DATA SHEET

Open RAN Studio

O-RAN Radio Unit (O-RU) Testing and Validation

Next generation O-RAN equipment design, validation and production teams face new and diverse test challenges. Open fronthaul architectures and gNB disaggregation are driving the need for unit testing in isolation, flexible peer emulation, and comprehensive analysis of new O-RAN devices – including multi-domain combinations of LTE and 5G Signal test scenarios with standard-based O-RAN CUS protocol generation and measurement.

Complete O-RAN Radio Unit Test and Validation

Keysight 5G Open RAN Studio tests O-RAN Radio Units (O-RU) and chipsets with O-RAN (ORAN-WG4.CUS.0-v02.00) split option 7.2x compliant CU-plane stimulus generation and analysis. Open RAN Studio emulates a Distributed Unit (O-DU), enabling users to generate test vectors against a DUT, captures O-RAN uplink communications, and perform the measurements necessary to validate an O-RU's functional operation and performance.

5G

5G Open RAN Studio

The most comprehensive solution for O-RU testing, featuring easy to use capabilities to:

- Build O-RAN compliant CUS_plane test vectors
- Emulate an O-RAN Distributed Unit (O-DU)
- Capture and decode O-RU responses
- Extract IQ vectors for modulation analysis
- Perform measurements to validate the O-RU meets standard compliant operation and radio performance
- Analyze both FR1 and FR2 radio downlink (DL) and uplink (UL) paths

KEYSIGHT TECHNOLOGIES

Table of Contents

Keysight Open RAN Studio – Solution Overview

Designed for LTE and 5G O-RAN Radio Unit (O-RU) testing, Keysight Open RAN Studio provides powerful, yet easy to use, capabilities to:

- Build O-RAN compliant CUS-plane test vectors.
- Emulate an O-RAN Distributed Unit (O-DU) – to generate the test vectors against a Device Under Test (DUT).
- Capture and accurately timestamp the DUT's responses.
- Perform measurements needed to validate if the O-RU meets standard compliant operation and radio performance.

Open RAN Studio includes powerful O-RAN focused tools to construct, play, capture, and measure O-RAN traffic over 10 Gbps / 25 Gbps (fronthaul) Ethernet interfaces. Out of the box integration with Keysight's industry leading PathWave Signal Studio and 89600 VSA software enables sophisticated 5G signal creation and easy capture, extraction, and export of IQ vectors – for advanced modulation analysis of received RF / mmWave signals and radio performance. Additionally, when combined with Keysight spectrum analyzers and signal sources, the integrated Open RAN Studio solution delivers the most comprehensive cross domain, multi-channel RF / mmWave and O-RAN protocol measurements available in the industry, for both FR1 and FR2 radios, downlink (DL) and uplink (UL) paths.

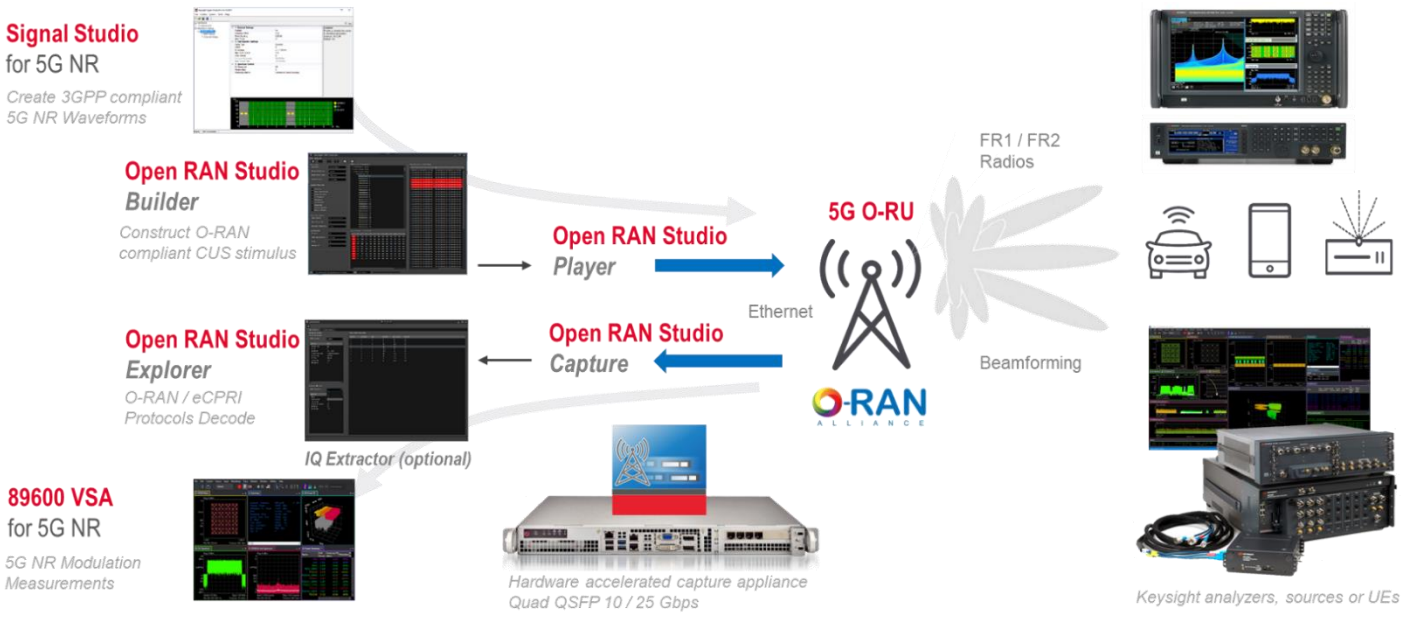


Figure 1: Integrated Open RAN Studio solution for comprehensive O-RU testing

Keysight Open RAN Studio – Solution Components

Figure 1 (page 3) illustrates a simplified architecture for the Open RAN Studio suite of integrated tools and optional elements, which include:

1. **Signal Studio Pro** for 5G NR creates 3GPP compliant 5G NR waveforms for emulation through Open RAN Studio to an O-RU / DUT and subsequent transmission to a downstream signal analyzer, DUT, or compliant UE.
2. **Open RAN Studio** integrates five powerful O-RAN development tools to construct, play, capture, measure, and extract IQ vectors for split option 7.2x O-RAN traffic over a 10 or 25 Gbps fronthaul Interface.
    a. **Open RAN Studio Builder** helps you easily construct diverse O-RAN test vectors. The PCAPNG formatted output file includes the complete Ethernet / VLAN / eCPRI / O-RAN stack.
    b. **Open RAN Studio Player** is a hardware-based exerciser that emulates a DU and generates test vectors to an O-RU / DUT through the O-RAN interface – honoring O-RAN CUS-plane timing windows.
    c. **Open RAN Studio Capture** is a hardware-based analyzer that captures the bidirectional Tx and Rx information flows between the DU and O-RU over the O-RAN interface.
    d. **Open RAN Studio Explorer** decodes and visualizes the O-RAN protocol information and enables measurement in both protocol and RF / mmWave domains.
    e. **Open RAN Studio IQ Extractor** is an optional application that reconstructs a time domain IQ file from an O-RAN trace capture for further modulation measurements with 89600 VSA software.
3. **89600 VSA for 5G NR** may optionally receive captured IQ vectors from Open RAN Studio IQ Extractor to perform 5G NR modulation and radio performance measurements.

O-RAN ALLIANCE

Keysight technologies is a founding member and active contributor for O-RAN Alliance Work Group 4:

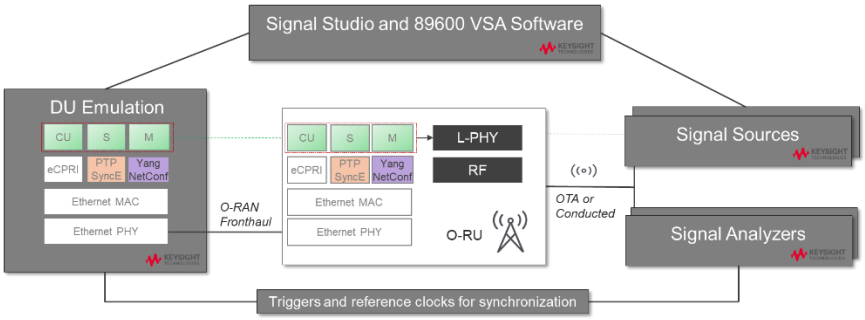
WG4 Open Fronthaul Interfaces – The objective of this work group is to deliver truly open fronthaul interfaces, in which multi-vendor DU-RRU interoperability can be realized. WG4 specifies an open front-haul interface (NGFI-I) between a DU and RRU, based on C-RAN and xRAN's work (IEEE 1914, eCPRI, CPRI).

Keysight Technologies is the primary editor of the O-RAN Alliance WG4 Fronthaul Conformance and Interoperability Test Specification

Open RAN Studio for O-RAN Radio Unit (O-RU) Testing

Open RAN Studio provides a test environment that includes and integrates with Keysight tools, in both RF and Protocol Domains, to help you completely exercise an O-RAN CUS compliant Radio Unit (O-RU).

To ensure measurement consistency between both RF and Baseband sides of the O-RU, Open RAN Studio software leverages the same industry leading 5G signal generation and measurement science used in Keysight spectrum analyzers and signal sources. This tight coupling ensures CU-plane messages and baseband information match exactly with the signals captured on the RF side of the Radio Unit.



With a split option 7.2x, O-RUs must implement the lower layer part of the 3GPP protocol stack

Open RAN Studio helps you debug, characterize, validate and test both RF performance and functional operation of your next generation LTE / 5G NR Radio Unit.

Open RAN Studio Player hardware features triggering and reference clock in / out capabilities, enabling synchronization with external test equipment (for example, Keysight signal generators, oscilloscopes or spectrum analyzers).

Signal Studio Pro *for 5G NR 2020, ORAN* (N7631ORNC)

Keysight Signal Studio Pro for 5G NR software is a flexible signal creation tool that helps significantly reduce the time spent on signal simulation. Quickly and easily generate 5G NR signals for component, transmitter and receiver test. Its user-friendly interface lets you configure signal parameters, calculate the resulting waveforms, and download .SCP files – for generation with Open RAN Studio Builder or for analysis using Keysight 89600 Vector Signal Analysis software.

N7631C PathWave Signal Studio Pro for 5G NR enables you to generate various 5G NR signals necessary to characterize the power and modulation performance of your components and transmitters. Easily manipulate a variety of signal parameters to simplify signal creation.

- Quickly configure and generate 5G NR test models for FDD and TDD.
- Create spectrally-correct signals for channel power, spectral mask, and spurious testing.
- View CCDF, spectrum, time domain, and power envelope graphs to investigate the effects of power ramps, modulation formats, power changes, clipping, and other effects on device performance.
- Adjust Peak-To-Average-Ratio (PAPR) with Crest Factor Reduction.
- Baseband filter and windowing for spectrum control to improve the out-of-band performance.
- Support test model presets for FR1 and FR2.

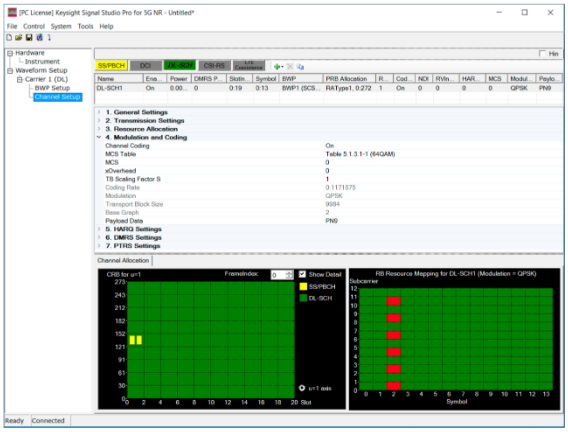


Figure 2: Signal Studio Pro 5G NR Channel Setup

Open RAN Studio *Builder* for O-RAN

Keysight Open RAN Studio Builder lets you quickly, easily, and reliably generate O-RAN test vectors compliant with the ORAN-WG4.CUS.0-v02.00 specification. The generated test vectors represent Ethernet based O-RAN messages from a distributed unit to the device being tested – the O-RU (Radio Unit).

