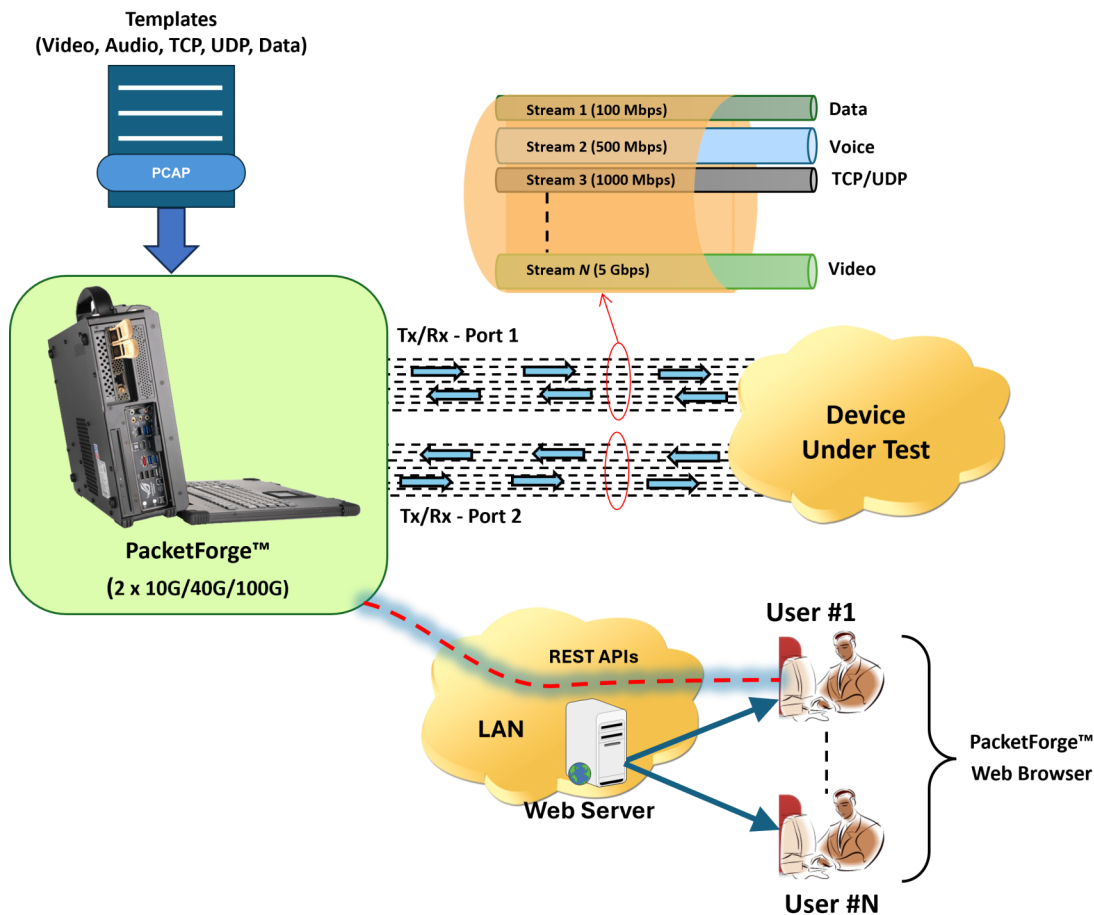


PacketForge™

High-Performance Network Traffic Generator



Overview

GL's PacketForge™ is a high-performance IP traffic generator and receiver that enables realistic, large-scale network testing. Powered by SmartNIC hardware and a browser-based interface, it can emulate thousands to millions of concurrent flows across TCP, UDP, IPv4, video, voice, and data applications, all at line rate. By importing PCAP templates or defining custom streams, users can create repeatable test scenarios with precise control over rates, addressing, and traffic profiles.

With real-time statistics, detailed reporting, and full automation support via REST APIs, PacketForge™ is built for service providers, equipment vendors, enterprises, and research labs. Whether validating routers, benchmarking firewalls, testing QoS policies, or studying new protocols, PacketForge™ delivers scalability, accuracy, and simplicity in one platform.

The system features a web-based user interface for easy access via any standard browser, with convenient multi-user control from PCs, laptops, and tablets. It is available in rack-mount and portable configurations and is equipped with specialized network interface cards, large RAM and storage, optimized processing with advanced cooling.

PacketForge™ combines speed, scalability, and simplicity in a single appliance. It enables teams to accelerate testing, expand to large-scale environments, and validate with precision—whether in lab setups, enterprise networks, or carrier-grade deployments.

