



# JDSU NetComplete® Ethernet Performance Management

Ethernet Performance and SLA Monitoring Application



# NetComplete® Service Assurance for Ethernet

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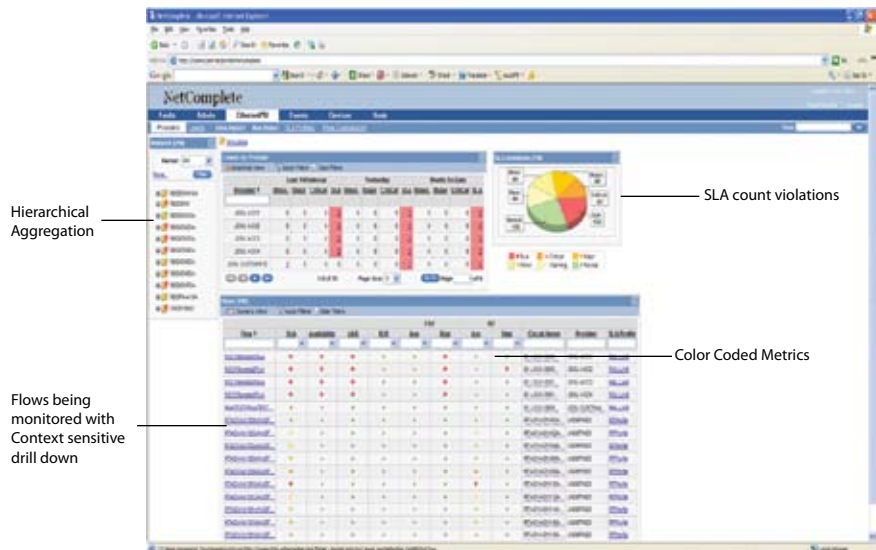
The JDSU NetComplete Solution for Ethernet provides an integrated, comprehensive centralized system for managing Ethernet business and mobile backhaul services over a heterogeneous core network.

Through a combination of active traffic generation, troubleshooting, and passive monitoring, NetComplete overcomes many operational obstacles to efficiently verify Ethernet service installation by rapidly isolating and troubleshooting problems and continuously monitoring service performance to assure customers' quality of service (QoS) and to avoid service level agreement (SLA) penalties. With centralized monitoring and testing functionality and automatic analysis of raw performance data, NetComplete helps service providers cost-effectively scale their network and operational resources as service penetration increases.

The NetComplete Ethernet Performance Management (EPM) application is based on both Y.1731-standard statistics and/or proprietary statistics collected from Ethernet service PM end points. Specifically, Ethernet service providers use the EPM application to proactively monitor network and customer Ethernet QoS to ensure they consistently meet SLAs, and to reactively help network operations technicians troubleshoot problems quickly and effectively.

# No Clicks Required

Users of the NetComplete Ethernet Service Performance Management application have visibility to all the key performance indicator (KPI) measurements for all flows that the system monitors at the top level. The top-level graphical user interface (GUI) screen displays detailed KPI analysis for every flow and provides context-sensitive links to drill down and troubleshoot on a per flow basis. Color-coded metrics provide quick guidance on the critical nature of the issues. The application provides service providers the flexibility to define hierarchical levels to help isolate issues and segregate flows. They can also display alarm and SLA violation counts by network levels or other user-defined parameters.