Open RAN Studio Builder is integrated with PathWave Signal Studio Pro for 5G NR (N7631ORNC) to create 3GPP NR standard-compliant signals and construct the corresponding Ethernet based O-RAN protocol test vectors, including complete and consistent C-plane and U-plane messages, ready for playout.

Key Features:

- Fully automated generation of Ethernet based O-RAN CU-plane messages with eCPRI transport encapsulation types. (ORAN-WG4.CUS.0-v02.00 Section 3.1, 3.2, 3.4)
- Predefined 3GPP test Patterns.
- Downlink stimulus test generation (CU-plane).
- Uplink stimulus test generation (C-plane).
- Multi-carrier support (up to 16 carriers).
- Generates a PCAP Next Generation based stimulus file for use with Open RAN Studio Player or Explorer.

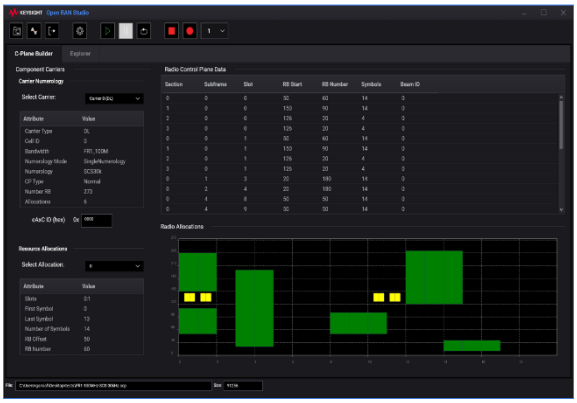


Figure 3: Open RAN Studio Builder C-Plane Setup

Downlink test vectors include both O-RAN C-plane and U-plane messages. C-plane messages are constructed to fully represent the allocations defined in the 5G NR signal definition, and the U-plane messages include frequency domain IQ for each resource block.

Uplink test vectors include only C-plane messages, as U-plane messages will be generated by the DUT. To ensure consistency, the C-plane messages match with the uplink test signal generated by Keysight signal sources.

Open RAN Studio *Player* for O-RAN

The Open RAN Studio Player software and integrated hardware appliance will playback Open RAN Studio Builder generated stimulus files to an O-RU Radio Unit over an Ethernet based O-RAN interface. The Open RAN Studio Player emulates and is seen by the DUT (O-RU) as an Open RAN DU. The Keysight Open RAN Studio Player application is provided for use on a third-party 1RU Server Appliance (BittWare TeraBox 1000S Server) running the Windows 10® Operating System and equipped with a specific FPGA Interface Module loaded with the Keysight Open RAN Player FPGA build (BittWare XUP-P3R).

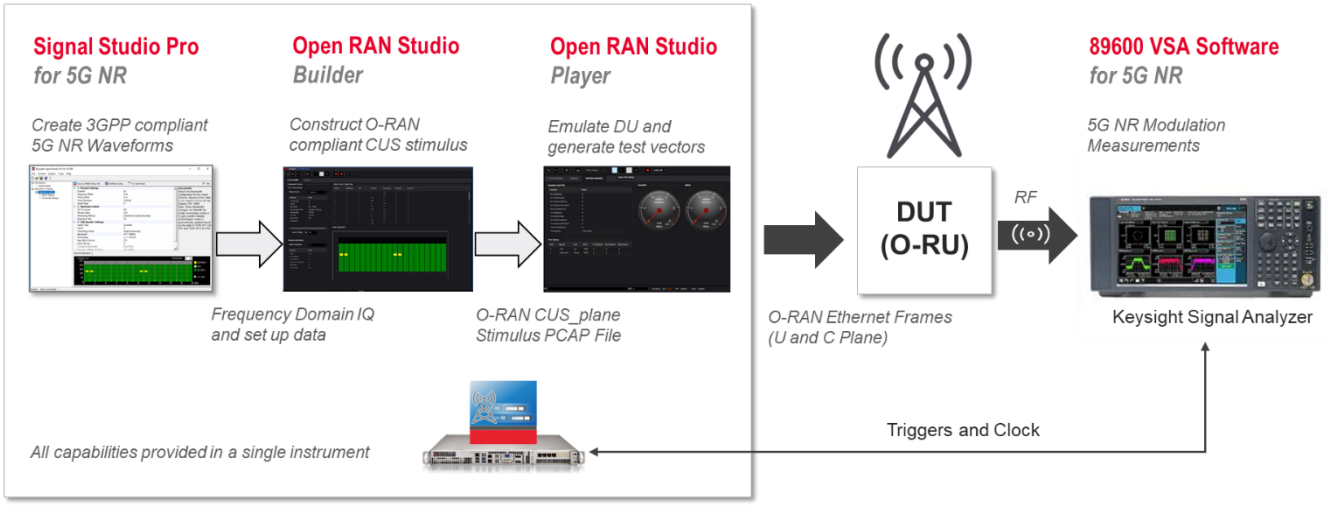
Figure 4: Open RAN Studio Player Interface Monitor

Key Features:

- Play Stimulus file once or repetitively.
- Real-time frame numbering.
- Real-time CRC Calculation.
- Dynamic Frame Numbering during playout.
- Reconfigurable DUT Destination MAC Address.
- 10 Gbps to 25 Gbps Ethernet interface.
- SFP or QSFP support (quad QSFP cage).
- 3 GByte stimulus memory depth.

To ensure compliant frame synchronization, the Open RAN Studio Player can also act as a PTP master and ensure that O-RAN messages are played honoring specified timestamps – enabling positive and negative testing of required timing windows.

Downlink Test Flow



Open RAN Studio *Capture* for O-RAN

The Open RAN Studio Capture appliance is integrated within the Open RAN Studio Player hardware appliance. It captures both Tx and Rx information flows between the DUT and DU – acting as an embedded protocol analyzer by passively extracting the information flows traveling over the Ethernet based O-RAN interface. Open RAN Studio Capture is transparent to the network and sees the O-RAN flows as an Open RAN DU would. Captured flows are stored in a circular capture buffer and can be save off as PCAP Next Generation compliant files for analysis in Open RAN Explorer or Wireshark.

