



# ORAN ODU Emulation

## OneAdvisor 800

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## 1. Scope

This document describes how to configure the OneAdvisor for ORAN ODU Emulation, including:

- O-RU Connectivity
- M-Plane Results
- S-Plane Results
- VSWR Results

The required products and parts to complete this procedure are as follows:

Description	Diagram
OneAdvisor with the following functions: <ul style="list-style-type: none"> <li>- ONA-800 mainframe equipped with the following module/Firmware/Licenses:               <ul style="list-style-type: none"> <li>o SPA06MA-O: SPA Module with Optical Board</li> <li>o Firmware version 4.2.1</li> <li>o ODU-E Licenses</li> </ul> </li> </ul>	 <p>ONA Front View.</p>
SFP+ for 10GBPS	 <p>SM SFP+</p>
Duplex Singlemode Fiber cable (potentially using the existing cable that connects to the RU)	 <p>Duplex SM Fiber</p>

## 2. OneAdvisor Overview

The OneAdvisor is a portable instrument for Cell Site installation and maintenance, the main test functions of OneAdvisor for cell site installation include:



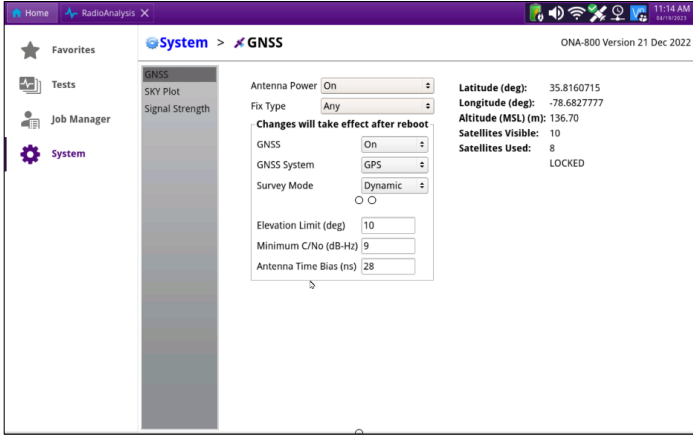
- Cable and antenna analysis up to 6GHz
- Fiber Inspection verification and Fiber validation (OTDR)
- Ethernet/VLAN testing
- ODU Emulation

### 2.1 ORAN ODU Emulation

The following procedure describes the steps to perform ORAN ODU Emulation analysis with OneAdvisor800. Successful results of this test prove that the radio is powered, connected, and ready to communicate with the actual DU. If this process fails to reach that end, one can troubleshoot based on what phase the process could/could not achieve.

### 2.1.1 Initial Setup

The following procedure describes the initial setup of ODU Emulation analysis, including turn-up and connectivity.

