Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; CBSD/DP as Unit Under Test (UUT) (Release 2)

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Test and Certification for CBRS; Conformance and Performance Test Technical Specification; CBSD/DP as UUT

1 Introduction

The present document contains the Protocol Implementation Conformance Statement (PICS), test cases to ensure conformance of the components of a three-tiered Spectrum Sharing Architecture to the Release 2 specifications and Requirements defined by Wireless Innovation Forum (WInnForum).

2 Scope

The WInnForum Test Specifications define test procedures for conformance and performance testing of components of the CBRS Architecture, detailed in Section 5. This document defines test and conformance procedures for CBSD and Domain Proxy components of the CBRS Architecture. A separate test specification is dedicated to SAS testing [n.7].

The conformance to the test specifications detailed herein will result in compliance for the Mandatory WInnForum Release 2 specifications and vendor CBSD/DP selected WInnForum Release 2 optional features.

CBSD operation, behavior or RF performance are outside the scope of this document, except those directly related to operation and interaction with a SAS.

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 test cases required for WInnForum Release 2 protocol compliance testing of CBSD and Domain Proxy, and does not include the proprietary tests performed by equipment vendors.

Moreover, this document only covers the test specifications and test cases for the CBRS architecture components, and does not include the test code.

3 References

3.1 Normative references

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

[n.1] SSC-Wireless Innovation Forum, "Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): Spectrum Access System (SAS) - Citizens Broadband Radio Service Device (CBSD) Interface Technical Specification", WINNF-TS-0016-V1.2.6, 25 November 2020

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

[n.3] SSC-Wireless Innovation Forum, "Requirements for Commercial Operation in the U.S. 3550-3700 MHz Citizens Broadband Radio Service Band", WINNF-TS-0112-V1.9.1, 13 March 2020

[n.4] SSC-Wireless Innovation Forum, "CBRS Operational and Functional Requirements (Release 2)", WINNF-TS-1001

[n.5] SSC-Wireless Innovation Forum, "WInnForum Recognized CBRS Air Interfaces and Measurements", WINNF-SSC-0002

[n.6] SSC-Wireless Innovation Forum, "WInnForum CBRS Certificate Policy Specification", WINNF-TS-0022-V1.5.0, 17 November 2020

[n.7] SSC-Wireless Innovation Forum, "Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; SAS as Unit Under Test (UUT)", WINNF-TS-4003

[n.8] SSC-Wireless Innovation Forum, "WInnForum Recognized CBRS Grouping Information", WINNF-SSC-0010

[n.9] SSC-Wireless Innovation Forum, "Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; CBSD/DP as Unit Under Test (UUT)", WINNF-TS-0122-V1.0.2, 25 November 2020

[n.10] FCC KDB 935210 D02 Signal Boosters Certification v04r02, 15 April 2019

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.

[i.1] WG4 GitHub Repositories,

- https://github.com/Wireless-Innovation-Forum/Citizens-Broadband-Radio-Service-Device
- https://github.com/Wireless-Innovation-Forum/Spectrum-Access-System

4 Definitions and Abbreviations

4.1 Abbreviations

CBRS: Citizens Broadband Radio Services

CBSD: Citizens Broadband Radio Service Device

DP: Domain Proxy

FCC: Federal Communications Commission

SAS: Spectrum Access System

UUT: Unit Under Test

4.2 Definitions

SAS Test Harness: A collection of routines that can be executed by the test operator, to interact with the CBSD or DP/CBSD UUT via interfaces specified in [n.2]. Test Harness emulates the message sequences that would be generated by a SAS and it is used to automate test sequences and procedures in this document.

Unit Under Test: A CBSD or DP/CBSD(s) that is tested for compliance with WInnForum test specification. The SAS Test Harness is used to receive and send messages with the Unit Under Test (UUT) according to the test procedures contained in this document. The term "Unit Under Test" is applied generically within this document to include, where appropriate, either a CBSD or the combination of a Domain Proxy and CBSD.

5 Test and Conformance Process

Work Group 4 develops the test cases to test the UUT for WInnForum Release 2 feature compliance with the requirements, protocols, specifications, and interfaces that are defined by SSC-WInnForum Work Groups 1 and 3. The conformance 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 CBSD/DP UUT to the requirements developed by WInnForum.

- Interoperability Test (IT): 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 CBSD/DP UUT to support various traffic models and actual operations in the field.

The Protocol and Functional test cases are converted to test scripts to facilitate the development of test apparatus (emulator), which must be validated through a process defined by WInnForum. The lab and performance testing require traffic/capacity modeling and measurement equipment.

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}.*{FCCRegulationImpact}.*{*TestFunction*}.{*SubTestNumber*}

TestRequirement indicates whether a test is to verify if the Unit Under Test meets FCC requirements or Technical Specifications provided by Wireless Innovation Forum. 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 or a combination of those entities. *TestFunction* indicates a particular function or requirement a test intends to verify. *SubTestNumber* is an integer larger than 0 to number different test cases in a group of tests performing similar test functions.

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

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

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

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

Value	Description
FT	This test is a functional test.
PT	This test is a performance test.

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

Value	Unit under test
C	CBSD
D	Domain Proxy (with CBSD(s))

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

Value	Description
FCE	Feature Capability Exchange
EGH	Enhanced CBSD Group Handling
EAP	Enhanced Antenna Pattern
CPE	CPE-CBSD Indicator
RSP	Response
PDG	Passive DAS Group
GRU	Grant Request Update

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

Value	REL
2	Release 2

Table 5-6 **The values of FCCRegulationImpact in Test ID**

Value	FCCRegulationImpact
NRI	NON-Regulatory Impacting

5.2 Equipment Requirements for this Test Plan

The following figure provide a high-level view of the main components required for the test configuration.

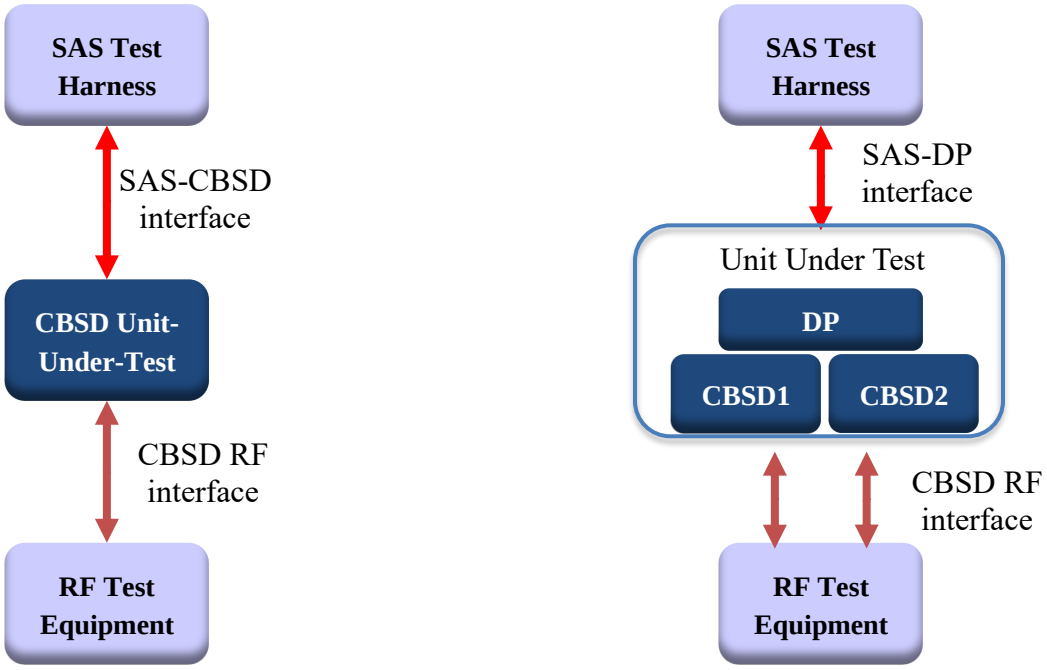

Figure 1: High level test configuration: BTS-CBSD and DP/BTS-CBSD

5.2.1 Required Vendor-Supplied Equipment for Test Process

The following equipment is required to perform test cases in this document:

- For stand-alone CBSD, vendor shall supply one CBSD
- For CBSD under control of Domain Proxy, vendor shall supply a Domain Proxy with two CBSDs
- Vendor shall supply any ancillary equipment and manual procedure if required to ensure CBSD will transmit when it obtains a grant in AUTHORIZED state. This may include additional equipment such as End-User device(s), if required.
- UUT shall be UTC time synchronized

5.2.2 Test Equipment Requirements

The following test equipment are required to test the UUT:

- SAS Test Harness for WInnForum Release 2
    - The SAS Test Harness shall validate all required parameters are provided in the various request messages. In addition, all the parameters, whether required or optional, included in the request message shall be validated by the SAS Test Harness to ensure the parameter and its value conforms to the proper format and acceptable range according to [n.2]. The SAS Test Harness will mark the test case as “Fail” if a required parameter is not provided, or its value is not of proper format or range.

  - If the SAS Test Harness fails the validation of the Request message from UUT, then the SAS Test Harness will mark the test case as "Fail" and will stop the execution of the test case.
  - SAS Test Harness for WInnForum Release 2 will not reject Heartbeat Request messages recived from CBSD/DP in intervals longer than *heartbeatInterval* specified in Grant Response message.
  - If WInnForum does NOT provide a SAS Test Harness for WInnForum Release 2 (the SAS Test Harness described in [i.1] is for WInnForum Release 1), the CBSD/DP vendor can:
    - build its own SAS Test Harness for WInnForum Release 2 for WInnForum Release 2 self-testing purposes.
    - Cooperate with a SAS vendor to conduct WInnForum Release 2 testing as Inter-Operability testing.
- RF measurement equipment: Equipment (such as spectrum analyzer) capable of measuring RF interface of UUT, to determine:
  - Whether UUT is transmitting or not, including ability to measure time when UUT RF transmission starts or ends
  - Whether UUT is transmitting within granted frequency range
  - Can assist in determining the transmitted power of the UUT according to its granted parameters from the SAS Test Harness

  This includes any ancillary RF components (attenuators, cables, couplers, etc.) which may be required to perform those measurements.

