



## RFoCPRI Interference Analysis OneAdvisor 800

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## 1. Overview

This procedure describes an alternate PIM troubleshooting methodology centered on using RFoCPRI analysis with the cell site receiver in real-time. Advantages include:

- Intrusive test access to RF connections is not required. Breaking and making these connections
  puts the sector out of service and may not find PIM generated by the radio and incur in
  unnecessary costs due to tower climbs.
- Work can be performed during regular service hours with very small interruption of service (only to insert/remove the optical tap between the BBU and the RRU)
- Minimal customer impact during test process. All carriers are up, and the site processing calls.
- No 'waiting time' on communications with Integrator contractor as RRUs can be put into full power mode and remain in that mode during entire detection / mitigation process
- Improves the effectiveness of PIM hunting and mitigation efforts through immediate feedback from the site's receive path with uplink real-time spectrum.
- Less time and expense will be spent fixing PIM sources that do not reach the site's receiver.
- Uplink monitoring is performed under peak Tx power load from one or all carriers at site whereas PIM testers might be stimulating one or two duplexed ports at a time. See the effect of multiple RRH and carriers (multiband PIM) on the affected uplink Rx
- Validate various power levels and tilts and their effect on PIM, if necessary.



OneAdvisor 800 - RFoCPRI Analysis (PIM Detection)



## 2. Scope

This document describes how to configure the OneAdvisor 800 for RFoCPRI interference analysis.

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

Description	Diagram
<ul> <li>OneAdvisor 800 with the following functions: <ul> <li>OneAdvisor 800 platform equipped with the following modules and options:</li> <li>Any radio analysis module with optical hardware:</li> <li>SPA06MA-O: Spectrum up to 6 GHz and Optical HW</li> <li>RA18MA-O: Spectrum up to 18 GHz and Optical HW</li> <li>RA32MA-O: Spectrum up to 32 GHz and Optical HW</li> <li>RA44MA-O: Spectrum up to 44 GHz and Optical HW</li> <li>RA44MA-O: Spectrum up to 44 GHz and Optical HW</li> <li>ONA-SP-CPRI17: RFoCPRI line rates 1 to 7 for interference analysis</li> <li>ONA-SP-CPRI8: RFoCPRI line rates 1 to 8 for interference analysis</li> </ul> </li> </ul>	Ungram Un
<ul> <li>Fiber accessories</li> <li>Pluggable SFP (it is recommended to use same type as BBU or RRH), alternatively: <ul> <li>CSFPPLUS-1G-10G-3-1: 1310 SFP+ supporting 1G to 10G all rates CPRI.</li> </ul> </li> <li>Fiber jumpers: <ul> <li>EPCSM10M-LC-LC: 10M SM Patch-cord LC/PC to LC/PC</li> </ul> </li> <li>Any optical tap: <ul> <li>TOT1-SM-LC-55-K: Optical nTAP one channel SM-LC 50/50 split ratio</li> <li>TOT3-SM-LC-55-K: Optical nTAP three channels SM-LC 50/50 split ratio</li> </ul> </li> </ul>	Pluggable SFPFiber JumperOptical tap

## 3. OneAdvisor 800 Overview

The OneAdvisor-800 are portable instruments for radio access installation, maintenance, and optimization. Their main test functions include:

- Realtime Spectrum Analysis



- Interference Analysis
- LTE-TDD and LTE-FDD Signal Analysis
- 5GNR Signal Analysis
- NSA Signal Analysis (multi-carrier LTE and 5G)
- DSS Signal Analysis (co-channel LTE and 5G)
- Blind Scanner (DSS, LTE and 5G)
- RFoCPRI Interference Analysis

#### 3.1 **RFoCPRI Interference Analysis**

The following procedure describes the steps to perform RFoCPRI Interference Analysis with the OneAdvisor 800.

The following information is required to complete the test:

- Active frequencies/bands at site to be tested
- RRH NEM Vendor (Ericsson/Nokia/Samsung)
- Carrier center frequency / Channel BW / MIMO config for RX antennas.

