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# Wireless Connectivity Tests

## User Guide

80-Y0306-1 Rev. L

October 1, 2014

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## Revision history

Revision	Date	Description
A	April 2012	Initial Release
B	June 2012	Added BT Low Energy, WLAN AR6003, Agilent N4010 WLAN support.
C	October 2012	WLAN802.11ac support with IQxel and NI PXI5644R, Agilent N4010A BT support, Station calibration support with connectivity test box, default WCNTesterConfig.xml for each test equipment.
D	January 2013	FM digital audio support, BT IQxel support, Test equipment options updated.
E	March 2013	BT LE IQxel support, BT LE CMW support, Test equipment options updated
F	July 2013	Added BT and WLAN AnritsuMT8870A support QSPR Bluetooth tests moved to BTTTestSuite. Added BT AR3002 QSPR tests
G	October 2013	Added QCA6174 test support Added WLAN MIMO test description Added ANT test description Added BT standalone support
H	November 2013	Added section 2.1.3 for WLAN MIMO test setup. Updated section 9.1.4 for BT standalone configuration.
J	March 2014	Added BT signaling test support
K	July 2014	Added NFC functional test support for SoC and FFA targets
L	September 2014	Added description for NFC tests utilizing IQNFC Added UDT support for BT DUT

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# 1 Introduction

---

## 1.1 Purpose

This document provides the procedures to perform wireless connectivity non-signaling RF tests and BT signaling tests using the Qualcomm® Sequence Profiling Resource (QSPR) and factory test mode (FTM) commands.

## 1.2 Scope

This document is intended for use by test engineers and test equipment companies that need to control Qualcomm connectivity chipsets that are mated with Qualcomm processors (MSM™ or MDM or APQ) and standalone SoC based targets. This document contains non signaling tests for WCN2243, WCN36x0, AR3002, AR6003, AR6005 and QCA6174 Qualcomm devices.

## 1.3 Conventions

Function declarations, function names, type declarations, and code samples appear in a different font, e.g., #include.

Button and key names appear in bold font, e.g., click **Save** or press **Enter**.

## 1.4 Related documentation

Reference documents, which may include Qualcomm, standards, and resource documents, are listed in section 1.4.1.

### 1.4.1 Qualcomm documents

**Table 1-1 References**

Reference	Document	DCN
<b>Qualcomm</b>		
Q1	Factory Test Mode Procedure for WLAN RF Test (WCN131X/WCN3660/WCN3680)	80-WL300-18
Q2	Factory Test Mode Procedure for FM RF Test	80-WL300-17
Q3	Factory Test Mode Procedure for Bluetooth RF Test	80-WL024-12
Q4	Qualcomm Sequence Profiling Resource QSPR User guide	80-VB987-1
Q5	Qualcomm Sequence Profiling Resource (QSPR) Tester Configuration User Guide	80-VB987-3
Q6	Qualcomm Product Support Tool (QPST) 2.7 User Guide	80-V1400-3
Q7	How to Install Qualcomm 64-Bit Windows 7 USB Host Driver User Guide	80-N2328-2
Q8	Application Note: Software Glossary for Customers	CL93-V3077-1
Q9	WCN36x0 Training WLAN Tx CLPC Characterization Using QSPR Tools	80-WL300-25
Q10	QCA61X4, QCA937X, QCA65X4 QDART USER GUIDE	80-WL400-24
<b>References</b>		
R1	IEEE	IEEE Std 802.11-2007
R2	IEEE	IEEE Std_80211N_2009
R3	Bluetooth SIG	RF-PHY.TS/4.0.1
R4	Bluetooth SIG	BLUETOOTH SPECIFICATION Version 4.0

## 1.5 Technical assistance

For assistance or clarification on information in this guide, submit a case to Qualcomm CDMA Technologies at <https://support.cdmatech.com/>.

If you do not have access to the CDMA Tech Support Service website, register for access or send email to [support.cdmatech@qualcomm.com](mailto:support.cdmatech@qualcomm.com).

## 1.6 Acronyms

The following terms are used in this document. Some elements are identified by more than one term.

**Table 1-2 Acronyms**

Term	Definition
<b>APQ</b>	Applications-Only Processor QUALCOMM
<b>ARB</b>	Arbitrary
<b>BER</b>	Bit Error Rate
<b>BR</b>	Basic Rate
<b>BT</b>	Bluetooth
<b>CW</b>	Continuous Wave
<b>DPSK</b>	Differential Phase Shift Keying
<b>DQPSK</b>	Differential Quaternary Phase Shift Keying
<b>DUT</b>	Device Under Test
<b>EDR</b>	Enhanced Data Rate
<b>EUT</b>	Equipment Under Test
<b>EVM</b>	Error Vector Magnitude
<b>FFA</b>	Form Factor Accurate
<b>FTM</b>	Field Test Mode
<b>GFSK</b>	Gaussian Frequency Shift Keying
<b>GPIO</b>	General Purpose Interface Bus
<b>LE</b>	Low Energy
<b>MDM</b>	Mobile Data Modem
<b>MIMO</b>	Multiple-Input and Multiple Output
<b>MSM</b>	Mobile Station Modem
<b>NFC</b>	Near Field Communication
<b>PER</b>	Packet Error Rate
<b>QSPR</b>	Qualcomm Sequence Profiling Resource
<b>RF</b>	Radio Frequency
<b>R&amp;S</b>	Rohde & Schwarz
<b>SG</b>	Signal Generator
<b>SoC</b>	System on a Chipset
<b>SRS</b>	System Requirement Specification
<b>SW</b>	Software
<b>UART</b>	Universal Asynchronous Receiver-Transmitter
<b>UDT</b>	User Defined Transport
<b>USB</b>	Universal Serial Bus

## 2 Hardware Setup and Requirements

This section covers the hardware installation pieces required for BT, WLAN and FM production tests for connectivity chipsets that are mated with Qualcomm processors (MSM or MDM or APQ) or standalone SoC connectivity chipsets. The test solutions utilize FTM features integrated on Qualcomm processors to communicate with connectivity chipsets for testing.

### 2.1 RF test setup

#### 2.1.1 BT/WLAN/FM RF test setup

Figure 2-1 shows the test setup needed for performing BT, WLAN and FM RF functional tests. DUT in Figure 2-1 refers to an FFA device that contains Qualcomm processors (MSM or MDM or APQ) mated with supported connectivity chipset.

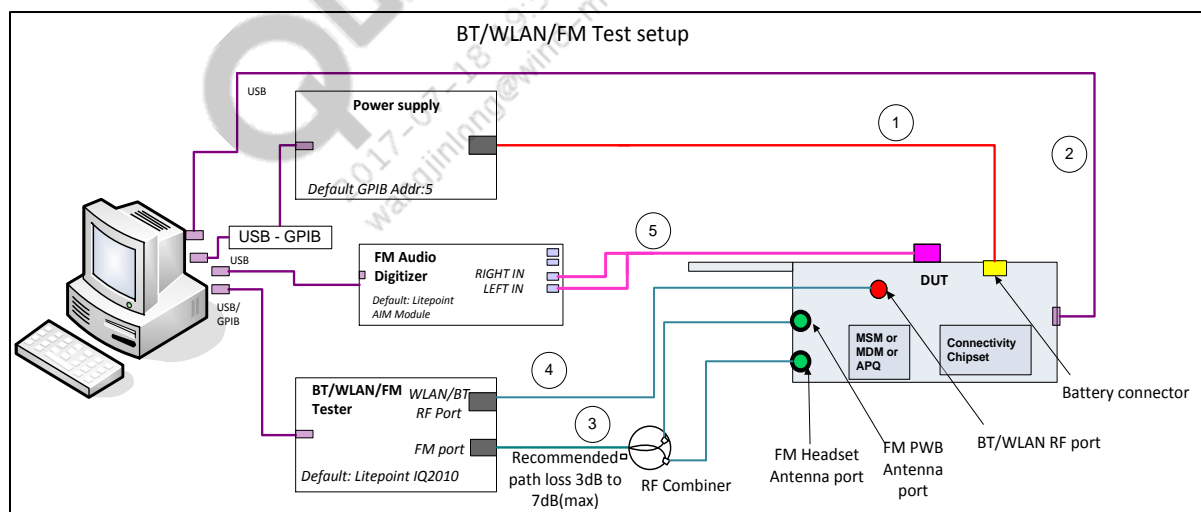


Figure 2-1 BT/WLAN/FM RF test setup

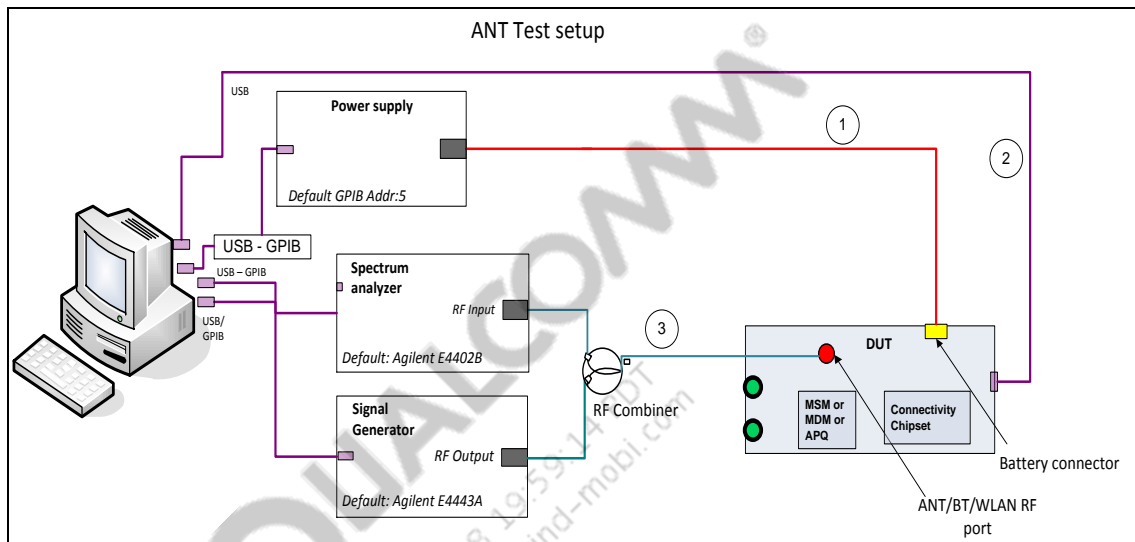
The following cables are required in the test setup:

1. A Power supply or battery emulator cable (cable#1)
2. An USB cable (cable #2)
3. A RF cable for FM headset and PWB paths using RF combiner from DUT to test box (cable #3)
4. A RF cable for BT and WLAN path from DUT to test box (cable #4)

5. A Stereo to L-R/RCA audio cable from DUT stereo audio jack to FM audio interface module (cable #5). Note: the FM Audio Digitizer and its related audio and USB cabling is not required when FM audio is digitally captured directly from the DUT.

## 2.1.2 ANT RF test setup

ANT RF functional tests are performed using the test setup shown below.



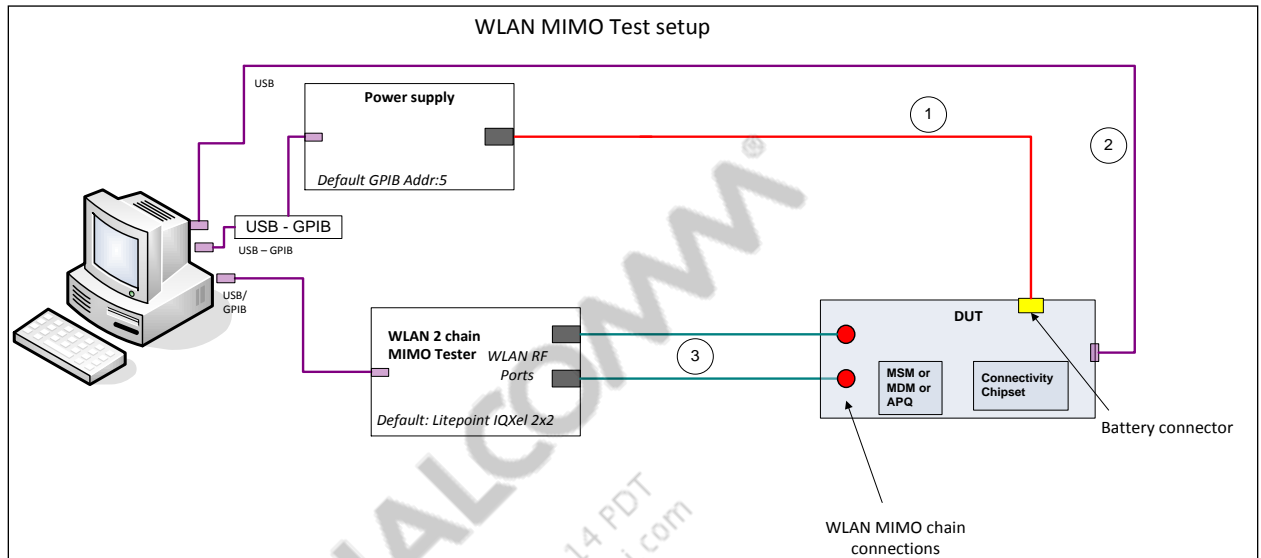
**Figure 2-2 ANT test setup**

The following cables are required in the test setup:

6. A Power supply or battery emulator cable
7. An USB cable
8. A RF cable for ANT path using RF directional coupler from DUT to ARB signal generator and spectrum analyzer

### 2.1.3 WLAN MIMO test setup

While not recommended for production, full WLAN MIMO characterization can be done with multi-chain setup show below.



**Figure 2-3 WLAN MIMO test setup**

The following cables are required in the test setup:

9. A Power supply or battery emulator cable
10. An USB cable (for standalone PCIe DUT, the DUT would be directly connected to the PC via a PCIe extender connection)
11. Two RF cables for both chains of the WLAN path from DUT to test box (cables #3)

## 2.1.4 NFC parametric test setup

Figure 2-4 shows the test setup needed for performing NFC parametric tests. DUT in Figure 2-4 refers to an FFA device that contains Qualcomm processors (MSM or MDM or APQ) mated with supported NFC connectivity chipset. NFC Testing is performed in a radiated fashion. The NFC DUT antenna and the NFC Tester antenna should be placed in close proximity, similar to a NFC tag.

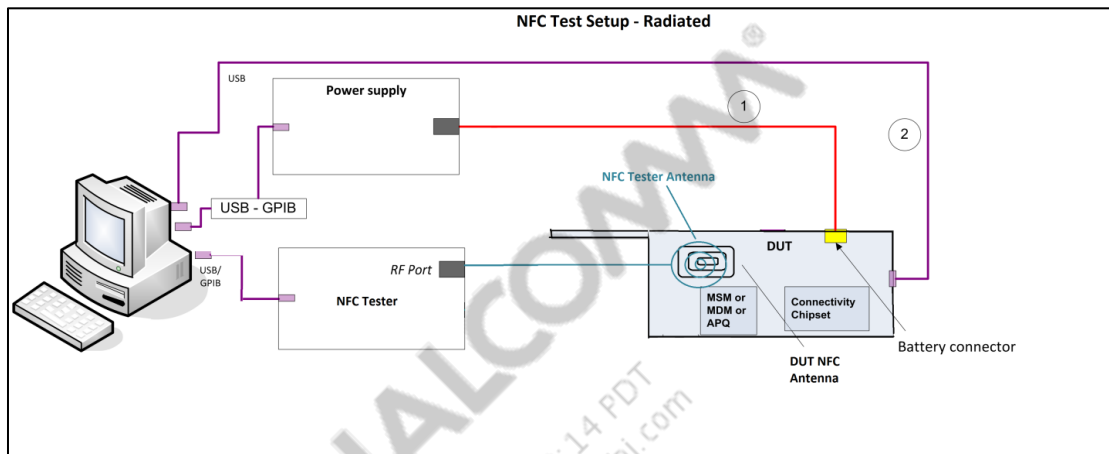


Figure 2-4 NFC parametric test setup

## 2.2 Station calibration

### 2.2.1 BT/WLAN/FM station calibration setup

Setup in Figure 2-5 is utilized to perform station calibration on various RF paths.

The following paths are required to be calibrated for performing BT, WLAN, FM and ANT tests:

- A Bluetooth path (default path name = BTPath)
- A WLAN path (default path name = WCD)
- A FM headset path (default path name = FM\_HS\_RX)
- A FM pwb path (default path name = FM\_PWB\_RXTX)
- An ANT Transmit path (transmit path name = SPath)
- An ANT Receive path (default path name = ARBPath)

A signal generator is connected on the DUT end in order to calibrate the path losses on the above listed RF paths from DUT to power meter.

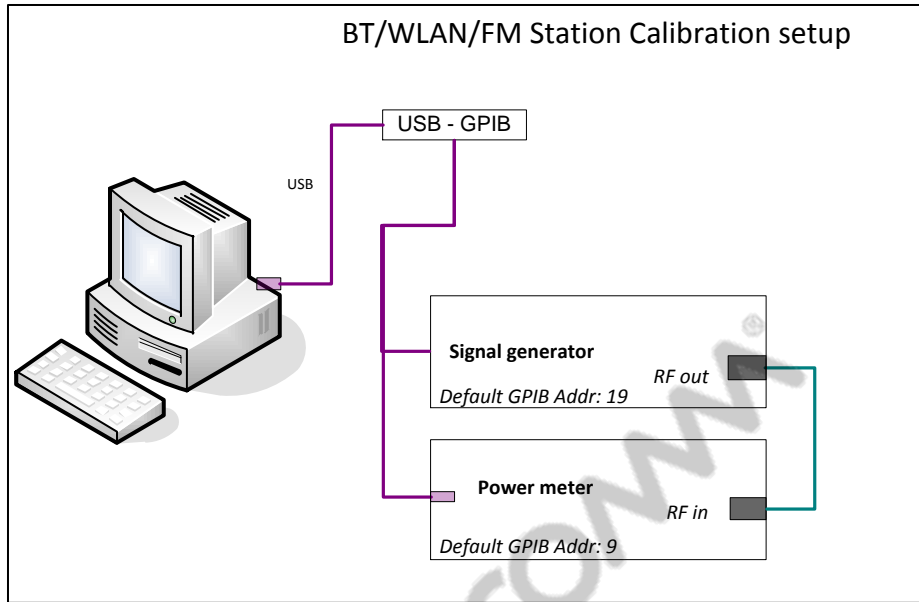


Figure 2-5 Station calibration setup

## 2.3 Test equipment

The list of test equipment needed to perform BT, WLAN and FM tests are mentioned in [Table 2-1](#). If test equipment is GPIB controlled, GPIB address is configurable based on an external configuration file. Please follow the instructions in [Chapter 7](#) to update the GPIB address for respective test equipment.

Table 2-1 Test equipment needed for BT, WLAN and FM tests

Manufacturer / Model	Description	Quantity	Default GPIB Address
Supported test box	Refer to <a href="#">2.3.1</a> for supported connectivity test box	1	20 (if GPIB based)
Supported power supply	Refer to section <a href="#">2.3.2</a> for supported power supply	1	5
Supported signal generator for ANT	Refer to <a href="#">2.3.3</a> for supported signal generator for ANT	1	19
Supported spectrum analyzer for ANT	Refer to <a href="#">2.3.4</a> for supported spectrum analyzer for ANT	1	18
Supported BT signaling test box	Refer to <a href="#">2.3.1</a> for supported BT signaling test box	1	27

### 2.3.1 Supported BT, WLAN, NFC and FM test box

To perform connectivity tests one of supported test boxes on [Table 2-2](#) should be used.

**Table 2-2 Test box supported by test solution**

Manufacturer / Model	Description	Required Options
LitePoint IQ2010	Non-signaling connectivity test box (WLAN(SISO)/BT/FM)	FM Software License: 0300-20XX-002 FM AUDIO Analysis Option: 0300-20XX-003 Refer to section 3.3 for SW details
R&S CMW500	Non-signaling connectivity test box (WLAN(SISO)/BT no FM)	BT/WLAN RF generator (prerequisite: CMW-B110A) BT Measurements (CMW-KM610) BT Low Energy (CMW-KM611) WLAN ABG RF analyzer (CMW-KM650) WLAN N RF analyzer (CMW-KM651)
Agilent N4010A	Non-signaling connectivity test box (WLAN(SISO)/BT no FM)	2.4 GHz and 5 GHz WLAN Tx/Rx analysis: N4010A-103 802.11n MIMO modulation analysis: N4010A-108 Bluetooth: N4010A-101 Bluetooth EDR – transmit and receive:N4010A-105 Bluetooth LE Tx/Rx: N4010A-109 Refer to Section 3.5 for SW details
LitePoint IQxel	Non-signaling connectivity test box (WLAN(SISO+MIMO)/BT no FM)	Bluetooth 1,2,3,4(LE) SW License : 0300-IXEL-001 Iqxel80 Test System,802.11a,b,g,n,ac(80MHz) : 0100-IXEL-002 Refer to section 3.6 for SW details
NI PXI5644R	Non-signaling connectivity test box (WLAN(SISO+MIMO) only)	Refer to section 3.7 for SW details
Anritsu 8870A	Non-signaling connectivity test box (WLAN(SISO) + BT + FM)	MU887000A MU887000A-001 MV887030A MV887031A MX887030A MX887031A MV887040A MX887040A MX887050A
R&S CBT	BT Signaling test box (Bluetooth only)	CBT-K55 “Enhanced Data Rate” CBT-K57 “Low Energy”
Anritsu MT8852B	BT Signaling test box (Bluetooth only)	Option 27 “Low Energy”
LitePoint IQNFC	NFC test box	Advanced Software License

### 2.3.2 Supported power supply

In order to perform RF tests one of the power supplies mentioned in [Table 2-3](#) should be used. The model string on the config file column refers to the model number information that can be specified on the configuration file to switch to other equipment than default.

**Table 2-3 Power supply supported by test solution**

Manufacturer / Model	Description	Model String on Config File
Keithley2303 (Default)	Keithley 2303 power supply	PS_KEITHLEY2303
Fluke 2812 /2813	Fluke 2812/2813 power supply	PS_FlukePM2812/ PS_FlukePM2813
Agilent E3640A/ Agilent E3641A/ Agilent E3642A/ Agilent E3643A/ Agilent E3644A/ Agilent E3645A/ Agilent E3646A/ Agilent E3647A/ Agilent E3648A/ Agilent E3649A	Agilent E364xA power supply	PS_AgilentE3640A/ PS_AgilentE3641A/ PS_AgilentE3642A/ PS_AgilentE3643A/ PS_AgilentE3644A/ PS_AgilentE3645A/ PS_AgilentE3646A/ PS_AgilentE3647A/ PS_AgilentE3648A/ PS_AgilentE3649A/
INSTEK 3202	Instek 3202 power supply	PS_PST3202
XantrexXDL355T	Xantrex XDL 355T power supply	PS_XDL355T

### 2.3.3 Supported signal generator for ANT

**Table 2-4 Signal generator supported by ANT solutions**

Manufacturer / Model	Description	Model String on Config File
AgilentN5182A	Agilent N5182A RF Vector Signal Generator with option 506 for 6GHz	SG_AgilentN5182A

### 2.3.4 Supported spectrum analyzer for ANT

**Table 2-5 Spectrum analyzer supported by ANT solutions**

Manufacturer / Model	Description	Model String on Config File
AgilentE4443A AgilentE4402B AgilentE4403B AgilentE4404B AgilentE4405B AgilentE4407B AgilentE4408B	Agilent E4443A PSA Spectrum Analyzer Agilent E440xB ESA Spectrum Analyzer	SA_AgilentE4443A

## 2.4 Station calibration test equipment

This section lists the test equipment required for station calibration. Station calibration is meant to update the RF path losses on various RF paths on a station calibration data file in the local PC. It is recommended to run an automated station calibration, but this file could be updated manually as well.

**Table 2-6 Test equipment needed for station calibration**

Manufacturer / Model	Description	Quantity	Default
Supported signal generator	Refer to Section 2.4.2 for supported signal generators	1	LitePoint IQ2010
Supported power meter	Refer to Section 2.4.1 for supported power meters	1	Giga-tronics 8541C

### 2.4.1 Supported power meter for station calibration

To perform station calibration one of supported power meters in Table 2-7 should be used. Additional power meters from the same vendors may work if the GPIB command set is the same. The model string on the config file column refers to the model number information that can be specified on the configuration file to switch to other equipment rather than the default.

**Table 2-7 Power meter supported by test solution**

Manufacturer / Model	Description	Model String on Config File
Agilent 4418B (Default)	Agilent 4418B	PM_HPE4418B
Giga-tronics 8651A	Giga-tronics 8651A	PM_GIG8651A
Giga-tronics 8541C	Giga-tronics 8541C	PM_GIG8541C
Agilent 437B	Agilent 437B	PM_HP437B
Rhode & Schwartz	NRP-Z11	PM_RSNRPZ11

### 2.4.2 Supported signal generator for station calibration

To perform station calibration one of supported signal generator mentioned in Table 2-8 should be used. Please note that the signal generators listed on Table 2-8 are the supported signal generators that go at least to 6GHz or more.

**Table 2-8 Signal generator supported by test solution**

Manufacturer / Model	Description	Model String on Config File
LitePoint IQ2010 (Default)	LitePoint IQ2010 with IQMeasure SW	SG_LitepointIQ2010
Agilent N4010A	Agilent N4010A - Test Suite version 6.53.0	SG_AgilentN4010A
R&S CMW500	Rohde and Schwarz CMW500	SG_CMW500
LitePoint IQxel	LitePoint IQxel	SG_LitePointIQxel
NI PXI5644R	National Instrument PXI5644R	SG_NITrident
Anritsu MT8870A	Anritsu MT8870A	SG_AnritsuMT8870A
Agilent 83712B	Agilent 83712B Synthesized CW Generator, 10 MHz to 20 GHz	SG_Agilent83712B

<b>Manufacturer / Model</b>	<b>Description</b>	<b>Model String on Config File</b>
Agilent 8665B	Agilent 8665B High-Performance Signal Generator, 6GHz	SG_Agilent8665B
AgilentE8257D	Agilent E8257D PSD Signal Generator	SG_AgilentE8257D
AgilentN5182A	Agilent N5182A RF Vector Signal Generator with option 506 for 6GHz	SG_AgilentN5182A
Keithley2920	Keithley 2920 RF Vector Signal Generator	SG_Keithley2920
Anritsu MT8870A	Anritsu MT8870A	SG_AnritsuMT8870A

QUALCOMM®  
2017-07-18 19:59:14 PDT  
wangjintong@wind-mobi.com

# 3 Software Installation

---

## 3.1 SW requirements

The following are software requirements for a PC that would run Wireless Connectivity test solutions on a Qualcomm based target. Appropriate version numbers are included against software packages where a specific version is required:

- Windows XP with Service Pack 3 or Windows 7
- Qualcomm SW tools
  - QDART installation with Manufacturing tool kit for QSPR option checked
    - QDART 4.8.05 or above
  - QPST installer – Refer to [Q6] in [Qualcomm documents](#) of section 1.4.1
  - Qualcomm Windows XP/7 USB composite drivers – [Q7]
- 3rd Party tools
  - NI 488.2 GPIB 2.73 version or later (See Section 3.3 for details)
  - LitePoint IQ2010 software (See Section 3.5 for details)
  - Agilent N4010A software (See Section 3.6 for details)
  - LitePoint IQxel wave files (See Section 3.7 for details)
  - National Instrument NI PXI5644R (See Section 3.8 for details)
  - LitePoint IQNFC software(See Section 3.10 for details)
  - Android debug bridge (adb) installed / available on system path (See Section 3.4 for details)
    - Included as part of Android SDK from Google
      - Adb.exe (Android debug bridge executable)
      - Adbwinapi.dll (ADB Windows API DLL)
  - Android Windows XP/7 USB drivers
    - Obtain drivers from SW team usually drivers are included with the Android build
    - Install the USB drivers on boot up of the DUT

## 3.2 QDART for non-FFA setup

Please see [Q10], QDART Users Guide for more information.

## 3.3 NI GPIB setup

National Instruments' GPIB software and drivers are used to control the power supply, power meter, signal generator and GPIB controlled connectivity test box connected to the PC to perform the automated testing.

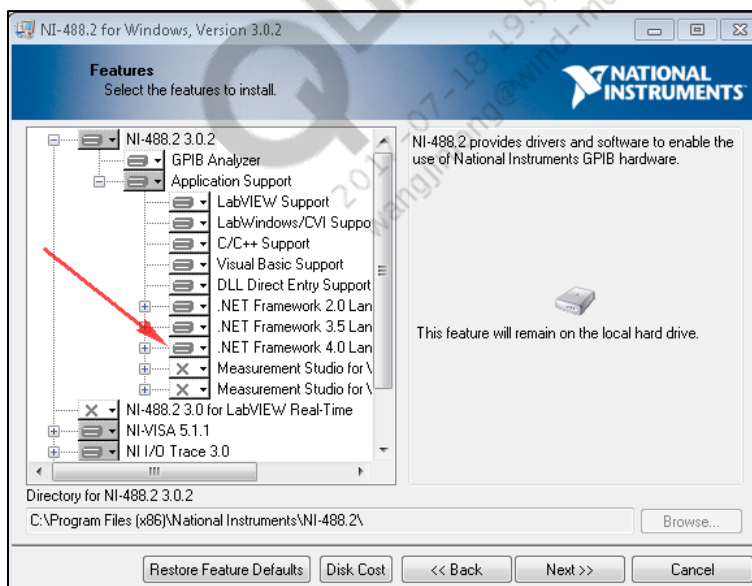
### 3.3.1 NI GPIB software setup

The NI 488.2 software can be downloaded from the NI website at <http://www.ni.com>.

**NOTE:** NI 488.2 3.02 version or later is required to be compatible with test software. Also, “.NET framework 4.0 Languages support” must be selected as part of installation as listed below:

To setup NI GPIB software:

1. Navigate to the latest NI GPIB software and run the setup.exe
2. Follow the on-screen prompts to install the NI 488.2 drivers and software
3. Please select Custom on the select installation option window
4. On the features to install window, please ensure that “.NET Framework 4.0 Languages support” is selected to install this feature



**Figure 3-1 Enable .NET Framework 4.0 Support on NI 488.2 for Windows Install**

5. The installer installs several parts of the package and then prompts for the addition of GPIB hardware. The wizard may be cancelled as the addition can be done when the hardware is plugged in.
6. Complete the installation by rebooting the computer.

### 3.3.2 NI GPIB driver setup

When the USB to GPIB controller is connected to the USB port on the PC, Windows starts to install the hardware driver for GPIB-USB controller. The following steps need to be followed for installing the driver properly:

1. Windows will prompt the “Found New Hardware Wizard.” Make sure that “Yes, this time only” is selected for windows update to search for drivers.



Figure 3-2 Signal generator supported by test solution

2. Windows prompts for automatic or manual installation of the driver. Make sure that the automatic installation is selected.



Figure 3-3 NI GPIB hardware setup – step 2

3. Windows will install the driver for the USB to GPIB controller and completes the hardware driver installation procedure.