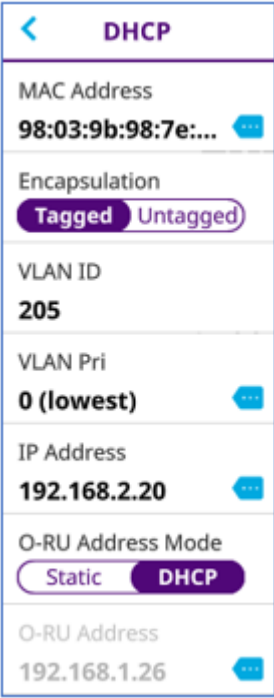

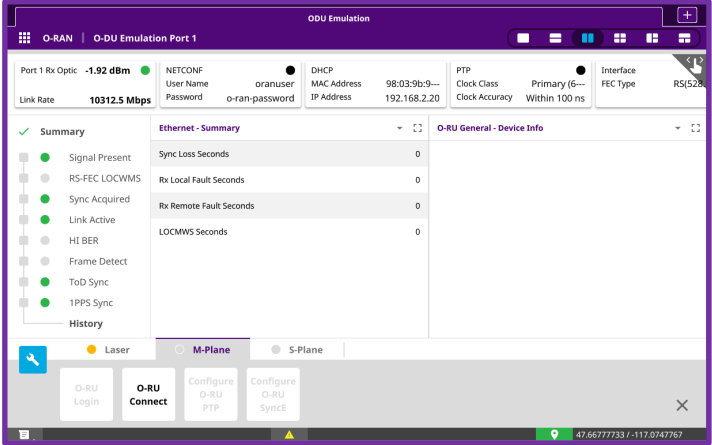
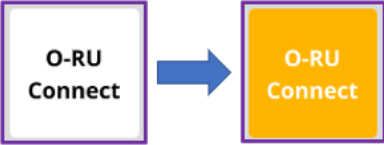
Step	Action	Description
1	Power ON OneAdvisor	Press and hold the ON/OFF button for 3 seconds to power on the One Advisor  
2	Connectivity: <ul style="list-style-type: none"> <li>- Insert the SFP+ into Port 1 on the optical board</li> <li>- Inspect, Clean, and connect a duplex fiber between the ONA and the RU under test</li> </ul>	 <div style="display: flex; justify-content: space-around; width: 100%;"> <span>ONA Front View.</span> <span>ORU Example</span> </div>
3	Enable GPS: <ul style="list-style-type: none"> <li>- Connect the GPS antenna to the SMA port</li> <li>- Select {Home}, {System}, {GNSS}</li> <li>- Set Antenna Power to: ON</li> <li>- Ensure the OneAdvisor gets a lock and displays Lat/Long</li> </ul>	

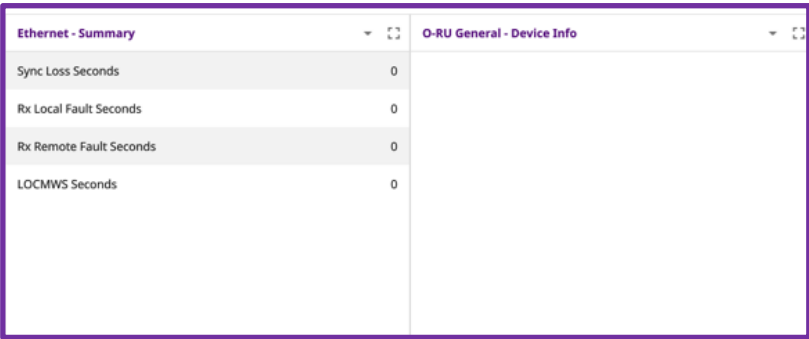
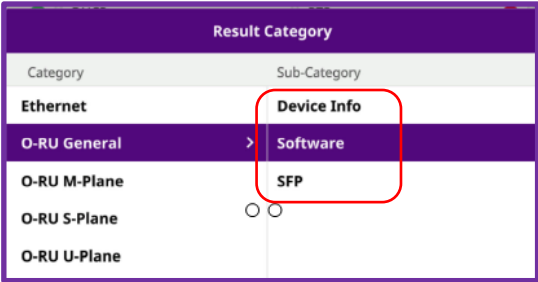
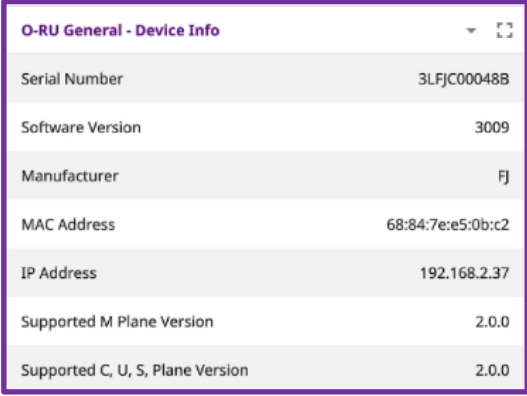
Step	Action	Description
4	<p>ORAN ODU Emulation mode:</p> <ul style="list-style-type: none"> <li>- Select {Home}, {Tests}, {Radio Analysis}, {O-DU Emulation}</li> </ul>	<p>ORAN ODU Emulation Measurement Mode</p> <p>ORAN ODU Emulation Measurement Screen</p>

### 2.1.2 ORAN ODU Emulation Testing – M-Plane RU Query

The following procedure describes the steps to perform ODU Emulation tests with OneAdvisor.