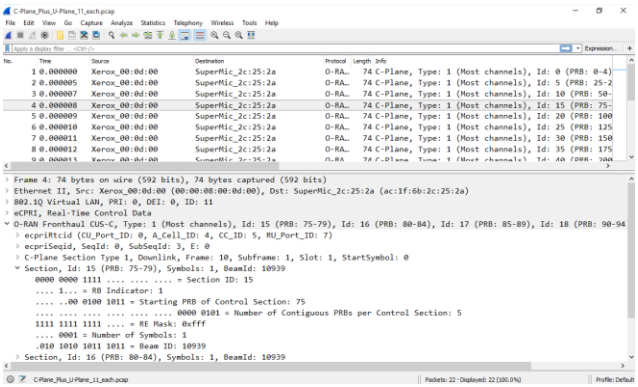
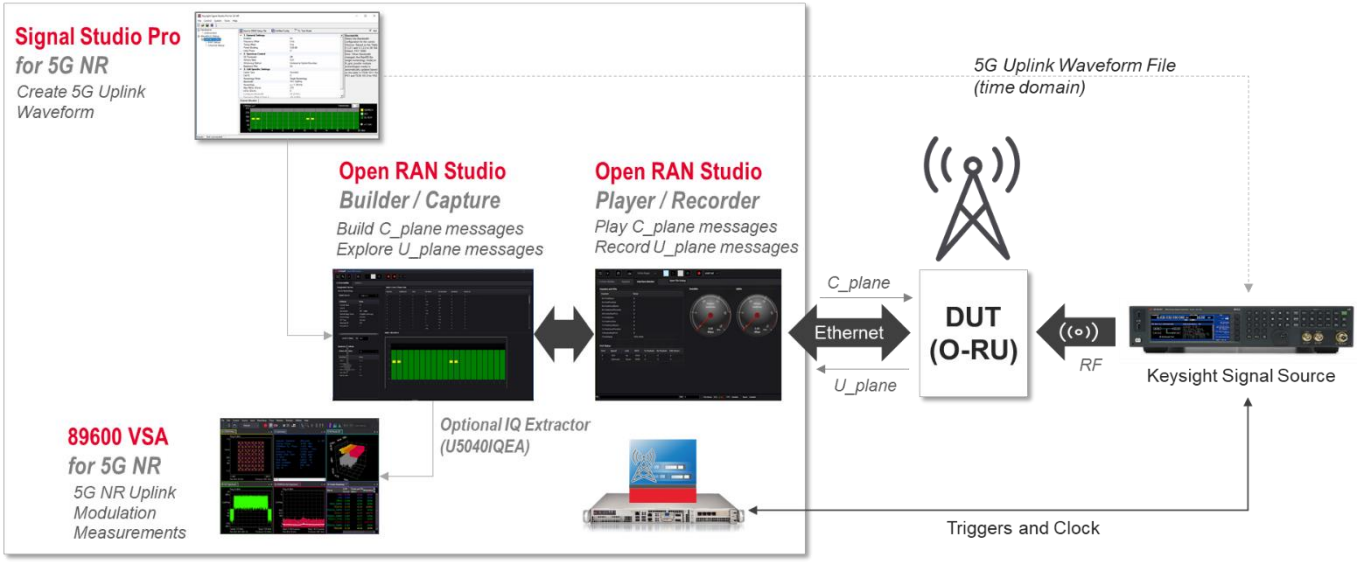


Figure 7: PCAP file opened in Wireshark

Key Features:

- Start/stop Capture.
- Continuous capture mode until full (last N frames).
- Full duplex capture capability.
  - Stimulus transmitted on the downlink
  - Uplink traffic from O-RU
- Configurable capture depth in # frames.
- Save captures in PCAPNG file format.

Uplink Test Flow



Open RAN Studio *Explorer* for O-RAN

Radio Units combine O-RAN protocol operation with RF transmit and receive performance, creating new test challenges. Analysis and validation of O-RU performance requires cross-domain measurements in both RF and Protocol domains.

With the optional Open RAN Studio IQ extractor, Open RAN Studio Explorer helps you visualize and fully decode the captured trace and enables IQ centric extraction, which enables RF centric measurements and vector analysis using Keysight 89600 Vector Signal Analyzer (VSA).

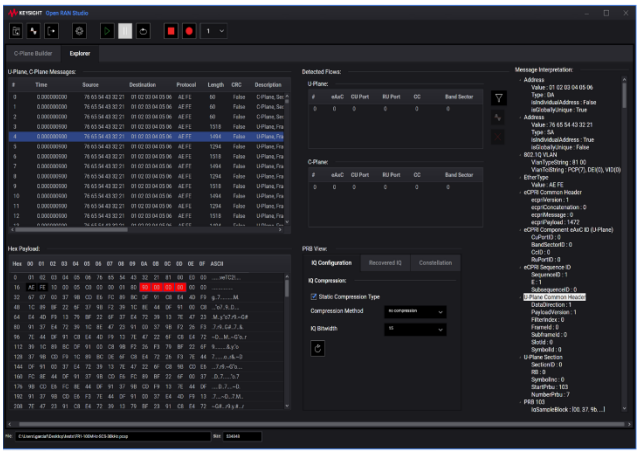


Figure 5: Open RAN Studio Explorer Interface Monitor

Key Features:

- Tx, Rx Bidirectional display.
- Accurate timestamped traces.
- U-plane and C-plane message summary.
- Full Stack Decoding.
- O-RAN Multiple Abstraction level.
- Cross referencing between displays.
- Flow based Filtering:
  - Filter traces on a single carrier.
- IQ extraction (with optional U5040IQEA):
  - IQ information embedded in PRBs can be extracted for RF modulation measurements using the 89600 Vector Signal Analyzer.

IQ Features:

- Configurable IQ bit width.
- Extract uncompressed IQ from captures.
- Decompress block floating point compressed IQ.
- Decompress IQ from captures using single dynamic compression methods (udCompHdr).
- PRB view:
  - Recovered IQ.
  - Constellation view.

