FastRecorder™ and PacketExtractor™ 400 G

(High Speed Packet Capture and Recording up to 400 Gbps)

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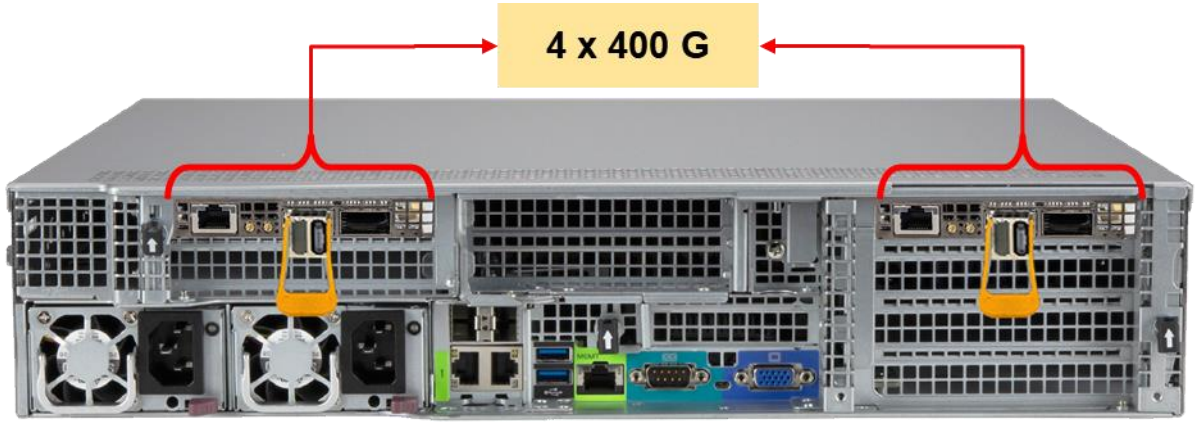
400 Gbps Packet Capture Systems

2-Port Portable System

4-Port Portable System



Dual Processor Rack-mount System

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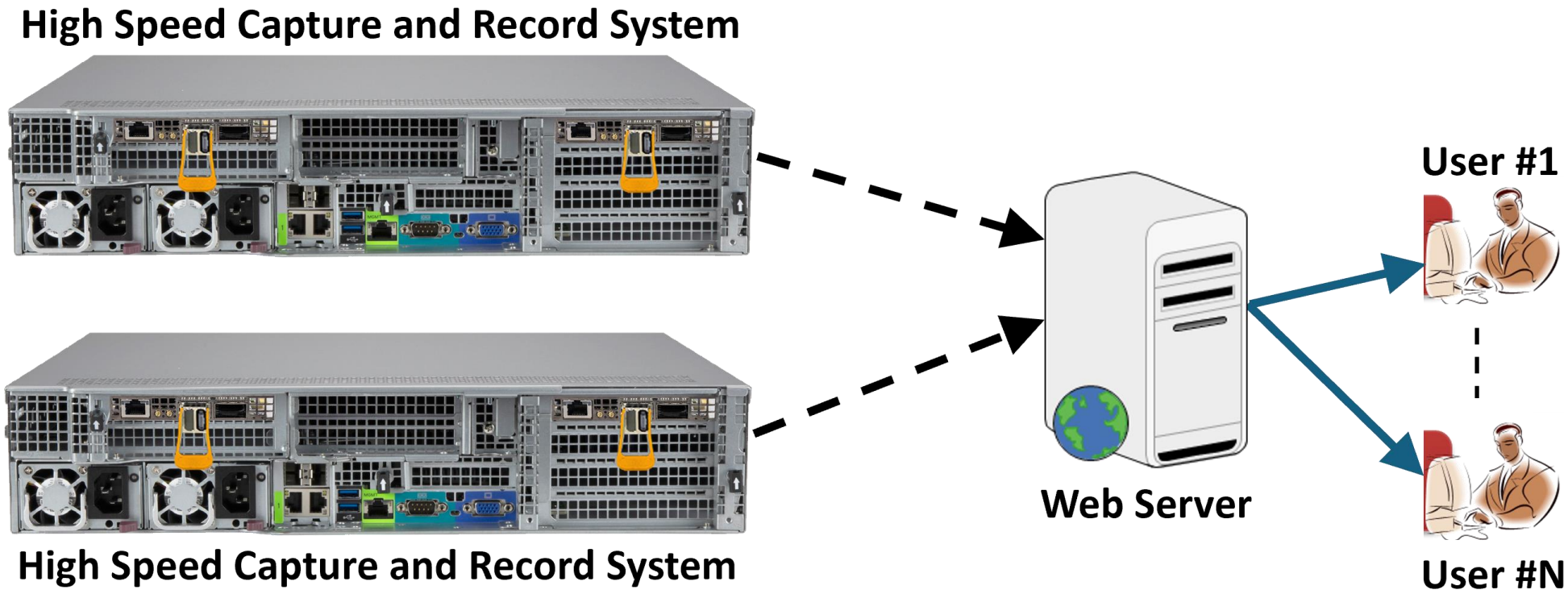
Key Features

- **High-Speed Duplex 400G Capture (Up to 800 Gbps Total Throughput)**: Duplex 400G capture (400G East + 400G West) delivering up to 800 Gbps directly to SSDs — records up to 6 TB per minute
- **Non-Intrusive Continuous Recording**: Non-intrusive capture and continuous recording over Ethernet with nanosecond precision
- **Multi-Port Traffic Merging**: Merges traffic from multiple ports with high-precision timestamps during recording
- **Optimized Distributed Disk Operation**: Optimized distributed disk operation to achieve wirespeed recording to disk
- **Advanced Hardware Filtering**: Apply efficient hardware filters based on MAC, 802.1Q (VLANs), IPv4/IPv6, Tunnel Traffic, TCP, UDP, and SCTP parameters to record only traffic of interest
- **Real-Time Recording Metrics**: Monitors total recording duration, L2 Rx rate, record rates, frame rates, captured frames, dropped frames, and recorded bytes for efficient and accurate high-speed packet capture
- **Live Network Performance Monitoring**: Provides real-time insights into port status, received frames, link utilization, capture rates, error counts, and frame-length distribution for efficient network performance analysis
- **Graphical Rate and Error Analysis**: Users can view Rate and Error Graphs for each port to analyze capture rates and detect issues like segment drops, Multi-Packet Receive Queue (MPRQ) buffer overflows, missed packets, and discarded packets during recording

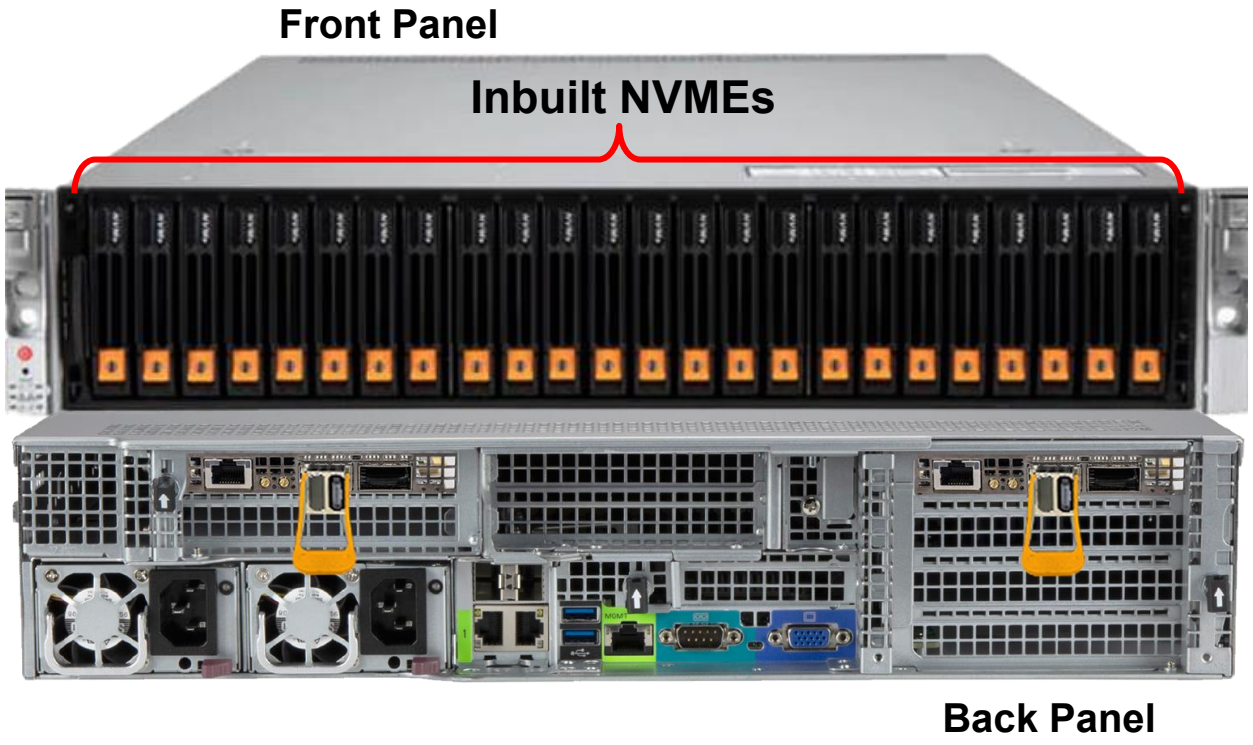
Multi-Server Connectivity



- The FastRecorder™ 400 G web interface enables users to access multiple servers within the same LAN, allowing seamless connectivity and centralized management of multiple devices for improved efficiency and control

