VIAVI Solutions

Case Study

TeraVM

Cisco uses TeraVM to benchmark VPN performance on Cisco® ASA and Cisco FirePOWER™ Next Generation Firewall

The Cisco® ASA and Cisco Firepower Threat Defence (FTD) Series are security solutions that provide firewall, intrusion prevention system (IPS) and virtual private network (VPN) functionality on physical appliances and virtualized platforms.

The challenge Cisco faced was how to properly benchmark all their firewalls in multiple platforms and to demonstrate VPN throughput in a repeatable and reliable manner. In addition, to accurately exercise the ASA and FTD Next Generation Firewall's (NGFW) at gigabit speeds required emulation of stateful Cisco VPN clients.

Technical Challenge

To fully benchmark the ASA VPN throughput up to 20 Gbps and beyond requires an end-to-end approach using Cisco's own

proprietary AnyConnect VPN clients for both SSL and IPsec. Cisco has been utilizing TeraVM since 2009 to develop and evolve the emulated AnyConnect VPN clients.

For an accurate assessment of VPN throughput, the tester must know the rate at which content is being served to the ASA for encryption from inside the firewall.

There is a large CPU requirement associated with testing the ASA end-to-end, to do this with a proprietary test chassis is cost prohibitive.

Overview

- Benchmark the volume of encrypted traffic that the Cisco ASA can serve to a client

Key Challenges

- Statefully emulate Cisco VPN clients:
  - AnyConnect SSL VPN
  - AnyConnect IPsec VPN
- Accurately measure the volume of encrypted traffic (e.g. 5 Gbps) being served by the ASA
- Reliably serve large files to the ASA

Why TeraVM?

- Statefully emulates Cisco VPN clients:
  - AnyConnect SSL VPN
  - AnyConnect IPsec VPN
- Cisco VPN clients are native applications in the software
- Virtualized test solution that runs on Cisco UCS hardware
- Statefully emulates server-side applications

Emulated Traffic

- AnyConnect SSL VPN client
- AnyConnect IPsec VPN client
- HTTP (client AND server)

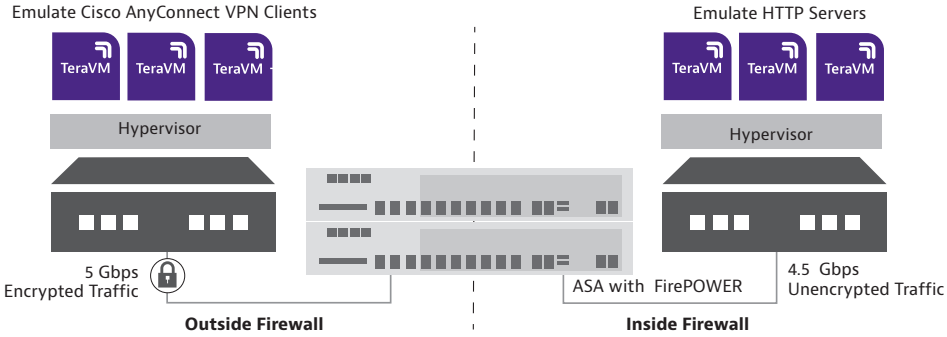
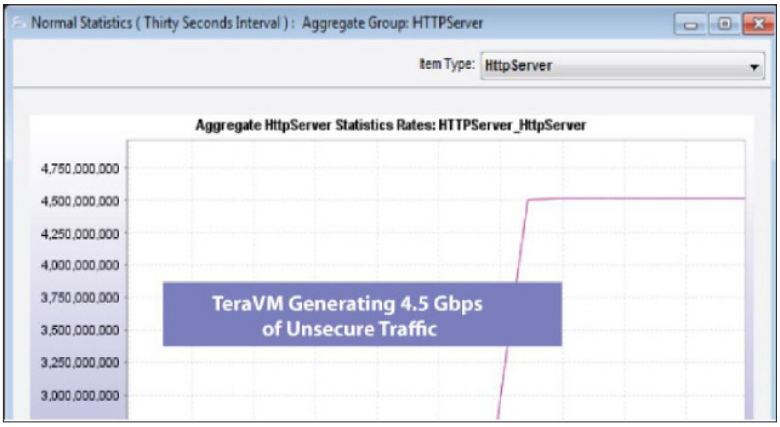


Figure 1: Test Configuration

Cisco applied the following selection criteria when choosing a test solution to benchmark ASA VPN throughput:

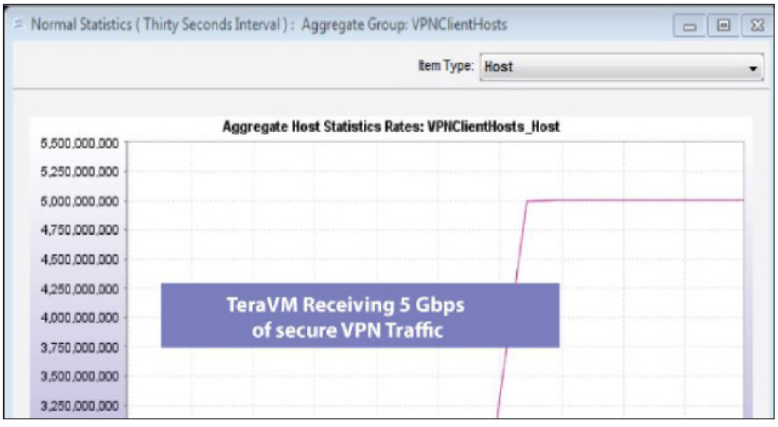
- Must statefully emulate the following Cisco VPN clients:
  - Cisco AnyConnect SSL VPN
  - Cisco AnyConnect IPsec VPN
- Establish fully stateful VPN tunnels with the ASA and pass application traffic
- Perform an end-to-end test by serving application content at a high rate for encryption by the ASA
- Use industry-standard hardware for greatest flexibility, especially to add additional CPU resources in order to scale the test bed as needed

Test Results



Inside the Firewall

- TeraVM emulates a stateful HTTP server
- TeraVM serves a large data file (resulting in a minimal number of connected VPN clients)
- TeraVM serves an aggregate of 4.5 Gbps of unencrypted traffic to the ASA for encryption



SuperMassive at scale

- TeraVM emulates Cisco AnyConnect SSL and AnyConnect IPsec VPN clients
- The stateful VPN clients establish secure tunnels with the ASA and pass traffic
- TeraVM processes 5 Gbps of encrypted application traffic served from the ASA

See the Cisco website for an overview on VPN throughput performance
http://www.cisco.com/en/US/products/ps6120/prod_models_comparison.html#~tab-c

Conclusion

Cisco used TeraVM to benchmark the VPN throughput of the Cisco® ASA and Cisco FirePOWER™ Next Generation Firewall. In the test setup TeraVM was deployed both inside and outside the firewall. Inside the firewall TeraVM emulated an HTTP server that served large data files. ASA received these files, encrypted them and served out to TeraVM that was sitting outside the firewall. TeraVM emulated Cisco Anyconnect SSL and IPsec clients.

Cisco conducted these benchmark tests using Cisco UCS hardware and without the use of any proprietary test hardware. This was not only cost effective but also provided the flexibility to scale the test bed on demand and move it to different locations as required.

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