For more details, refer to [Next-Generation Network Traffic Testing-PacketForge](#) webpage.

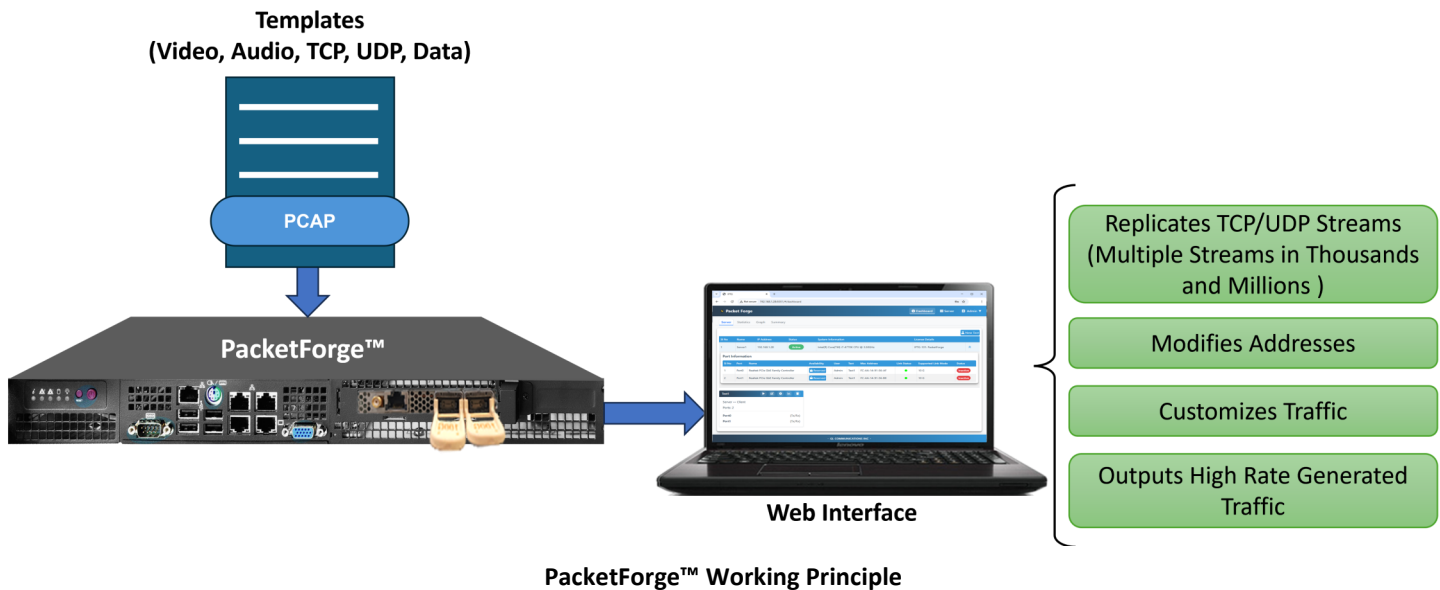


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Key Features

- Simulates thousands to millions of concurrent flows at line rate
- Generates realistic IP traffic at 10G,40G,100G line rates, using SmartNIC acceleration
- Supports Ethernet, IPv4, TCP, UDP, RTP, VoIP, HTTP, DNS, streaming, 5G, and custom workloads
- Configure, monitor, and analyze tests directly through a clean web dashboard
- Monitor latency, packet loss, throughput, and per-stream/session statistics via interactive dashboards
- Full REST API support for regression testing and orchestration environments
- Incremental, random, or masked addressing with fine-grained control over rates and flows
- Centrally manage distributed setups with role-based access and fairness control
- Build traffic from PCAP templates or custom-defined streams
- Intuitive, responsive GUI accessible from desktop and tablets—no local installation required
- Define custom burst patterns, ramp-up/ramp-down, or sustained load testing
- Role-based permissions for multi-user environments in labs or enterprises

Working Principle



PacketForge™ operates by utilizing a PCAP file as the foundational template, reading its inherent packet characteristics to generate thousands of unique traffic streams. The platform is designed to replicate TCP, UDP, or a mix of both streams from the template, creating thousands of concurrent flows at line rate. For the TCP streams, PacketForge includes an inbuilt retransmission mechanism and accurate windowing. The benefit of this feature is that it guarantees superior testing accuracy, enabling realistic emulation of network congestion and packet loss effects, thus validating the Device Under Test (DUT) against true real-world application behavior, not just simple packet replay. While the system uses the template's characteristics by default, engineers have comprehensive control to customize the scaled traffic: they can configure a specific transmission rate, set a user-defined Inter-Frame Gap (IFG), and explicitly define the frame size. To ensure each stream is unique, the system employs flexible addressing modes—including incremental and random—to systematically modify IPv4 addresses and source/destination ports. This entire process is accelerated by SmartNIC hardware, achieving throughput up to 100G, and all performance indicators are monitored via real-time, session-wise and stream-wise statistics on the receiver side.