#### 3.1.1 RFoCPRI Connectivity

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

Step	Action	Description			
1	Power ON OneAdvisor-800	Press and hold the ON/OFF button for 3 seconds			
2	Inspect and clean fiber endpoints, including SFP, fiber jumpers and Tap ports Using fiber jumpers connect the optical tap between the BBU and RRH with fiber jumpers; and from the optical tap to the instrument's SFP.	SFP Port Monitoring Fiber Optical Tap BBU BBU Fiber Connectivity (BBU-Tap-RRH and Tap-Instrument)			





#### 3.1.2 RFoCPRI Analysis – Auto CPRI

The following procedure describes the steps to perform RFoCPRI Analysis with Auto CPRI Configuration.

Step	Action	Description
1	RFoCPRI Analyzer After the instrument finishes its initialization process select: - Home - Tests	Home → Tests → Radio Analysis 6 GHz → RFoCPRI ANALYZER
	<ul> <li>Radio Analysis</li> <li>RFoCPRI ANALYZER</li> <li>From the test functions select:</li> <li>Settings</li> <li>Auto CPRI</li> <li>Press the Play Button</li> </ul>	Auto CPRI
		Auto CPRI



Step	Action	Descript	ion							
	The AutoCPRI process might take a few minutes to detect the radio	Home A	RadioAnalysis	Next ter Spectrum	>		) (Single	OneCl (Continue)	eck (Sweep Once)	7 PM #/2024
	configuration which might be	Auto CPR	I Configuration	1			li A	C Map	~	2 <b>9</b> 3
	transmitting multiple carriers, at	Bandwidth	Carrier	Center Frequency	Interferen	ice Result	PIM R	esult	Carrier Detected	-
	the end of the process it'll	10 MHz	Carrier 1	1.000 000 000 GHz	- •	4	-	4-		8
	Indicate Carrier Detected	10 MHz	Antenna 1	1.000 000 000 GHz	- •	*	-	*	Link Rate 10137.6 Mbps	
		10 MHz	Antenna 2	1.000 000 000 GHz	- 0	*	-	*	Optic Power -6.38 dBm	÷
		10 MHz	Antenna 3	1.000 000 000 GHz	- 0	*	-	*	SFP Information Vave Length 1310 nm	Ŵ
		10 MHz	Antenna 4	1.000 000 000 GHz	- 1	*	-	*	Vendor DELTA	M
									LCP-10G3B4QDRME2	^- ©
									Power Level Type Average	
									Report Done	0
				<b>A</b>					9	
					D	one				
		Home	PadioAnalysis		-		-		A 1 22	27 PM
		←] <sup>+</sup> □ <sup>-</sup>		Next	<u>&gt;</u>			OneCl	neck	4/2024
		RFoCPRI	Interference Analyz	ter   Spectrum			Single	Continue	Sweep Once	<b>\$</b>
		LOS O RAI O O	LOF O LO SDI O R	DT CH CH DS O LOF O AI O SDI O	Port 1 Rx Opti Port 2 Rx Opti Link Rate	c -6.38 dBi	- Rx IC - Rx Ba Mbps	Sample Width Indwidth 10	9 11 W T2 T3 MHz (3 AxC) T4 T5 T6 Detector RMS	
		Scale Unit	dBm		Port 1 / Carrier 1	l / Antenna	1		-	â
		-10.00								8
		-20.00						M	Α	<b>₩</b>
		-30.00 -40.00	mono	Man Marina	MAMMAM	Man	MAMA	MARIN	NAMAN PANA	Ŵ
		-50.00	1	2	,	1.55	1 .	h		M
		-60.00								÷-
		-80.00		1					min.	٥
		-90.00 MINY							he Ally	
		Center	782.000 000 MHz	<b>A</b>	Fre	quency			Span 11.520 000 MHz	0
2	To perform interference or PIM									
	detection measurements of									
	multiple branches, select:									
	- Quad-spectrum:									
	==									
	- PIM Detection:									



