6.4.1 Definition, Applicability, and Scope of the Test Case ..........54

    6.4.2 Test Characteristics ..................................54

    6.4.3 Method of test ..........................................54

    6.4.4 Test Procedure ..........................................56

  6.5 CPE-CBSD Indicator Handling Procedure ......................61

    6.5.1 Definition, Applicability, and Scope of the Test Case ..........61

    6.5.2 Test Characteristics ..................................61

    6.5.3 Method of test ..........................................61

    6.5.4 Test Procedure ..........................................62

  6.6 Passive DAS Group – Functional Tests ........................64

    6.6.1 Definition, Applicability, and Scope of the Test Case ..........64

    6.6.2 Test Characteristics ..................................64

    6.6.3 Method of test ..........................................64

    6.6.4 Test Procedure ..........................................65

  6.7 Principal Subordinate Single Frequency Group – Functional Tests ..70
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.7.1</td>
<td>Definition, Applicability, and Scope of the Test Case</td>
</tr>
<tr>
<td>6.7.2</td>
<td>Test Characteristics</td>
</tr>
<tr>
<td>6.7.3</td>
<td>Method of test</td>
</tr>
<tr>
<td>6.7.4</td>
<td>Test Procedure</td>
</tr>
<tr>
<td>7</td>
<td>SAS-SAS Interface Conformance Test Specifications</td>
</tr>
<tr>
<td>7.1</td>
<td>SAS-SAS Full Activity Dump Message</td>
</tr>
<tr>
<td>7.1.1</td>
<td>Definition, Applicability, and Scope of the Test Case</td>
</tr>
<tr>
<td>7.1.2</td>
<td>Test Characteristics</td>
</tr>
<tr>
<td>7.1.3</td>
<td>Method of test</td>
</tr>
<tr>
<td>7.1.4</td>
<td>Test Procedure</td>
</tr>
<tr>
<td>8</td>
<td>Appendix A (Informative) Document History</td>
</tr>
</tbody>
</table>
List of Tables

Table 5-1 The values of TestRequirement in Test ID ................................................................. 9
Table 5-2 The values of TestCategory in Test ID ................................................................. 9
Table 5-3 The values of UnitUnderTest in Test ID ................................................................. 9
Table 5-4 The values of TestFunction in Test ID ................................................................. 9
Table 5-5 The values of X in Test ID .................................................................................... 11
Table 5-6: Test Case Classification (for Table 5.7) ................................................................ 12
Table 5-7: Test Cases Required or Optional for Release 2 Features .................................. 13
Table 6-1: CBSD Registration Procedure Test Characteristics ........................................... 16
Table 6-2: Enhanced CBSD Group Handling Procedure Test Characteristics .................. 21
Table 6-3: CBSD Group Membership Declaration in Each Procedure .............................. 34
Table 6-4: CBSD Group Membership Declaration in Each Procedure .............................. 47
Table 6-5: Enhanced Antenna Pattern Procedure Test Characteristics .............................. 54
Table 6-6: CPE-CBSD Indicator Test Characteristics ............................................................ 61
Table 6-7: Passive DAS CBSD Configurations ...................................................................... 65
Table 6-8: PSSFG CBSD Configurations .............................................................................. 71
Table 7-1 SAS-SAS Full Activity Dump Test Characteristics .............................................. 75
Table 8-1: Document History ............................................................................................... 80
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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.


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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WINNF</td>
<td>This test is to verify a Technical Specifications provided by Wireless Innovation Forum</td>
</tr>
</tbody>
</table>

Table 5-2 The values of TestCategory in Test ID

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT</td>
<td>This test is a functional test</td>
</tr>
<tr>
<td>IT</td>
<td>This test is an interoperability test</td>
</tr>
<tr>
<td>PT</td>
<td>This test is a performance test</td>
</tr>
</tbody>
</table>

Table 5-3 The values of UnitUnderTest in Test ID

<table>
<thead>
<tr>
<th>Value</th>
<th>Unit under test</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>SAS</td>
</tr>
<tr>
<td>C</td>
<td>CBSD/DP</td>
</tr>
<tr>
<td>E</td>
<td>ESC</td>
</tr>
<tr>
<td>SC</td>
<td>SAS and CBSD</td>
</tr>
<tr>
<td>SS</td>
<td>SAS and SAS</td>
</tr>
</tbody>
</table>

Table 5-4 The values of TestFunction in Test ID

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXZ</td>
<td>Exclusion Zone enforcement test</td>
</tr>
<tr>
<td>REG</td>
<td>CBSD Registration procedure</td>
</tr>
<tr>
<td>SIQ</td>
<td>CBSD Spectrum inquiry procedure</td>
</tr>
<tr>
<td>GRA</td>
<td>CBSD Grant procedure</td>
</tr>
<tr>
<td>------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>HBT</td>
<td>CBSD Heartbeat procedure</td>
</tr>
<tr>
<td>MES</td>
<td>CBSD Measurement report</td>
</tr>
<tr>
<td>RLQ</td>
<td>CBSD Grant Relinquishment procedure</td>
</tr>
<tr>
<td>DRG</td>
<td>CBSD Deregistration procedure</td>
</tr>
<tr>
<td>SCS</td>
<td>SAS-CBSD Security validation</td>
</tr>
<tr>
<td>EPR</td>
<td>ESC Protection</td>
</tr>
<tr>
<td>IPR</td>
<td>Federal Incumbent Protection</td>
</tr>
<tr>
<td>FPR</td>
<td>FSS Protection</td>
</tr>
<tr>
<td>GPR</td>
<td>GWPZ Protection</td>
</tr>
<tr>
<td>PPR</td>
<td>PPA Protection</td>
</tr>
<tr>
<td>MCP</td>
<td>Multi-Constraint Protection</td>
</tr>
<tr>
<td>BPR</td>
<td>Border Protection</td>
</tr>
<tr>
<td>PCR</td>
<td>PPA Creation</td>
</tr>
<tr>
<td>FDB</td>
<td>Federal Government Database</td>
</tr>
<tr>
<td>WDB</td>
<td>WINNF Database</td>
</tr>
<tr>
<td>PAT</td>
<td>Propagation Model and Antenna gain</td>
</tr>
<tr>
<td>SSS</td>
<td>SAS-SAS Security, Authentication and Encryption Protocols</td>
</tr>
<tr>
<td>FAD</td>
<td>Full Activity Dump Message</td>
</tr>
<tr>
<td>FCE</td>
<td>Feature Capability Exchange</td>
</tr>
<tr>
<td>EGH</td>
<td>Enhanced CBSD Group Handling</td>
</tr>
<tr>
<td>EAP</td>
<td>Enhanced Antenna Pattern</td>
</tr>
<tr>
<td>CPE</td>
<td>CPE-CBSD Indicator</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>REL2.M</th>
<th>Mandatory for WInnForum Release 2 Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>REL2.C</td>
<td>Conditional. Required to execute the test case if SAS NRI UUT supports relevant functionality. See Table 5.7 for definition of conditional notation.</td>
</tr>
<tr>
<td>REL2.D</td>
<td>Deprecated. Test no longer required.</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Rel 2 Feature</th>
<th>Feature Reference Section</th>
<th>Test Case ID</th>
<th>Test Case Title</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feature Capability Exchange [n.15], [n.11]</td>
<td>6 [n.15] 6.2, 8.2, 8.3, 8.4, 8.5-8.15 [n.11]</td>
<td>WINNF.PT.S.REL2.NRI.REG.1</td>
<td>Array Multi-Step for a combination of Release 1 and Release 2 CBSDs</td>
<td>6.1.4.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WINNF.PT.S.REL2.NRI.REG.2</td>
<td>Array Single-Step Registration for a combination of Release 1 and Release 2 CBSDs</td>
<td>6.1.4.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WINNF.PT.S.REL2.NRI.REG.3</td>
<td>Invalid cbsdFeatureCapabilityList in Array Registration Request (responseCode 103)</td>
<td>6.1.4.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WINNF.PT.S.REL2.NRI.REG.4</td>
<td>[Configurable] CBSD Feature Capability List cbsdFeatureCapabilityList exchange</td>
<td>6.1.4.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Deprecated</td>
<td>6.2.4.1, 6.2.4.2, 6.2.4.3</td>
</tr>
<tr>
<td>Enhanced CBSD Group Handling [n.15]</td>
<td>Annex 1, [n.15], 6.3, 8, [n.11]</td>
<td>WINNF.PT.S.REL2.NRI.EGH.1</td>
<td>Release 2 CBSDs exchange messages with Group types that are supported and not supported by SAS</td>
<td>6.3.4.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Deprecated</td>
<td>6.3.4.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WINNF.PT.S.REL2.NRI.EGH.3</td>
<td>Release 2 CBSD changes the Group it belongs to on the messages</td>
<td>6.3.4.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Deprecated</td>
<td>6.3.4.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WINNF.PT.S.REL2.NRI.EGH.5</td>
<td>Release 1 based Grouping Information Exchange with Release 1 CBSD and Release 2 CBSD not supporting Enhanced CBSD Group Handling feature</td>
<td>6.3.4.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WINNF.PT.S.REL2.NRI.EGH.6</td>
<td>Release 2 CBSDs send incomplete groupingParam parameter</td>
<td>6.3.4.6</td>
</tr>
<tr>
<td>Feature</td>
<td>Annex, Reference</td>
<td>Specification</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------</td>
<td>--------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Enhanced Antenna Patterns [n.15], WF_ENH_ANTENNA_PATTERN [n.11]</td>
<td>Annex 5, [n.15], 6.4, 8.2-8.3, [n.11]</td>
<td>WINNF.FT.S.REL2.NRI.EAP.1</td>
<td>Antenna gain calculation using the release 2 EAP methods</td>
<td>6.4.4.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Deprecated</td>
<td>6.4.4.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Deprecated</td>
<td>6.4.4.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Deprecated</td>
<td>6.4.4.4</td>
</tr>
<tr>
<td>CPE-CBSD Indicator WF_CPE_CBSD_INDICATOR [n.11]</td>
<td>Annex 6, [n.15], 6.5, 8.2-8.3, [n.11]</td>
<td>WINNF.PT.S.REL2.NRI.CPE.1</td>
<td>Registration and Feature Capability Exchange of Release 2 CBSDs supporting the CPE CBSD Indicator feature</td>
<td>6.5.4.1</td>
</tr>
<tr>
<td>Principal-Subordinate Single Frequency Group (SFG) [n.15]</td>
<td>Annex 2, [n.15],</td>
<td></td>
<td>All test cases required for conformance to “Enhanced CBSD Group Handling [n.15], WF_ENH_GROUP_HANDLING [n.11]”</td>
<td></td>
</tr>
<tr>
<td>Feature Capability Exchange</td>
<td>6.3.1 [n.14]</td>
<td>WINNF.FT.S.REL2.NRI.PSSFG.1</td>
<td>Frequency Assignment and Reassignment for CBSDs in a Principal Subordinate Single Frequency Group</td>
<td>6.7.4.1</td>
</tr>
<tr>
<td>-----------------------------</td>
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<td>---------------------------------------------------------------------------------</td>
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</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th></th>
<th>Test ID</th>
<th>WINNF.PT.S.REL2.NRI.REG</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Title</td>
<td>CBSD Registration Procedure</td>
</tr>
<tr>
<td>3</td>
<td>Working Group / Entity</td>
<td>WG3</td>
</tr>
<tr>
<td>4</td>
<td>Test Type</td>
<td>Protocol</td>
</tr>
<tr>
<td>5</td>
<td>Test Class</td>
<td>Certification</td>
</tr>
<tr>
<td>6</td>
<td>Component / Interface</td>
<td>SAS / CBSD ↔ SAS</td>
</tr>
<tr>
<td>7</td>
<td>Target Specification</td>
<td>[n.4, n.11]</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ensure no <code>cbsdId</code> 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. SAS Administrator configures Admin NRI Test Harness with the SAS Operationally-Supported FIDs offline.</td>
</tr>
</tbody>
</table>
| 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:  
  - For at least one CBSD, `cbsdFeatureCapabilityList*` is included  
  - For at least one CBSD, `cbsdFeatureCapabilityList*` 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:  
  - SAS response includes a valid `cbsdId` for each CBSD.  
  - The `responseCode` parameter contained in the `response` parameter is 0 for each CBSD concluding an approved Registration  
  - SAS response for CBSDs that included `cbsdFeatureCapabilityList*` 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).  
  - SAS response for CBSDs that did not include `cbsdFeatureCapabilityList*` in their requests in Step 2, shall not contain `sasFeatureCapabilityList` parameter |