Step	Action	Description
1	<p>ODU Emulation Link Rate:</p> <ul style="list-style-type: none"> <li>- Set the Optical Link Rate to 10312.5 Mbps.</li> </ul> <p><i>Note: If testing a 25Gbps RU, use an SFP28 and set the link rate to 25781.5 Mbps</i></p>	<p>SFP+ Optical Link Rate</p>
2	<p>Set the Master (ONA) IP Address and VLAN ID :</p> <ul style="list-style-type: none"> <li>- Select the DHCP field and set the IP Address to 192.168.2.20</li> <li>- Set the VLAN to a value between than 200 and 210 (i.e., 205)</li> <li>- Verify the Encapsulation is set to Tagged</li> </ul>	<p>Top bar DHCP group</p> <p>Side-bar configuration icon</p>

Step	Action	Description
	<ul style="list-style-type: none"> <li>- Verify the O-RU Address Mode is set to DHCP</li> </ul>	 <p style="text-align: center;">Setting IP Address and VLAN Information</p>
3	<p>Start the ODU Emulation Process:</p> <ul style="list-style-type: none"> <li>- Turn ON the ONA Laser</li> <li>- Select the M-Plane tab</li> <li>- If the RU is powered and connected there will be green lights on the Summary area of the screen</li> </ul>	 
4	<p>Connect to the RU:</p> <ul style="list-style-type: none"> <li>- Press the O-RU Connect button to start the communications with the RU</li> </ul>	

Step	Action	Description
5	<p>Reading the RU Data:</p> <ul style="list-style-type: none"> <li>- If operating properly, the radio should be attempting to communicate through VLAN IDs 201 to 210.</li> <li>- Once the radio wraps around to the VLAN set on the OneAdvisor (205), the initial connection will be made.</li> <li>- This could take up to 3 minutes.</li> <li>- The following screens are available from the O-RU M-Plane</li> </ul>	<p>The User Interface has two results screens that can be changed as desired. Click in the header to change either screen.</p>  <p><b>Results Categories and Sub-Categories</b></p>  <p><b>O-RU General &gt; Device Info (below)</b></p>  <p><b>O-RU General &gt; Software Information (below)</b></p>