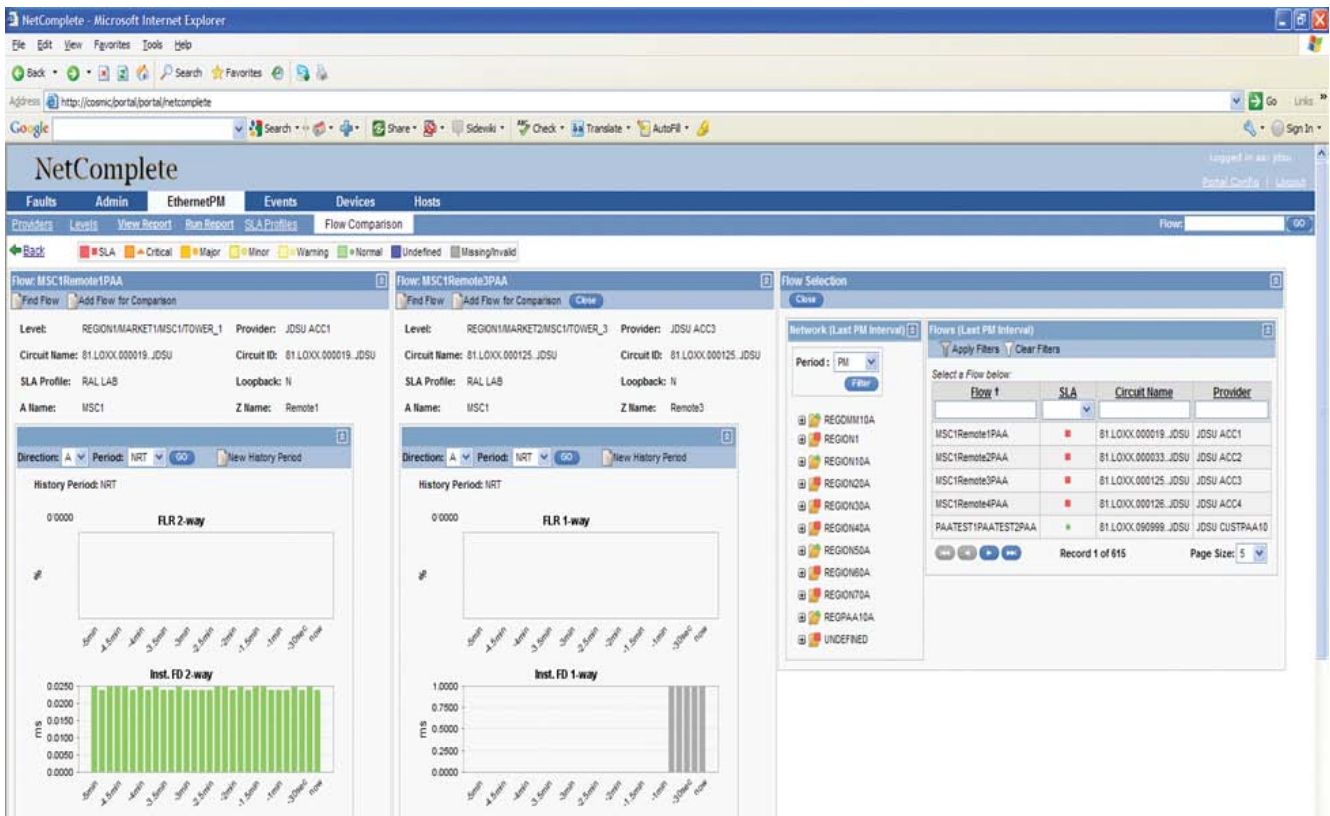


Top Level Monitoring View

# Analysis and Troubleshooting Made Easy

When troubleshooting, users must be able to view the same flow at different time periods or similar flows for the same time period to compare performance. The NetComplete Ethernet Service Performance Management application makes these comparisons easy with its side by side flow comparison tool. Through sophisticated filters, users can quickly define the flows and time periods for comparison.

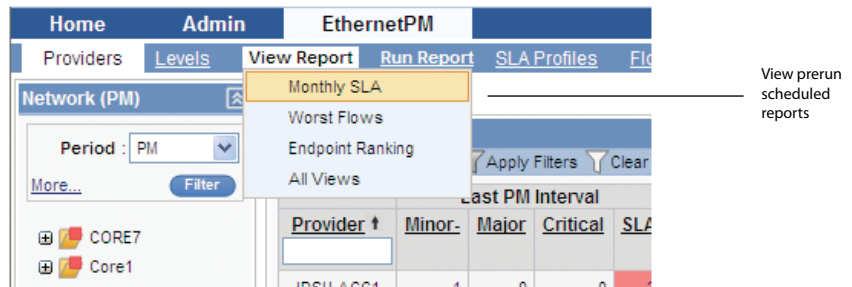
The flow comparison tool allows comparing up to three flows at a time. Users can use sophisticated filters to pinpoint specific historical events.



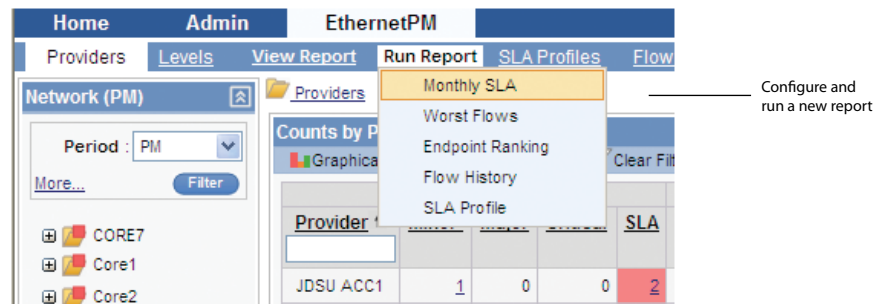
Flow Comparison Tool

# Scheduled and On-Demand Ethernet Performance Reporting

NetComplete organizes reports and views into two sections, each providing specific functions. The first section is dedicated to performance monitoring reports that users can schedule to run or can run on demand. The Monthly SLA and Worst Flow reports are normally scheduled for customer/provider SLA verification and for proactive problem prioritization purposes, respectively. The SLA Profile and Flow History reports are normally run on demand.