Figure 3-4 NI GPIB hardware setup – step 3

## 3.4 Android debug bridge installation

**NOTE:** These steps are specific based on HLOS on the embedded side. Skip them for non-Android HLOS.

The following steps will install adb and will add it to the system path:

1. Install the Android SDK from Google or obtain the SDK files from the software team.
2. Copy the following two Android SDK files into a local directory such as C:\Android\_tools.
  - Android debug bridge executable (Adb.exe)
  - Adb Windows API dll (Adbwinapi.dll)
3. Navigate to system properties on the computer. On Advanced tab, click on “Environment Variables...” and scroll to the Path variable on System variables section.

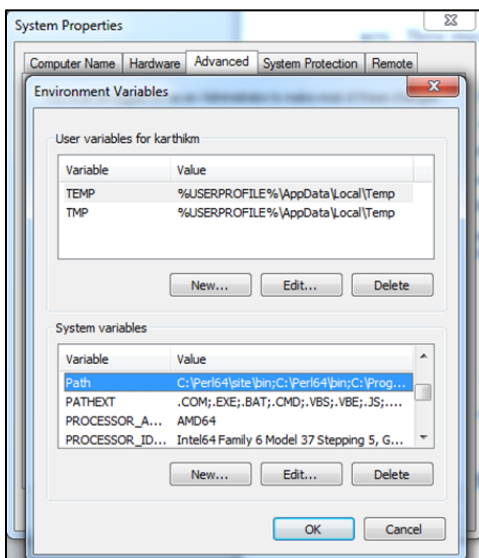
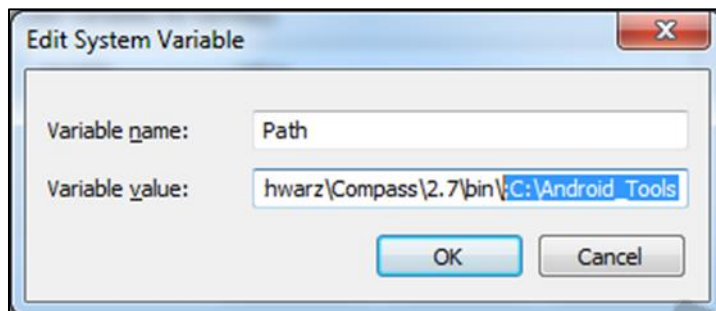


Figure 3-5 Path system variable on environment variables

4. Click on “Edit...” and add C:\Android\_tools or the local directory where the files are as shown in [Figure 3-6](#).



**Figure 3-6** Add ADB as part of the system path

## 3.5 LitePoint software for running

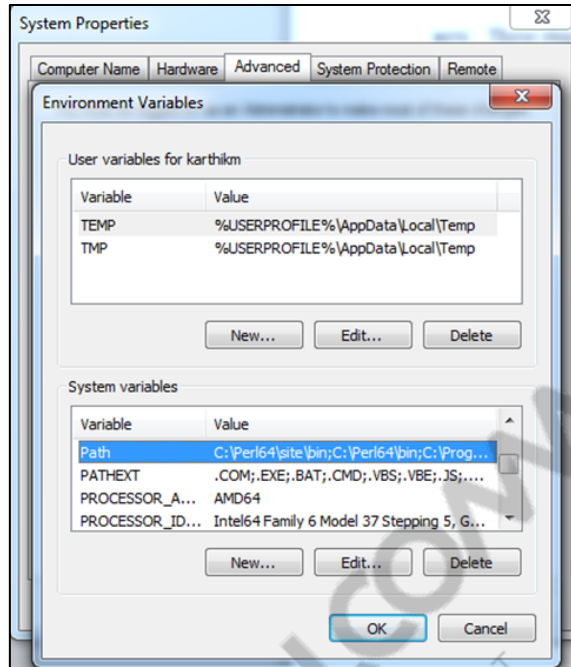
**NOTE:** These steps are specific to LitePoint IQ2010 software installation.

The following software programs are needed for LitePoint IQ2010. Please contact LitePoint to obtain this software.

- Drivers for IQ2010 installed on the PC (only required for LitePoint IQ2010)
  - Should be available as part of the disk that came with LitePoint
- IQmeasure package 3.0.8.3 or above – Available from LitePoint

**NOTE:** Test solutions are validated with IQMeasure package 3.0.8.3

- Bin folder of IQMeasure is required to be added to Windows system “Path”
  - Navigate to system properties on the computer. On Advanced tab, click on “Environment Variables...” and scroll to the Path variable on System variables section.



**Figure 3-7 Path system variable on environment variables**

- Click on **Edit...** and add “C:\LitePoint\IQmeasure\IQmeasure\_3.0.8.3”

### 3.6 Agilent N4010A software installation

An Agilent IO library 14.2 is required to be installed for Agilent N4010A testing.

- Agilent WLAN test software suite version A.06.53.00 and Agilent drivers are required to be installed before running the test.
- For downloading WLAN and custom Bluetooth waveforms, please contact Agilent Technologies N4010A Technical Support Team to get a website link and password: JIANN-DER SHAW [jiann-der\\_shaw@agilent.com](mailto:jiann-der_shaw@agilent.com), LEI YANG [lei\\_yang@agilent.com](mailto:lei_yang@agilent.com), GRACE HU [grace\\_hu@agilent.com](mailto:grace_hu@agilent.com)

### 3.7 LitePoint IQxel wave files installation

- Obtain wave files with iqvsg extensions from LitePoint and copy to tester PC.
- Add the path location of the wave files to the config file WCNTesterConfig.xml under the IQxel WLAN and BT section in info item name “WaveFilePath”.
- If the wave file names differ from the default file names in WCNTesterConfig.xml under the IQxel WLAN and BT section, enter the correct wave file names to be associated with each rate.

```

<!--*****Litepoint IQxel WLAN*****>
<Instrument>
  <ResourceIDList>
    <!--This resource ID "WLANTester" is used in the production test tre
    <Item>WLANTester</Item>
  </ResourceIDList>
  <Model>WCNTester_LPIQxelWLAN</Model>
  <OptionalConfigInfoList>
    <InfoItem Name="RFPort" Value ="left" />
    <InfoItem Name="WaveFilePath" Value ="user/" />
    <InfoItem Name="RATE_11B_LONG_1_Mbps" Value ="WiFi_DSSS-1.iqvsg" />
  </OptionalConfigInfoList>
<!--*****Litepoint IQxel BT*****>
<Instrument>
  <RequiredDriverInterfaceList>
    <Item>IWCNTesterInterface_BT</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
    <Item>BTTester</Item>
  </ResourceIDList>
  <DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
  <Model>WCNTester_LPIQxelBT</Model>
  <SimulationMode>No</SimulationMode>
  <OptionalConfigInfoList>
    <!--Bluetooth address of the waveform file used in RX testing-->
    <InfoItem Name="WaveformBluetoothAddress" Value="BD,35,9C,BD,35,9C" />
    <InfoItem Name="RFPort" Value ="left" />
    <!--Supported packet types DH1, DH5, 2DH5 and 3DH5-->
    <InfoItem Name="WaveFilePath" Value ="user/" />
    <InfoItem Name="BT_DH1" Value="QC_DH1.iqvsg" />
  </OptionalConfigInfoList>

```

Figure 3-8 LitePoint IQxel waveform location

### 3.8 NI PXI5644R software installation

The following software programs are needed for NI PXI5644R. Please contact National Instruments to obtain this software.

- Drivers for NI WLAN, NI Spectral Measurement Tool, NI-VST and NI-RIO installed on the PC. This is available as part of the disk that comes with National Instruments
- NIDotNetWrappersClassLibrary.dll and QDART NI client server modules are required. – Available from NI. Please note that the remote servers from NI needs to be running while QSPR is communicating with the NI PXI 5644R
- Generally, when the software is installed, it will reside in C:/Program Files/National Instruments and the DLLs for toolkits and drivers will reside in C:/Program Files/IVI Foundation

To obtain further information on the system requirements and setup please contact [qct\\_FTTL@ni.com](mailto:qct_FTTL@ni.com), reference part number 862003-01.

### 3.9 Agilent N5182A software and waveform files installation (ANT only)

Agilent N7622B Signal Studio for Toolkit is required to copy ANT waveform files to Agilent N5182A (or equivalent Agilent) ARB signal generator. This software is available for download from Agilent technologies website for free. After installation, use the settings shown below to download the waveform files.

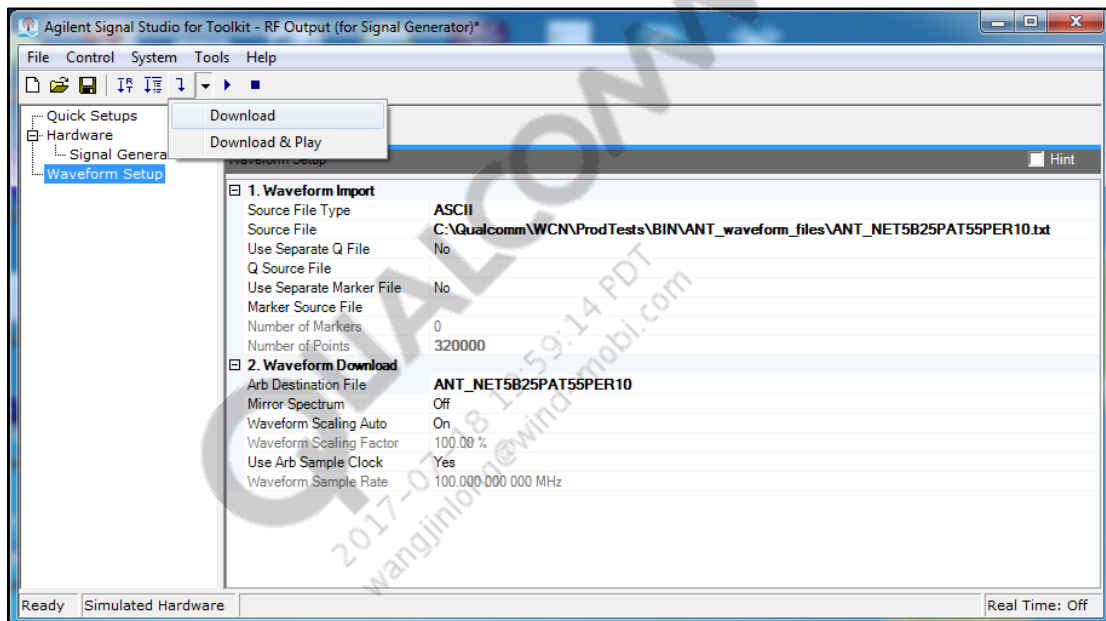


Figure 3-9 Loading waveform files on Agilent N5182A

### 3.10 LitePoint IQNFC Software

**NOTE:** These steps are specific to LitePoint IQNFC software installation. Skip this section if LitePoint IQNFC is not used at test box.

The following software programs are needed for LitePoint IQNFC. Please contact LitePoint to obtain this software.

- Drivers + Software for IQNFC installed on the PC
  - Should be available as part of the disk that came with LitePoint

# 4 Station Calibration

---

This section describes the station calibration test tree procedure. This test tree provides a way to perform station calibration and update the files using an automation environment.

## 4.1 Station calibration data file

### 4.1.1 BT/WLAN/FM RF test station calibration data file

Path loss on the RF path between the antenna test ports on DUT to the power meter is stored in the station calibration data file. Station calibration data file is present in:

C:\QUALCOMM\WCN\ProdTests\StationCal\QTA\_CalDataFile.xml.

The following paths are required to be calibrated for performing BT, WLAN, FM and ANT tests:

- Bluetooth path (default path name = BTPath)
- WLAN path (default path name = WCD)
- FM
  - FM headset path (default path name = FM\_HS\_RX)
  - FM pwb path (default path name = FM\_PWB\_RXTX)
- ANT
  - ANT transmit path (default path name = SAPath)
  - ANT receive path (default path name = ARBPath)

The data list main tag contains various data elements that contain the frequency at which loss (value) was measured. Delta indicates the difference between the current measurement to the previous measurement.

```
<Data>
  <Frequency>2400</Frequency>
  <Value>11.35</Value>
  <Delta>0</Delta>
</Data>
```

## 4.2 Station calibration instrument config file

Signal generator and power meter equipment to be utilized to perform station calibration is indicated by the instrument config file for station calibration.

StationCalInstrumentConfigFile.xml present in C:\QUALCOMM\WCN\ProdTests\ConfigFiles controls this configuration. The following XML tag can be changed by the user for power meter and signal generator:

- Model tag needs to reflect the model number of power meter and signal generator on their respective sections. Please use the model string config information specified in section 2.4.1 and 2.4.2 for changing the test equipment model if they are different from defaults. GPIB primary address for both types of equipment is specified in <PrimAddress> tag.

```
<Model>SG_Agilent83712B</Model>
```

```
<Model>PM_GIG8541C</Model>
```

- Power meter configuration**

- Make sure <ResourceIDList> tag contains “CALPM” <Item> tag.
- GPIB based power meter configuration.
  - Use <PartialClassName> tag as “NIGPIB”.
  - Configure <IGPIB> tag with BoardID , PrimAddress and ScndAddress

```
<Instrument>
  <RequiredDriverInterfaceList>
    <Item>IPowerMeter</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
    <Item>CALPM</Item>
  </ResourceIDList>
  <DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
  <Model>PM_GIG8541C</Model>
  <SimulationMode>At1stFunctionCall</SimulationMode>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>NIGPIB</PartialClassName>
    <IGPIB>
      <BoardID>0</BoardID>
      <PrimAddress>15</PrimAddress>
      <ScndAddress>0</ScndAddress>
    </IGPIB>
  </HardwareInterface>
  <DriverDLL>QC.TILib.PowerMeter.dll</DriverDLL>
</Instrument>
```

Figure 4-1 Station calibration GPIB power meter configuration

- **VISA based power meter configuration (R&S NRPZ11 only)**
  - Use <PartialClassName> tag as “Visa32”.
  - Configure <Resource> tag with VISA instrument string or VISA instrument alias.

```

<ResourceIDList>
  <Item>CALPM</Item>
</ResourceIDList>
<DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
<Model>PM_RSNRPZ11</Model>
<SimulationMode>At1stFunctionCall</SimulationMode>
<HardwareInterface>
  <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
  <PartialClassName>Visa32</PartialClassName>
  <IVisa32>
    <Resource>RSNRP::0x000c::101665::INSTR</Resource>
  </IVisa32>
</HardwareInterface>
<DriverDLL>QC.TILib.PowerMeter.dll</DriverDLL>

```

**Figure 4-2 Station calibration VISA power meter configuration**

■ **Signal generator configuration:**

In order to use the certain test equipment for station calibration, find the section of the test equipment, set <ResourceIDList><Item>CALSG</Item></ResourceIDList> tag to “CALSG”, and change other equipment tag to something else.

```

<ResourceIDList>
  <Item>CALSG</Item>
</ResourceIDList>

```

**Figure 4-3 Station calibration SG resource ID**

- LitePoint IQ2010 as signal generator
  - Under <ResourceIDList> tag configure <Item> tag as “CALSG”
  - Model – SG\_LitepointIQ2010
  - Under OptionalConfigInfoList, check the ServerExeFullLocation path to ensure that the StartLitepointConnectivityServer.exe is available. Set IPAddress, set RFPort to “LEFT” to use left RF port, “RIGHT” to use right RF port or “FM” to use FM port. Check the installation required for LitePoint software in section 3.3.

```

<!--LP IQ2010-->
<Instrument>
  <RequiredDriverInterfaceList>
    <Item>ISignalGenerator</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
    <Item>CALSG</Item>
  </ResourceIDList>
  <DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
  <Model>SG_LitepointIQ2010</Model>
  <SimulationMode>At1stFunctionCall</SimulationMode>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>SWFacade</PartialClassName>
    <ISWFacade>
    </ISWFacade>
  </HardwareInterface>
  <DriverDLL>QC.TILib.SignalGenerator.DLL</DriverDLL>
  <OptionalConfigInfoList>
    <InfoItem Name="ServerExeFullLocation" Value="C:\Program Files\Litepoint\SG_LitepointIQ2010\SG_LitepointIQ2010.exe" />
    <InfoItem Name="IPAddress" Value="127.0.0.1" />
    <InfoItem Name="RFPort" Value="left" />
  </OptionalConfigInfoList>
</Instrument>

```

Figure 4-4 Station calibration LP IQ2010 as signal generator

- **R&S CMW500 as signal generator**
  - Under <ResourceIDList> tag configure <Item> tag as “CALSG”
  - Model – SG\_CMW500
  - Specify GPIB primary address specified in <PrimAddress>

```

<!--R&S CMW500-->
<Instrument>
  <RequiredDriverInterfaceList>
  | <Item>ISignalGenerator</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
  | <Item>CALSG</Item>
  </ResourceIDList>
  <DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
  <Model>SG_CMW500</Model>
  <SimulationMode>At1stFunctionCall</SimulationMode>
  <HardwareInterface>
  | <HWInterfaceDLL>QC.TILib.LibraryManager</HWInterfaceDLL>
  | <PartialClassName>NIGPIB</PartialClassName>
  | <IGPIB>
  | | <BoardID>0</BoardID>
  | | <PrimAddress>20</PrimAddress>
  | | <ScndAddress>0</ScndAddress>
  | </IGPIB>
  </HardwareInterface>

```

**Figure 4-5 Station calibration R&S CMW500 as signal generator**

- **Agilent N4010A as signal generator**
  - Under <ResourceIDList> tag configure <Item> tag as “CALSG”
  - Model – SG\_AgilentN4010A
  - Set Partial Class Name to Visa32
  - Specify Visa instrument string or Visa instrument alias for <Resource> tag

```

<ResourceIDList>
  <!--use CALSG-->
  <Item>CALSG</Item>
</ResourceIDList>
<DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
<Model>SG_AgilentN4010A</Model>
<SimulationMode>At1stFunctionCall</SimulationMode>
<HardwareInterface>
  <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
  <PartialClassName>Visa32</PartialClassName>
  <IVisa32>
    <Resource>N4010A</Resource>
  </IVisa32>
</HardwareInterface>
<DriverDLL>QC.TILib.SignalGenerator.dll</DriverDLL>

```

Figure 4-6 Station calibration Agilent N4010A as signal generator

- **LitePoint IQxel as signal generator**
  - Under <ResourceIDList> tag configure <Item> tag as “CALSG”
  - Model – SG\_LitePointIQxel
  - Under OptionalConfigInfoList. Set RFPort to “LEFT” to use left RF port or “RIGHT” to use right RF port, set host IP address and port number.

```

<!--LP IQxel -->
<Instrument>
  <ResourceIDList>
    <!--use CALSG-->
    <Item>CALSG</Item>
  </ResourceIDList>
  <Model>SG_LitepointIQxel</Model>
  <OptionalConfigInfoList>
    <InfoItem Name="RFPort" Value ="left" />
  </OptionalConfigInfoList>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>TcpClient</PartialClassName>
    <ITcpClient>
      <Host>127.0.0.1</Host>
      <Port>24000</Port>
    </ITcpClient>
  </HardwareInterface>
  <DriverDLL>QC.TILib.SignalGenerator.dll</DriverDLL>

```

Figure 4-7 Station calibration LP IQxel as signal generator

- **NI PXI5644R as signal generator**
  - Under <ResourceIDList> tag configure <Item> tag as “CALSG”
  - Model – SG\_NITrident
  - Under OptionalConfigInfoList. Check the NIWrapperDLLPath and NIWrapperDLLName.

```

<!--NI Trident -->
<Instrument>
  <RequiredDriverInterfaceList>
    <Item>ISignalGenerator</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
    <!--use CALSG-->
    <Item>CALSG</Item>
  </ResourceIDList>
  <DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
  <Model>SG_NITrident</Model>
  <SimulationMode>At1stFunctionCall</SimulationMode>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>SWFacade</PartialClassName>
    <ISWFacade>
    </ISWFacade>
  </HardwareInterface>
  <DriverDLL>QC.TILib.SignalGenerator.DLL</DriverDLL>
  <OptionalConfigInfoList>
    <InfoItem Name="NIWrapperDLLPath" Value="C:\Program Files\IVI Foundation\IVI\Bin\" />
    <InfoItem Name="NIWrapperDLLName" Value ="NIDotNetWrappersClassLibrary.dll" />
  </OptionalConfigInfoList>

```

**Figure 4-8 Station calibration NI PXI5644R as signal generator**

- **Anritsu MT8870A as signal generator**
  - Under <ResourceIDList> tag configure <Item> tag as “CALSG”
  - Model – SG\_AnritsuMT8870A
  - Under OptionalConfigInfoList. Set RFPort to “1” to use left RF port or “2” to use right RF port, set host IP address and port number.

```

<!--Anritsu 8870A-->
<Instrument>
  <RequiredDriverInterfaceList>
    <Item>ISignalGenerator</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
    <!--use CALSG-->
    <Item>CALSG</Item>
  </ResourceIDList>
  <DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
  <Model>SG_AnritsuMT8870A</Model>
  <SimulationMode>At1stFunctionCall</SimulationMode>
  <OptionalConfigInfoList>
    <InfoItem Name="RFPort" Value = "1" />
  </OptionalConfigInfoList>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>TcpClient</PartialClassName>
    <ITcpClient>
      <Host>192.168.1.1</Host>
      <Port>56001</Port>
    </ITcpClient>
  </HardwareInterface>
</Instrument>

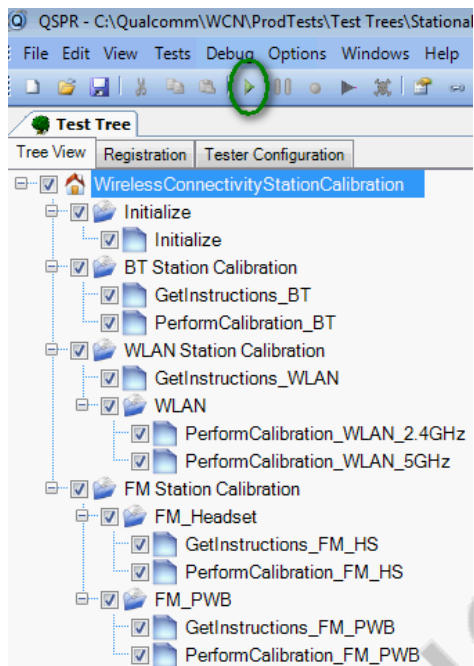
```

Figure 4-9 Station calibration LP IQxel as signal generator

## 4.3 Station calibration procedure

### 4.3.1 BT/WLAN/FM RF test station calibration procedure

1. From the Windows Start menu, select Start → All Programs → QDART → QSPR
2. From QSPR, open the Test Tree by selecting File → Open → C:\QUALCOMM\WCN\ProdTests\TestTrees\StationalCalibration.txt
3. Click the Go/No-Go button on the QSPR menu (the right arrow represented as a green-circle on [Figure 4-10](#)).



**Figure 4-10 Station calibration test tree**

4. Ignore the warning messages as the test tree is meant for updating the local files
5. While performing the station calibration if messages pop up to merge the paths for WLAN path, select “Yes” to merge path for WLAN 2.4 GHz and 5 GHz path
6. At the end of successful test tree execution, the data file in this location:  
C:\QUALCOMM\WCN\ProdTests\StationCal will be updated

### 4.3.2 NFC RF test station calibration procedure

NFC Tester Calibration is required if using LitePoint IQNFC tester. The calibration data is used by the tester while performing frequency sweep tests (NFCResonanceTest and NFCDUT\_FindResonance tests). Please run the ‘NFCTesterCalibrate’ test once manually with the complete fixture but with no DUT on the NFCTester Antenna. This test will save the calibration file to local disk which can be used every time the tree is run on that particular station.

The calibration file is unique to the Field Strength Level, Start Freq, Step Frequency and Stop Frequency which was used to run the calibrate function. ConfigureNFCTester test used to configure for Frequency Sweep and FindResonance tests should use the same parameters as the Calibration Test.

This test is part of NFC\_Test\_Reference.xtt

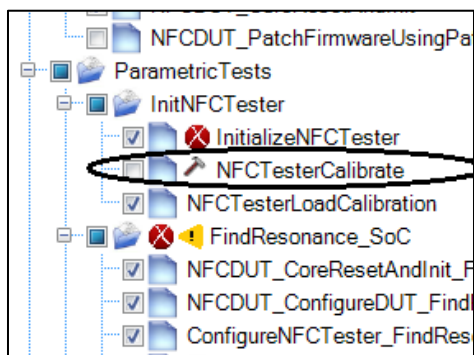


Figure 4-11 NFC tester calibration test

QUALCOMM®  
2017-07-18 19:59:14 PDT  
wangjintong@wind-mobi.com

# 5 Test Matrix

The following matrices present the type of tests and brief description of various tests that are performed in production environments. Detailed explanation and test settings are covered in later sections.

## 5.1 Bluetooth non-signaling production test matrix

Table 5-1 lists the tests that are covered under this document for testing Bluetooth devices in production environment.

**Table 5-1 Bluetooth non-signaling production test matrix**

Rate	Test Name	Description
BR	Measure_OutputPower_InitialCarrierFrequencyTolerance	This test measures average transmitter output power and transmitter initial carrier frequency tolerance.
BR	Measure_GFSK_Modulation_DeltaF2_CarrierDrift	This test measures Delta F2 and carrier frequency drift of the BT transmitter
BR	Measure_GFSK_Modulation_DeltaF1	This test measures Delta F1 of the BT transmitter
BR	GFSK RX Sensitivity	This test verifies minimum sensitivity at a given power and measures BER %.
BR	GFSK Max Input Power	This test verifies maximum input power at a given power and measures BER %.
EDR	Measure_EDRModulation	This test verifies the transmitter carrier frequency stability and modulation accuracy
EDR	EDR Sensitivity	This test verifies sensitivity at a given power and measures BER %.
EDR	EDR Max Input Power	This test measure maximum input power for given maximum BER %.
BLE	Measure_LE_TxOutputPower	This test measures average transmitter output power
BLE	Measure_LE_Modulation_DeltaF1	This test measure modulation parameters like DeltaF1
BLE	Measure_LE_Modulation_DeltaF2_FreqOffset_FreqDrift_MaxDriftRate	This test measures delta F2, frequency offset, carrier drift and max drift rate of LE transmitter
BLE	LE RX Sensitivity	This test measure LE receiver sensitivity
BLE	LE Max Input Power	This test measure max input power for given maximum PER%

## 5.2 WLAN production SISO test matrix

Table 5-2 lists the tests that are covered under this document for testing WLAN devices in production environment.

**Table 5-2 WLAN production test matrix**

Test Name	Description
SetUpDutTx	Sets up the DUT for TX testing
WlanTxEVMTTest	Transmit Modulation Accuracy Test; Measures EVM
WlanTxVerifySpectrumTest	Transmit Spectrum Verification Test; Measures center frequency leakage and spectral flatness
WlanTxVerifyMaskTest	Transmit Spectrum Mask Verification Test
WlanTxVerifyPowerTest	Transmit Power Verification Test; Measures maximum, minimum average TX power and maximum, minimum, average Peak TX Power
WlanPerTest	Receiver Minimum Input Sensitivity Test; Measures PER

## 5.3 WLAN production MIMO test matrix

Table 5-3 lists the tests that are covered under this document for testing MIMO and SISO WLAN devices in production environment.

**Table 5-3 WLAN production test matrix**

Test Name	Description
SetUpDutTxDetails	Sets up the DUT for TX testing (QCA6174)
WlanTxEvmTest_NxN	Transmit Modulation Accuracy Test for MIMO/SISO modulation rate; Measures EVM, Power Freq_err etc.
MeasureSpectrum_NxN	Transmit Spectrum Verification Test for MIMO/SISO modulation rate; Measures center frequency leakage and spectral flatness
WlanTxVerifyPowerTest_NxN	Transmit Power Verification Test for MIMO/SISO modulation rate; Measures maximum, minimum average TX power and maximum, minimum, average Peak TX Power
WlanPerTest_NxN	Receiver Minimum Input Sensitivity Test for MIMO/SISO modulation rate; Measures PER

## 5.4 FM production test matrix

Table 5-4 lists the tests that are covered under this document for testing FM devices in production environment.

**Table 5-4 FM production test matrix**

Test Name	Description
RX Sensitivity GONOGO	This test verifies sensitivity at a given power and measures SNR
RX Sensitivity Characterization	This test finds the minimum sensitivity level with an iterative search

Test Name	Description
RX Max SNR	This test measures SNR at a strong input signal level
RX Intermediate SNR	This test measures SNR at an intermediate input signal level with AM distortion added to the FM signal
RX THD	This test measures Total Harmonic Distortion
RX RDS Block Error Rate	This test measures RDS Block Error Rate (BLER)
TX Output Power	This test measures TX output power
TX FM Deviation	This test measures FM deviation on the TX signal
TX Stereo Audio SNR	This test measures audio SNR for Left & Right channels on the TX signal

**NOTE:** All FM tests are not supported with WCN2243. Tests listed in **bold** in Table 5-4 are not supported for WCN2243. Tests that are supported by WCN2243 are only supported for default headset path.

## 5.5 ANT production test matrix

Table 5-5 lists the tests that are covered under this document for testing ANT devices in production environment.

**Table 5-5 ANT production test matrix**

Test Name	Description
RX Sensitivity	This test finds the minimum sensitivity level with an iterative search
TX Channel Power	This test measures TX channel output power

## 5.6 WLAN WCN36x0 CLPC calibration

Refer to [Q9] for WLAN closed loop power control calibration for WCN36x0.

## 5.7 Bluetooth signaling production test matrix

Table 5-6 lists the tests that are covered under this document for testing Bluetooth devices in signaling environment.

**Table 5-6 Bluetooth signaling production test matrix**

Rate	Test Name	Description
<b>BR</b>	TRM/CA/01 TX Output Power	Verification of the maximum peak and average RF-output power.
<b>BR</b>	TRM/CA/07 Modulation Characteristics	Verification of the modulation index.
<b>BR</b>	TRM/CA/08 Initial Carrier Frequency Tolerance	Verification of the transmitter carrier frequency accuracy
<b>BR</b>	TRM/CA/09 Carrier Frequency Drift	Verification of the transmitter center frequency drift within a packet.

Rate	Test Name	Description
EDR	TRM/CA/10 EDR Relative Transmit Power	This test ensures the difference in average transmit power during frequency modulated [GFSK] and phase modulated [DPSK] portions of a packet is within an acceptable range.
EDR	TRM/CA/11 EDR Carrier Frequency Stability and Modulation Accuracy	This test verifies the transmitter carrier frequency stability and modulation accuracy.
BR	RCV/CA/01 Sensitivity – single slot packets	The sensitivity is tested using a non-ideal transmitter (one-slot packet).
BR	RCV/CA/02 Sensitivity – multiple slot packets	Multi-slot packets are sent to the EUT at the sensitivity level.
EDR	RCV/CA/07 EDR Sensitivity	Verification of the receiver sensitivity for the 10-4 bit error rate using a non-ideal transmitter.
BLE	TRM-LE/CA/01/02 LE TX Output Power	This test verifies the maximum peak and average power emitted from the EUT.
BLE	TRM-LE/CA/05 LE Modulation DeltaF1	This test verifies that the modulation characteristics (delta F1) of the transmitted signal are correct.
BLE	TRM-LE/CA/05/06/07 LE Modulation Delta F2 and Frequency Offset and Drift	This test verifies that the modulation characteristics (delta F2) of the transmitted signal are correct. This test verifies that the carrier frequency offset and carrier drift of the transmitted signal is within specified limits.
BLE	RCV-LE/CA/01/02 LE Receiver Sensitivity	This test verifies that the receiver sensitivity is within limits for non-ideal signals.

