VALKYRIE

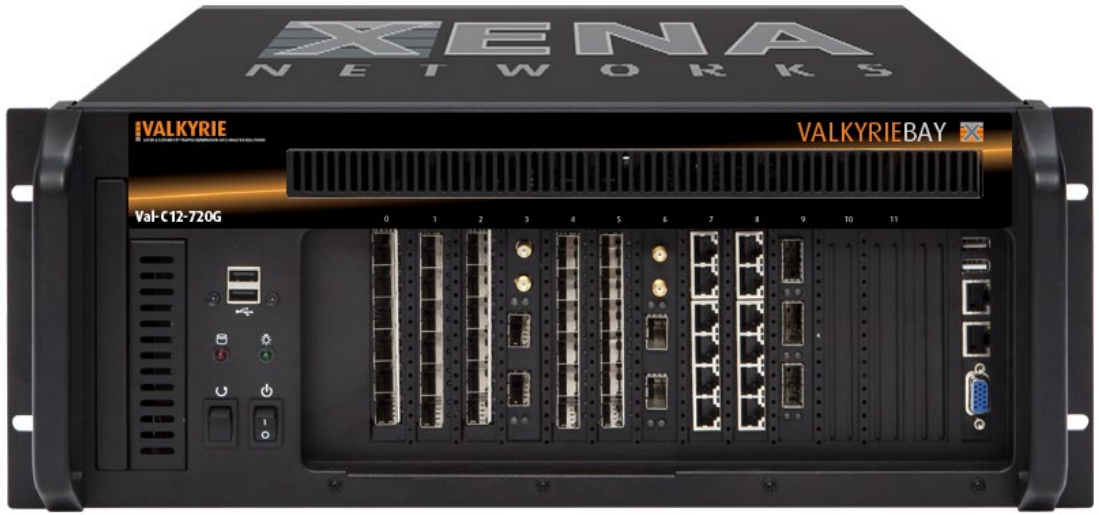
LAYER 2-3 ETHERNET TRAFFIC GENERATION AND ANALYSIS

CONTENTS

HARDWARE

- ValkyrieBay Chassis
- ValkyrieCompact Chassis
- Test Modules

HARDWARE – ValkyrieBay (C4-12) chassis



- Modular – 12 slots
- High port density
- 4U rack-mountable
- Weight: 18 kg (40lbs)
- Low noise

The ValkyrieBay chassis comes in two versions: the Val-C12-720G and the high performance Val-C12-2400G.

SPEEDS	PORTS	
400GE	6	DR4/FR8/LR8
200GE	6	DR4/SR4/FR4/LR4/CR4
100GE	6	LR4/SR4/CDWM4/SR10/CR4 ports
50GE	12	LR2/SR2 optical, CR2 electrical ports
40GE	24	QSFP+ (or 6 x LR4 / 12 x SR4) ports
25GE	24	LR/SR optical, CR electrical ports
10GE	144	Optical ports
5GE	72	Copper ports
2.5GE	72	Copper ports
1GE	72	Copper/optical ports

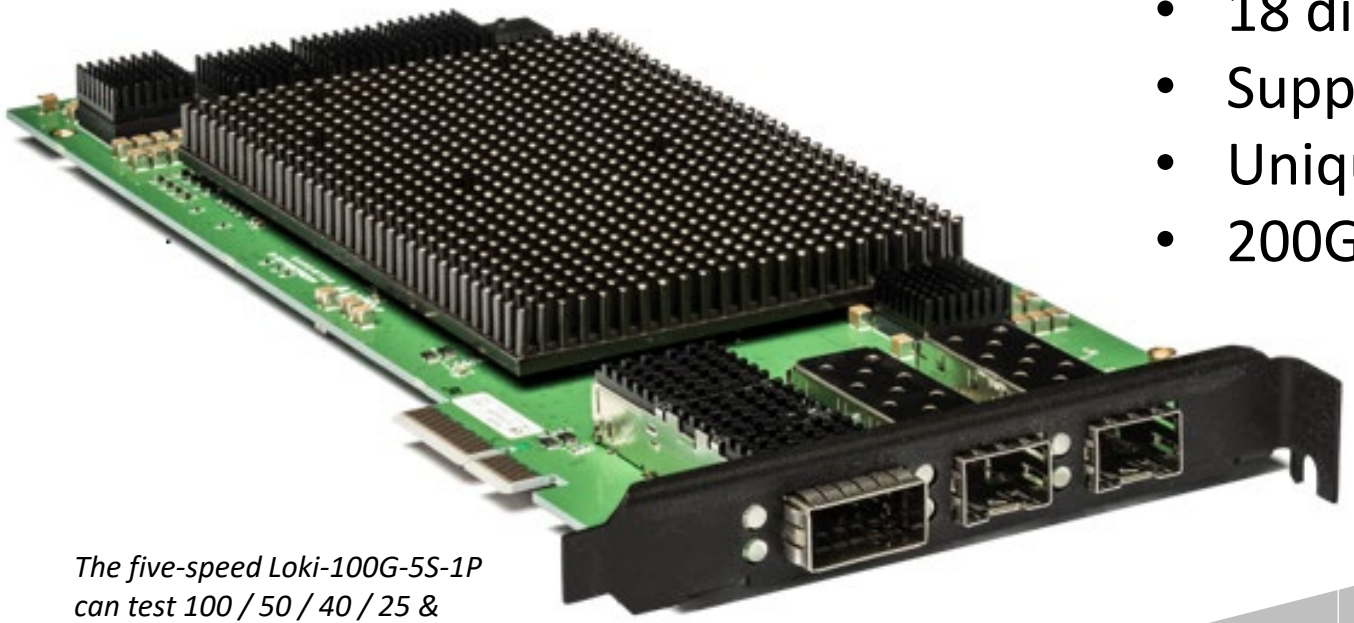
HARDWARE – ValkyrieCompact (C-xxxx) chassis