Report/View Navigation Hierarchy



Reporting GUI Navigation

# Ethernet Service Historical PM Reports

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## The Monthly SLA Report

Customers typically use the Monthly SLA Report to evaluate traditional monthly SLA threshold violations for their Ethernet services or to analyze SLA performance over multiple months or for month-to-date performance. The report can provide information about individual customers or can provide information based on any measured scope, including geographical constraints, such as per-region, by Ethernet service provider, or filter down to individual circuits or even the whole network.

The report header shows the filter criteria used to generate the report, including date/time range, system-configurable fields (for example, region, state, division, and mobile switching center [MSC] are four of five configurable reference fields), as well as the circuits and their constituent flows.

The hierarchy summary section breaks down the SLA violations by configurable hierarchy reference field (and by month if running the report for multiple months), including a quick-reference pie chart.

The per-flow detail gives the configured committed information rate (CIR) per direction, the average and maximum throughput delivered across both directions in megabits per second (Mbps) and also as a percentage of CIR. Additionally, the report highlights SLA performance per circuit-constituent flow, highlighting which particular circuits experienced issues and the underlying measurements that caused the violations. Users can drill-down to the SLA Profile report to see the actual threshold levels used to evaluate violations according to the SLA profile assigned and also to the Flow History report per flow, for detailed troubleshooting analysis of individual flow performance over the selected time period.



## Monthly SLA - Jan 2010 - Jun 2010

Provider(s): SLA Profile(s):  
 Region State Division MSC

Circuit(s): Flow:  
 Dates: Between Jan 1, 2010 12:00:00 AM and Jun 30, 2010 11:59:59 PM

### Hierarchy Summary

Month	SLA Profile	Region	State	Division	MSC	# Flows	# Flows in SLA Violation
JANUARY	TER LAB	Midwest	Indiana	Terre Haute	South Campus	2	1
JANUARY						2	1
FEBRUARY	TER LAB	Midwest	Indiana	Terre Haute	South Campus	2	1
FEBRUARY						2	1
MARCH	TER LAB	Midwest	Indiana	Terre Haute	South Campus	2	1
MARCH						2	1
APRIL	TER LAB	Midwest	Indiana	Terre Haute	South Campus	2	0
APRIL						2	0
MAY	TER LAB	Midwest	Indiana	Terre Haute	South Campus	2	0
MAY						2	0
JUNE	TER LAB	Midwest	Indiana	Terre Haute	South Campus	2	0
JUNE						2	0

### Flows in SLA Violation



### Per-Flow Detail

Month	SLA Profile	Region	State	Division	MSC	EVC/Circuit Name	Provider	Flow Name	Loop Back?	Stats 1/2-way?		SLA Violation	Availability (%)	UAS	FLR (%)	FD (ms)		FDV (ms)	
										FD	FDV					Avg	Max	Avg	Max
JANUARY	TER LAB	Midwest	Indiana	Terre Haute	South Campus	Report Flow 2-Way	Report Flow 2-Way	Report_Flow_1	N	2	2	NO	99.82774%	4,608	0.1722552%	0.041	0.261	0.020	0.201
								Report_Flow_2	N	1	1	YES	99.82774%	4,608	0.1722552%	0.061	0.271	0.001	0.191

Aug 18, 2010

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Example Monthly SLA Report

## The Worst Flows Report

The Worst Flows report prioritizes troubleshooting activities related to Ethernet service performance issues. It can be run over any measured scope including by geographical constraints, such as per-region, by Ethernet service provider(s) or customer(s), or even the whole network. Users can configure the metric used to determine worst performing circuit flow constituents when running the report.

The report header shows the filter criteria used to generate the report; including date/time range, system-configurable fields (for example, region, state, division, and MSC are four of five configurable reference fields), as well as the circuits and their constituent flows. Users can also choose to re-run the report by selecting a different sort-by metric from the pull-down list.

Users can drill-down to the SLA Profile report to see the actual threshold levels used to evaluate violations according to the SLA profile assigned. They can also see the Flow History report per flow for detailed troubleshooting analysis of individual flow performance over the selected time period.

