

# VIAVI

## TM500 O-RU Tester

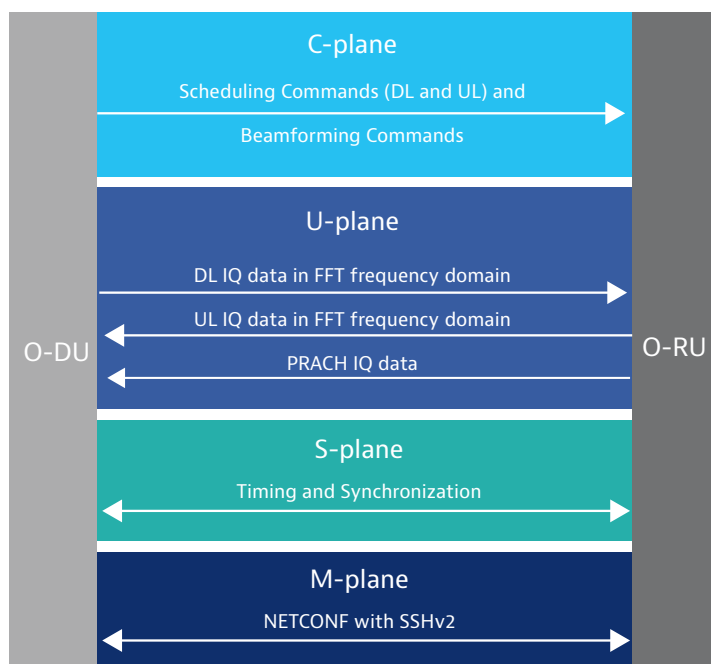
The VIAVI TM500 O-RU Tester Solution covers a wide range of test capabilities, allowing customers to ensure conformance, interoperability and performance test including real-time generation of the O-RAN C/U-plane messaging for the IQ data stream.

The VIAVI TM500 O-RU Tester emulates O-RAN DU by implementing required portions of the eNB/gNB functions as defined by split option 7-2x.

The TM500 O-RU Tester implements the O-DU side of the M-plane and C/U-plane functionality necessary to configure the interface with the O-RU under test and exchange I/Q data over the U-plane.

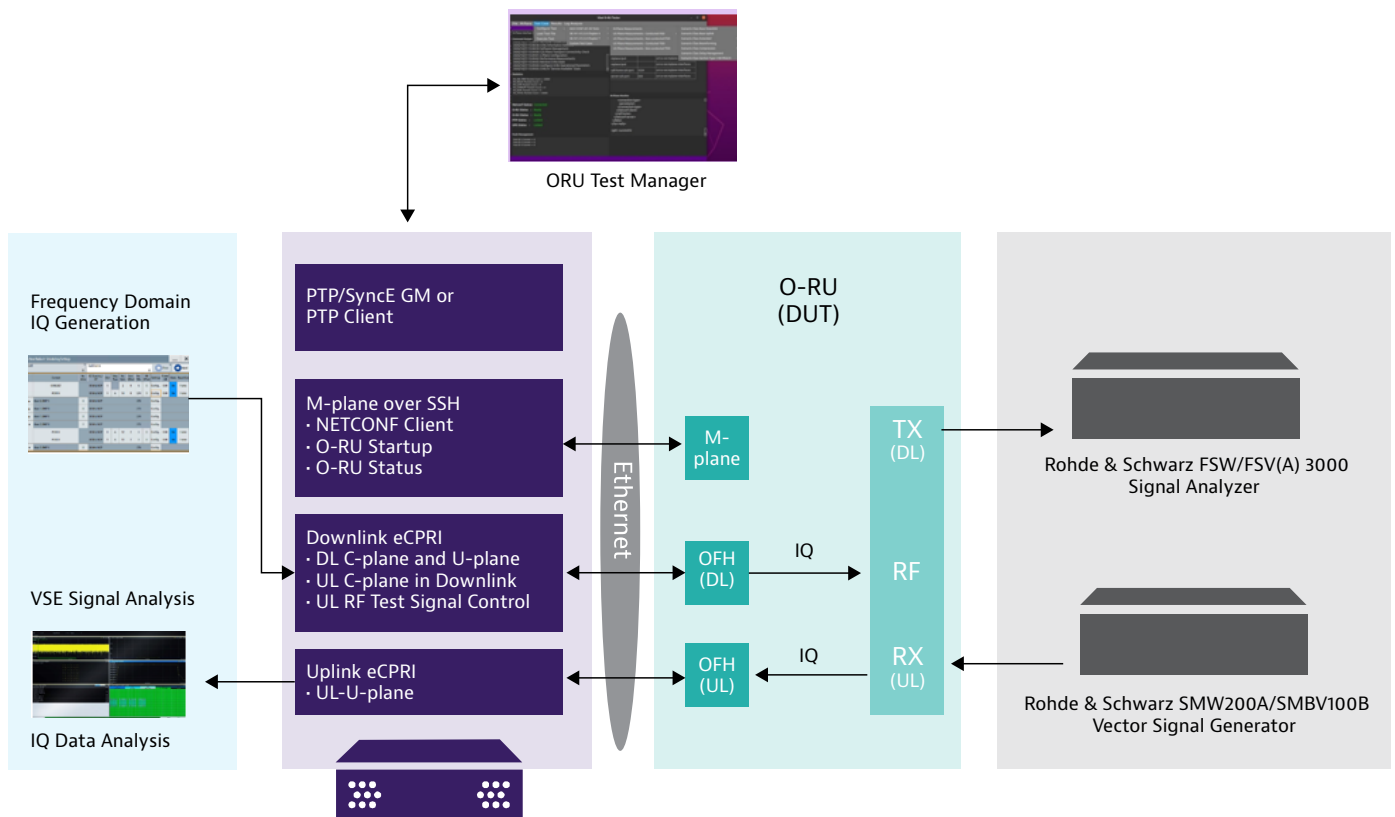
The solution supports several O-RAN S-Plane options:

- PTP and SyncE Grandmaster capability
- PTP client mode to allow synchronization with an external PTP Grandmaster.
- Synchronization to GPS signal independent of O-RU (IIs-C4)



### Key Features

- O-RU Category A and Category B support
- NETCONF Client to support Start-Up and get/edit of M-plane attributes in the O-RU under test
- O-RAN C/U-plane functionality to exchange I/Q data over Lower Layer Split 7-2x interface
- Real time CU-Plane eCPRI packets generation
- Embedded protocol analyzer for OFH traffic analysis
- Control/User-plane messaging support with eCPRI over Ethernet
- PTP/SyncE Grandmaster + PTP Client for Synchronization with external PTP Master
- OFH interface connectivity monitoring
- Wide range of synchronization topologies
- Jumbo frame support
- Extensive support of sections and section extension types
- Multiple options for stimulus waveform generation
- Single point of test control with O-RU TMA



The VIAMI O-RU Tester NETCONF client supports stateful M-plane. The O-DU cycles through typical M-plane procedures and establishes a link with the O-RU. The O-DU emulator's C/U-plane engine generates real-time eCPRI packets from downlink signal generated by VSG. eCPRI packets are transported to O-RU via Open Fronthaul interface. VSE software and VSA support analysis of downlink signal from O-RU's Tx port.

O-RU receives uplink signal via O-RU's Rx port from VSG. UL U-plane eCPRI packets are transported to O-DU emulator via Open Fronthaul interface in response to Uplink focused C-plane packets received by O-RU. Frequency domain uplink signal analyzed using VSE software.

O-RU Test Manager Application follows the philosophy of single point control where it enables user to configure, manage, analyze and generate test case reports all from same application..

The TM500 O-RU Tester is designed to work in concert with Rohde & Schwarz SMW200A Vector Signal Generator, FSV3007 Vector Signal Analyzer, and VSE software under a single point of control in O-RU TMA. Other Rohde & Schwarz models also supported. Please contact VIAMI and Rohde & Schwarz sales representatives for further details.

