







VULCAN

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Story

Vulcan generates stateful Ethernet traffic to analyze how firewalls, switches, routers, NAT routers, proxies, load balancers, bandwidth shapers and so on perform in a wide range of real-world scenarios.



Applications



QoS

Determining performance, responsiveness and stability of network devices.

- Gateway subnet to subnet routing
- Network Address Translation
- Traffic filtering and shaping
- Deep Packet Inspection
- Intrusion Detection and Prevention Systems



Functional tests

Verifying expected behavior of network devices.

- Gateway subnet to subnet routing
- Network Address Translation
- Traffic filtering and shaping



Service validation

Testing link performance complies with a Service Level agreement.

- Traffic throughput
- Traffic latency
- Traffic prioritization



Security testing

Ensuring that security measurements works as expected, also under significant workload.

- TLS/SSL
- Deep Packet Inspection
- Intrusion Detection and Prevention System

Quality of Service

Measuring performance, capacity and responsiveness of network devices is important to determine the overall Quality of Service the users will experience.

Layer 1 throughput and application goodput measurements reveals bottlenecks causing retransmissions and loss that can help optimizing network devices and infrastructures. The responsive of a network device is characterized as sessions per sec. as well as application transactions per sec, and its capacity by how many simultaneous sessions/traffic flows it can handle.

Vulcan offers a solution that with minimum configuration effort can do measures within performance, capacity and latency for network devices providing functionality such as:

- IP routing, Network Address Translation
- Stateful and content based Traffic filtering
- Traffic shaping
- Intrusion Detection and Preventing Systems

Functional testing

Verifying correct implementation of network devices during development is crucial, but often overseen is validation of correct configuration during and after deployment.

Use VulcanManager to define test cases targeting specific functionality. With the built-in high performance TCP, UDP and application library XenaAppMix, simple to very complex traffic scenarios spanning over multiple test ports can be configured.

Vulcan offer a solution that with its TCP/UDP and XenaAppmix can verify network devices providing functionality such as:

- IP routing, Network Address Translation
- Stateful and content based Traffic filtering
- Traffic shaping
- Intrusion Detection and Preventing Systems

Service validation

Vulcan makes it easy to test the capacity and performance of WANs (& SD-WANs) of service providers and large enterprise networks – where the focus is more on system-wide performance.

Relevant test parameters are:

- End-to-end throughput and latency in a managed IP network
- Optimal Maximum Segment Size (MSS).
- Traffic prioritization using Differentiated Services (DS) and other QoS mechanisms.
- Verify guaranteed bandwidths according to SLAs.

WAN testing can also take place over large geographical distances requiring simultaneous control over multiple traffic generators. For that Vulcan offers a perfect solution to; in a centralized manner orchestra separated test ports all over the world.

Security testing

The increasingly demands for security in terms of both privacy, trust as well as protecting systems from data leak and intrusion requires means for both performance and functional testing.

With Vulcans TLS features and application replay, performance and behavior of security devices can be verified. In focus for such test are both the ability to detect security breach, but also to verify that the implemented security means works as expected under high load.

This includes network functionality such as:

- TLS encryption /decryption
- Deep packet inspection
- Content based traffic filtering
- Intrusion detection and preventing systems.



Hardware



- 14 million Concurrent Connections (CC)
- 5 million Connections Per Second (CPS)
- 2.8 million Transactions Per Second (TPS)
- 500.000 Concurrent TLS Sessions

19" Rack size, 1U.

C-Vul-28PE-10G Throughput 20Gbps
2 x 2-speed 10GbE/1GbE SFP+ interfaces.

C-Vul-28PE-10G CU Throughput 20Gbps
2 x 4-speed 10GbE/5.0GbE/2.5GbE/10GbE RJ45
interfaces

C-Vul-28PE-25G Throughput 40Gbps
2 x 3-speed 25GbE/10GbE/1GbE SFP28 and SFP+
interfaces



- 28 million Concurrent Connections (CC)
- 10 million Connections Per Second (CPS)
- 800.000 Concurrent TLS Sessions
- 5.7 million Transactions Per Second (TPS)

19" rack size, 2U.

Vul-28PE-10G-CU Throughput 120Gbps
Up to 12 x 4-speed 10G/5G/2.5G/1G BASE-T interfaces.

Vul-28PE-25G Throughput 140Gbps
Up to 12 x 3-speed 25G/10G/1G SFP28 interfaces.

Vul-28PE-40G Throughput 140Gbps
2 x QSFP+ 40GBase.
Up to 8 x 3-speed 25G/10G/1G SFP28 interfaces.

Pay for the speeds you need

There are three port/speed versions of the VulcanBay – and then you enable the ports and speeds you need with a simple license upgrade. You buy **Speed licenses** to enable the speeds you need.

Vul-V1G-P Speed License

Enables 1G
on a Test Port

Vul-V10-P Speed License

Enables 1GE/
2.5GE/5GE/10GE
on a Test Port

Vul-V25-P Speed License

Enables 1GE/2.5GE/
5GE/10GE/25GE
on a Test Port

Vul-V40-P Speed License

Enables 1GE/2.5GE/
5GE/10GE/25GE/
40GE on a Test Port



Software

VulcanManager



The Vulcan software you'll use most of the time

A MS Windows application used to configure and generate streams of Ethernet traffic between our stateful test equipment and devices under test (DUTs) at port speeds up to 40 Gbps, and analyze the results.