PacketForge™ Dashboard

The PacketForge™ GUI presents a user-friendly dashboard with clear navigation tabs for server management, statistics, and test summaries, displaying real-time server details, port availability, and link status in organized tables, while providing quick-access controls for test setup and monitoring within a visually concise panel layout.

The screenshot displays the Packet Forge Dashboard Overview. At the top, there are navigation tabs for 'Dashboard', 'Server', and 'Admin'. Below this, there are sub-tabs for 'Server', 'Statistics', 'Graph', and 'Summary'. A 'New Test' button is visible in the top right corner. The main content area features a table with columns: SI No, Name, IP Address, Status, System Information, and License Details. Below this is a 'Port Information' section with a table containing columns: SI No, Port, Name, Availability, User, Test, Mac Address, Link Status, Supported Link Mode, and Status. At the bottom, there is a 'Test1' configuration panel showing 'Server → Client' and 'Ports: 2' with details for Port0 and Port1.

SI No	Name	IP Address	Status	System Information	License Details
1	Server1	192.168.1.77	Active	Intel(R) Core(TM) i7-4770 CPU @ 3.40GHz	IPTG-101: PacketForge

SI No	Port	Name	Availability	User	Test	Mac Address	Link Status	Supported Link Mode	Status
1	Port0	NT100A01-01-SCC-4x10G	Reserved	Admin	Test1	FC-AA-14-91-56-AF	●	10 G	Active
2	Port1	NT100A01-01-SCC-4x10G	Reserved	Admin	Test1	FC-AA-14-91-56-B0	●	10 G	Active
3	Port2	NT100A01-01-SCC-4x10G	Available		-	FC-AA-14-91-56-B1	●	10 G	Inactive
4	Port3	NT100A01-01-SCC-4x10G	Available		-	FC-AA-14-91-56-B2	●	10 G	Inactive

Port	MAC Address	Link Status	Mode	Add/Remove
Port0	00-0D-E9-06-48-38	●	Tx/Rx	⊖
Port1	00-0D-E9-06-48-39	●	Tx/Rx	⊖

Dashboard Overview

Test Configuration

The Test configurations offers a user-friendly modal to set test names, assign endpoint names, and manage port settings. Each port shows its MAC address, link status with color indicators, and selectable Tx/Rx mode, with simple add/remove controls. The organized layout, including input fields, dropdowns, and an Update Test button, enables quick and efficient network test setup.

The screenshot shows the 'Edit Test Configuration' modal. It includes input fields for 'Test Name' (Test2), 'End point 1 Name' (Server), and 'End point 2 Name' (Client). Below these is a table with columns: Port, MAC Address, Link Status, Mode, and Add/Remove. At the bottom right, there is an 'Update Test' button.

Port	MAC Address	Link Status	Mode	Add/Remove
Port0	00-0D-E9-06-48-38	●	Tx/Rx	⊖
Port1	00-0D-E9-06-48-39	●	Tx/Rx	⊖

Test Configuration

Port Configuration

In Port Configuration, each row shows the port's MAC address, IPv4 address, gateway, selectable link speed, endpoint role, and port mapping, with quick access to edit each entry. The layout uses clear headers, dropdown menus, and organized tables to simplify viewing and modifying network parameters during test.



