

VIAVI

TeraVM O-CU Simulator

Overview

The TeraVM O-CU Simulator provides a complimentary test component to the O-DU Test tool from TM500.

The O-RAN Alliance is promoting the disaggregation of the gNB into three distinct, open and standardized elements:

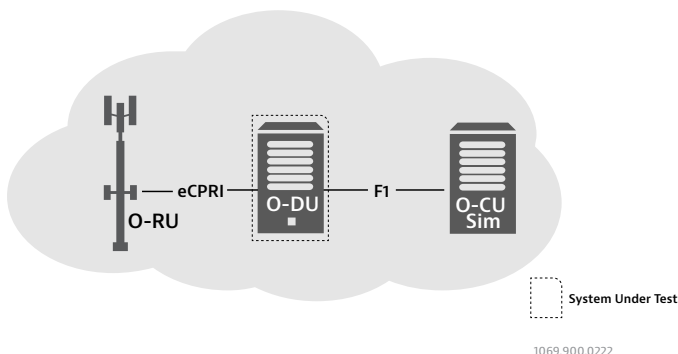
- O-RU: Open Radio Unit responsible for digital front end, lower part PHY layers
- O-DU: Open Distributed Unit responsible for RLC, MA and higher part PHY layers
- O-CU: Open Central Unit responsible for RRC and PDCP layers

VIAVI has introduced a new O-RAN test suite to help vendors validate their products according to the O-RAN standards as well as Service Providers wishing to verify the interoperability of these components before launching their network.

The TeraVM O-CU Simulator is a software-based test tool housed on x86 hardware – compliant against 3GPP F1 application protocol, supports up to 256 DUs per emulated CU and is capable of emulating up to 8 CUs per server.

The TeraVM O-CU Simulator can emulate 5G scenarios:

- 5G NSA Option 3a, option 3x
- 5G SA



Features

- First to market O-DU full wraparound test compliant with latest 3GPP,
- O-RAN standards
- Runs in lightweight VM on standard x86 hardware
- CI/CD Automation Integration
- Functional Testing
- Performance, Capacity Testing
- Supports Open-source automation tools such as Jenkins

Preparing for the Challenges of O-RAN Fronthaul Testing

The cellular industry is adopting cloud and virtual network technologies to simplify deployment, maintenance and optimize capital expenditure. To support this, one of the key objectives of the O-RAN Alliance is to bring uniformity in connectivity and test interfaces, and foster the use of off-the-shelf hardware as a means of reducing costs. Achieving these objectives opens new challenges for Network Equipment Manufacturers and Operators in particular. Some of the challenges include:

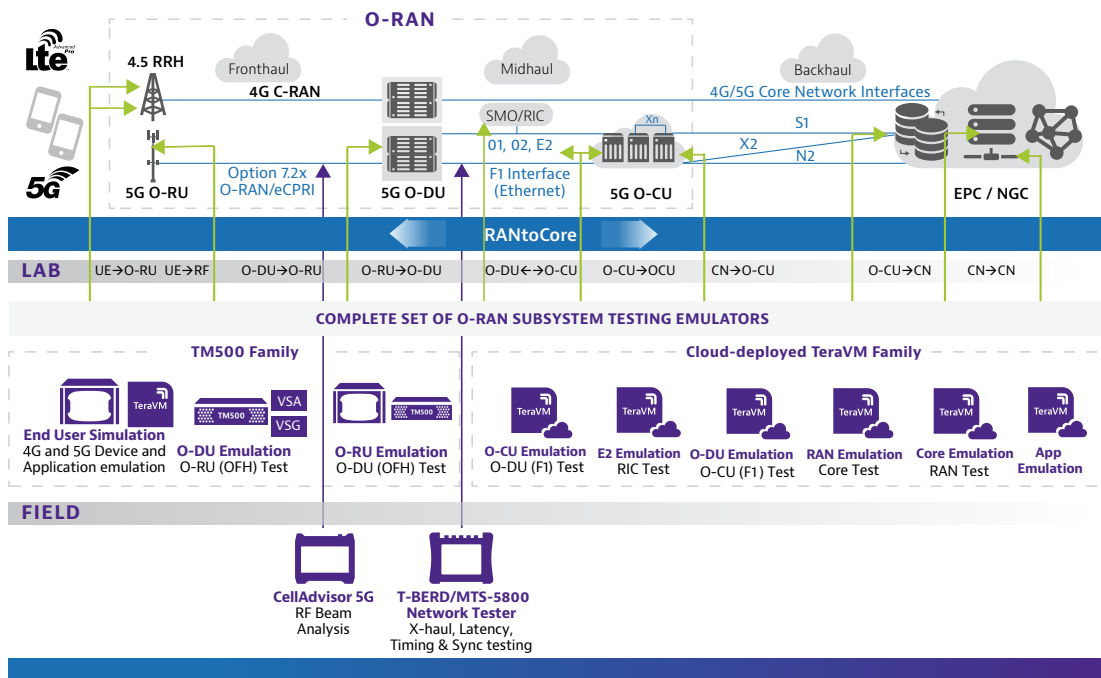
- Challenge of guaranteeing performance with scale and capacity E.g. ensuring that the O-DU can cope with high data volume and multiple RUs.
- Ensuring interoperability with legacy Radio Access Technologies (RAT) such as 4/4.5G. This is an important short/long term challenge for overall network performance management as 5G and O-RAN are expected to work with legacy. Operators and NEMs cannot ignore this as it can have a major impact on the Quality of Service (QoS) for 4G users in scenarios such as mobility and handover.
- Operators may have to do their own tests due to different vendor specific O-RAN requirements e.g. the O-RU, O-DU and O-CU can be from different vendors. They can also be standalone products or combined as a pair. Operators will need to decide whether to do the tests themselves or outsource testing to a lead vendor that can take responsibility for end-to-end system performance testing.
- Limited UE test capability and vendor experience If in-house solutions or a UE vendor with limited experience are used for testing, the breadth of 5G features and capabilities may be limited and may not have the sufficient coverage for a comprehensive test. This can put limitations on what can be tested or supported.
- Coping with different O-RAN customer requirements from an integration point of view can be problematic. Although O-RAN standards are meant to be universal, there is room for vendor specific requirements. For example, the O-RAN M-plane management which is defined by radio parameters, transport settings, RU management and state changes.