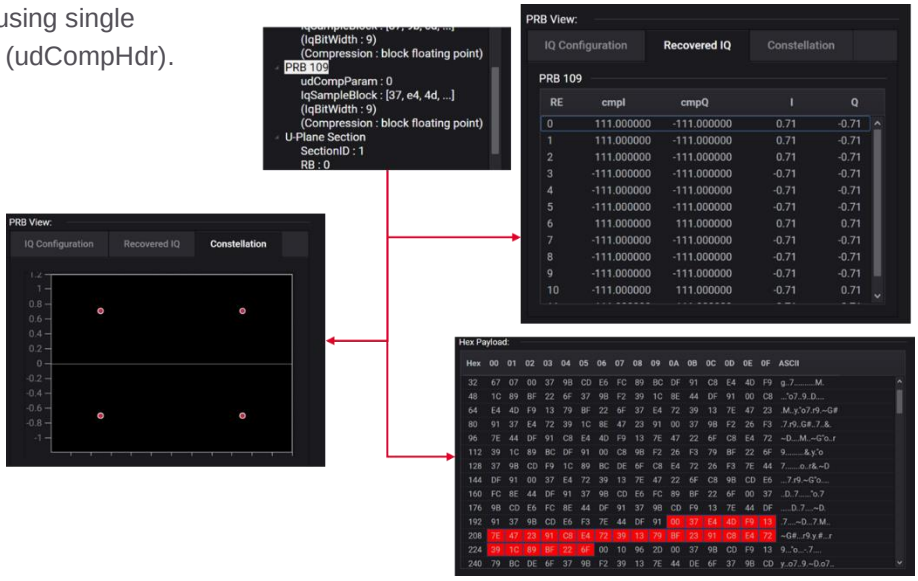


Figure 6: Open RAN Studio PRB decode view with corelated decode and IQ constellation

PathWave 89600 VSA *for 5G NR modulation analysis* (89601BHNC)

The Keysight 89600 VSA software's option 89601BHNC provides comprehensive analysis capabilities in the frequency, time, and modulation domains for signals based on both 3GPP's 5G NR specification (www.3gpp.org) and Verizon's 5G open trial specification (http://5gtf.org).

The software provides frequency-, time-, and modulation-domain analysis results in a single measurement. By configuring result traces of spectrum, acquisition time, and NR specific modulation quality traces and tables, engineers can identify overall signal characteristics and troubleshoot intermittent error peaks or repeated synchronization failures.

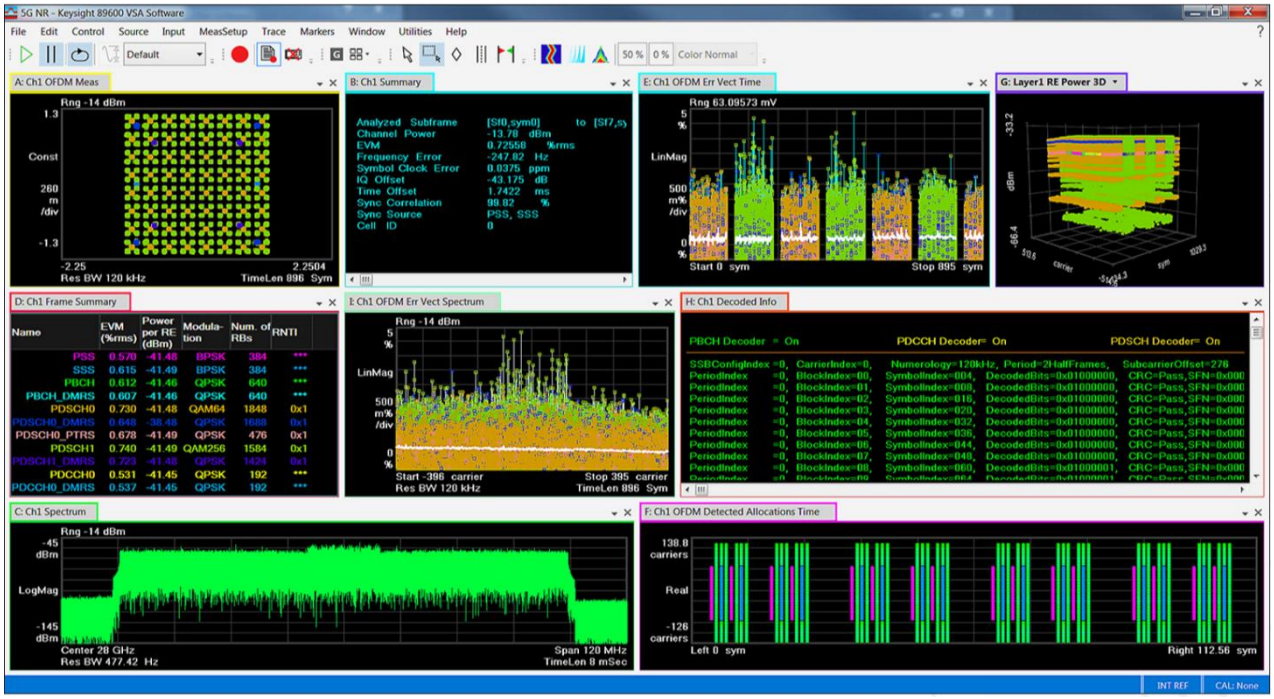


Figure 8: 5G NR modulation and vector analysis in Keysight 89600 VSA for 5G NR

89600 VSA software can open IQ extracted data from the Open RAN Studio IQ Extractor to perform detailed modulation and vector analysis.

5G NR is among over 75 signal standards and modulation types supported by the 89600 VSA software. The core software is a comprehensive set of tools for demodulation and vector signal analysis. These tools enable you to explore virtually every facet of a signal and optimize even the most advanced designs. As you assess your design tradeoffs, the 89600 VSA helps you cut through the complexity

Key Features:

- Modulation analysis of 5G New Radio (NR) signals based on 3GPP Release 15.
- Modulation analysis based on the Verizon 5G specification.
- Frequency, time and modulation-domain analysis results in a single measurement.
- Demodulate up to 16 component carriers simultaneously and view results side-by-side.
- Analyze up to 8x8 MIMO for downlink and 4x4 MIMO for uplink.
- In-depth analysis and troubleshooting traces for deeper insight:
  - EVM vs. spectrum and time, constellation, transport layer decoding plus more.

