



**Post Initial Certification Revisions to Test  
and Certification for CBRS; Conformance  
and Performance Test Technical  
Specification; SAS as UUT  
(WINNF-TS-0061-V1.5.1)**

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# Table of Contents

TERMS, CONDITIONS & NOTICES .....	i
Contributors .....	v
1 Introduction .....	1
2 Scope .....	1
3 References .....	2
3.1 Normative References .....	2
3.2 Informative References .....	4
4 Definitions and Abbreviations .....	6
4.1 Abbreviations .....	6
4.2 Definitions .....	6
5 General Principles of Certification Test Cases .....	7
5.1 Test ID Definition .....	7
5.2 Test Triggers .....	7
5.3 Test Tools Required .....	7
5.4 Baseline State of the SAS UUT .....	7
5.5 Summary of Changes .....	7
6 SAS-CBSD Interface Conformance Test Specifications .....	9
7 SAS-SAS Interface Conformance Test Specifications .....	10
8 SAS Functional Test Specifications .....	11
8.2 Propagation Model and Antenna Gain Calculation Testing .....	11
8.2.1 Definition, Applicability, and Scope of the Test Case .....	11
8.2.2 Test Characteristics .....	11
8.2.3 Method of test .....	12
8.2.3.1 Initial Conditions / Test Pre-conditions .....	12
8.2.3.2 Test Tools Required .....	12
8.2.4 Test Procedure .....	14
8.2.4.1 [WINNF.REL1EXT.FT.S.PAT.2] Propagation Model Calculation Testing for DPAs .....	14
8.9 Federal Incumbent Protection .....	16
8.9.1 Definition, Applicability, and Scope of the Test Case .....	16
8.9.2 Test Characteristics .....	16
8.9.3 Method of test .....	17
8.9.3.1 Initial Conditions / Test Pre-conditions .....	17
8.9.3.2 Test Tools Required .....	17
8.9.4 Test Procedure .....	18
8.9.4.8 [WINNF.REL1EXT.FT.S.IPR.8] Activation of a Single DPA with Clutter Loss and Network Loading .....	18
Appendix A: Revision History .....	22

## List of Figures

**No table of figures entries found.**

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# Post Initial Certification Revisions to Test and Certification for CBRS; Conformance and Performance Test Technical Specification; SAS as UUT (WINNF-TS-0061-V1.5.1)

## 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 specifications and Requirements defined by Federal Communications Commission (FCC) and Wireless Innovation Forum (WinnForum).

## 2 Scope

This document contains changes to “Test and Certification for CBRS; Conformance and Performance Test Technical Specification; SAS as UUT” technical specification (WINNF-TS-0061-V1.5.1) [n.24], also known as the Release 1 Baseline SAS Test and Certification. Unlike the test cases captured in “SAS Test and Certification (Release 2)”, which are entirely driven by industry need to improve commercial operation, the test plans captured here extend the baseline testing used for initial certification to capture changes in the FCC Part 96 rules or changes in the implementation of those rules as communicated by the FCC via Public Notice, Knowledge Database (KDB) entry, or other means. The source for each change is referenced throughout the document wherever applicable. While adoption of the test cases captured in this extension, or any WinnForum Standard, is voluntary, as with Release 1, demonstrating conformance with these requirements may be deemed by the FCC to be sufficient to show compliance with the Part 96 rules. The test plan provided in this document addresses the requirements captured in the specification “Post Initial Certification Revisions to CBRS Baseline Operational and Functional Requirements Specification” [n.25].

NOTE: Heading numbers have been kept consistent with TS-0061 throughout for readability purposes.

