Data Sheet

VIAVI
TeraVM
5G SA Core Test TVM-vRAN 5G Emulator

Overview

The VIAVI 5G SA vRAN emulator provides a full wraparound test of a 5G Standalone Core Network.

One of the biggest challenges facing NEMs and mobile operators as they launch 5G is developing products against constantly changing and maturing 3GPP specs.

TVM-vRAN 5G Emulator gives Core Network engineers a controllable and repeatable test environment that helps implement 3GPP standards rapidly. It also simplifies the development lifecycle of the 5G SA Core Network and the introduction of 5G services to the market.

TVM-vRAN 5G Emulator provides fully configurable emulation of thousands of basestations, millions of Ue's and user applications to create the most realistic 5G SA RAN environment to stress the core. Full support for 3GPP interfaces such as N1, N2, N3 and N6 enables the tester to accurately emulate UE applications and mobility behavior for inter-5G and inter-RAT scenarios.

The TeraVM virtualized platform makes it an ideal solution for validating the 5G SBA (Service Based Architecture) virtual mobile core and its components.
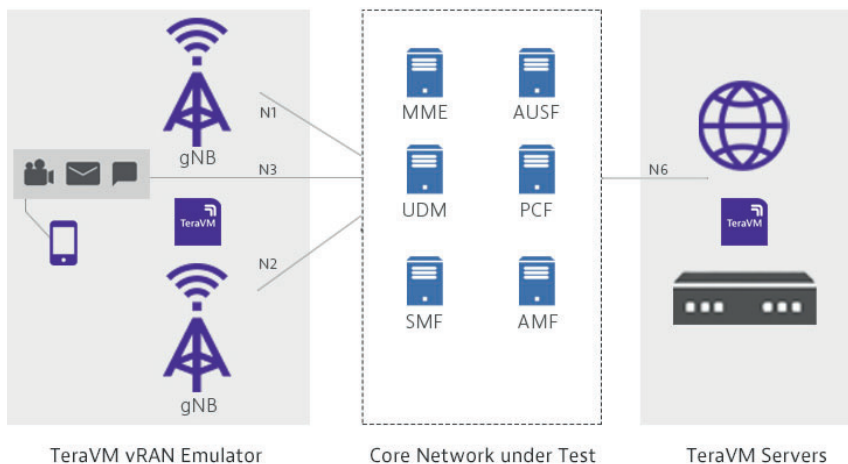
Features

- First to market alignment with 3GPP standards
- Runs in lightweight VM on standard x86 hardware
- CI/CD Automation Integration
- Supports Open Source automation tools such as Jenkins
- Automation and scripting tools
- Negative Testing via Error injection on N2 interface
- Test physical or virtual 5G Core Networks
- One-stop test support

TeraVM vRAN Emulator   Core Network under Test   TeraVM Servers

Figure 01

Benefits of Emulated RAN

- Fully virtual – runs on x86 OTS servers

- License sharing across geo-location

- Performs functional and load testing

- Create real life tests - subscriber profiles, mobility scenarios

- Mobility across RAT or inter-RAT

- Multiple use cases – Core Network Validation, Core Network Node Wraparound Testing, Security Gateway Testing, MEC Testing etc.

- Ease of access. Core engineers have access to an always available RAN test resource thereby boosting test productivity.

- RANtoCore - vRAN Emulator can be used in conjunction with the TeraVM Core Emulator (TeraVM 5G SA Core Emulator (48000/308,309)) and 5G SA individual node wrap around testing:

  - AMF (TVM-vRAN AMF Wraparound Test (48000/319))

  - SMF (TVM-vRAN SMF Wraparound Test (48000/320))

  - UPF (TVM-vRAN UPF Wraparound Test (48000/321))

    to provide the most comprehensive suite of 5G test capability on the market today.