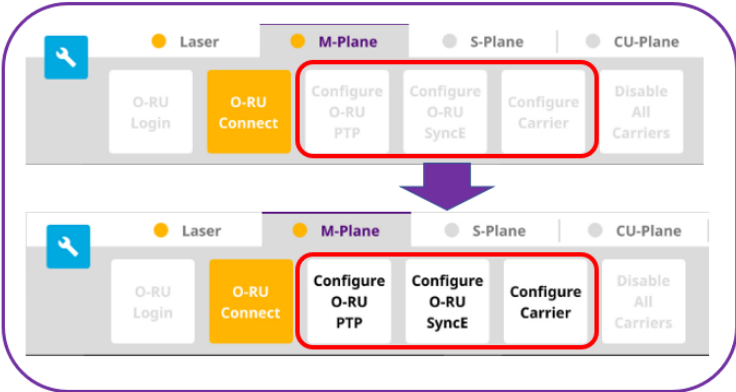
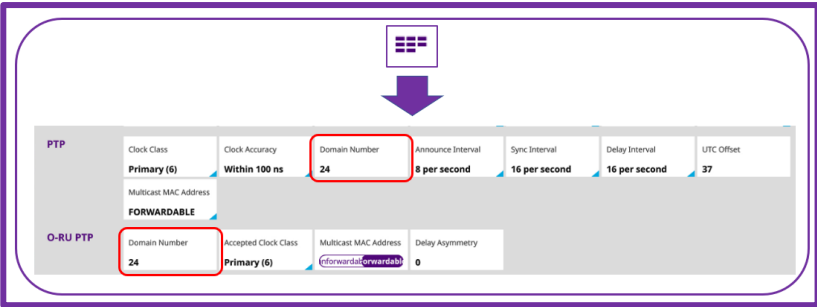
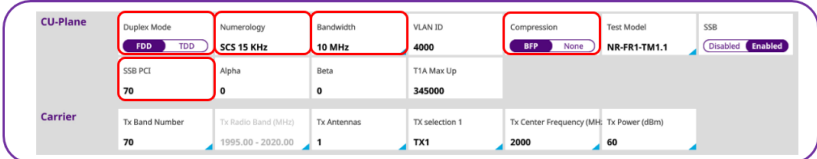
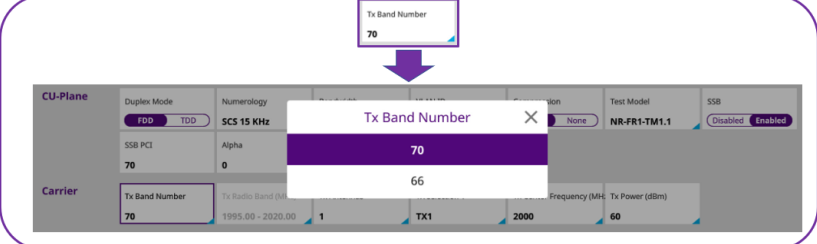
Step	Action	Description																																																												
		<div> <p><b>O-RU General - Software</b></p> <table border="1"> <tr><td>Slot 1</td><td>slot0</td></tr> <tr><td>Status 1</td><td>0</td></tr> <tr><td>Product Code 1</td><td>N712926R</td></tr> <tr><td>Vendor Code 1</td><td>FJ</td></tr> <tr><td>Build ID 1</td><td>5021</td></tr> <tr><td>Build Name 1</td><td>FJ-RU-RTB-----3009.FGF</td></tr> <tr><td>Build Revision 1</td><td>3009</td></tr> <tr><td>Slot 2</td><td>slot1</td></tr> <tr><td>Status 2</td><td>0</td></tr> <tr><td>Product Code 2</td><td>N712926R</td></tr> <tr><td>Vendor Code 2</td><td>FJ</td></tr> </table> </div> <p>O-RU General &gt; SFP Information (below)</p> <div> <p><b>O-RU General - SFP</b></p> <table border="1"> <tr><td>SFP 1 Interface Name</td><td>fheth0</td></tr> <tr><td>SFP 1 Port Number</td><td>0</td></tr> <tr><td>SFP 1 Vendor Name</td><td>000000SFP-10GS</td></tr> <tr><td>SFP 1 Rx Power (dBm)</td><td>-5.2</td></tr> <tr><td>SFP 1 Tx Power (dBm)</td><td>-1.8</td></tr> <tr><td>SFP 1 Bias Current (mA)</td><td>6.4</td></tr> <tr><td>SFP 1 Voltage (mV)</td><td>3,340.8</td></tr> <tr><td>SFP 1 Temperature (C)</td><td>54.7</td></tr> </table> </div> <p>O-RU M-Plane &gt; Capability (below)</p> <div> <p><b>O-RU M-Plane - Capability</b></p> <table border="1"> <tr><td>Supported Category</td><td>Category A</td></tr> <tr><td>Supported Number of Ports</td><td>8</td></tr> <tr><td>Number of Spatial