Test Configuration

The screenshot displays the 'pfSense Performance - VulcanManager' interface. The top navigation bar includes 'File', 'Test Configuration', 'Test Execution', and 'Statistics and Reporting'. A toolbar (1) contains icons for 'Chassis', 'Test', 'Add Testcase', and 'Add Scenario'. The left sidebar (2) shows a tree view of test cases under 'Test Explorer', with '# 3.2 TCP throughput' selected. The main area (3) shows the configuration for this test case, including a 'Description' section with 'Name: # 3.2 TCP throughput', 'Total Users: 30000', and 'Total Connections: 150000'. It also features a 'Distribution of total users' donut chart (33% Scenario 1, 33% Scenario 2, 33% Scenario 3) and a 'Load Profile' line graph showing users over time. A table at the bottom lists the test case details:

Identity	Subnets - Ports	Load Profile					
Active	Type	Name	Client Subnet	Server Subnet	Client Port	Server Port	Users
<input checked="" type="checkbox"/>	Pattern	Scenario 1	# 1.0 lan	# 1.0 wan 0	P-0-1-4	P-0-1-9	10.000
<input checked="" type="checkbox"/>	Pattern	Scenario 2	# 1.0 lan	# 1.0 wan 1	P-0-1-4	P-0-1-9	10.000
<input checked="" type="checkbox"/>	Pattern	Scenario 3	# 1.0 lan	# 1.0 wan 2	P-0-1-4	P-0-1-9	10.000

1 'Tool bar' with most common actions and configuration 'Traffic Light'.

- Scenario
- Subnet oversubscribed
- Ports

Configuration Status

2 Explores to easily navigate through test configuration and statistics.

3 Configuration and detail views with graphical elements.

Test Execution

The screenshot displays the 'pfSense Performance - VulcanManager' interface. At the top, there are tabs for 'File', 'Test Configuration', 'Test Execution', and 'Statistics and Reporting'. The 'Test Execution' tab is active, showing a 'State: Processed' and 'Progress: 100%'. Below this, there are various controls like 'Update Rate', 'Duration', 'Extend (sec)', and 'Reset'. A 'Live Charts' button is also visible.

The main area is divided into several sections:

- Realtime Statistics Explorer:** A tree view on the left showing the test configuration hierarchy, including '# 3.2 TCP throughput' and its sub-scenarios.
- Charts:** Three charts are displayed: 'Session start rate (per sec)', 'Active sessions', and 'Layer 5-7 goodput (bps)'. Each chart has a time axis from 0 to 120 seconds.
- Statistics Table:** A detailed table of metrics for the '# 3.2 TCP throughput' test, organized into three columns: 'Layer 5-7 Client', 'Layer 4', and 'Layer 1-3 Client'.

Layer 5-7 Client		Layer 4		Layer 1-3 Client	
Sessions					
Current Active	307 sess	TCP Connection Rates		Ethernet L1 Bit Rate	
Total Active	24,509 sess	Establish Rate	0 cps	Tx Rate	0 bps
Session Rate	0 cps	Max Establish Rate	3,018 cps	Rx Rate	0 bps
Max session Rate	612 sps	Close Rate	0 cps	Ethernet L2 Bit Rate	
Throughput		Max Close Rate	39,521 cps	Tx Rate	0 bps
Load	0 bps	TCP Connection Current		Rx Rate	0 bps
Goodput	0 bps	Attempting	0 con	Ethernet Packet Rate	
Max Goodput	4,58 Gbps	Established	837 con	Tx Packet Rate	0 pps
Total Forwarded	48,23 Gbyte	TCP Connection Total		Rx Packet Rate	0 pps
Throughput Upstream		Attempted	150,000 con	Ethernet Packets Total	
Load	0 bps	Established	122,510 con	Tx Packets	56,866,363 packet
Goodput	0 bps	Closed	148,533 con	Rx Packets	30,100,883 packet
Max Goodput	2,93 Gbps	TCP RTT		Ethernet Events	
Total Forwarded	27,54 Gbyte	Upstream	0 usec	Tx Errors	0 event
Throughput Downstream		Downstream	0 usec	Rx Errors	0 event
Load	0 bps	TCP Events - Client		Packet Reception Loss	0 event
Goodput	0 bps	Protocol Events	55,025 event		
Max Goodput	2,24 Gbps	Retransmission Events	18,736,868 event		
Total Forwarded	20,69 Gbyte	TCP Events - Server			
		Protocol Events	17,304 event		

1 Easily setup, control and monitor test execution.

2 Use Realtime Statistics Explorer to easily navigate through the hierarchy of live statistics counters and charts.

3 View extensive set of real-time statistics and monitor test progression with real time updated gauges and charts.

Statistics and Reporting

The screenshot displays the 'Statistics and Reporting' section of the VulcanManager interface. It features a 'Reporting' toolbar with 'Browse Test Results' and 'Create Report' buttons. A 'Statistics Explorer' sidebar on the left shows a tree view of test results, with 'Layer 3' selected. The main area displays a table of test execution statistics, including duration, steady period start/stop, and system integrity. It also shows performance metrics for Layer 4 efficiency and loss, Layer 4 steady upstream TCP RTT, Layer 1 steady throughput, and Layer 5-7 steady goodput. A line chart titled 'Sessions - Layer 5-7 goodput' shows the progression of sessions over time. Two donut charts show the 'Sessions distribution' (35,35% Scenario 1, 64,65% Scenario 0) and 'Layer 5-7 goodput volume distribution' (0,00% Scenario 1, 100,00% Scenario 0).