The SAS Test Harness and RF measurement equipment shall be synchronized to UTC time.

The following are outside the scope of this document:

- Choice of specific RF test equipment, and exact configuration or operation of that equipment
- Specific test setup to allow monitoring of the UUT by the RF measurement equipment

5.2.3 UUT Test Interface Requirements

The unit-under-test shall provide functionality via a vendor-defined test interface, in order to support completion of all test cases in this document. The interface is outside the scope of this test document, but shall provide a minimum set of functionalities as described below:

1. Method to return CBSD to an unregistered state after the conclusion of a test case. Test cases conclude with the CBSD in various states, such as AUTHORIZED state and actively transmitting, or may end with the SAS Test Harness providing an error condition (such as a non-zero error code, or no response). Therefore, it is necessary for the test interface to provide a method to return the CBSD to an unregistered state, prior to start of the next test case.
2. Method to trigger CBSD to perform the following sequence in its entirety, automatically, starting from an unregistered state, and provided each step results in a successful Response message (response code = 0):

a. Register with SAS
b. Perform Spectrum Inquiry Request (optional, if UUT supports this message)
c. Perform Grant Request, where UUT requests a pre-defined frequency range of operation and maxEirp, as required by the particular test case
d. Heartbeat the CBSD for the *grantId* obtained
e. Begin transmission within the Granted frequency range

3. Method to trigger CBSD to perform a Spectrum Relinquishment, if it has a valid grant in AUTHORIZED or GRANTED state.
4. Method to trigger CBSD to Deregister, if it is in the registered state.
5. Method to load test certificates into UUT, as required, for use in authentication procedures with the SAS Test Harness.
6. If provided by the CBSD, access to the CBSD CPI interface for entering of CPI-related registration information into the CBSD.
7. UUT shall be able to support a single grant request.

5.2.4 Requirements for UUT Supporting Group Types (CxG, SFG, etc.)

UUT supporting at least one group type according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc.) shall execute the test cases of Enhanced Group Handling listed in this document. The UUT does not need to execute Enhanced Group Handling test cases separately for every supported group type by the UUT.

6 SAS-CBSD/DP Interface Conformance Test Specifications

This section includes all the test cases required for ensuring the SAS-CBSD/DP interface conforms 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.

Table **6-1** indicates the legend for test case classification in Table **6-3**.

Table 6-1 Test Case Classification (for Table 6-3)

REL2.M	Mandatory for WInnForum Release 2 Compliance
REL2.O	Optional. Not required for WInnForum Release 2 Compliance
REL2.C	Conditional. Required to execute the test case if CBSD supports relevant functionality. See Table 6-2 for definition of conditional notation.
REL2.D	Deprecated. Test no longer required.

Table 6-2 defines the applicability of conditional test cases listed in Table 6-3. Test cases marked as Conditional in Table 6-3 are mandatory for devices, as defined by the UUT vendor, according to the conditional definitions below.

Table 6-2 Feature Test Case Definitions (for Table 6-3)

REL2.C1	For UUT capable of manually triggering Feature Capability Exchange Request message (from CBSD/DP management system)
REL2.C2	For UUT which start as "Release 2 CBSD/DP" sending in Registration Request cbsdFeatureCapabilityList . If SAS replies in Registration Response as "Release 1 SAS", then UUT De-Registers and changes to a "Release 1 CBSD/DP" implementation.
REL2.C3	Test Cases for CBSD/DP which remain in Registered state and continue to Authorized state without De-Registration, in case SAS replies in Registration Response as "Release 1 SAS".
REL2.C4	For UUT which Operationally-Supports Enhanced Group Handling (UUT which supports Single Frequency Group, or Coexistence Group or other proprietary group types)
REL2.C5	For UUT which Operationally-Supports Enhanced Group Handling (UUT which supports Single Frequency Group, or Coexistence Group or other proprietary group types). UUT capable of NOT including *groupParam* in Registration Request, and manually triggering *groupParam* in Registered State
REL2.C6	For UUT which Operationally-Supports Enhanced Antenna Pattern, and Multi-Step Registration
REL2.C7	For UUT which Operationally-Supports Enhanced Antenna Pattern, and Single-Step Registration
REL2.C8	For UUT which Operationally-Supports CPE-CBSD Indicator
REL2.C9	For UUT which Operationally-Supports Passive DAS
REL2.C10	For UUT which Operationally-Supports Grant Update

Table **6-3** lists all test cases in this document and applicability to CBSD or Domain Proxy (DP), with indication of compliance status (REL2.M/O/C – see Table **6-1**), and feature support by UUT where appropriate (see Table **6-2**). Specifically:

- CBSD column indicates test cases which apply to stand-alone CBSD as UUT (test cases numbered as WINNF.FT.C.REL2.xxx.yy).
- DP column indicates test case which apply to a combination of Domain Proxy and CBSD(s) as UUT (test cases numbered as WINNF.FT.D.REL2.xxx.yy).

Table 6-3 Test Case List

Section	CBSD	DP	Required for Conformance	Test Case ID	Test Case Title
6.1.4.1.1	X	--	REL2.C3	WINNF.FT.C.REL2.NRI.FCE.1	CBSD Backwards Compatibility With SAS Release 1: Registration Response does not include *sasFeatureCapabilityList*
6.1.4.1.2	--	X	REL2.C3	WINNF.FT.D.REL2.NRI.FCE.2	DP Backwards Compatibility With SAS Release 1: Registration Response does not include *sasFeatureCapabilityList*
6.1.4.1.3	X	--	REL2.C2	WINNF.FT.C.REL2.NRI.FCE.3	CBSD Backwards Compatibility With SAS Release 1: Registration Response does not include *sasFeatureCapabilityList*, CBSD De-Register and Register again as "Release 1 CBSD"
6.1.4.1.4	--	X	REL2.C2	WINNF.FT.D.REL2.NRI.FCE.4	DP Backwards Compatibility With SAS Release 1: Registration Response does not include *sasFeatureCapabilityList*, DP De-Register and Register again as "Release 1"
6.1.4.2.1	X	--	REL2.M	WINNF.FT.C.REL2.NRI.FCE.5	CBSD Successful Feature Capability Exchange with Release 2 SAS: Registration Response includes *sasFeatureCapabilityList* with partial match to *cbsdFeatureCapabilityList*
6.1.4.2.2	--	X	REL2.M	WINNF.FT.D.REL2.NRI.FCE.6	DP Successful Feature Capability Exchange with Release 2 SAS: Registration Response includes *sasFeatureCapabilityList* with partial match to *cbsdFeatureCapabilityList*
6.1.4.3.1	X	--	REL2.M	WINNF.FT.C.REL2.NRI.FCE.7	Release 2 SAS includes *featureCapabilityExchangeTrigger* = true for CBSD in Heartbeat Response, SAS has new FID in *sasFeatureCapabilityList*
6.1.4.3.2	--	X	REL2.M	WINNF.FT.D.REL2.NRI.FCE.8	Release 2 SAS includes *featureCapabilityExchangeTrigger* = true for DP in Heartbeat Response, SAS has new FID in *sasFeatureCapabilityList*
6.1.4.4.1	X	--	REL2.M	WINNF.FT.C.REL2.NRI.FCE.9	Feature Capability Exchange Response DEREGISTER (responseCode 105) to CBSD
6.1.4.4.2	--	X	REL2.M	WINNF.FT.D.REL2.NRI.FCE.10	Feature Capability Exchange Response DEREGISTER (responseCode 105) to DP
6.1.4.4.3	X	--	REL2.M	WINNF.FT.C.REL2.NRI.FCE.11	Feature Capability Exchange Response Missing Required Parameters (responseCode 102) to CBSD
6.1.4.4.4	--	X	REL2.M	WINNF.FT.D.REL2.NRI.FCE.12	Feature Capability Exchange Response Missing Required Parameters (responseCode 102) to DP
6.1.4.4.5	X	--	REL2.M	WINNF.FT.C.REL2.NRI.FCE.13	Feature Capability Exchange Response Invalid Parameters (responseCode 103) to CBSD
6.1.4.4.6	--	X	REL2.M	WINNF.FT.D.REL2.NRI.FCE.14	Feature Capability Exchange Response Invalid Parameters (responseCode 103) to DP
6.1.4.5.1	X	--	REL2.C1	WINNF.FT.C.REL2.NRI.FCE.15	CBSD updates Release 2 Operational Supported FIDs, SAS Response SUCCESS (*responseCode* 0)
6.1.4.5.2	--	X	REL2.C1	WINNF.FT.D.REL2.NRI.FCE.16	DP updates Release 2 Operational Supported FIDs, SAS Response SUCCESS (*responseCode* 0)
6.1.4.5.3	X	--	REL2.C1	WINNF.FT.C.REL2.NRI.FCE.17	CBSD updates Release 2 Operational Supported FIDs, SAS Response DEREGISTER (*responseCode* 105)
6.1.4.5.4	--	X	REL2.C1	WINNF.FT.D.REL2.NRI.FCE.18	DP updates Release 2 Operational Supported FIDs, SAS Response DEREGISTER (*responseCode* 105)
6.2.4.1.1	X	--	REL2.O	WINNF.FT.C.REL2.NRI.RSP.1	Release 2 SAS sends Registration Response with 106 NOT_PROCESSED to CBSD
6.2.4.1.2	--	X	REL2.O	WINNF.FT.D.REL2.NRI.RSP.2	Release 2 SAS sends Registration Response with 106 NOT_PROCESSED to DP