Step	Action	Description
		🕐 Home 🖌 RadioAnalysis
		Concluck
		III RFoCPRI Interference Analyzer   Spectrum
		Port1         C         H         Port2         C         H         Port12x Optic         -6.38 dBm         Rx IQ Sample Width         9         11         W         T2         T3           LOS         Image: LOF         Image: LOF         Image: LOF         Image: LOF         Port2 Rx Optic         -         Image: Rx IQ Sample Width         9         11         W         T2         T3         T3         T4         T5         T6         T5         T5         T6
		RAL SDL RAL SDL Link Rate 10137.6 Mbps Detector RMS
		Port 1 / Carrier 1 / Antenna 1 v Port 1 / Carrier 1 / Antenna 2 v 3 Ogg Scale Unit: dBm MIt- Ogg Scale Unit: dBm MIt-
		40.00 Maringeterrent water water and water and 40.00 Martin water water and and and and
		-100.00 Center 782,000 000 MHz Prequency Scan 11,320 000 MHz Center 1,000 000 000 GHz Frequency Scan 13,320 000 MHz
		Port 1 / Carrier 1 / Antenna 3 Port 1 / Carrier 1 / Antenna 4 M
		0.00 Scale Unit: dBm M1:- 0.00 Scale Unit: dBm M1:- 0.00 Scale Unit: dBm M1:- 1
		-20.00 - 20.00
		-60.00
		-100.00 mV
		Center         1.000 000 000 GHz         Frequency         Span         15.360 000 MHz         Center         1.000 000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 GHz         Frequency         Span         15.360 000 MHz         Image: Center         1.000 000 GHz         Image: Center         1.000 000 GHz         Image: Center
		REoCPRI Quad-spectrum
		🕒 Home 💪 BadioAnabesic
		+] TL ↔ ↓ Next > OneCheck
		III RFoCPRI Interference Analyzer   Spectrum
		Port1 C H C H Port2 C H C H Port1.Rx.Optic -6.38 dBm • Rx.IQ Sample Width 9 Rx.0 W Rx.1 W
		RAL SDI
		0.00 Scale Unit: dBm 0.00
		40.00 Marine Marin
		10000 MM 10000
		Center 782.000 000 MHz Frequency Span 11.520 000 MHz RSSI Max V
		Port 1 / Carrier 1 / Antenna 3 Port 1 / Carrier 1 / Antenna 3 Port 1 / Carrier 1 / Antenna 4
		Difference Max Difference Max Difference Max
		Degree Avg Degree Avg Degree Avg Degree Avg
		5.11*         -11.93 dBm         8.89*         -12.46 dBm         4.74*         -13.15 dBm         4.70*         -10.52 dBm           PAR         Min         PAR         Min         PAR         Min         PAR         Min         ***
		5.57 dB -21.00 dBm 5.64 dB -18.56 dBm 6.29 dB -20.80 dBm 5.55 dB -15.14 dBm



## 4. Annex

#### 4.1 Save Measurement Results

The following procedure describes the steps to save measurement results with OneAdvisor 800



### 4.2 PIM Signatures

The following are some examples of PIM signatures from RFoCPRI analysis.



RFoCPRI Spectrum – PIM is present in all 4 branches indicating External PIM (Band 13: 700MHz)

# VIAVI



RFoCPRI Spectrogram – PIM is constantly present in uplink lower frequency (Band 13: 700MHz)



RFoCPRI Spectrum – PIM is present in all 4 branches indicating External PIM (Band 5: 850MHz)



RFoCPRI Spectrum – PIM is present in 1 branch indicating Internal PIM (Band 5: 850MHz)



## 5. Technical Support

Technical support is provided by:

- Phone: 1-844-GO-VIAVI (1-844-468-4284) options 3-2-3
- Email: <u>diagnostics.tac@viavisolutions.com</u>

Regularly new firmware updates for the OneAdvisor 800 are released and it is recommended to keep the instrument in the latest firmware to provide all the enhancements and bug fixes.

- For firmware updates go to: <u>https://ona-800.updatemyunit.net</u>
- For how-to-test videos go to: <u>https://www.viavisolutions.com/en-us/products/oneadvisor-800-platform#resources\_videos</u>
- For additional information of cell site test go to: <u>http://www.viavisolutions.com/en/products/network-test-and-certification/cell-site-test</u>