## Functionality Matrix

### O-RAN specification compliance

- O-RAN.WG4.CUS
- O-RAN.WG4.MP
- O-RAN.WG4.CONF

### 3GPP specification compliance

- 3GPP TS 38.141-1 BTS conformance testing

## Specification

Feature	Functionality
RU category	Category A, Category B
Sub Carrier Spacing (SCS)	15 kHz, 30 kHz, 120 kHz, 240 kHz
Channel Bandwidth	All bandwidth parts up to 100 MHz
Antenna streams	2T2R, 4T4R
Synchronization plane	G.8275.1 based Sync for O-RU GNSS based sync for O-RU & O-DU SyncE based sync for O-RU
C/U Plane Transport	Ethernet transport encapsulation eCPRI transport header 10GbE/25GbE interconnect Configurable eAxC ID VLAN ID based separation of C/U-Plane & M-Plane traffic Jumbo frame support MTU size control Application Layer fragmentation support
U-Plane data compression method options	No IQ compression Block floating point compression Configuration IQ compression scaling Modulation Compression
C-Plane message types	Section Type 0 Section Type 1 Section Type 3 Section Extension Type 1: Beamforming Weights Extension Type Section Extension Type 4: Modulation compression params Section Extension Type 5: Modulation compression additional scaling params Section Extension Type 6: Non-contiguous PRB allocation Section Extension Type 11: Flexible Beamforming Weights Extension Type
M-Plane	Hierarchical Model Hybrid Model O-RU controller discovery NETCONF Call Home NETCONF Security NETCONF Authentication Monitoring NETCONF connectivity
Waveforms	Predefined 3GPP Test Models Downlink stimulus waveform generation Uplink stimulus waveform generation Custom configuration stimulus waveform generation On-board real time CU-Plane eCPRI packets generation

## Applicable Part Numbers

The part numbers are sub-categorized into VIAVI DU emulation and R&S VSG/VSA components. A complete test setup shall include all the components from each category.

VIAVI DU Emulator part numbers are listed below.

Hardware	
Part Number	Description
TK1089	TM500 O-RU Tester DU Emulation Hardware
TK1115	O-RU Tester PTP/SyncE enabled Switch
TK1112	O-RU Tester Interconnection Unit & Accessories (1U 19" Rack mountable with programmable settings)"
TK1116	TM500 O-RU Tester Interconnect Unit and cables. (Kit is not 19" rack mountable)
GPSG-1000	GPS Simulator – Optional
Software	
Part Number	Description
TK2055	(O-RAN) Open Fronthaul DU Emulation M-Plane
TK2135	(O-RAN) Open Fronthaul DU Emulation C/U-Plane
TK2136	(O-RAN) Generic conformance test suite
MTS/TB-5800	High Precision PTP Grandmaster and SyncE Master
TB5800-25G-O-DU	Mobility T-BERD/MTS-5800-100G Package for O-RU Test Support or
MTS5800-25G-O-DU	Mobility T-BERD/MTS-5800-100G Package for O-RU Test Support

The recommended R&S VSG and VSA configurations are listed here. Full specifications and an overview of available options can be obtained from the R&S website.

R&S Hardware
<b>Description</b>
R&S Vector Signal Generator (SMW200A with SMW-B1006)
R&S VSG Hardware Option – 2 RF paths (SMW-B2006)

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R&S VSG bandwidth configuration according to requirements

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R&S VSG baseband configuration according to requirements

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R&S Signal Analyzer (FSV3007)

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R&S VSA bandwidth configuration according to requirements

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### **R&S Software Options**

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R&S VSG 5G NR Measurement Application (DL/UL) (SMW-K144)

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R&S VSG O-RAN Measurement Application

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R&S Vector Signal Explorer Software with License dongle, PC SW (VSE, FSPC)

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R&S VSE 5G NR DL/UL Measurements (VSE-K144)

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R&S VSE O-RAN Measurement Application

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## **Further information on VSG and VSA**

To find out more information about Rohde & Schwarz Instruments and Applications, please visit [ROHDE & SCHWARZ](https://www.rohde-schwarz.com)

## **Support**

VIAMI will act as the first line of support for all TM500 O-RU Testers purchased through VIAMI including any R&S equipment included in the system so that customers have a single point of contact through VIAMI.



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