*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)

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ensure no \textit{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. SAS Administrator configures Admin NRI Test Harness with the SAS Operationally-Supported FIDs offline.</td>
</tr>
</tbody>
</table>
| 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 \textit{userId}, \textit{fccId}, \textit{cbsdSerialNumber}, and \textit{cbsdFeatureCapabilityList*}, plus all REG-Conditional parameters for Cat A CBSDs. Additionally, for Cat B CBSDs, ensure that:  
  - All REG-Conditional parameters are included except \textit{installationParam} outside \textit{cpiSignatureData}.  
  - For one CBSD, \textit{cbsdFeatureCapabilityList*} is included  
  - For one CBSD, \textit{cbsdFeatureCapabilityList*} 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:  
- SAS response includes a valid \textit{cbsdId} for each CBSD.  
- The \textit{responseCode} parameter contained in the \textit{response} parameter is 0 for each CBSD concluding an approved Registration  
- SAS response for CBSDs that included \textit{cbsdFeatureCapabilityList*} in their requests in Step 2, shall contain \textit{sasFeatureCapabilityList} parameter with one or more SAS Operationally-Supported valid FIDs (FID_1, FID_2, etc), or with one set to [] (for zero FID).  
- SAS response for CBSDs that did not include \textit{cbsdFeatureCapabilityList*} in their requests in Step 2, shall not contain \textit{sasFeatureCapabilityList} parameter

*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)

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>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. SAS Administrator configures Admin NRI Test Harness with the SAS Operationally-Supported FIDs offline.</td>
</tr>
</tbody>
</table>
| 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:  
- valid userId, fccId, cbsdSerialNumber, and cbsdFeatureCapabilityList, for the first CBSD  
- valid userId, fccId, and cbsdSerialNumber, but a wrongly-formatted cbsdFeatureCapabilityList 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:  
- SAS response includes a valid cbsdId for the first CBSD.  
- 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).  
- The responseCode parameter contained in the response parameter is 0 for the first CBSD concluding an approved Registration  
- The responseCode parameter contained in the response parameter is 103 for the second CBSD, concluding failed Registrations.  

*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 respondCode(s) to verify if they match the expected respondCode(s) as specified in the respective input configuration file.

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Configure the SAS NRI UUT to whitelist N1 &gt;= 0 FCC IDs and N2 &gt;= 0 user IDs.</td>
</tr>
<tr>
<td>2</td>
<td>Pre-load the SAS NRI UUT with conditional Registration data for N3 &gt;= 0 CBSDs. SAS Administrator configures Admin NRI Test Harness with the SAS Operationally-Supported FIDs offline.</td>
</tr>
</tbody>
</table>
| 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:  
  - Be syntactically correct according to the SAS-CBSD specification but need not meet all application-level requirements (e.g. required fields may be missing).  
  - contain cbsdFeatureCapabilityList parameter with one set to [] (for zero FID), or one with one or more supported FIDs (FID_1, FID_2, etc) |

CHECK  
The SAS response to the Registration Request Message must satisfy all of the following conditions:  
- The response shall contain N4 RegistrationResponse objects.  
- For each RegistrationResponse object:  
  - The respondCode parameter contained in the response parameter shall match the corresponding expected response code listed in the configuration file.  
  - If respondCode == SUCCESS:  
    - verify that the response contains a valid cbsdId.  
    - verify sasFeatureCapabilityList is included with SAS Operationally-Supported valid FIDs (FID_1, FID_2, etc), or with one set to [] (for zero FID).  
  - If respondCode == FAILURE, verify that the response does not contain a cbsdId.  

*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 test 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>
<thead>
<tr>
<th></th>
<th>Test ID</th>
<th>WINNF.PT.S.REL2.NRI.EGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Title</td>
<td>Enhanced CBSD Group Handling</td>
</tr>
<tr>
<td>3</td>
<td>Working Group / Entity</td>
<td>WG3</td>
</tr>
<tr>
<td>4</td>
<td>Test Type</td>
<td>Protocol</td>
</tr>
<tr>
<td>5</td>
<td>Test Class</td>
<td>Certification</td>
</tr>
<tr>
<td>6</td>
<td>Component / Interface</td>
<td>SAS / CBSD ↔ SAS</td>
</tr>
<tr>
<td>7</td>
<td>Target Specification</td>
<td>[n.4, n.11]</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
</table>
| 1    | • Ensure that no cbsdId nor grantId for the 4 CBSDs being tested exists in the SAS.  
• All REG-Conditional parameters for the CBSDs shall already be pre-loaded into the SAS NRI UUT.  
• Ensure that no Protected Entity is present.  
• The SAS Administrator configures Admin NRI Test Harness with the Group Types supported by the SAS NRI UUT.  
  ○ Let the set of supported Group types and/or a combination of Group types and IDs be \( L_{\text{Supported}} \).  
  ○ Let the group types be denoted as \( G_1 \), \( G_2 \), \( G_3 \), and \( G_4 \).  
  ○ 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 \( L_{\text{Supported}} \).  
• 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 \( L_{\text{Unacceptable}} \). Otherwise, the list would be empty.  
• 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:  
   • For CBSD1:  
   o cbsdFeatureCapabilityList is included with FID: WF_ENH_GROUP_HANDLING  
   o groupingParam is an array of objects consisting of only one GroupParam object, where the GroupParam object is configured as follows:  
     o groupType is set to \( G_1 \)  
     o groupId is set to \( GID_{11} \) |
• All other parameters of the \textit{RegistrationRequest} object are in proper format and within acceptable ranges.

For CBSD2:
• \textit{cbsdFeatureCapabilityList} is included with FID: WF\_ENH\_GROUP\_HANDLING
• \textit{groupingParam} is an array of objects consisting of only one \textit{GroupParam} object, where the \textit{GroupParam} object is configured as follows:
  • o \textit{groupType} is set to $G_2$
  • o \textit{groupId} is set to $GID_{24}$
• All other parameters of the \textit{RegistrationRequest} object are in proper format and within acceptable ranges.

For CBSD3:
• \textit{cbsdFeatureCapabilityList} is included with FID: WF\_ENH\_GROUP\_HANDLING
• \textit{groupingParam} is an array of objects consisting of two \textit{GroupParam} objects, where each \textit{GroupParam} object is configured as follows:
  • o \textit{GroupParam Object 1}: \textit{groupType} is set to $G_2$ and \textit{groupId} is set to $GID_{32}$
  • o \textit{GroupParam Object 2}: \textit{groupType} is set to $G_3$ and \textit{groupId} is set to $GID_{33}$
• All other parameters of the \textit{RegistrationRequest} object are in proper format and within acceptable ranges.

For CBSD4:
• \textit{cbsdFeatureCapabilityList} does NOT include the FID: WF\_ENH\_GROUP\_HANDLING
• \textit{groupingParam} is an array of objects consisting of only one \textit{GroupParam} object, where the \textit{GroupParam} object is configured as follows:
  • o \textit{groupType} is set to $G_2$
  • o \textit{groupId} is set to $GID_{42}$
• All other parameters of the \textit{RegistrationRequest} object are in proper format and within acceptable ranges.