Streams</td><td>4</td></tr> <tr><td>Max Power per PA Antenna (dBm)</td><td>49.0</td></tr> <tr><td>Min Power per PA Antenna (dBm)</td><td>37.0</td></tr> <tr><td>IQ Sample Dynamic Compression Supported</td><td>false</td></tr> <tr><td>IQ Sample Realtime Variable Bitwidth Supported</td><td>false</td></tr> <tr><td>IQ Sample Count of Supported Compression Methods</td><td>1</td></tr> <tr><td>IQ Compression Method 1 IQ Bitwidth</td><td>9</td></tr> <tr><td>IQ Compression Method 1 Compression Type</td><td>Static</td></tr> <tr><td>IQ Compression Method 1 Compression Format Exponent</td><td>4</td></tr> </table> </div>	Slot 1	slot0	Status 1	0	Product Code 1	N712926R	Vendor Code 1	FJ	Build ID 1	5021	Build Name 1	FJ-RU-RTB-----3009.FGF	Build Revision 1	3009	Slot 2	slot1	Status 2	0	Product Code 2	N712926R	Vendor Code 2	FJ	SFP 1 Interface Name	fheth0	SFP 1 Port Number	0	SFP 1 Vendor Name	000000SFP-10GS	SFP 1 Rx Power (dBm)	-5.2	SFP 1 Tx Power (dBm)	-1.8	SFP 1 Bias Current (mA)	6.4	SFP 1 Voltage (mV)	3,340.8	SFP 1 Temperature (C)	54.7	Supported Category	Category A	Supported Number of Ports	8	Number of Spatial Streams	4	Max Power per PA Antenna (dBm)	49.0	Min Power per PA Antenna (dBm)	37.0	IQ Sample Dynamic Compression Supported	false	IQ Sample Realtime Variable Bitwidth Supported	false	IQ Sample Count of Supported Compression Methods	1	IQ Compression Method 1 IQ Bitwidth	9	IQ Compression Method 1 Compression Type	Static	IQ Compression Method 1 Compression Format Exponent	4
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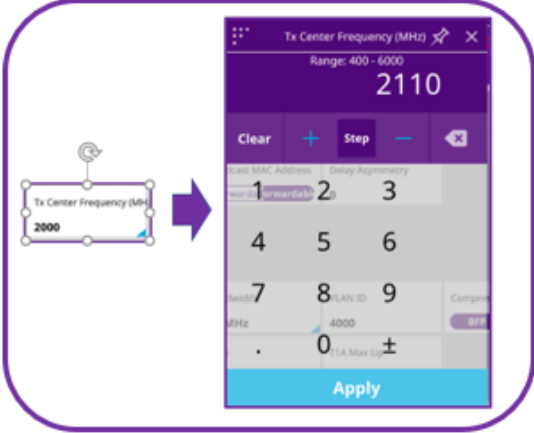
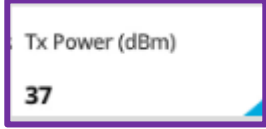

