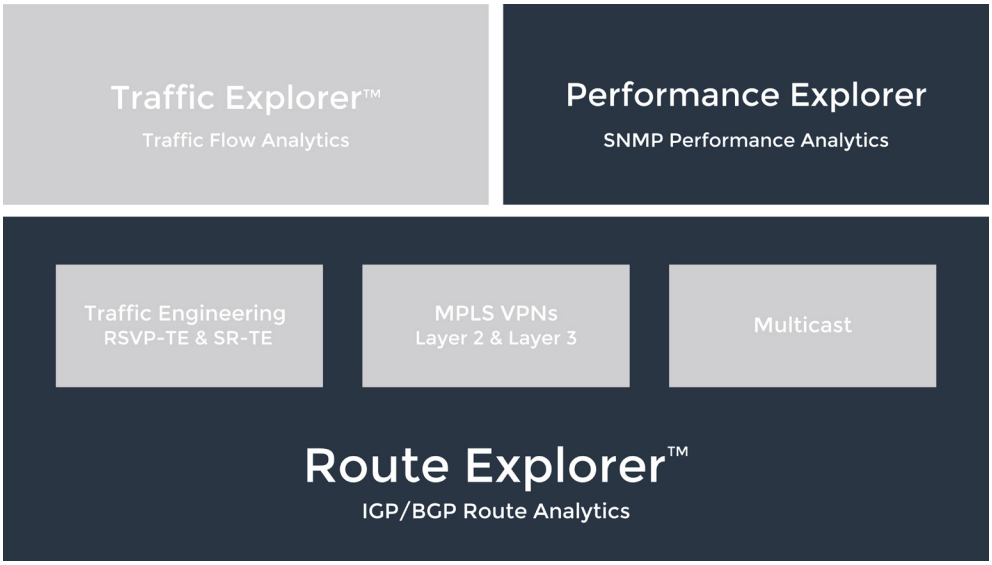
PERFORMANCE EXPLORER

Performance Explorer is a powerful module in the Explorer product suite. When used in combination with Packet Design's industry-leading route and traffic flow analytics, operations and engineering teams have real-time visibility into routing, traffic flows, latency, and performance across their entire network via the industry's first unified, path-aware network service assurance solution.

With network-wide visibility into both traffic paths and device performance, staff at service providers, enterprises, government agencies and educational institutions can optimize their networks with unprecedented levels of accuracy and speed. For the first time, engineers and operators can view routing, traffic, and performance analytics in a single integrated system, enabling them to maximize IT efficiency and productivity while reducing the capital and operational expenses required to maintain top network application and service quality.



Performance Explorer is a member of the Explorer network service assurance suite.

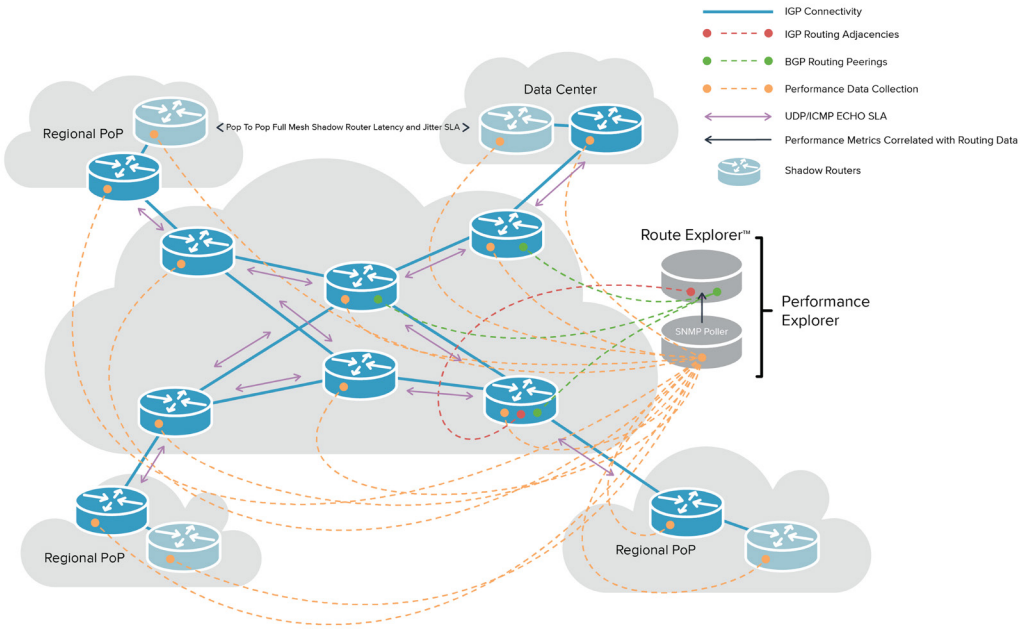
The Need for Path-Aware Performance Analytics