Dual Processor 400 G Capture System

- Customizable Storage up to 20 NVME SSDs (Each up to 30 TB)
- Capture rate to SSD 100 GBytes/sec
- Up to 4 x 400 G Ports
- Linux OS
- Redundant Power Supply
- Ethernet Port for Remote Access



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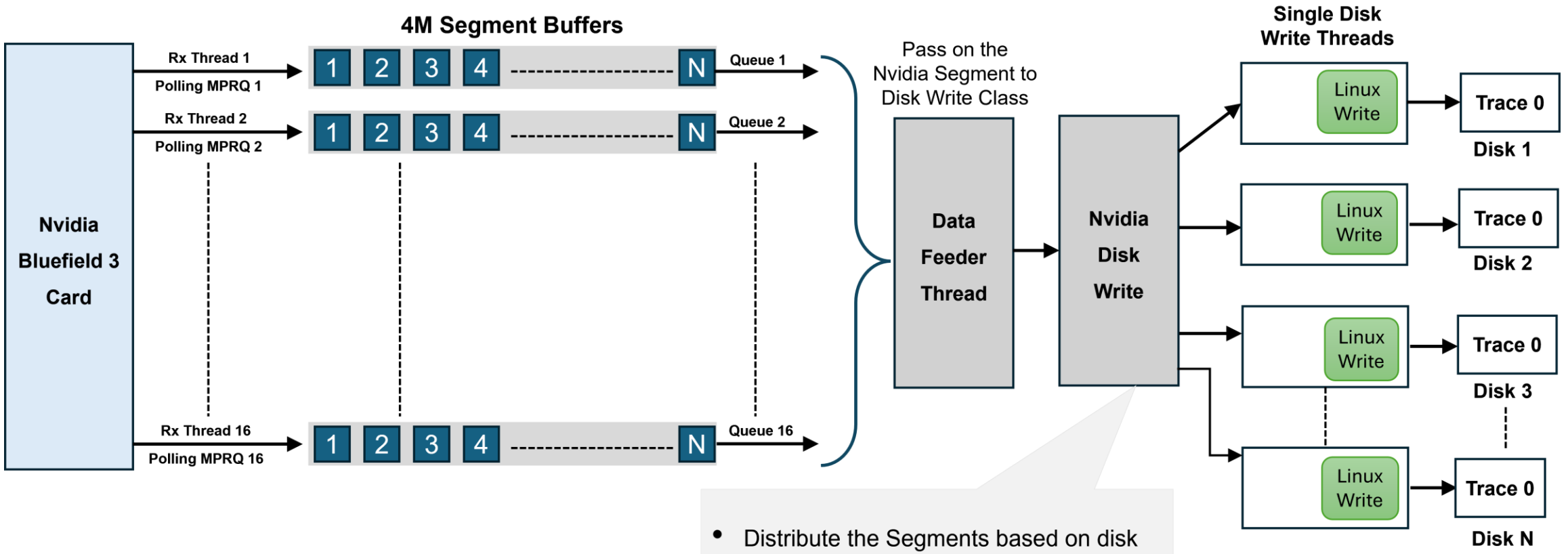
FastRecorder™ Architecture



- Distribute the Segments based on disk available for writing
- Assign the segment sequence number before distributing the segment to write thread
- Release the segments which are written to disk