1 Open previous stored test results and create reports.



2 Use Statistics Explorer to easily navigate through the hierarchy of statistics counters and charts.

3 Analyze counters and charts in details.

Vulcan Command Line Interface

Vulcan CLI is a command-line-interface (CLI) scripting API which supports multiple concurrent scripting sessions. This makes it easy for different users – in different locations – to work on the same Vulcan chassis simultaneously.

Any client platform that can establish a TCP/IP connection can be used to send and receive CLI commands as lines of text. Typical client platforms include Tcl*, Perl*, Python*, Java*, and VBA.

```

c_logon "xena"
c_owner "cu"

1/0 p_reservation reserve
1/1 p_reservation reserve

1/0 p_reset
1/1 p_reset

1/0 p4_clear_counters
1/1 p4_clear_counters

; Allocate PEs per port
1/0 p4e_allocate 2
1/1 p4e_allocate 2

1/0 p4e_allocation_info ?
1/1 p4e_allocation_info ?

;1/0 p4_vlan_offload off
;1/1 p4_vlan_offload off

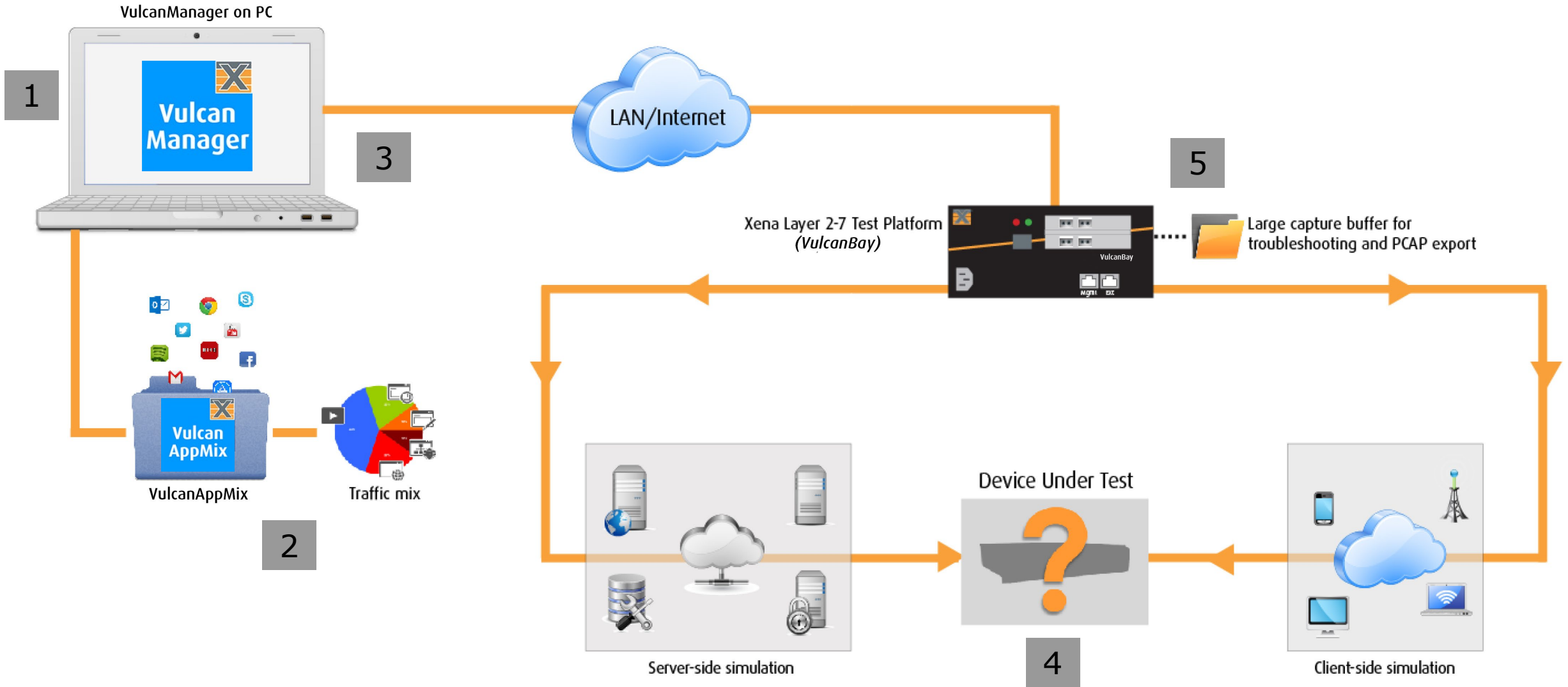
1/0 p4g_create [1]
1/1 p4g_create [1]

1/0 p4g_client_range [1] 10.0.1.1 1000 40001 100
1/0 p4g_server_range [1] 10.0.2.1 1 50001 1
1/1 p4g_client_range [1] 10.0.1.1 1000 40001 100
1/1 p4g_server_range [1] 10.0.2.1 1 50001 1

1/0 p4g_role [1] client
1/1 p4g_role [1] server
    
```



Key Features



Stateful TCP for extreme load performance testing.

TCP stack handles connection establishment, retransmission, and connection tear-down.