- Supports <u>all</u> Xena test modules
- Easy to transport
- Low noise

Flightcase available

- Fixed – 1 test module
- 1U rack-mountable
- Weight: 6 kg (14lbs)

HARDWARE – Test Modules



The five-speed Loki-100G-5S-1P can test 100 / 50 / 40 / 25 & 10GE) via QSFP28 and QSFP+

- 18 different test modules
- Support for all Ethernet speeds and interfaces
- Unique multi-speed / media capabilities
- 200GE coming soon

1GE	2.5GE & 5GE	10GE	25GE	40GE	50GE	100GE	400GE
Odin-10G-5S-6P-CU Odin-1G-3S-6P Odin-1G-3S-6P-E Odin-1G-3S-2P-T	Odin-10G-5S-6P-CU	Loki-100G-5S-1P Odin-10G-5S-6P-CU Odin-10G-1S-12P Odin-10G-1S-2P-X Odin-10G-1S-2P Odin-10G-1S-2P-T C-Odin-10G-4S-2P-Combi Odin-10G-1S-6P Odin-10G-3S-2P-CU Odin-10G-3S-6P-CU	Loki-100G-5S-1P	Loki-100G-5S-1P Loki-100G-3S-1P-B Loki-100G-3S-1P Odin-100G-3S-1P Odin-40G-2S-2P Odin-40G-2S-2P-B	Loki-100G-5S-1P	Loki-100G-5S-1P Loki-100G-3S-1P-B Loki-100G-3S-1P Odin-100G-3S-1P	Thor-400G-7S-1P