Network staff are tasked with providing high levels of service availability and performance at optimized latency levels. However, this is difficult, time-consuming and error-prone to do using traditional network monitoring tools

Performance Explorer Benefits

- Improve SLAs by proactively monitoring WAN infrastructure health and detect threats to service delivery early.
- Quickly spot network issues by seeing performance deviations from baseline.
- Pinpoint and isolate issues fast with latency, jitter, and packet loss metrics across every link in the network.
- Make smarter engineering decisions by understanding the impact that routing path changes will have on performance.
- Speed triage of trouble tickets with drill-down workflows from hotspots on the network topology map to routing and performance details.
- Understand how hop-by-hop performance for any service path changed over time.
- Easily view an inventory of polled elements, including interfaces, CPUs, memory, and service performance tests.

because they don't have real-time visibility into routing events and traffic paths across the entire network, and are unable to measure the impact of path changes on network performance. Packet Design uniquely correlates network performance to routing analytics to provide real-time visibility into the root cause of performance degradations. Network professionals can troubleshoot and resolve network issues more quickly, resulting in increased network service availability and quality, and enhanced productivity of network operations and engineering staff.



Performance Explorer adds SNMP metrics to Route Explorer for path-aware performance analytics.

- Collects SNMP-based performance data (e.g. availability, CPU, memory, latency, packet loss, jitter, etc.) from all network devices under management
- Correlates changes in performance to path changes caused by routing events using real-time routing data from Route Explorer™
- Enables network change modeling by combining performance data with routing and traffic data from Route Explorer and Traffic Explorer™
- Captures performance and latency metrics for all major equipment vendors, including Cisco IP SLA, Juniper RPM, Alcatel SAA and Huawei NQA, and calculates their deviations from baseline

Performance Dashboards Aid Proactive SLA Management

Many network issues can be avoided with proactive network monitoring. Baselining network performance and being alerted to deviations can help identify issues before they become a major problem. Performance Explorer's summary dashboard highlights performance deviations and errors, and provides an at-a-glance view of the network with key infrastructure and service delivery metrics. Baselines are established by hour of day and day of week for performance metrics, such as CPU and memory utilization, errors, jitter, and latency, using geometric averaging to weight more recent data. Deviations of more than 25% are flagged on the dashboard, helping network staff to identify potential network issues, analyze them, and often resolve them before clients or end-users even notice.

The summary dashboard also provides a complete inventory of monitored elements, including all CPUs within routers, memory, interfaces, and service performance tests (for all major network equipment brands). Performance dashboards can be configured for any historical time period providing an overall understanding of network performance at that time while also enabling quick isolation of emerging problems. Often, early awareness of anomalies means network problems can be avoided or resolved more quickly. Performance dashboards can also be used by engineers to understand trends, plan for network changes and growth, and verify changes made during scheduled maintenance. By clicking on dashboard elements, operations and engineering staff can drill-in on network hotspots for device and link-level analysis to help determine the root cause of issues.