Configure your Open RAN Studio for O-RAN Radio Unit (O-RU) Testing Solution

Open RAN Studio is the most comprehensive solution for O-RU testing. Get the most out of your O-RAN investment by choosing options and software to enable your required tasks.

Open RAN Solution Software

Model Number	Description
U5040BSCA (Required)	Open RAN Studio Application Suite, includes • Open RAN Studio Builder • Open RAN Studio Player • Open RAN Studio Capture • Open RAN Studio Explorer
N7631ORNC (Required)	Signal Studio Pro software for 5G NR signal creation (PathWave Signal generation for U5040BSCA)
U5040IQEA (Optional)	IQ Extraction Option for Open RAN Studio (Requires 89601BHNC for analysis of extracted IQ files)
89601200C (Optional)	PathWave 89600 VSA Software (Basic vector signal analysis and hardware connectivity)
89601BHNC (Optional)	5G New Radio Modulation Analysis for 89600 VSA Software (Requires 89601200C base VSA software) (Requires U5040IQEA for IQ extraction from O-RAN packets)

Open RAN Solution Third-Party Hardware

Keysight Open RAN Studio software is designed to operate with a specific third-party Windows® 10 Pro Workstation based operating system 1RU server and FPGA hardware accelerated Ethernet acquisition, timing, and triggering hardware from BittWare (a Molex company).

See www.bittware.com for additional information and to request a quote.

BittWare Model Number	Description
TRBX-1000S-0001 (Required)	TeraBox 1U System (SuperMicro SC515) Redundant PWS Chassis with Intel Xeon Bronze 3204 3 banks of 16GB DDR4-2666 1TB NVMe M.2 Board Kit: XUP-VV8/ XUP-VVH/ XUP-VVP/ XUP-VV4/XUP-P3R
SW-MS-WINDOWS10-PRO-WS	Microsoft Windows 10 Pro Workstation (Required with TRBX-1000S-0001)
XUPP3R-0121 (Required)	FPGA Ethernet Acquisition Module Xilinx Virtex UltraScale+ Quad QSFP DIMM 1: 16GB RDIMM DIMM 2: 16GB RDIMM SEP Trigger board installed: ACC-XPR-SEPTRIG

1. Choose Your Software Licensing and KeysightCare Software Support Subscriptions

Keysight offers a variety of flexible licensing options to fit your needs and budget. Choose your license term, license type, and KeysightCare software support subscription.

License Terms

Perpetual – Perpetual licenses can be used indefinitely.

Time-based – Time-based licenses can be only be used through the term of the license (6, 12, 24, or 36 months license options available).

License Types

Node-locked – License can be used on one specified instrument/computer.

Transportable – License can be used on one instrument/computer at a time but may be transferred to another using Keysight Software Manager (Internet connection required).

USB Portable – License can be used on one instrument/computer at a time but may be transferred to another using a certified USB dongle (available for additional purchase with Keysight part number E8900-D10).

Floating (single site) – Networked instruments/computers can access a license from a server one at a time. Multiple licenses can be purchased for concurrent usage.

KeysightCare Software Support Subscriptions

Perpetual licenses are sold with a 12 (default), 24, 36, or 60-month software support subscription. Support subscriptions can be renewed for a fee after that.

Time-based licenses include a software support subscription through the term of the license.

KeysightCare Software Support Subscription provides peace of mind amid evolving technologies

- Ensure your software is always current with the latest enhancements and measurement standards.
- Gain additional insight into your problems with live access to our team of technical experts.
- Stay on schedule with fast turnaround times and priority escalations when you need support.

Selecting your license:

Step 1. Choose your software product (for example: U5040BSCA).
Step 2. Choose your license term: perpetual or time-based.
Step 3. Choose your license type: node-locked, transportable, USB portable, or floating.
Step 4. Depending on the license term, choose your support subscription duration.

For more information on Signal Studio and VSA software, or to configure your product and request a quote:
http://www.keysight.com/find/N7631C
http://www.keysight.com/find/89600
http://www.keysight.com/find/ORAN

Contact your Keysight representative or authorized partner for more information or to place an order:
www.keysight.com/find/contactus

Open RAN Studio Specifications and Performance Characteristics

Open RAN Builder	Supported Standards and Performance Characteristics*
5G Waveform Input Type	Supports Keysight Signal Studio .SCP file format
Waveform Generation	Fully automated generation of Ethernet based O-RAN CU-plane messages with eCPRI transport encapsulation types (ORAN-WG4.CUS.0-v02.00 Section 3.1 , 3.2, 3.4)
	Predefined 3GPP test Patterns
	Downlink stimulus test generation
	Uplink stimulus test generation
Carrier Support	Multi-carrier support (up to 8 carriers)
Radio Type	Category A Radio
Numerology	Single & Multiple numerology
Bandwidth	Supports all 3GPP bandwidth schemes
Sub Carrier Spacing (SCS)	Supports all 3GPP Sub Carrier Spacing (SCS) schemes
Configurable eAxC	Parametric bit allocation according to: (ORAN-WG4.CUS.0-v02.00 Section 3.1.3.1.6)
Allocation	Supports DL-SCH PRB allocations following Signal Studio configurations and assign section ID for each allocation
	Supports DL DCI Channel PRB allocations following Signal Studio configurations and assign section ID for each allocation
	Supports DL SS/BPCH Channel PRB allocations following Signal Studio configurations and assign section ID for each allocation
	Supports UL-SCH PRB allocations following Signal Studio configurations and assign section ID for each allocation
	Configurable eAxC (manual configuration of eAxC bits)
IQ Bit width, Compression, and Scaling	Configurable IQ bit width per stimulus file (ORAN-WG4.CUS.0-v02.00 Section 6.3.2)
	Uncompressed IQ (ORAN-WG4.CUS.0-v02.00 Section 6.3.3.13)
	Block floating point compression (ORAN-WG4.CUS.0-v02.00 Section 6.3.3.13 , Annex A.1)
	Configurable IQ scaling (ORAN-WG4.CUS.0-v02.00 Section 6.1.3)
	Single/Multiple static compression method(s) per stimulus file. (ORAN-WG4.CUS.0-v02.00 Section 6.3.3.13, 6.3.3.15)
	Single/Multiple dynamic compression methods (udCompHdr) per stimulus file. Configured on a per eAxC ID basis. (ORAN-WG4.CUS.0-v02.00 Section 6.3.3.13, 6.3.3.15)
Section Type	Section type #0 support (ORAN-WG4.CUS.0-v02.00 Section 5.4.2)
	Section type #1 support (ORAN-WG4.CUS.0-v02.00 Section 5.4.2)
	Section type #1 support – numPrBc support for > 255 blocks
	Section type #3 – PRACH (ORAN-WG4.CUS.0-v02.00 Section 5.4.2)