## 5.8 NFC production functional test matrix

Table 5-7 lists the tests that are covered under this document for testing NFC device functionality.

**Table 5-7 NFC production functional tests**

Test	Description
Detect Tag	This test verifies the DUT is able to detect a NFC tag.
Detect Field	This test verifies the DUT is able to detect an externally generated NFC field.
NFCDUT_SelfTest	This test is based on the NFC chip's built in Self Test Function

**Table 5-8 NFC functional test tree nodes**

Test	Applicable to Phone	Applicable to SoC
SetInstrumentConfigFile	Yes	Yes
NFCDUT_SetConfigFile	Yes	Yes
NFCDUT_Instantiate	Yes	Yes
DUT_InitFramework	Yes	Yes
NFCDUT_RunTopLevelScript	No	Yes

Test	Applicable to Phone	Applicable to SoC
NFCDUT_Connect	Yes	Yes
NFCDUT_CoreResetAndInit	Yes	Yes
NFCDUT_PatchFirmwareUsingPatchFile	No	Yes
DialogBox_DetectTAG	Yes	Yes
NFCDUT_DetectTAG	Yes	Yes
NFCDUT_SelfTest	Yes	No
DialogBox_EnableField	Yes	Yes
NFCDUT_DetectField	Yes	Yes
NFCDUT_Disconnect	Yes	Yes
NFCDUT_Shutdown	Yes	Yes

**NOTE:** NFC Test nodes that are not applicable for a particular DUT type will be ignored and just exit true.

## 5.9 NFC reference test matrix

Table 5-9 lists the tests that are covered under this document for testing NFC device functionality.

**Table 5-9 NFC reference tests**

Test	Description
Initiator Test	This test measures the different RF characteristics of the DUT Initiator Tx waveform
InitiatorRx Test	This test verifies the functionality of the DUT Initiator Rx block.
Target Test	This test measures the different RF characteristics of the DUT Target Tx waveform
NFC Resonance Test	This test measures the resonance frequency which the DUT is tuned to.
Detect Tag	This test verifies the DUT is able to detect a NFC tag.
Detect Field	This test verifies the DUT is able to detect an externally generated NFC field.
NFCDUT_SelfTest	This test is based on the NFC chip's built in Self Test Function

**Table 5-10 NFC reference test tree nodes**

Test	Applicable to Phone	Applicable to SoC
SetInstrumentConfigFile	Yes	Yes
NFCDUT_SetConfigFile	Yes	Yes
NFCDUT_Instantiate	Yes	Yes
DUT_InitFramework	Yes	Yes

Test	Applicable to Phone	Applicable to SoC
NFCDUT_RunTopLevelScript	No	Yes
NFCDUT_Connect	Yes	Yes
NFCDUT_CoreResetAndInit	Yes	Yes
NFCDUT_PatchFirmwareUsingPatchFile	No	Yes
NFCDUT_FindResonance	No	Yes
NFCDUT_TuneCapNVM	No	Yes
InitiatorTest	Yes	Yes
InitiatorRxTest	Yes	Yes
TargetTest	Yes	Yes
ResonanceTest	Yes	Yes
DialogBox_DetectTAG	Yes	Yes
NFCDUT_DetectTAG	Yes	Yes
DialogBox_EnableField	Yes	Yes
NFCDUT_DetectField	Yes	Yes
NFCDUT_SelfTest	Yes	No
NFCDUT_Disconnect	Yes	Yes
NFCDUT_Shutdown	Yes	Yes

**NOTE:** NFC Test nodes that are not applicable for a particular DUT type will be ignored and just exit true.

## 6 Chipsets Supported

---

Table 6-1 lists supported Wireless Connectivity chipsets. These chipsets are supported as long as they are mated to Qualcomm applications processor targets with appropriate FTM test support.

**Table 6-1 Supported chipsets**

Chipset	Bluetooth	WLAN	FM	ANT	NFC
WCN2243	Yes	No	Yes	No	No
WCN36x0	Yes	Yes	Yes	Yes	No
AR6003	No	Yes	No	No	No
AR6004	No	Yes	No	No	No
AR6005	No	Yes	No	No	No
AR3002	Yes	No	No	No	No
QCA6174*	Yes	Yes	No	Yes	No
QCA1990	No	No	No	No	Yes

NOTE: QCA6174 and QCA1990 can also run in standalone mode connected directly to PC.

# 7 Setup Configuration

---

Navigate to C:\Qualcomm\ WCN\ProdTests \ConfigFiles\Sample. Based on the type of test box used, copy and rename the appropriate xxx--WCNTesterConfig.xml to WCNTesterConfig.xml under C:\Qualcomm\ WCN\ProdTests \ConfigFiles. Open WCNTesterConfig.xml. Verify the test equipment model types, settings and GPIB addresses match the setup on the test station. Make changes and save as required.

## 7.1 Power supply configuration

1. Instrument configuration file: Test instrument to be utilized to perform power supply tests is indicated by the instrument config file. WCNTesterConfig.xml present in C:\QUALCOMM\WCN\ProdTests\ConfigFiles controls this configuration.
  - a. To select a GPIB based power supply specified in section 2.3.2, check the following XML tags:
    - i ResourceID should be selected as “PowerSupply” on the Item

```
<ResourceIDList>
    <Item>PowerSupply</Item>
</ResourceIDList>
```
    - ii Ensure that the GPIB address mentioned on the config file has the right information. This is specified on <PrimAddress> tag

```

<!--***** Power Supply*****>
<Instrument>
  <RequiredDriverInterfaceList>
    <Item>IPowerSupply</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
    <Item>PowerSupply</Item>
  </ResourceIDList>
  <DeviceOpenTime>At Config File Load</DeviceOpenTime>
  <Model>PS KEITHLEY2303</Model>
  <SimulationMode>At Config File Load</SimulationMode>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>NIGPIB</PartialClassName>
    <IGPIB>
      <BoardID>0</BoardID>
      <PrimAddress>5</PrimAddress>
      <ScndAddress>0</ScndAddress>
    </IGPIB>
  </HardwareInterface>
  <DriverDLL>QC.TILib.PowerSupply.dll</DriverDLL>
</Instrument>

```

Figure 7-1 Power supply section on WCNTesterConfig.xml

## 7.2 Bluetooth non-signaling tester configuration

1. Test instrument to be utilized to perform BT tests is indicated by the instrument config file. WCNTesterConfig.xml present in C:\QUALCOMM\WCN\ProdTests\ConfigFiles controls this configuration
  - a. For BTTestBoxes specified in [Table 2-2](#) check the following XML tags
    - i. ResourceID should be selected as “BTTesterNS” on the Item
 

```

<ResourceIDList>
  <Item>BTTesterNS</Item>
</ResourceIDList>

```
    - ii. LitePoint IQ2010 only: Under OptionalConfigInfoList, check the ServerExeFullLocation Path to ensure that the StartLitepointConnectivityServer.exe is available. Check the installation required for LitePoint in [section 3.3](#).

```

<OptionalConfigInfoList>
<!--Bluetooth address of the waveform file used in RX testing-->
<InfoItem Name="WaveformBluetoothAddress" Value="00,00,88,C0,FF,EE" />
<InfoItem Name="ServerExeFullLocation" Value="C:\Program Files\LitePoint\IQmeasure 1.8.77.2\Bin\Start
<InfoItem Name="IPAddress" Value="127.0.0.1" />
<InfoItem Name="RFPort" Value="left" />
<!--Supported packet types DH1, DH5, 2DH5 and 3DH5-->
<!--path listed below is path on tester PC file system -->
<InfoItem Name="LE1a" Value="C:\Program Files\LitePoint\IQmeasure 1.8.77.2\Mod\1LE.mod" />
<InfoItem Name="EntireARBLocation_DH1" Value="C:\Program Files\LitePoint\IQmeasure 1.8.77.2\Mod\1DH1
<InfoItem Name="EntireARBLocation_DH5" Value="C:\Program Files\LitePoint\IQmeasure 1.8.77.2\Mod\1DH5
<InfoItem Name="EntireARBLocation_2DH5" Value="C:\Program Files\LitePoint\IQmeasure 1.8.77.2\Mod\2DH5
<InfoItem Name="EntireARBLocation_3DH5" Value="C:\Program Files\LitePoint\IQmeasure 1.8.77.2\Mod\3DH5
</OptionalConfigInfoList>
<HardwareInterface>
<HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
<PartialClassName>SWFacade</PartialClassName>
<ISWFacade>
<ConfigInfo></ConfigInfo>
</ISWFacade>

```

Figure 7-2 Bluetooth LitePoint config section in WCNTesterConfig.xml

- iii R&S CMW500 only: Ensure that the GPIB address mentioned in the config file has the right information. This is specified on <PrimAddress> tag.

```

<!--*****Bluetooth R&S CMW500*****-->
<Instrument>
<RequiredDriverInterfaceList>
<Item>IWCNTesterInterface_BT</Item>
</RequiredDriverInterfaceList>
<ResourceIDList>
<!--This resource ID "BTTester" is used in the production test tree-->
<Item>BTTester</Item>
</ResourceIDList>
<DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
<Model>WCNTester_CMW500BT</Model>
<SimulationMode>No</SimulationMode>
<OptionalConfigInfoList>
<!--Bluetooth address of the waveform file used in RX testing-->
<InfoItem Name="WaveformBluetoothAddress" Value="BD,35,9C,BD,35,9C" />
<!--Supported packet types DH1, DH5, 2DH5 and 3DH5-->
<!--path listed below is path on CMW500 file system -->
<InfoItem Name="EntireARBLocation_DH1" Value="D:\Rohde-Schwarz\CMW\Data\waveform\BT_DH1_BD359CBD359C.wv" />
<InfoItem Name="EntireARBLocation_DH5" Value="D:\Rohde-Schwarz\CMW\Data\waveform\BT_DH5_BD359CBD359C.wv" />
<InfoItem Name="EntireARBLocation_2DH5" Value="D:\Rohde-Schwarz\CMW\Data\waveform\BT_2DH5_BD359CBD359C.wv" />
<InfoItem Name="EntireARBLocation_3DH5" Value="D:\Rohde-Schwarz\CMW\Data\waveform\BT_3DH5_BD359CBD359C.wv" />
<InfoItem Name="LE1a" Value="D:\Rohde-Schwarz\CMW\Data\waveform\BT_LE.wv" />
</OptionalConfigInfoList>
<HardwareInterface>
<HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
<PartialClassName>NIGPIB</PartialClassName>
<IGPIB>
<BoardID>0</BoardID>
<PrimAddress>20</PrimAddress>
<ScndAddress>0</ScndAddress>
</IGPIB>
</HardwareInterface>
<DriverDLL>QC.TILib.WirelessConnectivity.dll</DriverDLL>
</Instrument>

```

Figure 7-3 BT R&S CMW500 GPIB settings in WCNTesterConfig.xml

- iv Under OptionalConfigInfoList, check the EntireARBLocation\_xDHx to ensure the location of ARB waveforms. For LitePoint and AgilentN4010A EntireARBLocation\_xDHx is the location on local PC and for CMW it is the location on the test box hard drive.
- v Under OptionalConfigInfoList, check the “WaveformBluetoothAddress” provided by test equipment vendors. Bluetooth address listed in the config file should match the Bluetooth address used for creating the ARB waveform files. This is a requirement for BT Rx testing.

```
<!--Bluetooth address of the waveform file used in RX testing-->
<InfoItem Name="WaveformBluetoothAddress" Value="00,00,00,00,00,08" />
```

**Figure 7-4 Bluetooth waveform address section in WCNTesterConfig.xml**

- vi For BT Low Energy receiver test waveform name and location needs to be listed in OptionalConfigInfoList. Make sure the “InfoItem Name=” matches the one used in QSPR test tree parameter “WaveformKey” for LE Rx Sensitivity. “Value=” is the entire location and filename of the waveform file.
- vii For AgilentN4010A only: Please verify the VISA instrument string or VISA instrument alias in the test PC. Default VISA alias set in config file is “N4010A”.

```
<HardwareInterface>
  <HWInterfaceDLL>QC.TILib.Librar
  <PartialClassName>Visa32</Parti
  <IVisa32>
    <Resource>N4010A</Resource>
  </IVisa32>
</HardwareInterface>
```

**Figure 7-5 BT AgilentN4010A VISA settings in WCNTesterConfig.xml**

- viii For LitePoint IQxel only: Please verify the RF port, host IP address and port number in the config file.

```

<!--*****Litepoint IQxel BT*****>
<Instrument>
  <RequiredDriverInterfaceList>
    <Item>IWCNTesterInterface_BT</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
    <Item>BTTester</Item>
  </ResourceIDList>
  <DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
  <Model>WCNTester_LPIQXe1BT</Model>
  <SimulationMode>No</SimulationMode>
  <OptionalConfigInfoList>
    <!--Bluetooth address of the waveform file used in RX testing-->
    <InfoItem Name="WaveformBluetoothAddress" Value="BD,35,9C,BD,35,9C" />
    <InfoItem Name="RFPort" Value ="left" />
    <!--Supported packet types DH1, DH5, 2DH5 and 3DH5-->
    <InfoItem Name="WaveFilePath" Value ="user/" />
    <InfoItem Name="BT_DH1" Value="QC_DH1.iqvsg" />
    <InfoItem Name="BT_DH5" Value="QC_DH5.iqvsg" />
    <InfoItem Name="BT_2DH5" Value="QC_2DH5.iqvsg" />
    <InfoItem Name="BT_3DH5" Value="QC_3DH5.iqvsg" />
    <InfoItem Name="LE1a" Value="QC_LE1a.iqvsg" />
  </OptionalConfigInfoList>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>TcpClient</PartialClassName>
    <ITcpClient>
      <Host>192.168.100.254</Host>
      <Port>24000</Port>
    </ITcpClient>
  </HardwareInterface>
  <DriverDLL>QC.TILib.WirelessConnectivity.dll</DriverDLL>
</Instrument>

```

**Figure 7-6 BT LitePoint IQxel settings in WCNTesterConfig.xml**

- ix For Anritsu MT8870A only: Please verify the RF port, host IP address and port number in the config file.

```

<!--*****Anritsu 8870A BT*****>
<Instrument>
  <RequiredDriverInterfaceList>
    <Item>IWCNTesterInterface_BT_NS</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
    <Item>BTTesterNS</Item>
  </ResourceIDList>
  <DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
  <Model>WCNTester_AnritsuMT8870ABT</Model>
  <SimulationMode>No</SimulationMode>
  <OptionalConfigInfoList>
    <!--Bluetooth address of the waveform file used in RX testing-->
    <InfoItem Name="WaveformBluetoothAddress" Value="00,00,6B,C6,96,7E" />
    <InfoItem Name="RFPort" Value ="1" />
    <!--Supported packet types DH1, DH5, 2DH5, 3DH5 and LE-->
    <InfoItem Name="WaveFilePath" Value ="user/" />
    <InfoItem Name="BT_DH1" Value="MV887040A_DH1C_Q" />
    <InfoItem Name="BT_DH5" Value="MV887040A_DH5C_Q" />
    <InfoItem Name="BT_2_DH5" Value="MV887040A_2-DH5C_Q" />
    <InfoItem Name="BT_3_DH5" Value="MV887040A_3-DH5C_Q" />
    <InfoItem Name="LE1a" Value="MV887040A_BLE_Q" />
    <InfoItem Name="LT Address" Value="0" />
  </OptionalConfigInfoList>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>TopClient</PartialClassName>
    <ITcpClient>
      <Host>192.168.1.1</Host>
      <Port>56001</Port>
    </ITcpClient>
  </HardwareInterface>
  <DriverDLL>QC.TILib.WirelessConnectivity.dll</DriverDLL>
</Instrument>

```

Figure 7-7 BT Anritsu MT8870A settings in WCNTesterConfig.xml

## 7.3 WLAN tester configuration (SISO only)

1. Instrument configuration file: Test instrument to be utilized to perform WLAN tests is indicated by the instrument config file. WCNTesterConfig.xml present in C:\QUALCOMM\WCN\ProdTests\ConfigFiles controls this configuration
  - a. For WLANTestBoxes specified on [Table 2-2](#) check the following XML tags.
    - i. ResourceID should be selected as “WLANTester” on the Item
 

```
<ResourceIDList>
                <Item>WLANTester</Item>
              </ResourceIDList>
```
    - ii. LitePoint IQ2010 only: Under LitePoint IQ2010 on OptionalConfigInfoList, check the ServerExeFullLocation Path to ensure that the StartLitepointConnectivityServer.exe is available. Check the installation required for LitePoint on [3.3](#).
    - iii. GPIB based testers only, ensure that the GPIB address mentioned on the config file has the right information. This is specified on <PrimAddress> tag.
    - iv. For LitePoint and CMW500 on OptionalConfigInfoList, check the WaveFilePath to ensure the location of ARB waveforms. For LitePoint WaveformFilePath is the location on local PC and for CMW500 it is the location on the test box hard driver.
    - v. NI PXI5644R only: On OptionalConfigInfoList, check the NIWrapperDLLPath has the correct path information and also ensures that the dll is available at that path. On OptionalConfigInfoList NIWrapperDLLName is the name of the dll provided by NI that is mostly NIDotNetWrappersClassLibrary.dll.
    - vi. Agilent N4010 for WLAN only: Under Agilent N4010A (See [Figure 7-10](#)).
      - (a) "InstrumentVisaString": This string value must be set to identify the Instrument's Visa String. The string could identify a USB, GPIB, or WLAN connection to the N4010A. It is recommended to use a USB connection to the N4010A with the rsrcName value in specified in the “InstrumentVisaString” value field. Default value used in config file is “N4010A”.
      - (b) "UseAutoRange": This item tells the instrument whether or not to use the AutoRange function. The value should be set to either 0 or 1. AutoRange will set the instrument PowerRange, TriggerLevel, MaxPacketLength, and MaxSymbolsUsed parameters which are used on TX measurements. Default value is 0
      - (c) "UseIncreasedDynamicRangeFor11bSpectralMask": This item tells the instrument whether or not to use an increased dynamic range for 802.11b spectral mask measurements. The value should be set to either 0 or 1. Default value is 0.
      - (d) "WaveformSampleRate\_11N\_HT20": This specifies the sample rate of 20 MHz 802.11n waveforms. The default value is 40000000. The units are Hz. If 20 MHz 802.11n waveforms are created with another sample rate, then specify that rate here.
      - (e) "WaveformSampleRate\_11N\_HT40": This specifies the sample rate of 40 MHz 802.11n waveforms. The default value is 80000000. The units are Hz. If 40 MHz

802.11n waveforms are created with another sample rate, then specify that rate here.

- vii For Anritsu 8870A on OptionalConfigInfoList, check the WaveFilePath to ensure the location of ARB waveforms. The WaveFilePath is the location on the test box for Anritsu 8870A. Also make sure that the IP address and port number for tester is properly set in ITcpClient as shown in [Figure 7-12](#).

```
<ResourceIDList>
  <!--This resource ID "WLANTester" is used in the production test tree-->
  <Item>WLANTester</Item>
</ResourceIDList>
<Model>WCNTester_LPIQ2010WLAN</Model>
<OptionalConfigInfoList>
  <InfoItem Name="ServerExeFullLocation" Value="C:\Program Files\LitePoint\IQmeasure 1.8.77.2\Bin\
  <InfoItem Name="IPAddress" Value ="127.0.0.1" />
  <InfoItem Name="RFPort" Value ="left" />
  <InfoItem Name="WaveFilePath" Value ="C:\Program Files\LitePoint\IQmeasure 1.8.77.2\Mod\" />
  <InfoItem Name="RATE_11B_LONG_1_MBPS" Value ="WiFi_DSSS-1.mod" />
  <InfoItem Name="RATE_11B_LONG_9_MBPS" Value ="WiFi_DSSS-9.mod" />
```

Figure 7-8 WLAN LitePoint test box section on WCNTesterConfig.xml

```
<ResourceIDList>
  <!--This resource ID "WLANTester" is used in the production test tree-->
  <Item>WLANTester</Item>
</ResourceIDList>
<DeviceOpenTime>At Get Instrument</DeviceOpenTime>
<Model>WCNTester_CMW500WLAN</Model>
<SimulationMode>No</SimulationMode>
<OptionalConfigInfoList>
  <InfoItem Name="WaveFilePath" Value ="D:\Rohde-Schwarz\CMW\Data\waveform\" />
  <InfoItem Name="RATE_11A_6_MBPS" Value ="WLAN_AG_6Mbps.wv"/>
  <InfoItem Name="RATE_11A_9_MBPS" Value ="WLAN_AG_9Mbps.wv"/>
```

Figure 7-9 R&S CMW WLAN section on WCNTesterConfig.xml

```
<ResourceIDList>
  <!--This resource ID "WLANTester" is used in the production test tree-->
  <Item>WLANTester</Item>
</ResourceIDList>
<Model>WCNTester_AgilentN4010AWLAN</Model>
<OptionalConfigInfoList>
  <InfoItem Name="InstrumentVisaString" Value="N4010A" />
  <InfoItem Name="UseAutoRange" Value ="0" />
  <InfoItem Name="UseIncreasedDynamicRangeFor11bSpectralMask" Value ="0" />
  <InfoItem Name="WaveFilePath" Value ="C:\Qualcomm\WCN\ProdTests\Waveforms\N4010A-waveforms\" />
  <InfoItem Name="WaveformSampleRate_11N_HT20" Value ="40000000" />
  <InfoItem Name="WaveformSampleRate_11N_HT40" Value ="80000000" />
  <InfoItem Name="RATE_11B_LONG_11_MBPS" Value ="11DSSS_CCK_1024B.WF1" />
```

Figure 7-10 Agilent N4010A WLAN section on WCNTesterConfig.xml

```

<!--***** WLAN National Instruments Trident *****-->
<Instrument>
  <ResourceIDList>
    <!--This resource ID "WLANTester" is used in the production test tree-->
    <Item>WLANTester</Item>
  </ResourceIDList>
  <Model>WCNTester_NITridentWLAN</Model>
<OptionalConfigInfoList>
  <InfoItem Name="NIWrapperDLLPath" Value="C:\Program Files\IVI Foundation\IVI\Bin\"
  <InfoItem Name="NIWrapperDLLName" Value ="NIDotNetWrappersClassLibrary.dll" />
</OptionalConfigInfoList>
<HardwareInterface>
  <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
  <PartialClassName>SWFacade</PartialClassName>

```

Figure 7-11 NI PXI5644R WLAN section on WCNTesterConfig.xml

```

- <ResourceIDList>
  <!--This resource ID "WLANTester" is used in the production test tree-->
  <Item>WLANTester</Item>
</ResourceIDList>
<Model>WCNTester_AnritsuMT8870AWLAN</Model>
- <OptionalConfigInfoList>
  <InfoItem Value="1" Name="RFPort"/>
  <InfoItem Value="user/" Name="WaveFilePath"/>
  <InfoItem Value="MV887030A_b_1_1024L" Name="RATE_11B_LONG_1_MBPS"/>
  <InfoItem Value="MV887030A_b_2_1024L" Name="RATE_11B_LONG_2_MBPS"/>
  <InfoItem Value="MV887030A_b_5p5_1024L" Name="RATE_11B_LONG_5_5_MBPS"/>
  <InfoItem Value="MV887030A_b_11_1024L" Name="RATE_11B_LONG_11_MBPS"/>

```

Figure 7-12 OptionalConfigInfoList section for Anritsu MT8870A on WCNTesterConfig.xml

```

- <Instrument>
  - <ResourceIDList>
    <!--This resource ID "WLANTester" is used in the production test tree-->
    <Item>WLANTester</Item>
  </ResourceIDList>
  <Model>WCNTester_AnritsuMT8870AWLAN</Model>
  + <OptionalConfigInfoList>
  - <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>TcpClient</PartialClassName>
    - <ITcpClient>
      <Host>192.168.1.1</Host>
      <Port>56001</Port>
    </ITcpClient>
    </HardwareInterface>
    <DriverDLL>QC.TILib.WirelessConnectivity.dll</DriverDLL>
  </OptionalConfigInfoList>
</Instrument>

```

Figure 7-13 ITcpClient section for Anritsu MT8870A on WCNTesterConfig.xml

## 7.4 WLAN Tester Configuration (MIMO only)

1. Instrument configuration file: Test instrument to be utilized to perform WLAN tests is indicated by the instrument config file. WCNTesterConfig.xml present in C:\QUALCOMM\WCN\ProdTests\ConfigFiles controls this configuration
  - a. For WLANTestBoxes specified on [Table 2-2](#) check the following XML tags
    - i. ResourceID should be selected as “WLANTester” on the Item
 

```
<ResourceIDList>
                <Item>WLANTester</Item>
              </ResourceIDList>
```
    - ii. LitePoint IQxel, make sure IQmeasure\_3.0.6\Bin is in your system path  
For this release it release IQmeasure\_3.0.6 up.
    - iii. For LitePoint on OptionalConfigInfoList, check the WaveFilePath to ensure the location of ARB waveforms. For LitePoint WaveformFilePath is the location on local PC.
    - iv. NI PXI5644R only: On OptionalConfigInfoList, check the NIWrapperDLLPath has the correct path information and also ensures that the dll is available at that path. On OptionalConfigInfoList NIWrapperDLLName is the name of the dll provided by NI that is mostly NIDotNetWrappersClassLibrary.dll

```
<Instrument>
  <ResourceIDList>
    <!--This resource ID "WLANTester" is used in the production test tree-->
    <Item>WLANTester</Item>
  </ResourceIDList>
  <Model>WCNTester_LPIQxelWLAN</Model>
  <OptionalConfigInfoList>
    <InfoItem Name="RFPort" value ="left" />
    <InfoItem Name="waveFilePath" value ="C:\Litepoint\mod\" />
    <InfoItem Name="RATE_11B_LONG_1_MBPS" value ="wiFi_DSSS-1.iqvsg" />
    <InfoItem Name="RATE_11B_LONG_2_MBPS" value ="wiFi_DSSS-2L.iqvsg" />
    <InfoItem Name="RATE_11B_LONG_5_5_MBPS" value ="wiFi_CCK-5_5L.iqvsg" />
    <InfoItem Name="RATE_11B_LONG_11_MBPS" value ="wiFi_CCK-11L.iqvsg" />
    <InfoItem Name="RATE_11B_SHORT_2_MBPS" value ="wiFi_DSSS-2S.iqvsg" />
  </OptionalConfigInfoList>
</Instrument>
```

**Figure 7-14 WLAN LitePoint Test Box section (MIMO only) on WCNTesterConfig.xml**

```

<!--***** WLAN National Instruments Trident *****>
<Instrument>
  <ResourceIDList>
    <!--This resource ID "WLANTester" is used in the production test tree-->
    <Item>WLANTester</Item>
  </ResourceIDList>
  <Model>WCNTester_NITridentWLAN</Model>
<OptionalConfigInfoList>
  <InfoItem Name="NIWrapperDLLPath" Value="C:\Program Files\IVI Foundation\IVI\Bin\
  <InfoItem Name="NIWrapperDLLName" Value = "NIDotNetWrappersClassLibrary.dll" />
</OptionalConfigInfoList>
<HardwareInterface>
  <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
  <PartialClassName>SWFacade</PartialClassName>

```

Figure 7-15 NI PXI5644R WLAN Section (MIMO only) on WCNTesterConfig.xml

## 7.5 FM tester configuration

1. Instrument configuration file: Test instrument to be utilized to perform FM tests is indicated by the instrument config file. WCNTesterConfig.xml present in C:\QUALCOMM\WCN\ProdTests\ConfigFiles controls this configuration.
  - a. For FMTestBoxes specified in Table 2-2 check the following XML tags:
    - i. ResourceID should be selected as “FMTester” on the Item
 

```

<ResourceIDList>
  <Item>FMTester</Item>
</ResourceIDList>

```
    - ii. For LitePoint on OptionalConfigInfoList, check the ServerExeFullLocation path to ensure that the StartLitepointConnectivityServer.exe is available. Check the installation required for LitePoint on 3.3.
    - iii. For LitePoint on OptionalConfigInfoList, check the FmAudioWaveFilePath path to ensure where the .wav audio files (audio from DUT captured with LitePoint AIM module) are to be written. These files are used for FM RX audio measurements.

**NOTE:** Please ensure FmAudioWaveFilePath path is physically available on the local PC.

- iv. For LitePoint on OptionalConfigInfoList, check the FmAudioCaptureSource value. A value of 0 specifies to digitize analog audio with the LitePoint AIM. A value of 1 specifies to capture digital FM audio directly from the DUT. Currently this is only supported on WCN3660. If this tag is omitted, then a default value of 0 is used.
- v. For LitePoint on OptionalConfigInfoList, check the FmAudioCaptureSampleRate value in Hz specifies the sample rate of the LitePoint AIM module. (default = 48000).
- vi. For LitePoint on OptionalConfigInfoList, check the FmExpectedMaxTxPower value to Zero. This affects the gain in the FM VSA. Set this to a value that is guaranteed not to be exceeded at the FM VSA input. Allow some safety margin so that the signal to the ADC in the VSA is never over range. Excessive margin however, may degrade

the TX Audio SNR measurements. The range of valid values is -40 dBm to +10 dBm. (default = 0.0).