Summary Dashboard Reports

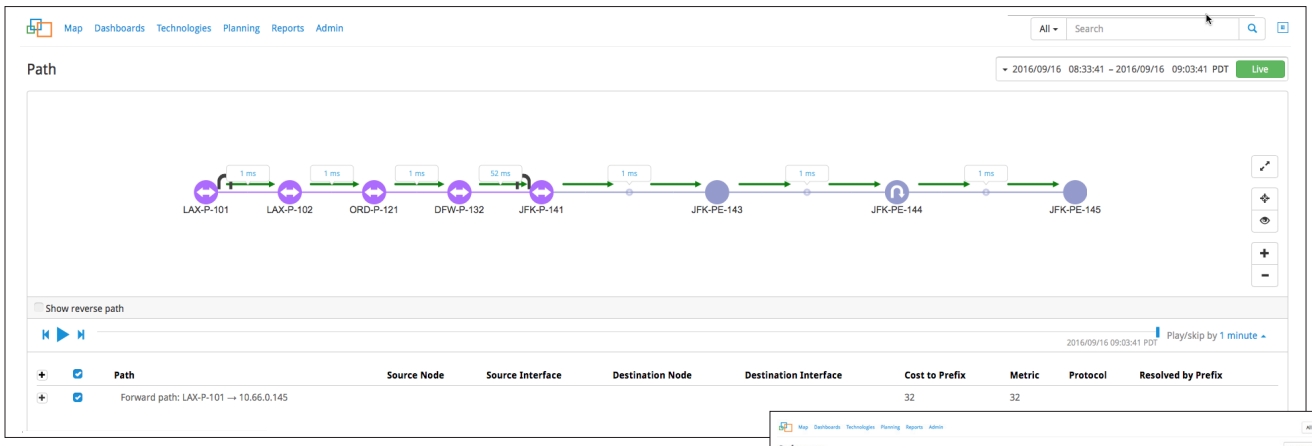
- Deviations
- Interface In/Out Utilization
- CPU Utilization
- Latency
- Inventory
- Device Errors In/Out
- Memory Utilization
- Jitter

Sample Performance Event Graphs

- Top Interfaces In/Out
- Top Errors In/out
- Top CPU
- Top Memory
- Top Jitter
- Top Latency Deviation

Sample Drill-Down Reports

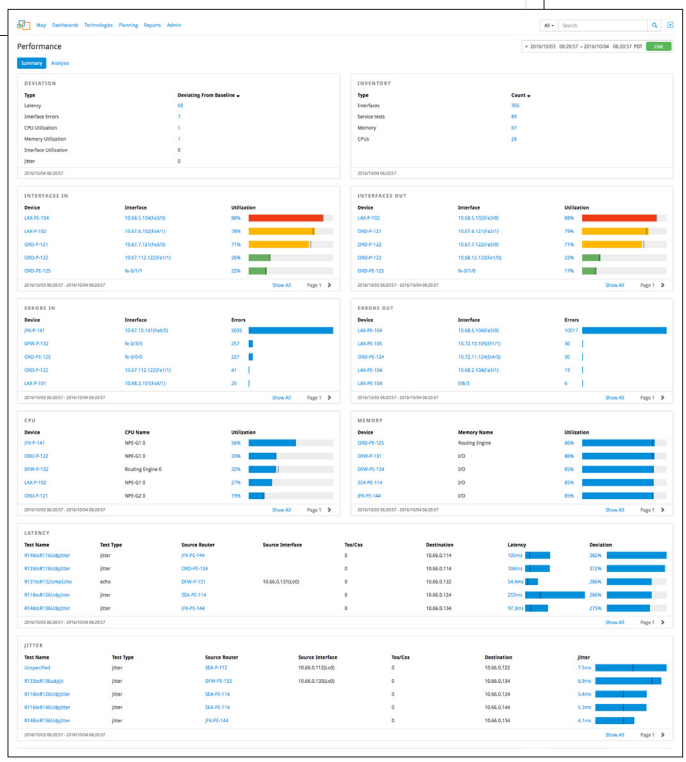
- Path Performance Overview
- Service Latency, Hop by Hop
- Device Utilization
- Device Events and Availability
- Interface Utilization
- Interface Events and Availability



The Performance Explorer mini-map of a particular service path shows hop-by-hop performance metrics with contextual analytics. The user can rewind and replay the behavior of the path to troubleshoot intermittent service delivery problems

Troubleshoot and Resolve Problems Faster

Performance Explorer presents historical performance metrics in context with routing events and traffic flows. This allows network staff to troubleshoot the hard-to-find, intermittent service delivery problems that traditional network monitoring tools often miss because they cannot see dynamic routing events and traffic flows across the network. From the performance dashboards, intuitive drill-in workflows help operations staff triage service delivery issues more efficiently. Users can quickly drill down from events displayed in the dashboard into the specific links or devices in question to see both the routing events and performance metrics in context. Correlation of device metrics, such as CPU and interface in/out utilization, can help explain performance issues.