* There are no warranted specifications for the Open RAN Studio software applications or third-party hardware appliance

Open RAN Studio Specifications and Performance Characteristics (continued)

Open RAN Builder	Supported Standards and Performance Characteristics
Beamforming	Predefined-beam Beamforming (ORAN-WG4.CUS.0-v02.00 Section 10.4.1)
	Weight-based dynamic beamforming (ORAN-WG4.CUS.0-v02.00 Section 10.4.2)
	Attribute-based dynamic beamforming (ORAN-WG4.CUS.0-v02.00 Section 10.4.3)
Timestamps	DL time advance configuration (ORAN-WG4.CUS.0-v02.00 Section 2.3.1)
Transport	(ORAN-WG4.CUS.0-v02.00 chapter 3)
	Application layer fragmentation support (ORAN-WG4.CUS.0-v02.00 Section 3.5.1)
	VLAN support (ORAN-WG4.CUS.0-v02.00 Section 3.4)
	Configurable MAC address
	MTU size control
	Jumbo packet support
Output file	Ready to play test vectors
	Consistent CU-plane messages (ORAN-WG4.CUS.0-v02.00 Section 5.2.1)
	Open RAN Studio Explorer PCAP Next Generation file format
	Timestamp support (nanosecond resolution)

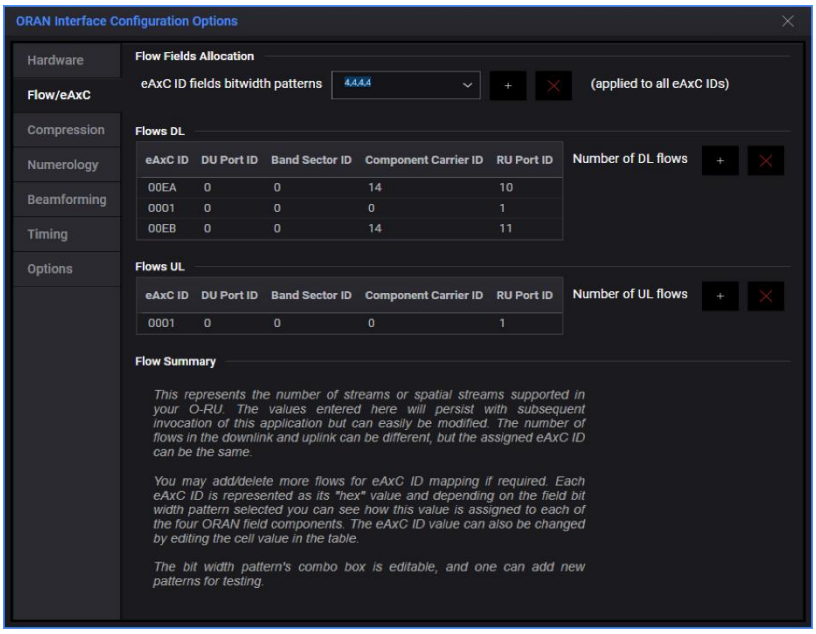


Figure 9: Open RAN Studio Builder – Flow/eAxC configuration options

Open RAN Studio Specifications and Performance Characteristics (continued)

Open RAN Explorer	Supported Standards and Performance Characteristics
Decode Features	Tx, Rx bidirectional display
	Timestamped trace
	Accepts both PCAP and PCAPNG file formats
	O-RAN U-plane and C-plane message summary
	Cross referencing between displays
Abstraction	O-RAN multiple abstraction level
	Command summary
	Multi-protocol Layer view
	Hex display
Filters	Flow based filtering
	Filter trace on single carrier
Protocol Support	Ethernet, VLAN, eCPRI and O-RAN
IQ Level Measurements	Configurable IQ bit width
	Extract uncompressed IQ from capture
	Decompress block floating point IQ compressed
	Decompress IQ from capture using static and dynamic compression methods (udCompHdr)
PRB Features	PRB details View
	Recovered IQ
	Constellation view
IQ Extraction (Requires U5040IQEA)	IQ information embedded in PRB can be extracted for RF modulation measurement using Keysight 89600 Vector Signal Analyzer (VSA)
	Output in .SCP format

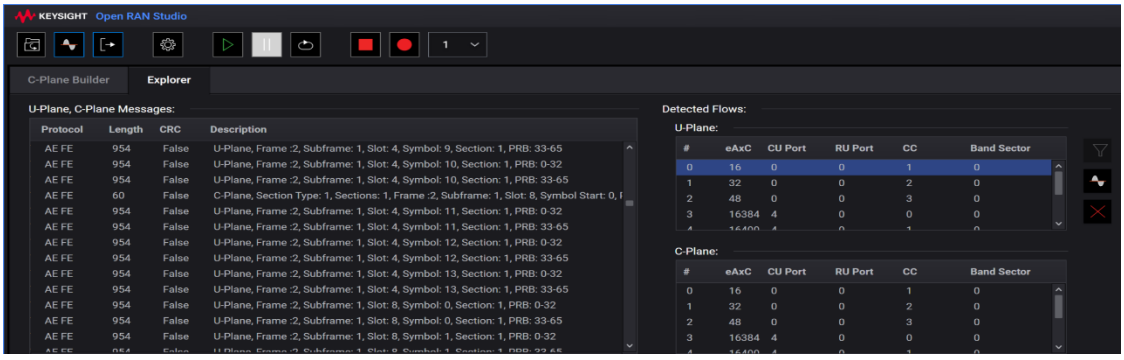


Figure 10: Easily filter on a Flow/eAxC ID in Open RAN Explorer

Open RAN Studio Specifications and Performance Characteristics (continued)