<table>
<thead>
<tr>
<th>CHECK #1</th>
<th>SAS NRI UUT returns a Registration Response Message, where each of \textit{RegistrationResponse} objects is configured as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• For CBSD 1</td>
</tr>
<tr>
<td></td>
<td>o \textit{cbsdId}:</td>
</tr>
</tbody>
</table>

CHECK #1
\begin{itemize}
  \item Shall be included.
  \begin{itemize}
    \item \textit{sasFeatureCapabilityList:}
      \begin{itemize}
        \item Shall be included with at least “WF\_ENH\_GROUP\_HANDLING”;
        \item \textit{groupingConfig} parameter includes at least one \textit{GroupConfig} object for Group Type \textit{G1} where:
          \begin{itemize}
            \item \textit{groupType} is set to \textit{G1}
            \item \textit{groupId} is set to \textit{GID\_11}
            \item \textit{supportedBySas} = true.
            \item \textit{groupConfigInfo} may optionally be included.
          \end{itemize}
        \end{itemize}
      \end{itemize}
  \end{itemize}
  \item \textit{responseCode:}
    \begin{itemize}
      \item 0 (SUCCESS)
    \end{itemize}
  \end{itemize}

For CBSD 2:
  \begin{itemize}
    \item \textit{cbsdId:}
      \begin{itemize}
        \item Shall be included if \textit{responseCode} = 0 (SUCCESS);
        \item Otherwise not included.
      \end{itemize}
    \item \textit{sasFeatureCapabilityList:}
      \begin{itemize}
        \item Shall be included and set to the array containing at least “WF\_ENH\_GROUP\_HANDLING” if \textit{responseCode} = 0 (SUCCESS);
        \item \textit{groupingConfig} parameter including one \textit{GroupConfig} object for Group Type \textit{G2} shall be included and configured as follows:
          \begin{itemize}
            \item \textit{groupType} is set to \textit{G4}
            \item \textit{groupId} is set to \textit{GID\_24}
            \item \textit{supportedBySas} = false.
            \item \textit{groupConfigInfo} parameter is NOT included.
          \end{itemize}
        \end{itemize}
    \item \textit{responseCode:}
      \begin{itemize}
        \item 0 (SUCCESS) or 201 (GROUP\_ERROR)
      \end{itemize}
    \item \textit{responseData:}
      \begin{itemize}
        \item Included with PARAM\_WARNING if \textit{responseCode} = 0 (SUCCESS).
      \end{itemize}
  \end{itemize}

For CBSD 3:
  \begin{itemize}
    \item \textit{cbsdId:}
      \begin{itemize}
        \item Shall be included if \textit{responseCode} = 0 (SUCCESS);
        \item Otherwise not included.
      \end{itemize}
    \item \textit{sasFeatureCapabilityList:}
      \begin{itemize}
        \item Shall be included with at least “WF\_ENH\_GROUP\_HANDLING” if \textit{responseCode} = 0 (SUCCESS);
      \end{itemize}
  \end{itemize}
o Includes groupingConfig parameter with two GroupConfig objects:
  ▪ GroupConfig Object 1
    • groupType is set to the G2
    • groupId is set to a GID32
    • supportedBySas = true.
    • groupConfigInfo may optionally be included.
  ▪ GroupConfig Object 2
    • groupType is set to G3
    • groupId is set to GID33
    • 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 Unacceptable includes the following combinations:
      • G2 and G3;
      • G2 + GID32 and G3;
      • G2 and G3 + GID33;
      • 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:
  • For CBSD1:
    • groupingParam is an array of objects containing only one GroupParam object, where the GroupParam object is configured as follows:
### CHECK #2

SAS NRI UUT returns a Spectrum Inquiry Response Message, where each of *SpectrumInquiryResponse* objects is configured as follows:

- For CBSD 1
  - *cbsdId*: Included with valid value.
  - *availableChannel*: Included
  - *responseCode*: 0 (SUCCESS)
  - *groupingConfig* parameter includes at least one *GroupConfig* object for Group Type G1, where:
    - **groupType** is set to G1
    - **groupId** is set to GID\(_{11}\)
    - **supportedBySas** = true.
    - **groupConfigInfo** may optionally be included.

- For CBSD 2 (if *SpectrumInquiryRequest* for CBSD 2 was sent to the SAS NRI UUT in the step 3)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CBRS Committee Work Group 4 (CBRS Test)</td>
<td>CBRS Release 2 Non-Regulatory Impacting (NRI) Test Specification for SAS as UUT</td>
</tr>
<tr>
<td>WINNF-TS-4003-V1.1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cbsdId: Included with valid value.</td>
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<td>-----------------------------------</td>
</tr>
<tr>
<td></td>
<td>availableChannel: Included</td>
</tr>
<tr>
<td></td>
<td>responseCode: 0 (SUCCESS)</td>
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<tr>
<td></td>
<td>groupingConfig parameter includes at least one GroupConfig object for Group Type G₁, where:</td>
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<tr>
<td></td>
<td>For CBSD 3 (if SpectrumInquiryRequest for CBSD 3 was sent to the SAS NRI UUT in the step 3)</td>
</tr>
<tr>
<td></td>
<td>cbsdId: Included with valid value.</td>
</tr>
<tr>
<td></td>
<td>availableChannel: Included</td>
</tr>
<tr>
<td></td>
<td>Includes groupingConfig parameter with two GroupConfig objects:</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>responseCode: 0 (SUCCESS) or 105 (DEREGISTER)</td>
</tr>
<tr>
<td></td>
<td>responseData: Included with</td>
</tr>
<tr>
<td></td>
<td>MULTI_GROUP_HANDLING_WARNING” if</td>
</tr>
<tr>
<td></td>
<td>responseCode = 0 (SUCCESS) and Unacceptable includes the following combinations:</td>
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</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The CBSD/DP NRI Test Harness sends a Grant Request message for CBSDs registered in Step 2, where each of <em>GrantRequest</em> objects is configured as follows:</td>
</tr>
</tbody>
</table>

For CBSD1:

- *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 *GrantRequest* 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 *GrantRequest* object are in proper format and within acceptable ranges.

For CBSD3 (Included if *responseCode* = 0 in CHECK#2):

- *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 *GrantRequest* object are in proper format and within acceptable ranges.

**CHECK #3**

SAS NRI UUT returns a Grant Response Message, where each of *GrantResponse* objects is configured as follows:

- For CBSD 1
  - *cbsdId*: Included with valid value.
  - *grantId*: Included with valid value.
  - *responseCode*: 0 (SUCCESS)
  - *groupingConfig* parameter includes at least one *GroupConfig* object for Group Type $G_1$, where:
    - *groupType* is set to $G_1$
- **groupId** is set to $GID_{11}$
- **supportedBySas** = true.
- **groupConfigInfo** may optionally be included.

- For CBSD 2 (if 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 
      $\text{LUnacceptable}$ includes 
      the following combinations:
      - $G_2$ and $G_3$;
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.

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:

For CBSD1:
- `groupingParam` is an array of objects containing only one GroupParam object, where the GroupParam object is configured as follows:
  - `groupName` is set to G1
  - `groupId` is set to GID11
- All other parameters of the HeartbeatRequest 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:
  - `groupName` is set to G2
  - `groupId` is set to GID22
- All other parameters of the HeartbeatRequest object are in proper format and within acceptable ranges.

For CBSD3 (Included if `responseCode` = 0 in CHECK#3):
- `groupingParam` is an array of objects containing two GroupParam objects, where each GroupParam object is configured as follows:
  - `GroupParam Object 1`: `groupName` is set to G2 and `groupId` is set to GID32
  - `GroupParam Object 2`: `groupName` is set to G3 and `groupId` is set to GID33
- 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:
- For CBSD 1
  - `cbsdId`: Included with valid value.
  - `grantId`: Included with valid value.
- `responseCode`: 0 (SUCCESS) or 501 (SUSPENDED_GRANT)
- `grantExpireTime` is set to UTC time greater than duration of the test
- `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)
  - `cbsdId`: Included with valid value.
  - `grantId`: Included with valid value.
  - `responseCode`: 0 (SUCCESS) or 501 (SUSPENDED_GRANT)
  - `grantExpireTime` is set to UTC time greater than duration of the test
  - `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)
  - `cbsdId`: Included with valid value.
  - `grantId`: Included with valid value.
  - `grantExpireTime` is set to UTC time greater than duration of the test
  - Includes `groupingConfig` parameter with two `GroupConfig` objects:
    - `GroupConfig` Object 1
      - `groupBySas` is set to \(G_2\)
      - `groupId` is set to \(GID_{32}\)
      - `supportedBySas` = true.
      - `groupConfigInfo` may optionally be included.
    - `GroupConfig` Object 2
      - `groupBySas` is set to \(G_3\)
      - `groupId` is set to \(GID_{33}\)
      - `supportedBySas` = true.
• groupConfigInfo may optionally be included.

  o responseCode:
    ▪ 0 (SUCCESS), 501 (SUSPENDED_GRANT) or 105 (DEREGISTER)

  o responseData:
    ▪ Included with "MULTI_GROUP_HANDLING_WARNING" if responseCode = 0 (SUCCESS) and 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

<table>
<thead>
<tr>
<th>CBSD</th>
<th>Registration</th>
<th>Spectrum Inquiry</th>
<th>Grant</th>
<th>Heartbeat</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBSD 1</td>
<td>G1</td>
<td>G2</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>CBSD 2</td>
<td>G1</td>
<td>G1, G2</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>CBSD 3</td>
<td>G1</td>
<td>G1, G3</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>CBSD 4</td>
<td>G1</td>
<td>n/a</td>
<td>G2</td>
<td>n/a</td>
</tr>
<tr>
<td>CBSD 5</td>
<td>G1</td>
<td>n/a</td>
<td>G1, G2</td>
<td>n/a</td>
</tr>
<tr>
<td>CBSD 6</td>
<td>G1</td>
<td>n/a</td>
<td>G1, G3</td>
<td>n/a</td>
</tr>
<tr>
<td>CBSD 7</td>
<td>G1</td>
<td>n/a</td>
<td>G1</td>
<td>G2</td>
</tr>
<tr>
<td>CBSD 8</td>
<td>G1</td>
<td>n/a</td>
<td>G1</td>
<td>G1, G2</td>
</tr>
<tr>
<td>CBSD 9</td>
<td>G1</td>
<td>n/a</td>
<td>G1</td>
<td>G1, G3</td>
</tr>
</tbody>
</table>

**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.

**NOTE 2:** “n/a” indicates request message is not sent by the CBSD concerned.

**NOTE 3:** “Disassociation” from a particular Group is not emulated because it is untestable for the SAS NRI UUT.

### Step Instructions

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
</table>
| 1    | • Ensure that neither cbasdId nor grantId for the 9 CBSDs being tested exists in the SAS.  
• All REG-Conditional parameters for the CBSDs shall already be pre-loaded into the SAS NRI UUT.  
• 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.  
• The SAS Administrator configures Admin NRI Test Harness with the Group Types supported by the SAS NRI UUT. |
Let the set of supported Group types and/or a combination of Group types and IDs be $L_{\text{Supported}}$.