Packet Forge

Dashboard Server Admin

Server Summary

Step 1 Port Configuration Step 2 Stream Configuration Step 3 Summary

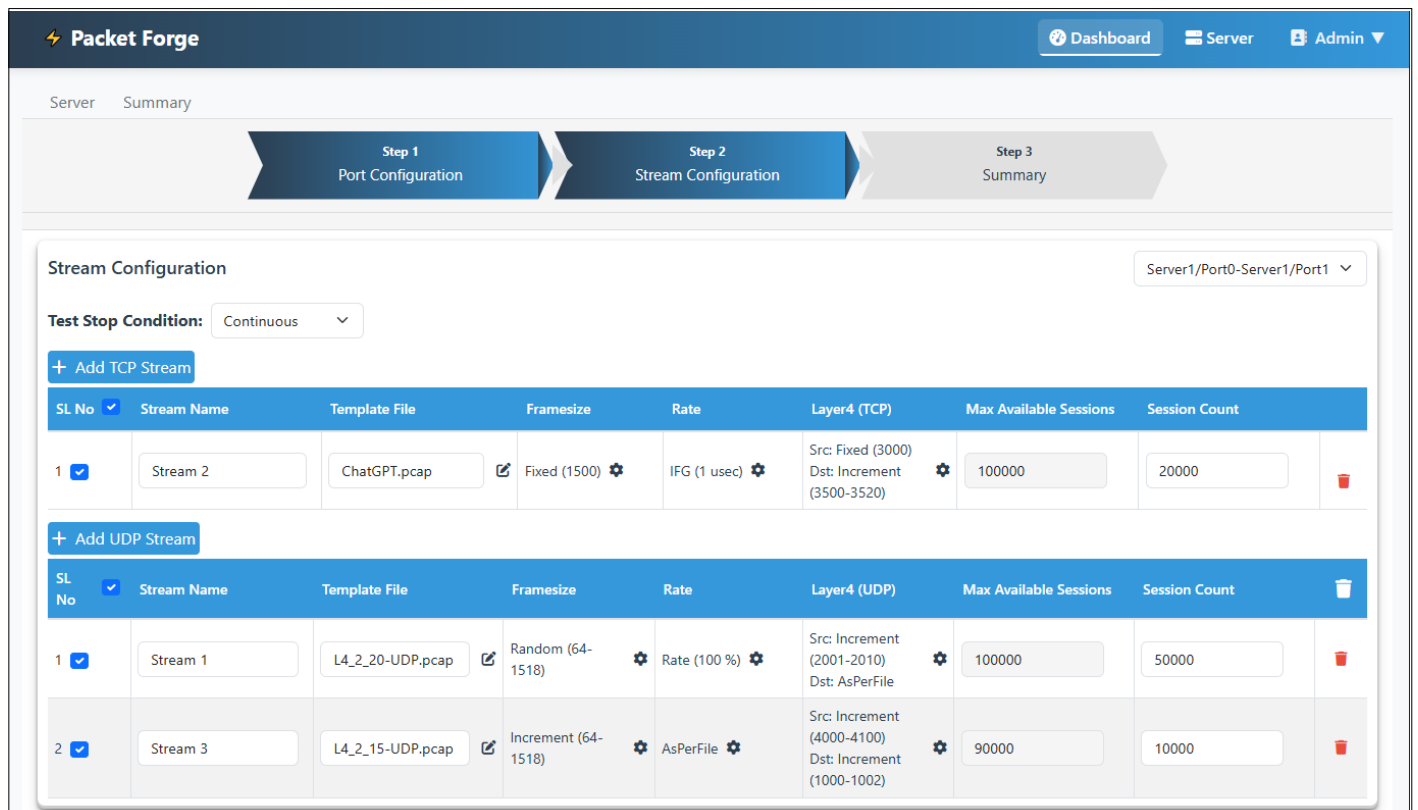
Port Configuration for Test1

Port Id	Source MAC Address	Source IPv4 Address	Gateway	Link Speed	End Point Selection	Port Mapping	Edit
Server2/Port0	FC-AA-14-91-56-AF	192.168.1.1	192.168.1.1	10 G	Server	Server2/Port1	
Server2/Port1	FC-AA-14-91-56-B0	192.168.1.2	192.168.1.1	10 G	Client	Server2/Port0	

Port Configuration

Stream Configuration

The Stream Configuration section offers a structured interface to define and manage test streams. Users can set stream names, select templates, specify frame size and rate, and configure TCP, UDP, TCP-UDP protocol details. Multiple streams can be added easily, with controls for session counts and maximum sessions.



Packet Forge

Dashboard Server Admin

Server Summary

Step 1 Port Configuration Step 2 Stream Configuration Step 3 Summary

Stream Configuration

Server1/Port0-Server1/Port1

Test Stop Condition: Continuous

+ Add TCP Stream

SL No	Stream Name	Template File	Framesize	Rate	Layer4 (TCP)	Max Available Sessions	Session Count
1	Stream 2	ChatGPT.pcap	Fixed (1500)	IFG (1 usec)	Src: Fixed (3000) Dst: Increment (3500-3520)	100000	20000