SOFTWARE

- Management Software
- Test Applications
- Automation & Scripting

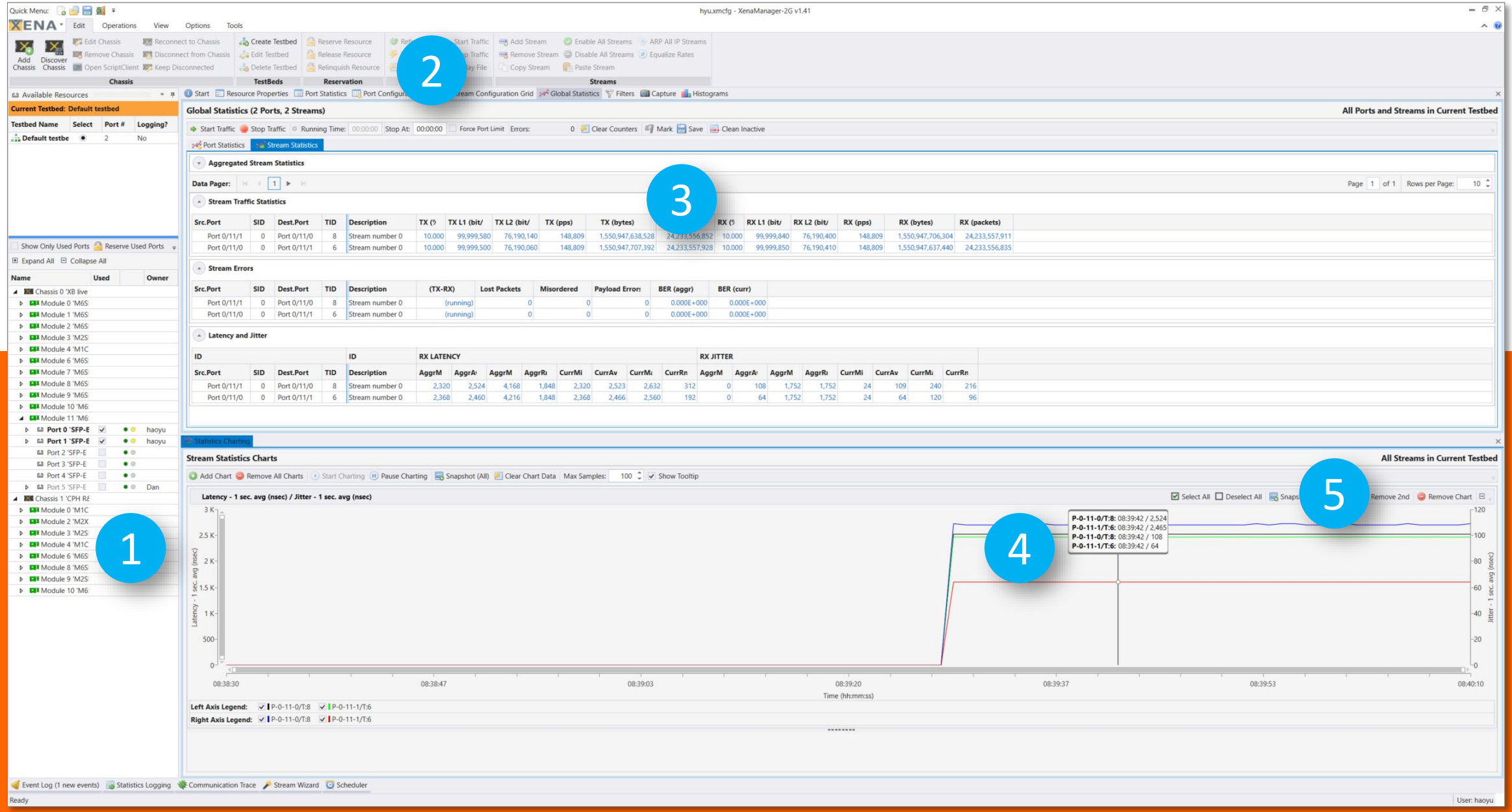
ValkyrieManager

The software you'll use most of the time

This is a Windows-based application used to configure and generate streams of Ethernet traffic between Xena test equipment and devices under test (DUTs) at all speeds up 100Gbps, and analyze the results.

It is included free with every system sold and the latest version can always be downloaded here: http://xenanetworks.com/download/

USER-FRIENDLY GUI



APPLICATION SOFTWARE

Valkyrie 2544

Valkyrie2544

Supports the 4 test-types specified in RFC2544. There are extensive configuration options, support for single stream and multi-stream testing and you can define protocol layers supported by the test (Ethernet, Customer and Service VLANs, IP and UDP) precisely the way you want.

Valkyrie 2889

Valkyrie2889

For accurately benchmarking the performance of Layer 2 LAN switches according to RFC 2889 tests. Incl. all throughput and forwarding rate tests, congestion control, address caching capacity, address learning rate, broadcast frame forwarding and latency, forward pressure and max. forwarding rate.

Valkyrie 1564

Valkyrie1564

For validating Ethernet service-level agreements (SLAs) in a single test per Y.1564. It supports multiple protocols per UNI (Ethernet, Customer and Service VLANs, MPLS, IPv4, IPv6, and UDP) and you can define Per-UNI or per-CoS bandwidth profiles, and specify CoS-to-DSCP mapping.

Valkyrie 3918

Valkyrie3918

For advanced IP multicast network testing using various framesizes, either as in-test variations or as multiple testruns each using a fixed frame size. Unicast and multicast traffic can be configured to use the exact protocol headers needed. All fields in the protocol headers can be modified.

ValkyrieCLI

The best test automation tool in the industry

ValkyrieCLI is a command-line-interface (CLI) scripting API with hundreds of scriptable parameters. Any client platform can be used (e.g. Tcl, Perl, Python, Java, Ruby and VBA). ValkyrieCLI supports multiple concurrent scripting sessions by different users in different locations.

SCRIPTING & AUTOMATION

See all our Automation Resources - xenanetworks.com/automation/

DOCUMENTATION

Step-by-step guides on how to automate Xena test suites and explore Layer 2-7 scripting.

DRIVERS & SCRIPTS

Find and download drivers and scripting examples in 8 scripting languages.