Let the group types used for this test case be denoted as $G_1$, $G_2$ and $G_3$.

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 $L_{\text{Supported}}$.

**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:

For all CBSDs:

- `$cbsdFeatureCapabilityList` is included with FID: `WF_ENH_GROUP_HANDLING`
- `$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 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:

- For all CBSDs:
  - `$cbsdId`: Included and set to the valid value.
  - `$sasFeatureCapabilityList`: Included and set to the array containing at least the FID “`WF_ENH_GROUP_HANDLING`”;
  - `groupingConfig` parameter includes at least one `GroupConfig` object for Group Type $G_1$, where:
    - `groupType` is set to $G_1$
    - `groupId` is set to $GID_1$
    - `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 2 shall be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, proceed to the next step.*
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):
  - `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:
    - `groupType`: G2
    - `groupId`: GID2
  - 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):
  - `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:
    - `GroupParam` object for Group G1:
      - `groupType`: G1
      - `groupId`: GID1
    - `GroupParam` object for Group G2:
      - `groupType`: G2
      - `groupId`: GID2
  - 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):
  - `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:
    - `GroupParam` object for Group G1:
      - `groupType`: G1
      - `groupId`: GID1
    - `GroupParam` object for Group G3:
      - `groupType`: G3
      - `groupId`: GID3
### CHECK #2

SAS NRI UUT approves the request and sends a Spectrum Response as follows:

**CBSD 1**
- `cbsdId`: Included and set to the valid value as received in step 3;
- `availableChannel`: Included.
- `groupingConfig`: Contains only one `GroupConfig` object configured as follows:
  - `groupType`: G\textsubscript{2}
  - `groupId`: GID\textsubscript{2}
  - `supportedBySas`: true
  - `groupConfigInfo`: May optionally be included;
- `responseCode`: 0 (SUCCESS)

**CBSD 2**
- `cbsdId`: Included and set to the valid value as received in step 3
- `availableChannel`: Included
- `groupingConfig`: Contains two `GroupConfig` objects, each of which is configured as follows:
  - **GroupParam** object for Group G1:
    - `groupType`: G\textsubscript{1}
    - `groupId`: GID\textsubscript{1}
    - `supportedBySas`: true
    - `groupConfigInfo`: may optionally be included;
  - **GroupParam** object for Group G2:
    - `groupType`: G\textsubscript{2}
    - `groupId`: GID\textsubscript{2}
    - `supportedBySas`: true
    - `groupConfigInfo`: may optionally be included;
- `responseCode`: 0 (SUCCESS);

**CBSD 3**
- `cbsdId`: Included and set to the valid value as received in step 3
- `availableChannel`:
  - Included if `responseCode` = 0 (SUCCESS)
- Otherwise not included.
  - `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`: 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.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The CBSD/DP NRI Test Harness sends a Grant Request message for CBSDs 4-9, where each <code>GrantRequest</code> object is configured as follows:</td>
</tr>
<tr>
<td></td>
<td>- <code>cbsdId</code>: Set to the valid value as provided by the SAS NRI UUT in the step 2</td>
</tr>
<tr>
<td></td>
<td>- <code>groupingParam</code> is an array containing only one <code>GroupParam</code> object, where the <code>GroupParam</code> object is configured as follows:</td>
</tr>
<tr>
<td></td>
<td>- <code>groupType</code>: G2</td>
</tr>
<tr>
<td></td>
<td>- <code>groupId</code>: GID2</td>
</tr>
<tr>
<td></td>
<td>- All other parameters in the <code>GrantRequest</code> object are in proper format and within acceptable ranges.</td>
</tr>
<tr>
<td></td>
<td>For CBSD 5 (Addition of new Group membership, which is supported by the SAS NRI UUT):</td>
</tr>
<tr>
<td></td>
<td>- <code>cbsdId</code>: Set to the valid value as provided by the SAS NRI UUT in the step 2</td>
</tr>
<tr>
<td></td>
<td>- <code>groupingParam</code> is an array containing two <code>GroupParam</code> objects, where each <code>GroupParam</code> object is configured as follows:</td>
</tr>
<tr>
<td></td>
<td>- <code>GroupParam</code> object for Group G1:</td>
</tr>
</tbody>
</table>
▪ groupType: G1
▪ groupId: GID1
  ○ GroupParam object for Group G2:
  ▪ groupType: G2
  ▪ groupId: GID2
  • 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):

• cbisdId: 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:
  ○ GroupParam object for Group G1:
    ▪ groupType: G1
    ▪ groupId: GID1
  ○ GroupParam object for Group G3:
    ▪ groupType: G3
    ▪ groupId: GID3
  • All other parameters in the GrantRequest object are in proper format and within acceptable ranges.

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

• cbisdId: 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:
  ○ groupType: G1
  ○ groupId: GID1
  • 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:

• CBSD 4:
  ○ cbisdId: Included and set to the valid value as received in step 3;
  ○ grantId: Included and set to the valid value.
  ○ channelType: GAA
  ○ grantExpireTime: UTC time greater than duration of the test
  ○ heartbeatInterval: Included with the valid value.
For CBSD 5:
- **cbsdId**: Included and set to the valid value as received in step 3
- **grantId**: Included and set to the valid value.
- **channelType**: GAA
- **grantExpireTime**: UTC time greater than duration of the test
- **heartbeatInterval**: Included with the valid value.
- **groupingConfig**: Contains two GroupConfig objects, each of which is configured as follows:
  - **GroupParam** object for Group G1:
    - **groupId**:_gid1
    - **supportedBySas**: true
    - **groupConfigInfo**: may optionally be included;
  - **GroupParam** object for Group G2:
    - **groupId**: gid2
    - **supportedBySas**: true
    - **groupConfigInfo**: may optionally be included;
- **responseCode**: 0 (SUCCESS)

For CBSD 6:
- **cbsdId**: Included and set to the valid value as received in step 3
- **grantId**:
  - Included and set to the valid value if **responseCode** = 0 (SUCCESS)
  - Otherwise not included.
- **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: G1
      -  groupId: GID1
      -  supportedBySas: true
      -  groupConfigInfo: may optionally be included;
    ▪  GroupParam object for Group G3:
      -  groupType: G3
      -  groupId: GID3
      -  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: G1
    ▪  groupId: GID1
    ▪  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: For CBSD 7 (Change to 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 only one *GroupParam* object, where the *GroupParam* object is configured as follows:
  - groupType: G<sub>2</sub>
  - groupId: GID<sub>2</sub>
- All other parameters in the HeartbeatRequest object are in proper format and within acceptable ranges.

For CBSD 8 (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:
  - *GroupParam* object for Group G1:
    - groupType: G<sub>1</sub>
    - groupId: GID<sub>1</sub>
  - *GroupParam* object for Group G2:
    - groupType: G<sub>2</sub>
    - groupId: GID<sub>2</sub>
- All other parameters in the HeartbeatRequest object are in proper format and within acceptable ranges.

For CBSD 9 (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:
  - *GroupParam* object for Group G1:
    - groupType: G<sub>1</sub>
    - groupId: GID<sub>1</sub>
  - *GroupParam* object for Group G3:
    - groupType: G<sub>3</sub>
    - groupId: GID<sub>3</sub>
- All other parameters in the HeartbeatRequest object are in proper format and within acceptable ranges.

<table>
<thead>
<tr>
<th>CHECK #4</th>
<th>SAS NRI UUT returns a Heartbeat Response Message, where each HeartbeatResponse object is configured as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• For CBSD 7:</td>
</tr>
<tr>
<td></td>
<td>o <code>cbsdId</code>: Included and set to the valid value as received in step 5;</td>
</tr>
<tr>
<td></td>
<td>o <code>grantId</code>: Included and set to the valid value as received in step 5.</td>
</tr>
<tr>
<td></td>
<td>o <code>transmitExpireTime</code>:</td>
</tr>
<tr>
<td></td>
<td>▪ If <code>responseCode</code> = 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 <code>grantExpireTime</code>.</td>
</tr>
<tr>
<td></td>
<td>▪ If <code>responseCode</code> = 501 (SUSPENDED_GRANT), included and set to the UTC time no later than the current time.</td>
</tr>
<tr>
<td></td>
<td>o <code>groupingConfig</code>: Contains only one GroupConfig object configured as follows:</td>
</tr>
<tr>
<td></td>
<td>▪ <code>groupType</code>: G2</td>
</tr>
<tr>
<td></td>
<td>▪ <code>groupId</code>: GID2</td>
</tr>
<tr>
<td></td>
<td>▪ <code>supportedBySas</code>: true</td>
</tr>
<tr>
<td></td>
<td>▪ <code>groupConfigInfo</code>: May optionally be included;</td>
</tr>
<tr>
<td></td>
<td>o <code>responseCode</code>: 0 (SUCCESS) or 501 (SUSPENDED_GRANT)</td>
</tr>
</tbody>
</table>

|  | • For CBSD 8: |
|  | o `cbsdId`: Included and set to the valid value as received in step 5 |
|  | o `grantId`: Included and set to the valid value as received in step 5. |
|  | o `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` = 501 (SUSPENDED_GRANT), included and set to the UTC time no later than the current time. |
|  | o `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 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.