- vii For LitePoint on OptionalConfigInfoList, check the FmVsaCaptureDuration. This value in milliseconds sets the capture duration for the FM VSA. This VSA capture is used for all TX RF, TX Demod, and TX Audio measurements. (default = 500).
- viii For LitePoint on OptionalConfigInfoList, check the FmAudioCaptureDuration. This value in milliseconds sets the capture duration for FM RX audio from the DUT. Audio capture is performed with the LitePoint AIM module. (default = 500).

```

<Item>FMTester</Item>
</ResourceIDList>
<DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
<Model>WCNTester_LPIQ2010FM</Model>
<SimulationMode>No</SimulationMode>
<OptionalConfigInfoList>
  <InfoItem Name="ServerExeFullLocation" Value="C:\Program Files\LitePoint\IQmeasure 1.8.77.2\Bin\StartLitePoint
  <InfoItem Name="IPAddress" Value="127.0.0.1" />
  <InfoItem Name="FmExpectedMaxTxPower" Value="0.0" />
  <InfoItem Name="FmVsaCaptureDuration" Value="500" />
  <!--For LitePoint AIM capture set value = 0, For audio capture from WCNSS Audio log packets set value = 1 -->
  <InfoItem Name="FmAudioCaptureSource" Value="1" />
  <InfoItem Name="FmAudioCaptureDuration" Value="500" />
  <InfoItem Name="FmAudioCaptureSampleRate" Value="48000" />
  <InfoItem Name="FmAudioWaveFilePath" Value="C:\Qualcomm\WCN\ProdTests\FMAudioFiles\" />
</OptionalConfigInfoList>
<HardwareInterface>
  <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
  <PartialClassName>SWFacade</PartialClassName>
  <ISWFacade>
    <ConfigInfo></ConfigInfo>

```

Figure 7-16 FM test box section on WCNTesterConfig.xml

## 7.6 Bluetooth signaling tester configuration

1. Test instrument to be utilized to perform BT tests is indicated by the instrument config file. WCNTesterConfig.xml present in C:\QUALCOMM\WCN\ProdTests\ConfigFiles controls this configuration
  - a. For BTTestBoxes specified on 2.3.1 check the following XML tags
    - i ResourceID should be selected as “BTTester” on the Item
 

```

<ResourceIDList>
  <Item>BTTester</Item>
</ResourceIDList>

```
    - ii Sample R&S CBT:

```

<!--*****Bluetooth R&S CBT*****>
<Instrument>
  <RequiredDriverInterfaceList>
    <Item>IWCNTesterInterface_BT_Signaling</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
    <!--This resource ID "BTTesterSignaling" is used in the BT DVT t
    <Item>BTTesterSignaling</Item>
  </ResourceIDList>
  <DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
  <Model>WCNTester_RSCBT</Model>
  <SimulationMode>No</SimulationMode>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>NIGPIB</PartialClassName>
    <IGPIB>
      <BoardID>0</BoardID>
      <PrimAddress>20</PrimAddress>
      <ScndAddress>96</ScndAddress>
    </IGPIB>
  </HardwareInterface>
  <DriverDLL>QC.TILib.WirelessConnectivity.dll</DriverDLL>
</Instrument>

```

Figure 7-17 Sample R&S CBT config section in WCNTesterConfig.xml

iii Sample AnritsuMT8852B:

```

<!--*****Bluetooth Anritsu 8852B*****>
<Instrument>
  <RequiredDriverInterfaceList>
    <Item>IWCNTesterInterface_BT_Signaling</Item>
  </RequiredDriverInterfaceList>
  <ResourceIDList>
    <!--This resource ID "BTTesterSignaling" is used in the BT DVT t
    <Item>BTTesterSignaling</Item>
  </ResourceIDList>
  <DeviceOpenTime>At1stFunctionCall</DeviceOpenTime>
  <Model>WCNTester_AnritsuMT8852B</Model>
  <SimulationMode>No</SimulationMode>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>NIGPIB</PartialClassName>
    <IGPIB>
      <BoardID>0</BoardID>
      <PrimAddress>27</PrimAddress>
      <ScndAddress>96</ScndAddress>
    </IGPIB>
  </HardwareInterface>
  <DriverDLL>QC.TILib.WirelessConnectivity.dll</DriverDLL>
</Instrument>

```

Figure 7-18 AnritsuMT8852B config section in WCNTesterConfig.xml

## 7.7 NFC tester configuration

Sample NFC Tester file is present in C:\Qualcomm\WCN\ProdTests\ConfigFiles\Sample\LP-IQNFC--NFCTesterConfig.xml.

**NOTE:** Please copy and rename the appropriate NFC Tester sample (e.g. LP-IQNFC--NFCTesterConfig.xml) to C:\Qualcomm\WCN\ProdTests\ConfigFiles\NFCTesterConfig.xml before running QSPR NFC reference tree tests.

2. Test instrument to be utilized to perform NFC tests is indicated by the instrument config file. NFCTesterConfig.xml present in C:\QUALCOMM\WCN\ProdTests\ConfigFiles controls this configuration.
  - a. For NFC TestBoxes specified on 2.3.1 check the following XML tags

- i ResourceID should be selected as “NFCTester” on the Item

```
<ResourceIDList>
  <Item>NFCTester</Item>
</ResourceIDList>
```

- ii Sample LitePoint IQNFC config item entry:

```
<!--*****Litepoint IQNFC *****-->
<Instrument>
  <Enabled>true</Enabled>
  <ResourceIDList>
    <Item>NFCTester</Item>
  </ResourceIDList>
  <Model>NFCTester_LPIQNFC</Model>
  <HardwareInterface>
    <HWInterfaceDLL>QC.TILib.LibraryManager.dll</HWInterfaceDLL>
    <PartialClassName>TcpClient</PartialClassName>
    <ITcpClient>
      <Host>127.0.0.1</Host>
      <Port>24000</Port>
    </ITcpClient>
  </HardwareInterface>
  <DriverDLL>QC.TILib.NFCTester.dll</DriverDLL>
</Instrument>
```

Figure 7-19 LitePoint IQNFC config section in NFCTesterConfig.xml

# 8 QSPR Test Trees

The following section contains sample wireless connectivity production test trees.

## 8.1 Bluetooth non-signaling + Bluetooth LE production test tree

Figure 8-1 shows Bluetooth test tree. BT\_xx(TYPE))\_xx(TestMode)\_Reference.xtt test tree is located on the local PC at C:\QUALCOMM\WCN\ProdTests\TestTrees\BT

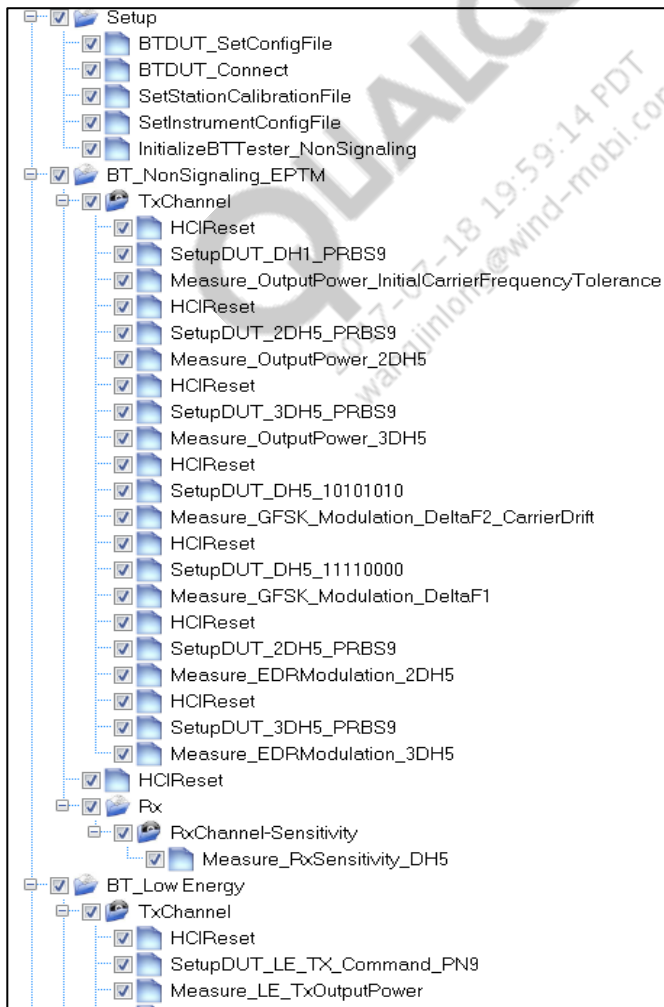


Figure 8-1 Sample Bluetooth production test tree

## 8.2 WLAN production test trees

Figure 8-2 and Figure 8-3 show a WLAN test tree. The WLAN\_xx(chipset)\_Production.xtt test tree is located on the local PC at C:\QUALCOMM\WCN\ProdTests\TestTrees\WLAN

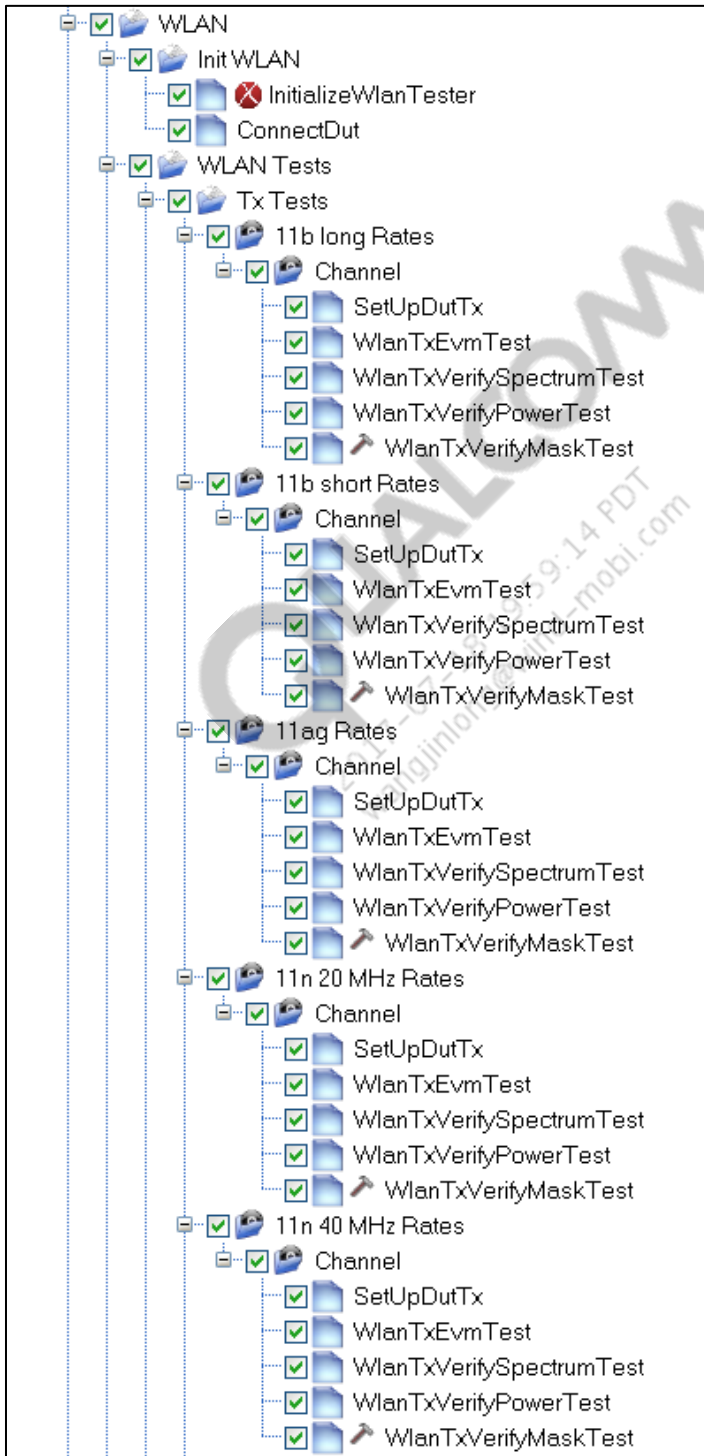


Figure 8-2 Sample WLAN production test tree part I

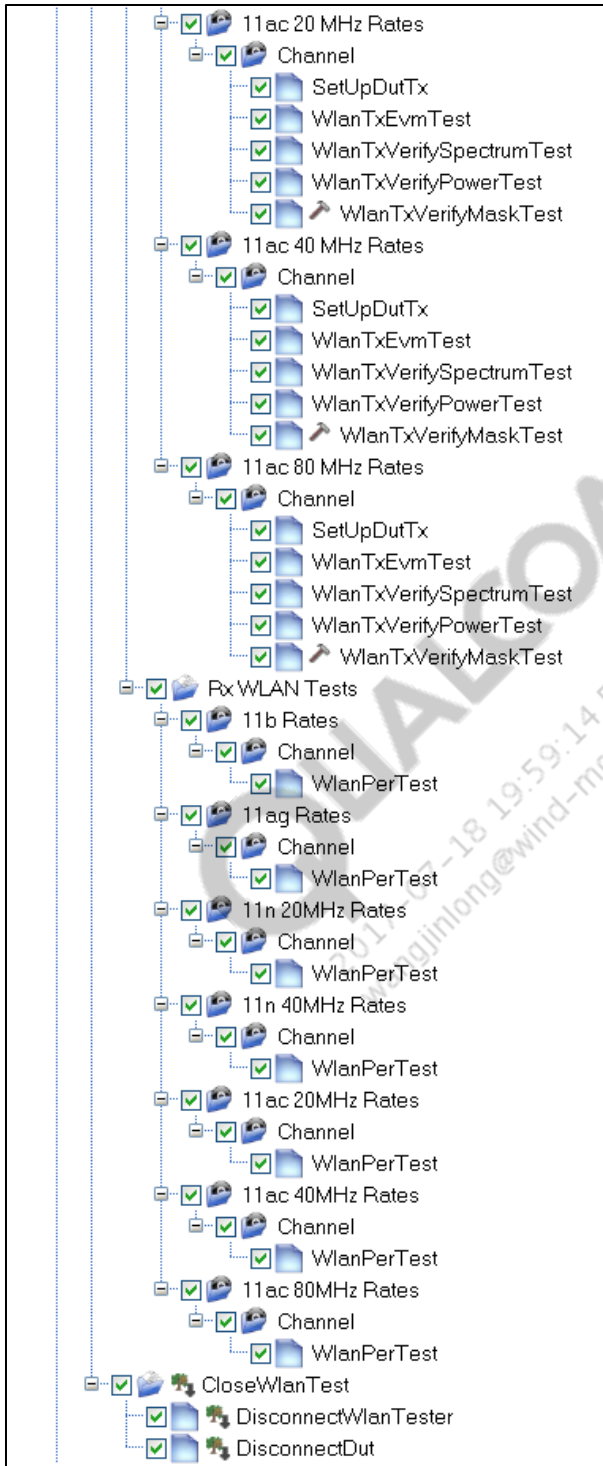


Figure 8-3 Sample WLAN production test tree part II

## 8.3 FM production test trees

Figure 8-4 shows a WLAN test tree. FM\_xx(chipset)\_Production.xtt test tree is located on the local PC at C:\QUALCOMM\WCN\ProdTests\TestTrees\FM

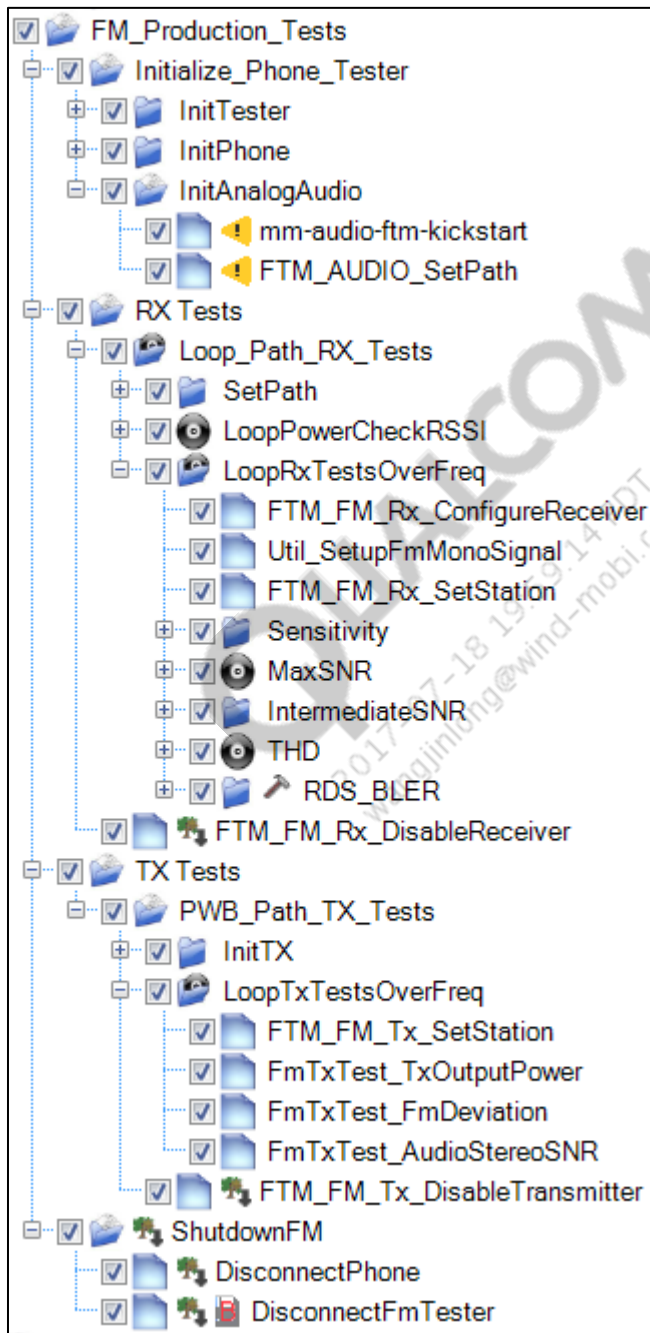


Figure 8-4 Sample FM production test tree

## 8.4 ANT production test tree

Figure 8-5 shows an ANT test tree. ANT\_xx(chipset)\_Production.xtt test tree is located on the local PC at C:\QUALCOMM\WCN\ProdTests\TestTrees\ANT

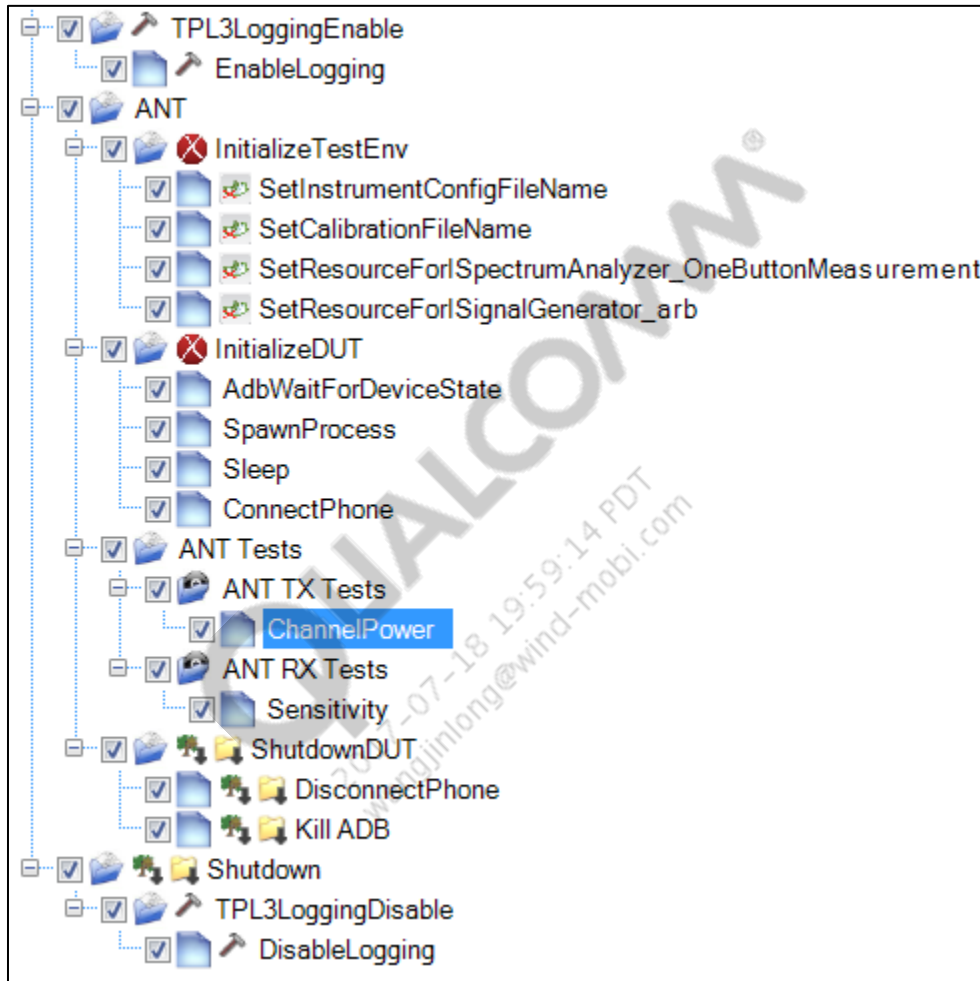


Figure 8-5 Sample ANT production test tree

## 8.5 Bluetooth signaling + Bluetooth LE production test tree

Figure 8-6 shows Bluetooth test tree. BT\_xx(TYPE))\_xx(TestMode)\_Reference.xtt test tree is located on the local PC at C:\QUALCOMM\WCN\ProdTests\TestTrees\BT

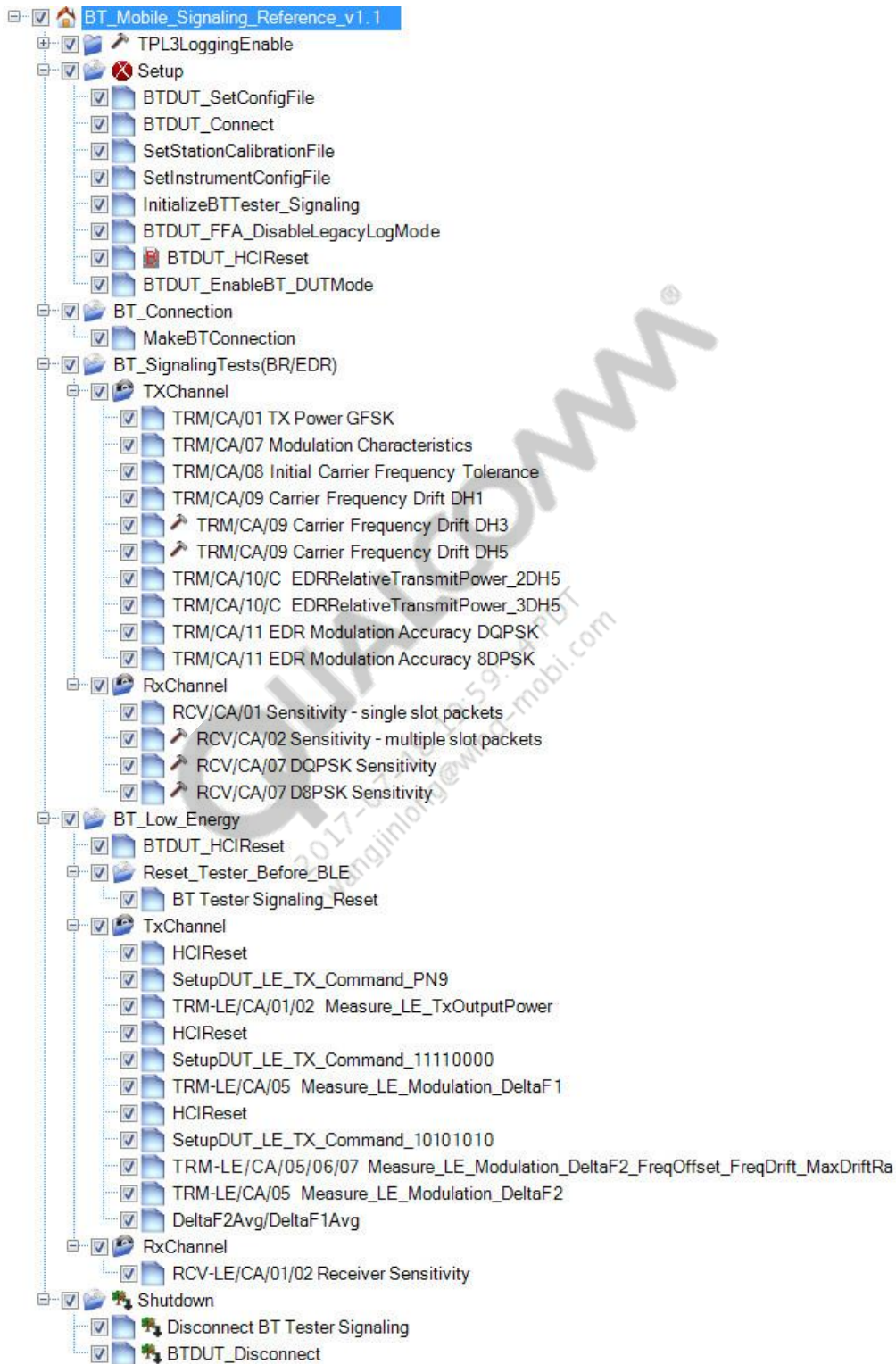


Figure 8-6 Sample Bluetooth signaling test tree

## 8.6 NFC production functional test tree

Figure 8-7 shows the NFC Functional test tree. NFC\_Functional.xtt test tree is located on the local PC at C:\QUALCOMM\WCN\ProdTests\Test Trees\NFC

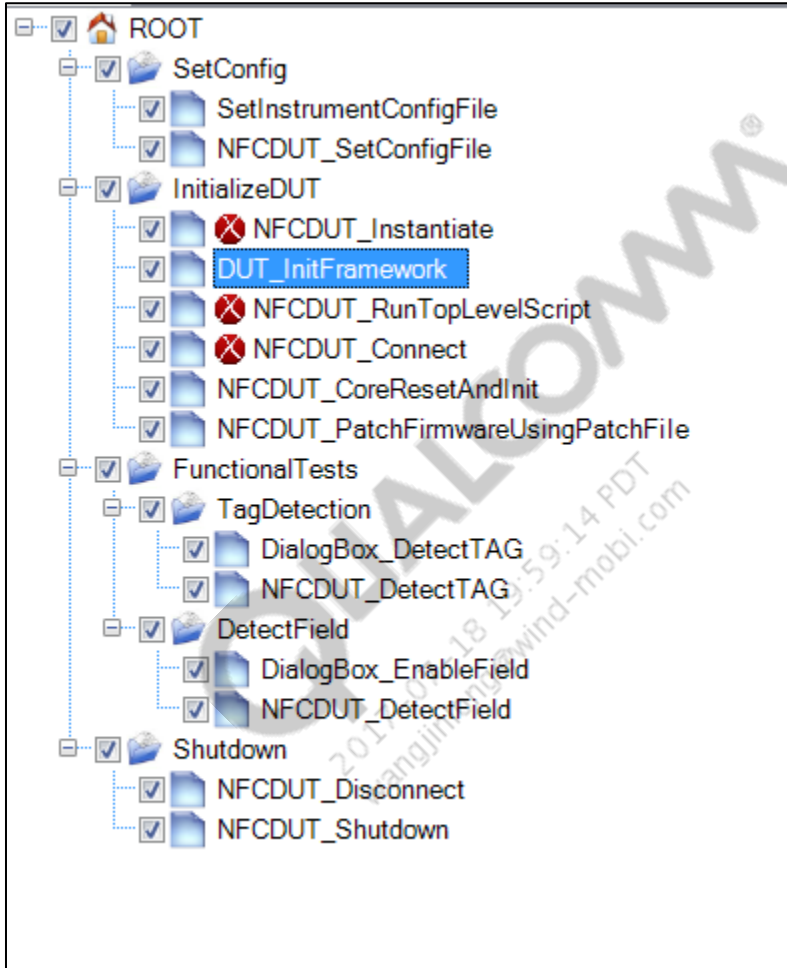
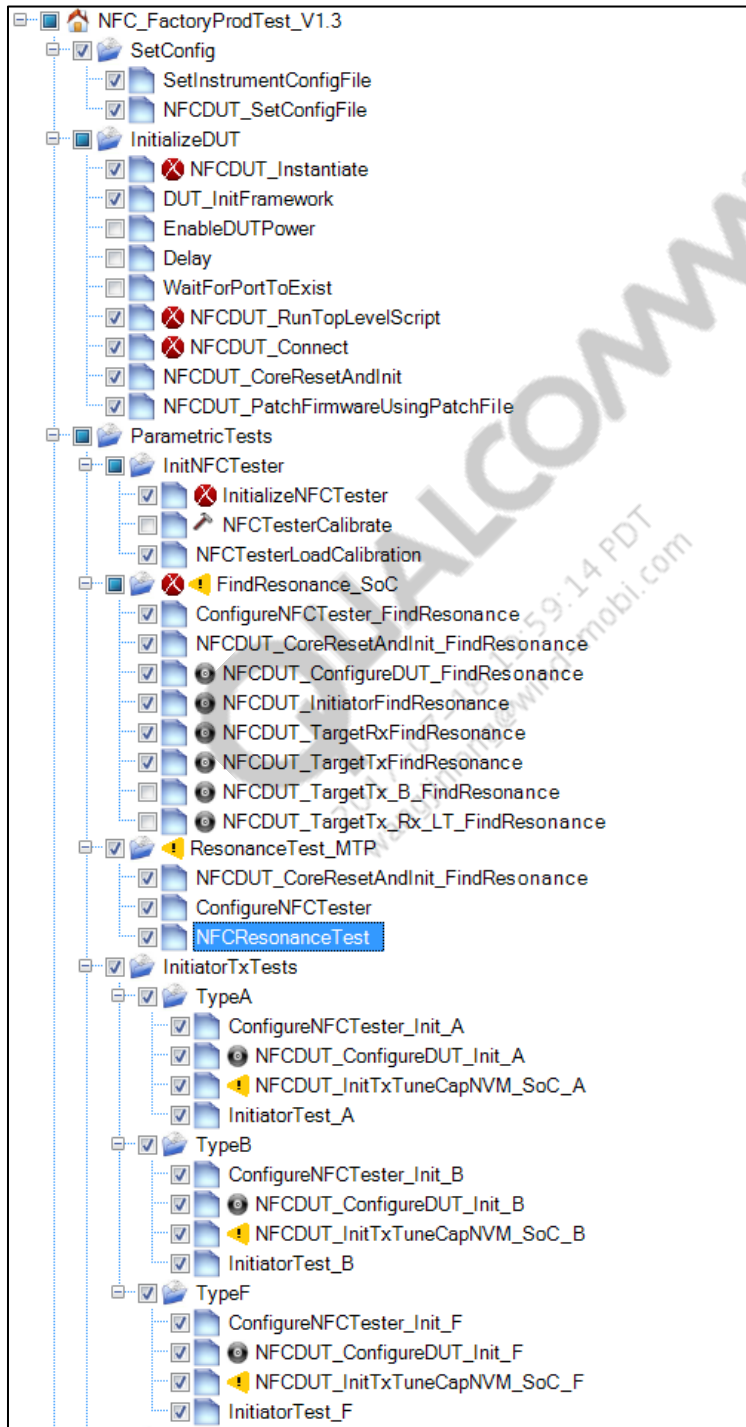


Figure 8-7 NFC Functional test tree

## 8.7 NFC production reference test tree

Figure 8-8 shows the NFC reference test tree. NFC\_Test\_Reference.xtt test tree is located on the local PC at C:\QUALCOMM\WCN\ProdTests\Test Trees\NFC



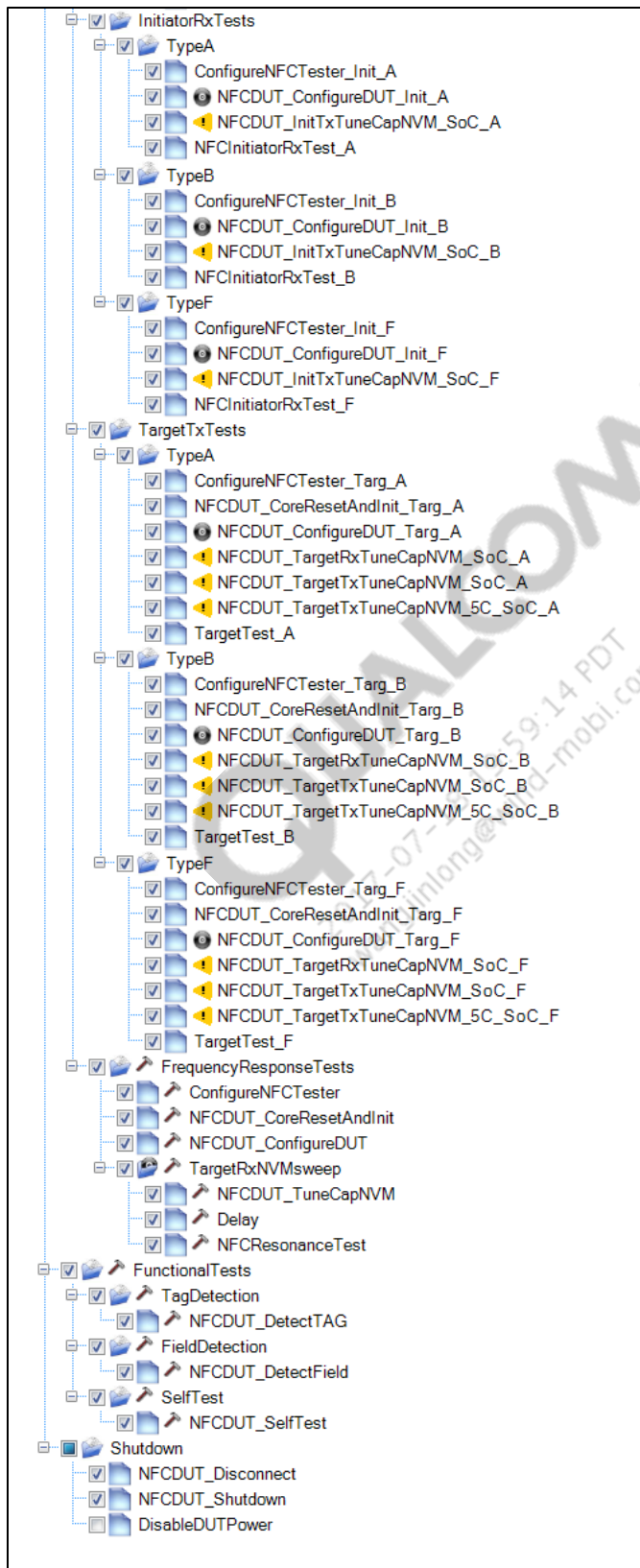


Figure 8-8 Sample NFC Reference Tree

# 9 Test Setup Details

---

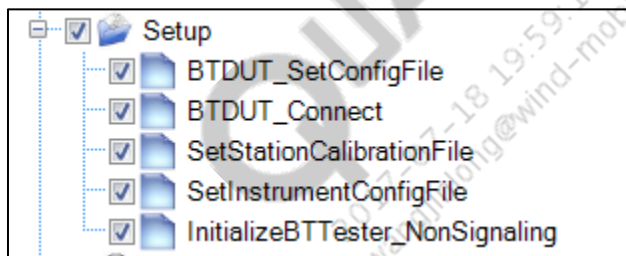
This section lists the initialization tests required for wireless connectivity tests. These tests are “setup tests” that are performed to setup the device under test and test equipment before actual functional tests are performed.

