

# VIAVI

## TeraVM RIC Test

### Overview

The VIAVI TeraVM RIC Test provides a comprehensive AI enablement and validation test suite for the RAN Interface Controller element of the Open RAN ecosystem.

The RAN intelligent controller (RIC) enables both near-real time RAN optimization by direct communication and control of Open RAN elements O-DU and O-CU over the Open RAN Alliance standardized E2 interface and non-real time RAN optimization through communication over O1 and A1 interfaces.

The RIC hosts container based microservices – called xApps and rApps – which use the standardized interfaces to collect RAN information on aspects such as QOS, Energy Consumption, Accessibility and Retainability, resource utilization, among other RAN network KPIs and perform AI/ML based decision making algorithms to project improvements and feed corresponding control action back to the RAN via aforementioned Open Ran interfaces.

RIC and x/rApp developers face several challenges:

- How to generate gNB, O-DU and O-CU traffic to ensure the RIC interpretation of the standards are implemented correctly
- How to configure multiple load, capacity and mobility scenarios as inputs to RIC for optimization algorithms.
- How to stimulate r/xApps with rich stream of UE simulations and scenarios to train and test App performance and interoperability.
- How to generate big and realistic RAN dataset for AI/ML model trainings.
- How to close the loop and check the RIC recommendations have the desired effect on the RAN

This is where TeraVM RIC Test comes in. Emulating UEs, gNBs, O-DUs, O-CUs, cells, mobility patterns, path loss propagation models, etc., allows the above challenges to be met.

### Features

- Market Leader RIC Test Suite compliant with Open RAN Alliance standards
- First to market AI enabled App Validation Engine (AVE)
- Runs in lightweight VM on standard x86 hardware.
- Full Cloud native deployment support (GCP, AWS, Azure etc.)
- Microservice (container based) architecture
- Latest Open RAN Alliance Interface (E2, A1, O1) standards version supported
- Various E2 Service models support (AP, KPM, NI, RC)
- Rich RAN scenario generator for r/xAPP Training, Testing and Benchmarking
- Accelerated Time Run environment support
- UE, gNB, O-CU, O-DU Emulation
- Easy scale options

## RIC Testing

The near/non real time RIC hosts micro-service based applications called r/xApps which handle traffic inputs from RAN elements such as gNB, O-DU and O-CU over a standard E2 interface. Using r/xApp intelligence (which can be Artificial Intelligence, machine learning, inbuilt algorithms) decisions regarding load-balancing, bearer management, interference detection and interference mitigation ,energy efficiency, QOS/QOE among others are taken and recommendations made to the RAN to optimize radio resources and enhance user experience.

Based on cloud native run time resources (CPU, memory, etc.) it is possible to produce simulation data in a shorter time period, e.g., produce 1 hour of simulated data in a realistic time scale of several minutes.

### 1. E2 Interface Performance Testing

How does E2 implementation perform according to Open RAN Alliance standards. Measure metrics such as:

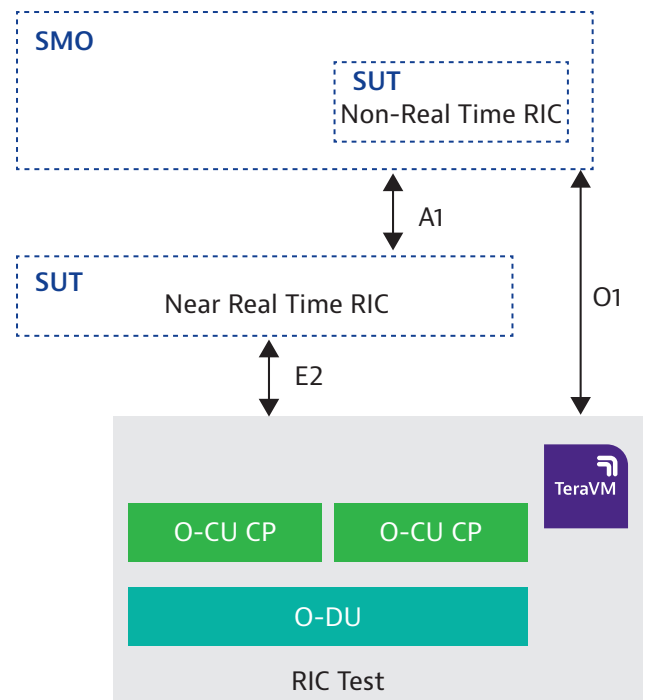
- How many SCTP Links from gNB to RIC
- How many TPS per E2 interface
- How many RICs for a large MNO network
- How many E2 set up messages per second
- How many UE reports generated per second

### 2. RAN Scenario Generator

r/xAPPs require mobile traffic to train their algorithm under different scenarios for a complete and all round RAN experience. With TeraVM RAN scenario generator rich traffic scenarios can be emulated and pushed towards the r/xAPPs to offer a diverse set of UE behaviors thereby fully training the xApp prior to live network deployment.

RAN Scenarios can be generated :

- RF/performance anomaly simulations
- Mobility pattern simulations
- RF propagation models including pathloss model, indoor/outdoor user pattern emulation
- Fading (shadow, fast)
- Multiple traffic consumption pattern, QOS and Networks slice policies configurations.
- Rich RAN L2 protocol stack and features support (3GPP L2 schedulers, CA, mMIMO, etc.)