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>• Ensure that neither cbsdId nor grantId for the 2 CBSDs being tested exists in the SAS.&lt;br&gt;• All REG-Conditional parameters for the CBSDs shall already be pre-loaded into the SAS NRI UUT.&lt;br&gt;• userId U1 shall be configured to the SAS NRI UUT as a valid UR-ID</td>
</tr>
<tr>
<td>2</td>
<td>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:&lt;br&gt;For CBSD 1 (as Release 2 CBSD not supporting EGH feature):&lt;br&gt;• userId: Set to U1&lt;br&gt;• cbsdFeatureCapabilityList: Included but the FID “WF_ENH_GROUP_HANDLING” is not contained in the list&lt;br&gt;• groupingParam is an array of objects consisting of only one GroupParam object, where the GroupParam object is configured as follows:&lt;br&gt;  o groupType: Set to “INTERFERENCE_COORDINATION”&lt;br&gt;  o groupId: Set to U1&lt;br&gt;• All other parameters of the RegistrationRequest object are in proper format and within acceptable ranges according to WINNF-TS-0016. For CBSD 2 (as Release 1 CBSD):&lt;br&gt;• userId: Set to U1&lt;br&gt;• cbsdFeatureCapabilityList: Not included</td>
</tr>
</tbody>
</table>
• **groupingParam** is an array of objects consisting of only one `GroupParam` object, where the `GroupParam` object is configured as follows:
  - `groupType`: Set to “INTERFERENCE_COORDINATION”
  - `groupId`: Set to U1

• All other parameters of the `RegistrationRequest` object are in proper format and within acceptable ranges according to WINNF-TS-3002.
  - 

<table>
<thead>
<tr>
<th>CHECK</th>
<th>SAS NRI UUT returns a Registration Response Message, where each of <code>RegistrationResponse</code> objects is configured as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• For CBSD 1:</td>
</tr>
<tr>
<td></td>
<td>- <code>cbsdId</code>: Included and set to the valid value.</td>
</tr>
<tr>
<td></td>
<td>- <code>sasFeatureCapabilityList</code>: Included and set to the array containing at least the FID “WF_ENH_GROUP_HANDLING”;</td>
</tr>
<tr>
<td></td>
<td>- <code>groupingConfig</code>: Not included</td>
</tr>
<tr>
<td></td>
<td>- <code>responseCode</code>:</td>
</tr>
<tr>
<td></td>
<td>▪ 0 (SUCCESS);</td>
</tr>
<tr>
<td></td>
<td>• For CBSD 2:</td>
</tr>
<tr>
<td></td>
<td>- <code>cbsdId</code>: Included and set to the valid value.</td>
</tr>
<tr>
<td></td>
<td>- <code>sasFeatureCapabilityList</code>: Not included;</td>
</tr>
<tr>
<td></td>
<td>- <code>groupingConfig</code>: Not included</td>
</tr>
<tr>
<td></td>
<td>- <code>responseCode</code>:</td>
</tr>
<tr>
<td></td>
<td>▪ 0 (SUCCESS)</td>
</tr>
</tbody>
</table>

*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>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
</table>
| 1    | • Ensure the followings:  
|      |   o Neither cbsdId nor grantId for the 8 CBSDs being tested exists in the SAS.  
|      |   o 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.  
|      |   • All REG-Conditional parameters for the CBSDs shall already be pre-loaded into the SAS NRI UUT.  
|      |   • The SAS Administrator configures Admin NRI Test Harness with the Group Types supported by the SAS NRI UUT.  
|      |   o Let the Group type used for this test case be denoted as G₁  
|      |   o Let the Group ID used for this test case be denoted as GID₁  
|      |   • 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 a Registration Request for the CBSDs 1-8, where each RegistrationRequest object is configured as follows:  

<table>
<thead>
<tr>
<th>CBSD</th>
<th>Registration</th>
<th>Spectrum Inquiry</th>
<th>Grant</th>
<th>Heartbeat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>groupType</td>
<td>Included</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>groupId</td>
<td>Missing</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>2</td>
<td>groupType</td>
<td>Missing</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>groupId</td>
<td>Included</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>3</td>
<td>groupType</td>
<td>Included</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>groupId</td>
<td>Included</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>4</td>
<td>groupType</td>
<td>Included</td>
<td>Missing</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>groupId</td>
<td>Included</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>5</td>
<td>groupType</td>
<td>Included</td>
<td>n/a</td>
<td>Included</td>
</tr>
<tr>
<td></td>
<td>groupId</td>
<td>Included</td>
<td>n/a</td>
<td>Missing</td>
</tr>
<tr>
<td>6</td>
<td>groupType</td>
<td>Included</td>
<td>n/a</td>
<td>Missing</td>
</tr>
<tr>
<td></td>
<td>groupId</td>
<td>Included</td>
<td>n/a</td>
<td>Included</td>
</tr>
<tr>
<td>7</td>
<td>groupType</td>
<td>Included</td>
<td>n/a</td>
<td>Included</td>
</tr>
<tr>
<td></td>
<td>groupId</td>
<td>Included</td>
<td>n/a</td>
<td>Missing</td>
</tr>
<tr>
<td>8</td>
<td>groupType</td>
<td>Included</td>
<td>n/a</td>
<td>Included</td>
</tr>
<tr>
<td></td>
<td>groupId</td>
<td>Included</td>
<td>n/a</td>
<td>Included</td>
</tr>
</tbody>
</table>
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`: G1
  - `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`: GID1
- 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`: G1
  - `groupId`: GID1
- All other parameters in the `RegistrationRequest` object are in proper format and within acceptable ranges.

<table>
<thead>
<tr>
<th>CHECK #1</th>
<th>SAS NRI UUT returns a Registration Response Message, where each <code>RegistrationResponse</code> object is configured as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- For CBSDs 1 and 2:</td>
</tr>
<tr>
<td></td>
<td>- <code>cbsdId</code>:</td>
</tr>
<tr>
<td></td>
<td>- Included and set to the valid value if <code>responseCode = 0</code> (SUCCESS);</td>
</tr>
<tr>
<td></td>
<td>- Not included otherwise.</td>
</tr>
<tr>
<td></td>
<td>- <code>sasFeatureCapabilityList</code>:</td>
</tr>
<tr>
<td></td>
<td>- Included and set to the array containing at least the FID “WF_ENH_GROUP_HANDLING” if <code>responseCode = 0</code> (SUCCESS);</td>
</tr>
<tr>
<td></td>
<td>- Not included otherwise.</td>
</tr>
</tbody>
</table>
### CBRS Committee Work Group 4 (CBRS Test)
**CBRS Release 2 Non-Regulatory Impacting (NRI) Test Specification for SAS as UUT**
WINNF-TS-4003-V1.1.0

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>groupingConfig</strong>: Included but may be empty array (i.e., “[]”).</td>
<td><strong>responseCode</strong>:</td>
</tr>
<tr>
<td></td>
<td>0 (SUCCESS) with responseData indicating PARAM_WARNING;</td>
</tr>
<tr>
<td></td>
<td>102 (MISSING_PARAM); or</td>
</tr>
<tr>
<td></td>
<td>201 (GROUP_ERROR);</td>
</tr>
</tbody>
</table>

- For CBSDs 3 to 8
  - cbsdId: Included and set to the valid value
  - sasFeatureCapabilityList: Included and set to the array containing at least the FID “WF_ENH_GROUP_HANDLING”;  
  - responseCode: 0 (SUCCESS);
  - groupingConfig: Contains only one GroupConfig object configured as follows:
    - groupType: G1
    - groupId: GID1
    - 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:

#### For CBSD 3:
- **cbsdId**: Set to the valid value as provided by the SAS NRI UUT in step 2;  
- **groupingParam** is an array containing only one GroupParam object, where the GroupParam object is configured as follows:
  - **groupType**: G1  
  - **groupId**: missing  
- All other parameters in the SpectrumInquiryRequest object are in proper format and within acceptable ranges.

#### For CBSD 4:
- **cbsdId**: Set to the valid value as provided by the SAS NRI UUT in step 2;  
- **groupingParam** is an array containing only one GroupParam object, where the GroupParam object is configured as follows:
  - **groupType**: Missing  
  - **groupId**: GID1
- All other parameters in the `SpectrumInquiryRequest` object are in proper format and within acceptable ranges.

<table>
<thead>
<tr>
<th>CHECK #2</th>
<th>SAS NRI UUT returns a Spectrum Inquiry Response Message, where each <code>RegistrationResponse</code> object is configured as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• For CBSDs 3 and 4:</td>
</tr>
<tr>
<td></td>
<td>o <code>cbsdId</code>: Included and set to the valid value as sent by the CBSD/DP NRI Test Harness in step 3.</td>
</tr>
<tr>
<td></td>
<td>o <code>availableChannel</code>:</td>
</tr>
<tr>
<td></td>
<td>▪ Included if <code>responseCode</code> = 0 (SUCCESS);</td>
</tr>
<tr>
<td></td>
<td>▪ Not included otherwise;</td>
</tr>
<tr>
<td></td>
<td>o <code>groupingConfig</code>: Included but may be empty array (i.e., “[]”).</td>
</tr>
<tr>
<td></td>
<td>o <code>responseCode</code>:</td>
</tr>
<tr>
<td></td>
<td>▪ 0 (SUCCESS) with <code>responseData</code> indicating <code>PARAM_WARNING</code>; or</td>
</tr>
<tr>
<td></td>
<td>▪ 102 (MISSING_PARAM);</td>
</tr>
</tbody>
</table>

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:

For CBSD 5:
- `cbsdId`: Set to the valid value as provided by the SAS NRI UUT in step 2;
- `groupingParam` is an array containing only one `GroupParam` object, where the `GroupParam` object is configured as follows:
  - `groupType`: `G1`
  - `groupId`: missing
- All other parameters in the `GrantRequest` object are in proper format and within acceptable ranges.