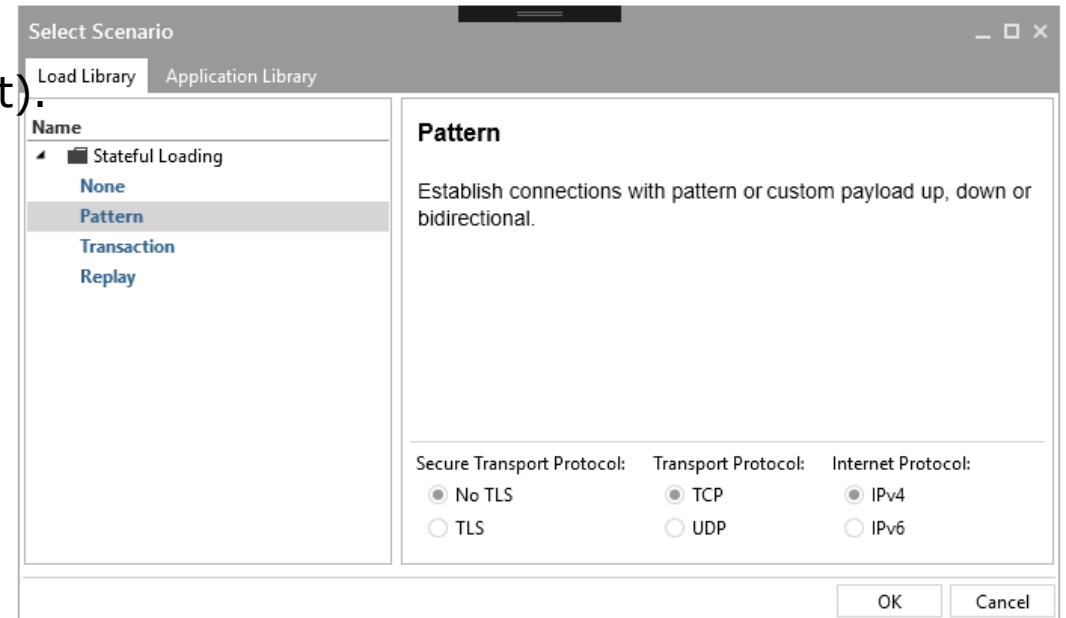
Support TCP congestion control: Reno, New Reno.

Support dynamic and static RTO (retransmission timeout).

Support RTT (round-trip time latency) measurement.

TCP CPS (connection per second) up to 10 million.

TCP CC (concurrent connections) up to 28 million.



Connection oriented traffic generation.

TCP connections can be customized by modifying the MAC/IP/TCP headers to create variations in the generated packets.

Traffic rates are specified as a percentage of line rate, frames per second or bit-rate, and traffic generation is controlled by a load profile specifying the speed with which connections are established and terminated.

The TCP payload can be automatically generated (random, incrementing) or customized. Payloads can also be loaded from files and different congestion control algorithms can be used to test network behavior.

Scenario 1 Connection Establishment

Subnet Selection

Subnet	Subnet size	Used IP addresses	Used IP Range
Client Subnet: Client IPv4	16,777,213	70,000	10.0.0.2 - 10.1.17.113
Server Subnet: Server IPv4	16,777,213	1	11.0.0.2

User Connections Setup

Number of Source Ports:	1	Number of Destination IP Addresses:	1
Use Ephemeral Source Port Range:	<input checked="" type="checkbox"/>	Number of Destination Ports:	1
Source Port Minimum:	49152	Destination Port Minimum:	80
Connections per User:	1		

Connection Establishment Profile

Total Users:	70,000
Total Connections:	70,000

Connection Updates

Connection Rebirth:	No rebirth
Repetitions:	1

Concurrent Users

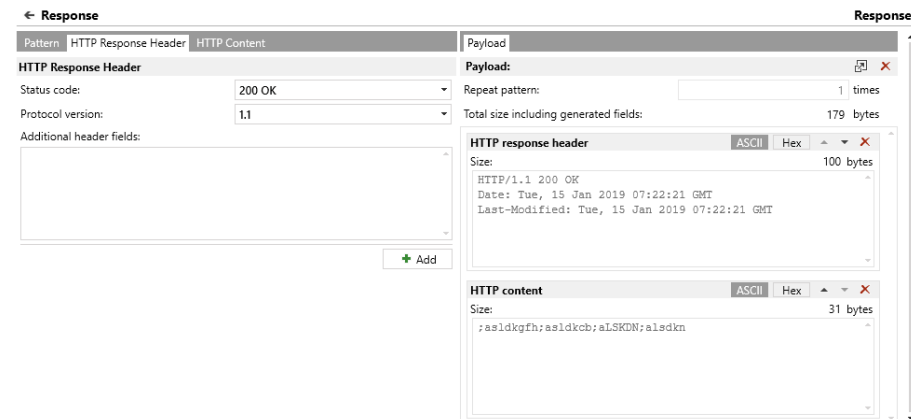
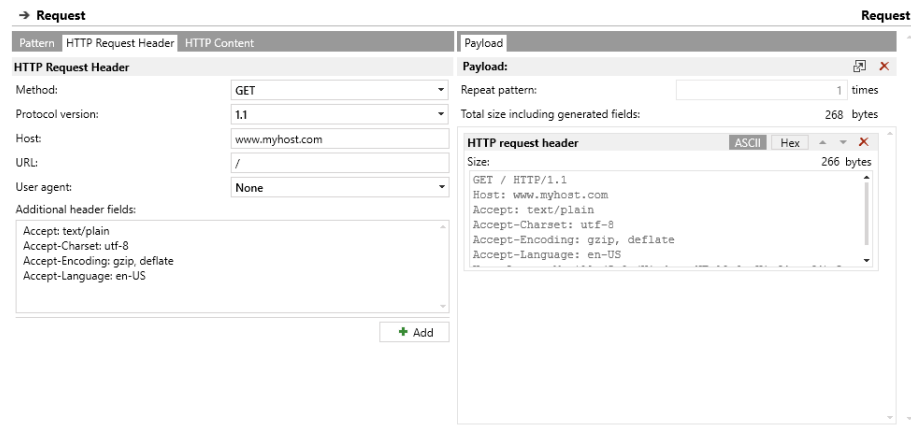
Users	Offset	Up	Steady	Down	Time Scale	Segments
10000	0	1	100	1	Seconds	<input type="button" value="Add"/>
20000	5	1	20	1	Seconds	<input type="button" value="Remove"/>
40000	30	1	20	1	Seconds	