Section	CBSD	DP	Required for Conformance	Test Case ID	Test Case Title
6.2.4.1.3	X	--	REL2.M	WINNF.FT.C.REL2.NRI.RSP.3	Release 2 SAS sends 106 NOT_PROCESSED in first Heartbeat Response to CBSD
6.2.4.1.4	--	X	REL2.M	WINNF.FT.D.REL2.NRI.RSP.4	Release 2 SAS sends 106 NOT_PROCESSED in first Heartbeat Response to DP
6.2.4.1.5	X	--	REL2.M	WINNF.FT.C.REL2.NRI.RSP.5	Release 2 SAS sends 106 NOT_PROCESSED in subsequent Heartbeat Response to CBSD
6.2.4.1.6	--	X	REL2.M	WINNF.FT.D.REL2.NRI.RSP.6	Release 2 SAS sends 106 NOT_PROCESSED in subsequent Heartbeat Response to DP
6.2.4.2.1	X	--	REL2.M	WINNF.FT.C.REL2.NRI.RSP.7	Release 2 SAS replies to CBSD with successful Registration Response with *responseData* and *responseMessage*
6.2.4.2.2	--	X	REL2.M	WINNF.FT.D.REL2.NRI.RSP.8	Release 2 SAS replies to DP with successful Registration Response with *responseData* and *responseMessage*
6.3.4.1.1	X	--	REL2.C4	WINNF.FT.C.REL2.NRI.EGH.1	CBSD successful *groupingParam* as part of Registration. Release 2 SAS Operationally-Supports the group types of the CBSD.
6.3.4.1.2	--	X	REL2.C4	WINNF.FT.D.REL2.NRI.EGH.2	DP successful *groupingParam* as part of Registration. Release 2 SAS Operationally-Supports the group types of the DP.
6.3.4.1.3	X	--	REL2.C4	WINNF.FT.C.REL2.NRI.EGH.3	CBSD successful *groupingParam* as part of Registration. Release 2 SAS does NOT Operationally-Support the group types of the CBSD.
6.3.4.1.4	--	X	REL2.C4	WINNF.FT.D.REL2.NRI.EGH.4	DP successful *groupingParam* as part of Registration. Release 2 SAS does NOT Operationally-Support the group types of the DP.
6.3.4.1.5	X	--	REL2.C4	WINNF.FT.C.REL2.NRI.EGH.5	Release 2 SAS does NOT Operationally-Support the Enhanced Group Handling for CBSD
6.3.4.1.6	--	X	REL2.C4	WINNF.FT.D.REL2.NRI.EGH.6	Release 2 SAS does NOT Operationally-Support the Enhanced Group Handling for DP
6.3.4.1.7	X	--	REL2.C4	WINNF.FT.C.REL2.NRI.EGH.7	Release 2 SAS Operationally-Supports Enhanced Group Handling, Release 2 SAS sends Registration Response with 201 Group Error to CBSD.
6.3.4.1.8	--	X	REL2.C4	WINNF.FT.D.REL2.NRI.EGH.8	Release 2 SAS Operationally-Supports Enhanced Group Handling, Release 2 SAS sends Registration Response with 201 Group Error to DP.
6.3.4.2.1	X	--	REL2.C5	WINNF.FT.C.REL2.NRI.EGH.9	CBSD invokes *groupingParam* in AUTHORIZED state. Release 2 SAS Operationally-Supports the group types of the CBSD.
6.3.4.2.2	--	X	REL2.C5	WINNF.FT.D.REL2.NRI.EGH.10	DP invokes *groupingParam* in AUTHORIZED state. Release 2 SAS Operationally-Supports the group types of the DP.
6.3.4.2.3	X	--	REL2.C5	WINNF.FT.C.REL2.NRI.EGH.11	CBSD invokes *groupingParam* in AUTHORIZED state. Release 2 SAS does NOT Operationally-Support the group types of the CBSD.
6.3.4.2.4	--	X	REL2.C5	WINNF.FT.D.REL2.NRI.EGH.12	DP invokes *groupingParam* in AUTHORIZED state. Release 2 SAS does NOT Operationally-Support the group types of the DP.
6.4.4.1.1	X	--	REL2.C6	WINNF.FT.C.REL2.NRI.EAP.1	Release 2 CBSD Multi-Step Registration with Enhanced Antenna Pattern
6.4.4.1.2	--	X	REL2.C6	WINNF.FT.D.REL2.NRI.EAP.2	Release 2 DP Multi-Step Registration with Enhanced Antenna Pattern
6.4.4.1.3	X	--	REL2.C7	WINNF.FT.C.REL2.NRI.EAP.3	Release 2 CBSD Single-Step Registration with CPI signed data and Enhanced Antenna Pattern
6.4.4.1.4	--	X	REL2.C7	WINNF.FT.D.REL2.NRI.EAP.4	Release 2 DP Single-Step Registration with CPI signed data and Enhanced Antenna Pattern
6.5.4.1.1	X	--	REL2.C8	WINNF.FT.C.REL2.NRI.CPE.1	CPE-CBSD included in Capabilities Exchange from CBSD
6.5.4.1.2	--	X	REL2.C8	WINNF.FT.D.REL2.NRI.CPE.2	CPE-CBSD included in Capabilities Exchange from DP
6.6.4.1.1	X	--	REL2.C9	WINNF.FT.C.REL2.NRI.PDG.1	Passive DAS Successful Registration without Domain Proxy
6.6.4.1.2	--	X	REL2.C9	WINNF.FT.D.REL2.NRI.PDG.2	Passive DAS Successful Registration with Domain Proxy
6.7.4.1.1	X	--	REL2.C10	WINNF.FT.C.REL2.NRI.GRU.1	Release 2 SAS Operationally-Supports the Grant Update FID from CBSD as part of Registration

Section	CBSD	DP	Required for Conformance	Test Case ID	Test Case Title
6.7.4.1.2	--	X	REL2.C10	WINNF.FT.D.REL2.NRI.GRU.2	Release 2 SAS Operationally-Supports the Grant Update FID from Domain Proxy as part of Registration
6.7.4.1.3	X	--	REL2.C10	WINNF.FT.C.REL2.NRI.GRU.3	Release 2 SAS does not support the Grant Update FID from CBSD as part of Registration
6.7.4.1.4	--	X	REL2.C10	WINNF.FT.D.REL2.NRI.GRU.4	Release 2 SAS does not support the Grant Update FID from Domain Proxy as part of Registration

6.1 CBSD Feature Capability Exchange Process

6.1.1 Definition and applicability and Scope of Test Case

This section provides test steps, conditions and procedures to test the conformance of the CBSD implementation for the CBSD Feature Capability Exchange Procedure. A precondition is the CBSD includes the *cbsdFeatureCapabilityList* in Registration Request message.

6.1.2 Test Characteristics

Table 6-4 CBSD Feature Capability Exchange Process Test Characteristics

1	**Test ID**	WINNF.FT.C.REL2.NRI.FCE
2	**Title**	CBSD Feature Capability Exchange Process
3	**Working Group / Entity**	WG3
4	**Test Type**	Functionality
5	**Test Class**	Certification
6	**Component / Interface**	CBSD / CBSD ← → SAS

6.1.3 Method of test

6.1.3.1 Initial Conditions / Test Pre-conditions

– The pre-conditions of the test case are:
  - CBSD/DP has gone through SAS discovery process and can authenticate with the SAS. The exact condition of the CBSD after the discovery process are detailed in each test case.
  - CBSD/DP includes the *cbsdFeatureCapabilityList* in Registration Request message.

6.1.4 Test Procedure

6.1.4.1 Backwards Compatibility with SAS Release 1

The test cases in this section verify that a “Release 2 CBSD/DP” properly acknowledges a “Release 1 SAS”.

6.1.4.1.1 [WINNF.FT.C.REL2.NRI.FCE.1] CBSD Backwards Compatibility with SAS Release 1: Registration Response does not include *sasFeatureCapabilityList*

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is NOT included	--	--
4	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 5, or If message is type Grant Request, go to step 7	--	--
5	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
6	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
7	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
8	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test	--	--

	• *responseCode* = 0		
9	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED" • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
10	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
11	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED" • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 10 is complete, and its transmission is limited to within the bandwidth range F. • UUT did not send Feature Capability Exchange Request message during the test. • After step 3 UUT did not include in Request messages any parameters associated with WinnForum Release 2 features.	PASS	FAIL

6.1.4.1.2 [WINNF.FT.D.REL2.NRI.FCE.2] DP Backwards Compatibility with SAS Release 1: Registration Response does not include *sasFeatureCapabilityList*

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness	--	--

	• UUT is in the Unregistered state		
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is NOT included	--	--
4	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 5, or If message is type Grant Request, go to step 7	--	--
5	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
6	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
7	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
8	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
9	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2}	PASS	FAIL

	• *operationState* = "GRANTED" • NO parameters associated with WinnForum Release 2 features		
10	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
11	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED" • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
13	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 10 is complete, and its transmission is limited to within the bandwidth range Fi. • UUT did not send Feature Capability Exchange Request message during the test. • After step 3 UUT did not include in Request messages any parameters associated with WinnForum Release 2 features.	PASS	FAIL

6.1.4.1.3 [WINNF.FT.C.REL2.NRI.FCE.3] CBSD Backwards Compatibility with SAS Release 1: Registration Response does not include *sasFeatureCapabilityList*, CBSD De-Register and Register again as "Release 1 CBSD"

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL

	• *cbsdFeatureCapabilityList* is included		
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is NOT included	--	--
4	UUT sends Deregistration Request to SAS Test Harness with the following parameters: • *cbsdId* = C • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
5	SAS Test Harness approves the request with a Deregistration Response message with parameters: • *cbsdId* = C • *responseCode* = 0	--	--
6	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is NOT included • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
7	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is NOT included	--	--
8	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 9, or If message is type Grant Request, go to step 11	--	--
9	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
10	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
11	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96	PASS	FAIL

	• *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band • NO parameters associated with WinnForum Release 2 features		
12	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
13	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED" • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED" • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
16	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
17	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 14 is complete, and its transmission is limited to within the bandwidth range F. • UUT did not send Feature Capability Exchange Request message during the test. • After step 3 UUT did not include in Request messages any	PASS	FAIL

	parameters associated with WinnForum Release 2 features.		