For CBSD 6:
- `cbsdId`: Set to the valid value as provided by the SAS NRI UUT in step 2;
- `groupingParam` is an array containing only one `GroupParam` object, where the `GroupParam` object is configured as follows:
  - `groupType`: Missing
  - `groupId`: `GID1`
- All other parameters in the `GrantRequest` object are in proper format and within acceptable ranges.
For CBSDs 7 and 8:
- `cbsdId`: Set to the valid value as provided by the SAS NRI UUT in step 2;
- `groupingParam` is an array containing only one `GroupParam` object, where the `GroupParam` object is configured as follows:
  - `groupType`: `G1`
  - `groupId`: `GID1`
- 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:

- For CBSDs 5 and 6:
  - `cbsdId`: Included and set to the valid value as sent by the CBSD/DP NRI Test Harness in step 4.
  - `grantId`:
    - Included and set to the valid value if `responseCode = 0` (SUCCESS);
    - Not included otherwise.
  - `groupingConfig`: Included but may be empty array (i.e., `"[]"`).
  - `responseCode`:
    - 0 (SUCCESS) with `responseData` indicating `PARAM_WARNING`;
    - 102 (MISSING_PARAM);

- For CBSDs 7 to 8:
  - `cbsdId`: Included and set to the valid value as sent by the CBSD/DP NRI Test Harness in step 4.
  - `grantId`: Included and set to the valid value.
  - `channelType`: GAA
  - `grantExpireTime`: UTC time greater than duration of the test
  - `heartbeatInterval`: Included with the valid value.
  - `responseCode`: 0 (SUCCESS);
  - `groupingConfig`: Contains only one `GroupConfig` object configured as follows:
    - `groupType`: `G1`
    - `groupId`: `GID1`
    - `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 4 shall
be repeated only for the CBSD concerned until responseCode 106 (NOT_PROCESSED) is NOT returned. Otherwise, it proceed to the next step

<table>
<thead>
<tr>
<th>5</th>
<th>The CBSD/DP NRI Test Harness sends a Heartbeat Request for the CBSDs 7 and 8, where each <em>HeartbeatRequest</em> object is configured as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td>For CBSD 7:</td>
<td></td>
</tr>
<tr>
<td>• cbsdId: Set to the valid value as provided by the SAS NRI UUT in step 2;</td>
<td></td>
</tr>
<tr>
<td>• grantId: Set to the valid value as provided by the SAS NRI UUT in step 4;</td>
<td></td>
</tr>
<tr>
<td>• groupingParam is an array containing only one <em>GroupParam</em> object, where the <em>GroupParam</em> object is configured as follows:</td>
<td></td>
</tr>
<tr>
<td>o groupType: $G_1$</td>
<td></td>
</tr>
<tr>
<td>o groupId: missing</td>
<td></td>
</tr>
<tr>
<td>• All other parameters in the <em>HeartbeatRequest</em> object are in proper format and within acceptable ranges.</td>
<td></td>
</tr>
<tr>
<td>For CBSD 8:</td>
<td></td>
</tr>
<tr>
<td>• cbsdId: Set to the valid value as provided by the SAS NRI UUT in step 2;</td>
<td></td>
</tr>
<tr>
<td>• grantId: Set to the valid value as provided by the SAS NRI UUT in step 4;</td>
<td></td>
</tr>
<tr>
<td>• groupingParam is an array containing only one <em>GroupParam</em> object, where the <em>GroupParam</em> object is configured as follows:</td>
<td></td>
</tr>
<tr>
<td>o groupType: Missing</td>
<td></td>
</tr>
<tr>
<td>o groupId: GID$_1$</td>
<td></td>
</tr>
<tr>
<td>• All other parameters in the <em>HeartbeatRequest</em> object are in proper format and within acceptable ranges.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHECK #4</th>
<th>SAS NRI UUT returns a Heartbeat Response Message, where each <em>HeartbeatResponse</em> object is configured as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• For CBSDs 7 and 8:</td>
<td></td>
</tr>
<tr>
<td>o cbsdId: Included and set to the valid value as sent by the CBSD/DP NRI Test Harness in step 5</td>
<td></td>
</tr>
<tr>
<td>o grantId: Included and set to the valid value as sent by the CBSD/DP NRI Test Harness in step 5</td>
<td></td>
</tr>
<tr>
<td>o transmitExpireTime:</td>
<td></td>
</tr>
<tr>
<td>▪ If <em>responseCode</em> = 0 (SUCCESS), included with the valid UTC time in the future, not later than 240 seconds in the future and not later than the <em>grantExpireTime</em>.</td>
<td></td>
</tr>
<tr>
<td>▪ If <em>responseCode</em> = 102 (MISSING_PARAM) or 501 (SUSPENDED_GRANT), included with the UTC time no later than the current time.</td>
<td></td>
</tr>
<tr>
<td>o groupingConfig: Included but may be empty array (i.e., “[]”).</td>
<td></td>
</tr>
<tr>
<td>responseCode:</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>▪ 0 (SUCCESS) with responseData indicating PARAM_WARNING;</td>
<td></td>
</tr>
<tr>
<td>▪ 102 (MISSING_PARAM);</td>
<td></td>
</tr>
<tr>
<td>▪ 501 (SUSPENDED_GRANT)</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>WINNF.FT.S.REL2.NRI.EAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Test ID</td>
<td>WINNF.FT.S.REL2.NRI.EAP</td>
</tr>
<tr>
<td>2</td>
<td>Title</td>
<td>Enhanced Antenna Pattern Test</td>
</tr>
<tr>
<td>3</td>
<td>Working Group / Entity</td>
<td>WG1, WG3, WG5</td>
</tr>
<tr>
<td>4</td>
<td>Test Type</td>
<td>Functionality</td>
</tr>
<tr>
<td>5</td>
<td>Test Class</td>
<td>Certification</td>
</tr>
<tr>
<td>6</td>
<td>Component / Interface</td>
<td>SAS / CBSD ← → SAS</td>
</tr>
<tr>
<td>7</td>
<td>Target Specification / Feature</td>
<td>[n.4, n.11, n.18]</td>
</tr>
</tbody>
</table>

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 3D 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. 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

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ensure no <code>cbsdId</code> exists in the SAS NRI UUT for the CBSDs being tested.</td>
</tr>
<tr>
<td>2</td>
<td>The Admin NRI Test Harness injects records of CBSD Antenna Pattern Database into the SAS NRI UUT.</td>
</tr>
<tr>
<td>3</td>
<td>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].</td>
</tr>
</tbody>
</table>

**CHECK**

The SAS NRI UUT approves the request by sending a Registration Response Message to the DP NRI Test Harness as follows:
- SAS response includes a valid `cbsdId` for each CBSD.
- The `responseCode` parameter contained in the `response` parameter is 0 for each CBSD concluding an approved Registration.

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

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>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.</td>
</tr>
<tr>
<td>5</td>
<td>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.</td>
</tr>
</tbody>
</table>

**CHECK**

The information provided by the SAS NRI UUT through the EAP Testing API shall meet the following conditions:
- The CBSD IDs provided are the same as those given in step 4,
- For each CBSD ID:
  - 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])
  - 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.

*If the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it PASSES.*
CBRS Committee Work Group 4 (CBRS Test)
CBRS Release 2 Non-Regulatory Impacting (NRI) Test Specification for SAS as UUT
WINNF-TS-4003-V1.1.0
[WINNF.FT.S.REL2.NRI.EAP.2] Deprecated
[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>
<thead>
<tr>
<th></th>
<th>Test ID</th>
<th>WINNF.PT.S.REL2.NRI.CPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Title</td>
<td>CPE-CBSD Indicator</td>
</tr>
<tr>
<td>2</td>
<td>Working Group / Entity</td>
<td>WG3</td>
</tr>
<tr>
<td>3</td>
<td>Test Type</td>
<td>Protocol</td>
</tr>
<tr>
<td>4</td>
<td>Test Class</td>
<td>Certification</td>
</tr>
<tr>
<td>5</td>
<td>Component / Interface</td>
<td>SAS / CBSD ← → SAS</td>
</tr>
<tr>
<td>6</td>
<td>Target Specification</td>
<td>[n.4]</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
</table>
| 1    | - Ensure no `cbsdId`s exists in the SAS for the 3 CBSDs being tested.  
- 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  
For all CBSDs  
- The Registration Request is in proper format and parameters are within acceptable ranges.  
For CBSD1:  
  - `cbsdFeatureCapabilityList` is included with FID: `WF_CPE_CBSD_INDICATOR`  
  - `cpeCbsdIndication` is included with value set to TRUE.  
For CBSD2:  
  - `cbsdFeatureCapabilityList` is included with FID: `WF_CPE_CBSD_INDICATOR`  
  - `cpeCbsdIndication` is included with value set to FALSE.  
For CBSD3:  
  - `cbsdFeatureCapabilityList` is included with FID: `WF_CPE_CBSD_INDICATOR`  
  - `cpeCbsdIndication` is not included |
| CHECK | SAS NRI UUT approves the request and sends a Registration Response as follows:  
- For CBSD 1:  
  - `cbsdId`: Included and set to valid value.  
  - `responseCode`: 0 (SUCCESS)  
- For CBSD 2:  
  - `responseCode`: 0 (SUCCESS) or 103 (INVALID_VALUE)  
  - `cbsdId`:  
  - For `responseCode` = 0 (SUCCESS): Included and set to valid value. |
<table>
<thead>
<tr>
<th>Response Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>103 (INVALID_VALUE)</td>
<td>Not included. If any of the above conditions are not met, the SAS NRI UUT FAILS this test. Otherwise, it PASSES.</td>
</tr>
<tr>
<td>0 (SUCCESS)</td>
<td>Included and set to valid value. For ( \text{responseCode} = 0 ), FID_WARNING or PARAM_WARNING is indicated against ( \text{cpeCbsdIndication} ).</td>
</tr>
<tr>
<td>102 (MISSING_PARAM)</td>
<td>Not included.</td>
</tr>
</tbody>
</table>