The graph shows the number of concurrent users over time. The y-axis is labeled 'Users' with markers at 0, 30.0 k, and 60.0 k. The x-axis is labeled 'Time [Sec]' with markers at 0, 20, 40, 60, 80, 100, and 120. The graph shows a step-like increase in users, reaching a peak of approximately 50,000 users between 30 and 50 seconds, before decreasing back to zero.

Transaction based traffic generation

Makes it easy to emulate transaction-based traffic based on the request-response communication model.

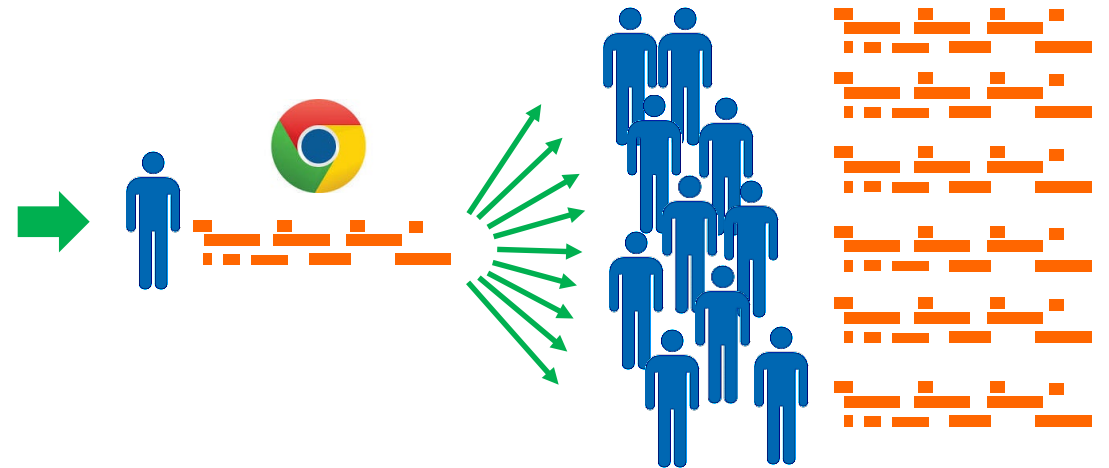
With the customizable HTTP template and configuration transactions per TCP connection, users can create millions of HTTP transactions for HTTP capacity testing, e.g. HTTP connections per second, HTTP transactions per second, and HTTP throughput at various response sizes.



Stateful Application Payload Replay

- Importing PCAP for Replay scenario
- PCAP files are parsed and payload extracted for replay
- Replay on top of TCP stack
- Support one-to-many communication pattern in PCAP
- Capable of scaling from one user to millions