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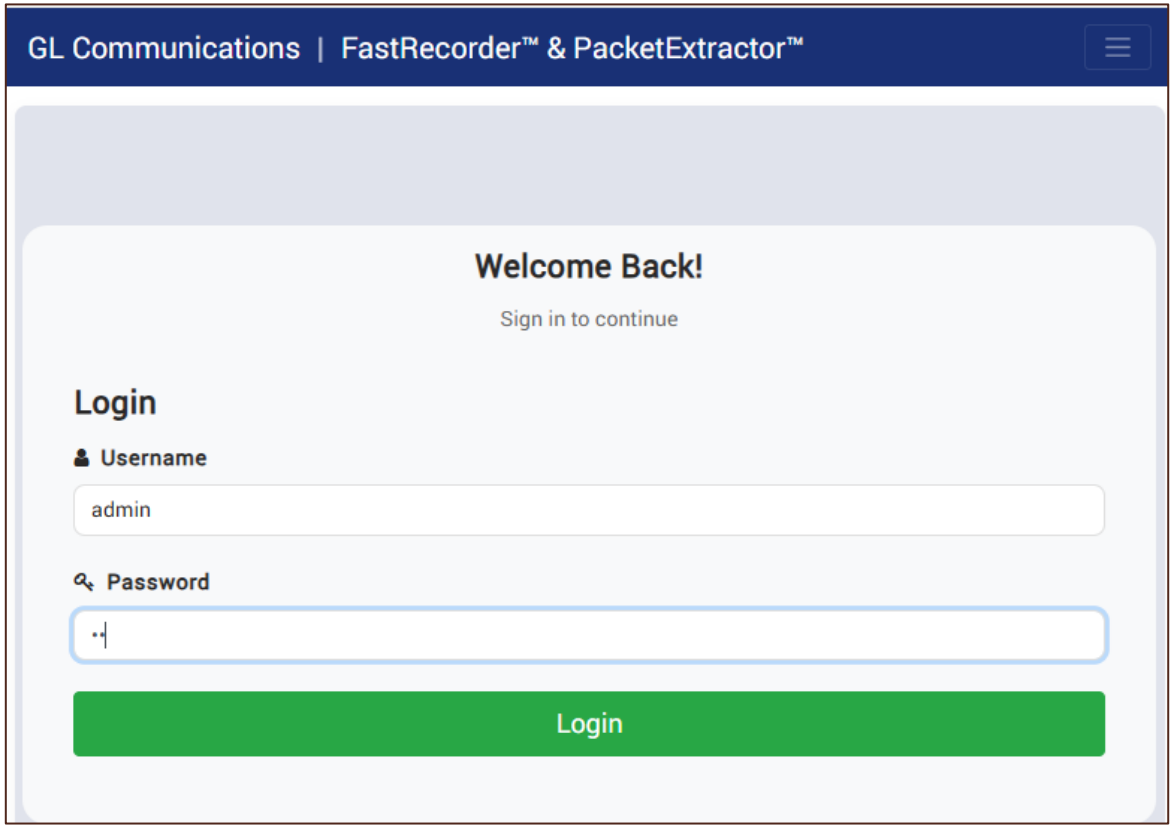
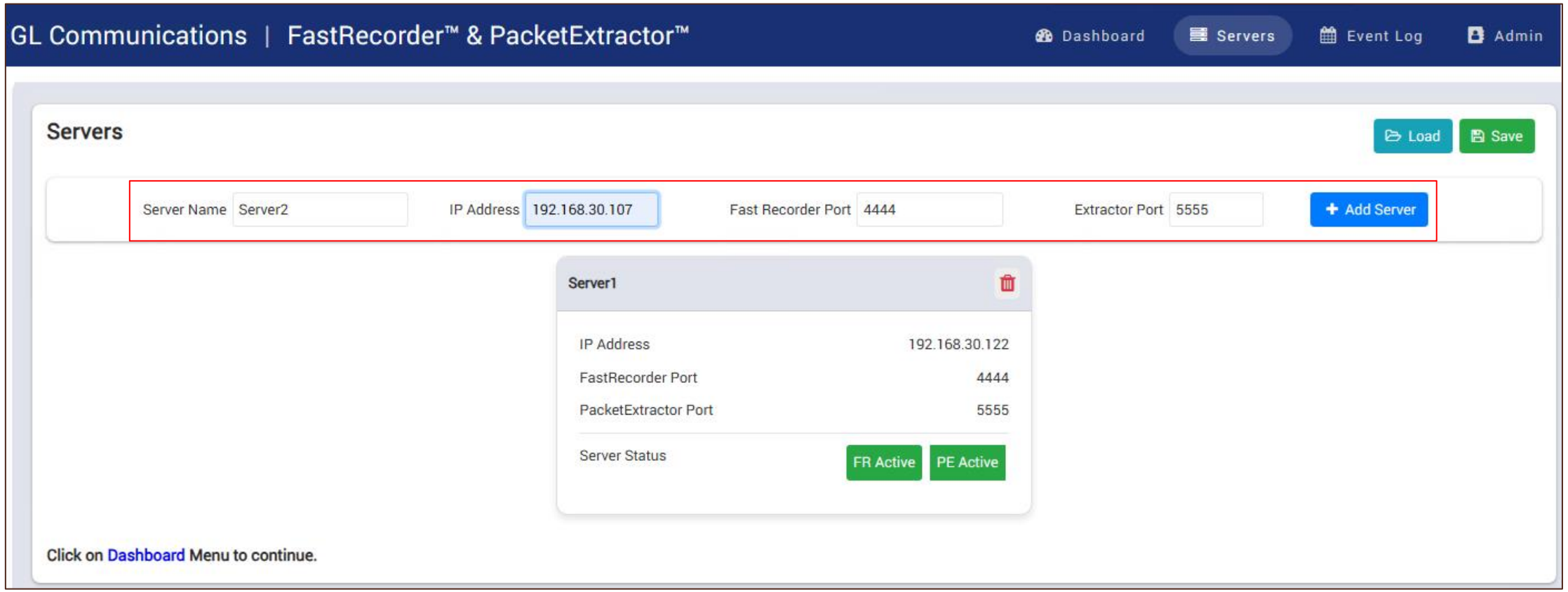
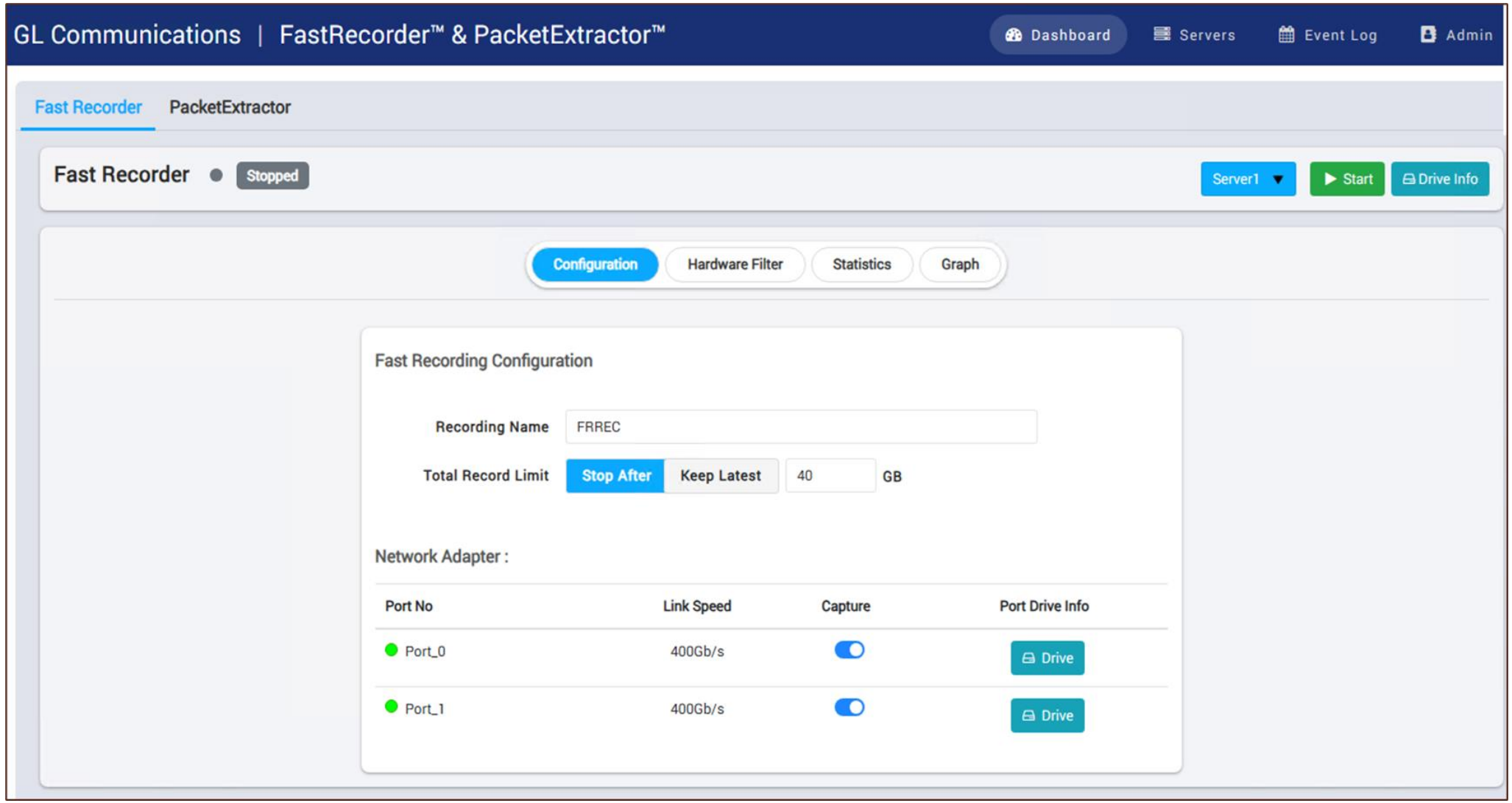
FastRecorder™ Main Window (Web Interface)