The report lists the circuit flow for each constituent with the configured CIR per direction, the average and maximum delivered throughput across both directions in megabits per second (Mbps), and also as a percentage of CIR. It also indicates SLA violations, availability, unavailable seconds (UAS), and frame loss ratio (FLR) as well as average and maximum frame delay (FD), and average and maximum frame delay variation (FDV) for the report period selected. Additionally, to indicate threshold violation density over the report period (for example, whether violations were sporadic or numerous), it reports interval violation counts by severity level to show whether a few errors are causing the SLA violations or the result of a larger systemic problem.



**Worst Flows**

Customer(s): \_\_\_\_\_ SLA Profile(s): RAL LAB

Region	State	Division	MSC

Circuit(s): \_\_\_\_\_ Flow: \_\_\_\_\_

Sort By: Availability ▾

Dates: Yesterday (Mar 25, 2010 12:00:00 AM - Mar 25, 2010 11:59:59 PM)

Customer	SLA Profile	Region	State	Division	MSC	EVC/Circuit Name	Flow Name	Loop Back?	FD	FDV	Calculated for Report Period			FD (ms)		FDV (ms)		PM Interval Violation Counts				
											SLA Violation	Availability (%)	UAS	FLR (%)	Avg	Max	Avg	Max	SLA	Critical	Major	Minor
JDSU	RAL LAB	Southeast	NC	Rail	YYY	EVC2	BalmsLab	N	2	2	100	100.000000%	0.00000000%	0.085	0.269	0.075	0.202	2	12	52	249	209

Example Worst Flows Report

## The SLA Profile Report

The SLA Profile report provides reference details concerning particular threshold levels used per time interval (for example, defined monitoring interval or monthly) and per threshold severity level (for example, SLA, critical, major, minor, warning) for each measurement. The report also shows the threshold levels of FD and FDV used for the purposes of UAS derivation, and any FD offset value used if the flow end point is connected via an Ethernet switch and not in line with the actual circuit end point.

For every SLA profile selected, all metric threshold levels reported are grouped by either severity level or metric. Normally, this report is initiated via a drill-down link from either the Monthly SLA report or Worst Flows report and only displays the thresholds for the profile selected.



### SLA Profile

Group By:  Severity  xpi

SLA Profile	Interval	SLA Thresholds					Critical Thresholds					Major Thresholds					Minor Thresholds								
		FLR (%)	Avg FD (ms)	Max FD (ms)	Avg FDV (ms)	Max FDV (ms)	Availability (%)	FLR (%)	Avg FD (ms)	Max FD (ms)	Avg FDV (ms)	Max FDV (ms)	Availability (%)	FLR (%)	Avg FD (ms)	Max FD (ms)	Avg FDV (ms)	Max FDV (ms)	Availability (%)	FLR (%)	Avg FD (ms)	Max FD (ms)	Avg FDV (ms)	Max FDV (ms)	Availability (%)
TER LAB	PM	1.6600000%	0.130	0.270	0.060	0.220	98.34000%	1.3300000%	0.120	0.260	0.050	0.215	98.67000%	0.9999900%	0.110	0.250	0.040	0.210	99.01000%	0.6600000%	0.100	0.240	0.030	0.200	99.34000%
	Month	3.3200000%	0.130	0.270	0.060	0.220	99.99000%	2.6600000%	0.120	0.260	0.050	0.215	99.99200%	1.9999000%	0.110	0.250	0.040	0.210	99.99300%	1.3200000%	0.100	0.240	0.030	0.200	99.99400%

Example SLA Profile Report

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## The Flow History Report

The Flow History report enables troubleshooting specific Ethernet service problems by analyzing all relevant metrics in each direction over time against assigned SLA profile threshold levels for the circuit. It can only be run for a single constituent flow of a circuit due to the volume of measurement data returned.

The report header shows the filter criteria used to generate the report, including date/time range, system-configurable fields (for example, region, state, division, and MSC are four of five configurable reference fields), as well as the circuit and the constituent flow under analysis. Depending on the circuit configuration, the appropriate CIR and peak information rate (PIR) in each direction are also displayed for reference purposes.

The report lists all pertinent metrics vertically for each direction of the Ethernet circuit's constituent flow to enable easy visual time alignment analysis. The first three graphs in each direction show offered, accepted, and delivered throughput, respectively, against the configured CIR and PIR for the circuit as a percentage. Offered throughput is the average bit rate input into the circuit demarcation point and accepted throughput is the average bit rate allowed through a traffic conditioning function (for example, monitoring). Theoretically accepted throughput should equal offered throughput up to either CIR or PIR; and delivered throughput is the average bit rate output at the far-end circuit demarcation point.