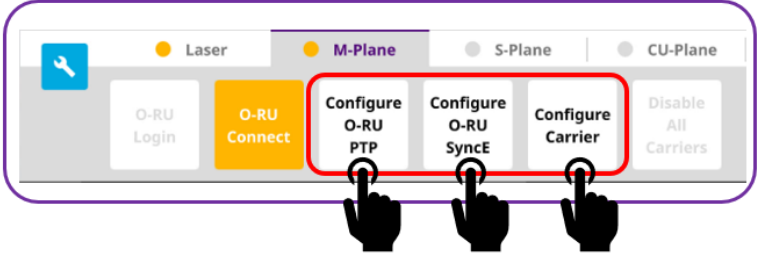

Step	Action	Description																																												
		<p style="text-align: center;">O-RU M-Plane &gt; Bands (below)</p> <div style="border: 1px solid purple; padding: 5px;"> <p><b>O-RU M-Plane - Bands</b> ▾ [ ]</p> <table border="1"> <tr><td>Band 1 Band Number</td><td>71</td></tr> <tr><td>Band 1 Max Supported Freq DL (MHz)</td><td>652.0</td></tr> <tr><td>Band 1 Min Supported Freq DL (MHz)</td><td>617.0</td></tr> <tr><td>Band 1 Max Supported BW DL (MHz)</td><td>35.0</td></tr> <tr><td>Band 1 Max Num Carriers DL</td><td>4</td></tr> <tr><td>Band 1 Max Carrier BW DL (MHz)</td><td>20.0</td></tr> <tr><td>Band 1 Min Carrier BW DL (MHz)</td><td>0.2</td></tr> <tr><td>Band 1 Max Supported Freq UL (MHz)</td><td>698.0</td></tr> <tr><td>Band 1 Min Supported Freq UL (MHz)</td><td>663.0</td></tr> <tr><td>Band 1 Max Supported BW UL (MHz)</td><td>35.0</td></tr> <tr><td>Band 1 Max Num Carriers UL</td><td>4</td></tr> </table> </div> <p style="text-align: center;">O-RU M-Plane &gt; Delay Profile (below)</p> <div style="border: 1px solid purple; padding: 5px;"> <p><b>O-RU M-Plane - Delay Profile</b> ▾ [ ]</p> <table border="1"> <tr><td>T2A Min UP 1 (us)</td><td>132.0</td></tr> <tr><td>T2A Min UP 1 (us)</td><td>452.0</td></tr> <tr><td>T2A Min CP Downlink 1 (us)</td><td>257.0</td></tr> <tr><td>T2A Max CP Downlink 1 (us)</td><td>577.0</td></tr> <tr><td>T2A Min CP Uplink 1 (us)</td><td>125.0</td></tr> <tr><td>T2A Max CP Uplink 1 (us)</td><td>70.0</td></tr> <tr><td>TCP Adv DL 1 (us)</td><td>232.0</td></tr> <tr><td>TA3 Min 1 (us)</td><td>410.0</td></tr> <tr><td>TA3 Max 1 (us)</td><td>0.0</td></tr> <tr><td>T2A Min UP 2 (us)</td><td>132.0</td></tr> <tr><td>T2A Min UP 2 (us)</td><td>452.0</td></tr> </table> </div>	Band 1 Band Number	71	Band 1 Max Supported Freq DL (MHz)	652.0	Band 1 Min Supported Freq DL (MHz)	617.0	Band 1 Max Supported BW DL (MHz)	35.0	Band 1 Max Num Carriers DL	4	Band 1 Max Carrier BW DL (MHz)	20.0	Band 1 Min Carrier BW DL (MHz)	0.2	Band 1 Max Supported Freq UL (MHz)	698.0	Band 1 Min Supported Freq UL (MHz)	663.0	Band 1 Max Supported BW UL (MHz)	35.0	Band 1 Max Num Carriers UL	4	T2A Min UP 1 (us)	132.0	T2A Min UP 1 (us)	452.0	T2A Min CP Downlink 1 (us)	257.0	T2A Max CP Downlink 1 (us)	577.0	T2A Min CP Uplink 1 (us)	125.0	T2A Max CP Uplink 1 (us)	70.0	TCP Adv DL 1 (us)	232.0	TA3 Min 1 (us)	410.0	TA3 Max 1 (us)	0.0	T2A Min UP 2 (us)	132.0	T2A Min UP 2 (us)	452.0
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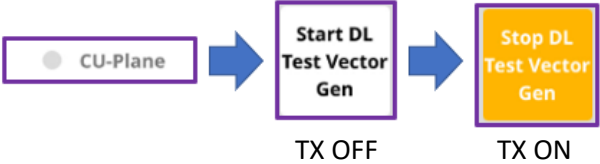
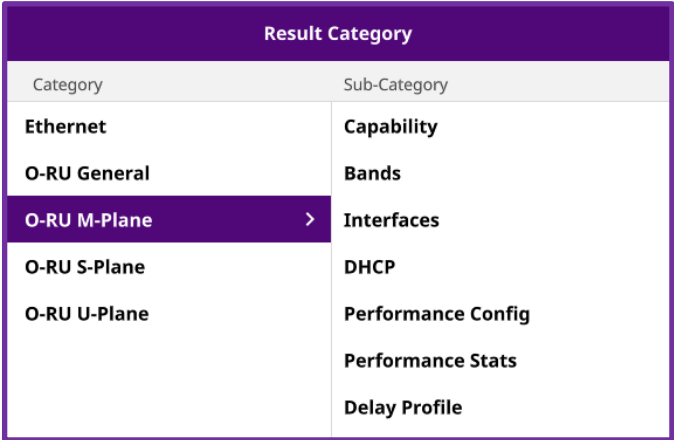
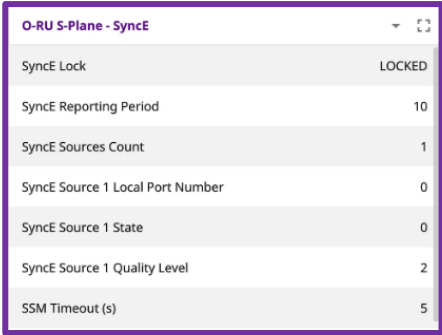
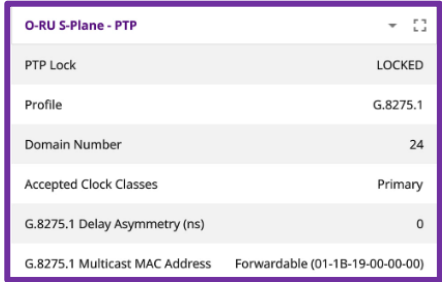




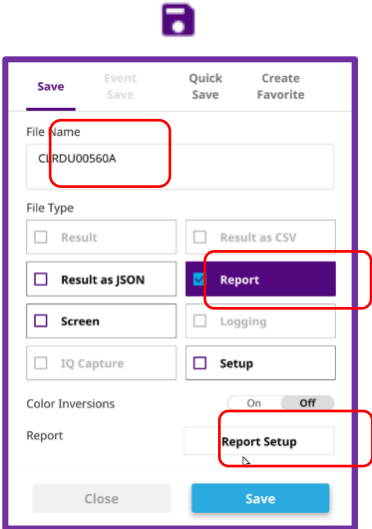
### 2.1.3 ORAN ODU Emulation Testing – S and CU-Plane RU Transmit