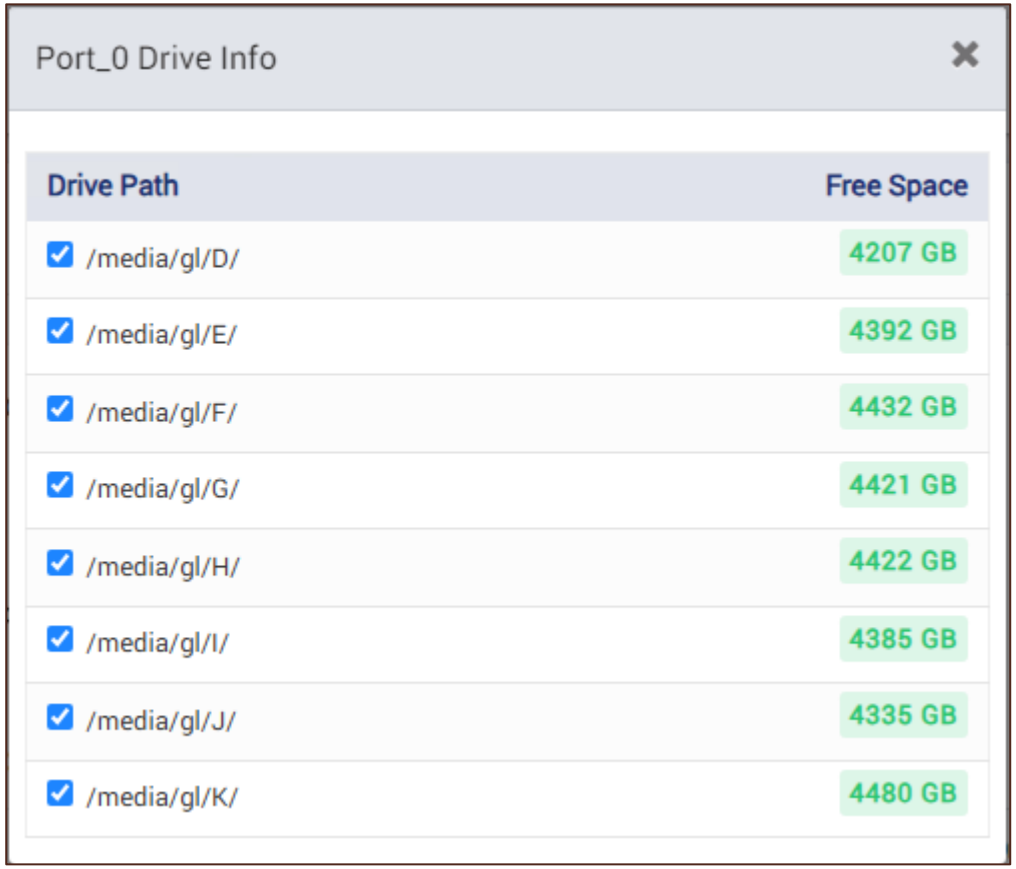
FastRecorder™ Server

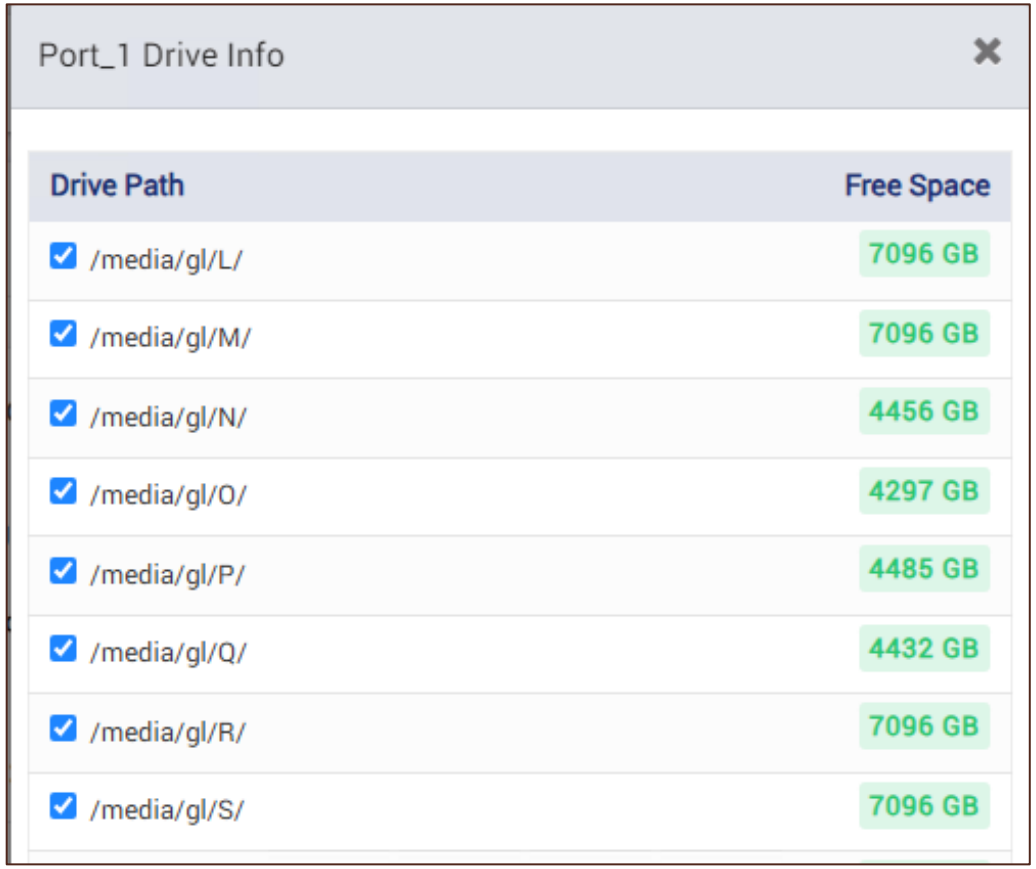


FastRecorder™ Configuration GUI



Driver Information





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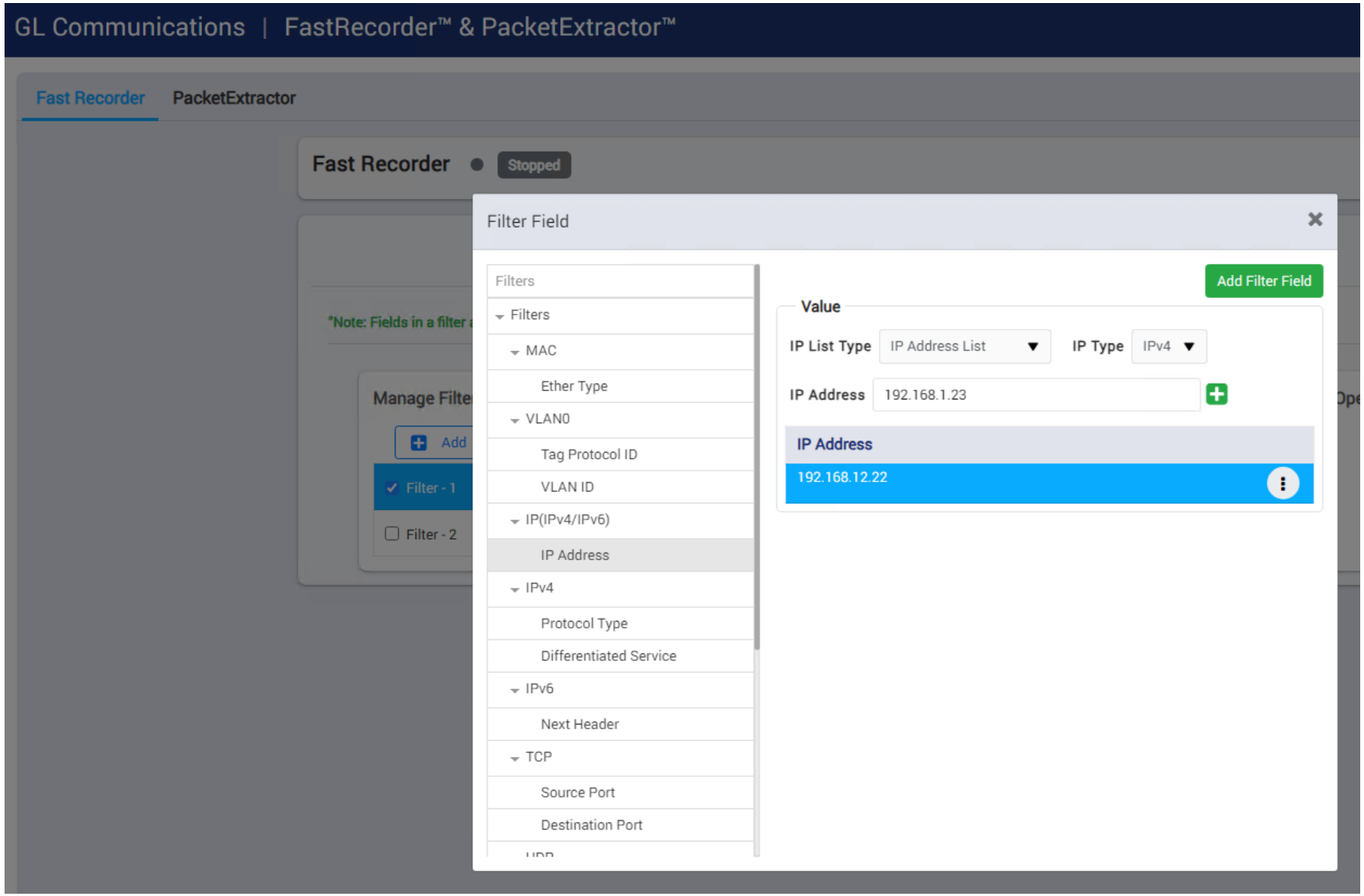
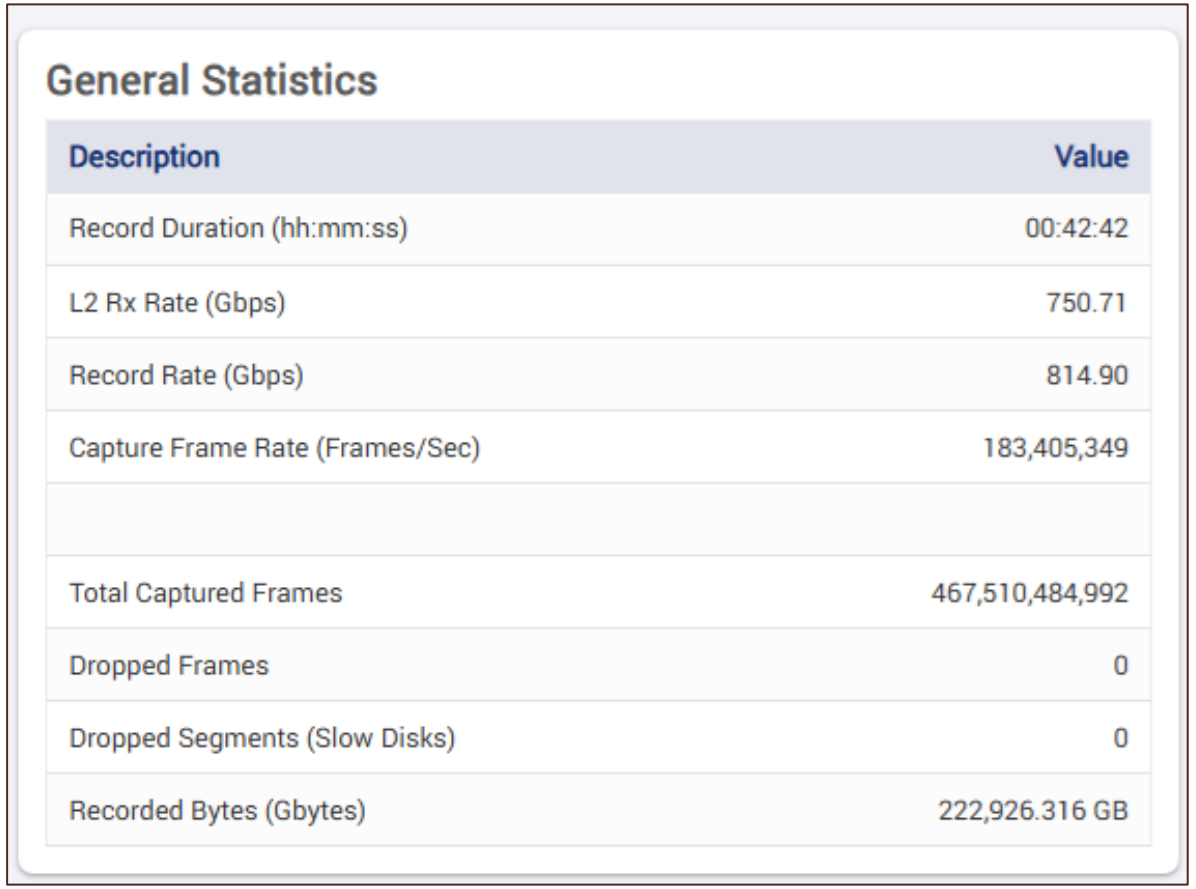
Hardware Filters

