



SPIRENT

PERFORMANCE MONITORING FOR ETHERNET QUALITY OF SERVICE

eScout

eScout

ENSURING YOUR ETHERNET QUALITY OF SERVICE (QoS) AND YOUR CUSTOMER'S QUALITY OF EXPERIENCE (QoE)

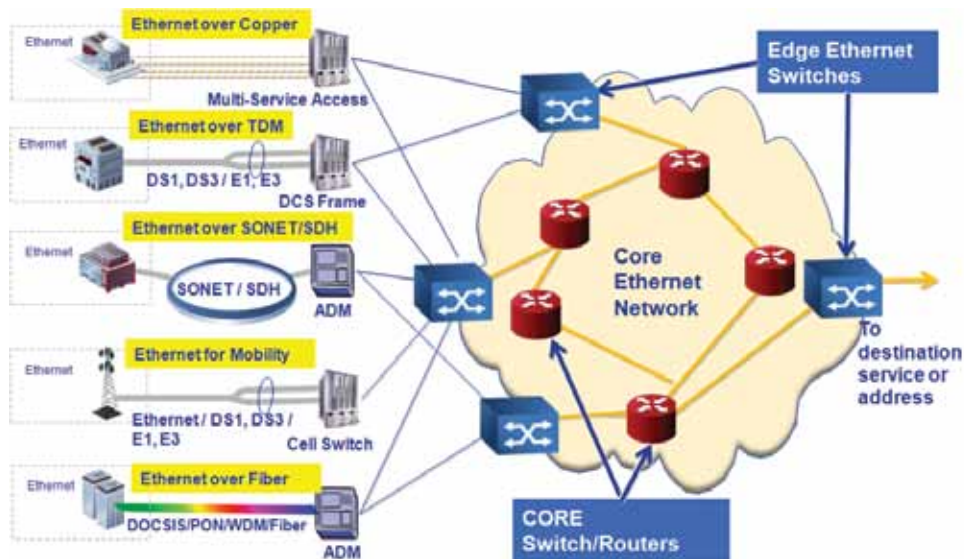
The evolution of Ethernet has seen the migration of Ethernet technology from the Local Area Network (LAN) to Metro Area Networks (MAN) as Service Providers have embraced the flexibility and efficiency of the Ethernet architecture as a replacement for traditional TDM services. Many of the Ethernet services today carry mission critical data and the networks carrying this data must be monitored continuously. In many instances, Service Level Agreements (SLA) dictate requirements for system uptime, loss, latency, and jitter and inability to prove network performance may result in penalties or lost customers.

Spirent's SmartSight eScout performance monitoring solution provides real-time performance visibility across the entire footprint of the production network without impacting revenue generating traffic. By utilizing Ethernet OAM capabilities defined by ITU Y.1731 and IEEE 802.1ag, Spirent's SmartSight QoS Scope probes are able to provide full mesh testing to any standards-compliant device or between QoS Scope probes and feed that data into a powerful centralized analysis and reporting engine. The combination of the QoS Scope and the analysis engine is eScout.

eScout's intuitive, web-based interface provides dashboard and reporting capabilities, and the Northbound XML interface and direct SQL access to performance results allows rapid integration with existing OSS and back office systems. In addition to performance monitoring, the QoS Scope probes also provide simultaneous on-demand active and passive Ethernet test capabilities and can help ensure the high Quality of Service (QoS) and Quality of Experience (QoE) demanded in the very competitive Ethernet services marketplace.

The Ethernet Market

One of the primary reasons for the unprecedented 40% growth of Ethernet services worldwide is its capability to be deployed over almost any network technology, configuration or medium. Consequently, it has become the choice for service providers looking to eliminate single purpose service networks and transition to converged network topologies where multiple services can be efficiently and cost effectively provisioned and maintained. Ethernet provides these capabilities easily and quickly with high reliability and bandwidth.