## 9.1 Bluetooth initialization and de-initialization tests

This section applies to Bluetooth and Bluetooth Low energy setup tests that are done before performing core non-signaling functional tests as described in section 10.1.

Sample section of Bluetooth DUT and tester initialization test tree looks like as shown in Figure 9-1. A sample section of Bluetooth shutdown test tree is shown in Figure 9-2.

### 9.1.1 Bluetooth initialization



**Figure 9-1 Sample Bluetooth test initialization**

- BTDUT\_SetBTConfigFile  
This test sets the path of Bluetooth configuration file. Refer to section 9.1.2 for details.
- BTDUT\_Connect  
This test connect to the device under test. HCI reset after successfully connection is optional (This test requires Bluetooth FTM running).
- BTDUT\_LoadNVMFile (only applicable to standalone device, if required by chipset)  
This test sets NVM file location and downloads NVM to the device under test.
- BTDUT\_PatchFirmware (only applicable to standalone device, if required by chipset)  
This test sets firmware patch file location and downloads firmware patch to the device under test.
- BTDUT\_FFA\_DisableLegacyLogMode(only applicable to FFA/MTP based device)  
This test sets disables legacy DIAG log for Bluetooth
- SetStationCalibrationFile  
This test sets the location of station calibration file used for testing

- SetInstrumentConfigFile  
This test sets the tester configuration file path
- InitializeBTTester\_NonSignaling  
This test initializes Bluetooth non-signaling test box based on the ResourceID listed in instrument configuration file.
- InitializeBTTester\_Signaling  
This test initializes Bluetooth signaling test box based on the ResourceID listed in instrument configuration file.

### 9.1.2 Bluetooth configuration file details

Bluetooth configuration section is listed in  
C:\Qualcomm\WCN\ProdTests\ConfigFiles\Sample\BluetoothDUTConfig\_Sample.xml.

**NOTE:** Please copy and rename BluetoothDUTConfig\_Sample.xml to  
C:\Qualcomm\WCN\ProdTests\ConfigFiles\BluetoothDUTConfig.xml before running QSPR  
Bluetooth tests.

QUALCOMM  
2017-07-18 19:59:14 PDT  
wangjintong@wind-mobi.com

```

<BluetoothConfiguration>
  <DUT>
    <DUTInterfaceDLL>C:\Qualcomm\WCN\ProdTests\BIN\QC.CTE.BTTestSuite.dll<
    <OptionalConfigInfoList>
      <!--ConnectionType valid options:
      1. DIAG
      2. SERIAL
      3. USB-->
      <InfoItem Name="ConnectionType" Value="DIAG" />
      <!--Optional config items for MSM/MDM/APQ based targets-->
      <!--TargetType valid options:
      1. MSM/MDM
      2. APQ"-->
      <InfoItem Name="TargetType" Value="MSM/MDM" />
      <!--PhoneComport valid options:
      1. AUTO - QPST auto detect set value
      2. COM8 "example Value="COM8"-->
      <InfoItem Name="PhoneComport" Value="AUTO" />
      <!--useQPST valid options, Yes and No"-->
      <InfoItem Name="useQPST" Value="Yes" />
      <InfoItem Name="PhoneAutoDetectTimeoutMs" Value="5000" />

      <!--Optional config items for SoC based SERIAL targets-->
      <InfoItem Name="Comport" Value="COM9" />
      <InfoItem Name="BaudRate" Value="115200" />
      <!--Optional config items for SoC based USB targets only-->
      <InfoItem Name="USBConnectionInfo" Value="\\.\ATH0" />
    </OptionalConfigInfoList>
  </DUT>
</BluetoothConfiguration>

```

**Figure 9-2 Bluetooth DUT configuration file**

- ConnectionType

This field configures the transport/protocol type for device under test. Valid options:

- DIAG – MSM/MDM or APQ based targets
- SERIAL – UART based devices
- USB – USB based devices

- TargetType

This option is only valid when ConnectionType is **DIAG**. Valid options:

- MSM/MDM – when target type is MSM or MDM
- APQ – when target type is APQ

- PhoneComport

This option is only valid when ConnectionType is **DIAG**. Valid options:

- AUTO – auto detects the first available connected device
- COMx – (example: COM23)

- useQPST

This option is only valid when ConnectionType is **DIAG**. Valid options:

- Yes
- No

- PhoneAutoDetectTimeoutMs

This option is only valid when ConnectionType is **DIAG**. This timeout is used for auto detecting the COM port.

- Comport

This option is only valid when ConnectionType is **SERIAL**.

- COMx (example: COM9)

- BaudRate

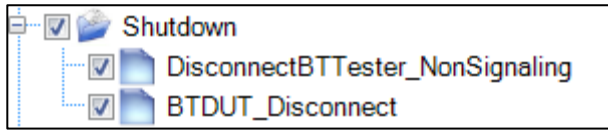
This option is only valid when ConnectionType is **SERIAL**.

- Device and PC support baud rate. Example : 115200

- USBConnectionInfo

This option is only valid when ConnectionType is **USB**.

### 9.1.3 Bluetooth de-initialization



**Figure 9-3 Sample Bluetooth de-initialization**

- DisconnectBTTester\_NonSignaling  
This test disconnects to the non-signaling tester and releases any resources used by the tester
- DisconnectBTTester\_Signaling  
This test disconnects to the signaling tester and releases any resources used by the tester
- BTDUT\_Disconnect  
This test disconnects to the Bluetooth DUT

### 9.1.4 Bluetooth UART/USB test setup using BT DIAG BRIDGE

**NOTE:** This mode requires QPST running

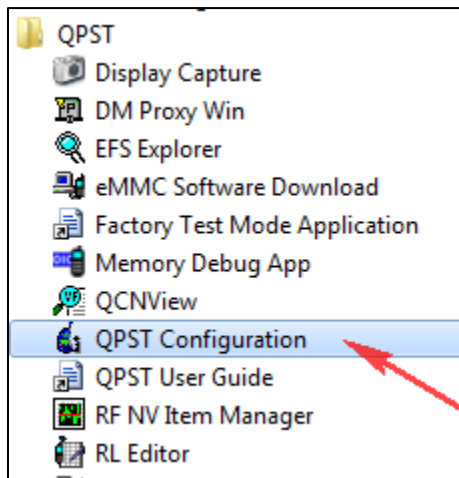
This section summarizes setup details for running QSPR/QRCT tests in UART/ USB mode for standalone devices.

QC.BT.DIAG.BRIDGE.exe application gets installed on PC at C:\Program Files (x86)\Qualcomm\QDART\bin

To set up BT DIAG BRIDGE, use the following sequence.

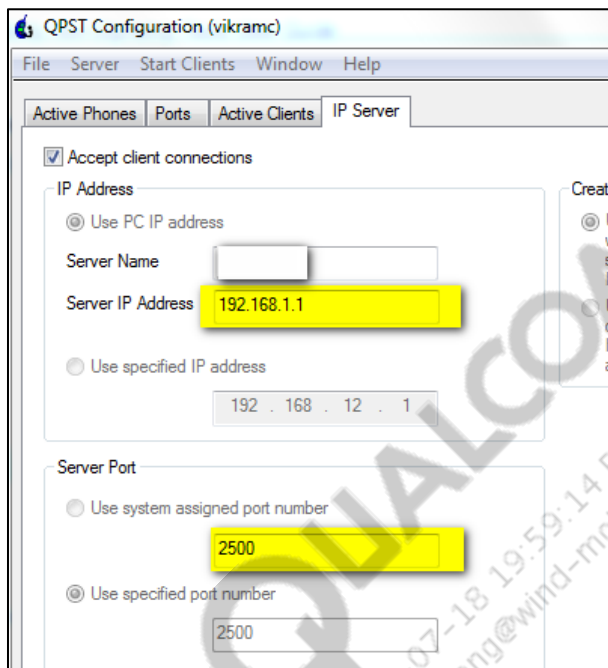
#### QPST configuration

1. Open QPST configuration



**Figure 9-4 BT Diag Bridge - opening QPST**

2. Navigate to “IP Server” tab
3. Under “IP Address” select “Use PC IP Address” to connect to local machine
4. Under Server Port select “Use specified port number”, example 2500
5. Check “Accept Client connections”



**Figure 9-5 BT Diag Bridge - setup QPST IP address and port number**

6. Open a command line
7. Navigate to C:\Program Files (x.86)\Qualcomm\QDART\bin.
8. Run QC.BT.DIAG.BRIDGE.exe with various command line arguments.

**Note:** No spaces are allowed in between ‘=’. Command line arguments are not case sensitive. Refer to the following example, arguments in bold are mandatory.

```
QC.BT.DIAG.BRIDGE.exe IPAddress=192.168.1.1 Port=2500 IOType=SERIAL
ConnectionDetails=COM13 Handshake=none Baudrate=115200 Patch=C:\xxx.img
NVM=c:\xxx.nvm
```

```

Command Prompt - QC.BT.DIAG.BRIDGE.exe IOType=SERIAL ConnectionDetails=COM13
C:\Program Files (x86)\QUALCOMM\QDART\bin>QC.BT.DIAG.BRIDGE.exe IOType=SERIAL Co
nnectionDetails=COM13
Missing QPST server ipaddress, using default IPADDRESS=localhost
Missing QPST server port number, using default port number 2500
Missing baudrate option, using default 115200
Missing handshake mode option, using NONE as default
Missing patch FW details, will not download patch
Missing NUM file details, will not download NUM
Connecting.....
Waiting for QPST connection... Connected to SoC DUT!
echo for status
echo for version
echo for nvItemRead
echo for version
echo for esn
In default

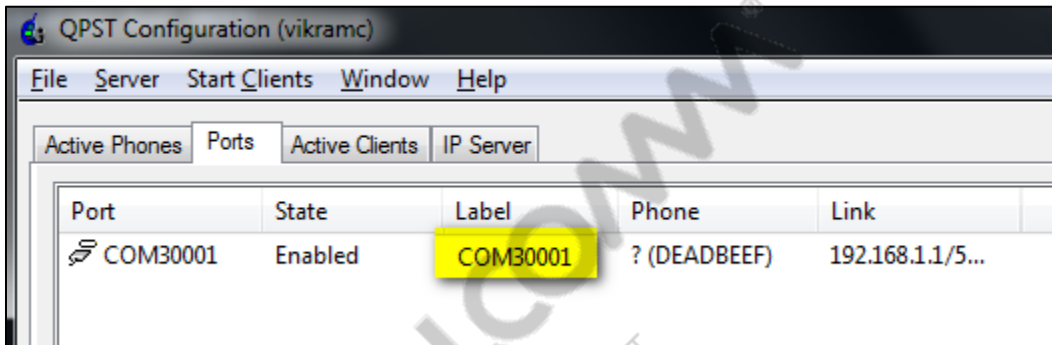
```

**Figure 9-6 Running BT DIAG BRIDGE**

*Command line arguments*

- IPAddress (**optional**, default = localhost)
  - Use same ipaddress listed in QPST as shown in [Figure 9-5](#), QPST is running on the same machine one can use “localhost” too.
- Port (**optional**, default = 2500)
  - Use the same port number listed in QPST as shown in [Figure 9-5](#).
- IOType
  - SERIAL (for UART based devices)
  - USB (for USB based devices)
- ConnectionDetails
  - COMxx (applicable in UART/SERIAL connection type, example COM96)
  - \\.\ATH0 (applicable for USB connection type only)
- Baudrate (**optional**, only applicable in SERIAL mode)
  - 115200 (default)
- Handshaking (**optional**, only applicable in SERIAL mode)
  - NONE (default)
  - XONXOFF
  - RequestToSend
  - RequestToSendXONXOFF

- Patch (**optional**, only applicable in SERIAL mode)
    - Location for patch file on PC
  - NVM (**optional**, only applicable in SERIAL mode)
    - Location of NVM file on PC
9. After QC.BT.DIAG.BRIDGE.exe is successfully started, QSPT will list a COM3000x comport as shown in [Figure 9-7](#).



**Figure 9-7 BT Diag Bridge - QPST comport listing**

10. The comport listed in [Figure 9-7](#) can be used to configure QSPR Bluetooth test or QRCT/QMSL DUT connection.
- Configuring QSPR tests in this mode.
    - Update BluetoothDUTConfig.xml as shown in section [9.1.2](#).
    - Confirm “ConnectionType” in config file is “DIAG.”
    - Confirm “PhoneComport” lists the same comport as shown in [Figure 9-7](#), e.g., “COM30001.”






### 9.1.5 Bluetooth User Defined Transport (UDT) test setup using BT DIAG BRIDGE

This section summarizes setup details for running QSPR tests in UDT mode for standalone devices.

QMSL\_BT\_Transport.dll gets installed on C:\Program Files (x86)\Qualcomm\QDART\BIN

QC.BT.DIAG.BRIDGE.exe application gets installed on C:\Program Files (x86)\Qualcomm\QDART\bin

**NOTE:** For testing DUT connected to remote PC, the two files are in the same location in remote PC.

-  ConnectDutUsingDutType
-  BTDUT\_SetConfigFile
-  BTDUT\_Connect
-  BTDUT\_PatchFirmware
-  BTDUT\_LoadNVMFile

**Figure 9-8 Connect DUT using DUT type and connection options**

Parameter Name	Value
TargetType	2 QLIB_TARGET_TYPE_X86_STANDALONE
resourceID	connectiondetails=com6,iotype=serial,port=2390,ipaddress=127.0.0.1
useQPST	False
userDefinedTrans	QMSL_BT_Transport.dll

**Figure 9-9 Input parameters of ConnectDutUsingDutType**

### Input parameters to use for UDT mode:

#### TargetType

This field configures the target type for device under test. Valid options:

- 0 QLIB\_TARGET\_TYPE\_MSM\_MDM– MSM/MDM based targets
- 1 QLIB\_TARGET\_TYPE\_APQ– APQ based devices
- 2 QLIB\_TARGET\_TYPE\_X86\_STANDALONE – Standalone/SoC based devices

#### resourceID

This field configures the unique target resource ID for different DUTs.

- For MSM/MDM and APQ based devices, it can be AUTO or exact comport of the device. AUTO mode will pick up first device in QPST list
- For Standalone devices, its resourceID is formed by several parameters. As an example: **iotype=serial,connectiondetails=com8,port=2390,ipaddress=127.0.0.1**
  - iotype:
    - serial – UART based devices
    - usb – USB based devices
  - connectiondetails:
    - comx – This option is the physical comport that DUT connects to the PC, it is only valid when iotype is SERIAL
    - \\.\ATHx – This option is the physical usb port that DUT connects to the PC, it is only valid when iotype is USB
  - port:
    - TCP IP port of the PC or remote PC (if applicable).
  - ipaddress:
    - TCP IP address of the local PC, ipaddress. If DUT is connected to the same PC one can either ignore this or set it 127.0.0.1.

For running in remote PC, TCP IP address cannot be omitted and is required to provide IP address of the remote PC.

**NOTE:** No spaces are allowed in the resourceID. Command line arguments are not case sensitive. Refer example, arguments in bold are mandatory and each argument is separated by coma.

### UseQPST

- True means DUT connection uses QPST, QPST installer – Refer to [Q6] in [Qualcomm documents](#) of section 1.4.1
- False means DUT connection uses UDT as the dll is defined below.

### userDefinedTransport

- User Defined transport dll name; used only on Standalone configuration.

## 9.1.6 Additional configuration for remote DUT using User Defined Transport and BT DIAG BRIDGE on remote PC.

- BT DIAG BRIDGE must be executed in remote PC before running QSPR on local machine.
- Command line for BT DIAG BRIDGE must add one additional parameter “**udt=yes, iotype=serial,connectiondetails=com8,port=2390,ipaddress=127.0.0.1**” before other command line arguments. As shown in [Figure 9-10](#).

```

C:\Program Files (x86)\Qualcomm\QDART\bin>QC.BT.DIAG.BRIDGE.exe udt=yes,iotype=serial,connectiondetails=com8,port=2390,ipaddress=10.64.240.222
Missing baudrate option, using default 115200
Missing handshake mode option, using NONE as default
Missing patch FW details, will not download patch
Missing NUM file details, will not download NUM
connecting.....
waiting for client connection... Connected to SoC DUT!

```

Figure 9-10 Remote PC connects to DUT using UDT

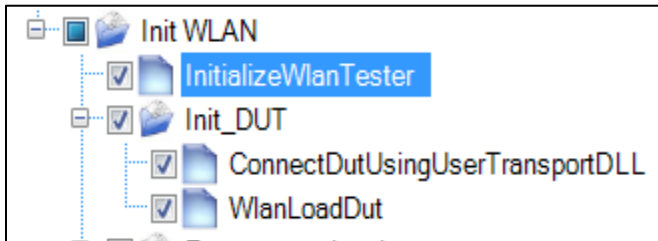
## 9.2 WLAN setup and initialization tests

There are three initialization tests that need to be executed before running WLAN Production Tests described in section 10.1.12.

These three tests are grouped under the folder “Init WLAN” as shown in [Figure 9-11](#) and de-initialization is shown in [Figure 9-12](#).

### 9.2.1 WLAN initialization



**Figure 9-11 Sample WLAN test initialization****Figure 9-12 Sample WLAN test initialization with user Transport DLL**

- InitializeWlanTester
  - This test makes the connection with the Wlan Tester and initializes the Wlan Tester specified by “WlanTesterResourceID”
  - WlanTesterResourceID must match the item value described in Section 7.3.  
<Item>WLANTester</Item>

**Table 9-1 Initialize Wlan tester parameters**

Parameter Name	Value	Unit	Description
testerConfigFileName	C:\Qualcomm\WCN\ProdTests\ ConfigFiles\WCNTesterConfig.xml		Full path name of configuration file
stationCalFileName	C:\Qualcomm\WCN\ProdTests\ StationCal\ QTA_CalDataFile.xml		Full path name of station calibration file
WlanTesterResoureID	WLANTester		WLAN Tester resource name as it appears in config file
TxStationCalPathName	WCD		Tx Station cal path name as it appears in station cal file
RxStationCalPathName	WCD		Rx Station cal path name as it appears in station cal file

- ConnectDut
  - This test makes the connection to the DUT specified by “wlanId” through COM port via QPST.
  - DUT must be set up for WLAN FTM communication before this test can run

**Table 9-2 Connect DUT parameters**

Parameter Name	Value	Unit	Description
Type	0 QLIB_TARGET_TYPE_MSM_MDM		Select target type MSM or APQ
wlanId	3680		WLAN ID.
comPort	AUTO		Com port number or “AUTO”
useQPST	True		True: Use QPST, False: talk directly to com port

**Table 9-3 Connect DUT with user transport DLL parameters**

Parameter Name	Value	Unit	Description
Type	1 QLIB_TARGET_TYPE_APQ		Select target type MSM or APQ
wlanId	6174		WLAN ID.
comPort	127.0.0.1		IP or 127.0.0.1 for user TransportDLL
userTransportDll	QMSL_WLAN_Transport.dll		User Defined Transport DLL name with folder path, or dll name only with default path at where QMSL_MSVC DLL is located.

**Table 9-4 WLAN DUT load**

Parameter Name	Value	Unit	Description
DevDLLName	QC6174		Device dll name (less than 30 characters)
refDesign	QC6174		refDesign
eepFName	C:\QUALCOMM\WCN\ProdTests\ refDesigns\BoardData\ fakeBoardData_AR6320.bin		eep file name with path (less than 250 characters)
iNVMemOption	3 DataOtp		NV memory Option
ssid	0x3e		Device ID

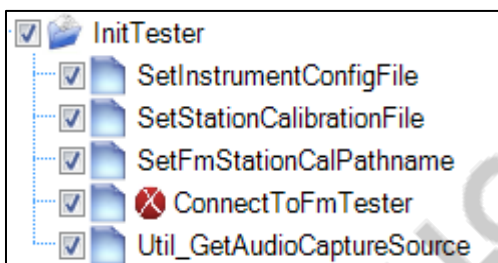
## 9.2.2 WLAN de-initialization

**Figure 9-13 Sample WLAN test de-initialization**

- DisconnectWlanTester  
This test disconnects to the tester and releases any resources used by the tester.
- DisconnectPhone  
This test disconnects to the DUT and closes QPST server.

## 9.3 FM setup and initialization tests

### 9.3.1 FM initialization



**Figure 9-14 Sample FM tester initialization**

- SetInstrumentConfigFile  
This test sets the FM tester configuration file path.
- SetStationCalibrationFile  
This test sets the location of station calibration file used for FM testing.
- SetFmStationCalPathname  
This sets the default name of station calibration path name specified in station calibration path loss file to be used for FM tests. This may be reset later on in the test tree.
- ConnectToFmTester  
This test makes the connection with the FMTester and initialize the FM tester specified by the “FMResourceID”. The FMTesterResourceID must match the <Item> value specified by <ResourceIDList> described in section 7.4.

### 9.3.2 FM RX initialization

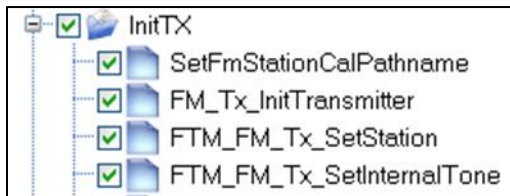


**Figure 9-15 Sample FM RX initialization**

- ConnectPhone
  - This test connects to the phone DIAG port. The COM port can be specified or auto detection can be used.
- FM\_Rx\_InitReceiver
  - This test disables FM TX, if it was enabled. It then calls FTM command `FTM_FM_RX_ENABLE_RECEIVER` with input parameters RadioBand, Emphasis, ChSpacing, RdsStd, UserDefinedBandFreqMin, and UserDefinedBandFreqMax. If this command completes successfully, it then waits some delay (see parameter `DelayAfterEnable`) and then exits.
  - If the Enable command returns an error status, the test then tries FTM command `FTM_FM_RX_CONFIGURE_RECEIVER` with the same 6 parameters. This is done because on WCN2243 platforms, the Enable command can only be done once. Subsequent calls of the Enable command do no harm, but they return a bad status. So in order to determine if the FM receiver is ready for test, the Configure command is called after bad status is returned by the Enable command.
- FTM\_FM\_Rx\_ConfigureReceiver
  - This calls FTM command `FTM_FM_RX_CONFIGURE_RECEIVER`.
- FTM\_FM\_Rx\_SetAntenna
  - This calls FTM command `FTM_FM_RX_SET_ANTENNA` to select either the headset FM antenna or the PWB FM antenna.
- FTM\_FM\_Rx\_SetStation
  - This calls FTM command `FTM_FM_RX_SET_STATION` to set an initial frequency.
- FTM\_FM\_Rx\_SetSoftMuteMode
  - This calls FTM command `FTM_FM_RX_SET_SOFTMUTE` to disable soft muting. Soft mute is disabled because it makes it more difficult to perform accurate audio measurements at low RF signal levels.
- FTM\_FM\_AUDIO\_SetPath
  - This calls FTM command `FTM_AUDIO_SET_PATH` with a path value that directs FM RX audio to the headset port.

### 9.3.3 FM TX initialization

This folder contains items to configure the DUT and tester for testing FM TX on the PWB antenna port.



**Figure 9-16 Sample FM TX initialization**

- SetFmStationCalPathname
  - This test sets the name of station calibration path name specified in station calibration path loss file to be used for FM TX tests
- FM\_Tx\_InitTransmitter
  - This test disables FM RX, if it was enabled. It then calls FTM command FTM\_FM\_TX\_ENABLE\_TRANSMITTER with input parameters RadioBand, Emphasis, ChSpacing, RdsStd, UserDefinedBandFreqMin, and UserDefinedBandFreqMax. If this command completes successfully it waits some delay (see parameter DelayAfterEnable) and exits
  - If the Enable command returns an error status, the test then tries FTM command FTM\_FM\_TX\_CONFIGURE\_TRANSMITTER with the same 6 parameters. This is done because on WCN2243 platforms the Enable command can only be done once. Subsequent calls of the Enable command do no harm but they return a bad status. In order to determine if the FM transmitter is ready for test, the Configure command is called after bad status is returned by the Enable command
- FTM\_FM\_Tx\_SetStation
  - This calls FTM command FTM\_FM\_TX\_SET\_STATION to set an initial frequency
- FTM\_FM\_Tx\_SetInternalTone
  - This calls FTM command FTM\_FM\_TX\_SET\_INTERNAL\_TONE to select an audio tone for modulating TX. The tone used is 1 kHz at full scale (0 dBFS) with Left=Right

### 9.3.4 FM de-initialization



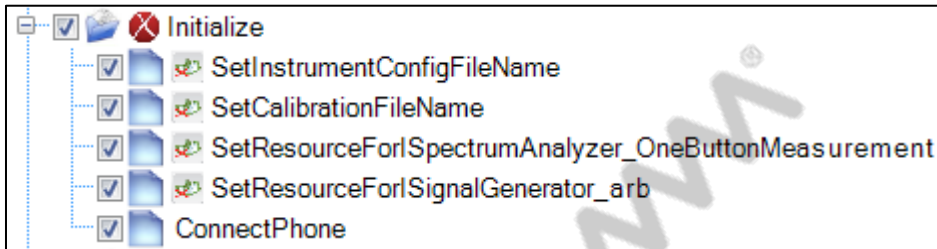
**Figure 9-17 Sample FM de-initialization**

- DisconnectPhone
  - This test disconnects to the Bluetooth DUT and closes QPST server
- DisconnectFmTester

- This test disconnects to the tester and releases any resources used by the tester

## 9.4 ANT setup and initialization tests

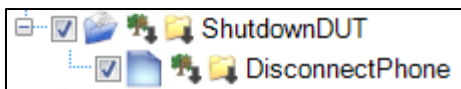
### 9.4.1 ANT initialization



**Figure 9-18 Sample ANT test initialization**

- SetInstrumentConfigFileName  
This test sets the ANT tester configuration file path
- SetCalibrationFileName  
This test sets the location of station calibration file used for ANT testing
- SetResourceForISpectrumAnalyzer\_OneButtonMeasurement  
This test initializes the spectrum analyzer specified by the parameter “ResourceID”.
- SetResourceForISignalGenerator\_arb  
This test initializes the signal generator specified by the parameter “ResourceID”.
- ConnectPhone  
This test connects to the device under test.

### 9.4.2 ANT De-initialization



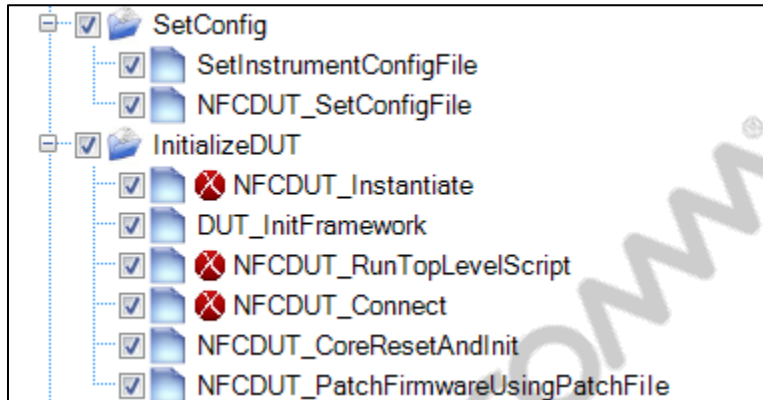
**Figure 9-19 Sample ANT test de-initialization**

- DisconnectPhone  
This test disconnects from the DUT and closes QPST server

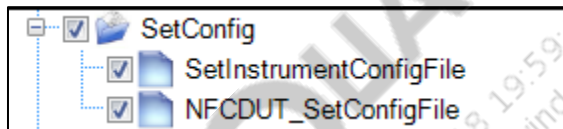
## 9.5 NFC initialization and deinitialization

This section describes the setup and initialization tests that need to be run before running any functional tests.