PLATFORMS

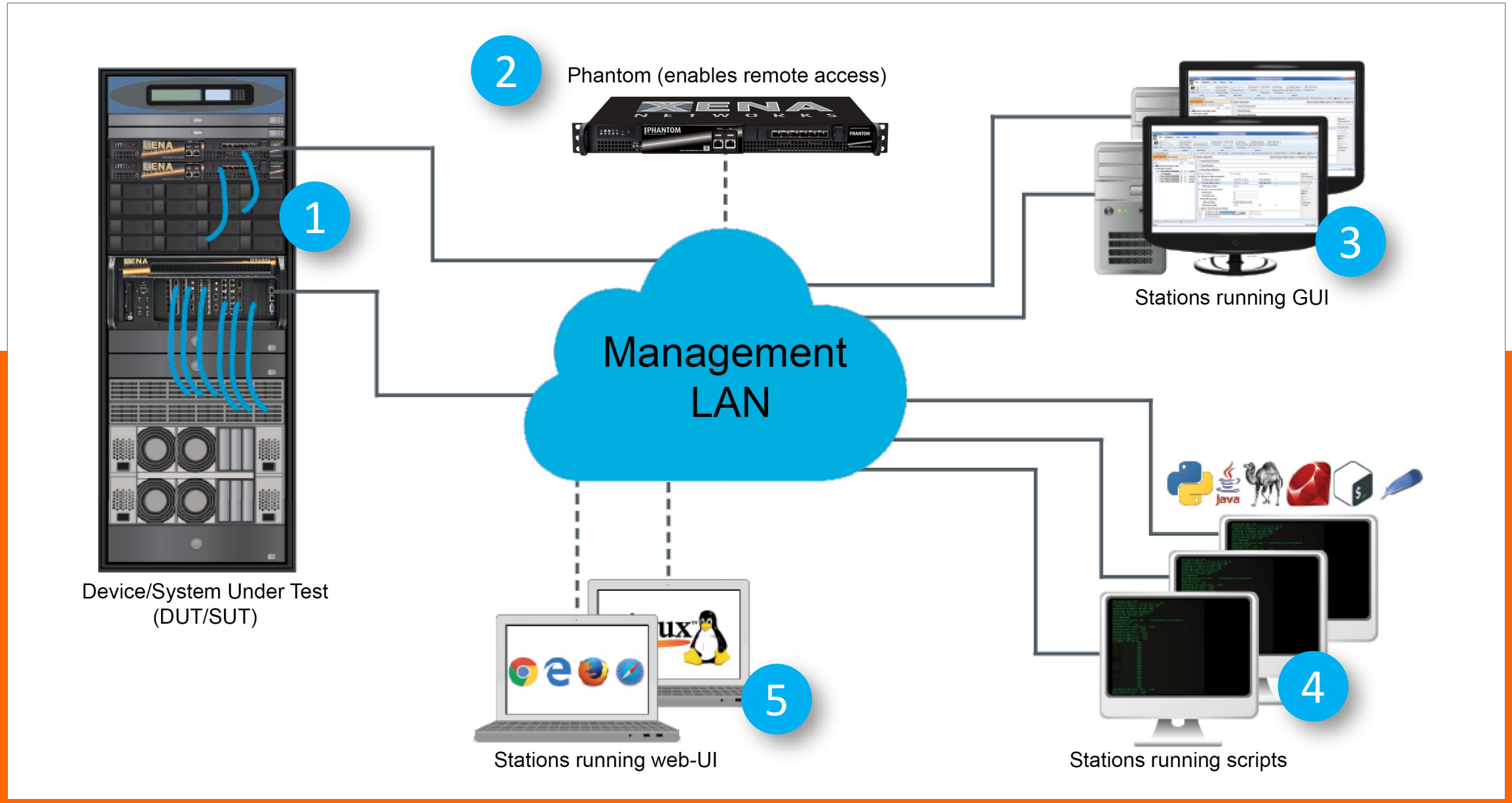
Learn about commercial and open source platforms and frameworks that support Xena's ethernet test solutions.

PROJECTS

Read about Xena's work with Open Platform for NFV (OPNFV) community on the vSwitch Performance (VSPerf) project.