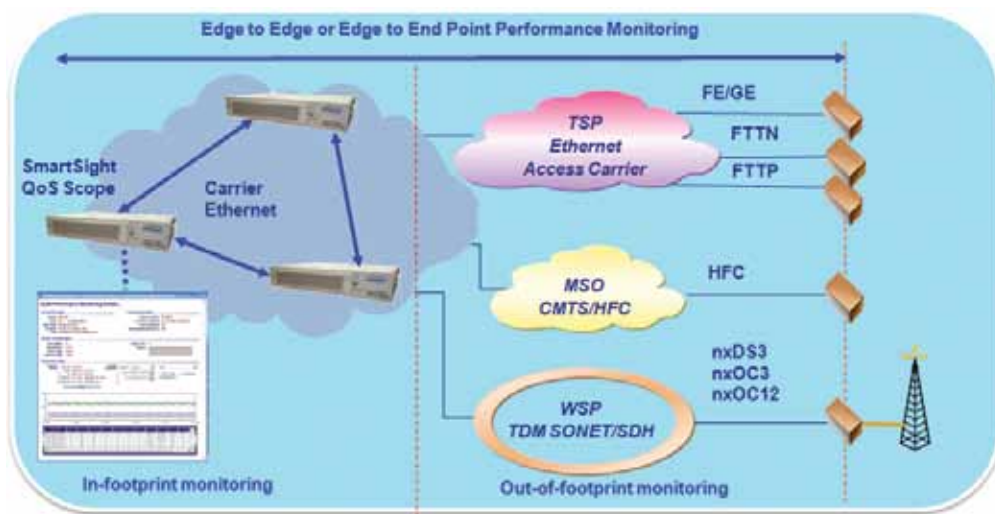
Versatility of Ethernet Networks

ethernet eScout PM with Active Traffic Generation to Determine QoS and QoE

Incorporating Spirent's next generation eScout Performance Monitoring (PM) solution with active traffic generation in evolving Ethernet network infrastructures for enhanced service issue identification provides an efficient cost effective service assurance solution. eScout will allow providers to answer the critical service questions above and build the best possible QoS and QoE as well as maximize profitability by providing:

- **Proactive detection of network degradation:** Proactive trouble resolution with threshold-based alarming to notify personnel of a problem immediately; significantly reducing the MTTR.
- **Flexible testing capabilities:** Support for on-demand service assurance testing in the QoS Scope in addition to performance monitoring ensures efficient use of capital budgets.
- **Network historical performance:** Network-wide visibility with a Carrier class architecture designed for thousands of nodes and hundreds of simultaneous users ensures that the system can grow in concert with the network.
- **Reduced Repeat and Chronic Reports.**
- **Reduced CAPEX:** Use of ITU/IEEE standards for Ethernet OAM yield universal interoperability and reduces the need for specialized equipment.
- **Ease of Integration:** An open Northbound XML interface and direct test results access via SQL allows straightforward integration into existing OSS of back office solutions.

eScout provides fast effective identification and sectionalization of service issues for Ethernet Business Services.



eScout with QoS Scopes Probes in Traditional Service Providers (TSPs), Multi-Service Operators (MSOs) and Wireless Service Providers (WSPs) Networks

Challenge of Ethernet Services

With the explosion in demand for Ethernet Business Services it is imperative providers employ a strategy that simultaneously supports maintenance of their current networks and growth of next generation Ethernet networks. This statement poses significant challenges because Ethernet's network architecture versatility brings immense complexity to service assurance. Consequently, in order to reduce New Circuit Failures (NCF) and Failure Frequency (FF), Repeats, Chronics, non-productive dispatches and meet critical Service Level Agreements (SLAs), the provider's Ethernet PM solutions must answer several critical questions.

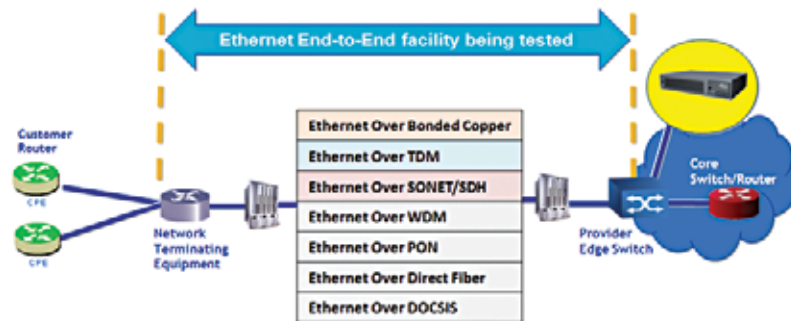
- Do I have visibility into the customer's actual service?
- Can I evaluate my Quality of Service (QoS) and the customer's Quality of Experience (QoE)?
- Are we providing the QoS we sold to the customer under their SLA?
- Can I expand my process automation and technician efficiency to match product growth?
- Can I sectionalize service issues into the correct network segment?
- Are we providing the necessary QoS in order to deliver high quality voice, data, and video services (2G thru 4G architectures) over the Ethernet backhaul networks?
- Can I achieve a competitive Return on Investment?

eScout’s exceptional visibility into the customer’s Ethernet VLAN service using both current and historical information empowers providers to offer essential Ethernet Service Level Agreements (SLAs) with absolute confidence in their ability to meet them. eScout is the software that manages the performance data, enables back office integration, facilitates, simplifies and improves automation, and drives the QoS Scope. eScout sectionalizes trouble into or out of a provider’s network, or between providers in shared Ethernet networks utilizing Spirent’s best in class Quality of Service Scope (QoS Scope). The probe provides real time monitoring of Ethernet service performance with scaling capability to meet carrier class requirements. eScout uses the probe to emulate the customer’s service by actively generating data patterns across the network to measure, validate, and ensure QoS. The QoS Scope quickly assesses the subscriber’s service identifying any service issues that are present and provides information to support accurate dispatches back to eScout. The QoS Scope family supports both 1 GigE and 10 GigE interfaces.