6.1.4.1.4 [WINNF.FT.C.REL2.NRI.FCE.4] DP Backwards Compatibility with SAS Release 1: Registration Response does not include *sasFeatureCapabilityList*, DP De-Register and Register again as "Release 1"

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is NOT included	--	--
4	UUT sends Deregistration Request to SAS Test Harness with the following parameters: • *cbsdId* = Ci, i={1,2} • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
5	SAS Test Harness approves the request with a Deregistration Response message with parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD	--	--
6	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is NOT included • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
7	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is NOT included	--	--
8	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 9, or If message is type Grant Request, go to step 11	--	--

9	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
10	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
11	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
12	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
13	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED" • NO parameters associated with WinnForum Release 2 features	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED" • NO parameters associated with WinnForum Release 2 features	PASS	FAIL

16	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
17	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 14 is complete, and its transmission is limited to within the bandwidth range Fi. • UUT did not send Feature Capability Exchange Request message during the test. • After step 3 UUT did not include in Request messages any parameters associated with WinnForum Release 2 features.	PASS	FAIL

6.1.4.2 Successful Feature Capability Exchange with SAS Release 2

The test cases in this section verify that "Release 2 CBSD/DP" acknowledges a "Release 2 SAS" during Registration Request/Response. If the CBSD/DP has additional information for its Release 2 Operationally Supported Features, the test cases in this section verify that CBSD/DP sends a correct and valid Feature Capability Exchange Request message.

6.1.4.2.1 [WINNF.FT.C.REL2.NRI.FCE.5] CBSD Successful Feature Capability Exchange with Release 2 SAS: Registration Response includes *sasFeatureCapabilityList* with partial match to *cbsdFeatureCapabilityList*

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is included with 2 FIDs: FID #1 matches FID #1 in *cbsdFeatureCapabilityList* , FID #2 does not match any FID in *cbsdFeatureCapabilityList*	--	--
4	Depending on the existence of additional information for the UUT	PASS	FAIL

	Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6		
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is included with 2 FIDs: FID #1 matches FID #1 in *cbsdFeatureCapabilityList* , FID #2 does not match any FID in *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including:	PASS	FAIL

	• *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"		
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.1.4.2.2 [WINNF.FT.D.REL2.NRI.FCE.6] DP Successful Feature Capability Exchange with Release 2 SAS: Registration Response includes *sasFeatureCapabilityList* with partial match to *cbsdFeatureCapabilityList*

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters:	--	--

	• *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included with 2 FIDs: FID #1 matches FID #1 in *cbsdFeatureCapabilityList* , FID #2 does not match any FID in *cbsdFeatureCapabilityList*		
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included with 2 FIDs: FID #1 matches FID #1 in *cbsdFeatureCapabilityList* , FID #2 does not match any FID in *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters:	--	--

	• *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD		
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.1.4.3 SAS Release 2 includes *featureDataExchangeTrigger* = true for CBSD/DP in Response message

The test cases in this section verify that Release 2 CBSD/DP initiates the Feature Capability Exchange Request message following *featureDataExchangeTrigger* = true in successful Heartbeat Response message from Release 2 SAS.

6.1.4.3.1 [WINNF.FT.C.REL2.NRI.FCE.7] Release 2 SAS includes *featureDataExchangeTrigger* = true for CBSD in Heartbeat Response, SAS has new FID in *sasFeatureCapabilityList*

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects	--	--

	• *responseCode* = 0		
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For subsequent 5 Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	UUT sends Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
16	The SAS Test Harness responds with a Heartbeat Response message	--	--

	including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *featureCapabilityExchangeTrigger* = true • *responseCode* = 0		
17	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
18	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList* PLUS additional FID which does not match any FID in *cbsdFeatureCapabilityList*	--	--
19	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.1.4.3.2 [WINNF.FT.D.REL2.NRI.FCE.8] Release 2 SAS includes *featureDataExchangeTrigger* = true for DP in Heartbeat Response, SAS has new FID in *sasFeatureCapabilityList*

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--

4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including:	PASS	FAIL

	• *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"		
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
13	For subsequent 5 Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	UUT sends Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
16	The SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *featureCapabilityExchangeTrigger* = true • *responseCode* = 0 for each CBSD	--	--
17	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
18	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList* PLUS additional FID which does	--	--

	not match any FID in *cbsdFeatureCapabilityList*		
19	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.1.4.4 Unsuccessful Feature Capability Exchange Response Message (Non-Zero *responseCode*)

The test cases in this section verify Release 2 CBSD/DP when receiving Unsuccessful Feature Capability Exchange Response (*responseCode* not 0). The Unsuccessful Response is to the Feature Capability Exchange Request message initiated from UUT following *featureDataExchangeTrigger* = true in successful Heartbeat Response message from Release 2 SAS.

CBSD/DP under test cannot be expected to generate a message with a missing or invalid parameter. To test for Response Code not equal to 0, the SAS Test Harness will respond to a valid Feature Capability Exchange Request message with a Feature Capability Response message with a non-zero Response Code.

Missing/Invalid response codes are tested by injecting those Response Codes into the SAS Test Harness generated response message, even though the UUT has sent a valid message.

6.1.4.4.1 [WINNF.FT.C.REL2.NRI.FCE.9] Feature Capability Exchange Response DEREGISTER (*responseCode* 105) to CBSD

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature	PASS	FAIL

	Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6		
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G	PASS	FAIL

	• *operationState* = "GRANTED"		
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For subsequent 5 Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	UUT sends Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
16	The SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *featureCapabilityExchangeTrigger* = true • *responseCode* = 0	--	--
17	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
18	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 105 (DEREGISTER)	--	--
19	Monitor the RF output of the UUT from start of test until 60 seconds after last step. Verify: • UUT does not transmit at any time prior to completion of the	PASS	FAIL

	first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F. • UUT stopped RF within 60 seconds after receiving *responseCode* =105 in previous step		

6.1.4.4.2 [WINNF.FT.D.REL2.NRI.FCE.10] Feature Capability Exchange Response DEREGISTER (*responseCode* 105) to DP

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--

7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of frequencyRange objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
13	For subsequent 5 Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2}	--	--

	• *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD		
15	UUT sends Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
16	The SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *featureCapabilityExchangeTrigger* = true • *responseCode* = 0 for each CBSD	--	--
17	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
18	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 105 (DEREGISTER)	--	--
19	Monitor the RF output of the UUT from start of test until 60 seconds after last step. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F. • UUT stopped RF within 60 seconds after receiving *responseCode* =105 in previous step	PASS	FAIL

6.1.4.4.3 [WINNF.FT.C.REL2.NRI.FCE.11] Feature Capability Exchange Response Missing Required Parameters (*responseCode* 102) to CBSD

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL

3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters:	--	--

	• *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0		
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For subsequent 5 Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	UUT sends Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
16	The SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *featureCapabilityExchangeTrigger* = true • *responseCode* = 0	--	--
17	After completion of previous step, SAS Test Harness will continue to provide Heartbeat Response messages with *responseCode*=0 to further Heartbeat Request messages in "AUTHORIZED" state from the UUT.	--	--

18	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
19	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 102 (Missing Required Parameters)	--	--
20	Monitor the RF output of the UUT from start of test until 60 seconds after last step. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.1.4.4.4 [WINNF.FT.D.REL2.NRI.FCE.12] Feature Capability Exchange Response Missing Required Parameters (*responseCode* 102) to DP

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL

5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--

13	For subsequent 5 Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	UUT sends Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
16	The SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *featureCapabilityExchangeTrigger* = true • *responseCode* = 0 for each CBSD	--	--
17	After completion of previous step, SAS Test Harness will continue to provide Heartbeat Response messages with *responseCode*=0 to further Heartbeat Request messages in "AUTHORIZED" state from the UUT.	--	--
18	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
19	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 102 (Missing Required Parameters)	--	--
20	Monitor the RF output of the UUT from start of test until 60 seconds after last step. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.1.4.4.5 [WINNF.FT.C.REL2.NRI.FCE.13] Feature Capability Exchange Response Invalid Parameters (*responseCode* 103) to CBSD

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters:	--	--

	• *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0		
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For subsequent 5 Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	UUT sends Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G	PASS	FAIL

	• *operationState* = "AUTHORIZED"		
16	The SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *featureCapabilityExchangeTrigger* = true • *responseCode* = 0	--	--
17	After completion of previous step, SAS Test Harness will continue to provide Heartbeat Response messages with *responseCode*=0 to further Heartbeat Request messages in "AUTHORIZED" state from the UUT.	--	--
18	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
19	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 103 (Invalid Parameters)	--	--
20	Monitor the RF output of the UUT from start of test until 60 seconds after last step. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.1.4.4.6 [WINNF.FT.D.REL2.NRI.FCE.14] Feature Capability Exchange Response Invalid Parameters (*responseCode* 103) to DP

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included and matches	--	--

	cbsdFeatureCapabilityList		
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
11	UUT sends a first Heartbeat Request message.	PASS	FAIL

	Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"		
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
13	For subsequent 5 Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	UUT sends Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
16	The SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *featureCapabilityExchangeTrigger* = true • *responseCode* = 0 for each CBSD	--	--
17	After completion of previous step, SAS Test Harness will continue to provide Heartbeat Response messages with *responseCode*=0 to further Heartbeat Request messages in "AUTHORIZED" state from the UUT.	--	--
18	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
19	SAS Harness replies with Feature Capability Exchange Response with the following parameters:	--	--

	• *cbsdId* = Ci, i={1,2} • *responseCode* = 103 (Invalid Parameters)		
20	Monitor the RF output of the UUT from start of test until 60 seconds after last step. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.1.4.5 CBSD/DP manually triggering Feature Capability Exchange Request Message

The test cases in this section verify Release 2 CBSD/DP when manually triggering Feature Capability Exchange Request Message after reaching AUTHORIZED state. This is to when CBSD/DP updates its Release 2 Operational Supported FIDs.