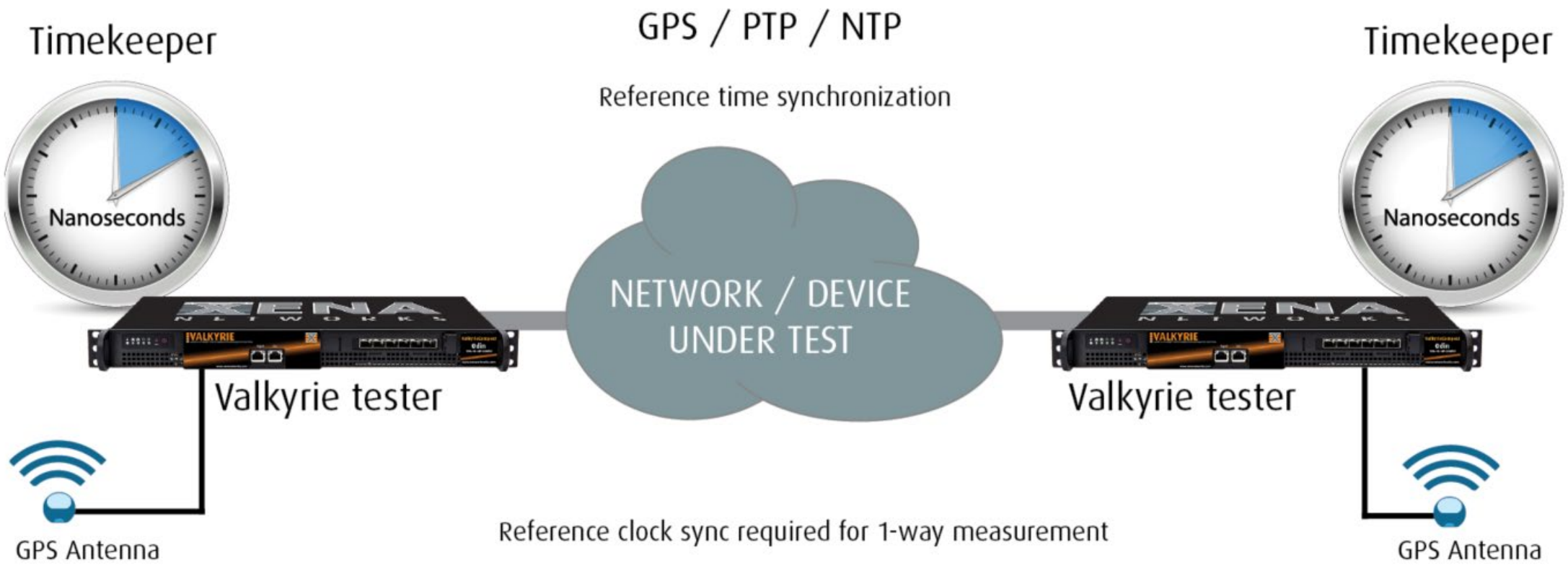
Visit **xenanetworks.com/automation/**

COMMON TESTBED SCENARIO



VALKYRIE TIMESYNCH

For One-Way Latency (OWL) measurements,
synchronized traffic start and accurate timestamping



KEY FEATURES

- Stream-oriented traffic generation
- Statistics Charting and Logging
- Real-time Analysis and Reporting
- Scheduling
- Eye Diagram
- Design – high port density / low noise