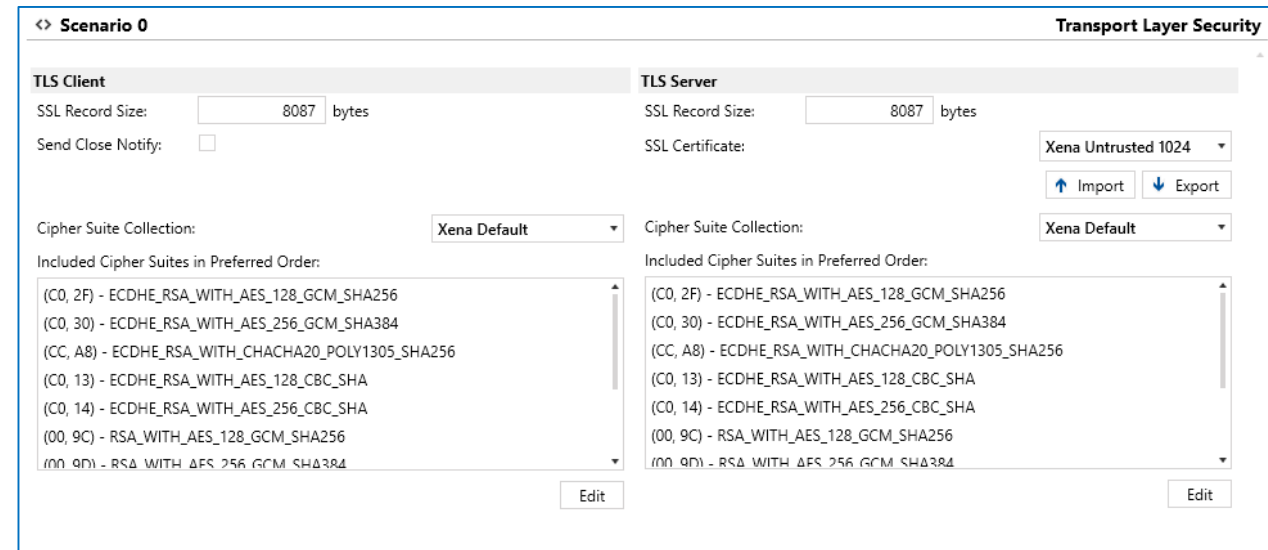
No.	Time	Source	Destination	Protocol	Length	Info
0	0.000000	22.0.0.12	22.0.0.14	TCP	64	4497 → 118 [FIN] Seq=13987 Win=0 Len=0
1	0.001854	22.0.0.14	22.0.0.12	TCP	64	118 → 4497 [ACK] Seq=13988 Win=0 Len=0
2	0.001965	22.0.0.14	22.0.0.12	POP	127	5: HK Password Communications, Web Reflector Pop3 Server [
3	0.002080	22.0.0.14	22.0.0.12	POP	78	C: USER user1
4	0.002917	22.0.0.14	22.0.0.12	POP	86	5: HK Password required for user user1
5	0.003255	22.0.0.14	22.0.0.12	POP	84	5: HK user1
6	0.003865	22.0.0.14	22.0.0.12	POP	84	5: HK user1 user logged in
7	0.003924	22.0.0.12	22.0.0.14	POP	64	C: STAT
8	0.004815	22.0.0.14	22.0.0.12	POP	71	5: HK 1 13381
9	0.004825	22.0.0.14	22.0.0.12	POP	64	C: RETR 1
10	0.004900	22.0.0.14	22.0.0.12	POP	1518	5: HK 13381 octets
11	0.005154	22.0.0.14	22.0.0.12	POP	1518	5: DATA Fragment, 1488 bytes
12	0.005212	22.0.0.14	22.0.0.12	TCP	64	4497 → 118 [ACK] Seq=13987 Win=32768 Len=0
13	0.005237	22.0.0.14	22.0.0.12	POP	1518	5: DATA Fragment, 1488 bytes
14	0.005359	22.0.0.14	22.0.0.12	POP	1518	5: DATA Fragment, 1488 bytes
15	0.005372	22.0.0.12	22.0.0.14	TCP	64	4497 → 118 [ACK] Seq=13987 Win=32768 Len=0
16	0.005465	22.0.0.14	22.0.0.12	POP	1518	5: DATA Fragment, 1488 bytes
17	0.005485	22.0.0.14	22.0.0.12	POP	1518	5: DATA Fragment, 1488 bytes
18	0.005610	22.0.0.14	22.0.0.12	TCP	64	4497 → 118 [ACK] Seq=13987 Win=32768 Len=0
19	0.005784	22.0.0.14	22.0.0.12	POP	1518	5: DATA Fragment, 1488 bytes
20	0.005798	22.0.0.14	22.0.0.12	POP	1518	5: DATA Fragment, 1488 bytes
21	0.005814	22.0.0.14	22.0.0.12	TCP	64	4497 → 118 [ACK] Seq=13987 Win=32768 Len=0
22	0.005798	22.0.0.14	22.0.0.12	POP	1518	5: DATA Fragment, 1488 bytes
23	0.005798	22.0.0.14	22.0.0.12	POP	64	C: QUIT
24	0.005800	22.0.0.14	22.0.0.12	POP	75	5: HK Closing mailbox
25	0.005837	22.0.0.12	22.0.0.14	TCP	64	118 → 4497 [FIN] Seq=13987 Win=0 Len=0
26	0.005875	22.0.0.14	22.0.0.12	TCP	64	4497 → 118 [ACK] Seq=13988 Win=0 Len=0
27	0.005925	22.0.0.14	22.0.0.12	TCP	64	118 → 4497 [ACK] Seq=13988 Win=0 Len=0



SSL / TLS Performance Testing

VulcanManager supports SSL 3.0, TLS 1.0, 1.1, 1.2 performance testing e.g. handshakes per second, TLS throughput, concurrent TLS connections, etc. Users can specify different cipher suites and certificate key sizes.

With native TLS, this lets you test a device that acts in TLS proxy mode, where the device decrypts traffic on one side and encrypts on the other.



Real Traffic Emulation - VulcanAppMix



Test your networks or devices with “real” traffic.

VulcanAppMix is a free library of application traffic and protocols, that makes it easy to set up large-scale realistic traffic from various applications, using pre-defined traffic and mix templates.

Vulcan AppMix - Applications

Amazon
App Store App
Apple Map
AWS S3
Bing Search
BitTorrent
Bloomberg
Chrome
Chrome Incognito
CNN
DNS
Dropbox
eBay
Email application
Facebook
Facebook Messenger
Finance orders (FIX4.0)

Finance orders (FIX4.1)
Finance orders (FIX4.2)
Finance orders (FIX4.3)
Finance orders (FIX4.4)
Finance orders (FIX5.0)
Finance orders (FIXT1.1)
Firefox
Firefox Private
Flickr
Gmail Web
Google App
Google Calendar
Google Hangouts App
Google Search
Google Drive
Google Maps
Hotmail Web

Instagram
iOS Calendar
IoT Publish
IoT Publish over TLS
iTunes App
LINE App
LinkedIn
Mobile Bank
MySQL
MySQL over TLS
Outlook Web Mail
Paypal
QQ App
Reddit
Remote Desktop
RSS Feed
SIP VoIP

Skype
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Twitter
Video stream 1080p over HTTP
Video stream 1080p over RTP
WeChat App
Weibo
Wikipedia Search
Yahoo
Yahoo Mail Web
YouTube