The Performance Explorer summary dashboard provides an at-a-glance view of network-wide performance, highlighting deviations from baselines. Users can drill in to detailed analysis pages to diagnose network hots spots.

Network staff can view the path of a specific service performance test and see contextual analytics. A mini-map shows just the path's devices and links and displays hop-by-hop latency for easy detection of hotspots. The device and link performance metrics are included in the same view, as well as the Class of Service values used in the test, with drill-in details to aid troubleshooting. A "network DVR' capability on the mini-map enables users to rewind and replay the path behavior and performance to show how they changed over time.

Alerts Provide Real-Time Warnings of Potential Problems

Alerts

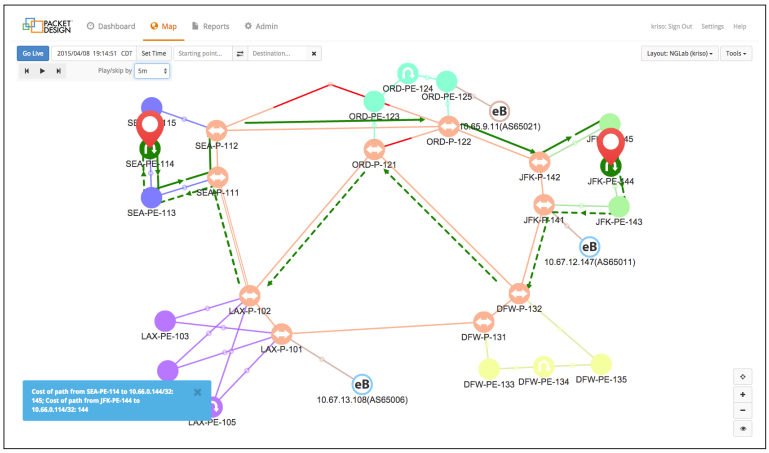
- Interfaces
- Routers (CPU, memory)
- Latency (Cisco, Juniper, Nokia, Huawei)
- SLAs

Performance Explorer provides a wide range of alerts that can be enabled selectively, allowing for monitoring of specific path-aware events or problem areas and early notification of potential failures. Alert notifications can be viewed on the console, e-mailed, sent as SNMP traps to network management systems, or recorded to Syslog for consolidated problem reporting and management.

Performance Explorer's real-time alerts, operations dashboards, powerful analytics, and intuitive, guided workflows enable network staff to triage and troubleshoot problems more efficiently, resulting in lower MTTR and improved service delivery.

Mitigate the Risks from Network Changes

The majority of network disruptions are due to misconfigurations. Network engineers performing routine routing changes have traditionally been at a disadvantage because they lacked both the visibility to understand distributed routing dynamics and the automation to quickly gather and interpret dynamic routing states. Without these capabilities, they often found themselves working with inaccurate information when planning and executing changes in the network, that could lead to costly and time-consuming errors.



Example network with Core P routers using ICMP ECHO for hop-by-hop latency. End-to-end jitter/latency metrics are provided by full mesh shadow router connections in the regional PoPs.

Performance Explorer, in conjunction with Route Explorer, enables network engineers to more confidently and accurately model network changes before they are implemented using dynamic, real-time performance monitoring data on the "as running" network. This significantly reduces the risks of service disruptions from simple misconfigurations and unanticipated network behavior after maintenance windows, resulting in fewer SLA breaches and higher customer satisfaction.

Optimize Network Resiliency and Service Delivery

Performance Explorer helps optimize network resiliency and overall service delivery by identifying and isolating performance hot spots caused by excessive latency, jitter, or packet loss to specific paths or links. Network operations staff are alerted when there is a loss of reachability or redundancy, and can better understand the impact to customers by being able to pinpoint and correlate service-impacting events. Having complete, always-accurate network routing, traffic, and performance analytics not only helps staff to improve network resiliency and overall service delivery levels, but also to defend the network from being unfairly blamed when problems arise.