6.1.4.5.1 [WINNF.FT.C.REL2.NRI.FCE.15] CBSD updates Release 2 Operational Supported FIDs, SAS Response SUCCESS (*responseCode* 0)

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters:	--	--

	• *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*		
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate:	PASS	FAIL

	• *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"		
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	Invoke manual trigger for CBSD to initiate Feature Capability Exchange Request message.	--	--
16	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
17	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
18	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.1.4.5.2 [WINNF.FT.D.REL2.NRI.FCE.16] DP updates Release 2 Operational Supported FIDs, SAS Response SUCCESS (*responseCode* 0)

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2}	--	--

	• *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*		
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test	--	--

	• *responseCode* = 0 for each CBSD		
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	Invoke manual trigger for CBSD to initiate Feature Capability Exchange Request message.	--	--
16	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
17	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
18	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.1.4.5.3 [WINNF.FT.C.REL2.NRI.FCE.17] CBSD updates Release 2 Operational Supported FIDs, SAS Response DEREGISTER (*responseCode* 105)

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters:	--	--

	• *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0		
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	Invoke manual trigger for CBSD to initiate Feature Capability Exchange Request message.	--	--
16	UUT sends Feature Capability Exchange Request message to SAS Test Harness:	PASS	FAIL

	• The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.		
17	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 105 (DEREGISTER)	--	--
18	Monitor the RF output of the UUT from start of test until 60 seconds after last step. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F. • UUT stopped RF within 60 seconds after receiving *responseCode* = 105 in previous step	PASS	FAIL

6.1.4.5.4 [WINNF.FT.D.REL2.NRI.FCE.18] DP updates Release 2 Operational Supported FIDs, SAS Response DEREGISTER (*responseCode* 105)

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList*	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL

5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 6, or If message is type Grant Request, go to step 8	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--

13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	Invoke manual trigger for CBSD to initiate Feature Capability Exchange Request message.	--	--
16	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL
17	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 105 (DEREGISTER)	--	--
18	Monitor the RF output of the UUT from start of test until 60 seconds after last step. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F. • UUT stopped RF within 60 seconds after receiving *responseCode* = 105 in previous step	PASS	FAIL

6.2 WInnForum Release 2 Response Object

6.2.1 Definition and applicability and Scope of Test Case

This section provides test steps, conditions and procedures to test the conformance of the CBSD implementation for the WInnForum Release 2 Response Object. A precondition is the CBSD includes the *cbsdFeatureCapabilityList* in Registration Request message.

6.2.2 Test Characteristics

Table 6-5 WInnForum Release 2 Response Object Test Characteristics

1	**Test ID**	WINNF.FT.C.REL2.NRI.RSP
2	**Title**	WInnForum Release 2 Response Object

3	**Working Group / Entity**	WG3
4	**Test Type**	Functionality
5	**Test Class**	Conformance
6	**Component / Interface**	CBSD / CBSD ← → SAS

6.2.3 Method of test

6.2.3.1 Initial Conditions / Test Pre-conditions

– The pre-conditions of the test case are:
  - CBSD/DP has gone through SAS discovery process and can authenticate with the SAS. The exact condition of the CBSD after the discovery process are detailed in each test case.
  - CBSD/DP includes the *cbsdFeatureCapabilityList* in Registration Request message.

6.2.4 Test Procedure

6.2.4.1 Response Code 106

The test cases in this section verify that a "Release 2 CBSD/DP" properly acknowledges Response Code 106.

  - CBSD/DP has gone through SAS discovery process and can authenticate with the SAS. The exact condition of the CBSD after the discovery process are detailed in each test case.
  - CBSD/DP includes the *cbsdFeatureCapabilityList* in Registration Request message.

6.2.4.1.1 [WINNF.FT.C.REL2.NRI.RSP.1] Release 2 SAS sends Registration Response with 106 NOT_PROCESSED to CBSD

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *responseCode* = 106 (NOT_PROCESSED) • *responseData* = T	--	--
4	If UUT sends a Request message within time of {completion of step 3 + T}, go to step 5.	--	--

	If UUT does not send a Request message within time of {completion of step 3 + T}, go to step 7.		
5	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
6	SAS Test Harness sends a Registration Response message, with the following parameters: • *responseCode* = 106 (NOT_PROCESSED) • *responseData* = T	--	--
7	After completion of step 6, SAS Test Harness will not provide any positive response (*responseCode*=0) to further request messages from the UUT.	--	--
8	Monitor the RF output of the UUT from start of test until test until 60 seconds after Step 7 is complete. Verify: • UUT shall not transmit RF	PASS	FAIL

6.2.4.1.2 [WINNF.FT.D.REL2.NRI.RSP.2] Release 2 SAS sends Registration Response with 106 NOT_PROCESSED to DP

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *responseCode* = 106 (NOT_PROCESSED) for each CBSD • *responseData* = T	--	--
4	If UUT sends a Request message within time of {completion of step 3 + T}, go to step 5. If UUT does not send a Request message within time of {completion of step 3 + T}, go to step 7.	--	--
5	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
6	SAS Test Harness sends a Registration Response message, with the	--	--

	following parameters: • *responseCode* = 106 (NOT_PROCESSED) for each CBSD • *responseData* = T		
7	After completion of step 6, SAS Test Harness will not provide any positive response (*responseCode*=0) to further request messages from the UUT.	--	--
8	Monitor the RF output of the UUT from start of test until test until 60 seconds after Step 3 is complete. Verify: • UUT shall not transmit RF	PASS	FAIL

6.2.4.1.3 [WINNF.FT.C.REL2.NRI.RSP.3] Release 2 SAS sends 106 NOT_PROCESSED in first Heartbeat Response to CBSD

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = [] (empty list)	--	--
4	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 5, or If message is type Grant Request, go to step 7	--	--
5	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
6	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
7	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96	PASS	FAIL

	• *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band		
8	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
9	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS	FAIL
10	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = not included • *responseCode* = 106 (NOT_PROCESSED)	--	--
11	After completion of step 10, SAS Test Harness shall not allow any further grants to the UUT.	--	--
12	Monitor the SAS-CBSD interface. Verify either A OR B occurs: A. UUT sends a Heartbeat Request message. Ensure message is sent within *grantExpireTime*, and is correctly formatted with parameters: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED" B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters: • *cbdsId* = C • *grantId* = G Monitor the RF output of the UUT. Verify: UUT does not transmit at any time	PASS	FAIL

6.2.4.1.4 [WINNF.FT.D.REL2.NRI.RSP.4] Release 2 SAS sends 106 NOT_PROCESSED in first Heartbeat Response to DP

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--

2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included.	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = [] (empty list)	--	--
4	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 5, or If message is type Grant Request, go to step 7	--	--
5	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
6	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
7	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band	PASS	FAIL
8	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
9	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"	PASS	FAIL
10	SAS Test Harness sends a Heartbeat Response message, with the following parameters:	--	--

	• *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* not included • *responseCode* = 106 NOT_PROCESSED for each CBSD		
11	After completion of step 10, SAS Test Harness shall not allow any further grants to the UUT.	--	--
12	Monitor the SAS-CBSD interface. Verify either A OR B occurs: A. UUT sends a Heartbeat Request message. Ensure message is sent within *grantExpireTime*, and is correctly formatted with parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED" B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters: • *cbdsId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} Monitor the RF output of the UUT. Verify: UUT does not transmit at any time	PASS	FAIL

6.2.4.1.5 [WINNF.FT.C.REL2.NRI.RSP.5] Release 2 SAS sends 106 NOT_PROCESSED in subsequent Heartbeat Response to CBSD

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has registered successfully as a Release 2 CBSD with SAS Test Harness. SAS Test Harness included in Registration Response *sasFeatureCapabilityList* = [] (empty list) • UUT has a valid single grant as follows: o valid *cbsdId* = C o valid *grantId* = G o grant is for frequency range F, power P o *grantExpireTime* = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface	--	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within latest specified *heartbeatInterval*, and is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
3	SAS Test Harness sends Heartbeat Response, including the following parameters:	--	--

	• *cbsdId* = C • *grantId* = G • *transmitExpireTime* = T = current UTC time + 200 seconds • *responseCode* = 0		
4	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within latest specified *heartbeatInterval*, and is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
5	SAS Test Harness sends Heartbeat Response, including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* not included • *responseCode* = 106	--	--
6	For further Heartbeat Request message sent from UUT until *TransmitExpireTime* (from step 3). Verify Heartbeat Request message is sent within latest specified *heartbeatInterval*, and is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
7	SAS Test Harness sends Heartbeat Response for each request, including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* not included • *responseCode* = 106	--	--
8	Monitor the RF output of the UUT. Verify: • UUT shall stop all RF transmission within (*transmitExpireTime* + 60 seconds), using the *transmitExpireTime* sent in Step 3.	PASS	FAIL

6.2.4.1.6 [WINNF.FT.D.REL2.NRI.RSP.6] Release 2 SAS sends 106 NOT_PROCESSED in subsequent Heartbeat Response to DP

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • DP has two CBSD registered successfully as a Release 2 CBSD with SAS Test Harness. SAS Test Harness included in Registration Response *sasFeatureCapabilityList* = [] (empty list) • Each CBSD has a valid single grant as follows:	--	--