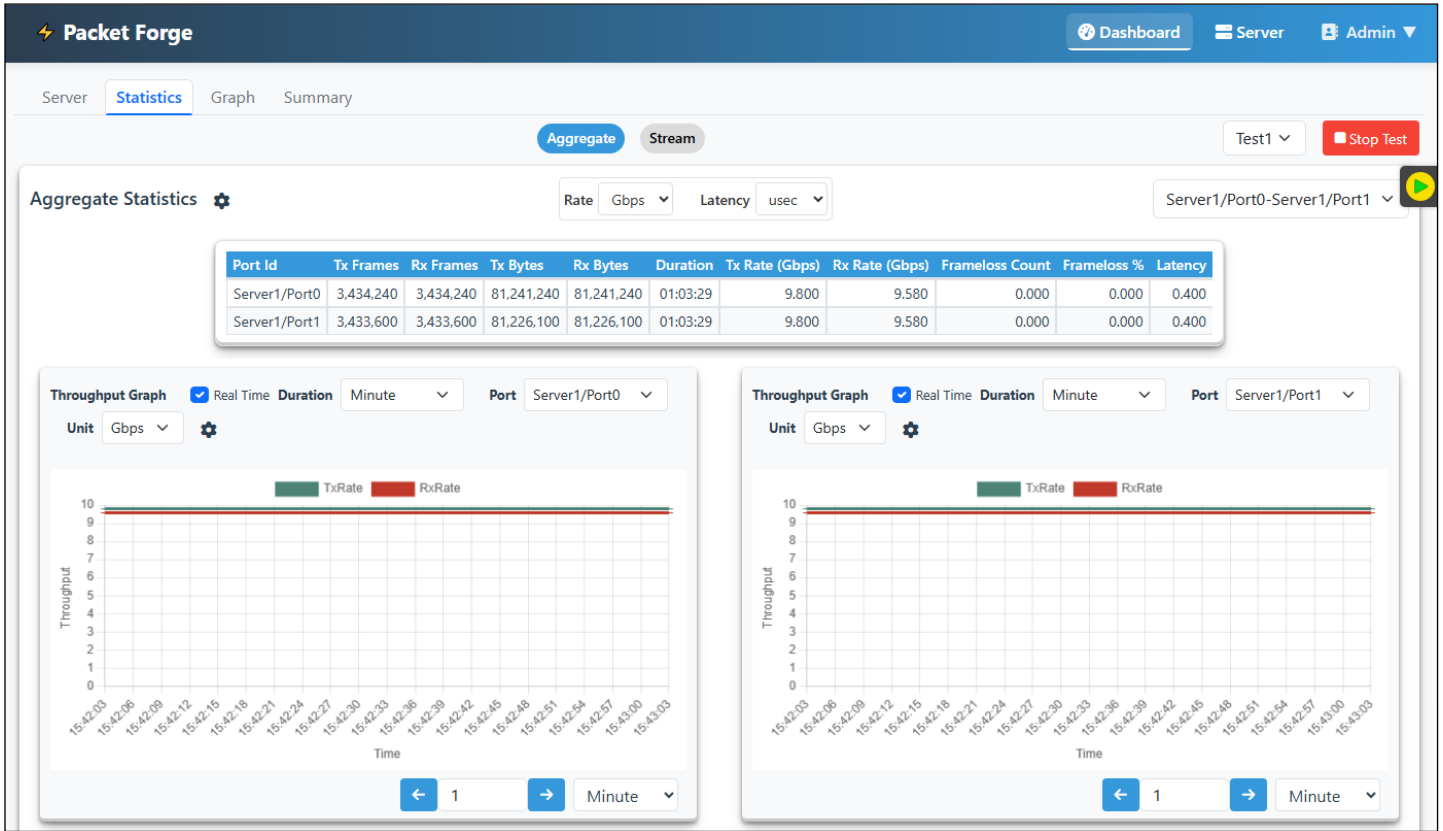
+ Add UDP Stream

SL No	Stream Name	Template File	Framesize	Rate	Layer4 (UDP)	Max Available Sessions	Session Count
1	Stream 1	L4_2_20-UDP.pcap	Random (64-1518)	Rate (100 %)	Src: Increment (2001-2010) Dst: AsPerFile	100000	50000
2	Stream 3	L4_2_15-UDP.pcap	Increment (64-1518)	AsPerFile	Src: Increment (4000-4100) Dst: Increment (1000-1002)	90000	10000