Why VIAVI?

VIAVI has an end-to-end O-RAN product portfolio for multi-vendor RAN development, test and IoT. VIAVI is a one stop shop, simplifying the complexity of testing different O-RAN interfaces across the network. Customers can rely on an unparalleled global support footprint, reduced complexity of integration, and coordinated support as part of the VIAVI Lab to Field and RAN to Core solutions.

Over many years of working with all major NEMs and small cell manufacturers, VIAVI has built a reputation as a trusted supplier of leading-edge cellular test equipment. Our flexible approach and ability to accommodate different customer requirements allows to support the various options and configurations different operators require in order to deploy O-RAN solutions.

VIAVI is part of O-RAN and is involved in developing specifications. This is important particularly in supporting multiple vendors with different vendor specific requirements. As O-RAN continues to evolve, VIAVI is well placed to align with its objectives on virtualization, interoperability and the use of low cost, off-the-shelf platforms.



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O-DU Test Cases

The TeraVM O-CU Simulator acts as a responder to the O-DU under test responding to and acknowledging messages sent across the F1 interface. The following functional test types available for TeraVM O-CU Simulator:

- Interface Management: F1 Setup Procedure, Release Procedure
- RRC Message Transfer Procedures
- UE Context Management
- Security Key Exchange
- Data Path Verification

Features of TeraVM O-CU Simulator

- Portability – 1U Server based system, easy to transport and setup (Lab/Field)
- Simultaneously emulate up to 8 CU per server
- Test both 5G SA and NSA scenarios
- Single API for test case definition
- Lightweight – Deploy and configure in real-time
- Deterministic Performance – Outcome is always consistent
- Time to Market – Frequent updates to most recent 3GPP Specifications

First to Market 3GPP Standards Test Alignment

VIAMI has the largest dedicated 4G and 5G R&D team of any test company focusing on gNB, Core Network test. We work closely with our key customers to ensure that our roadmap is aligned to market needs and that we deliver test capability first.

Specification and Configuration

The TeraVM O-CU Simulator consists of the following network function and interfaces:

Network Functions

- O-CU Emulator

Interfaces

- F1

The implemented features are according to the following specifications: (Contact VIAMI for latest Spec compliance)

- 3GPP TS 38.473: NG-RAN F1 Application Protocol

Hardware Specifications

The TeraVM O-CU Simulator is based on the POWEREDGE R740 server with the following specifications below:

Features	Technical Specifications
Processor	Two Intel® Xeon® Scalable processors, 18 cores per processor
Memory	192 GB ECC DDR per server
Power Supply	Platinum Hot plug power supplies with full redundancy
Dimensions	Form factor: Rack (2U) Max depth: 752 mm
Power dissipation	550W/ 700W/ 850W maximum for 0/ 1/ 2 Radio Cards

