



# VulcanBay

## Modular Ethernet Layer 4-7 Traffic Generator and Analyzer



VulcanBay is a scalable Gigabit TCP test chassis that offers extreme performance for stateful traffic load testing, analysis and characterizing of Ethernet equipment and network infrastructure. It supports 1/2.5/5/10/25/40GE L4-7 interfaces and can be used for simulating millions of real-world end-user environments to test and validate infrastructure, a single device, or an entire system.

VulcanBay offers stateful end-to-end testing of network appliances such as switches, firewalls, routers, NAT routers, proxies, bandwidth shapers, and more. The platform is also suitable to characterize entire network infrastructure performance.

Developers of Ethernet-based network appliances can characterize their performance by measuring connection establishment and teardown rates, packet forwarding rate at large numbers of connections and identify performance bottlenecks. The platform is also ideal for rapid validation of performance or regression testing.

Developers of stateful network security devices such as next-generation firewalls (NGFW) can measure TLS handshake rate, TLS throughput, TCP CC/CPS, and HTTP CPS/TPS. Users can also replay their own PCAP files to the DUT for performance verification.

VulcanManager is included for ad-hoc test execution and remote management of test equipment located in multiple locations. VulcanAppMix helps to test with real-world applications and protocols for highly scalable application emulation.

### Flexible Upgrade Path

VulcanBay can be easily upgraded for greater performance thanks to Xena's flexible licensing model which lets you easily upgrade VulcanBay by simply updating your license. This helps you protect your investment by spreading out capital expenditure across multiple quarters, and optimize your budget by purchasing additional performance when required.

### Features and Benefits

- Stateful TCP traffic load generation with extreme performance – 24 million TCP connections \*
- High throughput of TLS encrypted traffic
- Scalable performance via license upgrade
- Supports 1/2.5/5/10/25/40GE optical or copper Ethernet interfaces for L4-7
- Configuration and tuning of Ethernet, IP and TCP header fields for advanced traffic scenarios
- Extensive live stats and test reports
- Wire-speed traffic capture with up to 4 million packets capacity
- Switched and routed network topologies, TCP proxy and NAT support
- Free traffic generation and analysis software included (VulcanManager)
- Scalable application emulation for performance testing with real-world protocols, applications, and traffic mixes from VulcanAppMix

### Extreme Performance:




- 24 million Concurrent Connections (CC)\*
- 6 million Connections Per Second (CPS)\*\*
- 1.2 million Concurrent TLS Sessions, 14,000 TLS Sessions Per Second
- 6 million HTTP Connections Per Second, 7 million HTTP Transactions Per Second (TPS)\*\*\*
- Capture capacity: 40 million x 128 bytes buffers / 4 million full-size buffers