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

This step was deprecated in V1.1.0 of this technical specification.
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>
<thead>
<tr>
<th></th>
<th></th>
<th>WINNF.FT.S.REL2.NRI.PDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Test ID</td>
<td>WINNF.FT.S.REL2.NRI.PDG</td>
</tr>
<tr>
<td>2</td>
<td>Title</td>
<td>Enhanced CBSD Group Handling – Passive DAS</td>
</tr>
<tr>
<td>3</td>
<td>Working Group / Entity</td>
<td>WG1</td>
</tr>
<tr>
<td>4</td>
<td>Test Type</td>
<td>Functional</td>
</tr>
<tr>
<td>5</td>
<td>Test Class</td>
<td>Certification</td>
</tr>
<tr>
<td>6</td>
<td>Component / Interface</td>
<td>CBSD $\rightarrow$ SAS</td>
</tr>
<tr>
<td>7</td>
<td>Target Specification</td>
<td>WINNF-TS-1001 CBRS Operational and Functional Requirements (Release 2)</td>
</tr>
</tbody>
</table>

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:
   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 assign 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
<table>
<thead>
<tr>
<th>CBSD Configuration</th>
<th>Testing Purpose</th>
<th>Registration</th>
<th>Grant Procedure</th>
<th>Testing API</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBSD 1</td>
<td>REL2-R3-SGN-72200-a</td>
<td>FCC_1 SN_1 FCC_1:SN_1:CHAIN_1</td>
<td>FR1_1 within 3550-3700 MHz range.</td>
<td>No command is provided to the SAS NRI UUT for this Group.</td>
</tr>
<tr>
<td>CBSD 2</td>
<td>REL2-R3-SGN-72200-a</td>
<td>FCC_1 SN_1 FCC_1:SN_1:CHAIN_1</td>
<td>FR1_1 within 3550-3700 MHz range.</td>
<td>No command is provided to the SAS NRI UUT for this Group.</td>
</tr>
<tr>
<td>CBSD 3</td>
<td>REL2-R3-SGN-72200-a</td>
<td>FCC_1 SN_1 FCC_1:SN_1:CHAIN_1</td>
<td>FR1_1 within 3550-3700 MHz range.</td>
<td>No command is provided to the SAS NRI UUT for this Group.</td>
</tr>
<tr>
<td>CBSD 4</td>
<td>REL2-R3-SGN-72200-a</td>
<td>FCC_2 SN_2 FCC_1:SN_1:CHAIN_2</td>
<td>FR2_1 within 3550-3700 MHz range.</td>
<td>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)</td>
</tr>
<tr>
<td>CBSD 5</td>
<td>REL2-R3-SGN-72200-a</td>
<td>FCC_2 SN_2 FCC_1:SN_1:CHAIN_2</td>
<td>FR2_1 within 3550-3700 MHz range.</td>
<td>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)</td>
</tr>
<tr>
<td>CBSD 6</td>
<td>REL2-R3-SGN-72200-a</td>
<td>FCC_2 SN_2 FCC_1:SN_1:CHAIN_2</td>
<td>FR2_2 (≠ FR2_1) within 3550-3700 MHz range.</td>
<td>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)</td>
</tr>
<tr>
<td>CBSD 7</td>
<td>REL2-R3-SGN-72200-b</td>
<td>FCC_3 SN_3 FCC_1:SN_1:CHAIN_3</td>
<td>FR3_1 within 3550-3700 MHz range.</td>
<td>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)</td>
</tr>
<tr>
<td>CBSD 8</td>
<td>REL2-R3-SGN-72200-b</td>
<td>FCC_3 SN_3 FCC_1:SN_1:CHAIN_3</td>
<td>FR3_1 within 3550-3700 MHz range.</td>
<td>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)</td>
</tr>
<tr>
<td>CBSD 9</td>
<td>REL2-R3-SGN-72200-b</td>
<td>FCC_3 SN_3 FCC_1:SN_1:CHAIN_3</td>
<td>FR3_1 within 3550-3700 MHz range.</td>
<td>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)</td>
</tr>
<tr>
<td>CBSD 10</td>
<td>REL2-R3-SGN-72200-c</td>
<td>FCC_4 SN_4 FCC_1:SN_1:CHAIN_4</td>
<td>FR4_1 within 3550-3700 MHz range.</td>
<td>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)</td>
</tr>
<tr>
<td>CBSD 11</td>
<td>REL2-R3-SGN-72200-c</td>
<td>FCC_4 SN_4 FCC_1:SN_1:CHAIN_4</td>
<td>FR4_1 within 3550-3700 MHz range.</td>
<td>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)</td>
</tr>
<tr>
<td>CBSD 12</td>
<td>REL2-R3-SGN-72200-c</td>
<td>FCC_4 SN_4 FCC_1:SN_1:CHAIN_4</td>
<td>FR4_1 within 3550-3700 MHz range.</td>
<td>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)</td>
</tr>
</tbody>
</table>
1. Ensure no `cbsdIds` nor Grants exists in the SAS NRI UUT for the 12 CBSDs being tested.
   - 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
   - The SAS NRI UUT approves the request and sends a Registration Response Message as follows:
     - All CBSDs
       - Includes valid `cbsdId` for the CBSD.
       - The `responseCode` parameter is 0 (SUCCESS) indicating an approved Registration
       - `sasFeatureCapabilityList` shall be included with FID list containing at least FID: WF_ENH_GROUP_HANDLING
       - `groupingConfig`: one `GroupConfig` object configured as follows is included.
         - `groupId`: Set to the same value as included in the `GroupParam` object
         - `supportedBySas`: true

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
   - The SAS NRI UUT sends a Grant Response Message as follows:
     - 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”:
       - `cbsdId`: Included and set to valid value;
       - `grantId`: Included and set to valid value;
       - `grantExpireTime`: Included and set to valid value;
       - `heartbeatInterval`: Included and set to valid value;
       - `channelType`: Included and set to “GAA”;
       - `responseCode`: 0 (SUCCESS);
     - For CBSDs belonging to Group ID “FCC_1:SN_1:CHAIN_2”:
       - `cbsdId`: Included and set to valid value;
       - `grantId`: Not included;
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:

- For CBSDs belonging to Group ID “FCC_1:SN_1:CHAIN_1”:
  - cbsdId: Included and set to valid value;
  - grantId: Included and set to valid value;
  - transmitExpireTime: Included and set to valid value;
  - responseCode: 0 (SUCCESS);

- For CBSDs belonging to Group ID “FCC_1:SN_1:CHAIN_3”:
  - cbsdId: Included and set to valid value;
  - grantId: Included and set to valid value;
  - responseCode: 500 (TERMINATED_GRANT)
  - operationParam: Not included.
  - operationParamArray: Not included.

- For CBSDs belonging to Group ID “FCC_1:SN_1:CHAIN_4”:
  - cbsdId: Included and set to valid value;
  - grantId: Included and set to valid value;
  - responseCode: 500 (TERMINATED_GRANT) or 501 (SUSPENDED_GRANT)
  - operationParam: may be included. If included, operationFrequencyRange indicates FR4_2 for all the CBSDs.
  - operationParamArray: may be included. If included, at least operationFrequencyRange indicating FR4_2 is included for all the CBSDs.
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.*

<table>
<thead>
<tr>
<th>CHECK</th>
</tr>
</thead>
<tbody>
<tr>
<td>The SAS NRI UUT sends a Grant Response Message as follows:</td>
</tr>
<tr>
<td>• 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”:</td>
</tr>
<tr>
<td>o <code>cbsdId</code>: Included and set to valid value;</td>
</tr>
<tr>
<td>o <code>grantId</code>: Included and set to valid value;</td>
</tr>
<tr>
<td>o <code>grantExpireTime</code>: Included and set to valid value;</td>
</tr>
<tr>
<td>o <code>heartbeatInterval</code>: Included and set to valid value;</td>
</tr>
<tr>
<td>o <code>channelType</code>: Included and set to “GAA”;</td>
</tr>
<tr>
<td>o <code>responseCode</code>: 0 (SUCCESS);</td>
</tr>
<tr>
<td>• For CBSDs belonging to Group ID “FCC_1:SN_1:CHAIN_2”:</td>
</tr>
<tr>
<td>o <code>cbsdId</code>: Included and set to valid value;</td>
</tr>
<tr>
<td>o <code>grantId</code>: Not included;</td>
</tr>
<tr>
<td>o <code>responseCode</code>: non-zero response code concluding disapproval of Grant request;</td>
</tr>
<tr>
<td>o <code>operationParam</code>: may be included. If included, <code>operationFrequencyRange</code> indicates is exactly the same among the CBSDs.</td>
</tr>
<tr>
<td>o <code>operationParamArray</code>: may be included. If included, all <code>operationFrequencyRange</code> parameters indicated by this array parameter are exactly the same among the CBSDs.</td>
</tr>
</tbody>
</table>