- Set up filters to capture traffic of interest only
- Filters can be modified during run-time
- In this example, the specified **IPv4** address is filtered



400 G General Statistics

- **Record Duration (hh:mm:ss):** Total recording duration in hours, minutes, and seconds
- **L2 Rx Rate (Gbps):** Total capture rate of all selected ports on the capture interface in gigabits per second
- **Record Rate (Gbps):** Total record rate of all selected ports on the capture interface in gigabits per second
- **Capture Frame Rate (Frames/Sec):** Total number of frames received per second on the capture interface
- **Total Captured Frames:** Total number of frames recorded during the capture session
- **Dropped Frames:** Number of frames that were not captured due to buffer limitations or other constraints
- **Dropped Segments (Slow Disks):** Number of segments lost due to insufficient disk write speed
- **Recorded Bytes (Gbytes):** Total number of bytes recorded in the current session, measured in gigabytes



General Statistics

Description	Value
Record Duration (hh:mm:ss)	00:42:42
L2 Rx Rate (Gbps)	750.71
Record Rate (Gbps)	814.90
Capture Frame Rate (Frames/Sec)	183,405,349
Total Captured Frames	467,510,484,992
Dropped Frames	0
Dropped Segments (Slow Disks)	0
Recorded Bytes (Gbytes)	222,926.316 GB

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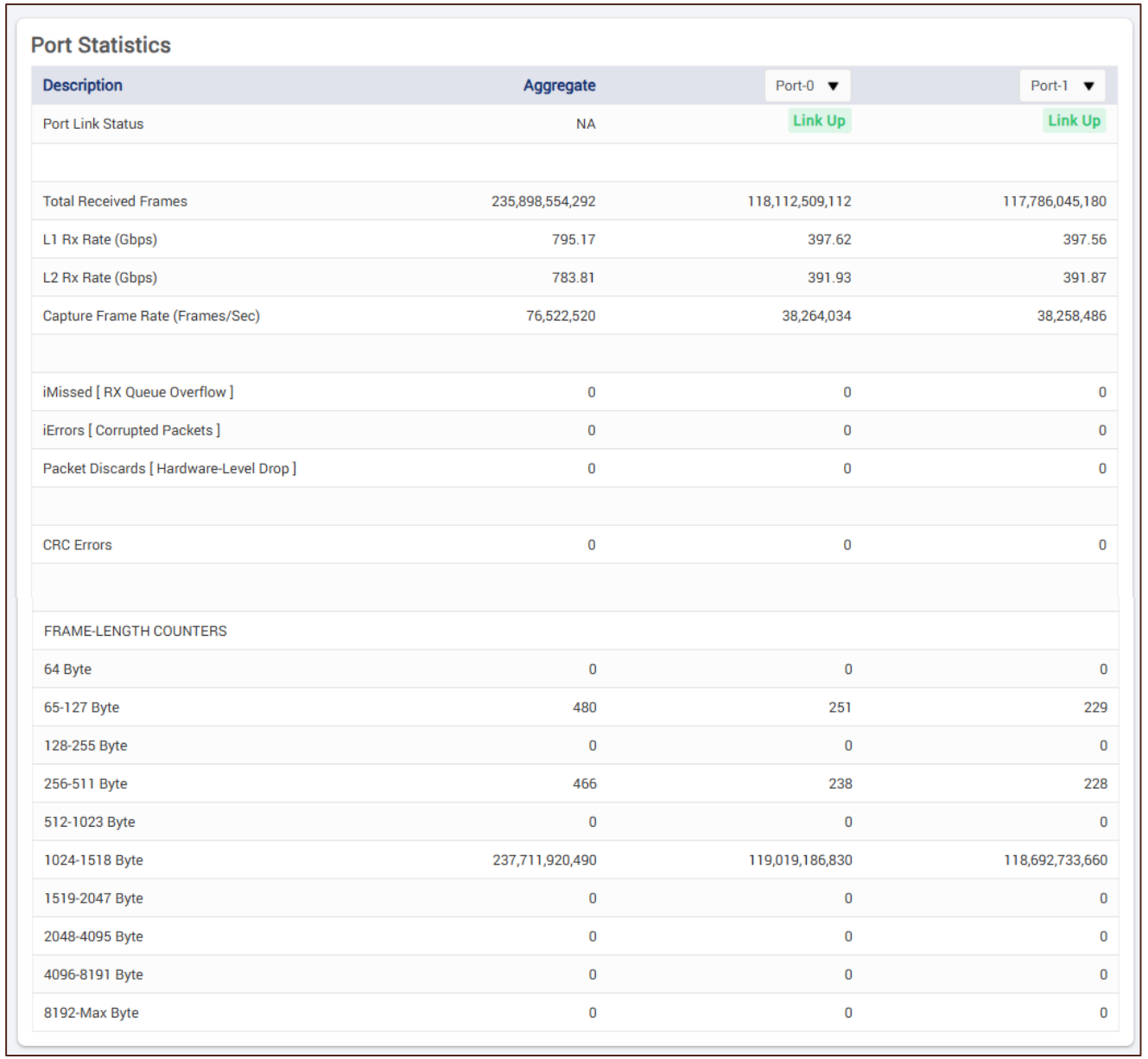
400 G Port Statistics

- **Port Link Status:** Port “Link Up” or “Link Down” status
- **Total Received Frames:** Total number of frames successfully received on the capture interface during the recording session
- **L1 Rx Rate (Gbps):**

  L1 Rx Rate = **[Bytes/sec+(Packets/sec×20)]×8**
  20 byte = 12 byte (interframe gap) + 8 byte (preamble)
- **L2 Rx Rate (Gbps):** Total capture rate of all selected ports on the capture interface in gigabits per second

  Bytes = Ethernet header + FCS

  Capture Rate = [Bytes/sec]*8
- **Capture Frame Rate (Frames/Sec)**: Total number of frames received per second on the capture interface
- **iMissed [RX Queue Overflow]:** Number of missed packets due to receive queue overflow (driver statistic)



Port Statistics

Description	Aggregate	Port-0	Port-1
Port Link Status	NA	Link Up	Link Up
Total Received Frames	235,898,554,292	118,112,509,112	117,786,045,180
L1 Rx Rate (Gbps)	795.17	397.62	397.56
L2 Rx Rate (Gbps)	783.81	391.93	391.87
Capture Frame Rate (Frames/Sec)	76,522,520	38,264,034	38,258,486
iMissed [RX Queue Overflow]	0	0	0
iErrors [Corrupted Packets]	0	0	0
Packet Discards [Hardware-Level Drop]	0	0	0
CRC Errors	0	0	0
FRAME-LENGTH COUNTERS			
64 Byte	0	0	0
65-127 Byte	480	251	229
128-255 Byte	0	0	0
256-511 Byte	466	238	228
512-1023 Byte	0	0	0
1024-1518 Byte	237,711,920,490	119,019,186,830	118,692,733,660
1519-2047 Byte	0	0	0
2048-4095 Byte	0	0	0
4096-8191 Byte	0	0	0
8192-Max Byte	0	0	0