Spirent’s QoS Scope 1GigE Probe

Unlike other performance monitoring systems, eScout generates this OAM traffic to perform definitive Ethernet service performance measurements to quickly identify service issues over the various network technologies used by service providers.



QoS Scope’s Active Traffic Generation

When strategically placed at the service router on the Provider Edge (PE), the QoS Scope uses the Switch/Router for access to join the service in real time and provides maximum visibility into the network playing a vital role in measuring the subscriber’s experience. This visibility extends to multiple locations end-to-end throughout the provider’s network, including other aggregation locations or end-points. The QoS Scopes are able to monitor the customer’s service at three important layers:

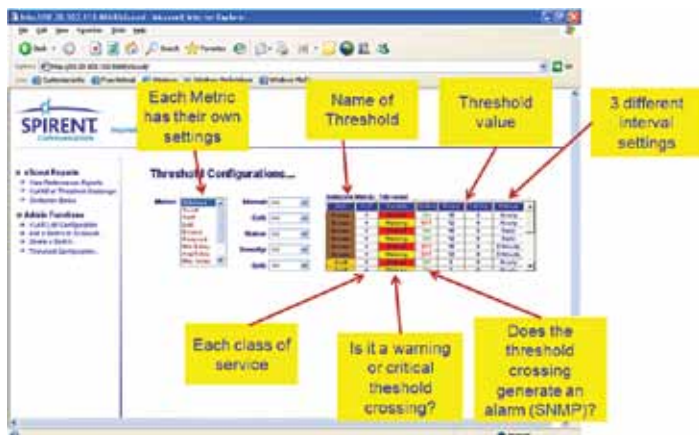
- Layer 2 PM (EOAM)
- Layer 3 PM (TWAMP)
- Application Layer (Ex. VoIP)

In addition, eScout can support thousands of VLANs per port and can gather the requested information in small incremental 250 ms bursts. Reports can be for short five-minute windows aggregating the 250 ms bursts of information so actual network surveillance is happening in micro slices of time while eScout reports the information in meaningful windows. The graphic to the right provides an example of an eScout Performance Report Screen and some of the data retrieval options.

eScout Performance Monitoring Details

eScout Reports

Reports come in several flavors, providing detailed near real time and historical data on key metrics. The reports provide views of the data in an array of intervals – 5 minute intervals for 24 hours, hourly intervals for a week, and daily intervals for a week, month, and quarter for example. eScout has the capability to present information showing Ethernet QoS down to each Ethernet data stream for each Class of Service (CoS). In addition, the provider can obtain the information directly from eScout or eScout can feed the information into a higher level PM OSS in their network.



eScout's Dynamic Changeable Threshold Crossings Results Retrieval

eScout also provides a summary view of all of the VLANs that have crossed targeted Critical and Warning service thresholds within various periods or increments of time such as 5-minutes, hourly, or daily. Analyzing data gathered every day and throughout each day is especially valuable to determine service trends during low, average and peak activity time periods. In addition, eScout has a constant source of near “real time” data that supports analysis of performance for reactive troubleshooting.

eScout will identify critical threshold crossings and send the alerts or SNMP alarm traps to designated fault systems. The providers can designate the SLAs for which threshold service measurements will be invoked and set these thresholds per Key Performance Metric (KPM) i.e., Frame Loss and Frame Delay for both Warning (Yellow) and Critical (Red) Threshold Violations.



eScout Summary of VLANs with Threshold Crossings by Time Increment



eScout VLANs Threshold Crossings By Switch

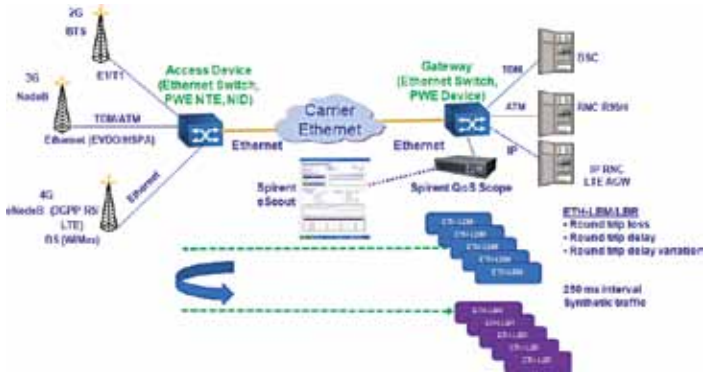
These reports provide valuable information that will assist personnel in determining the “root cause” of real network service issues. eScout allows the provider to slice this information numerous ways such as by service category (Gold, Silver, Bronze, etc.), by switch or all switches, or by service metric (Average Delay etc). The possible data combinations retrievable from eScout are almost limitless.