### 3 References

#### 3.1 Normative References

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

- [n.1] FCC Report and Order 15-47A1: "Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band", FCC, April 17 2015, [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-15-47A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-47A1.pdf)
- [n.2] FCC Report and Order 16-55A1: "Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band", FCC, May 2 2016, [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-16-55A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-55A1.pdf)
- [n.3] SSC- Wireless Innovation Forum, WG1&3 Task Group: "SAS Functional Architecture ", Working Document WINNF-15-P-0047 Version V1.0.0
- [n.4] E. Drocella, et. al., "3.5 GHz Exclusion Zone Analyses and Methodology," NTIA Technical Report TR-15-517, June 2015. Available at <http://www.its.bldrdoc.gov/publications/2805.aspx>
- [n.5] "NTIA Letter to FCC on Commercial Operations in the 3550-3650 MHz Band," GN Docket No. 12-354, April 14, 2015. Available online: <http://www.ntia.doc.gov/fcc-filing/2015/ntia-letter-fcc-commercial-operations-3550-3650-MHz-band>
- [n.6] NOAA Maritime Boundaries, Available online: <http://www.nauticalcharts.noaa.gov/csdl/mbound.htm> Last accessed March 16, 2016
- [n.7] [https://www.census.gov/geo/maps-data/data/kml/kml\\_nation.html](https://www.census.gov/geo/maps-data/data/kml/kml_nation.html)
- [n.8] SSC-Wireless Innovation Forum, "[CBRS Communications Security Technical Specification](#)", WINNF-TS-0065 V1.1.0
- [n.9] SSC-Wireless Innovation Forum, "Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): Spectrum Access System (SAS) -



Citizens Broadband Radio Service Device (CBSD) Interface Technical Specification”, WINNF-TS-0016 V1.2.2

- [n.10] FCC List of protected FSS Sites in 3650-3700 MHz Band  
<https://transition.fcc.gov/ib/sd/3650/grandftr.pdf>
- [n.11] SSC-Wireless Innovation Forum, “Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS); Spectrum Access System (SAS) - SAS Interface Technical Specification”, WINNF-TS-0096 V1.3.0
- [n.12] SSC-Wireless Innovation Forum, “Requirements for Commercial Operation in the U.S. 3550-3700 MHz Citizens Broadband Radio Service Band”, WINNF-15-S-0112 V1.6.0
- [n.13] “FSS Sites in 3650-3700 MHz”,  
<https://transition.fcc.gov/ib/sd/3650/grandftr.pdf>, FCC.
- [n.14] SSC-Wireless Innovation Forum, “Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; CBSD as Unit Under Test (UUT) – DRAFT, Request for Comment”, WINNF-TS-0122 V1.1.1
- [n.15] Electronic Code of Federal Regulations, Title 47, Chapter I, Subchapter D, Part 96, <http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=0076fe7586178336d9db4c5146da8797&mc=true&n=pt47.5.96&r=PART&ty=HTML>.
- [n.16] SSC-Wireless Innovation Forum, “Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): WinnForum Recognized CBRS Air Interfaces and Measurements”, WINNF-SSC-0002
- [n.17] RFC-2119, “Key words for use in RFCs to Indicate Requirement Levels”, March 1997. Available at: <https://tools.ietf.org/html/rfc2119>
- [n.18] [www.fcc.gov/cbrr-protected-fss-sites](http://www.fcc.gov/cbrr-protected-fss-sites)
- [n.19] [Wireless.fcc.gov/ULS](http://Wireless.fcc.gov/ULS)

- [n.20] Coordinated Periodic Activities Policy, WINNF-SSC-0008
- [n.21] Margin Policy, WINNF-SSC-0007
- [n.22] FSS Earth Station Antenna Registration System
- [n.23] Arrangement R, [https://transition.fcc.gov/ib/sand/agree/files/can-nb/Arrangement\\_R.pdf](https://transition.fcc.gov/ib/sand/agree/files/can-nb/Arrangement_R.pdf)
- [n.24] SSC-Wireless Innovation Forum, “Test and Certification for CBRS; Conformance and Performance Test Technical Specification; SAS as UUT”, WINNF-TS-0061 V1.5.1
- [n.25] SSC-Wireless Innovation Forum, “Post Initial Certification Revisions to CBRS Baseline Operational and Functional Requirements Specification”, WINNF-TS-1020 V1.1.0
- [n.26] Wireless Innovation Forum, Spectrum Sharing Committee, “Definitions Related to Commercial Operations in the U.S. 3550-3700 MHz Citizens Broadband Radio Service Band” available at:  
<http://www.wirelessinnovation.org/fcc-definitions>

### 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 Repository, <https://github.com/Wireless-Innovation-Forum/Spectrum-Access-System>
- [i.2] <http://robotframework.org/>
- [i.3] Deprecated
- [i.4] Deprecated
- [i.5] SSC-Wireless Innovation Forum, “CBRS Requirements Traceability Matrix”, WINNF-SSC-0003



## 4 Definitions and Abbreviations

The Wireless Innovation Forum Spectrum Sharing Committee (SSC) leverages the definitions provided by the FCC from their Title 47 Part 96 rules. These definitions and others are also available at reference [n.26].