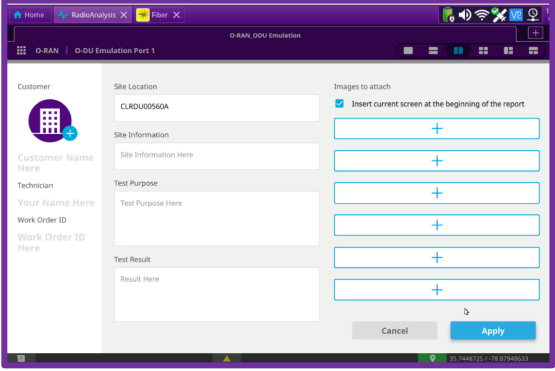
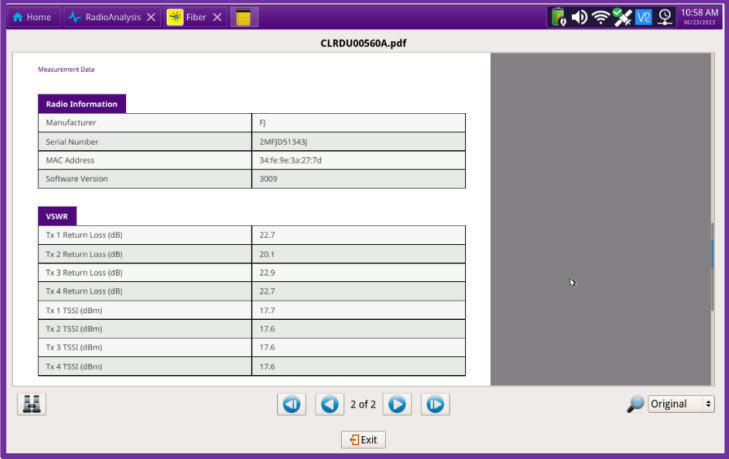
The following procedure describes the steps to perform O-DU Emulation tests with OneAdvisor.

Step	Action	Description
1	<p>Reading the RU Data:</p> <ul style="list-style-type: none"> <li>- After about 3 minutes the RU will respond to the ONA</li> <li>- The PTP and SyncE buttons will activate when the RU is ready</li> </ul>	 <p style="text-align: center;">Wait for the Configuration Buttons to become Active</p>
2	<p>Configuring PTP, and CU Plane</p> <ul style="list-style-type: none"> <li>- Set the Domain Number to 24 for BOTH the ONA AND the O-RU!</li> </ul>	 <p style="text-align: center;">PTP Setting</p>
3	<p>CU-Plane Settings</p> <ul style="list-style-type: none"> <li>- Duplex = FDD</li> <li>- Numerology = 15 kHz</li> <li>- Bandwidth = RU Band Dependent</li> <li>- Compression = BFP</li> <li>- Set the PCI to <b>104</b></li> </ul>	
4	<p>RU Carrier Settings</p> <ul style="list-style-type: none"> <li>- Select the Tx Band Number (this will depend on the radio's capabilities)</li> </ul> <ul style="list-style-type: none"> <li>- Enter the Center Frequency of the Band (the available range will depend on the radio's</li> </ul>	 <p style="text-align: center;">Band Number</p>

Step	Action	Description
	<p>capabilities. Always transmit in Dish owned spectrum)</p>	 <p style="text-align: center;">Center Frequency of Carrier</p>
5	<p>RU TX POWER</p> <ul style="list-style-type: none"> <li>- Set TX Power to lowest allowed by the RU</li> <li>- Press the menu button to exit</li> </ul>	 <p style="text-align: center;">Carrier Power</p>  <p style="text-align: center;">Exit Settings</p>
6	<p>Push Configurations to the RU</p> <ul style="list-style-type: none"> <li>- Press the PTP button to push the config to the RU</li> <li>- Press the SyncE button to push the config to the RU</li> <li>- Press the Configure Carrier button to push the config to the RU</li> </ul> <p>NOTE – The Configure Carrier configuration takes several seconds to finish</p>	 <p style="text-align: center;">Press Each button once</p>
7	<p>Turn on PTP</p> <ul style="list-style-type: none"> <li>- Press the SyncE and the PTP buttons</li> </ul> <p>NOTE - PTP takes 2 minutes to connect and turn green</p>	 <p style="text-align: center;">Timing Buttons</p>