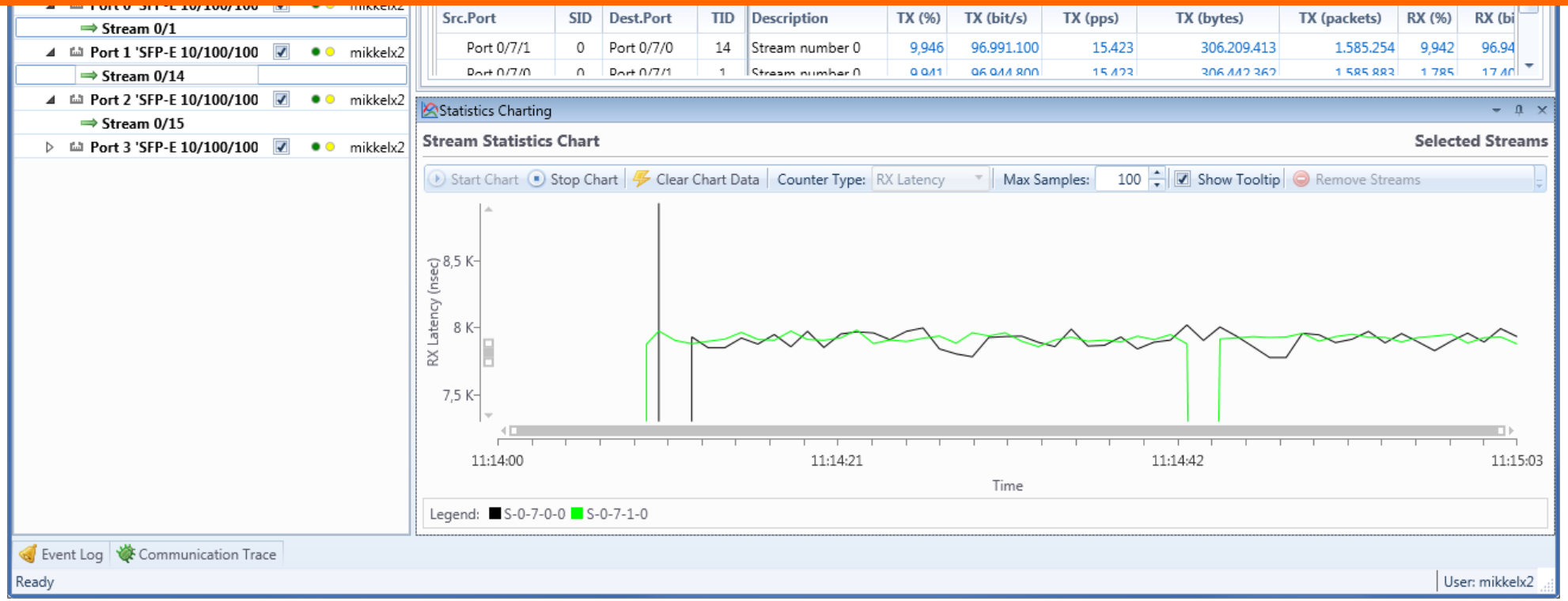
KEY FEATURES

Stream-oriented Traffic Generation

- Generate hundreds of unique transmit and receive traffic “streams”
- Each stream can generate 100k’s of unique traffic “flows” using programmable packet field modifiers to increment or randomize field values such as MAC addresses, IP addresses, and VLAN identifiers
- Stream rates can be defined as a percentage of line rate, frames per second, or bit-rate
- Packet injection can be controlled as a single-packet shot, number of packets, time duration, or in continuous mode
- Traffic profiles can be defined as uniform or bursty
- Custom packet editing (via a graphical editor) lets you build any packet format via predefined packet templates for Ethernet, Ethernet II, VLAN, ARP, IPv4, IPv6, UDP, TCP, LLC, SNAP, GTP, ICMP, RTP, RTCP, STP, SCTP, MPLS, PBB, FCoE, IGMPv2/3, or fully specified by user.

KEY FEATURES

Statistics Charting and Logging



- Real-time charts of monitored parameters. Displays multiple charts at once
- Choose two different parameters where each parameter is associated with its own Y-axis
- Periodically poll counters for all ports in a testbed and log to a CSV or XML file

Real-time Analysis and Reporting

Packet flow statistics are tracked per stream, or per-user defined filters which can include any combination of programmable field values. Incoming packet streams are automatically identified using optionally auto-inserted Test Payload fields.

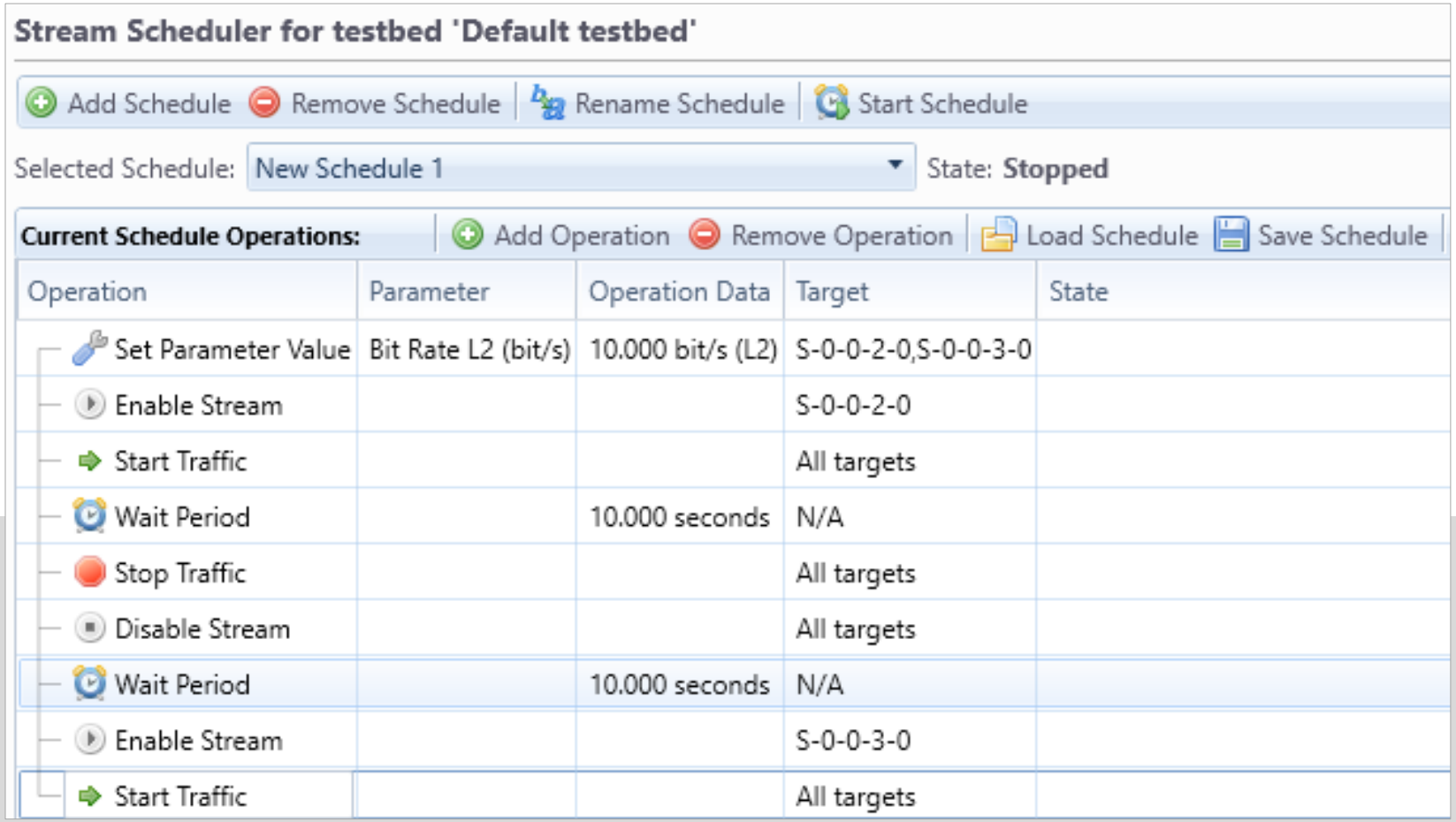
Analysis of traffic throughput, latency, jitter, loss, sequence, and misorder errors is performed real-time per received stream with 16/32 ns accuracy depending on the interface type (optical/electrical).