- Portability – 1U Server based system, easy to transport and setup (Lab/Field)

- Lightweight – Deploy and configure in real-time

- Deterministic Performance – Outcome is always consistent

Supported Features

	Release 15 5G SA
TVM-vRAN	NGAP Setup/Reset
	5G SA Registration/Deregistration Procedure
	Authentication Algorithms- XOR, Milenage
	Integrity and cyphering algorithms -Null, Snow3G, AES
	5G SA PDU Session Activation/Modification/Deactivation
	Service Request Procedure
	Paging Procedure
	IPv4/IPv6 IP address assignment
	Application (Ping/TCP/UDP) traffic over N3/N6 interface
	Negative Testing/Error Insertion on N2 interface

KPI's to Validate vRAN

An extensive range of counters are available for the TVM-vRAN 5G Emulator including, but not limited to:

- Active Users

- Attach Requests/Accept/Complete/Reject

- Detach Requests/Accept

- Authentication Request/Result/Fail/Reject

- Security Mode Command/Complete/Reject

- TAU Request/Accept/Complete/Reject

- Service Request/Reject

- PDN Connection Request/Reject

- PDN Disconnection Request/Reject

Error Insertion via N2 Interface

Use TVM-vRAN 5G Emulator to introduce errors via the N2 interface and observe how the Core Network reacts. All protocol layers from IP over SCTP to NG-AP and NAS can be emulated. Modification of messages and/or parameters on any protocol layer can be achieved using the TVM-vRAN Emulator built-in error generation.

The following emulated error states are supported:

- Semantic Error

- Procedure Collision

- Message Duplication

- Syntax Error

- Message Rejection

- Reordering

- Discard Silently

- Superfluous Messages

- Response Delay

The above flexibility allows the customer to decide which impairments they would like emulated and tested. (Subject to change, please contact VIAVI for latest supported specifications)

"Pay As You Grow" Architecture

TeraVM was designed from the start as a virtualized solution that runs on industry-standard servers. Virtualization gives customers the flexibility to scale TeraVM's performance to suit specific needs.

Starting from an entry level 1 Gbps capacity suitable for a new project start up or small cell supplier.

Automation and Scripting

The TVM-vRAN Emulator comes with build-in management options, shell or a web client and provides APIs to control and operate the Emulator from external applications.

vRAN Emulator shell:

- CLI (Command Line Interface) with readline/autocompletion support

- Fully scriptable

First to Market 3GPP Standards Test Alignment

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

Specification and Configuration

The TVM-vRAN 5G Emulator consists of the following interfaces:

Interfaces

- · N1
- · N2
- · N3
- · N6

The implemented features are according to the following specifications:

- 3GPP TS 23.501 V15.3.1 (2017–12): System Architecture for the 5G System
- 3GPP TS 23.502 V15.3.0 (2018–03): Procedures for the 5G System
- 3GPP TS 24.501 V15.1.0 (2018–3): Non-Access-Stratum (NAS) protocol for 5GS
- 3GPP TS 38.300 V15.3.0 (2017–12): NR and NG-RAN Overall Description
- 3GPP TS 38.413 V15.1.0 (2018–03): NG Application Protocol (NGAP)
- 3GPP TS 38.420 V15.1.0 (2018–03): NG-RAN; Xn general aspects and principles
- 3GPP TS 38.423 V15.1.0 (2018–03): NG-RAN; Xn application protocol (XnAP)
- 3GPP TR 38.801 V14.0.0 Study on New Radio Access Technology; Radio Access Architecture and Interfaces
- 3GPP TR 38.401 V15.3.0 NG-RAN Architecture Description
- 3GPP TR 38.410 V15.1.0 NG-U, Userplane interface (gNB – UPF)

Order Codes

TVM-vRAN 5G Emulator is available with the following product codes

Part Number	Description	Gbps	Support
4800/315	5GC Wraparound Test – N1/N2/N3/N6 100 Gbps	100 Gbps	SA315
4800/322	5GC Wraparound Test – N1/N2/N3/N6 50 Gbps	50 Gbps	SA322
4800/317	Error Insertion N1/N2-100K TPS	100 Gbps	SA317