\* 24M TCP Clients and 24M TCP Servers on one VulcanBay

\*\* Measured at 1M CC per 10G port

\*\*\* Measured at 10 transactions per connection



PRODUCT NUMBER	DESCRIPTION																																			
Vul-28PE-10G-CU	 <p>W: 19" (43.7 cm) <span style="float: right;">H: 3.5" (9.1 cm)</span></p> <table border="1"> <tr> <th>Slot #:</th> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td></td> <td>1G</td> <td>1G</td> <td>1G</td> <td>1G</td> <td>1G</td> <td>1G</td> </tr> <tr> <td></td> <td>2.5G</td> <td>2.5G</td> <td>2.5G</td> <td>2.5G</td> <td>2.5G</td> <td>2.5G</td> </tr> <tr> <td></td> <td>5G</td> <td>5G</td> <td>5G</td> <td>5G</td> <td>5G</td> <td>5G</td> </tr> <tr> <td></td> <td>10G</td> <td>10G</td> <td>10G</td> <td>10G</td> <td>10G</td> <td>10G</td> </tr> </table> <p><b>VulcanBay 6-slot chassis (non-modular), 28 packet engines, unit controller, AC power, excl. tvcrs</b></p> <ul style="list-style-type: none"> <li>• Slots 0 TO 5: L4-7 Test Ports 2 x RJ45, 2 x 4-speed 10000/5000/2500/1000 BASE-T (requires 2 x Vul-V1G-P / Vul-V10G-P licenses)</li> </ul>	Slot #:	0	1	2	3	4	5		1G	1G	1G	1G	1G	1G		2.5G	2.5G	2.5G	2.5G	2.5G	2.5G		5G	5G	5G	5G	5G	5G		10G	10G	10G	10G	10G	10G
Slot #:	0	1	2	3	4	5																														
	1G	1G	1G	1G	1G	1G																														
	2.5G	2.5G	2.5G	2.5G	2.5G	2.5G																														
	5G	5G	5G	5G	5G	5G																														
	10G	10G	10G	10G	10G	10G																														
Vul-28PE-25G	 <p>W: 19" (43.7 cm) <span style="float: right;">H: 3.5" (9.1 cm)</span></p> <table border="1"> <tr> <th>Slot #:</th> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td></td> <td>1G</td> <td>1G</td> <td>1G</td> <td>1G</td> <td>1G</td> <td>1G</td> </tr> <tr> <td></td> <td>10G</td> <td>10G</td> <td>10G</td> <td>10G</td> <td>10G</td> <td>10G</td> </tr> <tr> <td></td> <td>25G</td> <td>25G</td> <td>25G</td> <td>25G</td> <td>25G</td> <td>25G</td> </tr> </table> <p><b>VulcanBay 6-slot chassis (non-modular), unit controller, AC power, excl. tvcrs</b></p> <ul style="list-style-type: none"> <li>• Slot 0 to 5: L4-7 Test Ports 2 x SFP28, 2 x 3-speed 25GBASE-SR/LR/DAC (requires 2 x Vul-V1G-P / Vul-V10G-P / Vul-V25G-P licenses)</li> </ul>	Slot #:	0	1	2	3	4	5		1G	1G	1G	1G	1G	1G		10G	10G	10G	10G	10G	10G		25G	25G	25G	25G	25G	25G							
Slot #:	0	1	2	3	4	5																														
	1G	1G	1G	1G	1G	1G																														
	10G	10G	10G	10G	10G	10G																														
	25G	25G	25G	25G	25G	25G																														
Vul-28PE-40G	 <p>W: 19" (43.7 cm) <span style="float: right;">H: 3.5" (9.1 cm)</span></p> <table border="1"> <tr> <th>Slot #:</th> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td></td> <td>1G</td> <td>1G</td> <td>40G</td> <td>1G</td> <td>1G</td> <td>40G</td> </tr> <tr> <td></td> <td>10G</td> <td>10G</td> <td></td> <td>10G</td> <td>10G</td> <td></td> </tr> <tr> <td></td> <td>25G</td> <td>25G</td> <td></td> <td>25G</td> <td>25G</td> <td></td> </tr> </table> <p><b>VulcanBay 6-slot chassis (non-modular), unit controller, AC power, excl. tvcrs</b></p> <ul style="list-style-type: none"> <li>• Slot 0: L4-7 Test Ports 2 x SFP28, 2 x 3-speed 25GBASE-SR/LR/DAC (requires 2 x Vul-V1G-P / Vul-V10G-P / Vul-V25G-P licenses)</li> <li>• Slot 1: L4-7 Test Ports 2 x SFP28, 2 x 3-speed 25GBASE-SR/LR/DAC (requires 2 x Vul-V1G-P / Vul-V10G-P / Vul-V25G-P licenses)</li> <li>• Slot 2: L4-7 Test Port 1 x QSFP+, 1 x 1-speed 40GBASE-SR4/LR4/DAC (requires 1 x Vul-V40G-P license)</li> <li>• Slot 3: L4-7 Test Ports 2 x SFP28, 2 x 3-speed 25GBASE-SR/LR/DAC (requires 2 x Vul-V1G-P / Vul-V10G-P / Vul-V25G-P licenses)</li> <li>• Slot 4: L4-7 Test Ports 2 x SFP28, 2 x 3-speed 25GBASE-SR/LR/DAC (requires 2 x Vul-V1G-P / Vul-V10G-P / Vul-V25G-P licenses)</li> <li>• Slot 5: L4-7 Test Port 1 x QSFP+, 1 x 1-speed 40GBASE-SR4/LR4/DAC (requires 1 x Vul-V40G-P license)</li> </ul>	Slot #:	0	1	2	3	4	5		1G	1G	40G	1G	1G	40G		10G	10G		10G	10G			25G	25G		25G	25G								
Slot #:	0	1	2	3	4	5																														
	1G	1G	40G	1G	1G	40G																														
	10G	10G		10G	10G																															
	25G	25G		25G	25G																															
<b>PORT LICENSES</b> (Required to enable port)																																				
Vul-V1G-P	Perpetual license to enable 1 x L4-7 Test Port to operate at 1GE (port must support the speed)																																			
Vul-V10G-P	Perpetual license to enable 1 x L4-7 Test Port to operate at 1GE/2.5GE/5GE/10GE (port must support the speed)																																			
Vul-V25G-P	Perpetual license to enable 1 x L4-7 Test Port to operate at 1GE/2.5GE/5GE/10GE/25GE (port must support the speed)																																			
Vul-V40G-P	Perpetual license to enable 1 x L4-7 Test Port to operate at 1GE/2.5GE/5GE/10GE/25GE/40GE (port must support the speed)																																			
<b>FEATURE LICENSES</b> (Required to enable features)																																				
Vul-Sec-P	Perpetual license to enable security features (TLS traffic generation) on the chassis																																			
<b>SUPPORTED TRANSCEIVERS</b>																																				
<ul style="list-style-type: none"> <li>• E10GSFPSR</li> <li>• E10GSFPLR</li> <li>• E40GQSFP28SR</li> <li>• E25GSFP28SR</li> </ul>	<ul style="list-style-type: none"> <li>• Intel® Ethernet SFP+ SR Optic (1000BASE-SX 1G Ethernet &amp; 10GBASE-SR 10G Ethernet)</li> <li>• Intel® Ethernet SFP+ LR Optic (1000BASE-LX 1G Ethernet &amp; 10GBASE-LR 10G Ethernet)</li> <li>• Intel® Ethernet QSFP+ (40GBASE-SR4 - 4x10GbE and 1x40GbE)</li> <li>• Intel® Ethernet SFP28 SR Optic (10G/25GBASE-SR)</li> </ul>																																			