Users can capture packets at wire speed on each port for detailed analysis and hot-button export packet analysis tool WireShark, which in conjunction with event triggering and programmable filters provides a unique ability to identify and isolate performance issues.

Scheduling

ValkyrieManager supports scheduling – a sequence of operations activated with a single mouse click – to make testing easier.

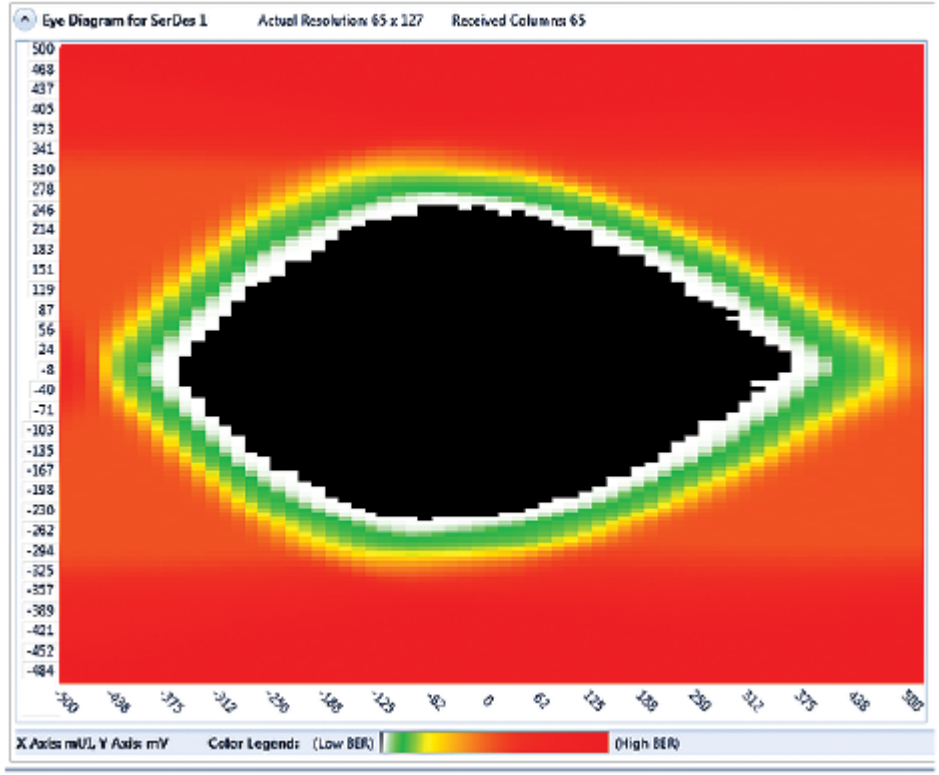
Stream Scheduler can be used to start-and-stop traffic, change packet rate, change operations orders, add loop section, etc.



KEY FEATURES

Unique Eye Diagram

Xena's latest generation of multi-speed 100GE test modules support a unique feature for analyzing signal quality called the "eye diagram" – an estimate of parameters such as width, height and jitter presented in a convenient graphical format.



APPLICATIONS

- QoS Solutions
- Benchmark Testing
- Functional Testing
- Convergence
- Service Validation
- Security / Negative Testing
- Open Flow
- Conformance

QoS Solutions

Traffic is typically given a priority depending on its importance. Some types of traffic are more sensitive to latency, jitter and packet loss than other.

Xena offers QoS validation solutions in accordance with RFC 2544 and Y.1564, as well as advanced statistics functions that help users track, analyze and troubleshoot QoS to maintain a high service quality guarantee.

QoS Testing

- Network application emulation
- Charting and histograms
- Background traffic injection
- Jitter analysis
- One-way latency analysis
- Inline measurements mode
- TCP response time and performance
- HTTP performance testing
- Latency monitoring

See these White Papers on our website:

- Latency & Jitter
- Application Emulation
- Time Synchronization
- Quality of Service (QOS)

Benchmark Testing

Benchmark testing focuses the performance of a DUT via parameters like maximum throughput, latency and jitter.