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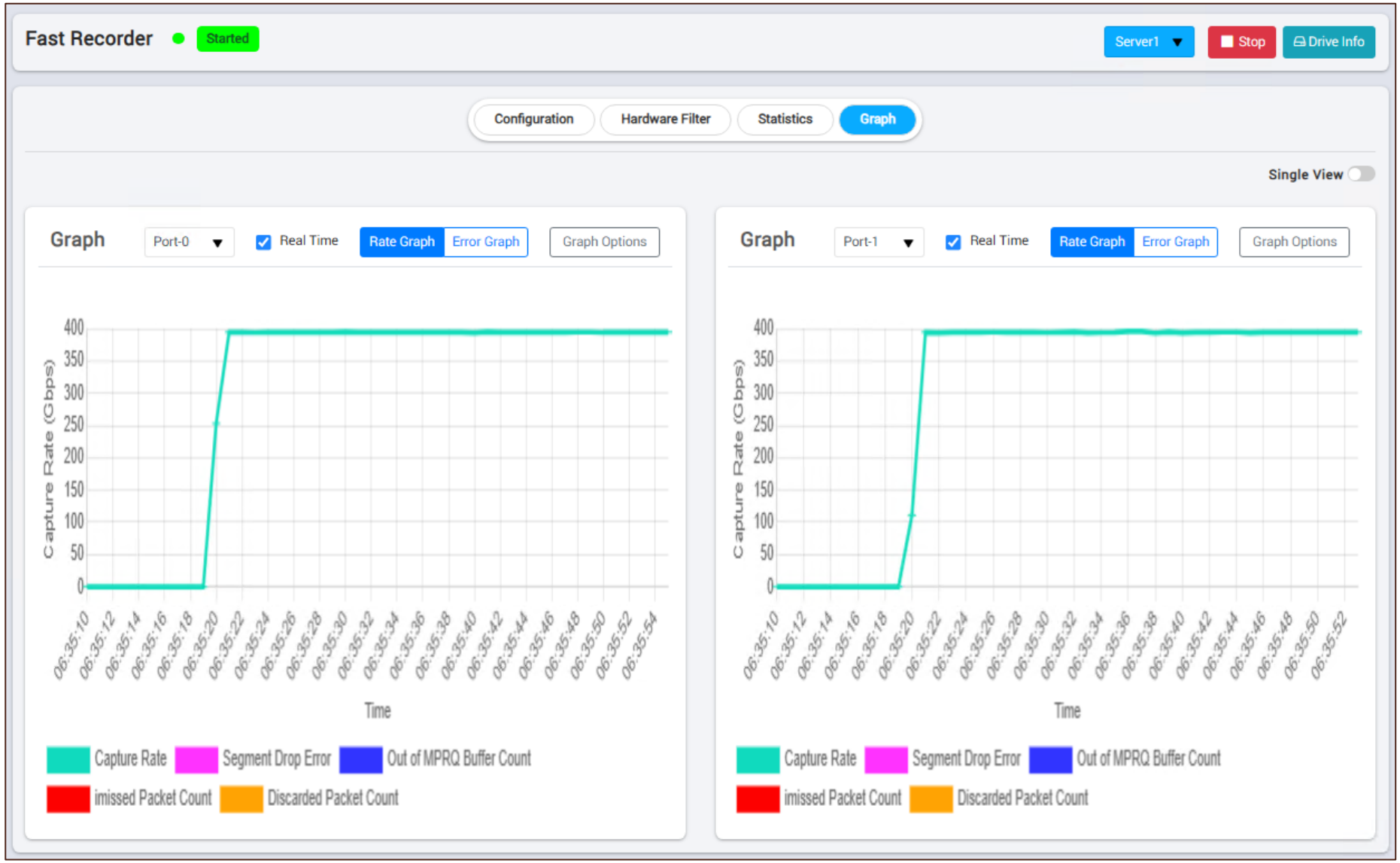
400 G Port Statistics (Contd.)

iErrors [Corrupted Packets]	0	0	0
Packet Discards [Hardware-Level Drop]	0	0	0
CRC Errors	0	0	0
FRAME-LENGTH COUNTERS			
64 Byte	0	0	0
65-127 Byte	480	251	229
128-255 Byte	0	0	0
256-511 Byte	466	238	228
512-1023 Byte	0	0	0
1024-1518 Byte	237,711,920,490	119,019,186,830	118,692,733,660
1519-2047 Byte	0	0	0
2048-4095 Byte	0	0	0
4096-8191 Byte	0	0	0
8192-Max Byte	0	0	0

- **iErrors [Corrupted Packets]**: Number of packets received with errors due to corruption
- **Packet Discards [Hardware-Level Drop]**: Number of packets dropped at the NIC's hardware ring buffer due to lack of buffers for DMA operation towards application
- **CRC Errors**: Number of packets with cyclic redundancy check (CRC) failures due to transmission errors
- **FRAME-LENGTH COUNTERS**: Number of frames captured within specific byte length ranges for traffic analysis

FastRecorder™ - Rate Graph

- Provides two types of graphs **Rate Graph** and **Error Graph** for each port
- The **Rate Graph** shows the capture rate of a recorded or ongoing recording file and indicates errors detected at a specific instance during capture or recording



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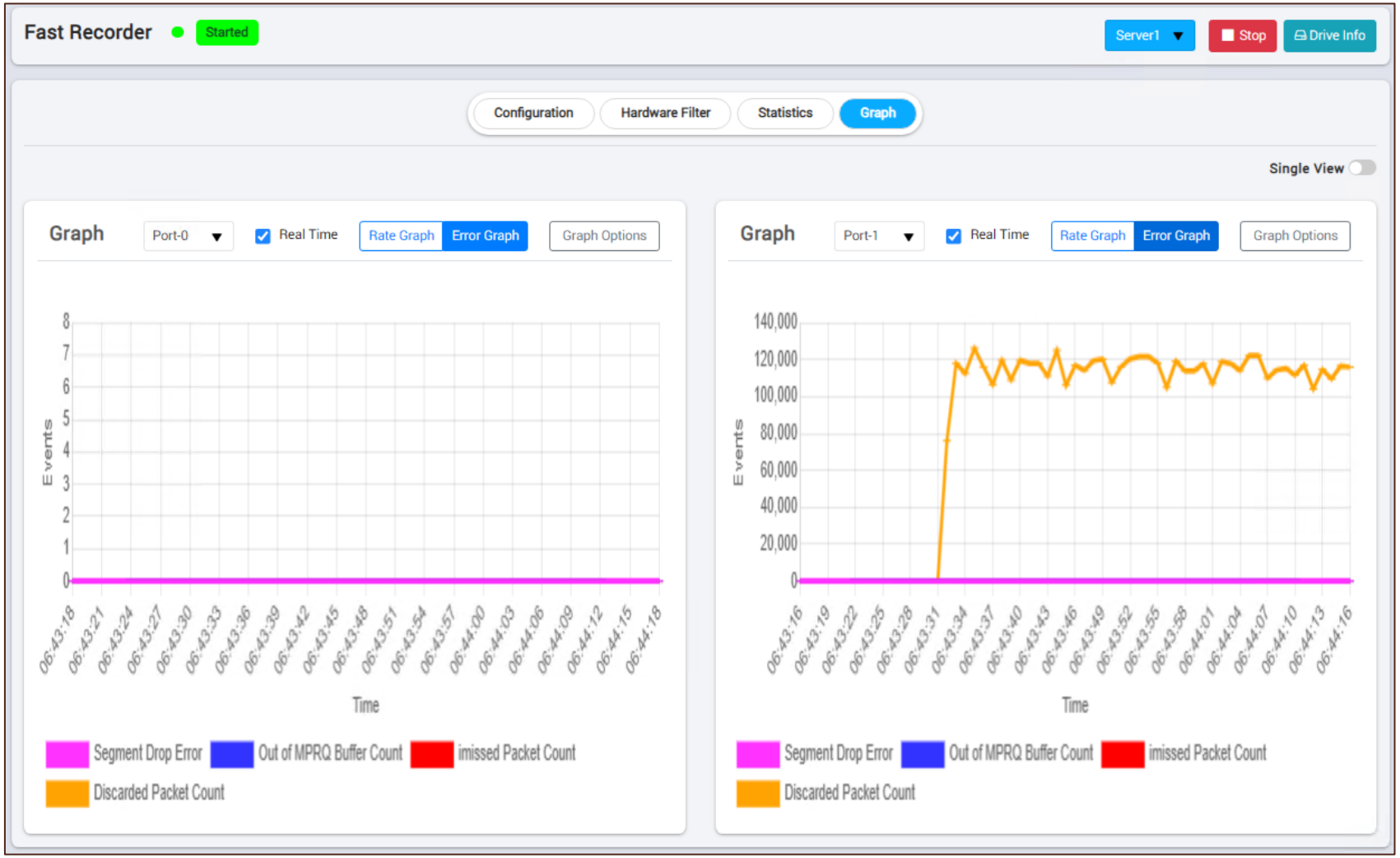
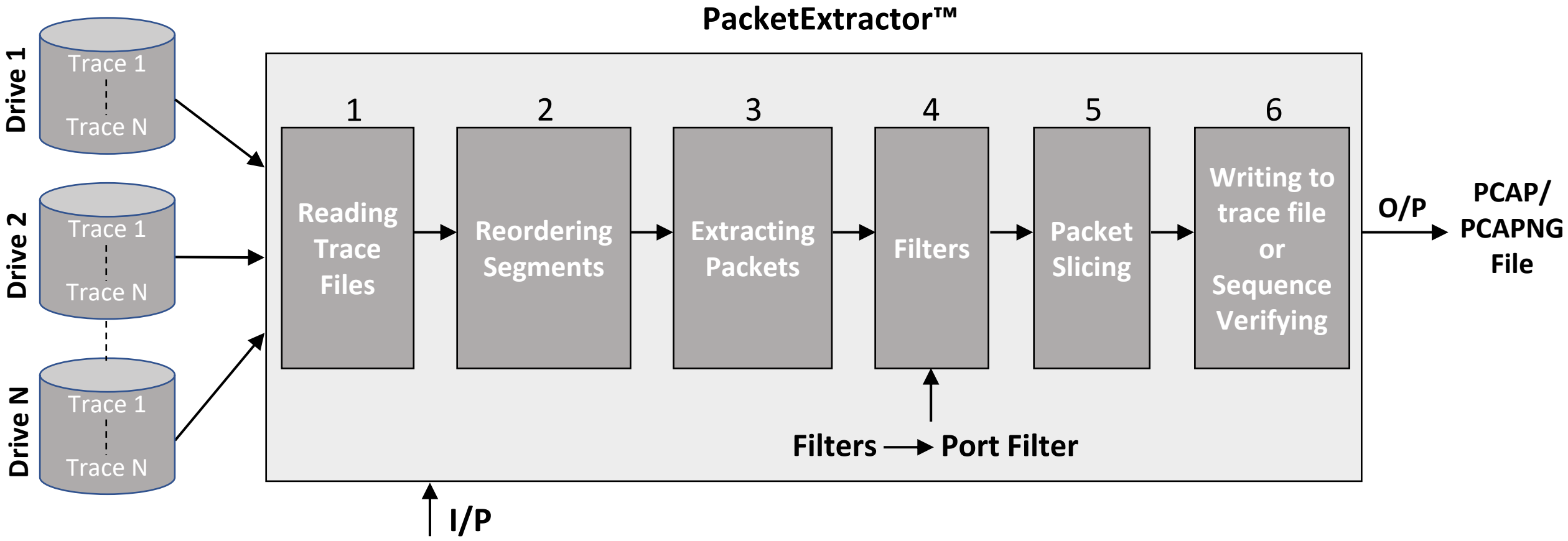
FastRecorder™ - Error Graph