**Technical Specifications**

	Vul-28PE-10G-CU	Vul-28PE-25G	Vul-28PE-40G
Port Speeds	12 x 1G/2.5G/5G/10G	12 x 1G/10G/25G	2 x 40G 8 x 1G/10G/25G
Port Speed Licenses Required	Vul-V1G-P Vul-V10G-P	Vul-V1G-P Vul-V10G-P Vul-V25G-P	Vul-V1G-P Vul-V10G-P Vul-V25G-P Vul-V40G-P
Packet Engines	28	28	28

**NON-TLS PERFORMANCE & CAPACITIES PER CHASSIS**

UDP Concurrent Flows	28 million	28 million	28 million
UDP Flows per second	24 million/s (measured with 2 x 10G ports and 14 PEs per port)	24 million/s (measured with 2 x 25G ports and 14 PEs per port)	24 million/s (measured with 2 x 40G ports and 14 PEs per port)
TCP Concurrent Connections	28 million	28 million	28 million
TCP Connections per second	7 million/s (max) 3 million/s (sustained) (measured with 2 x 10G ports and 14 PEs per port, no TCP payload)	8.5 million/s (max) 3.5 million/s (sustained) (measured with 2 x 25G ports and 14 PEs per port, no TCP payload)	10 million/s (max) 4.5 million/s (sustained) (measured with 2 x 40G ports and 14 PEs per port, no TCP payload)
Transactions per second*	3.5 million/s (measured with 2 x 10G ports and 14 PEs per port)	4.5 million/s (measured with 2 x 25G ports and 14 PEs per port)	5.7 million/s (measured with 2 x 40G ports and 14 PEs per port)
Non-TLS Throughput**	120 Gbps (measured with 12 x 10G ports and 2 PEs per 10G port)	140 Gbps (measured with 4 x 25G and 4 x 10G ports, 5 PEs per 25G port, 2 PEs per 10G port)	140 Gbps (measured with 2 x 40G and 6 x 10G ports, 8 PEs per 40G port, 2 PEs per 10G port)