### 4.1 Abbreviations

This document follows all the abbreviations of [n.24, Section 4.1].

### 4.2 Definitions

This document follows all the definitions of [n.24, Section 4.2].

## 5 General Principles of Certification Test Cases

In addition to the principles described in this section, this document follows the general principles of certification test cases defined in [n.24, Section 5].

### 5.1 Test ID Definition

The test case specified in this document follows the same test ID definition as [n.24, Section 5.1], by adding a term “REL1Ext“, which designates the test case as Release 1 Extensions. The test IDs in this document shall be defined in the following format, with all fields as defined in [n.24, Section 5.1].

*{TestRequirement}.REL1Ext.{TestCategory}.{UnitUnderTest}.{TestFunction}.{SubTestNumber}*

### 5.2 Test Triggers

This document follows the test triggers defined in [n.24, Section 5.2].

### 5.3 Test Tools Required

This document follows the test tools defined in [n.24, Section 5.3].

### 5.4 Baseline State of the SAS UUT

This document follows the baseline state of SAS UUT test triggers defined in [n.24, Section 5.4].

### 5.5 Summary of Changes

The following Table summarizes the changes compared to [n.24] and their relevant requirements in [n.25].

Test Case in [n.24]	New Test Case	Relevant Requirement in [n.25]
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8.13: WINNF.FT.S.BPR.1	8.15: WINNF.REL1Ext.FT.S.BPR.1	REL1Ext-R1-SGN-09
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## 6 SAS-CBSD Interface Conformance Test Specifications

This Section includes all test cases required to ensure the SAS-CBSD interface conforms to the specifications defined by WinnForum and as directed by the requirements established by the FCC.

## 7 SAS-SAS Interface Conformance Test Specifications

This section specifies test cases required for SAS to verify the conformance with the technical specifications on procedures and protocols for SAS-SAS interface and the requirements established by FCC and DOD.



## 8 SAS Functional Test Specifications

This section specifies the test cases required to ensure the functionalities implemented in the SAS UUT conform to the specifications, as defined by WinNF Forum and directed by the requirements established by FCC and DOD.

### 8.2 Propagation Model and Antenna Gain Calculation Testing

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

The specification in [n.24, Section 8.2.1] is replaced with the following:

This section explains test steps, conditions, and procedures to verify that SAS correctly calculates:

1. Path loss based on propagation models as defined in [n.12] and [n.25]. The path loss towards Federal Incumbents (DPAs points) are calculated based on propagation model defined in [n.12] and modified by the following features:
  - a. Apply section 3.2 of ITU P.2108 defined Clutter loss for CBSDs with transmit antenna equal or below 6m AGL when calculating path loss or Interference contribution towards any DPA protection point,
  - b. Apply 8 dB reduction, which is derived considering duty cycle and network loading factor, to all CBSDs when calculating path loss or interference contribution to any DPA protection point.
2. The antenna gains of CBSDs and FSS based on locations and antenna patterns of the transmitter and the receiver as defined in [n.12].

#### 8.2.2 Test Characteristics

The specification in [n.24, Section 8.2.2] is replaced with the following:

**Table 8.2.2-1 Propagation model and Antenna Gain Calculation Test Characteristics**

1	<b>Test ID</b>	WINNF.REL1Ext.FT.S.PAT
2	<b>Title</b>	Propagation model and antenna gain test
3	<b>Working Group / Entity</b>	WG1
4	<b>Test Type</b>	Functionality

5	<b>Test Class</b>	Certification
6	<b>Component / Interface</b>	SAS / CBSD $\leftarrow$ $\rightarrow$ SAS
7	<b>Target Specification / Feature</b>	[n.12], [n.25]

### 8.2.3 Method of test

The specification in [n.24, Section 8.2.3, and Section 8.2.3.2] are replaced with the following:

A special Propagation Model API is used for this test so that the SAS UUT can perform path loss and antenna gain calculation without exercising the rest of the SAS functionalities. The API defined in WINNF.FT.S.PAT.1 in [n.24] is updated to address the modified propagation model and network loading described in Section 8.2.1. The Propagation Model API shall be used to execute the test case outlined in this section to validate SAS UUT implementation of propagation model and antenna gain only, with the modifications described in Section 8.2.1. To execute this test, the Admin Test Harness shall send configurations of multiple CBSDs, using transmitter antennas with varying AGL heights, equal, below and above 6 m as the transmitter, an FSS or a DPA point as the incumbent receiver, and a propagation model type to the SAS UUT through the Propagation Model API. After receiving the test configurations from the Admin Test Harness, the SAS UUT shall compute the CBSD antenna gain, the FSS antenna gain, and the path loss accordingly, and send the results back to the Admin Test Harness through the Propagation Model API. The Main Test Harness calculates the CBSD antenna gain, the FSS antenna gain, and the path losses with the same configurations using the reference implementation. A SAS UUT passes this test if the calculated antenna gains, and path losses are within certain ranges of the results calculated by the reference implementation.

This test can be configured differently to test different scenarios.

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

#### 8.2.3.2 Test Tools Required

The Propagation Model API used for this test includes two parts. The first part is test configurations sent by Admin Test Harness to SAS UUT. The second part is test results sent by SAS UUT to Admin Test Harness. The content of the Propagation Model API is listed in the following.

- From Admin Test Harness to SAS UUT (API Inputs):
  1. Propagation Model Type:
    - a. Type 1: ITM used for FSS and ESC
    - b. Type 2: Hybrid Propagation Model (R2-SGN-04 in [n.24] for PPA protection

- c. Type 3: ITM for DPA Points augmented by Clutter loss and network loading factors.
  - d. If no Propagation Model Type is provided, the default value is Type 1.
2. Propagation model: Reliability Level
- a. The value could be -1, 0.05, 0.5, and 0.95. A value of “-1” indicates the mean value shall be calculated. This parameter only applies to the ITM model. The mean path loss is always returned by the SAS UUT if the Hybrid model is used. The mean path loss is defined as  $\frac{1}{\langle 1/L \rangle}$ , where L is the path loss of the ITM and hybrid propagation Reference Models, and  $\langle \cdot \rangle$  denotes the statistical mean. Confidence interval is always set at 0.5 for ITM model.
3. CBSD (Tx) configuration:
- a) CBSD Latitude,
  - b) CBSD Longitude
  - c) CBSD Height (m)
  - d) CBSD Height Type (AGL/AMSL)
  - e) CBSD Antenna azimuth,
  - f) CBSD Antenna Peak gain,
  - g) CBSD Antenna beamwidth
  - h) Indoor Flag (TRUE, or FALSE)

Note: The CBSD Antenna characteristics (items e, f, and g) are not considered in WINNF.REL1EXT.FT.S.PAT.2 and are retained here only for Release 1 backward compatibility.

Receiver configuration:

- a. FSS; for ITM model only (Use default values for weights w1 and w2)
  - a) Latitude, longitude, height of the FSS (Lat/long could present a point within an offshore DPA. In that case, antenna height = 50m)
  - b) Antenna peak gain, azimuth and elevation of the FSS
  - c) Rx Antenna Gain Required; A flag to determine whether the Rx antenna gain is required

- If the flag is set to True, SAS UUT shall send the Rx antenna gain to Admin Test Harness.
  - If the flag is set to False, SAS UUT doesn't need to send the Rx antenna gain to Admin Test Harness.
- b. PPA; for Hybrid model only
- a) PPA boundary containing exactly one protection point.
    - 1. The boundary shall also be small enough that it includes exactly one 1-arcsecond point so that the NLCD value at the location of the protection point is used by the propagation model.
- c. DPA Point including the following parameters:
- a) DPA Point Latitude,
  - b) DPA Point Longitude,
  - c) DPA Point height (m): The value for offshore ESC-Controlled shall be 50 m and for Portal-Controlled and Ground-Based (GB) shall be 10 m.
  - d) DPA Point Height type (AMSL, AGL): The Value for ESC-Controlled offshore shall be AMSL, and for Portal-Controlled and GB shall be AGL.
- From SAS UUT to Admin Test Harness (API Output)
    - 1. Path loss in dB
    - 2. Tx antenna gain in dBi toward the direction of the receiver (Not required for DPA Points)
    - 3. Rx antenna gain in dBi toward the direction of the transmitter (Not required for DPA Points)