Testing can be done with different frame sizes to check how this affects the performance. The DUT can be loaded beyond its throughput capacity to see how this affects frame loss, latency and jitter.

Benchmark Testing

- RFC2889
- RFC2544
- RFC3918
- VSperf (Virtual Switch Performance)
- G.FAST per ID-337
- GPON per TR-247/ATP-247 and TR-255

See these White Papers on our website:

VSPERF
GPON Testing
G.fast
100G PON
TCP Testing
Testing NGFWS
Emulation vs. Simulation
Advanced Layer 4 replay

Functional Testing

Functional testing can cover many parameters and depends on the DUT and the application.

The testing will verify the basic functionality of the DUT. Functional testing can be performed during development, quality assurance and production.

Functional Testing

- Multicast
- 40/100G PCS and PMA Layer
- Transparent Transport
- Energy Efficient Ethernet (EEE)
- Microbursts and random IFG
- Synchronous Ethernet
- Automotive Ethernet
- 1588v2 Performance Testing
- Regression testing
- Kernel drivers and NIC testing
- Hardware emulation (ASIC)

See these White Papers on our website:

Microburst
Automotive Ethernet
Putting 2.5GE & 5 GE to the test
The case for 25GE &50GE
Emulation vs. Simulation
Advanced Layer 4 replay

Convergence

Many network topologies provide resiliency to protect network services. This typically means re-routing traffic away from a faulty line section. However re-routing connections can result in frame loss.

When traffic with a given transmitted frame rate is sent through the connection during re-routing, ValkyrieManager can measure the packet loss and calculate the convergence time.

Convergence

- Spanning (xSTP) and Routing
- G.8031/G.8032
- MPLS

Service Validation

Testing that link performance complies with a Service Level Agreement (SLA) includes verifying Frame Transfer Delay (FTD), Frame Delay Variation (FDV) and Frame Loss Ratio (FLR) at the Committed Information Rate (CIR) defined in the SLA.

Verifying the SLA with the Valkyrie1544 allows doing the test on a line simultaneously loaded with traffic from other services.

Service Validation

- ITU-T Y.1564
- Live Monitoring
- Proactive Testing
- Wholesale Ethernet
- Performance Logging

See these White Papers on our website:

SD-WAN

Security / Negative Testing

Security/negative testing is usually conducted during development to reveal how a DUT handles abnormal conditions like:

- very high traffic load,
- different frame sizes incl. undersized and oversized frames,
- frames with different IFG settings,
- various types of errors and deviation of the signal frequency
- various types of DDoS attacks.

Security / Negative Testing

- Firewall Performance testing
- L2/3/4 Errors
- PCS Layer Errors
- Fragment Overlap
- DDoS / Protocol Fuzzing

See these White Papers on our website:

NGFW performance
DDOS

Open Flow

Software Defined Networking (SDN) products need to meet the Open Networking Foundation (ONF) OpenFlow specifications.

It is also important to measure the performance of SDN switches. This includes how long it takes to process OpenFlow messages sent to the switch to add/modify/delete rules in the switch's forwarding table ("Flow-Mod" messages).

Open Flow

- Table Capacity
- Flow-Mod
- Packet In/Out

See these White Papers on our website:

- OpenFlow

Conformance

Conformance testing determines if a DUT complies with the requirements stated in a given specification/standard.

For example G.8031 and G.8032 Ethernet Protection Switching typically require that switching from a faulty line to a backup line is completed in less than 50 msec. This can be verified as a part of a conformance test.

Conformance

- Spanning (xSTP) and Routing
- G.8031/G.8032
- MPLS

ROADMAP

Coming up…

New test modules that support 50/200/400GE Ethernet speeds, based on 56Gbps PAM4 SerDes technology

VantageBay – a new production test solution for manufacturers

ChimeraBay - network emulation (impairment) for 10GE to 200GE speeds

ALWAYS INCLUDED WITH EVERY SYSTEM

Value for Money

All current SW applications included for free

- ValkyrieManager, ValkyrieCLI, Valkyrie2544, Valkyrie2889, Valkyrie3889, Valkyrie1564

Free 36 Months of Software Maintenance subscription included

- All future SW applications and features covered under 3 year SW maintenance agreement

Free technical support

- Free technical support for lifetime of products
- E-mail, web-based training sessions

Free RMA (36 months HW warranty)

- Ship to US or Europe for repair
- Inbound and outbound shipping paid by Xena

FOR MORE INFORMATION

Valkyrie Landing Page	Visit now
Software Download	Visit now
Install Guide	Visit now
User Manuals	Visit now
Tech Support	Visit now

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