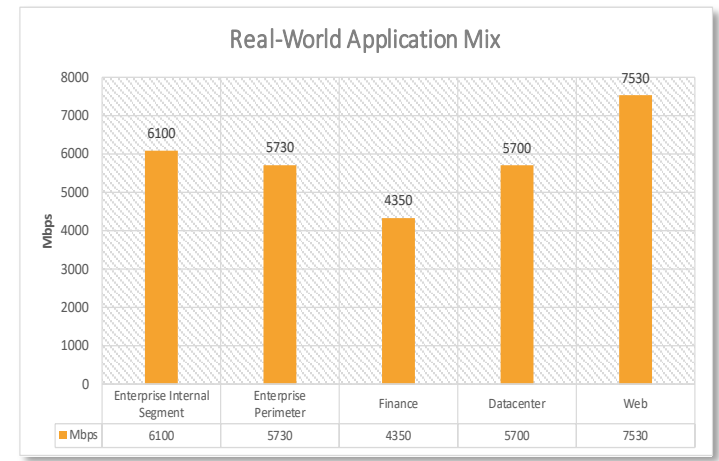
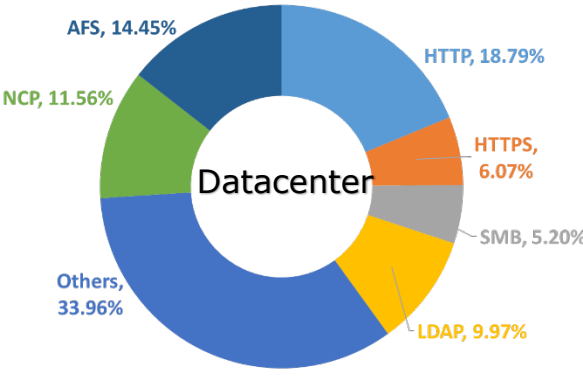
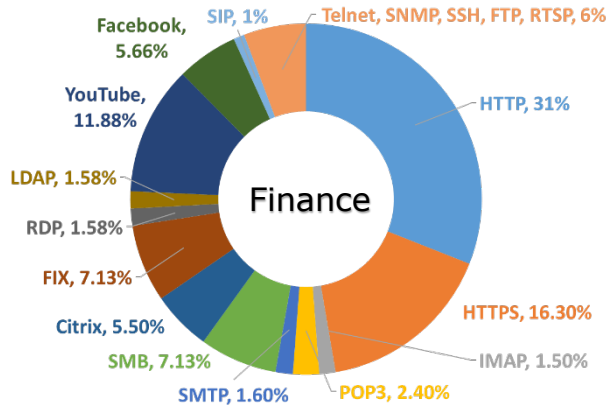
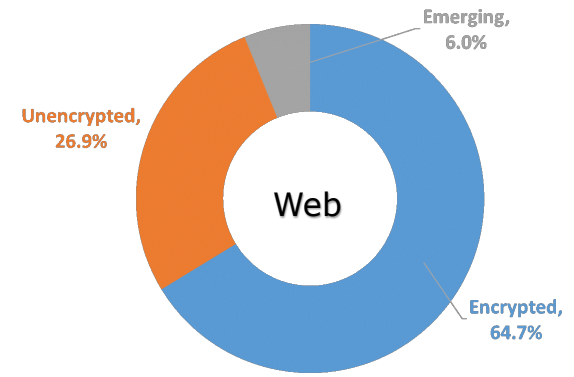
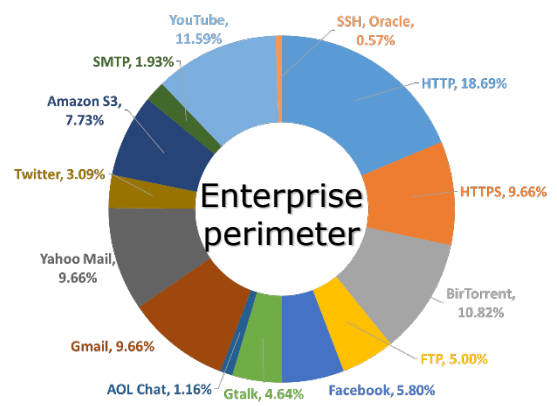
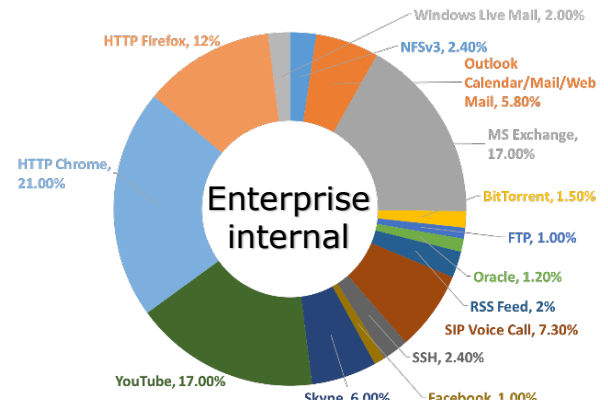
Vulcan AppMix - Protocols

AFS
BitTorrent
DNS
Echo
FIX4.0
FIX4.1
FIX4.2
FIX4.3
FIX4.4
FIX5.0
FIXT1.1
FTP (active)
FTP (passive)
HTTP
HTTPS

IMAP
IMAPS
LDAP
LLMNR
MDNS
MQTT
MQTTS
MSExchange MAPI
NBNS
NFSv2
NFSv3
POP3
POP3 over TLS
QUIC
RDP

RTP/RTCP
RTSP
SIP
SMB2
SMTP
SMTP over TLS
SRTP
SSDP
SSHv2
TELNET (per-character)
TELNET (per-line)
TFTP Read Request
TFTP Write Request