	○ valid *cbsdId* = Ci, i={1,2} ○ valid *grantId* = Gi, i={1,2} ○ grant is for frequency range Fi and power Pi, i={1,2} ○ *grantExpireTime* = UTC time greater than duration of the test • Both CBSD are in AUTHORIZED state and is transmitting within the grant bandwidth Fi on RF interface		
2	DP with two CBSDs sends Heartbeat Request in the form of one 2-element Array or as individual messages to SAS Test Harness: Verify Heartbeat Request message is sent within latest specified *heartbeatInterval* and is formatted correctly for each CBSD, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
3	SAS Test Harness sends a Heartbeat Response in the form of one 2-element Array or individual messages with the following parameters for each CBSD: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = Ti = current UTC time + 200 seconds • *responseCode* = 0	--	--
4	UUT sends a Heartbeat Request message for each CBSD. Verify Heartbeat Request message is sent within latest specified *heartbeatInterval* and is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
5	SAS Test Harness sends Heartbeat Response to each CBSD, including the following parameters: For CBSD #1: • *cbsdId* = C1 • *grantId* = G1 • *transmitExpireTime* not included • *responseCode* = 106 NOT_PROCESSED For CBSD #2: • *cbsdId* = C2 • *grantId* = G2 • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
6	For further Heartbeat Request message sent from UUT until *TransmitExpireTime* (from step 3 for C1) for each CBSD. Verify Heartbeat Request message is sent within latest specified	PASS	FAIL

	heartbeatInterval and is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"		
7	SAS Test Harness sends Heartbeat Response for each request, including the following parameters: For CBSD #1: • *cbsdId* = C1 • *grantId* = G1 • *transmitExpireTime* not included • *responseCode* = 106 NOT_PROCESSED For CBSD #2: • *cbsdId* = C2 • *grantId* = G2 • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
8	Monitor the RF output of the UUT. Verify: • UUT transmits after step 1 is complete, and its transmission is limited to within the bandwidth range Fi. • CBSD1 shall stop all RF transmission within (*transmitExpireTime* + 60 seconds), using the *transmitExpireTime* sent in Step 3.	PASS	FAIL

6.2.4.2 SAS Release 2 includes *responseData* and *responseMessage* for Successful Response Code 0

The test cases in this section verify that Release 2 CBSD/DP is able to accept *responseData* and *responseMessage* for Successful Response message (*responseCode* 0).

6.2.4.2.1 [WINNF.FT.C.REL2.NRI.RSP.7] Release 2 SAS replies to CBSD with successful Registration Response with *responseData* and *responseMessage*

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C	--	--

	• *responseCode* = 0 • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList* • *responseData* = [“GENERAL”, “PARAM_WARNING”, “FID_WARNING”] • *responseMessage* = “Additional Information from SAS Test Harness”		
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the	--	--

	parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0		
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.2.4.2.2 [WINNF.FT.D.REL2.NRI.RSP.8] Release 2 SAS replies to DP with successful Registration Response with *responseData* and *responseMessage*

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-	PASS	FAIL

	element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included		
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included and matches *cbsdFeatureCapabilityList* • *responseData* = [“GENERAL”, “PARAM_WARNING”, “FID_WARNING”] • *responseMessage* = “Additional Information from SAS Test Harness”	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = is included and matches *cbsdFeatureCapabilityList*	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of frequencyRange objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • availableChannel is an array of availableChannel objects • *responseCode* = 0 for each CBSD	--	--

9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • maxEIRP is at or below the limit appropriate for CBSD category as defined by Part 96 • operationFrequencyRange, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • grantExpireTime = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.3 Enhanced CBSD Group Handling

6.3.1 Definition and applicability and Scope of Test Case

This section provides test steps, conditions and procedures to test the conformance of the CBSD implementation for the Enhanced CBSD Group Handling Feature. A precondition is the CBSD includes the *cbsdFeatureCapabilityList* with FID: WF_ENH_GROUP_HANDLING in Registration Request message.

6.3.2 Test Characteristics

Table 6-6 CBSD Enhanced Group Handling Test Characteristics

1	**Test ID**	WINNF.FT.C.REL2.NRI.EGH
2	**Title**	CBSD Enhanced Group Handling
3	**Working Group / Entity**	WG3
4	**Test Type**	Functionality
5	**Test Class**	Conformance
6	**Component / Interface**	CBSD / CBSD ← → SAS

6.3.3 Method of test

6.3.3.1 Initial Conditions / Test Pre-conditions

– The pre-conditions of the test case are:
  - CBSD/DP has gone through SAS discovery process and can authenticate with the SAS. The exact condition of the CBSD after the discovery process are detailed in each test case.
  - CBSD/DP includes the *cbsdFeatureCapabilityList* in Registration Request message.

6.3.4 Test Procedure

6.3.4.1 Enhanced Group Handling with SAS Release 2, group information is part of Registration Request.

The test cases in this section verify that “Release 2 CBSD/DP” successfully handles Enhanced Grouping with a “Release 2 SAS” during Registration Request/Response.

6.3.4.1.1 [WINNF.FT.C.REL2.NRI.EGH.1] CBSD Successful *groupingParam* as part of Registration. Release 2 SAS Operationally-Supports the group types of the CBSD.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness	--	--

	• UUT is in the Unregistered state		
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS) • *groupingConfig* is included and matches the group values from CBSD with *supportedBySas* = true	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL

8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = true	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • operationFrequencyRange, F, sent by UUT is a valid range within the CBRS band • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = true	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED" • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 • If *groupingParam* was included in Request message in previous	--	--

	step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = true		
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED" • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = true	--	--
15	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.3.4.1.2 [WINNF.FT.D.REL2.NRI.EGH.2] DP Successful *groupingParam* as part of Registration. Release 2 SAS Operationally-Supports the group types of the DP.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported	PASS	FAIL

	groups)		
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS) • *groupingConfig* is included and matches the group values from CBSD with *supportedBySas* = true	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* =	--	--

	true		
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = true	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED" • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = true	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2}	PASS	FAIL

	• *operationState* = "AUTHORIZED" • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)		
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = true	--	--
15	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.3.4.1.3 [WINNF.FT.C.REL2.NRI.EGH.3] CBSD Successful *groupingParam* as part of Registration. Release 2 SAS does NOT Operationally-Support the group types of the CBSD.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)	--	--

	• *groupingConfig* is included and matches the group values from CBSD with *supportedBySas* = false		
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = false	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL

	• If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)		
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = false	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED" • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = false	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED" • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C	--	--

	• *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = false		
15	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.3.4.1.4 [WINNF.FT.D.REL2.NRI.EGH.4] DP Successful *groupingParam* as part of Registration. Release 2 SAS does NOT Operationally-Support the group types of the DP.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS) • *groupingConfig* is included and matches the group values from CBSD with *supportedBySas* = false	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format	PASS	FAIL

	and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6		
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = false	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2}	--	--

	• *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = false		
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED" • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* = false	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED" • If *groupingParam* is included, it shall contain values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD • If *groupingParam* was included in Request message in previous step, then *groupingConfig* is included in Response message and matches the group values from CBSD with *supportedBySas* =	--	--

	false		
15	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.3.4.1.5 [WINNF.FT.C.REL2.NRI.EGH.5] Release 2 SAS does NOT Operationally-Support the Enhanced Group Handling for CBSD.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = [] (empty list) • *groupingConfig* is NOT included	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0	--	--

	• *sasFeatureCapabilityList* = [] (empty list)		
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G	PASS	FAIL

	• *operationState* = "AUTHORIZED"		
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F. • *groupingParam* is NOT included in any Request message from UUT after step 3.	PASS	FAIL

6.3.4.1.6 [WINNF.FT.D.REL2.NRI.EGH.6] Release 2 SAS does NOT Operationally-Support the Enhanced Group Handling for DP.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = [] (empty list) • *groupingConfig* is NOT included	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL

	If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6		
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = [] (empty list)	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 6, or If message is type Grant Request, go to step 8	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters:	--	--

	• *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD		
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi. • *groupingParam* is NOT included in Request message from UUT after step 3.	PASS	FAIL

6.3.4.1.7 [WINNF.FT.C.REL2.NRI.EGH.7] Release 2 SAS Operationally-Supports Enhanced Group Handling, Release 2 SAS sends Registration Response with 201 Group Error to CBSD.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *responseCode* = 201 (Group Error)	--	--

	• *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)		
4	Monitor the RF output of the UUT from start of test until test until 60 seconds after Step 3 is complete. Verify: • UUT shall not transmit RF	PASS	FAIL

6.3.4.1.8 [WINNF.FT.D.REL2.NRI.EGH.8] Release 2 SAS Operationally-Supports Enhanced Group Handling, Release 2 SAS sends Registration Response with 201 Group Error to DP.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *responseCode* = 201 (Group Error) for each CBSD • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)	--	--
4	Monitor the RF output of the UUT from start of test until test until 60 seconds after Step 3 is complete. Verify: • UUT shall not transmit RF	PASS	FAIL

6.3.4.2 Enhanced Group Handling with SAS Release 2, group information is not part of Registration Request.

The test cases in this section verify that “Release 2 CBSD/DP” successfully handles Enhanced Grouping with a “Release 2 SAS” after Registration Request/Response.

The test cases in this section are applicable for CBSD/DP that

- Support Enhanced Group Handling
- Do not include *groupingParam* in Registration Request

- Can invoke manual trigger for CBSD to include *groupingParam* when CBSD/DP is in Registered State. The test cases in this section are written specifically for CBSD/DP to invoke manual trigger to include *groupingParam* in AUTHORIZED state.