- The **Error Graph** displays errors that occurred on each port during recording or in a recorded file
  - **Segment Drop Error** – Indicates packet drops due to slow disk performance
  - **Out of MPRQ Buffer Count** – Number of packets lost due to insufficient MPRQ buffers, this occurs that disk write has consumed all the available 4MB (made up of multiple MPRQ buffers) and NIC doesn't have any of these left to DMA the incoming frames
  - **iMissed Packet Count** – Number of packets dropped because the MPRQ queue overflow, this indicates the sluggishness at application in picking the MPRQ buffers from NIC
  - **Discarded Packet Count** – Captures packets that were dropped at the NIC's hardware ring buffer due to lack of MPRQ buffers for DMA operation towards application



PacketExtractor™ Architecture



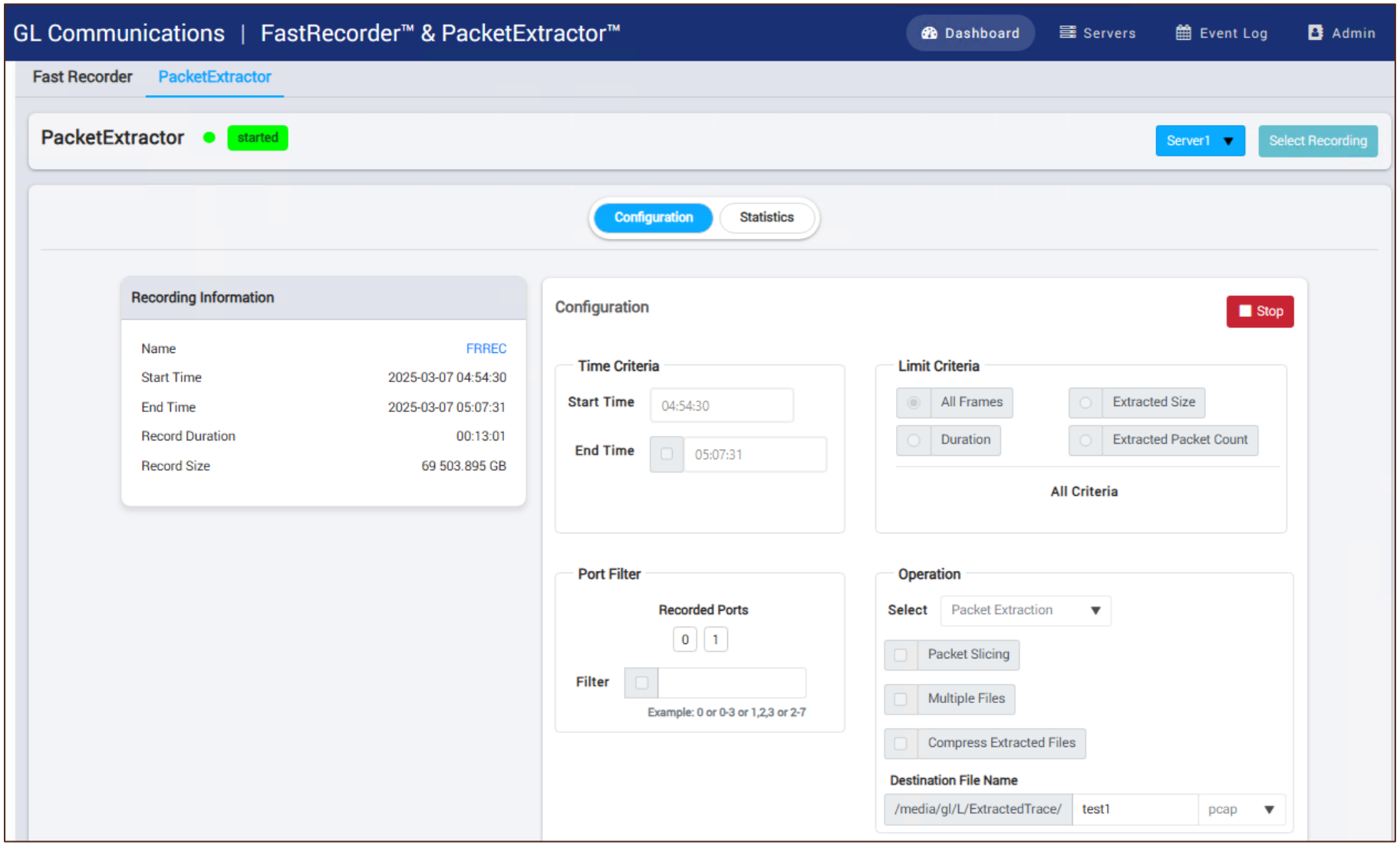
Select Previous Recording → Output file generated from FastRecorder™, once recording is stopped

PacketExtractor™

- **Targeted Packet Extraction**: Extract specific traffic from previous recordings into PCAP and PCAPNG (Wireshark® format) output traces
- **Post-Extraction Analysis**: Analyze the extracted trace in PacketScan™ HD or Wireshark®
- **Flexible Output Trace Options**: Extract packets into a single or multiple output traces
- **Conditional Extraction Filters**: Extract traces based on file size, time period, or packet count limit
- **Time-Based Extraction**: Perform extraction from user-specified start and end times
- **Recording Status Indicator**: Provides Recording Status options as Complete or Partial
- **Packet Slicing for Efficiency**: Slice packets to a limited length to optimize output trace size
- **Extraction Metrics and Reporting**: Provides detailed insights into the extraction process, including frame count, data volume, processing and extraction rates, and total duration for efficient traffic analysis