Vulcan AppMix – Application Mixes



VulcanManager

Test Configuration – Test Execution – Statistics and Reporting

1

AppMix - Scenario 0 Enterprise Mix (Internal Segment)

Layer 5-7 Volume (Bytes)

- 1% NFSv3
- 5% SMTP
- 8% BitTorrent
- 1% FTP (passive)
- 1% RSS Feed
- 1% SIP VoIP
- 1% SSHv2
- 7% Facebook II
- 3% Skype
- 35% Youtube II
- 8% Chrome
- 4% Firefox
- 25% HTTP III-1

Identity	Content	Connections	TCP	UDP	Payload Size	Payload Distribution (Up - Down)
NFSv3		9	✓	✓	17 kB	48.8% 51.2%
SMTP		1	✓		45 kB	99.4% 0.6%
BitTorrent		5	✓		72 kB	3.2% 96.8%
FTP (passive)		3	✓		733 B	15.1% 84.9%
RSS Feed		2	✓		10 kB	15.2% 84.8%
SIP VoIP		5	✓	✓	83 kB	17.1% 82.9%
SSHv2		1	✓		8 kB	35.3% 64.7%
Facebook II		8	✓	✓	17 MB	0.7% 99.3%
Skype		6	✓	✓	52 kB	41.6% 58.4%

2

Manager

Processed 00:02:12 100%

Layer 4 Events

- TCP Retransmits - Client: 14 event
- Retransmission timeouts: 6 event
- SYN retransmissions: 6 event
- FIN retransmissions: 14 event
- TCP Retransmits - Server: 11 event
- SYN retransmissions: 11 event
- TCP Events - Client: 0 seg
- Packet transmission overflow: 1 event
- RST transmitted: 1 event
- Reset local: 1 event
- Reset peer: 1 event
- TCP Events - Server: 0 seg
- Packet transmission overflow: 0 event
- RST transmitted: 1 event

3

Sessions

- 0.57% NFSv3
- 12.86% SMTP
- 14.53% BitTorrent
- 14.42% FTP (passive)
- 14.39% RSS Feed
- 0.57% SIP VoIP
- 14.28% HTTP III-1
- 0.57% Youtube II
- 11.76% Chrome
- 0.57% Skype
- 7.33% Facebook II
- 0.57% Firefox
- 0.08% Skype
- 0.40% Youtube II
- 14.02% BitTorrent
- 0.15% FTP (passive)
- 2.09% RSS Feed
- 0.06% SIP VoIP
- 1.54% SSHv2
- 0.08% Firefox
- 0.40% Youtube II

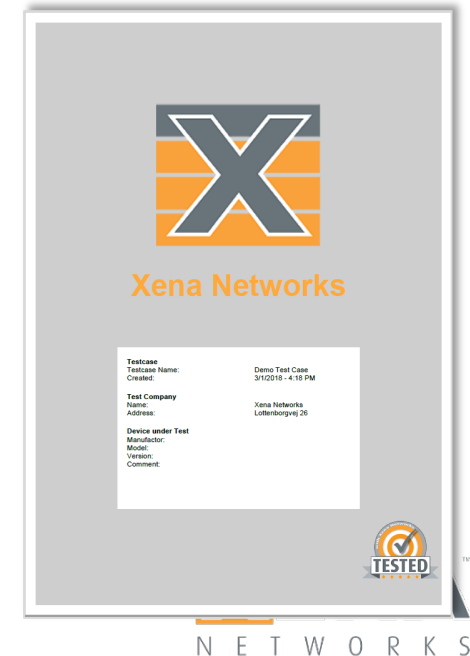
Volume (%)	Forwarded Volume (%)	Forwarded Volume (Bytes)	Total Sessions
0.07%	0.00%	0	500
8.04%	8.06%	501,162,006	11,252
13.98%	14.02%	871,974,509	12,709
0.15%	0.15%	9,188,104	12,618
2.08%	2.09%	129,855,024	12,593
0.08%	0.06%	3,872,500	500
1.54%	1.54%	95,864,487	12,497
7.30%	7.33%	455,524,864	520
0.12%	0.08%	4,810,176	500
0.57%	0.40%	24,887,348	500
43.86%	44.00%	2,735,582,750	10,308

Ease of Use & Debug

Vulcan L4-7 test platform is scalable and can be used to quickly and easily generate millions of TCP connections with specified load profiles and configurable IP/TCP/Payload parameters. Real time stats and test reports provide an in-depth overview of the DUT/SUT characteristics.

Xena's L4-7 test modules are suited for multi-user environments at the level of per-port reservation. Packet Engines (PE's) mean performance can be allocated individually depending on the test scenario, for full operational flexibility.

Enabling the capturing function, users can record communication traffic between test ports as a pcap file for in-depth analysis of the network behavior of the DUT/SUT.





Roadmap



Future features releases:

Stay up to date
follow <https://xenanetworks.com/comingsoon>

COMING SOON



Summary

What?

Stateful ethernet traffic generation and analysis platform

For who?

- Network equipment manufactures – firewalls, packet brokers, security platforms,
- Infrastructure – Subscriber edges, service providers, etc.
- Enterprise customers – firewalls, security platforms etc.

Top issues Vulcan solves:

- Quality of Service, performance, what if analysis.
- Functional testing, security rules, validation etc.
- Service validation, traffic throughput, latency, prioritization
- Security

Why Vulcan?

- Compact, Scalable
- Low total owner cost
- Simple and easy to use

Thank you



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