This is a screen shot of the initialization section of the tree.



### 9.5.1 NFC setup config



- SetInstrumentConfigFile
  - This test sets the path for the NFC tester/equipment config file and loads it. NFC testers (if applicable) and power supply (if applicable) will be set by this config file.
- NFCDUT\_SetConfigFile
  - This test sets the path for the DUT configuration file and loads it. Config items related to the DUT type (SoC/phone) and connection related parameters

### 9.5.2 NFC DUT configuration file details

NFC configuration file is installed at the following location  
 C:\Qualcomm\WCN\ProdTests\ConfigFiles\Sample\NFCDUTConfig.xml.

Copy NFCDUTConfig.xml to C:\Qualcomm\WCN\ProdTests\ConfigFiles\NFCDUTConfig.xml before running QSPR NFC tests.

```

<NFCConfiguration>
  <DUT>
    <DUTInterfaceDLL>C:\Qualcomm\WCN\ProdTests\BIN\QC.CTE.NFCTestSuite.dll</DUTInterfaceDLL>
    <OptionalConfigInfoList>
      <!--ConnectionType valid options: Use DIAG for phone/MTP and SERIAL for Standalone/SoC
      1. DIAG
      2. SERIAL-->
      <InfoItem Name="ConnectionType" Value="SERIAL" />
      <!--Optional config items for MSM/MDM/APQ based targets-->
      <!--TargetType valid options:
      1. MSM/MDM
      2. APQ-->
      <InfoItem Name="TargetType" Value="MSM/MDM" />

      <!--PhoneComport valid options:
      1. AUTO - QPST auto detect set value
      2. COM8 "example Value="COM8"-->
      <InfoItem Name="PhoneComport" Value="AUTO" />
      <!--useQPST valid options, Yes and No-->
      <InfoItem Name="useQPST" Value="Yes" />
      <InfoItem Name="PhoneAutoDetectTimeoutMs" Value="5000" />

      <!--Optional config items for SoC based SERIAL targets-->
      <InfoItem Name="Comport" Value="COM37" />
      <InfoItem Name="BaudRate" Value="57600" />
      <InfoItem Name="Slave1_Address_NCI" Value="2C" />
      <InfoItem Name="Slave0_Address_TopLevel" Value="0E" />
    </OptionalConfigInfoList>
  </DUT>
</NFCConfiguration>

```

**Figure 9-20 NFC DUT Configuration file**

- **ConnectionType**

This field configures the transport/protocol type for device under test. Valid options:

  - DIAG – MSM/MDM or APQ based targets
  - SERIAL – UART based devices (standalone EVK/EVB etc)
- **TargetType (Phone type DUT)**

This option is only valid when ConnectionType is **DIAG**. Valid options:

  - MSM/MDM – when target type is MSM or MDM
  - APQ – when target type is APQ
- **PhoneComport (Phone type DUT)**

This option is only valid when ConnectionType is **DIAG**. Valid options:

  - AUTO – auto detects the first available connected device
  - COMx – (example: COM23)
- **useQPST**

This option is only valid when ConnectionType is **DIAG**. Valid options:

- Yes
- No
- PhoneAutoDetectTimeoutMs
 

This option is only valid when ConnectionType is **DIAG**. This timeout is used for auto detecting the COM port.
- Comport (SoC only)
 

This option is only valid when ConnectionType is **SERIAL**. This port will be used to open the NFC port on the device.

  - COMx (example: COM9)
- BaudRate
 

This option is only valid when ConnectionType is **SERIAL**.

  - Device and PC support baud rate. Example : 57600
- Slave1\_Address\_NCI
 

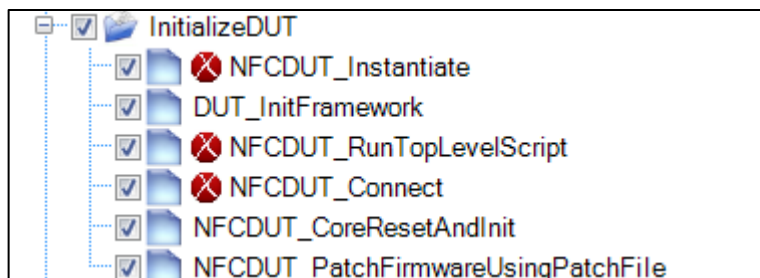
This option is only valid when ConnectionType is **SERIAL**. This is the I2C slave address (in hex) used to send the NCI commands.

  - Device and PC support baud rate. Example : 2C
- Slave0\_Address\_TopLevel
 

This option is only valid when ConnectionType is **SERIAL**. This is the I2C slave address in hex used for I2C writes and for bring up script.

  - Device and PC support baud rate. Example : 0E

### 9.5.3 NFC DUT Initialization



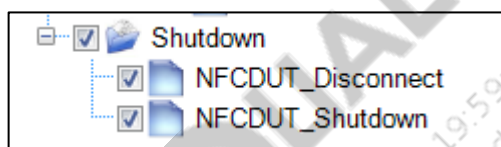
- NFCDUT\_Instantiate
 

This test instantiates the DUT type as set in the config file.
- DUT\_InitFramework
 

This test starts up the test framework. This test also sets the path for the folder that contains installed TCL files/binaries.

- NFGDUT\_RunTopLevelScript (only applicable to standalone device, if required by chipset)  
This test runs the initialization TCL script to start up the development board.
- NFGDUT\_Connect  
This test connect to the device under test using the connection details specified in the NFC DUT config file.
- NFGDUT\_CoreResetAndInit  
This test sends a NFC core reset command followed by a core init command. For phone type DUT, NFC FTM daemon needs to be running for this test.
- NFGDUT\_PatchFirmwareUsingPatchFile (only applicable to standalone device, if required by chipset)  
This test sets firmware patch file location and downloads firmware patch to the device under test.

#### 9.5.4 NFC de-initialization



- NFGDUT\_Disconnect  
This test disconnects the DUT and releases all the COM ports used by the test.
- NFGDUT\_Shutdown  
This test releases all the resources used by the test suite framework.

# 10 Wireless Connectivity Test Description

## 10.1 Bluetooth non-signaling production test description

This section summarizes limits and parameters captured for Bluetooth RF functional tests in operations. All the productions Bluetooth tests are performed at three channels 0, 39, 78.

### 10.1.1 Set Bluetooth ChipID

This test is performed for configuring BT chip ID.

[Table 10-1](#) and [Table 10-2](#) list the input and output parameters for this test.

Test Name: BTDUT\_SetBluetoothChipID

Test Condition: None

**Table 10-1 Set Bluetooth ChipID input parameters**

Parameter Name	Value	Unit	Description
BluetoothChipID	0		Bluetooth Chip ID = 0, for WCN2243 and WCN36xx , = 3002, for AR3002 chipset

**Table 10-2 Set Bluetooth ChipID output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage			NA	error messages

### 10.1.2 BTDUT\_FFA\_DisableLegacyLogMode

This test is performed for supporting Bluetooth legacy log.

[Table 10-3](#) and [Table 10-4](#) list the input and output parameters for this test.

Test Name: BTDUT\_FFA\_DisableLegacyLogMode

Test Condition: None

**Table 10-3 BTDUT\_FFA\_DisableLegacyLogMode input parameters**

Parameter Name	Value	Unit	Description
disableLegacyLogMode	True		Disable legacy log mode = true, Enable legacy log mode = false

**Table 10-4** BTDUT\_FFA\_DisableLegacyLogMode output parameters

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage			NA	error messages

### 10.1.3 Setup DUT for GFSK and EDR transmit tests

This test is performed for configuring device under test for GFSK and EDR transmit tests.

[Table 10-5](#) and [Table 10-6](#) list the input and output parameters for this test.

Test Name: BTDUT\_PROD\_TEST\_SUBCOMMAND\_TEST\_TX\_BURST

Test Condition: Normal

**Table 10-5** BTDUT\_PROD\_TEST\_SUBCOMMAND\_TEST\_TX\_BURST input parameters

Parameter Name	Value	Unit	Description
TxChannel	0	NA	Channel range (0-78)
PacketType	BT_DH1	NA	Bluetooth packet type
TransmitPattern	PSEUDO_RANDOM	NA	Bluetooth transmit pattern
PowerLevel	9	NA	Bluetooth Power Level (WCN36x0/WCN2243 = 0-9, AR3002 = 0-7)
BluetoothAddress	BD,35,9C,BD,35,9C	NA	Bluetooth Address, comma separated, example = BD,35,9C,BD,35,9C

**Table 10-6** BTDUT\_PROD\_TEST\_SUBCOMMAND\_TEST\_TX\_BURST output parameters

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage			NA	error messages

### 10.1.4 Setup DUT for LE transmit tests

This test is performed for configuring device under test for LE transmit tests. [Table 10-7](#) and [Table 10-8](#) list the input and output parameters for this test.

Test Name: BTDUT\_LE\_TX\_Command

Test Condition: Normal

**Table 10-7** BTDUT\_LE\_TX\_Command input parameters

Parameter Name	Value	Unit	Description
TxChannel	0	NA	Tx Channel (Range - 0-78, even only)
PayloadLength	37	Byte(s)	Payload length
TransmitPattern	PN_9	NA	TransmitPattern

**Table 10-8 BTDUT\_LE\_TX\_Command output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				Error message

### 10.1.5 Measure Tx output power and initial carrier frequency tolerance

This test verifies and measures transmitter power and carrier frequency tolerance. [Table 10-9](#) and [Table 10-10](#) list the input and output parameters for this test.

Test Name: Measure\_OutputPower\_InitialCarrierFrequencyTolerance

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-9 Measure Tx output power and initial carrier frequency tolerance input parameters**

Parameter name	Value	Unit	Description
TxChannel	78	NA	TX channel (0-78)
PacketType	BT_DH1	NA	Bluetooth Packet Type

**Table 10-10 Measure output power and initial carrier frequency tolerance output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
Power	-4	13	dBm	Transmit power in dBm
FrequencyDeviation	-75	75	KHz	Frequency deviation KHz

### 10.1.6 Measure GFSK modulation DeltaF2 and CarrierDrift

This test verifies and measures transmitter delta F2 and carrier frequency drift. [Table 10-11](#) and [Table 10-12](#) list the input and output parameters for this test.

Test Name: Measure\_GFSK\_Modulation\_DeltaF2\_CarrierDrift

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-11 Measure GFSK modulation DeltaF2 and CarrierDrift input parameters**

Parameter Name	Value	Unit	Description
TxChannel	78	NA	Bluetooth Tx Channel (0-78)

**Table 10-12 Measure GFSK modulation DeltaF2 and CarrierDrift output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
DeltaF2Max	115	300	KHz	Delta F2 Max in KHz
FrequencyDrift	-40	45	KHz	Frequency drift in KHz

### 10.1.7 Measure GFSK modulation DeltaF1

This test verifies and measures transmitter delta F1. [Table 10-13](#) and [Table 10-14](#) list the input and output parameters for this test.

Test Name: Measure\_GFSK\_Modulation\_DeltaF1

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-13 Measure GFSK modulation DeltaF1 input parameters**

Parameter Name	Value	Unit	Description
TxChannel	78	NA	Bluetooth Tx Channel (0-78)

**Table 10-14 Measure GFSK modulation DeltaF1 output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
DeltaF1Average	140	175	KHz	Delta F1 in KHz

### 10.1.8 Measure EDR modulation

This test verifies and measures transmitter average and peak DEVM. [Table 10-15](#) and [Table 10-16](#) list the input and output parameters for this test.

Test Name: Measure\_EDRModulation

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-15 Measure EDR modulation input parameters**

Parameter Name	Value	Unit	Description
TxChannel	0	NA	Bluetooth Tx Channel (0-78)
PacketType	BT_2_DH5	NA	Bluetooth Packet Type This test is only valid for EDR packet types.

**Table 10-16 Measure EDR modulation output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit
errorMessage			

Parameter Name	Lower Limit	Upper Limit	Unit
EDRAverageDEVM	0	0.2	
EDRPeakDEVM	0	0.35	

### 10.1.9 Measure LE Tx output power

This test verifies and measures LE transmitter power. [Table 10-17](#) and [Table 10-18](#) list the input and output parameters for this test.

Test Name: Measure\_LE\_TxOutputPower

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-17 Measure LE Tx output power input parameters**

Parameter Name	Value	Unit	Description
TxChannel	0	NA	TX Channel, only even channel in BLE

**Table 10-18 Measure LE Tx output power output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
AvgPower	-4	15	dBm	Average LE Power in dBm

### 10.1.10 Measure LE modulation DeltaF1

This test verifies and measures LE transmitter delta F1. [Table 10-19](#) and [Table 10-20](#) list the input and output parameters for this test.

Test Name: Measure\_LE\_Modulation\_DeltaF1

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-19 Measure LE modulation DeltaF1 input parameters**

Parameter Name	Value	Unit	Description
TxChannel	0	NA	TX Channel, only even channel in BLE

**Table 10-20 Measure LE modulation DeltaF1 output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
DeltaF1Average	225	275	KHz	Delta F1 average in KHz

### 10.1.11 Measure LE modulation DeltaF2, FreqOffset, FreqDrift and MaxDriftRate

This test verifies and measures LE transmitter delta F2, frequency offset, frequency drift and max drift rate. [Table 10-21](#) and [Table 10-22](#) list the input and output parameters for this test.

Test Name: Measure\_LE\_Modulation\_DeltaF2\_FreqOffset\_FreqDrift\_MaxDriftRate

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-21 Measure LE modulation DeltaF2, FreqOffset, FreqDrift and MaxDriftRate input parameters**

Parameter Name	Value	Unit	Description
TxChannel	0	NA	TX Channel, only even channel in BLE

**Table 10-22 Measure LE modulation DeltaF2, FreqOffset, FreqDrift and MaxDriftRate output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
DeltaF2	185	500	kHz	Delta F2 in kHz
FrequencyOffset	-150	150	kHz	FrequencyOffset
FrequencyDrift	-50	50	kHz	Frequency drift
MaxDriftRate	0	20	kHz/ $\mu$ s	Max drift rate

### 10.1.12 Measure Rx sensitivity/max input

This test verifies sensitivity/Max Input at a given power and measures BER %. [Table 10-23](#) and [Table 10-24](#) list the input and output parameters for this test.

Test Name: Measure\_RxSensitivity

Test Condition: Normal

Loop Condition: Rx Channel

**Table 10-23 Measure Rx sensitivity input parameters**

Parameter Name	Value	Unit	Description
RxChannel	0		RX channel (0-78)
StartPowerdBm	-70	dBm	Start Test RX power from VSG, if Start and Stop are same it acts like GoNoGo
StopPowerdBm	-70	dBm	Stop Test RX power from VSG, if Start and Stop are same it acts like GoNoGo
PacketType	BT_DH5	NA	Bluetooth Packet Type
MinimumCoarseNumberOfPackets	100	NA	Minimum coarse number of packets required for test

Parameter Name	Value	Unit	Description
MinimumFineNumberOfPackets	1000	NA	Minimum fine number of packets required for test
fineStepSize	0.5	dB	step size for BER fine search loop
coarseStepSize	1	dB	step size for BER coarse search loop
ReceiverTestType	Sensitivity	NA	RX Test Type: <ul style="list-style-type: none"> <li>▪ Sensitivity</li> <li>▪ MaxInput</li> </ul>

**Table 10-24 Measure RxSensitivity output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				Error message
BER	0	0.1	%	BER in percent
RxSensitivityPowerdBm	-70	-70	dBm	Sensitivity level

### 10.1.13 Measure LE Rx sensitivity/max input

This test verifies sensitivity/Max input at a given power and measures PER %. [Table 10-25](#) and [Table 10-26](#) list the input and output parameters for this test.

Test Name: Measure\_LE\_RxSensitivity

Test Condition: Normal

Loop Condition: Rx Channel

**Table 10-25 Measure LE Rx sensitivity input parameters**

Parameter Name	Value	Unit	Description
RxChannel	0		RX channel (0-78),only even channels in BLE
StartPowerdBm	-70	dBm	Start Test RX power from VSG, if Start and Stop are same it acts like GoNoGo
StopPowerdBm	-70	dBm	Stop Test RX power from VSG, if Start and Stop are same it acts like GoNoGo
CoarseNumberOfPackets	500		Minimum coarse number of packets required for test
FineNumberOfPackets	2000		Minimum fine number of packets required for test
fineStepSize	0.5	dB	step size for PER fine search loop
coarseStepSize	2.0	dB	step size for PER coarse search loop
WaveformKey	LE1a	NA	Waveform key in the tester config XML file

Parameter Name	Value	Unit	Description
PacketIntegrity	False		LE packet integrity is on or off, not valid if using waveforms
ReceiverTestType	Sensitivity		RX Test Type: : <ul style="list-style-type: none"> <li>▪ Sensitivity</li> <li>▪ MaxInput</li> </ul>
Dirty	0		Dirty mode, not valid if using waveforms

**Table 10-26 Measure LE Rx sensitivity output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				Error message
BER	0	0.1	%	BER in percent
RxSensitivityPower	-70	-70	dBm	Rx Sensitivity in dBm

### 10.1.14 Set BTDUT\_PROD\_TEST\_SUBCOMMAND\_TEST\_RX\_BURST

This test configures the device under tests in receive mode for performing non-signaling Rx tests. [Table 10-27](#) and [Table 10-28](#) list the input and output parameters for this test., if tests can be used to configure AR3002 receiver.

Test Name: BTDUT\_PROD\_TEST\_SUBCOMMAND\_TEST\_RX\_BURST

Test Condition: Normal

**Table 10-27 BTDUT\_PROD\_TEST\_SUBCOMMAND\_TEST\_RX\_BURST input parameters**

Parameter Name	Value	Unit	Description
RxChannel	0	NA	Channel range (0-78))
BluetoothAddress	BD,35,9C,BD,35,9C	NA	Bluetooth Address, comma separated, example = BD,35,9C,BD,35,9C
PacketType	15	NA	Bluetooth packet type
LTAddress	0	NA	Bluetooth LT/AM Address

**Table 10-28 BTDUT\_PROD\_TEST\_SUBCOMMAND\_TEST\_RX\_BURST output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				Error message

### 10.1.15 BTDUT\_PROD\_TEST\_HCI\_GET\_PER\_AR3002

**NOTE:** This test is only valid when ChipID = 3002

This test verifies gets receiver statistics from device under tests. [Table10-29](#) and [Table 10-30](#) list the input and output parameters for this test.

Test Name: BTDUT\_PROD\_TEST\_HCI\_GET\_PER\_AR3002

Test Condition: Normal

**Table 10-29 BTDUT\_PROD\_TEST\_HCI\_GET\_PER\_AR3002 input parameters**

Parameter Name	Value	Unit	Description
PacketType	BT_DH5		Bluetooth packet type

**Table 10-30 BTDUT\_PROD\_TEST\_HCI\_GET\_PER\_AR3002 output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
PacketsReceived			NA	Total packets received
PacketsWithCRCErrors			NA	Total CRC packets received

## 10.2 WLAN production test description (SISO Only)

### 10.2.1 SetUpDutTx

**Table 10-31 SetUpDutTx parameters**

Parameter Name	Value	Unit	Description
channel	1		WLAN Channel
cbState	0 none		Channel Bonding State 0:HT20, 1-3:HT40, 4-10:VHT80
Rate	3 RATE_11MBs		TX Data Rate
Short11b_nGuard	False	boolean	True: 11b short or 11n/11ac short guard
pwrMode	2 SCPC		TX Power Control Mode
powerLevel	10.0	dBm	TX Power Level
gain	2	unitless	RF Gain (open loop power control mode only)
digitalGain	0	unitless	Digital Gain (open loop power control mode only)
dpdMode	False	boolean	True: Enable DPD (WCN36x0 targets only)
payloadSize	500	bytes	Payload size in bytes
txChain	1		TX Chain to transmit on

### 10.2.2 WlanTxEvmTest

This test measures transmit modulation accuracy. [Table 10-32](#) and [Table 10-33](#) list the input and output parameters for this test.

Test Name: WlanTxEvmTest

Test Condition: Normal

Loop Condition: Channel, Rate

Test Equipment: “LitePoint IQ2010, “LitePoint IQxel”, Rohde & Schwarz CMW500”, “NI PXI5644R”, Agilent 4010A”

**Table 10-32 TX EVM test input parameters**

Parameter Name	Value	Unit	Description
channel	1		WLAN Channel
powerLevel	10.0	dBm	TX Power Level
wlanRate	16	WLAN_RATE	WLAN Rate Enums
chEstimationMethod	preambleOnly		ChannelEstimationOption Enums
numOfMIMOStream	1	unitless	Number of MIMO steams
numAverages	3		number of averages
vsaTriggerLevel	-20	dB	VSA trigger Level

**Table 10-33 TX EVM test output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
evm	-100	-25	dBm	TX EVM
amplErr			dB	TX Amplitude Error
dataRateMB	1	135	Mbs	TX Data Rate
symbolClockError			PPM	TX Symbol Clock Error
freqErr	-20	20	PPM	TX Frequency Error
phaseErr			PPM	TX Phase Error
avgTxPower	7	13	dBm	Average TX Power
avgTxPowerDelta	-2	2	dB	TX Power Accuracy
loLeakage	-120	-15	dB	LO Leakage

### 10.2.3 WlanTxVerifySpectrumTest

This test measures transmit spectrum in terms of carrier center frequency leakage and spectral flatness. [Table 10-34](#) and [Table 10-35](#) list the input and output parameters for this test.

Test Name: WlanTxVerifySpectrumTest

Test Condition: Normal

Loop Condition: Channel, Rate

Test Equipment: “LitePoint IQ2010, “LitePoint IQxel”, Rohde & Schwarz CMW500”, “NI PXI5644R”, Agilent 4010A”

**Table 10-34 TxVerifySpectrum test input parameters**

Parameter Name	Value	Unit	Description
channel	1		WLAN Channel
powerLevel	10.0	dBm	TX Power Level
wlanRate	16	WLAN_RATE	WLAN Rate Enums
chEstimationMethod	preambleOnly		ChannelEstimationOption Enums

Parameter Name	Value	Unit	Description
numOfMIMOStream	1		Number of MIMO steams
vsaTriggerLevel	-20	dB	VSA trigger Level

**Table 10-35 TxVerifySpectrum test output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
carrierNumber	-52	52		Number of Carriers
flatnessMargin	-4	2	dB	Average Power Flatness over spectrum
loLeakage	-120	-15	dBm	LO Leakage
avgTxPower	7	13	dBm	Average TX Power

## 10.2.4 WlanTxVerifyPowerTest

This test measures transmit power levels. It measures the maximum, minimum and average TX power and maximum, minimum and average peak Tx power. [Table 10-36](#) and [Table 10-37](#) list the input and output parameters for this test.

Test Name: WlanTxVerifyPowerTest

Test Condition: Normal

Loop Condition: Channel, Rate

Test Equipment: “LitePoint IQ2010, “LitePoint IQxel”, Rohde & Schwarz CMW500”, “NI PXI5644R”, Agilent 4010A”

**Table 10-36 Tx verify power test input parameters**

Parameter Name	Value	Unit	Description
channel	1		WLAN Channel
powerLevel	10.0	dBm	TX Power Level
wlanRate	16	WLAN_RATE	WLAN Rate Enums
numOfMIMOStream	1	unitless	Number of MIMO steams
vsaTriggerLevel	-20	dB	VSA trigger Level

**Table 10-37 TX verify power test output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
txPowerAvg			dBm	Average TX Power
txPowerAvgDelta	-2	2	dB	TX Power Accuracy
txPowerMax			dBm	Maximum TX Power
txPowerMin			dBm	Minimum TX Power
txPowerPeak			dBm	Average Peak TX Power
txPowerPeakMax			dBm	Maximum Peak TX Power
txPowerPeakMin			dBm	Minimum Peak TX Power
cableLoss			dBm	Path loss (from cable)

## 10.2.5 WlanTxVerifyMaskTest

This test measures transmit spectrum mask; it reports whether the WLAN transmit spectrum complies or fails with the standard WLAN mask. It will also output the worst failure margins and their associated frequencies. [Table 10-38](#) and [Table 10-39](#) list the input and output parameters for this test. Note: This test generates a lot of data. “Out of Memory” errors can occur in QSPR if this test is executed excessively in a loop.

Test Name: WlanTxVerifySpectrumTest

Test Condition: None

Loop condition: Channel, Rate

Test Equipment: “LitePoint IQ2010, “LitePoint IQxel”, Rohde & Schwarz CMW500”, “NI PXI5644R”, Agilent 4010A”

**Table 10-38 TxVerifyMask test input parameters**

Parameter Name	Value	Unit	Description
channel	1		WLAN Channel
powerLevel	10.0	dBm	TX Power Level
wlanRate	16	WLAN_RATE	WLAN Rate Enums
numOfMIMOStream	1	unitless	Number of MIMO streams
vsaTriggerLevel	-25	dB	VSA trigger Level

**Table 10-39 TxVerifyMask output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
maskPass				Pass/Fail WLAN Mask
violationPct				Percentage of the mask that fails
avgTxPower	7	13	dBm	Average TX Power
spectrum				Spectrum Magnitude Array
spectrumFreqs				Spectrum Frequency Array
Mask				Mask Magnitude Array
MaskFreqs				Mask Frequency Array

## 10.2.6 WlanPerTest

This test measures receiver minimum input sensitivity. It measures the PER of the receiver at the minimum input sensitivity level: -69 dBm for 2.4GHz; -65 dBm for 5GHz. [Table 10-40](#) and [Table 10-41](#) list the input and output parameters for this test.

Test Name: WlanPerTest

Test Condition: None

Loop Condition: Channel

Test Equipment: “LitePoint IQ2010, “LitePoint IQxel”, Rohde & Schwarz CMW500”, “NI PXI5644R”, Agilent 4010A”

**Table 10-40 WLAN Per test input parameters**

Parameter Name	Value	Unit	Description
startPower	-69	dBm	PER Search Start Power
stopPower	-69	dBm	PER Search Stop Power
channel	7		WLAN Channel
rate	RATE_11N_HT20_MCS7	WLAN_RATE	WLAN Rate Enums
wlanMode	2	WLAN_MODE	WLAN Mode Enums
coursePktCount	2000		number of packets for PER coarse search loop
finePktCount	10000		number of packets for PER fine search loop
coarseStepSize	2.0	dB	step size for PER coarse search loop
fineStepSize	0.5	dB	step size for PER fine search loop
rxChain	1		Rx Chain to test

**Table 10-41 WLAN Per test output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
PER	0	10	%	PER at Per Power; must define Upper Limit
PerPower	-100	0	dBm	Power at which reported PER is measured
Rssi	-100	0	dBm	Received Signal Strength Indicator

## 10.2.7 WlanPerSweepTest

This test sweeps receiver's power with a specified step, measures receiver PER at each input power steps.

[Table 10-42](#) and [Table 10-43](#) list the input and output parameters for this test.

Test Name: WlanPerSweepTest

Test Condition: None

Loop Condition: Channel

Test Equipment: LitePoint IQ2010 “;“LitePoint IQxel”, “NI PXI5644R”

**Table 10-42 WLAN PerSweepTest input parameters**

Parameter Name	Value	Unit	Description
startPower	-50	dBm	PER Search Start Power
stopPower	-90	dBm	PER Search Stop Power
channel	7		WLAN Channel number or FreqMHz
rate	RATE_11N_HT20_MCS7	WLAN_RATE	WLAN Rate Enums
channelBonding	2	WLAN_MODE	WLAN Mode Enums

Parameter Name	Value	Unit	Description
pktCount	200		number of packets for PER sweep
stepSize	-2.0	dB	step size for PER sweep
rxChain	1		Rx ChainMask to test
perLimit	10		PER limit to compute min and max passed power

**Table 10-43 WLAN PerSweepTest output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
allMeasuredPERs	0	10	%	PER at Per Power; must define Upper Limit
allPerPowers	-110	0	dBm	Power at which reported PER is measured
allMeasuredRssis	-100	0	dBm	Received Signal Strength Indicator
minPassPerPower	-100 (rate dependent)	0	dBm	Min power for PER within upperLimit
maxPassPerPower	-100	0	dBm	Max power for PER within upperLimit

## 10.2.8 WlanSendRxPacketsTest

This test set VSG to Tx number of packets (numPackets) at specified power level

[Table 10-44](#) list the input parameters for this test.

Test Name: WlanSendRxPacketsTest

Test Condition: None

Loop Condition: Channel

Test Equipment: LitePoint IQ2010 “;“LitePoint IQxel”, “NI PXI5644R”

**Table 10-44 WLAN PerSweepTest input parameters**

Parameter Name	Value	Unit	Description
Power	-60	dBm	VSG Tx Power level
numPackets	1000		Number of packets to send
channel	5210		WLAN Channel number or FreqMHz
rate	RATE_11N_HT20_MCS7	WLAN_RATE	WLAN Rate Enums

## 10.3 WLAN production test description (MIMO or SISO)

### 10.3.1 SetUpDutTxDetails

Only applicable to QC98xx, QCA6174

**Table 10-45 SetUpDutTxDetails parameters**

Parameter Name	Value	Unit	Description
channel	1		WLAN Channel
cbState	0 none		Channel Bonding State 0:HT20, 1-3:HT40, 4-10:VHT80
Rate	3 RATE_11MBs		TX Data Rate
pwrMode	2 SCPC		TX Power Control Mode
txMode	3 ContTx99		Tx Mode
txChainMask	3 WLAN_CHAIN_12		Tx ChainMask to turn on
powerLevel	10.0	dBm	TX Power Level dBm, only for pwrMode set as one of TxPowerForce
gain	2	unitless	gain index only for pwrMode set as ForcedGain or ForcedDesiredGain
digitalGain	0	unitless	Digital Gain (open loop power control mode only) dacGain only for pwrMode set as ForcedGain or ForcedDesiredGain
PAcfg	0		PA configuration only for QCA6174
payloadSize	1500	bytes	Payload size in bytes
Short11b_nGuard	False	boolean	True: 11b short or 11n/11ac short guard
ldpcRate	False	boolean	True if this is an 11n or 11ac LDPC rate
stbcMode	False	boolean	True if this is an 11n or 11ac stbc mode
aggregation	1	1 to 31	aggregation
dpdMode	Disable	boolean	Enable/Disable PA predistortion
ifs	1	byte	Interframe space
dutyCycle	10	byte	dutyCycle percentage (not programmed in this release)
nPattern	4	byte	data frame data pattern enum. If >=6, data frame will be user defined in pattern with length of nPattern (nPattern>=6 not programmed in this release)
Pattern	1	byte	Used when nPattern >=6, user defined data pattern with length of nPattern
nPacket	0	byte	0 for continuous Tx >0 for number of packets Tx send
broadcastMode	True	boolean	True: BroadCastMode

pwrMode

ForcedGain 0

→ TPC\_FORCED\_GAINIDX = 4

```

OpenLoopSearch 1 → not used
TxPowerAuto 2 → TPC_TGT_PWR = 1
TxPowerForce_CLPC 3 → TPC_TX_PWR = 0
TxPowerForce_SCPC 4 → TPC_TX_PWR = 0
TxPowerForce_OLPC 5 → TPC_TX_PWR = 0
ForcedDesiredGain 6 → TPC_FORCED_GAINIDX = 4
txMode
    DisablingContinuousMode = 0,
    EnablingContinuousUnmodulatedTX = 1,
    EnablingContinuousModulatedTX = 2,
    ContTx99 = 3,
    ContTx100 = 4,
txChainMask
    WLAN_CHAIN_1 = 1,
    WLAN_CHAIN_2 = 2,
    WLAN_CHAIN_12 = 3,
    WLAN_CHAIN_3 = 4,
    WLAN_CHAIN_13 = 5,
    WLAN_CHAIN_123 = 7,

```

### 10.3.2 WlanTxEvmTest\_NxN

This test measures transmit modulation accuracy. [Table 10-46](#) and [Table 10-47](#) list the input and output parameters for this test.