*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>
<thead>
<tr>
<th>1</th>
<th>Test ID</th>
<th>WINNF.FT.S.REL2.NRI.PSSFG</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Title</td>
<td>Enhanced CBSD Group Handling – Principal Subordinate Single Frequency Group</td>
</tr>
<tr>
<td>3</td>
<td>Working Group / Entity</td>
<td>WG1</td>
</tr>
<tr>
<td>4</td>
<td>Test Type</td>
<td>Functional</td>
</tr>
<tr>
<td>5</td>
<td>Test Class</td>
<td>Certification</td>
</tr>
<tr>
<td>6</td>
<td>Component / Interface</td>
<td>CBSD $\rightarrow$ SAS</td>
</tr>
<tr>
<td>7</td>
<td>Target Specification</td>
<td>WINNF-TS-1001 CBRS Operational and Functional Requirements (Release 2)</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>CBSD Configuration</th>
<th>Testing Purpose</th>
<th>Registration</th>
<th>PS-SFG Group ID</th>
<th>Role in SFG</th>
<th>Requested frequency range</th>
<th>Testing API</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBSD 1</td>
<td>REL2-R3-SGN-22200</td>
<td>FCC_1 SN_1</td>
<td>PS_SFG_1</td>
<td>Principal</td>
<td>n/a</td>
<td>FR1 to be made available to CBSD 1 (step 3).</td>
</tr>
<tr>
<td>CBSD 2</td>
<td>REL2-R3-SGN-22200</td>
<td>FCC_1 SN_1</td>
<td>PS_SFG_1</td>
<td>Subordinate</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>CBSD 3</td>
<td>REL2-R3-SGN-22200</td>
<td>FCC_1 SN_1</td>
<td>PS_SFG_1</td>
<td>Subordinate</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>CBSD 4</td>
<td>REL2-R3-SGN-22201-c, REL2-R3-SGN-22201-d</td>
<td>FCC_2 SN_2</td>
<td>PS_SFG_2</td>
<td>Principal</td>
<td>FR2 within 3550-3700 MHz range.</td>
<td>• FR2 to be made available to</td>
</tr>
<tr>
<td>CBSD 5</td>
<td>REL2-R3-SGN-22201-c, REL2-R3-SGN-22201-d</td>
<td>FCC_2 SN_2</td>
<td>PS_SFG_2</td>
<td>Subordinate</td>
<td>FR2 within 3550-3700 MHz range.</td>
<td></td>
</tr>
</tbody>
</table>

Table 6-8: PSSFG CBSD Configurations
NOTE: Compliance with REL2-R3-SGN-22201-a and REL2-R3-SGN-22201-b is not tested because those requirements are functionally untestable.

<table>
<thead>
<tr>
<th>CSBD 6</th>
<th>REL2-R3-SGN-22201-c, REL2-R3-SGN-22201-d</th>
<th>FCC_2</th>
<th>SN_2</th>
<th>PS_SFG_2</th>
<th>Subordinate</th>
<th>FR2 within 3550-3700 MHz range.</th>
<th>CBSD 4 (step 5).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• FR2 to be made unavailable to CBSD 4 (step 8).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• FR3 to be made available to CBSD 4 (step 5).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
</table>
| 1    | • Ensure no cbsdIds nor Grants exists in the SAS NRI UUT for the 6 CBSDs being tested.  
      • 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. |
|     | o CHECK |
|     | The SAS NRI UUT approves the request and sends a Registration Response as follows: |
|     | • All CBSDs |
|     | o Includes valid cbsdId for the CBSD. |
|     | o The responseCode parameter is 0 (SUCCESS) indicating an approved Registration |
|     | o sasFeatureCapabilityList shall be included with FID list containing atleast FID: WF_ENH_GROUP_HANDLING |
|     | o groupingConfig: |
|     | • eventType is set to |
|     | “PRINCIPAL_SUBORDINATE_SFG” |
|     | • groupId is set to PSSFG  |
|     | • supportedBySas set to true |
| 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. |
The SAS NRI UUT sends a Spectrum Inquiry Response Message as follows:

- For all CBSDs belonging to PS_SFG_1:
  o `cbsdId`: Included and set to the valid value;
  o `availableChannel`: One `AvailableChannel` object indicating FR1 is included in this array-type parameter.
  o `responseCode`: 0 (SUCCESS)

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

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.

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.

The SAS NRI UUT sends a Grant Response Message as follows:

- For all the CBSDs belonging to PS_SFG_2:
  o `cbsdId`: Included and set to valid value;
  o `grantId`: Included and set to valid value;
  o `grantExpireTime`: Included and set to valid value;
  o `heartbeatInterval`: Included and set to valid value;
  o `channelType`: Included and set to “GAA”;
  o `responseCode`: 0 (SUCCESS);

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

DP Test Harness successfully exchanges Heartbeat with the SAS NRI UUT for the Grants approved in Step 6 and keeps them in Authorized State.

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:

- Make the frequency range FR2 unavailable to the CBSD 4; and
- Make the frequency range FR3 available to the CBSD 4;

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.

The SAS NRI UUT sends a Heartbeat Response Message as follows:

- For CBSD 4:
  o `cbsdId`: Included and set to valid value;
  o `grantId`: Included and set to valid value;
  o `responseCode`: 500 (TERMINATED_GRANT)
  o 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>
<thead>
<tr>
<th>1</th>
<th>Test ID</th>
<th>WINNF.PT.S.REL2.NRI.FAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Title</td>
<td>SAS-SAS Full Activity Dump Message</td>
</tr>
<tr>
<td>3</td>
<td>Working Group / Entity</td>
<td>WG3</td>
</tr>
<tr>
<td>4</td>
<td>Test Type</td>
<td>Protocol</td>
</tr>
<tr>
<td>5</td>
<td>Test Class</td>
<td>Certification</td>
</tr>
<tr>
<td>6</td>
<td>Component / Interface</td>
<td>SAS / SAS ( \leftarrow \rightarrow ) SAS</td>
</tr>
<tr>
<td>7</td>
<td>Target Specification / Feature</td>
<td>[n.4]</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Use Admin NRI Test Harness to configure the SAS NRI UUT to whitelist N1 &gt; 0 FCC IDs and N1 user IDs.</td>
</tr>
<tr>
<td>2</td>
<td>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.</td>
</tr>
<tr>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>4</td>
<td>Admin NRI Test Harness injects information about N2 &gt; 0 PPAs into the SAS NRI UUT.</td>
</tr>
<tr>
<td>5</td>
<td>Send a valid Grant Request Message with N1 elements (one per registered CBSD). Verify that the responseCode for each is SUCCESS.</td>
</tr>
<tr>
<td>6</td>
<td>Admin NRI Test Harness injects information about N3 &gt; 0 ESC sensors into the SAS NRI UUT.</td>
</tr>
<tr>
<td>7</td>
<td>Notify the SAS NRI UUT about N4 &gt; 0 SAS NRI Test Harnesses.</td>
</tr>
<tr>
<td>8</td>
<td>Trigger the SAS NRI UUT to generate a Full Activity Dump.</td>
</tr>
<tr>
<td>9</td>
<td>Send a Full Activity Dump Request to the SAS NRI UUT.</td>
</tr>
</tbody>
</table>

CHECK The SAS NRI UUT response to the request must satisfy all of the following conditions:
- HTTP status code shall be 200 (success).
- The message includes all required fields and the fields are syntactically correct.

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:
- Exactly all Operationally-Supported FIDs are included
- Exactly N1 CBSDs are included, each with parameters corresponding to the Registrations and Grants in Steps 2-3.
- Exactly N2 PPAs are included, each with parameters corresponding to the information loaded in Step 4.
- Exactly N3 ESC sensors are included, each with parameters corresponding to the information loaded in Step 5.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>• All required field exists, and no banned content [n.6, R2-ISC-06, R2-ISC-07] is included.</strong>&lt;br&gt;&lt;br&gt;<strong>If the any of the above conditions is not met, the SAS FAILS this test. Otherwise, PROCEED.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>If N4 &gt; 1, the remaining SAS NRI Test Harnesses retrieve all of the data in the Full Activity Dump from the SAS NRI UUT.</td>
</tr>
</tbody>
</table>
| **CHECK** | The data retrieved by each SAS NRI Test Harness is consistent with the data retrieved in Step 10.  
*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.

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>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.</td>
</tr>
<tr>
<td>2</td>
<td>Configure the SAS NRI Test Harness with an array of Operationally-Supported FIDs</td>
</tr>
<tr>
<td>3</td>
<td>Configure the SAS NRI Test Harness with information about 1 ESC sensor.</td>
</tr>
<tr>
<td>4</td>
<td>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.</td>
</tr>
<tr>
<td>5</td>
<td>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.</td>
</tr>
<tr>
<td>6</td>
<td>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.</td>
</tr>
<tr>
<td>7</td>
<td>Configure the SAS NRI Test Harness with information about 1 PPA.</td>
</tr>
<tr>
<td>8</td>
<td>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.</td>
</tr>
<tr>
<td>9</td>
<td>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.</td>
</tr>
<tr>
<td>10</td>
<td>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.</td>
</tr>
<tr>
<td>12</td>
<td>Notify the SAS NRI UUT about the SAS NRI Test Harness.</td>
</tr>
<tr>
<td>13</td>
<td>Trigger CPAS in the SAS NRI UUT. Verify that the CPAS have completed.</td>
</tr>
</tbody>
</table>
| 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.  
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:  
- 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 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

<table>
<thead>
<tr>
<th>Document history</th>
<th>3 May 2021</th>
<th>Initial release</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.0.0</td>
<td>22 Dec 2023</td>
<td>Implemented WinnF-I-23-00053 r3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Implemented WinnF-I-23-00085 r1 - FW-CR on EAP NRI Test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Implemented WinnF-I-23-00070 r1 - CR on CPE and PDG and PSSFG Test Cases in TS-4003</td>
</tr>
</tbody>
</table>