6.3.4.2.1 [WINNF.FT.C.REL2.NRI.EGH.9] CBSD invokes *groupingParam* in AUTHORIZED state. Release 2 SAS Operationally-Supports the group types of the CBSD.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is NOT included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS) • *groupingConfig* is NOT included	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--

7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • *groupingParam* is NOT included	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band • *groupingParam* is NOT included	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED" • *groupingParam* is NOT included	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED" • *groupingParam* is NOT included	PASS	FAIL

14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	Invoke manual trigger for CBSD to include *groupingParam* in Heartbeat Request message in AUTHORIZED state.	--	--
16	UUT sends Heartbeat Request message to SAS Test Harness: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED" • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
17	SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 • *groupingConfig* is included and matches the group values from CBSD with *supportedBySas* = true	--	--
18	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.3.4.2.2 [WINNF.FT.D.REL2.NRI.EGH.10] DP invokes *groupingParam* in AUTHORIZED state. Release 2 SAS Operationally-Supports the group types of the DP.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING	PASS	FAIL

	• *groupingParam* is NOT included		
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS) • *groupingConfig* is NOT included	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • *groupingParam* is NOT included	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid	PASS	FAIL

	range within the CBRS band • *groupingParam* is NOT included		
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED" • *groupingParam* is NOT included	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED" • *groupingParam* is NOT included	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	Invoke manual trigger for DP to include *groupingParam* in Heartbeat Request message in AUTHORIZED state.	--	--
16	UUT sends Heartbeat Request message to SAS Test Harness: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED" • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL

17	SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD • *groupingConfig* is included and matches the group values from CBSD with *supportedBySas* = true	--	--
18	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.3.4.2.3 [WINNF.FT.C.REL2.NRI.EGH.11] CBSD invokes *groupingParam* in AUTHORIZED state. Release 2 SAS does NOT Operationally-Support the group types of the CBSD.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is NOT included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS) • *groupingConfig* is NOT included	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally	PASS	FAIL

	Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6		
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range • *groupingParam* is NOT included	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band • *groupingParam* is NOT included	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED" • *groupingParam* is NOT included	PASS	FAIL

12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED" • *groupingParam* is NOT included	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
15	Invoke manual trigger for CBSD to include *groupingParam* in Heartbeat Request message in AUTHORIZED state.		
16	UUT sends Heartbeat Request message to SAS Test Harness: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED" • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
17	SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 • *groupingConfig* is included and matches the group values from CBSD with *supportedBySas* = false	--	--
18	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.3.4.2.4 [WINNF.FT.D.REL2.NRI.EGH.12] DP invokes *groupingParam* in AUTHORIZED state. Release 2 SAS does NOT Operationally-Support the group types of the DP.

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is NOT included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS) • *groupingConfig* is NOT included	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS)	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the	PASS	FAIL

	CBRS frequency range • *groupingParam* is NOT included		
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2} • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band • *groupingParam* is NOT included	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED" • *groupingParam* is NOT included	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
13	For further Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED" • *groupingParam* is NOT included	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2}	--	--

	• *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD		
15	Invoke manual trigger for DP to include *groupingParam* in Heartbeat Request message in AUTHORIZED state.		
16	UUT sends Heartbeat Request message to SAS Test Harness: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED" • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] (CxG, SFG, etc. according to UUT supported groups)	PASS	FAIL
17	SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD • *groupingConfig* is included and matches the group values from CBSD with *supportedBySas* = false	--	--
18	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.4 Enhanced Antenna Pattern

6.4.1 Definition and applicability and Scope of Test Case

This section provides test steps, conditions and procedures to test the conformance of the CBSD implementation for the Enhanced Antenna Pattern. A precondition is the CBSD includes the *cbsdFeatureCapabilityList* with FID: WF_ENH_ANTENNA_PATTERN in Registration Request message.

6.4.2 Test Characteristics

Table 6-7 CBSD Enhanced Antenna Pattern Test Characteristics

1	**Test ID**	WINNF.FT.C.REL2.NRI.EAP
2	**Title**	CBSD Enhanced Antenna Pattern
3	**Working Group / Entity**	WG3

4	**Test Type**	Functionality
5	**Test Class**	Conformance
6	**Component / Interface**	CBSD / CBSD ← → SAS

6.4.3 Method of test

6.4.3.1 Initial Conditions / Test Pre-conditions

– The pre-conditions of the test case are:
  - CBSD/DP has gone through SAS discovery process and can authenticate with the SAS. The exact condition of the CBSD after the discovery process are detailed in each test case.
  - CBSD/DP includes the *cbsdFeatureCapabilityList* in Registration Request message.

6.4.4 Test Procedure

6.4.4.1 Enhanced Antenna Pattern with SAS Release 2

The test cases in this section verify that "Release 2 CBSD/DP" correctly sends parameters related to the feature Enhanced Antenna Pattern with a "Release 2 SAS" during Registration Request/Response.

6.4.4.1.1 [WINNF.FT.C.REL2.NRI.EAP.1] Release 2 CBSD Multi-Step Registration with Enhanced Antenna Pattern

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_ANTENNA_PATTERN • *cpiSignatureData* is not included • *installationParam* is not included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_ENH_ANTENNA_PATTERN (only this FID is supported by SAS)	--	--
4	After completion of step 3, SAS Test Harness will not provide any	--	--

	positive response (*responseCode*=0) to further request messages from the UUT.		
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS	FAIL

6.4.4.1.2 [WINNF.FT.D.REL2.NRI.EAP.2] Release 2 DP Multi-Step Registration with Enhanced Antenna Pattern

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_ANTENNA_PATTERN • *cpiSignatureData* is not included • *installationParam* is not included	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_ENH_ANTENNA_PATTERN (only this FID is supported by SAS)	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS	FAIL

6.4.4.1.3 [WINNF.FT.C.REL2.NRI.EAP.3] Release 2 CBSD Single-Step Registration with CPI signed data and Enhanced Antenna Pattern

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL

	• *cbsdFeatureCapabilityList* is included with FID: WF_ENH_ANTENNA_PATTERN
	• *cpiSignatureData* is included, the *encodedCpiSignedData* MAY include
	  o *antennaVerticalBeamwidth*
	  o *antennaModel*		

3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_ENH_ANTENNA_PATTERN (only this FID is supported by SAS)	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS	FAIL

6.4.4.1.4 [WINNF.FT.D.REL2.NRI.EAP.4] Release 2 DP Single-Step Registration with CPI signed data and Enhanced Antenna Pattern

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--

2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness:
	• The Registration Request is in proper format and parameters are within acceptable ranges.
	• *cbsdFeatureCapabilityList* is included with FID: WF_ENH_ANTENNA_PATTERN
	• *cpiSignatureData* is included, the *encodedCpiSignedData* MAY include
	  o *antennaVerticalBeamwidth*
	  o *antennaModel*
		PASS	FAIL

3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_ENH_ANTENNA_PATTERN (only this FID is supported by SAS)	--	--
4	After completion of step 3, SAS Test Harness will not provide any	--	--

	positive response (*responseCode*=0) to further request messages from the UUT.		
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS	FAIL

6.5 CPE-CBSD Indicator

6.5.1 Definition and applicability and Scope of Test Case

This section provides test steps, conditions and procedures to test the conformance of the CBSD implementation for the CPE-CBSD Indicator. A precondition is the CBSD includes the *cbsdFeatureCapabilityList* with FID: WF_CPE_CBSD_INDICATOR in Registration Request message.

6.5.2 Test Characteristics

Table 6-8 CPE-CBSD Indicator Test Characteristics

1	**Test ID**	WINNF.FT.C.REL2.NRI.CPE
2	**Title**	CPE-CBSD Indicator
3	**Working Group / Entity**	WG3
4	**Test Type**	Functionality
5	**Test Class**	Conformance
6	**Component / Interface**	CBSD / CBSD ← → SAS

6.5.3 Method of test

6.5.3.1 Initial Conditions / Test Pre-conditions

– The pre-conditions of the test case are:
  - CBSD/DP has gone through SAS discovery process and can authenticate with the SAS. The exact condition of the CBSD after the discovery process are detailed in each test case.
  - CBSD/DP includes the *cbsdFeatureCapabilityList* in Registration Request message.

6.5.4 Test Procedure

6.5.4.1 CPE-CBSD Indicator with SAS Release 2

The test cases in this section verify that “Release 2 CBSD/DP” correctly sends parameters related to the Feature CPE-CBSD Indicator with a “Release 2 SAS” during Registration Request/Response.

6.5.4.1.1 [WINNF.FT.C.REL2.NRI.CPE.1] CPE-CBSD included in Capabilities Exchange from CBSD

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request message to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • Registration Request includes *cpeCbsdIndication* = true • *cbsdFeatureCapabilityList* is included with FID WF_CPE_CBSD_INDICATOR	PASS	FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* is included and contains only FID WF_CPE_CBSD_INDICATOR	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID WF_CPE_CBSD_INDICATOR • *CbsdFeatureData* object is included with *cpeCbsdIndication* = true If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = is included and contains only FID WF_CPE_CBSD_INDICATOR	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C	PASS	FAIL

	• List of *frequencyRange* objects sent by UUT are within the CBRS frequency range		
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = C • *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, F, sent by UUT is a valid range within the CBRS band	PASS	FAIL
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--
13	For subsequent 5 Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--	--

15	UUT sends Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS	FAIL
16	The SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *featureCapabilityExchangeTrigger* = true • *responseCode* = 0	--	--
17	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID WF_CPE_CBSD_INDICATOR • *CbsdFeatureData* object is included with *cpeCbsdIndication* = true	PASS	FAIL
18	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = is included and contains only FID WF_CPE_CBSD_INDICATOR	--	--
19	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range F.	PASS	FAIL

6.5.4.1.2 [WINNF.FT.D.REL2.NRI.CPE.2] CPE-CBSD included in Capabilities Exchange from DP

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges.	PASS	FAIL

	• Registration Request includes *cpeCbsdIndication* = true • *cbsdFeatureCapabilityList* is included with FID WF_CPE_CBSD_INDICATOR		
3	SAS Test Harness sends a Registration Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* is included and contains only FID WF_CPE_CBSD_INDICATOR	--	--
4	Depending on the existence of additional information for the UUT Release 2 Operationally Supported Features, UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID WF_CPE_CBSD_INDICATOR • *CbsdFeatureData* object is included with *cpeCbsdIndication* = true If UUT has no additional information for its Release 2 Operationally Supported Features, and does not send Feature Capability Exchange Request, then: • Go to step 6	PASS	FAIL
5	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = is included and contains only FID WF_CPE_CBSD_INDICATOR	--	--
6	UUT sends a message: If message is type Spectrum Inquiry Request, go to step 7, or If message is type Grant Request, go to step 9	--	--
7	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = Ci, i={1,2} • List of *frequencyRange* objects sent by UUT are within the CBRS frequency range	PASS	FAIL
8	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = Ci, i={1,2} • *availableChannel* is an array of *availableChannel* objects • *responseCode* = 0 for each CBSD	--	--
9	UUT sends Grant Request message. Validate: • *cbsdId* = Ci, i={1,2}	PASS	FAIL

