Data Sheet

VIAVI
TeraVM 4G vRAN Emulator

Overview

The VIAVI 4G vRAN emulator provides a full wrap-around test of a 4G Core/5G NSA Core Network or it's constitute elements.

TeraVM 4G vRAN Emulator gives Core Network engineers a controllable and repeatable test environment that helps implement 3GPP standards rapidly and simplify the rollout of 4G services to the market.

TeraVM 4G vRAN emulator provides fully configurable emulation of thousands of base stations, millions of UE's and user applications to create the most realistic 4G RAN environment to stress test the 4G core network.

The TeraVM virtualized platform makes it an ideal solution for validating the 4G/5G NSA virtual mobile core and it's components.
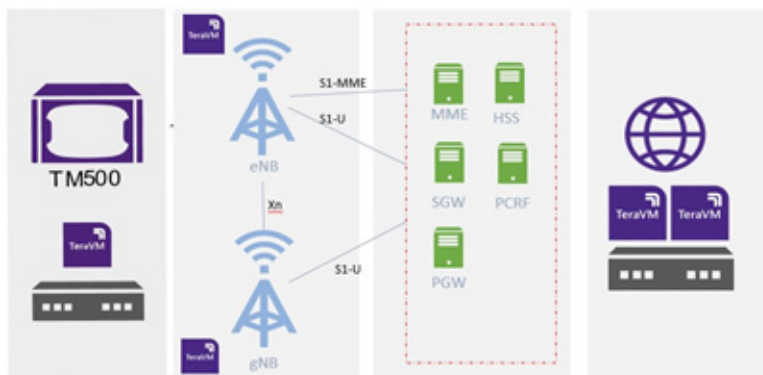
Features

- 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/message delay/drop on S1-MME interface
- Test physical or virtual 4G Core Networks
- One-stop test support

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 wraparound Testing, MME wraparound testing, Packet Gateway wraparound Testing.

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

• 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

S1AP Procedures

	S1AP Procedures
1	S1 Setup
2	S1 Reset
3	S1 Flex
4	eNB/MME Configuration Update
5	Overload Start / Stop
6	Initial Context Setup
7	E-RAB Activation/Modification/Release
8	Initial Context Setup, CSFB
9	UE Context Modification/Release
10	Path Switch Procedure (X2 HO)
11	S1 Handover (S1 HO with or without MME/SGW Relocation)
12	eNB Status Transfer
13	MME Status Transfer
14	UE Capability Info Indication
15	Location Reporting Procedures
16	Paging
17	NAS Non-Delivery
18	S1 Location Report
19	UE Context Suspend
20	Error Indication

NAS-EMM Procedures

	NAS-EMM Procedures
1	Attach Procedure (IMSI/GUTI)
2	Combined EPS attach/ IMSI Attach
3	Emergency Attach
4	UE / Network Initiated Detach
5	Identity Procedure
6	Authentication Procedure
7	Security Procedure
8	Tracking Aria Update Procedure
9	TAU with/without change of MME and SGW
10	TAU with/without active flag on
11	Service Procedure
12	Extended Service Procedure
13	Inter-MME HO
14	Intra-MME HO
15	Pathswitch: X2-based Handover Intra-E-UTRAN with/without SGW unchanged
16	EMM Status

NAS-ESM Procedures

	NAS-ESM Procedures
1	PON Connection/Disconnection
2	ESM Information Procedure
3	Activate Default EPS Bearer
4	Activate Dedicated EPS Bearer
5	Bearer Resource addition/modification/deletion
6	Modify Bearer Procedure
7	Video-2-Voice Downgrade
8	Mobile 2 Mobile SMS Service

CIoT Procedures

	CIoT Procedures
1	Control Plane Service Request
2	EPS Session Mgmt. Data Transport
3	Uplink Data Transport
4	Extended idle-mode DRX cycle
5	Interaction with Power Save mode and idle mode
6	PON Connection Request (Non-IP)
7	'UE User Plane CIoT Support Indicator' IE
8	IP Data Delivery over NAS
9	NIDO over S11u, S1-U and SCEF
10	SCEF Interfaces - T6a and s6t

EPC Services

	EPC Services
1	Authentication Algorithm- XOR, Milenage
2	Integrity Protection and Ciphering - Null, Snow3G, AES
3	Up to 11 bearers
4	CSFB to 3G and 2G
5	Inter System HO to and from 3G
6	SMS
7	User Plane- S1U, SGi
8	Up to 11 Bearers/UE supported
9	VoLTE/IMS call.
10	UE/Network initiated Bearer Support
11	Traffic Prioritization on Ethernet Layer
12	VLAN Tagged S1 interface
13	IPSec enabled S1 interface
14	SCTP multi-homing
15	Ethernet Jumbo Frames
16	1Pv4/1Pv6 IP assignment
17	MBMS
18	SRVCC
19	Overload Start and Stop Indication

KPI's to Validate vRAN

An extensive range of counters are available for the TVM 4G vRAN 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 S1-MME Interface

Use TVM 4G vRAN Emulator to introduce errors via the S1-MME 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 NAS and S1AP layer can be achieved using the TVM 4G vRAN Emulator built-in error generation. Messages can be delayed or dropped from the simulator for negative testing.

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.

"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 4G 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 4G vRAN Emulator consists of the following interfaces:

Interfaces

• S1-MME

• S1-U

The implemented features are according to the following specifications:

• 3GPP TS 24.301 Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3

• 3GPP TS 23.401 Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access

• 3GPP TS 36.413 S1 Application Protocol (S1AP)

Order Codes

TVM 4G vRAN Emulator is available with the following product codes:

Part Number	Description	Gbps	Support
4800/438	4G Wraparound Test – S1/MME 100 Gbps	100 Gbps	SA438
4800/316	Error Insertion S1-4k TPS	100 Gbps	SA316