## 8.2.4 Test Procedure

Add the following section to [n.24, Section 8.2.4]

### 8.2.4.1 [WINNF.REL1EXT.FT.S.PAT.2] Propagation Model Calculation Testing for DPAs.

Step	Instructions
1	<p>The Admin Test Harness sends the configurations of a DPA point, the DPA ID, to the SAS UUT through the Propagation Model API. The configuration of the DPA point includes:</p> <ul style="list-style-type: none"> <li>• Latitude and Longitude of the point</li> <li>• Receiver antenna height and height Type.</li> </ul> <p>Moreover, the Admin Test Harness sends the configurations of a collection of CBSDs, so that the set includes CBSDs with AGL heights below and above 6 meters. The Admin Test Harness receives the results.</p>
2	<p>The Main Test Harness calculates the path losses using the reference implementation with the same configurations as in Step 1.</p> <p>Note: The Main Test Harness records the calculated path losses in a log file.</p>
CHECK	<p>SAS UUT sends the path losses for all CBSDs as in Step 1 in dB.</p> <ul style="list-style-type: none"> <li>• For each CBSD in Step 1, the path loss calculated by the SAS UUT shall be no more than 1 dB higher than the path loss calculated by the reference implementation.</li> </ul> <p><i>If any of the above conditions do not hold for at least 90% of trials, the SAS UUT FAILS this test. Otherwise, it PASSES.</i></p>

## 8.9 Federal Incumbent Protection

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

The specification in [n.24, Section 8.9.1] is replaced with the following:

This test verifies that the SAS as the unit under test (UUT) meets established criteria for the protection of federal incumbent dynamic protection areas (DPAs). It tests the response of the SAS UUT to new Grant Requests, as well as the ability of the SAS UUT to manage the aggregate interference of existing authorized CBSD Grants when DPAs are activated. It also tests the response of the SAS UUT to loss of connectivity with the ESC. A new test case has been added in Section 8.9.4.8 to evaluate the SAS capability to use the updated propagation model, the change in DPA aggregate interference statistics, and the updates of DPA neighborhoods. The updates in propagation model for calculating the path loss towards Federal Incumbents and DPA aggregate interference statistics are:

- Apply section 3.2 of ITU P.2108 defined Clutter loss for CBSDs with transmit antenna AGL height equal or below 6 m when calculating path loss or interference contribution towards any DPA protection point,
- Apply 8 dB reduction, which is derived using duty cycle and network loading factor, to all CBSDs when calculating path loss or interference contribution to any DPA protection point.
- Change the DPA aggregate interference statistics from Monte Carlo 95-percentile to 50% (Median), applied to offshore, inland and out-of-band DPAs.

### 8.9.2 Test Characteristics

The specification in [n.24, Section 8.9.2] is replaced with the following:

**Table 8.9.2-1 Federal Incumbent Protection**

1	<b>Test ID</b>	WINNF.REL1Ext.FT.S.IPR
2	<b>Title</b>	Federal Incumbent Protection
3	<b>Working Group / Entity</b>	WG1
4	<b>Test Type</b>	Functionality
5	<b>Test Class</b>	Certification
6	<b>Component / Interface</b>	SAS / CBSD ← → SAS
7	<b>Target Specification / Feature</b>	[n.12], [n.25]

### 8.9.3 Method of test

The specification in [n.24, Section 8.9.3.1, and Section 8.9.3.2] are replaced with the following:

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

- The SAS UUT is active and able to receive messages from the CBSD, SAS, and ESC Test Harnesses.
  - The ESC Test Harness is associated with all DPAs. The ESC Test Harness provides the ability to arbitrarily activate/deactivate DPAs.