Stream Configuration

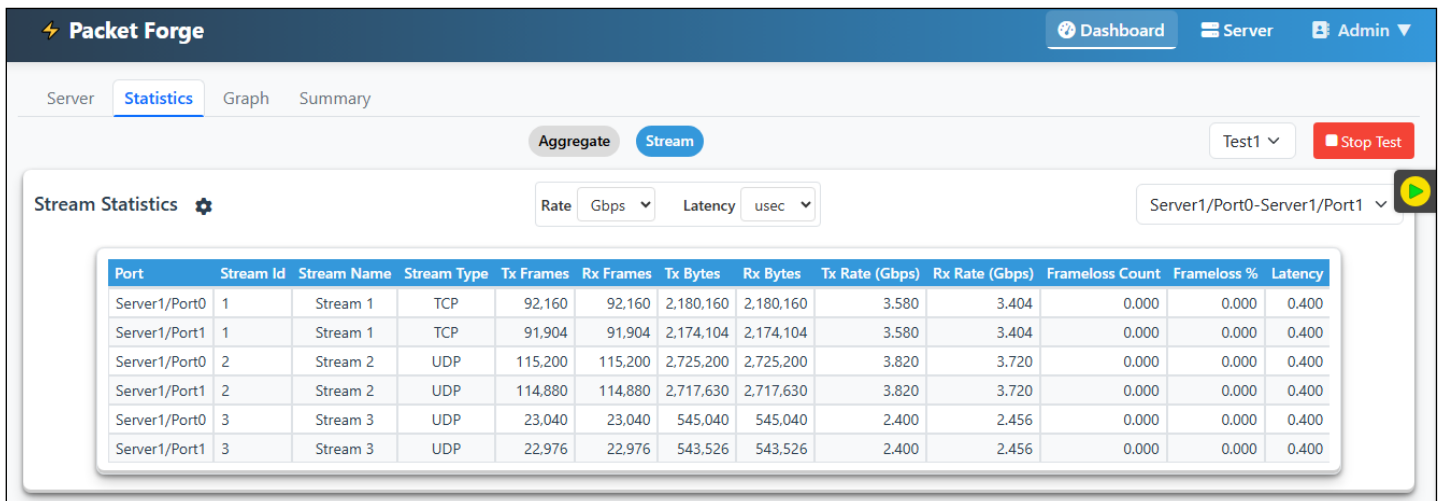
Statistics

The Aggregate Statistics GUI in Packet Forge provides a real-time summary of network traffic metrics for each active port, displaying transmitted and received frames, byte counts, measured throughput rates in Gbps, duration, frames per second, and latency in microseconds; control options above the table allow switching units and managing the test session, while the data is continuously refreshed for easy monitoring of overall network health, all without referencing Stream Statistics or detailed stream-level views.



Aggregate Statistics

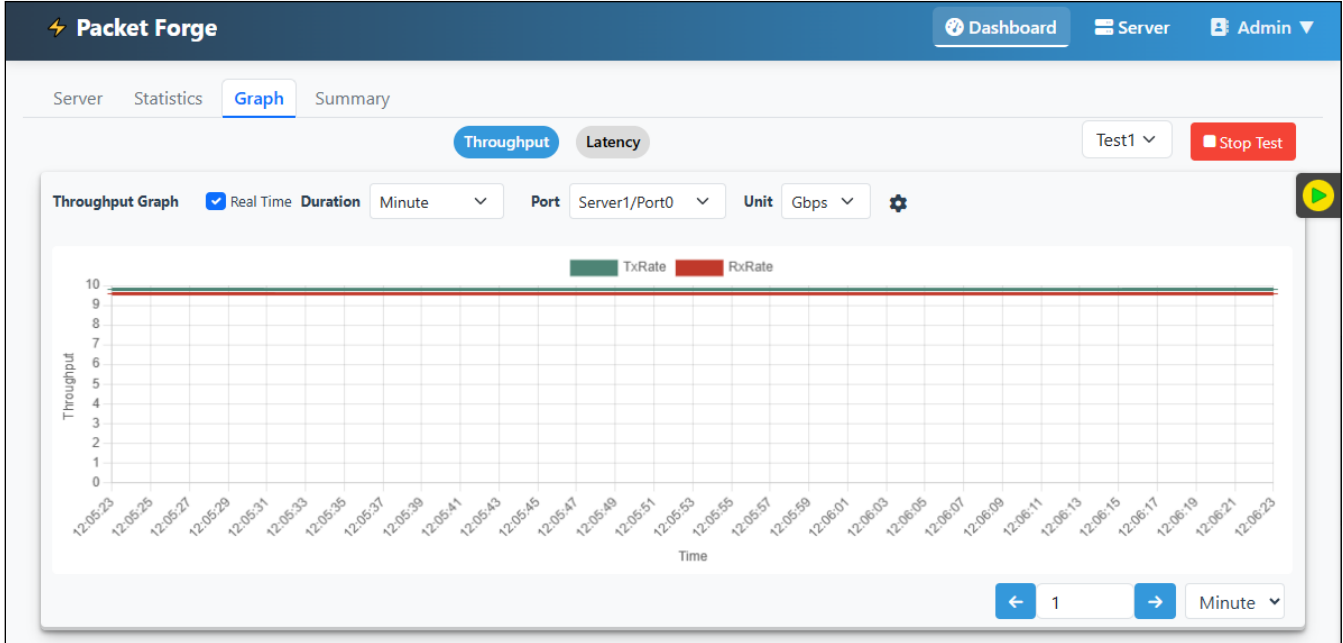
The Packet Forge stream statistics delivers a streamlined web interface for detailed traffic analysis. The window displays the metrics like port, stream ID, type (TCP/UDP), transmitted/received frames and bytes, data rates, latency, and frame loss percentage in a structured table. Interactive dropdown controls enable flexible display customization, while real-time updates ensure all test results are current and accessible for rapid port-by-port performance comparison.