	• *maxEIRP* is at or below the limit appropriate for CBSD category as defined by Part 96 • *operationFrequencyRange*, Fi, i={1,2}, sent by UUT is a valid range within the CBRS band		
10	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} (a valid grant ID) • *grantExpireTime* = UTC time greater than duration of the test • *responseCode* = 0 for each CBSD	--	--
11	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "GRANTED"	PASS	FAIL
12	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
13	For subsequent 5 Heartbeat Request messages sent from UUT after completion of previous step, validate: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
14	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0 for each CBSD	--	--
15	UUT sends Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2} • *operationState* = "AUTHORIZED"	PASS	FAIL
16	The SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = Ci, i={1,2} • *grantId* = Gi, i={1,2}	--	--

	• *transmitExpireTime* = current UTC time + 200 seconds • *featureCapabilityExchangeTrigger* = true • *responseCode* = 0 for each CBSD		
17	UUT sends Feature Capability Exchange Request message to SAS Test Harness: • The Feature Capability Exchange Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID WF_CPE_CBSD_INDICATOR • *CbsdFeatureData* object is included with *cpeCbsdIndication* = true	PASS	FAIL
18	SAS Harness replies with Feature Capability Exchange Response with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = is included and contains only FID WF_CPE_CBSD_INDICATOR	--	--
19	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 12 is complete, and its transmission is limited to within the bandwidth range Fi.	PASS	FAIL

6.6 Passive DAS

6.6.1 Definition and applicability and Scope of Test Case

This section provides test steps, conditions and procedures to test the conformance of the CBSD implementation for the Passive DAS Feature. A precondition is the CBSD includes the *cbsdFeatureCapabilityList* with FID: WF_ENH_GROUP_HANDLING in Registration Request message.
Test cases in this section require the following test setup: single Radio Unit (RU) feeding N Transmission Points (TP) where N>=2. Since Each TP associated to a Passive DAS is a CBSD, then all the test cases in this section are executed with N CBSDs (TPs) where N>=2. The N CBSDs of this Passive DAS (RU with N TPs) communicate with the SAS Test Harness with or without a Domain Proxy.

6.6.2 Test Characteristics

Table 6-9 Passive DAS Test Characteristics

1	**Test ID**	WINNF.FT.C.REL2.NRI.PDG
2	**Title**	Passive DAS
3	**Working Group / Entity**	WG1

4	**Test Type**	Functionality
5	**Test Class**	Conformance
6	**Component / Interface**	CBSD / CBSD ← → SAS

6.6.3 Method of test

6.6.3.1 Initial Conditions / Test Pre-conditions

– The pre-conditions of the test case are:
  - CBSD/DP meet with the requirements for Passive DAS defined by the FCC in KDB 935210 D02 Signal Boosters Certification [n.10]
  - CBSD/DP successfully executed the relevant Enhanced CBSD Group Handling (EGH) test cases appearing in this document according to Table 6-2 and Table 6-3 of this document
  - CBSD/DP has gone through SAS discovery process and can authenticate with the SAS. The exact condition of the CBSD after the discovery process are detailed in each test case.
  - CBSD/DP includes in Registration Request message the *cbsdFeatureCapabilityList* with FID: WF_ENH_GROUP_HANDLING
  - CBSD/DP includes in Registration Request message the *groupingParam* with values according to WINNF-SSC-0010 [n.8] :
    groupType = PASSIVE_DAS
    groupId = <FCC-ID>:<Serial Number>:<Chain_ID>

6.6.4 Test Procedure

6.6.4.1 Passive DAS group with SAS Release 2.

The test cases in this section verify that “Release 2 CBSD/DP” correctly sends parameters related to Passive DAS Group with a “Release 2 SAS” during Registration Request/Response for each CBSD (TP) connected to the RU.

6.6.4.1.1 [WINNF.FT.C.REL2.NRI.PDG.1] Passive DAS Successful Registration without Domain Proxy

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT is Passive DAS with N CBSDs (TPs) where N>=2 • UUT is without Domain Proxy • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	CBSDi (TPi), i={1…N, N>=2} sends Registration Request as individual message from each CBSDi (TPi) to SAS Test Harness: • The Registration Request is in proper format and parameters are	PASS	FAIL

	within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] : o *groupType* = PASSIVE_DAS o *groupId* = <FCC-ID>:<Serial Number>:<Chain_ID>		
3	SAS Test Harness sends individual Registration Response message to each CBSDi (TPi), with the following parameters: • *cbsdId* = Ci, i={1…N, N>=2} • *responseCode* = 0 for each CBSD (TP) • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING (only this FID is supported by SAS) • *groupingConfig* is included and matches the group values from CBSD with *supportedBySas* = true	--	--
4	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. Verify: • UUT CBSDi (TPi), i={1…N, N>=2} shall not transmit RF	PASS	FAIL

6.6.4.1.2 [WINNF.FT.D.REL2.NRI.PDG.2] Passive DAS Successful Registration with Domain Proxy

#	Test Execution Steps	**Results**	
1	Ensure the following conditions are met for test entry: • UUT is Passive DAS with N CBSDs (TPs) where N>=2 • UUT is with Domain Proxy • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT with Domain Proxy sends Registration Request in the form of N-element Array (N>=2) or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_ENH_GROUP_HANDLING • *groupingParam* is included with values according to WINNF-SSC-0010 [n.8] : o *groupType* = PASSIVE_DAS o *groupId* = <FCC-ID>:<Serial Number>:<Chain_ID>	PASS	FAIL
3	SAS Test Harness sends Registration Response message with the following parameters: • *cbsdId* = Ci, i={1…N, N>=2} • *responseCode* = 0 for each CBSD (TP) • *sasFeatureCapabilityList* = WF_ENH_GROUP_HANDLING	--	--

	(only this FID is supported by SAS) • *groupingConfig* is included and matches the group values from CBSD with *supportedBySas* = true		
4	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. Verify: • UUT CBSDi (TPi), i={1…N, N>=2} shall not transmit RF	PASS	FAIL

6.7 Grant Update

6.7.1 Definition and applicability and Scope of Test Case

This section provides test steps, conditions and procedures to test the conformance of the CBSD implementation for the Grant Update Feature. A precondition is the CBSD includes the *cbsdFeatureCapabilityList* with FID: WF_GRANT_UPDATE in Registration Request message.

6.7.2 Test Characteristics

Table 6-10 Grant Update Test Characteristics

1	**Test ID**	WINNF.FT.C.REL2.NRI.GRU
2	**Title**	Grant Update
3	**Working Group / Entity**	WG3
4	**Test Type**	Functionality
5	**Test Class**	Conformance
6	**Component / Interface**	CBSD / CBSD ← → SAS

6.7.3 Method of test

6.7.3.1 Initial Conditions / Test Pre-conditions

– The pre-conditions of the test case are:
  - CBSD/DP has gone through SAS discovery process and can authenticate with the SAS. The exact condition of the CBSD after the discovery process are detailed in each test case.
  - CBSD/DP includes in Registration Request message the *cbsdFeatureCapabilityList* with FID: WF_GRANT_UPDATE

6.7.4 Test Procedure

6.7.4.1 Grant Update with SAS Release 2

The test cases in this section verify that “Release 2 CBSD/DP” successfully handles Grant Update with a “Release 2 SAS” during Registration Request/Response.

6.7.4.1.1 [WINNF.FT.C.REL2.NRI.GRU.1] Release 2 SAS Operationally-Supports the Grant Update FID from CBSD as part of Registration

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_GRANT_UPDATE	PASS	FAIL
3	SAS Test Harness sends Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = WF_GRANT_UPDATE (only this FID is supported by SAS)	--	--
4	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. Verify: • UUT shall not transmit RF	PASS	FAIL

6.7.4.1.2 [WINNF.FT.D.REL2.NRI.GRU.2] Release 2 SAS Operationally-Supports the Grant Update FID from Domain Proxy as part of Registration

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_GRANT_UPDATE	PASS	FAIL
3	SAS Test Harness sends Registration Response message with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = WF_GRANT_UPDATE (only this FID is supported by SAS)	--	--
4	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. Verify:	PASS	FAIL

	• UUT shall not transmit RF		

6.7.4.1.3 [WINNF.FT.C.REL2.NRI.GRU.3] Release 2 SAS does not support the Grant Update FID from CBSD as part of Registration

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	UUT sends Registration Request to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_GRANT_UPDATE	PASS	FAIL
3	SAS Test Harness sends Registration Response message, with the following parameters: • *cbsdId* = C • *responseCode* = 0 • *sasFeatureCapabilityList* = [] (empty list)	--	--
4	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. Verify: • UUT shall not transmit RF	PASS	FAIL

6.7.4.1.4 [WINNF.FT.D.REL2.NRI.GRU.4] Release 2 SAS does not support the Grant Update FID from Domain Proxy as part of Registration

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	DP with two CBSDs sends Registration Request in the form of one 2-element Array or as individual messages to SAS Test Harness: • The Registration Request is in proper format and parameters are within acceptable ranges. • *cbsdFeatureCapabilityList* is included with FID: WF_GRANT_UPDATE	PASS	FAIL
3	SAS Test Harness sends Registration Response message with the following parameters: • *cbsdId* = Ci, i={1,2} • *responseCode* = 0 for each CBSD • *sasFeatureCapabilityList* = [] (empty list)	--	--
4	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. Verify:	PASS	FAIL

	• UUT shall not transmit RF		

7 History

Document history		
V1.0.0	30 September 2020	Initial Release
V1.1.0	23 August 2021	Adding Passive DAS and Grant Update, Incorporates ballot results August 2021