#### 8.9.3.2 Test Tools Required

- ESC Test Harness
  - Representing a single ESC system
  - Capable of communicating the activation of one or more DPAs and the affected channels of each activated DPA
  - With support as needed by the SAS UUT to detect loss of connectivity with the ESC Test Harness
- DPA Reference Move List Model
  - To pre-calculate the reference move list for a DPA on a frequency range, the Main Test Harness shall follow the procedure in [n.25, REL1Ext-R2-SGN-06, REL1Ext-R2-IPM-01, and REL1Ext-R2-IPM-02]. This calculation shall assume that a CBSD with an approved Grant (i.e., in the *Granted* or *Authorized* state) emits with the maximum EIRP permitted by the Grant (*maxEirp* parameter in the Grant Request). The reference move list shall account for the uncertainty in the output of the reference move list model.
- Aggregate Interference Model
- SAS Test Harness
  - To create Grant configurations in the SAS Test Harness that achieve desired aggregate interference conditions, these Grants can be run through the Aggregate Interference Reference Model prior to the test to ensure they meet those conditions.
- DP Test Harness
- The DPA Neighborhood KML file, which includes the information about DPAs to be protected and the six DPA neighborhoods as described below:
  - *CatB\_<=6m\_Km*: DPA Neighborhood Distance in km applied to Category B CBSDs with AGL height  $\leq 6$  m
  - *CatB\_>6m\_Km*: DPA Neighborhood Distance in km applied to Category B CBSDs with AGL height  $> 6$  m
  - *CatA\_<=6m\_Indoor\_Km*: DPA Neighborhood Distance in km applied to Category A Indoor CBSDs with AGL height  $\leq 6$  m
  - *CatA\_>6m\_Indoor\_Km*: DPA Neighborhood Distance in km applied to Category A Indoor CBSDs with AGL height  $> 6$  m
  - *CatA\_<=6m\_Outdoor\_Km*: DPA Neighborhood Distance in km applied to Category A Outdoor CBSDs with AGL height  $\leq 6$  m

- *CatA\_>6m\_Outdoor\_Km*: DPA Neighborhood Distance in km applied to Category A Outdoor CBSDs with AGL height > 6 m

#### 8.9.4 Test Procedure

Add the following section to [n.24, Section 8.9.4]

##### 8.9.4.8 [WINNF.REL1EXT.FT.S.IPR.8] Activation of a Single DPA with Clutter Loss and Network Loading

In this test case, SAS UUT is expected to manage the Grants of CBSDs after a DPA is activated to meet its protection criteria. In the following,  $(D_i, C_j)$  is a DPA/channel pair, where  $D_i$  is the DPA ID of an ESC-monitored DPA a portal-controlled DPA, or Ground-Based (GB), and  $C_j$  is a channel in 3500 MHz to 3650 MHz that must be protected in DPA  $D_i$ . The test may be repeated by changing the DPA to be protected and re-configuring the CBSD list. In the PASS/FAIL criteria of this test,  $\Delta^{DPA}$  is an aggregate interference uncertainty margin (dB) whose value shall be configured to be commensurate with the 95% confidence interval of the aggregate interference calculation.

Step	Instructions
1	The Admin Test Harness instructs SAS UUT to load all DPA contours and protection criteria. If testing with portal-controlled DPA(s), the Admin Test Harness creates a DPA database which contains the DPA to be tested.
2	If testing ESC-monitored DPA(s), ESC Test Harness communicates that all its fully monitored DPAs are inactive in 3550 MHz to 3650 MHz (except those which are always active, e.g., inland sites with a permanent frequency assignment).
3	If Testing portal-controlled or GB DPA(s), and the CPAS Flag in the configuration file is TRUE, Admin Test Harness triggers CPAS and waits until completion of CPAS.
4	<p><math>N_D &gt; 0</math> DP Test Harnesses register with the SAS UUT <math>N_1</math> CBSDs configured to be from the following CBSD groups:</p> <ul style="list-style-type: none"> <li>a. CBSD group 1: Outdoor Category A CBSDs located within <i>CatA_&lt;=6m_Outdoor_Km</i> from at least one point of the DPA and AGL height <math>\leq 6</math> m</li> <li>b. CBSD group 2: Outdoor Category A CBSDs located within <i>CatA_&gt;6m_Outdoor_Km</i> from at least one point of the DPA and AGL height <math>&gt; 6</math> m.</li> <li>c. CBSD group 3: Indoor Category A CBSDs located within <i>CatA_&lt;=6m_Indoor_Km</i> from at least one point of the DPA and AGL height <math>\leq 6</math> m</li> </ul>