eScout also enables the provider to drill down into a specific VLAN to see the exact QoS they are providing and the customer's QoE. This capability is extremely essential to ensure a provider is meeting SLAs and keeping SLA monetary penalties to an absolute minimum.



eScout Individual VLAN Performance for SLA Support

eScout is vendor agnostic, allowing the service provider to utilize eScout's active traffic generation capabilities to characterize network performance in any mix of vendor NID, NTE, PWE or NEs without loss of eScout functionality. In the graphic below, eScout is driving a QoS Scope in a WSP's network and actively generating traffic and utilizing OAM loopbacks to ensure QoE without disruption to the customer's traffic as it traverses the network.

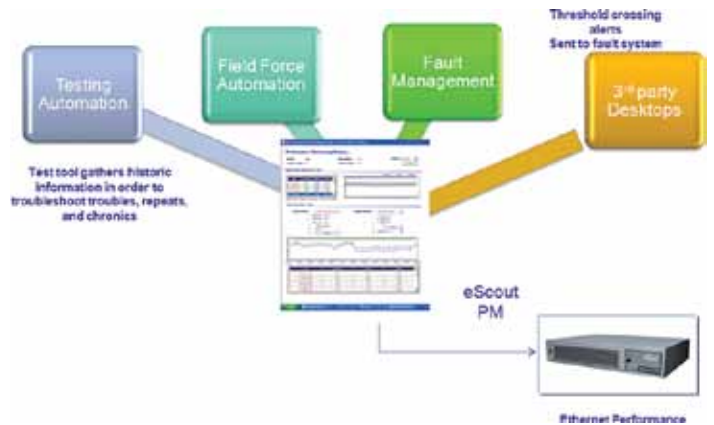


eScout Driving QoS Scopes In a WSP's Network

Regardless of the provider or network architecture, eScout can effectively measure key QoS measurements such as Frame Loss, Frame Delay, and Frame Delay Variation. In addition, eScout can evaluate service specific traffic such as VoIP and Video traffic and produce a very comprehensive set of Ethernet service metrics to characterize QoS and QoE for these high revenue services.

eScout's Architecture

eScout has an open northbound interface to facilitate fast and easy integration into a provider's back office systems for improved automation, such as interfacing to the trouble reporting system and automatically opening trouble tickets for SNMP alarms or service degradations detected by eScout across the provider's network.



eScout's Architecture, Capabilities, and Integration Into a Provider OSSs

The QoS Scope gathers the results and pushes them back to eScout. eScout processes the results according to the provider's business rules and can:

- Push the test results to a Back Office OSS
- Generate SNMP fault notifications based on threshold crossings
- Use its own dashboard and produce eScout reports for the service provider

The eScout dashboard:

- Reduces training cycles
- Provides tabular & graphic results reports
- Reports information in PDF, Email, HTTP, or Excel format

Why Spirent?

Spirent's Performance Analysis Broadband (PAB) division works with standards bodies and research organizations during the new technology evaluation process and provides test and diagnostic equipment to ensure the technology meets appropriate standards. Our Service Assurance Broadband (SAB) division utilizes the information PAB gains and develops and deploys service assurance solutions in the provider's live Ethernet networks. This total life cycle involvement with Ethernet technology uniquely positions Spirent to help service providers drive new services to mass market faster with fewer resources and improved profitability while enhancing customer satisfaction.

At the beginning of this year, three new top-tier global network operators announced they would be assuring their Ethernet services at national and international levels with Spirent's solutions. In addition, Frost & Sullivan declared Spirent the market leader in Ethernet testing. This award underscores Spirent's unmatched Ethernet expertise that extends from the lab with product development and verification, to the field for service provisioning, troubleshooting, and performance management, and to the in-home network to ensure QoE of multi-play applications.

Summary

Designed to address the need for proactive performance monitoring of Ethernet networks for end-user business and data backhaul services, eScout provides the real-time visibility and analysis needed for SLA verification and fault isolation. eScout, Spirent's proven QoS Scope Ethernet probes combined with a web-based analysis and reporting engine, provides robust performance monitoring capabilities based on industry standard Ethernet OAM technology. The result is total network visibility without the need to deploy a probe at each endpoint or customer location.

Spirent is proud of our award winning family of Ethernet products and continues to invest in Ethernet Business Solutions. We are committed to maintaining our leadership in developing the Ethernet performance, test and diagnostic tools the industry requires to meet the ever increasing consumer demand for bandwidth.



Spirent's Professional Services Available to the Provider for eScout

To facilitate eScout deployments, Spirent provides the following services for providers to utilize based on their preference:

- Implementation Services
- Integration Services
- Education Services
- Maintenance Services
- In-region Support Services



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