Step	Action	Description
		 <p style="text-align: center;">PTP Sync Status</p>
8	Turning on the Carrier - When you have your measurements Turn Off the carrier	
9	- The following screens are available from the RU	<p style="text-align: center;">ORAN Results Categories and Sub-Categories</p>  <p style="text-align: center;">O-RU S-Plane – SyncE (Below)</p>  <p style="text-align: center;">O-RU S-Plane – PTP (Below)</p>  <p style="text-align: center;">O-RU U-Plane &gt; Tx Array Carriers (below)</p>

Step	Action	Description																												
		<div> <p><b>O-RU U-Plane - Tx Array Carriers</b></p> <table border="1"> <tr><td>Tx Array Carrier 1 Name</td><td>txarraycarrier0</td></tr> <tr><td>Tx Array Carrier 1 Gain (dB)</td><td>37.0</td></tr> <tr><td>Tx Array Carrier 1 Abs Radio Freq Channel</td><td>422000</td></tr> <tr><td>Tx Array Carrier 1 Center Freq of Channel (MHz)</td><td>2,110.0</td></tr> <tr><td>Tx Array Carrier 1 Carrier Channel BW (MHz)</td><td>10.0</td></tr> <tr><td>Tx Array Carrier 1 Active Type</td><td>ACTIVE</td></tr> <tr><td>Tx Array Carrier 1 Carrier State</td><td>READY</td></tr> </table> </div> <p>O-RU Specific &gt; VSWR (below)</p> <div> <p><b>O-RU Specific - VSWR</b></p> <table border="1"> <tr><td>Tx 1 TSSI (dBm)</td><td>17.7</td></tr> <tr><td>Tx 1 Return Loss (dB)</td><td>22.7</td></tr> <tr><td>Tx 2 TSSI (dBm)</td><td>17.6</td></tr> <tr><td>Tx 2 Return Loss (dB)</td><td>20.1</td></tr> <tr><td>Tx 3 TSSI (dBm)</td><td>17.6</td></tr> <tr><td>Tx 3 Return Loss (dB)</td><td>22.9</td></tr> <tr><td>Tx 4 TSSI (dBm)</td><td>17.6</td></tr> </table> </div>	Tx Array Carrier 1 Name	txarraycarrier0	Tx Array Carrier 1 Gain (dB)	37.0	Tx Array Carrier 1 Abs Radio Freq Channel	422000	Tx Array Carrier 1 Center Freq of Channel (MHz)	2,110.0	Tx Array Carrier 1 Carrier Channel BW (MHz)	10.0	Tx Array Carrier 1 Active Type	ACTIVE	Tx Array Carrier 1 Carrier State	READY	Tx 1 TSSI (dBm)	17.7	Tx 1 Return Loss (dB)	22.7	Tx 2 TSSI (dBm)	17.6	Tx 2 Return Loss (dB)	20.1	Tx 3 TSSI (dBm)	17.6	Tx 3 Return Loss (dB)	22.9	Tx 4 TSSI (dBm)	17.6
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10	<p>Save a Report </p> <ul style="list-style-type: none"> <li>- Press Save </li> <li>- Enter a file name</li> <li>- Select Report as the File Type and then click on Report Set-up</li> <li>- Add any additional descriptive information to the fields available here</li> <li>- Click Apply</li> <li>- Then Click Save</li> <li>- Home &gt; System &gt; Files and open the report</li> <li>- From here you can also copy to a USB Drive</li> </ul>																													

Step	Action	Description
		 

### 3. Technical Support

Technical support is provided by:

- Phone: 1-844-GO-VIAVI (1-844-468-4284) options 3-2-3
- Email: [diagnostics.tac@viavisolutions.com](mailto:diagnostics.tac@viavisolutions.com)

Regularly new firmware updates for the CellAdvisor 5G are released and it is recommended to keep the instrument in the latest firmware to provide all the enhancements and bug fixes.

- For additional information of cell site test go to:  
<http://www.viavisolutions.com/en/products/network-test-and-certification/cell-site-test>