Open RAN Player/Capture (Hardware)	Supported Standards and Performance Characteristics
Interface	Single port 10 Gbps to 25 Gbps Ethernet interface
BittWare (XUPP3R-0121)	Xilinx Virtex UltraScale+ PCIe w/ 4 RDIMMs with SEP
	SFP or QSFP support (Quad QSFP Cage)
	DIMM 1: 16GB RDIMM DIMM 2: 16GB RDIMM
	Timing: SEP Trigger board (ACC-XPR-SEPTRIG)
SEP Trigger Board - Ports	10 MHz clock in / 10 MHz clock out
	Trigger in / Trigger out
	PPS in
Protocol Support	Ethernet, VLAN, eCPRI and O-RAN
	IEEE 1588 PTPv2 master (G.8275.1 profile)
Synchronization	PTPv2 Master emulation
	Configurable to start playing frames on next 10 ms boundary
Memory Depth	Stimulus: 3.5 GBytes before overhead
	1 second or 100 radio frames captured at 25 Gbps
Triggering	Trigger out signal generation on 10 ms frame boundaries
Playout Features	Reconfigurable DUT destination MAC address
	Real-time CRC calculation
	SyncE clock generation (excluding ESMC messages)
	Configurable delay relative to frame boundaries
	Dynamic frame numbering during playout
	Play Stimulus PCAP Next Generation file once or repetitively

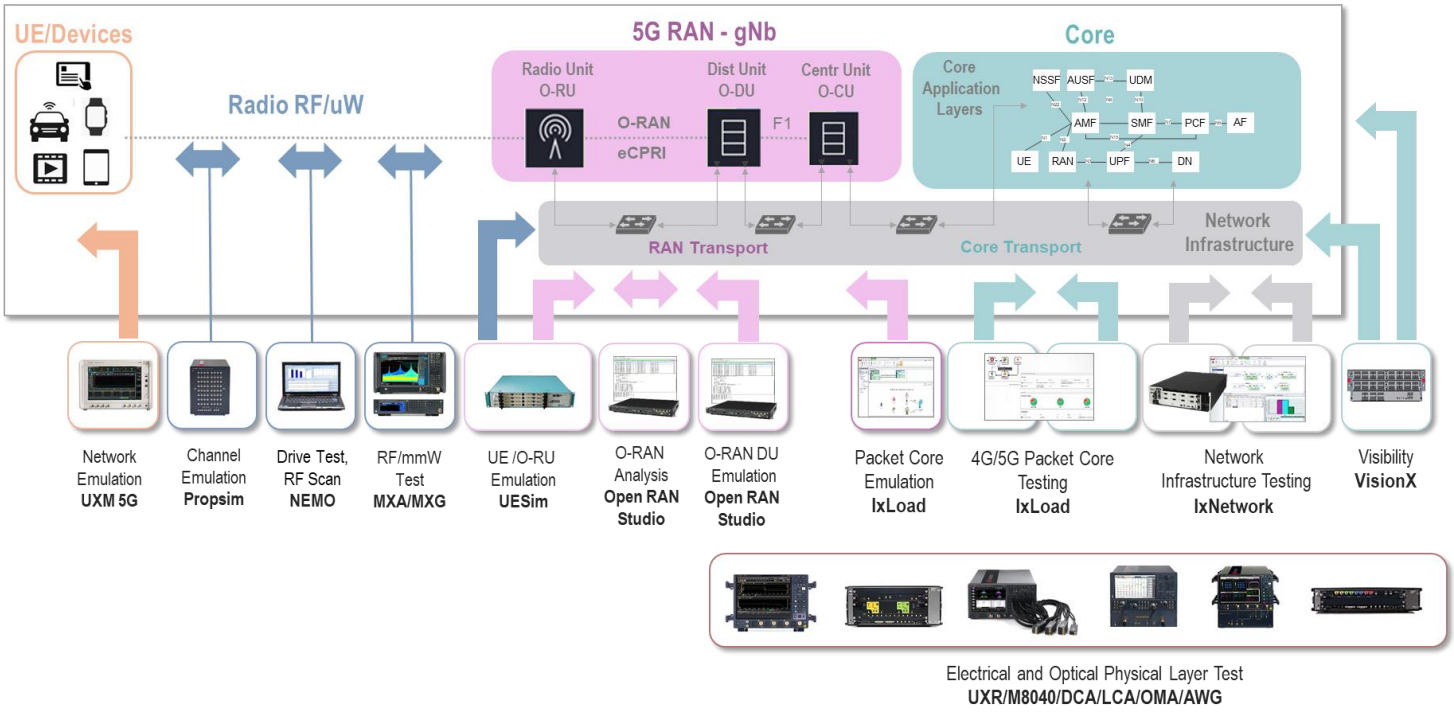
Reliability and Support

The Keysight Open RAN Studio test platform is designed for continuous high reliability up-time applications such as manufacturing test. As with all Keysight products, it is designed with the same quality standards and it is supported by Keysight's worldwide sales and support network. Keysight's Services organization is available for custom development projects if desired.

Open RAN studio API interface enables automated test applications. It is designed to be integrated in rack mounted test systems with minimal footprint, and be remotely controlled from a single controller, or from cloud-based applications, using standardized, documented API interfaces

Keysight 5G Solutions

Keysight's industry-first 5G end-to-end design and test solutions enable the mobile industry to accelerate 5G product design development from the physical layer to the application layer and across the entire workflow from simulation, design, and verification to manufacturing, deployment, and optimization.



Electrical and Optical Physical Layer Test
UXR/M8040/DCA/LCA/OMA/AWG

Keysight offers common software and hardware platforms compliant to the latest 3GPP standards, enabling the ecosystem to quickly and accurately validate 5G chipsets, devices, base stations and networks, as well as emulate subscriber behavior scenarios. Additional information about Keysight's 5G solutions is available at www.keysight.com/find/5G

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

KEYSIGHT TECHNOLOGIES