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### 3. APP Validation Engine

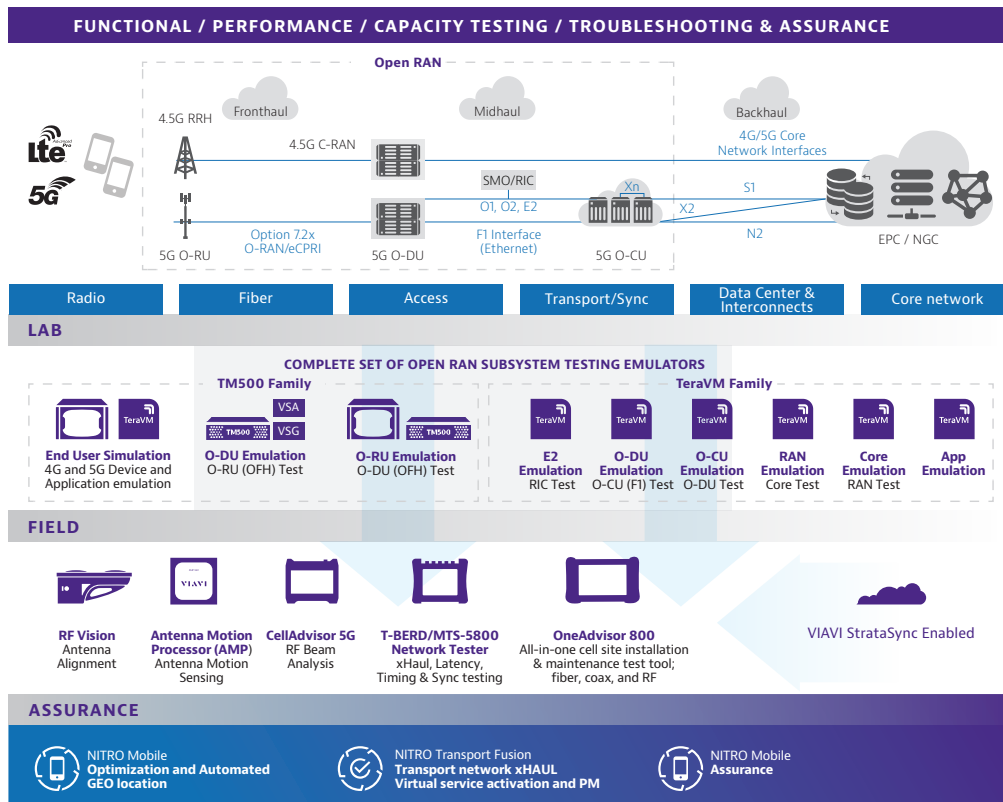
How effective are the decisions taken by the r/xAPPs housed on the non and near real time RIC. Measure the effectiveness of r/xAPP recommendations by performing the changes in the emulated RAN and measuring the change to see if the desired improvement is achieved.

Typical supported r/xAPP use cases:

- Traffic Steering
- Anomaly Detection and Mitigation
- QOS/QOE optimization
- RAN Slice Assurance
- NSSI optimization
- Energy Efficiency
- Geo Location xAPP
- Massive MIMO

### Why VIAVI RIC Test

- VIAVI is a regular contributor to O-RAN Alliance work groups helping define the RIC interface standards. VIAVI has also developed a RIC prototype for the Open RAN community using OSC RIC SW.
- The VIAVI RIC Test is built leveraging the in-depth RAN knowledge from the market leading TM-500 UE emulator and adapted to support specific Open RAN scenarios through engagement with the Open RAN OSC vendor community.
- The VIAVI RIC test is part of a complete end-to-end suite of Open RAN test tools.
- The VIAVI RIC test has been a major contributor to the Open RAN Alliance Plugfest series with dozens of engagements to date
- VIAVI RIC Test solution has already been proven in the market by being used in 8 Open RAN Alliance Global Plugfests where it was used by over 25 RIC/x/rApp vendors to validate their products.



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## Order Codes

RIC Test is available with the following product codes:

Part Number	Description
TVM6200	E2 RIC Test base License
TVM6202	RIC Data License – including 200k UE, 20k E2 Nodes, 100k report/s
TVM6203	RIC Test Advanced RF Model for RAN Scenario Generator
TVM6204	Advanced Traffic Model Support for RAN Scenario Generator
TVM6205	Advanced Interface Support for RIC Test A1
TVM6206	Advanced Interface Support for RIC Test O1
TVM6207	mMIMO support:3GPP M.MIMO Beam Management
TVM6208	E2 KPM Service Model Support
TVM6209	E2 RC Service Model Support
TVM6210	OpenStack Cloud Deployment Support for RIC Test
TVM6211	Google Cloud Deployment Support for RIC Test
TVM6212	Idle Mode Support for RAN Scenario Generator
TVM6213	RIC Security Validation
TVM6214	RIC Network Slice SLA Support
TVM6215	RIC Energy Efficiency
TVM6216	RIC QoS Support
TVM6217	RIC App Validation Engine
TVM6218	RIC PCI Conflict Resolution
TVM6219	MLB Support for RSG
TVM6220	Beam based MLB for RSG support
TVM6222	Carrier Aggregation Support
TVM6223	Massive MIMO: SSB Beamforming
TVM6224	RIC Test Deployment on AWS
TVM6225	Big Data Generation for AI Training
TVM6227	E2 CCC Service Model Support
TVM6228	Azure Cloud Deployment
TVM6229	Massive MIMO – ES Tx/Rx switch on/off
TVM6230	Massive MIMO Digital Beamforming
SWSUPPPG-NR-RIC-Test	SW Support



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