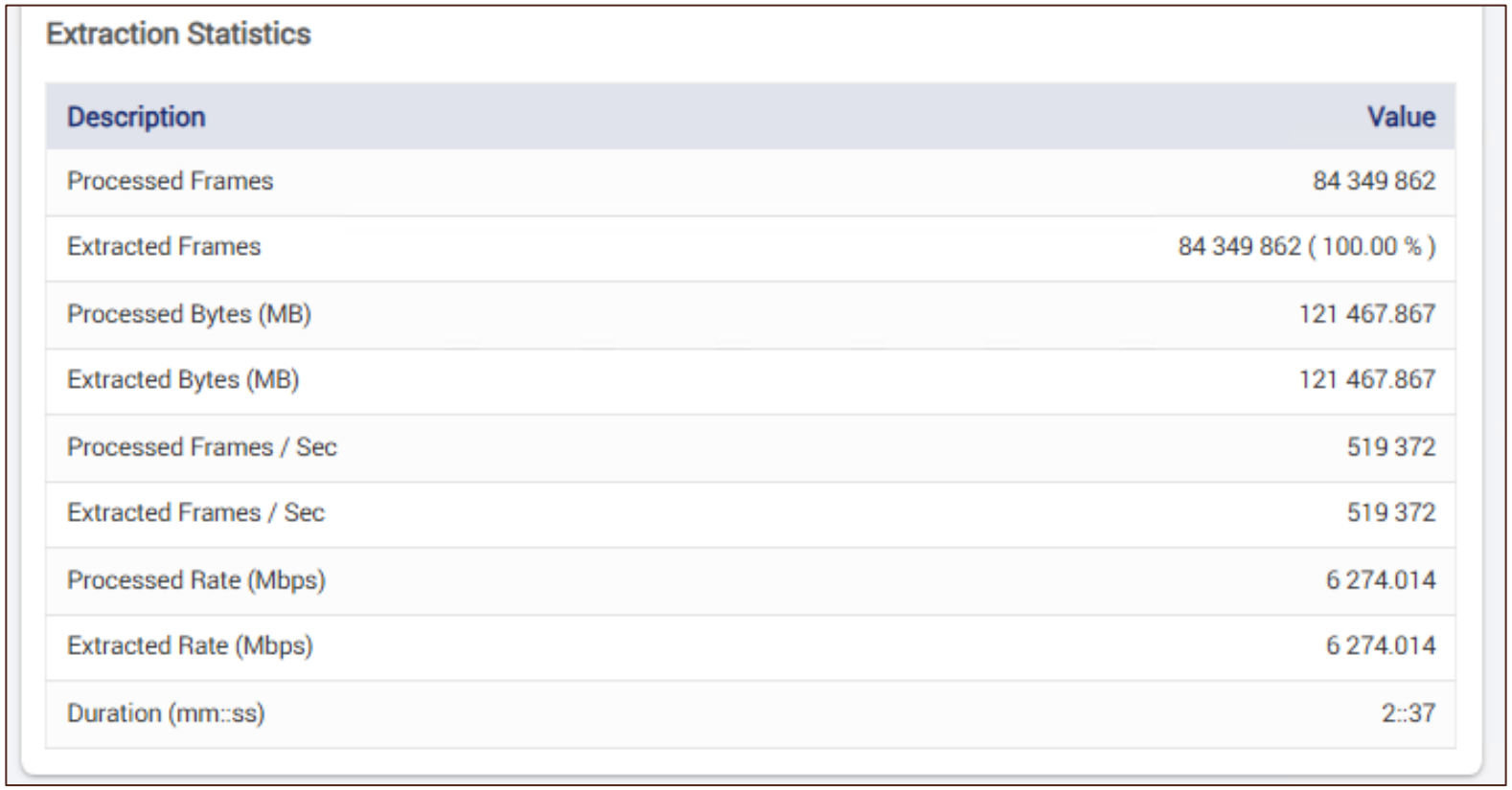
PacketExtractor™ Configuration GUI

- Enables efficient extraction of recorded network traffic with flexible filtering and export options
- Configure time limits, apply filters, and select specific ports for targeted extraction
- Supports packet slicing, multiple file exports, and compression, with output saved in PCAP format for analysis



Extraction Statistics

- **Processed Frames:** The total number of frames analyzed during the extraction process
- **Extracted Frames:** The number of frames successfully extracted from the processed frames
- **Processed Bytes (MB):** The total amount of data processed, measured in megabytes
- **Extracted Bytes (MB)**: The total amount of extracted data, measured in megabytes
- **Processed Frames/Sec:** The rate at which frames are processed per second
- **Extracted Frames/Sec:** The rate at which frames are extracted per second
- **Processed Rate (Mbps):** The speed at which data is processed, measured in megabits per second
- **Extracted Rate (Mbps):** The speed at which data is extracted, measured in megabits per second
- **Duration (mm:ss):** The total time taken for extraction, displayed in minutes and seconds

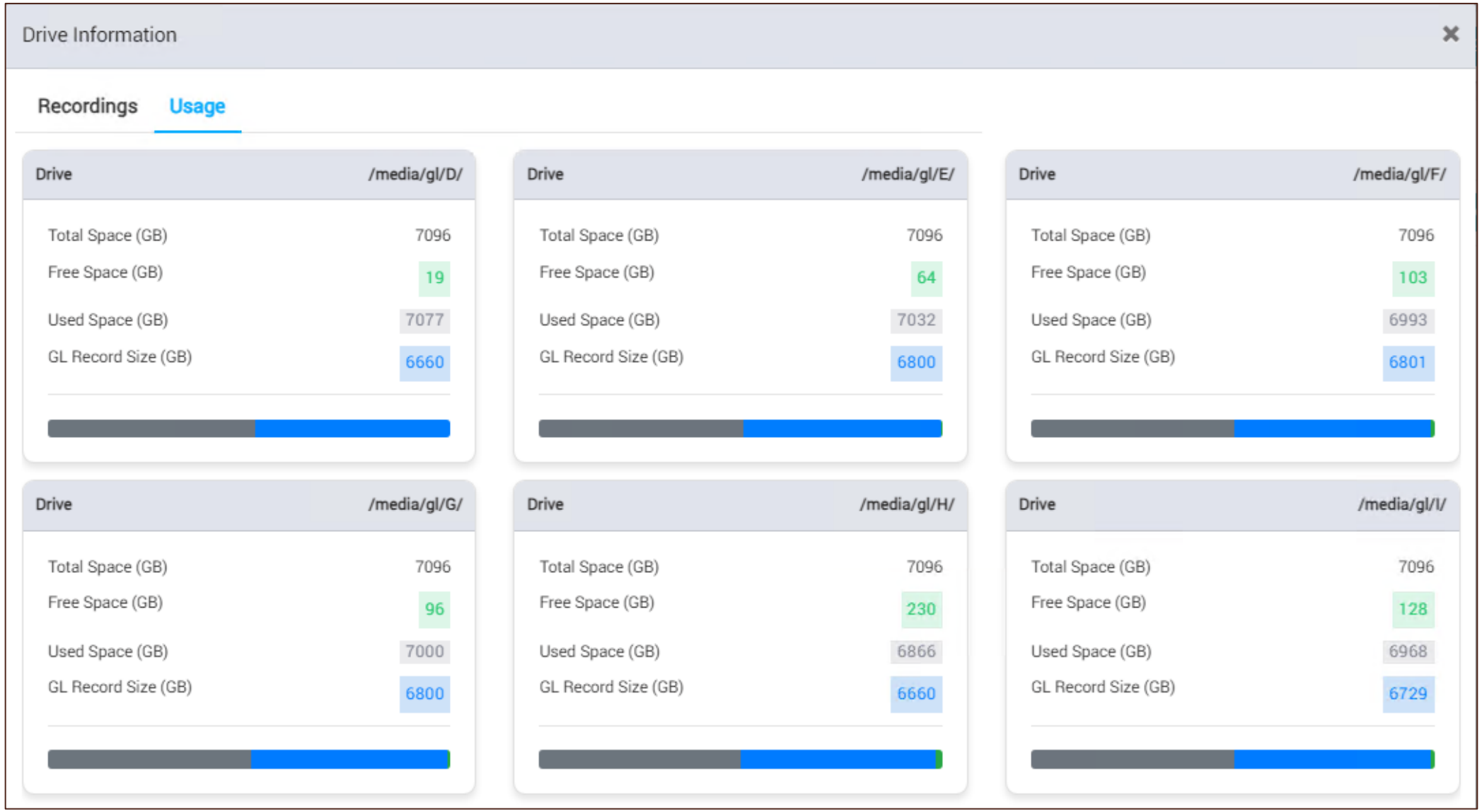


Extraction Statistics

Description	Value
Processed Frames	84 349 862
Extracted Frames	84 349 862 (100.00 %)
Processed Bytes (MB)	121 467.867
Extracted Bytes (MB)	121 467.867
Processed Frames / Sec	519 372
Extracted Frames / Sec	519 372
Processed Rate (Mbps)	6 274.014
Extracted Rate (Mbps)	6 274.014
Duration (mm::ss)	2::37

Drive Info - Recordings

Drive Info - Usage



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Thank you