

TeraVM is a flow based real world application traffic emulation solution used to validate the performance of network functions, application services and security. TeraVM provides comprehensive measurement and performance analysis on each and every application flow with the ability to easily pinpoint and isolate problem flows.

Advantages

- Highly scalable: 1 Gbps to 1 Tbps
- Performance validation for physical and virtual network functions
- Supports all major hypervisors: VMware ESXi, Microsoft Hyper-V, Citrix XenServer and KVM
- Cloud Support for AWS, Azure and OpenStack: Ubuntu and RHEL
- Delivers 100% of capabilities with over 10+ years of development
- Rapid expansion and contraction of validation platforms
- Utilizes industry standard hardware, datacenter ready
- Offers the most cost effective method for validation

Features

- Elastic Test Bed, scale to 1Tbps of application traffic
- Bandwidth equivalent or core based licensing models
- Rack & Stack
- Emulation and real-time measurement of millions of unique application flows
- Fully stateful application flows, validate live application servers
- Comprehensive cybersecurity database
- Easy pinpointing and isolation of problem flows

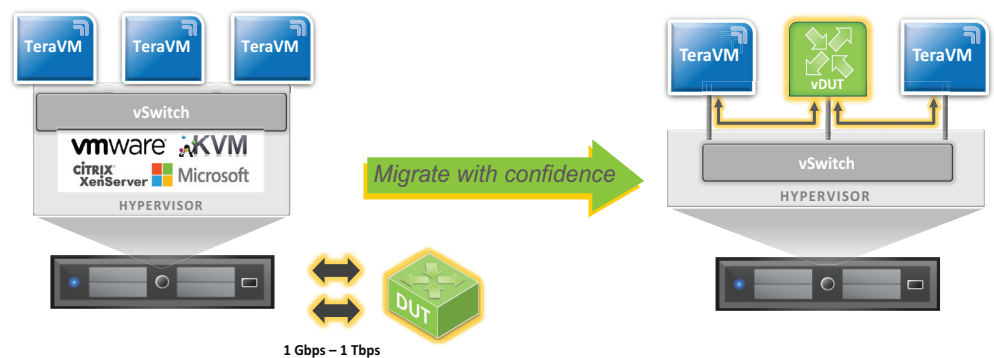


Figure 1: Migrate to virtualization with confidence, validation for proprietary and virtual functions

Validation for Proprietary Hardware and Virtual Network Functions

TeraVM is delivered as a software only or as a physical appliance solution which is ideal for validating the performance of proprietary hardware/virtual network functions and application services. The flexibility to validate both the physical and virtual function provides the confidence and assurance necessary to deliver application services in the age of Network Function Virtualization (NFV).

Proven Scalability

TeraVM enables unprecedented scale; from a gigabit or less to a terabit of stateful layer 4 to 7 traffic. By simply adding more TeraVM it's possible to rapidly scale to meet test needs. Alternatively, build a large scale test bed and then break it out for multiple test beds, enabling greater utilization of testing resources.

Proven Portability

TeraVM is packaged as a virtual machine which is easily deployed on any industry-standard hardware and only requires a software license to operate. For geographically dispersed organizations moving a test bed between locations is as simple as checking out a license from a centrally deployed license server that is installed in the user's network.

Comprehensive Validation Suite

TeraVM provides a comprehensive validation suite covering key network segments such as access, mobile network backhaul and security. TeraVM is used to validate key application services of video, voice and data. TeraVM's portable cybersecurity database enables performance validation with both good and bad flows. The TeraVM central licensing for security offers a more cost effective approach to security hardening.