Test Name: WlanTxEvmTest\_NxN

Test Condition: Normal

Loop Condition: Channel, Rate

Test Equipment: “LitePoint IQxel”, “NI PXI5644R”

**Table 10-46 TX EVM Test NxN input parameters**

Parameter Name	Value	Unit	Description
rate		WLAN_RATE	WLAN_DataRate Enums
channel			Center Frequency of Tx Signal
powerLevel		dBm	TX Power Level
vsaTriggerLevel		dBm	VSA trigger Level
chEstimationMethod			ChannelEstimationOption Enums
chainStreamSelection			Chain or stream EVM Selection ( 0 for chain; 1 for stream )
numAverages			number of samples for averaging

**Table 10-47 TX EVM Test NxN output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
evm[]	-100	-25	dB	TX EVM
evmDataMb	-999	999	Mbs	TX Data Rate
amplErr[]			dB	TX Amplitude Error
symbolClockError[]	m		PPM	TX Symbol Clock Error
freqErr[]	-20	20	PPM	TX Frequency Error
phaseErr[]			PPM	TX Phase Error
avgTxPower[]	7	13	dBm	Average TX Power
avgTxPowerDelta	-2	2	dB	Delta Between Requested And Measured Tx Power
loLeakage[]	-120	-15	dB	LO Leakage

### 10.3.3 WlanTxVerifyPowerTest\_NxN

This test measures transmit power levels. It measures the maximum, minimum and average TX power and maximum, minimum and average peak Tx power. [Table 10-48](#) and [Table 10-49](#) list the input and output parameters for this test.

Test Name: WlanTxVerifyPowerTest\_NxN

Test Condition: Normal

Loop Condition: Channel, Rate

Test Equipment: “LitePoint IQxel”, “NI PXI5644R”

**Table 10-48 Tx verify power test NxN input parameters**

Parameter Name	Value	Unit	Description
rate			Wi-Fi Rate of Tx Signal
channel		MHz	Center Frequency of Tx Signal
powerLevel		dBm	TX Power Level
vsatTriggerLevel		dB	VSA trigger Level

**Table 10-49 TX verify power Test NxN output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
txPowerAvg[]			dBm	Average TX Power
txPowerAvgDelta[]	-2	2	dB	TX Power Accuracy
txPowerMax[]			dBm	Maximum TX Power
txPowerMin[]			dBm	Minimum TX Power
txPowerPeak[]			dBm	Average Peak TX Power
txPowerPeakMax[]			dBm	Maximum Peak TX Power
txPowerPeakMin[]			dBm	Minimum Peak TX Power
cableLoss[]			dBm	Path loss (from cable)

### 10.3.4 MeasureMask\_NxN

This test measures transmit spectral mask; it reports whether the WLAN transmit spectrum complies or fails with the standard WLAN mask. [Table 10-50](#) and [Table 10-51](#) list the input and output parameters for this test.

Test Name: MeasureMask\_NxN

Test Condition: Normal

Loop Condition: Channel, Rate

Test Equipment: “LitePoint IQxel”, “NI PXI5644R”

**Table 10-50 MeasureMask\_NxN test input parameters**

Parameter Name	Value	Unit	Description
rate			WLAN Rate Enums
channel		MHz	Center Frequency of Tx Singal
powerLevel		dBm	TX Power Level
vsaTriggerLevel[]		dBm	VSA trigger Level

**Table 10-51 MeasureMask\_NxN test output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
maskPass[]			dBm	Pass/Fail WLAN Mask
violationPct[]	-2	2	dB	Percentage of the mask that fails
freq_at_margin_positive[]			Hz	Frequency At Margin Positive
freq_at_margin_negative[]			Hz	Frequency At Margin Negative
margin_db_positive[]			dB	Margin at Positive
margin_db_negative[]			dB	Margin at Negative
spectrumTrace_1			dB	Spectral Trace Chain 1
spectrumMaskTrace_1			dB	Spectral Mask Trace Chain 1
frequencyList_1			Hz	Frequency List Chain 1
spectrumTrace_2			dB	Spectral Trace Chain 2
spectrumMaskTrace_2			dB	Spectral Mask Trace Chain 2
frequencyList_2			Hz	Frequency List Chain 2
spectrumTrace_3			dB	Spectral Trace Chain 3
spectrumMaskTrace_3			dB	Spectral Mask Trace Chain 3
frequencyList_3			Hz	Frequency List Chain 3
spectrumTrace_4			dB	Spectral Trace Chain 4
spectrumMaskTrace_4			dB	Spectral Mask Trace Chain 4
frequencyList_4			Hz	Frequency List Chain 4

### 10.3.5 MeasureSpectrum\_NxN

This test measures transmit spectrum in terms of carrier center frequency leakage and spectral flatness. [Table 10-52](#) and [Table 10-53](#) list the input and output parameters for this test.

Test Name: MeasureSpectrum\_NxN

Test Condition: Normal

Loop Condition: Channel, Rate

Test Equipment: “LitePoint IQxel”, “NI PXI5644R”

**Table 10-52 MeasureSpectrum\_NxN test input parameters**

Parameter Name	Value	Unit	Description
rate			WLAN Rate Enums
channel	1	MHz	Center Frequency of Tx Singal
powerLevel	10.0	dBm	TX Power Level
vsaTriggerLevel[]	-25	dBm	VSA trigger Level
chEstimationMethod			ChannelEstimationOption Enums

**Table 10-53 MeasureSpectrum\_NxN test output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
spectrumPower[]			dBm	Spectrum Power
carrierNumber_1[]				Carrier Number for Chain 1
carrierNumber_2[]				Carrier Number for Chain 2
carrierNumber_3[]				Carrier Number for Chain 3
carrierNumber_4[]				Carrier Number for Chain 4
flatnessMargin_1[]			dB	Average Power Flatness over spectrum for chain 1
flatnessMargin_2[]			dB	Average Power Flatness over spectrum for chain 2
flatnessMargin_3[]			dB	Average Power Flatness over spectrum for chain 3
flatnessMargin_4[]			dB	Average Power Flatness over spectrum for chain 4
loLeakage[]			dBm	LO Leakage

### 10.3.6 WlanPerTest\_NxN

This test measures receiver minimum input sensitivity. It measures the PER of the receiver at the minimum input sensitivity level: -69 dBm for 2.4GHz; -65 dBm for 5GHz. [Table 10-54](#) and [Table 10-55](#) list the input and output parameters for this test.

Test Name: WlanPerTest\_NxN

Test Condition: None

Loop Condition: Channel

Test Equipment: “LitePoint IQxel”, “NI PXI5644R”

**Table 10-54 WLAN Per NxN test input parameters**

Parameter Name	Value	Unit	Description
startPower	-69	dBm	PER Search Start Power
stopPower	-69	dBm	PER Search Stop Power
channel	5180		WLAN Channel number or FreqMHz
rate	RATE_11N_HT20_MCS7	WLAN_RATE	WLAN 11n/11ac Rate Enums
channelBonding	2	WLAN_MODE	WLAN Mode Enums
coursePktCount	2000		number of packets for PER coarse search loop
finePktCount	10000		number of packets for PER fine search loop
coarseStepSize	2.0	dB	step size for PER coarse search loop
fineStepSize	0.5	dB	step size for PER fine search loop
rxChain	1		Rx ChainMask

**Table 10-55 WLAN Per NxN test output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
PER	0	10	%	PER at Per Power; must define Upper Limit
PerPower	-100	0	dBm	Power at which reported PER is measured
Rssi	-100	0	dBm	Received Signal Strength Indicator

### 10.3.7 WlanPerSweepTest\_NxN

This test sweeps receiver's power with a specified step, measures receiver PER at each input power steps.

Table 10-56 and Table 10-57 list the input and output parameters for this test.

Test Name: WlanPerSweepTest\_NxN

Test Condition: None

Loop Condition: Channel

Test Equipment: "LitePoint IQxel", "NI PXI5644R"

**Table 10-56 WLAN PerSweepTest\_NxN input parameters**

Parameter Name	Value	Unit	Description
startPower	-50	dBm	PER Search Start Power
stopPower	-90	dBm	PER Search Stop Power
channel	7		WLAN Channel number or FreqMHz
rate	RATE_11N_HT20_MCS7	WLAN_RATE	WLAN 11n/11ac Rate Enums
channelBonding	2	WLAN_MODE	WLAN Mode Enums
pktCount	200		number of packets for PER sweep
stepSize	-2.0	dB	step size for PER sweep
rxChain	3		Rx ChainMask to test
perLimit	10		PER limit to compute min and max passed power

**Table 10-57 WLAN PerSweepTest\_NxN output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
allMeasuredPERs	0	10	%	PER at Per Power; must define Upper Limit
allPerPowers	-110	0	dBm	Power at which reported PER is measured
allMeasuredRssis	-100	0	dBm	Received Signal Strength Indicator
minPassPerPower	-100 (rate dependent)	0	dBm	Min power for PER within upperLimit
maxPassPerPower	-100	0	dBm	Max power for PER within upperLimit

### 10.3.8 WlanSendRxPacketsTest\_NxN

This test set VSG to Tx number of packets (numPackets) at specified power level

[Table 10-58](#) list the input parameters for this test.

Test Name: WlanSendRxPacketsTest\_NxN

Test Condition: None

Loop Condition: Channel

Test Equipment: “LitePoint IQxel”, “NI PXI5644R”

**Table 10-58 WLAN PerSweepTest input parameters**

Parameter Name	Value	Unit	Description
Power	-60	dBm	VSG Tx Power level
numPackets	1000		Number of packets to send
channel	5210		WLAN Channel number or FreqMHz
rate	RATE_11N_HT20_MCS7	WLAN_RATE	WLAN 11n/11AC Rate Enums

## 10.4 FM production test description

### 10.4.1 FM RX tests

#### 10.4.1.1 Sensitivity GONOGO

This test verifies that the minimum sensitivity is met. But it does NOT find the sensitivity level, defined as the input power level where SNR=26 dB. [Table 10-59](#) and [Table 10-60](#) list the input and output parameters for this test.

Test Name: FmRxTest\_Sensitivity\_GONOGO

Test Condition: Normal

Loop Condition: FM Frequency

Test Equipment: “LitePoint IQ2010”

**Table 10-59 Sensitivity GONOGO input parameters**

Parameter Name	Value	Unit	Description
carrierPowerdBm	-102.0	dBm	Input Power Level at DUT
carrierFreqKHz	Set by loop	kHz	RF Frequency
audioToneFreqHz	1000	Hz	Audio Frequency
MaxRetries	3		Max # of measurement retry attempts. Retries happen if SNR < lower limit, or L&R measurements are unbalanced by more than 1 dB

**Table 10-60 Sensitivity GONOGO output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
SNR	26	99	dB	Audio SNR; lower limit must be specified in test tree

### 10.4.1.2 Sensitivity characterization

This test finds the minimum FM sensitivity level with an iterative search. FM Sensitivity is defined as the input power level where SNR=26 dB. [Table 10-61](#) and [Table 10-62](#) list the input and output parameters for this test.

Test Name: FmRxTest\_Sensitivity\_Characterization

Test Condition: Normal

Loop Condition: FM Frequency

Test Equipment: "LitePoint IQ2010"

**Table 10-61 Sensitivity characterization input parameters**

Parameter Name	Value	Unit	Description
PowerStart	-108.0	dBm	Start power for iterative search
PowerStep	1.0	dB	Step size for iterative search
PowerMax	-90.0	dBm	Max power for iterative search
PowerMin	-114.0	dBm	Min power for iterative search
SNRTarget	26.0	dB	SNR target for iterative search
carrierFreqKHz	Set by loop	kHz	RF Frequency
audioToneFreqHz	1000	Hz	Audio Frequency
MaxRetries	3		Max # of measurement retry attempts. Retries happen if SNR < 10 dB, or L&R measurements are unbalanced by more than 1 dB

**Table 10-62 Sensitivity characterization output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
FmSens	-115	-102	dBm	FM Sensitivity; RF input level where audio SNR = 26 dB

### 10.4.1.3 Max SNR

This test finds the maximum SNR. [Table 10-63](#) and [Table 10-64](#) list the input and output parameters for this test.

Test Name: FmRxTest\_MaxSNR

Test Condition: Normal

Loop Condition: FM Frequency

Test Equipment: “LitePoint IQ2010”

**Table 10-63 Max SNR input parameters**

Parameter Name	Value	Unit	Description
carrierPowerdBm	-47.0	dBm	Input Power Level at DUT
carrierFreqKHz	Set by loop	KHz	RF Frequency
stereo	True or False	Boolean	Flag to Enable Stereo Pilot & Modulation
pilotDeviationHz	6750	Hz	Pilot Deviation; Only relevant if stereo=True
totalFmDeviationHz	22500 (if mono) 75000 (if stereo)	Hz	Total FM Deviation
audioToneFreqHz	1000	Hz	Audio Frequency
MaxRetries	3	3	Max # of measurement retry attempts. Retries happen if SNR < lower limit, or L&R measurements are unbalanced by more than 1 dB

**Table 10-64 Max SNR output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
SNR	57 (if mono) 53 (if stereo)	99	dB	Audio SNR; lower limit must be specified in test tree

### 10.4.1.4 Intermediate SNR

This test finds the SNR at an intermediate power level with AM distortion added to the FM signal. [Table 10-65](#) and [Table 10-66](#) list the input and output parameters for this test.

Test Name: FmRxTest\_IntermediateSNR

Test Condition: Normal

Loop Condition: FM Frequency

Test Equipment: "LitePoint IQ2010"

**Table 10-65 Intermediate SNR input parameters**

Parameter Name	Value	Unit	Description
carrierPowerBm	-90.0	dBm	Input Power Level at DUT
carrierFreqKHz	Set by loop	kHz	RF Frequency
audioToneFreqHz	1000	Hz	Audio FM Frequency
amFreqHz	400	Hz	AM Frequency
amDepthPercent	30	%	AM Depth
MaxRetries	3		Max # of measurement retry attempts. Retries happen if SNR < lower limit, or L&R measurements are unbalanced by more than 1 dB

**Table 10-66 Intermediate SNR output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
SNR	45	99	dB	Audio SNR; lower limit must be specified in test tree

### 10.4.1.5 THD

This test finds the Total Harmonic Distortion (THD). [Table 10-67](#) and [Table 10-68](#) list the input and output parameters for this test.

Test Name: FmRxTest\_THD

Test Condition: Normal

Loop Condition: FM Frequency, Audio Frequency, and mono|stereo state

Test Equipment: “LitePoint IQ2010”

**Table 10-67 THD input parameters**

Parameter Name	Value	Unit	Description
carrierPowerdBm	-47.0	dBm	Input Power Level at DUT
carrierFreqKHz	Set by loop	kHz	RF Frequency
stereo	True or False	Boolean	Flag to Enable Stereo Pilot & Modulation
pilotDeviationHz	6750	Hz	Pilot Deviation; Only relevant if stereo=True
totalFmDeviationHz		75000	Hz
audioToneFreqHz	mono: 400, 1000, & 3000 stereo: 3000	Hz	Audio Frequency
MaxRetries	3		Max # of measurement retry attempts. Retries happen if THD > upper limit, or L&R measurements are unbalanced by more than 1 dB

**Table 10-68 THD output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
THD	0	0.8 (if mono) 1.5 (if stereo)	%	Audio THD; upper limit must be specified in test tree

### 10.4.1.6 RDS block error rate

This test finds the RDS Block Error Rate (BLER). [Table 10-69](#) and [Table 10-70](#) list the input and output parameters for this test.

Test Name: FmRxTest\_RDS\_BLER

Test Condition: Normal

Loop Condition: FM Frequency

Test Equipment: “LitePoint IQ2010”

**Table 10-69 RDS BLER input parameters**

Parameter Name	Value	Unit	Description
carrierPowerdBm	-86.0*	dBm	Input Power Level at DUT
carrierFreqKHz	Set by loop	KHz	RF Frequency
pilotDeviationHz	6750	Hz	Pilot Deviation
rdsDeviationHz	2000	Hz	RDS Deviation
totalFmDeviationHz	75000	Hz	Total FM Deviation
preEmphasis	PRE_EMPHASIS_75US	enum	Time Constant of Pre-emphasis filter
rdsTransmitString	QCOM-RDS		RDS Transmit String
audioToneFreqHz	1000	Hz	Audio Frequency
MinNumBlocks	5000*	Sec	Min # of Blocks for BLER calculation
DelayBeforeMeasurement	1	Sec	Delay between enabling RDS signal and measuring BLER
TimeOutPercent	110.0	%	Percentage of expected time to wait for MinNumBlocks before aborting the test
ExitEarlyIfFailing	True	Boolean	Flag to exit test early if TotalRdsBlockErrors guarantees the test is going to fail

**NOTE:** The value for carrierPowerdBm is not fixed by chip specifications. Choose an appropriate value.

The value for MinNumBlocks is a tradeoff of test time vs. statistical confidence. Choose an appropriate value.

**Table 10-70 RDS BLER output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
BLER_percent	0.0	5.0	%	Block Error Rate; upper limit must be specified in test tree
TotalRdsBlockErrors				# of RDS Block Errors
TotalRdsBlocks				# of RDS Blocks
TotalRdsGroups				# of RDS Groups
ElapsedTime			seconds	time duration of the BLER measurement

## 10.4.2 FM TX tests

### 10.4.2.1 TX output power

This test measures the TX output power. [Table 10-71](#) and [Table 10-72](#) list the input and output parameters for this test.

Test Name: FmTxTest\_TxOutputPower

Test Condition: Normal

Loop Condition: FM Frequency

Test Equipment: “LitePoint IQ2010”

**Table 10-71 TX output power input parameters**

Parameter Name	Value	Unit	Description
carrierFreqKHz	Set by loop	kHz	RF Frequency

**Table 10-72 TX output power output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
TxOutputPower			dBm	Tx Output Power

### 10.4.2.2 FM deviation

This test measures FM Deviation. [Table 10-73](#) and [Table 10-74](#) list the input and output parameters for this test.

Test Name: FmTxTest\_TxOutputPower

Test Condition: Normal

Loop Condition: FM Frequency

Test Equipment: “LitePoint IQ2010”

**Table 10-73 FM deviation input parameters**

Parameter Name	Value	Unit	Description
carrierFreqKHz	Set by loop	kHz	RF Frequency

**Table 10-74 FM deviation output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
PlusPeakDev			Hz	Positive Peak Dev
MinusPeakDev			Hz	Negative Peak Dev
AvgPeakDev	70000	80000	Hz	Average Peak Dev
RmsPeakDev			Hz	RMS Peak Dev
Cfo			Hz	Center Frequency Offset

### 10.4.2.3 TX stereo audio SNR

This test measures TX stereo audio SNR. [Table 10-75](#) and [Table 10-76](#) list the input and output parameters for this test.

Test Name: FmTxTest\_TxOutputPower

Test Condition: Normal

Loop Condition: FM Frequency

Test Equipment: “LitePoint IQ2010”

**Table 10-75 TX stereo audio SNR input parameters**

Parameter Name	Value	Unit	Description
carrierFreqKHz	Set by loop	kHz	RF Frequency
deEmphasis	DE_EMPHASIS_75US	Enum	analysis de-emphasis setting; set this to match DUT pre-emphasis setting

**Table 10-76 TX stereo audio SNR output parameters**

Parameter name	Lower limit	Upper limit	Unit	Description
TxLeftSNR	60	99	dB	Left Channel SNR
TxRightSNR	60	99	dB	Right Channel SNR

## 10.5 ANT production test description

### 10.5.1 Transmit channel power

This test measures the TX output power over the channel bandwidth.

Test Name: ChannelPower

Test Condition: Normal

Loop Condition: ANT Frequency

Test Equipment: “Agilent E4443A/E440xB”

**Table 10-77 TX channel power input parameters**

Parameter Name	Value	Unit	Description
Bandwidth	1	MHz	Channel bandwidth
FrequencyOffset	Set by loop	MHz	Transmit frequency offset from 2400 MHz
Packets	0		Total number of packets for Tx/Rx. 0 indicates continuous test
PacketRate	100	Hz	Packet rate per second
DeviceNumber	55		Device number field of device address
DeviceType	11		Device type field of device address

Parameter Name	Value	Unit	Description
TransmissionType	208		Transmission type field of device address
DataPayload	5555555555555555		Data payload in the expected packet in hex format
TxPathName	SAPath		Transmit path name

**Table 10-78 TX channel power output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
channelPower	-2	2	dBm	Channel power

QUALCOMM®  
 2017-07-18 19:59:14 PDT  
 wangjintong@wind-mobi.com

## 10.5.2 Receive sensitivity

This test measures the RX sensitivity defined as minimum power level at which BER is less than 1%.

Test Name: Sensitivity

Test Condition: Normal

Loop Condition: ANT Frequency

Test Equipment: “Agilent N5182A”

**Table 10-79 Receive sensitivity input parameters**

Parameter Name	Value	Unit	Description
ArbFileName	ANT_NET5B25PAT55PER10		ARB file name on signal generator
StartPower	-85	dBm	Power value at which search starts
StopPower	-100	dBm	Power value at which search stops
CoarsePowerStep	1	dBm	Initial power step
FinePowerStep	0.1	dBm	Final power step
FrequencyOffset	Set by loop	MHz	Transmit frequency offset from 2400 MHz
CoarsePackets	1000		Total number of packets for Tx/Rx for initial search with coarse step size
Packets	10000		Total number of packets for Tx/Rx. 0 indicates continuous test
PacketRate	100	Hz	Packet rate per second
DeviceNumber	55		Device number field of device address
DeviceType	11		Device type field of device address
TransmissionType	208		Transmission type field of device address
DataPayload	5555555555555555		Data payload in the expected packet in hex format
RxPathName	ARBPath		Receive path name

**Table 10-80 Receive sensitivity output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
sensitivity	-98	-85	dBm	Sensitivity
lostPacketRate	0	50		LPR
crcErrorRate	0	50		CRC Error rate
packetErrorRate	0	50		PER
bitErrorRate	0	0.1		BER
packetsReceived	0	10000		No. of packets received

Parameter Name	Lower Limit	Upper Limit	Unit	Description
packetsLost	0	5000		No. of packets lost
packetsWithBadHeader	0	5000		No. of packets with bad header
packetsWithBadCRC	0	5000		No. of packets with bad CRC
totalBitErrors	0	12000		Total bit errors
syncLosses				No. of sync losses

## 10.6 Bluetooth signaling production test description

LE production tests are covered in [Section 10.1](#).

### 10.6.1 BTDUT\_FFA\_DisableLegacyLogMode

This test is performed for supporting Bluetooth legacy log.

[Table 10-81](#) and [Table 10-82](#) list the input and output parameters for this test.

Test Name: BTDUT\_FFA\_DisableLegacyLogMode

Test Condition: None

**Table 10-81 BTDUT\_FFA\_DisableLegacyLogMode input parameters**

Parameter Name	Value	Unit	Description
disableLegacyLogMode	True		Disable legacy log mode = true, Enable legacy log mode = false

**Table 10-82 BTDUT\_FFA\_DisableLegacyLogMode output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage			NA	error messages

### 10.6.2 BTDUT\_EnableBT\_DUTMode

This test is performed to enable BT DUT mode.

Test Name: BTDUT\_EnableBT\_DUTMode

Test Condition: None

### 10.6.3 Measure Tx GFSK power

This test is performed for configuring device under test for GFSK transmit tests.

[Table 10-83](#) and [Table 10-84](#) list the input and output parameters for this test.

Test Name: TRM/CA/01 TX Power GFSK

Test Condition: Normal

**Table 10-83 TRM/CA/01 TX Power GFSK input parameters**

Parameter Name	Value	Unit	Description
TxChannel	0	NA	TX Channel (0-78)
RxChannel	78	NA	RX Channel (0-78)
PacketType	BT_DH1	NA	Bluetooth packet type
Hopping	No	NA	Channel Hopping mode
DefaultTxPower	-40	dBm	Default TX Power Level
NumOfPackets	1	NA	Number of packets (0-10000)

**Table 10-84 TRM/CA/01 TX Power GFSK output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage			NA	error messages
AvgPowerdBm	2	16	dBm	Average Bluetooth power

## 10.6.4 Measure Tx modulation characteristics

This test verifies and measures modulation characteristics. [Table 10-85](#) and [Table 10-86](#) list the input and output parameters for this test.

Test Name: TRM/CA/07 Modulation Characteristics

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-85 TRM/CA/07 modulation characteristics input parameters**

Parameter name	Value	Unit	Description
TxChannel	78	NA	TX channel (0-78)
RxChannel	0	NA	RX channel (0-78)
PacketType	BT_DH5	NA	Bluetooth Packet Type
TestType	Loopback	NA	Test Type
DefaultTxPower	-40	dBm	Default TX Power Level
NumOfPackets	1	NA	Number of packets (0-10000)

**Table 10-86 TRM/CA/07 modulation characteristics output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
DeltaF1Avg	140	175	KHz	Delta F1 average deviation KHz
DeltaF2Max	115	250	KHz	Delta F2 maximum deviation KHz
DeltaF2byF1	0.8	2	NA	Delta F2 by F1

## 10.6.5 Measure GFSK initial carrier frequency tolerance

This test verifies and measures initial carrier frequency tolerance. [Table 10-87](#) and [Table 10-88](#) list the input and output parameters for this test.

Test Name: TRM/CA/08 Initial Carrier Frequency Tolerance

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-87 TRM/CA/08 initial carrier frequency tolerance input parameters**

Parameter name	Value	Unit	Description
TxChannel	78	NA	TX channel (0-78)
RxChannel	0	NA	RX channel (0-78)
PacketType	BT_DH1	NA	Bluetooth Packet Type
TestType	Loopback	NA	Test Type
DefaultTxPower	-40	dBm	Default TX Power Level
NumOfPackets	1	NA	Number of packets (0-10000)

**Table 10-88 TRM/CA/08 initial carrier frequency tolerance output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
FrequencyTolerance	-75	75	KHz	Frequency Tolerance in KHz

## 10.6.6 Measure GFSK carrier frequency drift

This test verifies and measures carrier frequency drift and frequency drift rate. [Table 10-89](#) and [Table 10-90](#) list the input and output parameters for this test.

Test Name: TRM/CA/09 Carrier Frequency Drift

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-89 TRM/CA/09 carrier frequency drift input parameters**

Parameter name	Value	Unit	Description
TxChannel	78	NA	TX channel (0-78)
RxChannel	0	NA	RX channel (0-78)
PacketType	BT_DH1	NA	Bluetooth Packet Type
TestType	Loopback	NA	Test Type
DefaultTxPower	-40	dBm	Default TX Power Level
NumOfPackets	1	NA	Number of packets (0-10000)

**Table 10-90 TRM/CA/09 Carrier Frequency Drift output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
MaxDrift	-25	25	KHz	Max drift in kHz, limit for DH1= +- 25, for DH3 and DH5 limit = +-40
MaxDriftRate	-20	20	KHz/50us	Max drift rate

### 10.6.7 Measure EDR relative transmit power

This test verifies and measures EDR relative transmit power. [Table 10-91](#) and [Table 10-92](#) list the input and output parameters for this test.

Test Name: TRM/CA/10/C EDRRelativeTransmitPower

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-91 TRM/CA/10/C EDRRelativeTransmitPower input parameters**

Parameter name	Value	Unit	Description
TxChannel	78	NA	TX channel (0-78)
RxChannel	0	NA	RX channel (0-78)
PacketType	BT_2DH5	NA	Bluetooth Packet Type
Hopping	No	NA	Channel Hopping mode
TestType	Loopback	NA	Test Type
DefaultTxPower	-40	dBm	Default TX Power Level
NumOfPackets	1	NA	Number of packets (0-10000)

**Table 10-92 TRM/CA/10/C EDRRelativeTransmitPower output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
GFSKPower	3	12	dBm	GFSK absolute power
DPSKPower	3	12	dBm	DPSK absolute power
RelativePower	-4	1	dB	Relative power

### 10.6.8 Measure EDR modulation accuracy

This test verifies and measures EDR modulation accuracy. [Table 10-93](#) and [Table 10-94](#) list the input and output parameters for this test.

Test Name: TRM/CA/11 EDR Modulation Accuracy

Test Condition: Normal

Loop Condition: Tx Channel

**Table 10-93 TRM/CA/11 EDR modulation accuracy input parameters**

Parameter name	Value	Unit	Description
TxChannel	78	NA	TX channel (0-78)
RxChannel	0	NA	RX channel (0-78)
PacketType	BT_2DH5	NA	Bluetooth Packet Type
Hopping	No	NA	Channel Hopping mode
TestType	Loopback	NA	Test Type
DefaultTxPower	-40	dBm	Default TX Power Level
NumOfPackets	1	NA	Number of packets (0-10000)

**Table 10-94 TRM/CA/11 EDR modulation accuracy output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				error message from test
InitialFreqError	-75	75	KHz	Initial Frequency Error
FreqError	-10	10	KHz	Frequency Error
BlockFreqError	-75	75	KHz	Block Frequency Error
DEVMRMS	0	0.2	NA	DEVMRMS Limit for 2DHx limit = 0.20 and for 3DHx limit = 0.13
DEVMPeak	0	0.35	NA	DEVMPeak Limit for 2DHx limit = 0.35 and for 3DHx limit = 0.25
DEVM99Percent	99	100	%	DEVM 99%

### 10.6.9 Measure Rx sensitivity single slot packets

This test verifies sensitivity at a given power and measures BER %. [Table 10-95](#) and [Table 10-96](#) list the input and output parameters for this test.