Stream Statistics

Graphs Throughput

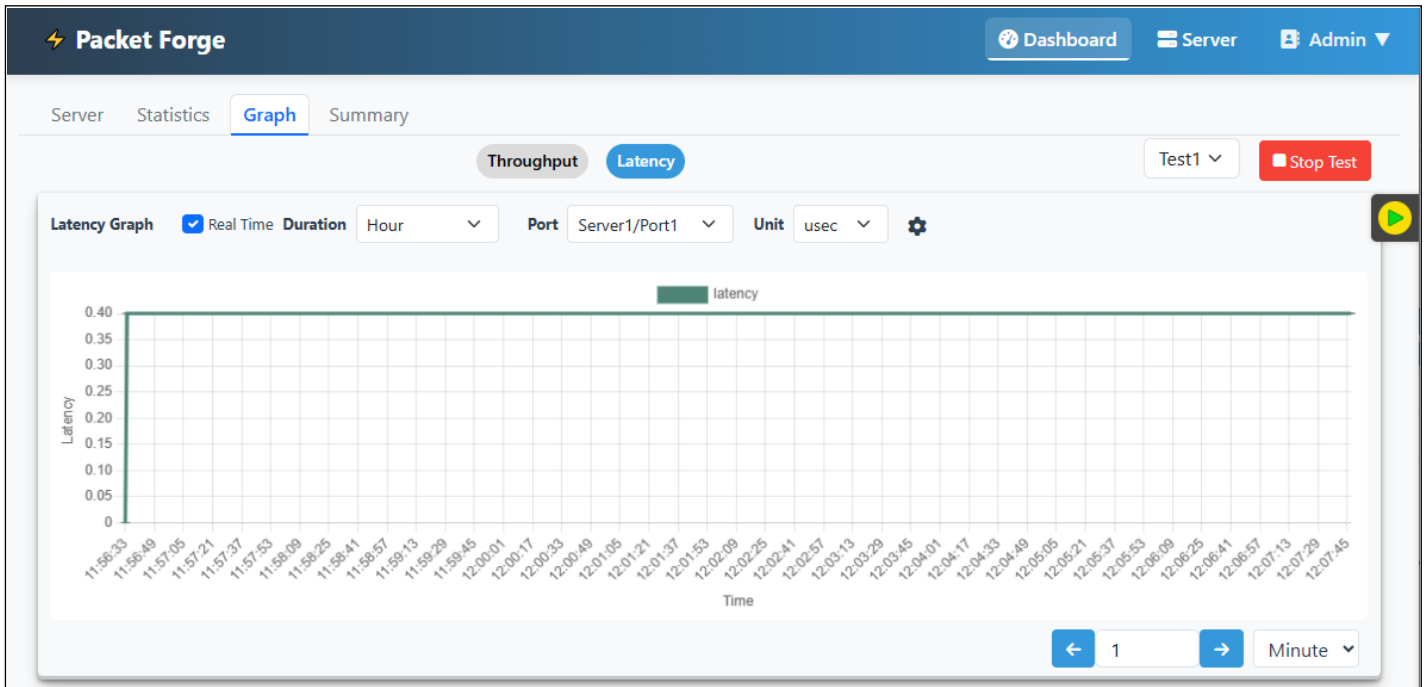
The Graph section of the PacketForge™ GUI features real-time throughput visualization, displaying Tx and Rx rates over time on a clear, customizable line graph. Users can select measurement units (such as Gbps), adjust the duration window, pick specific ports for analysis, and toggle between throughput and latency views, enabling quick trend analysis and detailed monitoring of network performance throughout the test session.