	<p>d. CBSD group 4: Indoor Category A CBSDs located within <math>CatA_{&gt;6m\_Indoor\_Km}</math> from at least one point of the DPA and AGL height &gt; 6 m.</p> <p>e. CBSD group 5: Category B CBSDs located within <math>CatB_{\leq 6m\_Km}</math> from at least one point of the DPA and AGL height <math>\leq 6</math> m</p> <p>f. CBSD group 6: Category B CBSDs located within <math>CatB_{&gt;6m\_Km}</math> from at least one point of the DPA and AGL height &gt; 6 m.</p> <p>Moreover, the DP Test Harnesses register with the SAS UUT <math>N_2</math> CBSDs configured to be from the following CBSD groups:</p> <p>g. CBSD group 7: Outdoor Category A CBSDs located beyond <math>CatA_{\leq 6m\_Outdoor\_Km}</math> from all points of the DPA and AGL height <math>\leq 6</math> m</p> <p>h. CBSD group 8: Outdoor Category A CBSDs located beyond <math>CatA_{&gt;6m\_Outdoor\_Km}</math> from all points of the DPA and AGL height &gt; 6 m</p> <p>i. CBSD group 9: Indoor Category A CBSDs located beyond <math>CatA_{\leq 6m\_Indoor\_Km}</math> from all points of the DPA and AGL height <math>\leq 6</math> m</p> <p>j. CBSD group 10: Indoor Category A CBSDs located beyond <math>CatA_{&gt;6m\_Indoor\_Km}</math> from all points of the DPA and AGL height &gt; 6 m.</p> <p>k. CBSD group 11: Category B CBSDs located beyond <math>CatB_{\leq 6m\_Km}</math> from all points of the DPA and AGL height <math>\leq 6</math> m</p> <p>l. CBSD group 12: Category B CBSDs located beyond <math>CatB_{&gt;6m\_Km}</math> from all points of the DPA and AGL height &gt; 6 m.</p> <p>The Grants requested by CBSDs in groups 1 through 6 are such that the aggregate interference from the <math>N_1</math> Grants would exceed the protection criteria of DPA/channel pair <math>(D_i, C_j)</math>.</p> <p>Note: CBSD groups 7 to 12 are added to ensure SAS UUT handles the neighborhood sizes appropriately and are not used in calculating the aggregate interference toward the DPA points.</p>
5	Admin Test Harness triggers CPAS and waits until completion of CPAS.
6	If $D_i$ is an ESC-monitored DPA and $C_j$ is in 3550 MHz to 3650 MHz, ESC Test Harness communicates that DPA/channel pair $(D_i, C_j)$ is active.
7	<p>After 240 seconds, DP Test Harnesses send a Heartbeat Request for each Grant managed by SAS UUT.</p> <p>Note: The Main Test Harness records the list of <i>cbsdID</i> and <i>grantID</i> for all those grants in a log file.</p>
8	<p>For each protection point <math>p</math> of the active DPA/channel pair, and for each antenna azimuth <math>a</math>, the Main Test Harness calculates:</p> <p><math>A_{p,a}^{DPA}</math>, the sum of interferences at protection point <math>p</math> and incumbent antenna azimuth <math>a</math>, for all SAS UUT Grants authorized in the Step 7 from all CBSDs in CBSD groups</p>

	<p>1 through 6, using the ITM Median path losses as modified by REL1Ext-R2-SGN-02 (a) and REL1Ext-R2-SGN-02 (b), depending on the AGL height of CBSDs in groups 1 through 6.</p> <p>Note: The Main Test Harness records the calculated aggregate interference <math>A_{p,a}^{DPA}</math> in a log file.</p>
CHECK	<p><math>A_{p,a}^{DPA} \leq TH + \Delta^{DPA}</math> for each azimuth <math>a</math> of each protection point <math>p</math> of DPA/channel pair <math>(D_i, C_j)</math>, where <math>TH</math> is the required protection level of the DPA.</p> <p><i>If any of the above conditions are not met, the SAS UUT FAILS this test. Otherwise, it PASSES.</i></p>



## Appendix A: Revision History

Document History		
V1.0.00	3 May 2024	Initial release