The next six graphs per direction are automatically color-coded according to SLA profile threshold severity levels to allow easy determination of any performance issues (for example, red is bad and green is good). FLR is displayed first, followed by Availability. Then average and maximum FD graphs are displayed, followed by average and maximum FDV graphs. Depending on the circuit configuration and knowledge of clock synchronization between the two flow end points, the Flow History report decides whether to display 1-way or 2-way FD and FDV results. This automation eliminates requiring users to understand the circuit configuration or interpreting the raw measurements.



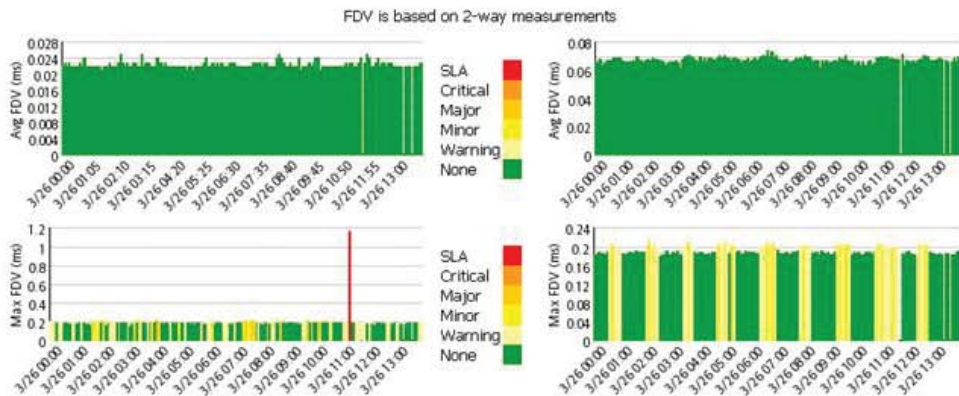
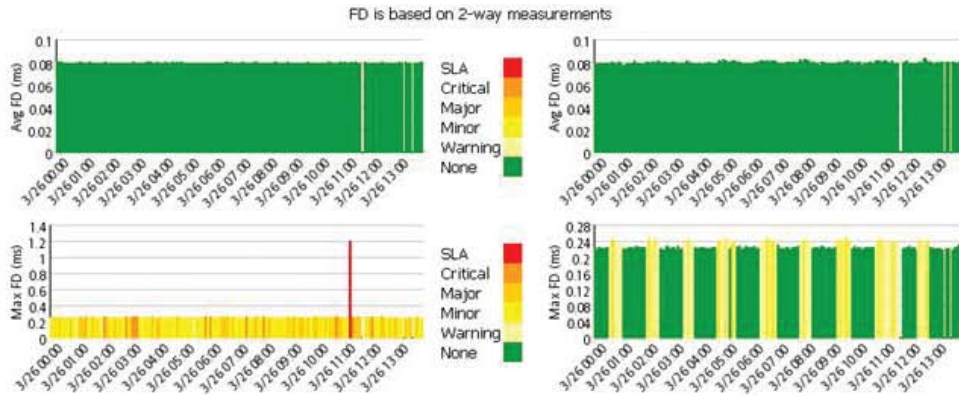
### Flow History

Customer(s):  
Region State Division MSC

Circuit(s):  
LoopBack: Is Not Enabled

SLA Profile(s):  
Flow:RaleighLab

Dates: Between Mar 26, 2010 12:00:00 AM and Mar 26, 2010 1:59:59 PM



Mar 26, 2010

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# Conclusion

The overview of the JDSU NetComplete Service Assurance Solution for Ethernet offered in this brochure focused on explaining benefits of the Ethernet Performance Management application as well as how to interpret the resulting reports and views to facilitate overall performance and SLA monitoring. The NetComplete Ethernet Solution also supports many other applications such as detailed test and troubleshooting with filtering, traffic capture, and protocol analysis enabled by the NetAnalyst Centralized Test Management system and QT-600 Ethernet probes. Additionally, the NetOptimize OSS enables polling multiple NEs in the end-to-end Ethernet service delivery network (such as Ethernet aggregation switches and SONET/SDH/Optical transport systems) to enable proactive management of performance and capacity. These capabilities also allow network operations technicians to evaluate key NE performance criteria when troubleshooting poor Ethernet service quality.

The NetComplete Service Assurance Solution for Ethernet is available today and can be deployed in your network to facilitate monitoring and assuring Ethernet service performance. Contact your local or regional sales office for more information.



## Test & Measurement Regional Sales

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