Throughput Graph

Latency

The Latency Graph in PacketForge™ offers real-time visualization of network latency for selected ports, plotted over time in either milliseconds or microseconds. Users can set the observation duration, navigate through time intervals, and easily distinguish latency trends with an intuitive, clear chart layout for rapid monitoring and troubleshooting



Latency Graph

Configuration Summary

The Summary in PacketForge™ presents a concise overview of the current test's network configuration and stream setup. It displays detailed source and destination host parameters such as MAC type and address, IPv4 addressing details, gateway, and subnet mask in a table format. Below, it lists all TCP and UDP streams configured for the test, including template file used, frame size, bandwidth settings, layer 4 mapping, and session counts, giving users a comprehensive snapshot of their active test scenario at a glance.

The screenshot displays the Packet Forge interface. At the top, there's a navigation bar with 'Packet Forge' logo and 'Dashboard', 'Server', and 'Admin' links. Below this, a 'Server' section has a 'Summary' tab. A dropdown menu shows 'Test1'. The main content area is titled 'Summary' and contains a table for host addresses and a section for 'Streams Configured'.

	Source Host Address	Destination Host Address
MAC Address Type	Fixed	Fixed
MAC Address	FC-AA-14-91-56-AF	FC-AA-14-91-56-B0
IPv4 Address Type	Increment ([0-99],[0-99],[1],[1] - 10000)	Fixed
IPv4 Address	192.168.1.1	192.168.1.2
Gateway	192.168.1.1	192.168.1.1

Streams Configured

Stop Condition:	Continuous	
TCP Streams	1 configured	
Template File	Frame Size	Bandwidth Control
ChatGPT.pcap	Fixed (1500)	IFG (1 usec)
		Layer4 (TCP)
		Src: Fixed (3000) Dst: Increment (3500-3520)
Session Count	20000	
UDP Streams	2 configured	
Template File	Frame Size	Bandwidth Control
L4_2_20-UDP.pcap	Random (64-1518)	Rate (100 %)
		Layer4 (UDP)
		Src: Increment (2001-2010) Dst: AsPerFile
Session Count	50000	
L4_2_15-UDP.pcap	Increment (64-1518)	As Per File
		Src: Increment (4000-4100) Dst: Increment (1000-1002)
Session Count	10000	

Configuration Summary

Hardware Specifications

PacketForge™ Rack-mount Platforms

- Ideal for Lab environments that require centralized management of multiple servers and network devices
- Rack-mount units offer flexibility for scaling up or down as needed by adding or removing individual units

PacketForge™ 2U Rack-mount



Specifications	
Dimensions	3.5" H x 17.2" W x 17.7" D
Weight	30 lbs.
Number of Supported Cards/Ports	Up to 2 Cards x (2x100G Ports), Maximum of 4 Ports
Power supply	800W

PacketForge™ 1U Rack-mount



Specifications	
Dimensions	1.7" H x 17.2" W x 9.8" D
Weight	10 lbs.
Number of Supported Cards/Ports	1 x Full-height 1 Card x (2x100G Ports), Maximum of 2 Ports
Power supply	200W

Hardware Specifications (Contd.)

PacketForge™ Portable Platforms

- Ideal for field engineers, military personnel, or researchers who need a powerful and portable computing solution in remote or rugged locations
- Suitable for environments where traditional desktops or laptops may be too fragile or lack necessary durability

Ultra-Portable PacketForge™



Specifications	
Dimensions	12.4" H x 16.41" W x 4.39" D
Display	17.3" 1920x1080
Weight	16.5 lbs.
Number of Supported Cards/Ports	Up to 2 Cards x (2x100G Ports), Maximum of 4 Ports
Power supply	400W (optional 500W)

Portable PacketForge™



Specifications	
Dimensions	13.62" H x 16.50" W x 7.25" D
Display	17.3" 1920x1080
Weight	~23 lbs. (10.4kg)
Number of Supported Cards/Ports	Up to 3 Cards x (2x100G Ports), Maximum of 6 Ports
Power supply	680W 100/240VAC

Note: PCs which include GL hardware/software require Intel or AMD processors for compliance.

For more details, refer to [Next-Generation Network Traffic Testing-PacketForge](#) webpage.