Test Name: RCV/CA/01 Sensitivity – single slot packets

Test Condition: Normal

Loop Condition: Rx Channel

**Table 10-95 RCV/CA/01 sensitivity – single slot packets input parameters**

Parameter Name	Value	Unit	Description
RxChannel	0		RX channel (0-78)
TxChannel	78		TX channel (0-78)
Dirty	Yes		Dirty mode
StartPowerdBm	-70	dBm	Start Test RX power from VSG, if Start and Stop are same it acts like GoNoGo
StopPowerdBm	-70	dBm	Stop Test RX power from VSG, if Start and Stop are same it acts like GoNoGo
fineStepSize	0.5	dB	step size for BER fine search loop

Parameter Name	Value	Unit	Description
coarseStepSize	1	dB	step size for BER coarse search loop
PacketType	BT_DH1	NA	Bluetooth Packet Type
Hopping	No	NA	Channel Hopping mode
DefaultTxPower	-40	NA	Default Tx Power for test
CoarseNumberOfPackets	100	NA	Minimum coarse number of packets required for test
FineNumberOfPackets	5000	NA	Minimum fine number of packets required for test
ReceiverTestType	Sensitivity	NA	RX Test type

**Table 10-96 RCV/CA/01 sensitivity – single slot packets output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				Error message
BERPercent	0	0.1	%	BER in percent
FERPercent	0	50	%	FER in percent
RxSensitivityPowerdBm	-70	-70	dBm	Sensitivity level
LPR	0	50	%	LPR in percent

### 10.6.10 Measure Rx sensitivity multiple slot packets

This test verifies sensitivity at a given power and measures BER %. [Table 10-97](#) and [Table 10-98](#) list the input and output parameters for this test.

Test Name: RCV/CA/02 Sensitivity – multiple slot packets

Test Condition: Normal

Loop Condition: Rx Channel

**Table 10-97 RCV/CA/02 sensitivity – multiple slot packets input parameters**

Parameter Name	Value	Unit	Description
RxChannel	0		RX channel (0-78)
TxChannel	78		TX channel (0-78)
Dirty	Yes		Dirty mode
StartPowerdBm	-70	dBm	Start Test RX power from VSG, if Start and Stop are same it acts like GoNoGo
StopPowerdBm	-70	dBm	Stop Test RX power from VSG, if Start and Stop are same it acts like GoNoGo
fineStepSize	0.5	dB	step size for BER fine search loop
coarseStepSize	1	dB	step size for BER coarse search loop
PacketType	BT_DH5	NA	Bluetooth Packet Type
Hopping	No	NA	Channel Hopping mode

Parameter Name	Value	Unit	Description
DefaultTxPower	-40	NA	Default Tx Power for test
CoarseNumberOfPackets	100	NA	Minimum coarse number of packets required for test
FineNumberOfPackets	589	NA	Minimum fine number of packets required for test
ReceiverTestType	Sensitivity	NA	RX Test type

**Table 10-98 RCV/CA/02 Sensitivity – multiple slot packets output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				Error message
BERPercent	0	0.1	%	BER in percent
FERPercent	0	50	%	FER in percent
RxSensitivityPowerdBm	-70	-70	dBm	Sensitivity level
LPR	0	50	%	LPR in percent

### 10.6.11 Measure EDR Rx sensitivity

This test verifies sensitivity at a given power and measures BER %. [Table 10-99](#) and [Table 10-100](#) list the input and output parameters for this test.

Test Name: RCV/CA/07 EDR Sensitivity

Test Condition: Normal

Loop Condition: Rx Channel

**Table 10-99 RCV/CA/07 EDR sensitivity input parameters**

Parameter Name	Value	Unit	Description
RxChannel	0		RX channel (0-78)
TxChannel	78		TX channel (0-78)
Dirty	Yes		Dirty mode
StartPowerdBm	-70	dBm	Start Test RX power from VSG, if Start and Stop are same it acts like GoNoGo
StopPowerdBm	-70	dBm	Stop Test RX power from VSG, if Start and Stop are same it acts like GoNoGo
fineStepSize	0.5	dB	step size for BER fine search loop
coarseStepSize	1	dB	step size for BER coarse search loop
PacketType	BT_2DH5	NA	Bluetooth Packet Type
Hopping	No	NA	Channel Hopping mode
DefaultTxPower	-40	NA	Default Tx Power for test
CoarseNumberOfPackets	100	NA	Minimum coarse number of packets required for test

Parameter Name	Value	Unit	Description
FineNumberOfPackets	294	NA	Minimum fine number of packets required for test
ReceiverTestType	Sensitivity	NA	RX Test type

**Table 10-100 RCV/CA/07 EDR sensitivity output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				Error message
BERPercent	0	0.1	%	BER in percent
PERPercent	0	50	%	PER in percent
RxSensitivityPowerdBm	-70	-70	dBm	Sensitivity level
LPR	0	50	%	LPR in percent

## 10.7 NFC production functional test description

### 10.7.1 NFCDUT\_DetectTag

This test verifies that the DUT is able to detect a NFC tag.

**Table 10-101 NFCDUT\_DetectTag input parameters**

Parameter name	Value	Unit	Description
SelectNFCTech	3 ALL	NA	Select the NFC Polling Protocol.
timeoutMs	5000	ms	Specify the time the test waits for the RF Interface activated notification from the DUT to arrive. This parameter only applies for standalone DUT.
RetryCount	3		Number of times to rerun the test in case the test fails.

**Table 10-102 NFCDUT\_DetectTag output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				Error message
ErrorCode				Value is 0 if no error, 1 is any error

### 10.7.2 NFCDUT\_DetectField

This test verifies the DUT is able to detect an externally generated NFC field. The DUT is setup to listen for all the three protocols – POLLA, POLLB and POLLF

**Table 10-103 NFCDUT\_DetectField input parameters**

Parameter name	Value	Unit	Description
timeoutMs	5000	ms	Specify the time the tests waits for the RF Field info notification to arrive from the DUT. This parameter only applies for standalone DUT.
RetryCount	3		Number of times to rerun the test in case the test fails.

**Table 10-104 NFCDUT\_DetectField output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
errorMessage				Error message
ErrorCode				Value is 0 if no error, 1 is any error

## 10.7.3 NFCDUT\_SelfTest

This test verifies executes the firmware based SelfTest function and reports the results. The firmware test limits for RFOsc count can be set using input parameters.

**Table 10-105 NFCDUT\_SelfTest input parameters**

Parameter name	Value	Unit	Description
CheckSWP1	1	N.A	Enter 1 to enable SWP1 check, 0 to disable
CheckSWP2	1	N.A	Enter 1 to enable SWP2 check, 0 to disable
iRfOscLL	109936	N.A	Enter the lower limit RF Oscillator count value to check for pass/fail
iRfOscUL	132800	N.A	Enter the upper limit RF Oscillator count value to check for pass/fail

**Table 10-106 NFCDUT\_SelfTest output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorCodeNFCEE			N.A	0= PASS, 1 = FAIL, 2= TIMEOUT, 3 = ERROR
ErrorCodeRfOsc			N.A	0= PASS, 1 = FAIL, 2= TIMEOUT, 3 = ERROR
ErrorCodeCarrierDet			N.A	0= PASS, 1 = FAIL, 2= TIMEOUT, 3 = ERROR
NFCEE			N.A	Read NFCEE value
RfOsc			N.A	RfOsc Count value
CarrierDet			N.A	Carrier Detect value
errorMessage			N.A	Error message

## 10.8 NFC reference parametric test description

### 10.8.1 SetInstrumentConfigFile

This test sets the instrument config xml file for the test suite. The instrument config file contains details about the NFC Tester to be used and the power supply being used.

**Table 10-107 SetInstrumentConfigFile input parameters**

Parameter name	Value	Unit	Description
InstrumentConfigFilename	C:\Qualcomm\WCN\ProdTests\ConfigFiles\NFCTesterConfig.xml	N.A	Full path and name for the instrument config file.

**Table 10-108 SetInstrumentConfigFile output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.2 NFCDUT\_SetConfigFile

This test sets the DUT config xml file for the test suite. The instrument config file contains details about the DUT Type and the connection details for the DUT.

**Table 10-109 NFCDUT\_SetConfigFile input parameters**

Parameter name	Value	Unit	Description
NFCDUTConfigFilename	C:\Qualcomm\WCN\ProdTests\ConfigFiles\NFCDUTConfig.xml	N.A	Full path and name for the DUT config file.

**Table 10-110 NFCDUT\_SetConfigFile output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.3 NFCDUT\_Instantiate

This test reads the loaded DUTconfig file and sets the DUT type for the Test Suite – Serial/SoC or MTP/Phone. The two possible DUT interface strings are QC.CTE.NFCTestSuite.NFCDUT\_SoC and QC.CTE.NFCTestSuite.NFCDUT\_MTP.

**Table 10-111 NFCDUT\_Instantiate output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
DUTInterface			N.A	This parameter displays the DUT interface type set in the config file.
ErrorMessage			N.A	Error message

## 10.8.4 DUT\_InitFramework

This test starts up the test framework. This test also sets the path for the folder that contains installed TCL files/binaries.

**Table 10-112 DUT\_InitFramework input parameters**

Parameter name	Value	Unit	Description
tclInstallPath	C:\Qualcomm\WCN\ProdTests\bin\TCL\	N.A	Provide the directory path for the tcl installation folder

**Table 10-113 InitFramework output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.5 EnableDUTPower

This test turns ON the power supply specified in the instrument config file.

**Table 10-114 EnableDUTPower input parameters**

Parameter name	Value	Unit	Description
voltage		Volts	The voltage for the power supply

**Table 10-115 EnableDUTPower output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.6 WaitForPortToExist

This test waits for the port to be available until the specified timeout.

**Table 10-116 WaitForPortToExist input parameters**

Parameter name	Value	Unit	Description
portName	COM37	N.A	Specify the port name to be checked for availability
timeoutMs		millisec	Time in milliseconds to wait before failing the test.

**Table 10-117 WaitForPortToExist output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.7 NFCDUT\_RunTopLevelScript

This test only applies to standalone/SoC type DUT.

Qualcomm NFC EVK/EVB boards need to be initialized by a tcl script to initialize all the clocks and voltages on the board. This test runs the specified top level script.

**Table 10-118 NFCDUT\_RunTopLevelScript input parameters**

Parameter name	Value	Unit	Description
filename		N.A	Specify the path to the top level tcl script
workingDirectory		N.A	The directory path of the tcl file

Parameter name	Value	Unit	Description
TopLevelI2C_API	None_ScriptOpensPort, TopLevelI2C_API_FM, TopLevelI2C_API_NFC	Dropdown Selection	Select which type of port access API's the script uses – NFC API's, FM API's or None (Script will open and close the correct ports)

**Table 10-119 NFCDUT\_RunTopLevelScript output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

### 10.8.8 NFCDUT\_Connect

This test will try to open the port and connect to the DUT.

**Table 10-120 NFCDUT\_Connect output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

### 10.8.9 NFCDUT\_PatchFirmwareUsingPatchFile

This test only applies to Standalone/SoC type DUT. This test will download the tcl based patch to the DUT.

**Table 10-121 NFCDUT\_PatchFirmwareUsingPatchFile input parameters**

Parameter name	Value	Unit	Description
FileName		NA	Specify the file path to the patch file (signedtclpatch.out file)

**Table 10-122 NFCDUT\_PatchFirmwareUsingPatchFile output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

### 10.8.10 InitializeNFCTester

This test initializes the NFC Tester. This test has to be run before any other NFC Tester based tests. *If using LitePoint IQNFC, please start the LitePoint SCPI server before running this test. Refer to Section 3.10 for LitePoint software installation.*

Supported Test Box: LitePoint IQNFC

**Table 10-123 InitializeNFCTester input parameters**

Parameter name	Value	Unit	Description
testerConfigFileName	C:\Qualcomm\WCN\ ProdTests\ConfigFiles\ NFCTesterConfig.xml	NA	Provide the path to the tester config xml file for NFC
NFCTesterResourceID	NFCTester	NA	Specify the Equipment resource ID

**Table 10-124 NFCDUT\_DetectTag output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

### 10.8.11 NFCTesterCalibrate

**NOTE:** Calibration is required to capture the baseline (no DUT) return loss values for the NFC Tester. NFCTesterCalibrate should be run in the actual test setup/fixture but *without the DUT*. Since the procedure is sensitive to external electromagnetic interference and proximity to metal, it is recommended that the test be performed without any NFC coils, electronic equipment, metal object etc. in the close vicinity of the NFC Tester antenna. One feet or more of clearance is recommended.

**NOTE:** Please run this test once *manually* without the DUT to set up the calibration.

This test is disabled by default so it won't run automatically every time the tree is run. The calibration file will be saved on the local machine with the name provided in the input parameters. The file path is always fixed and does not need to be specified. This same file name then needs to be loaded in the subsequent test 'NFCTesterLoadCalibration' which is run every time the tree is run.

This test only needs to be rerun if the configuration of the test fixture changes.

Supported Test Box: LitePoint IQNFC

Pre-requisite Test: InitializeNFCTester has to be run before this test.

**Table 10-125 NFCTesterCalibrate input parameters**

Parameter name	Value	Unit	Description
FileName	NFCTesterCalibration1	NA	
FS	0	dBvpeak	Field Strength to use for calibration
FreqStart	12	MHz	Start frequency for calibration
FreqStep	0.005	MHz	Frequency step/resolution for calibration
FreqStop	16	MHz	End frequency for calibration

**Table 10-126 NFCTesterCalibrate output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.12 NFCTesterLoadCalibration

This test loads the previously saved calibration file. This test needs to be run before any resonance sweep or Resonance Find tests are run.

Supported Test Box: LitePoint IQNFC

**Table 10-127 NFCTesterLoadCalibration input parameters**

Parameter name	Value	Unit	Description
FileName	NFCTesterCalibration1	NA	Specify the file name for the previously saved calibration file.

**Table 10-128 NFCTesterLoadCalibration output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.13 NFCDUT\_CoreResetAndInit

This test sends a core reset followed by a core init command to the chip. This applies to both SoC and phone type DUT.

**Table 10-129 NFCDUT\_CoreResetAndInit output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.14 NFCDUT\_ConfigureDUT

This test sets up the DUT for a specific test. The test type and the NFC protocol type needs to be selected.

**Table 10-130 NFCDUT\_ConfigureDUT input parameters**

Parameter name	Value	Unit	Description
SelectTestType	Frequency Sweep Test, Initiator test, Target test or P2P tests	<i>Dropdown selection</i>	Select one of the test type to set up the DUT for. P2P test is not supported currently.
SelectNFCTech	A, B, F, All	<i>Dropdown selection</i>	Selects the NFC technology type

**Table 10-131 NFCDUT\_ConfigureDUT output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.15 ConfigureNFCTester

This test sets up and configures the NFC tester. The NFC tester needs to be configured prior to the test being performed. The three types of tests supported are Frequency Sweep Test, Initiator Tests and Target Tests. P2P tests are not currently supported.

Supported Test Box: LitePoint IQNFC

**Table 10-132 ConfigureNFCTester input parameters**

Parameter name	Value	Unit	Description
SelectTestType	Frequency Sweep Test, Initiator test, Target test or P2P tests	<i>Dropdown selection</i>	Select one of the test type to set up the NFC Tester for. P2P test is not supported currently.
SelectNFCTech	A, B, F, All	<i>Dropdown selection</i>	Selects the NFC technology type
ResonatorType	OFF, RES_13_56MHZ, RES_15MHZ, RES_16_1MHZ	<i>Dropdown selection</i>	Selector the coupling resonance for the NFC Tester
CaptureLength		s	Specify the capture length for the NFC captures in seconds
DataRate	RATE_R106, RATE_R212, RATE_R424	<i>Dropdown selection</i>	Select the data rate for the NFC tester transceiver
ModDepth		<i>Dropdown selection</i>	Select the modulation depth for the NFC Tester Initiator mode
FieldStrength	Allowed range -30 to 24	dBVp	Specifies the field strength for initiator mode in dBv peak. This field Strength will be used for Initiator mode tests and Resonance Sweep tests.
FreqStart	12	MHz	Starting frequency for Resonance Sweep tests
FreqStop	16	MHz	End Frequency for Resonance Sweep Tests
FreqStep	0.005	MHz	Frequency step/resolution for Resonance Tests

**Table 10-133 ConfigureNFCTester**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

**10.8.15.1 Default Settings for Configure NFC Tester****Table 10-134 Type A initiator test default tester configuration**

Parameter name	Value
SelectTestType	INITIATOR TEST
SelectNFCTech	A
ResonatorType	RES_13_56MHZ,
CaptureLength	0.1
DataRate	RATE_R106
ModDepth	M100
FieldStrength	6
FreqStart	12 (not applicable for this test mode)
FreqStop	16 (not applicable for this test mode)
FreqStep	0.005 (not applicable for this test mode)

**Table 10-135 Type B initiator test default tester configuration**

Parameter name	Value
SelectTestType	INITIATOR TEST
SelectNFCTech	B
ResonatorType	RES_13_56MHZ,
CaptureLength	0.1
DataRate	RATE_R106
ModDepth	M10
FieldStrength	6
FreqStart	12 (not applicable for this test mode)
FreqStop	16 (not applicable for this test mode)
FreqStep	0.005 (not applicable for this test mode)

**Table 10-136 Type F initiator test default tester configuration**

Parameter name	Value
SelectTestType	INITIATOR TEST
SelectNFCTech	F
ResonatorType	RES_13_56MHZ,
CaptureLength	0.1
DataRate	RATE_R212
ModDepth	M100

Parameter name	Value
FieldStrength	6
FreqStart	12 (not applicable for this test mode)
FreqStop	16 (not applicable for this test mode)
FreqStep	0.005 (not applicable for this test mode)

**Table 10-137 Type A target test default tester configuration**

Parameter name	Value
SelectTestType	TARGET_TEST
SelectNFCTech	A
ResonatorType	RES_13_56MHZ,
CaptureLength	0.1
DataRate	RATE_R106
ModDepth	M100
FieldStrength	6
FreqStart	12 (not applicable for this test mode)
FreqStop	16 (not applicable for this test mode)
FreqStep	0.005 (not applicable for this test mode)

**Table 10-138 Type B target test default tester configuration**

Parameter name	Value
SelectTestType	TARGET_TEST
SelectNFCTech	B
ResonatorType	RES_13_56MHZ,
CaptureLength	0.1
DataRate	RATE_R106
ModDepth	M10
FieldStrength	6
FreqStart	12 (not applicable for this test mode)
FreqStop	16 (not applicable for this test mode)
FreqStep	0.005 (not applicable for this test mode)

**Table 10-139 Type F target test default tester configuration**

Parameter name	Value
SelectTestType	TARGET_TEST
SelectNFCTech	F
ResonatorType	RES_13_56MHZ,
CaptureLength	0.1
DataRate	RATE_R212
ModDepth	M100
FieldStrength	6

Parameter name	Value
FreqStart	12 (not applicable for this test mode)
FreqStop	16 (not applicable for this test mode)
FreqStep	0.005 (not applicable for this test mode)

**Table 10-140 Resonance test default tester configuration**

Parameter name	Value
SelectTestType	FREQ_SWEEP_TEST
SelectNFCTech	A (not applicable for this test mode)
ResonatorType	OFF
CaptureLength	0.1 (not applicable for this test mode)
DataRate	RATE_R212 (not applicable for this test mode)
ModDepth	M100 (not applicable for this test mode)
FieldStrength	0
FreqStart	12
FreqStop	16
FreqStep	0.005

### 10.8.16 NFCDUT\_FindResonance

This test is applicable to SoC/Standalone type DUT. The main purpose of this test is to find the cap code to calibrate the DUT matching for fixture specific impedance variations.

This test finds the cap code corresponding to the required resonance frequency using the NFC Tester. Cap codes are written to specific NVM registers specified by the Payload Format parameter to tune the resonance frequency. Maximum and minimum possible Cap Codes are taken as input parameters. These values set the boundaries for the test to sweep the Cap Code.

The test uses an iterative algorithm to find the cap code corresponding to the target resonance frequency within the specified tolerance. Initial estimation for the cap code is calculated by interpolating from the measured maximum and minimum possible resonance frequency.

The algorithm halts and exits if any of the following situations are encountered:

1. Resonance frequency within the specified tolerance has been attained.
2. Maximum or Minimum Cap Code reached. The target frequency is probably out of range.
3. Minimum Cap Code resolution reached. Finer tuning using Cap Code is not possible.

It is recommended that QSPR output parameter limits should be set on 'FreqError' parameter to enable a pass/fail condition for this test. The final achieved Cap Code will be copied to a QSPR global variable which will be used in the tests that follow.

Supported Test Box: LitePoint IQNFC

**Table 10-141 NFCDUT\_FindResonance input parameters**

Parameter name	Value	Unit	Description
PayloadFormat	00 00 00 02 00 82 02 00	N.A	This is the format for the NCI command to be used for setting the NVM. It contains the public register address for the Target Rx Cap NVM
TargetTuneFreq		MHz	The required Resonance frequency
Tolerance	0.02	MHz	Target tolerance for the achieved frequency.
MinCapCode	00	N.A	Minimum valid Cap Code
MaxCapCode	1F	N.A	Maximum valid Cap Code

**Table 10-142 NFCDUT\_FindResonance output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
CapCode			N.A	Final achieved Cap Code by the test
AchievedFreq			MHz	Final Achieved frequency corresponding to the achieved Cap Code
FreqError			MHz	Frequency difference between Target and actual achieved frequency. It is recommended that the FreqError test limits be set higher than the input parameter 'Tolerance'.
ErrorCode			N.A	Status code explaining the algorithm status: 0 = no error, 1 = generic error, 2 = max/min cap code reached, 3 = max iteration count of 8 reached 4 = accuracy limited by cap code tuning resolution.
ErrorMessage			N.A	Error message

## 10.8.17 NFCDUT\_TuneCapNVM

This test updates the NVM with the provided CapCode and the payload format. It uses the provided payload format to generate the NCI command string. The payload format also contains the public address for the NVM register.

**Table 10-143 NFCDUT\_TuneCapNVM input parameters**

Parameter name	Value	Unit	Description
PayloadFormat	00 00 00 02 00 82 02 00	N.A	This is the format for the NCI command to be used for setting the NVM. It contains the public register address for the Target Rx Cap NVM
CapCode		N.A	The CapCode to be written.

**Table 10-144 NFCDUT\_TuneCapNVM output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.18 InitiatorTest

This test measures RF parametric of the DUT Initiator Tx signal. This test will capture and report details of the first poll signal within the capture length specified in the ConfigureNFCTester test. The ConfigureNFCTester and ConfigureDUT should be run every time before this test so that the DUT and the NFC tester have been configured to the correct NFC protocols, test type (initiator test) and other setup details.

Supported Test Box: LitePoint IQNFC

Pre-requisite setup tests:

- NFCDUT\_ConfigureDUT (please select Initiator test for test type and the required NFC protocol type)
- ConfigureNFCTester (please select Initiator test for test type and the required NFC protocol type and other details to match the protocol type. Refer to section [10.8.15.1](#) for more details regarding default for each protocol)

Test Scenario: The NFC Tester is configured to be a target and the DUT as an initiator.

**Table 10-145 InitiatorTest input parameters**

Parameter name	Value	Unit	Description
NfcType	NFCA, NFCB, NFCF, NFCP2P	<i>Dropdown selection</i>	Select the NFC protocol type. Only the selected NFC initiator signal parametric data will be reported. Other NFC types if present will be ignored. NFCP2P is currently not supported.
RetryCount	3	N.A	This is the number of times the test will retry, if it fails to find the Polling signal.

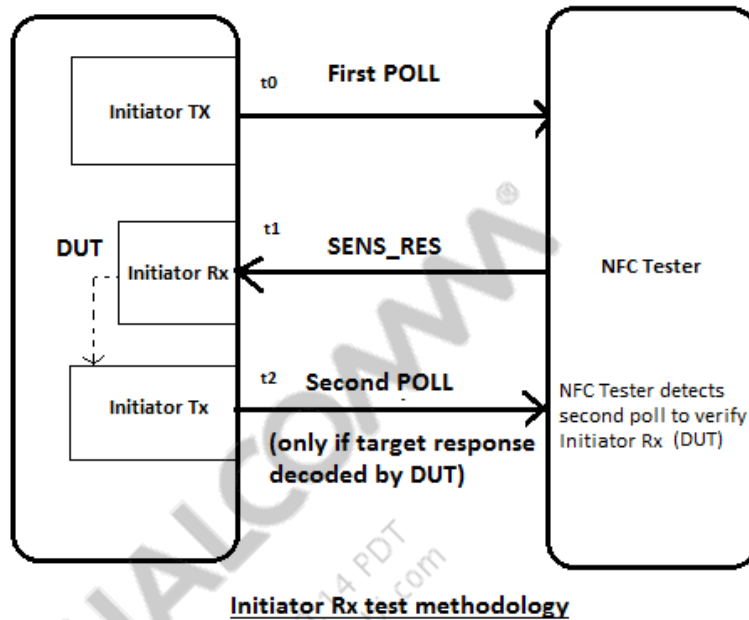
**Table 10-146 InitiatorTest output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
Meas_FS			mA/m	This is the measured Field Strength in mA/m for the DUT Initiator field
Meas_DataRate			Kbps	Measured data rate for the initiator signal
Mod_Index			%	Modulation index. Applicable for NFC B and F
Mod_Depth			%	Modulation depth. Applicable for NFC A
Carrier_Freq_Offset			Hz	Measured Carrier frequency offset in Hz
Rise_Time			µs	Applicable to NFC B and F
Fall_Time			µs	Applicable to NFC B and F
Rise_Overshoot			%	Applicable to NFC B and F
Rise_Undershoot			%	Applicable to NFC B and F
Fall_Overshoot			%	Applicable to NFC B and F
Fall_Undershoot			%	Applicable to NFC B and F
Bits				Comma separated string of decoded bits
CRC			bool	CRC check result
t1			µs	Applicable to NFC A
t2			µs	Applicable to NFC A
t3			µs	Applicable to NFC A
t4			µs	Applicable to NFC A
t5			µs	Applicable to NFC A
ErrorMessage				Error message

### 10.8.19 InitiatorRxTest

This test checks the functionality of the Initiator Rx block. The test methodology is shown in the figure. The NFC tester responds to the polling from the DUT with SENS\_RES. The DUT upon successfully receiving SENS\_RES, will send the next Poll in accordance with the NFC protocol. This test checks for this second poll to verify that the DUT Initiator Rx is functional.

The ConfigureNFCtester and ConfigureDUT should be run every time before this test so that the DUT and the NFC tester have been configured to the correct NFC protocols, test type (initiator test) and other setup details.



Supported Test Box: LitePoint IQNFC

Pre-requisite setup tests:

- NFCDUT\_ConfigureDUT (select Initiator test for test type and the required NFC protocol type)
- ConfigureNFCTester (select Initiator test for test type and the required NFC protocol type and other details to match the protocol type. Refer to section 10.8.15.1 for more details regarding default for each protocol)

Test Scenario: The NFC Tester is configured to be a target and the DUT as an initiator.

**Table 10-147 Initiator Rx test input parameters**

Parameter name	Value	Unit	Description
NfcType	NFCA, NFCB, NFCF, NFCP2P	Dropdown selection	Select the NFC protocol type. Only the selected NFC initiator signal parametric data will be reported. Other NFC types if present will be ignored. NFCP2P is currently not supported.
RetryCount	3	N.A	This is the number of times the test will retry, if it fails to find the Polling signal.

**Table 10-148 Initiator Rx test output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
Poll1Bits				Comma separated string of decoded bits for 1st POLL
Poll2Bits				Comma separated string of decoded bits for 2 <sup>nd</sup> POLL
ErrorCode	0	0		0 if no error(Test passed) and 1 if any error(Test Failed)
ErrorMessage				Error message

## 10.8.20 TargetTest

This test measures RF parametric of the DUT target Tx signal. This test will capture and report details of the first target response signal within the capture length specified in the ConfigureNFCTester test. The ConfigureNFCTester and ConfigureDUT should be run every time before this test so that the DUT and the NFC tester have been configured to the correct NFC protocols, test type (set as target test) and other setup details.

Supported Test Box: LitePoint IQNFC

Pre-requisite setup tests:

- NFCDUT\_ConfiguredDUT (please select target test for test type and the required NFC protocol type),
- ConfigureNFCTester (please select target test for test type and the required NFC protocol type and other details to match the protocol type. Refer to section 10.8.15.1 for more details regarding default for each protocol)

Test Scenario: The NFC Tester is configured to be an initiator and the DUT as a target.

**Table 10-149 TargetTest input parameters**

Parameter name	Value	Unit	Description
NfcType	NFCA, NFCB, NFCF, NFCP2P	<i>Dropdown selection</i>	Select the NFC protocol type. Only the selected NFC initiator signal parametric data will be reported. Other NFC types if present will be ignored. NFCP2P is currently not supported.
RetryCount	3	N.A	This is the number of times the test will retry, if it fails to find the Polling signal.

**Table 10-150 TargetTest output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
Meas_DataRate			Kbps	Measured data rate for the target response
Frame_Delay_Time			µs	Frame delay time in sec
Load_Modulation			mA/m	measured load modulation in volts

Parameter Name	Lower Limit	Upper Limit	Unit	Description
Mod_Index			%	Not used
Mod_Depth			%	Not used
Volt_Peak_to_Peak			mA/m	Peak to peak measurement for the RF envelop
SubCarrierFrequency			kHz	Measured sub carrier frequency for load modulation
Bits				Comma separated string of decoded data bits in the target response
CRC			bool	CRC check
ErrorMessage				Error message

## 10.8.21 ResonanceTest

This test measures resonance of the DUT NFC antenna system. This test will capture and report the Measured resonance frequency, the associated Q and the Bandwidth of the resonance network. The ConfigureNFCTester and ConfigureDUT should be run every time before this test so that the DUT and the NFC tester have been configured to the correct mode and test type (Frequency Sweep test).

Supported Test Box: LitePoint IQNFC

Pre-requisite setup tests:

NFCDUT\_ConfigureDUT (please select target test for test type. This will put the DUT in listen mode. Other modes like CoreResetAndInit can be selected depending on the user requirement)

ConfigureNFCTester (please select `FREQ_SWEEP_TEST` for test type other details to match the protocol type. Refer to section [10.8.15.1](#) for more details regarding default for each protocol)

The Frequency Start, Stop, and the FS Level set during the creation of the Calibration file should match the settings in ConfigureTester test. Loading the matching calibration file is required for this test.

Test Scenario: The NFC Tester is configured for Resonance sweep and the DUT can be configured in a mode deemed appropriate by the user.

**Table 10-151 ResonanceTest output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
Freq			MHz	Measured resonance frequency in MHz. Calculated using geometric mean of the 3dB points
Q			N.A	Q of the resonance network
BW_3dB			kHz	3dB Bandwidth
ErrorMessage			N.A	Error message

## 10.8.22 Disconnect

This test disconnects all the open ports.

**Table 10-152 Disconnect output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

## 10.8.23 Shutdown

This test shuts down the test suite framework and releases all the resources.

**Table 10-153 Shutdown output parameters**

Parameter Name	Lower Limit	Upper Limit	Unit	Description
ErrorMessage			N.A	Error message

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