\*measured at 10 transactions per connection

\*\*measured with Pattern bidirectional traffic scenario (1518-byte packet length)

**TLS PERFORMANCE & CAPACITIES PER CHASSIS**

Feature License Required	Vul-Sec-P	Vul-Sec-P	Vul-Sec-P
TLS Concurrent Connections	1.4 million	1.4 million	1.4 million
TLS Connections per second*	7,000/s (measured with 2 x 10G ports and 14 PEs per port, no TLS payload)	7,000/s (measured with 2 x 25G ports and 14 PEs per port, no TLS payload)	7,000/s (measured with 2 x 40G ports and 14 PEs per port, no TLS payload)
Transactions per second**	70,000/s (measured with 2 x 10G ports and 14 PEs per port)	70,000/s (measured with 2 x 25G ports and 14 PEs per port)	70,000/s (measured with 2 x 40G ports and 14 PEs per port)
TLS Throughput***	72 Gbps (measured at 12 x 10G ports and 2 PEs per 10G port)	64 Gbps (measured at 4 x 25G and 4 x 10G ports, 5 PEs per 25G port, 2 PEs per 10G port)	80 Gbps (measured with 2 x 40G and 6 x 10G ports, 8 PEs per 40G port, 2 PEs per 10G port)

\*measured at TLS record size 8KB, 2KB key size, using (CO, 2F) ECDHE\_RSA\_WITH\_AES\_128\_GCM\_SHA256

\*\*measured at 10 transactions per connection

\*\*\*measured with Pattern bidirectional traffic scenario (1518-byte packet length, TLS record size 8KB, 2KB key size, using (CO, 2F) ECDHE\_RSA\_WITH\_AES\_128\_GCM\_SHA256)

**PACKET CAPTURE CAPABILITY**

Packet Capture per Chassis	40 million* 4 million**	40 million* 4 million**	40 million* 4 million**
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\*capture mode: small, 128 bytes kept per packet

\*\*capture mode: full, full-size packet

**REPLAY CAPABILITY**

PCAP Files	50 (per port) 300 (per chassis)	50 (per port) 300 (per chassis)	50 (per port) 250 (per chassis)
Replay Events*	2 million (per port) 12 million (per chassis)	2 million (per port) 12 million (per chassis)	2 million (per port) 10 million (per chassis)

one replay event is a TCP/UDP packet in the PCAP file

**Technical Specifications (port performance)**

Port Speed	1G	2.5G	5G	10G	25G	40G
Port Non-TLS Throughput*	1 Gbps	2.5 Gbps	5 Gbps	10 Gbps	25 Gbps	40 Gbps
Minimum Number of PEs Required by Port	1	2	2	2	5	8
Port TLS Throughput**	1 Gbps	2.5 Gbps	5 Gbps	10 Gbps	25 Gbps	37 Gbps
Minimum Number of PEs Required by Port	1	4	4	4	10	14

\*measured with Pattern scenario (1518-byte packet length, 1000 connections)

\*\*measured with Pattern scenario (1518-byte packet length, 1000 connections, TLS record size 8KB, 2KB key size, using (CO, 2F) ECDHE\_RSA\_WITH\_AES\_128\_GCM\_SHA256)

**Technical Specifications (cont'd)**

Dimensions (H x W x D)	(2U) 3.5" x 17.2" x 17.7" (89 mm x 437 mm x 450 mm)
Weight	42 lbs. (19.05 kg)
Input Voltage	100 – 240 VAC, 50 – 60 Hz
Power Supply	Two 800W AC power supplies. One power supply is redundant.
Operating Environment	5 °C – 35 °C
Non-Operating Environment	-40 °C – 70 °C
Operating Relative Humidity	8% – 90% (non-condensing)
Non-Operating Relative Humidity	5% – 95% (non-condensing)