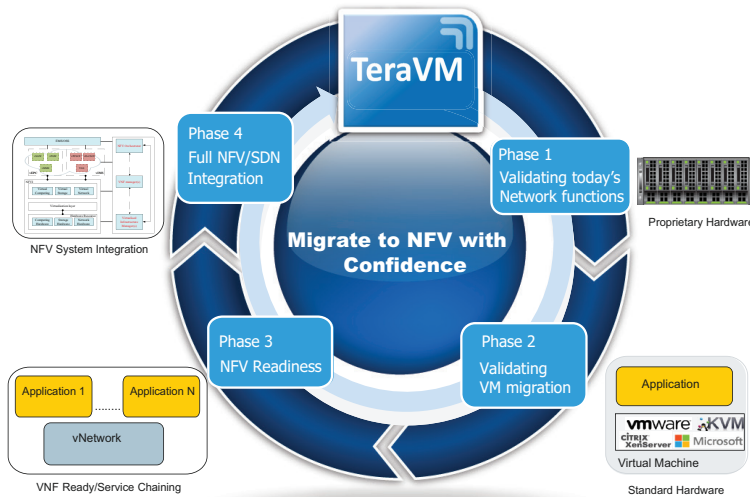


Figure 2: TeraVM performance validation for virtualization lifecycles

Use Case: Virtualization Lifecycle Testing with TeraVM

Phase 1 and 2: Use TeraVM to assess and characterize the performance of the physical network function, migrate to a virtual machine and assess the impact that standard hardware and hypervisor settings has on operational performance.

Phase 3: Assess performance on platforms where there is limited control on configuration. Determine the impact that orchestration and network management has on the performance of the virtual function e.g. assess for performance loss when networks are under software defined network (SDN) control.

Phase 4: As the virtual function evolves to be more inclusive of NFV system integration recommendations, validate the performance of the virtual function as part of a service delivery chain. Assess performance of the application service with dedicated quality of experience performance metrics.

TeraVM Features and Functionality

GENERAL

- Real-time isolation of problem flows
- Elastic Test bed (up to 1Tbps)

NETWORK INTERFACE SUPPORT

- Support for 1/10/40Gbps I/O
- Mellanox ConnectX-4 support for 56/100Gbps

DATA

- TCP / UDP, Teraflow, Ookla speed test
- HTTP/HTTPS (v1/2, incl. stateful response parser)
- SMTP / POP3 (incl. file attachments)
- FTP (Passive/Active), P2P applications, DNS

ADDRESS ASSIGNMENT

- Configurable MAC
- DHCP, PPPoE (IPv4 & IPv6)
- Dual Stack (6RD, DS Lite)

ETHERNET SWITCH

- VLAN Tagging (up to 8 concurrent tags)
- ACL, 802.1p, DSCP

DATA CENTER

- VxLAN, GRE, SR-IOV

REPLAY

- Replay large PCAP files - TCP, UDP and raw data playback
- Amplify and dynamically substitute data into PCAP files

VIDEO

- Multicast: IGMP v1/v2/v3 & MLD v1/v2
- Automatic Multicast Tunelling (AMT)
- Video on Demand (RTSP)
- Adaptive Bit Rate Video (HLS, HDS, MPEG-DASH, Smooth)
- Video conferencing, Webex

SECURE ACCESS / VPN

- Clientless VPN (SSL/TLS/DTLS), IPSec (IKEv1/v2), Generic remote access
- Cisco AnyConnect SSL VPN Client, Cisco AnyConnect IPsec VPN
- Cisco ScanSafe
- Juniper Pulse, Juniper Network Connect
- SAML (F5, Citrix SSO), Dell SSO
- 802.1x EAP-MD5

SECURITY ATTACK MITIGATION

- Spam / Viruses / DDoS
- Cybersecurity Database

VOICE

- VoIP: SIP & RTP (secure & unsecure), SMS
- Dual Hosted UACs, SIP Trunking
- Voice & Video quality metric (MOS)

LTE/4G

- EPC and RAN (Rel.8, 10, 11)
- VoLTE (secure/unsecure), ViLTE
- Wifi Offload (EoGRE)

SLA

- TWAMP, PING

AUTOMATION

- CLI, Perl, TCL, XML, Java API
- Python, Jython
- Qualisystems (CloudShell)
- OpenStack

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