Managing Network and Application Performance Through an MPLS Cloud

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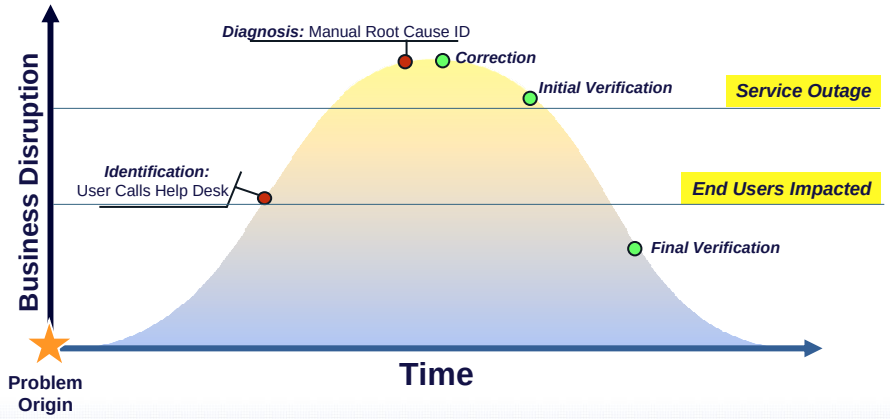
Eileen Haggerty brings 15 years of experience in networking and telecommunications to her role as solutions marketing director. She leads a team in developing solutions-focused materials for the technology and market-specific needs of users of NetScout's application and network performance management products.

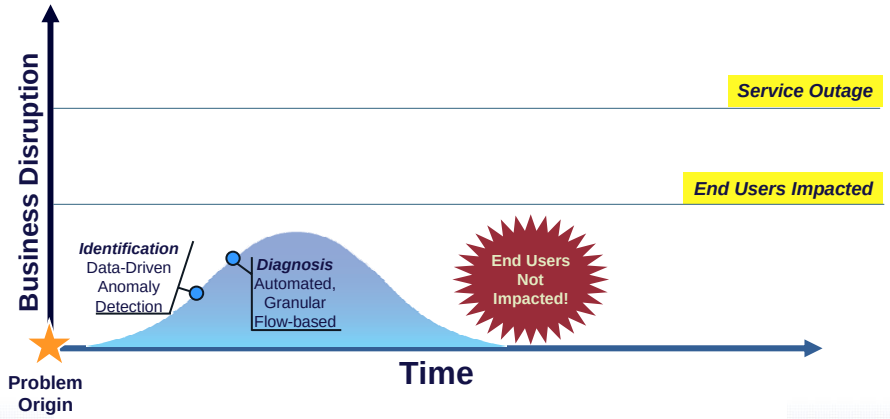
Previously, she worked with WAN technologies at IP/MPLS switch maker Celox Networks, routing/switching vendor Racal, Motorola's frame relay division and in voice solutions at GTE.

Today's Performance Challenge: MTTR



The Ultimate Payoff – Reduced MTTR

- ***Faster time to resolution/minimized user impact*** -



Service Delivery/Manageability Challenges

Network and Application Performance Is Critical For Business Success

- Today's business runs over the network
  - It is the foundation for corporate communications, organizational processes and strategic competitive initiatives
- Business suffers when application performance degrades
- Network and application performance ***must*** be optimized to support the productivity and protect the profitability of the business

MPLS Adoption Trends

- "IP Services, particularly MPLS, will clearly be the dominant networking service in the future worldwide. . ."
- 2004 saw the first significant migration from FR to MPLS services in the U.S.
- In the Large Enterprise Market
  - U.S. managed MPLS Services growing 30% per year
    - Deep widespread implementation is still a couple years away
  - Unmanaged MPLS based service revenue will grow at a solidly at over 7% compound annual growth rate.

Source: Aug 2, 2005 Gartner Report – The Future of Network Service Is Managed MPLS

MPLS Business Drivers

- Increased network complexity and remote connectivity needs with constrained budgets
- Demand for improved provisioning, real-time bandwidth on demand and greater network scalability
- Industry-specific application traffic (voice, video and data) convergence over a single network resulting in network simplification
- Future-proof technology

Source: Aug 2, 2005 Gartner Report – The Future of Network Service Is Managed MPLS

Issues Delaying MPLS Deployment

- Difficulty quantifying and benchmarking MPLS benefit and cost reduction in tight budget environment
- Satisfaction and overall high level of comfort with existing network services and price reductions for current offerings
- Migration difficulties (expense and hassle)
- IT management's resistance to change and release of control for managed services

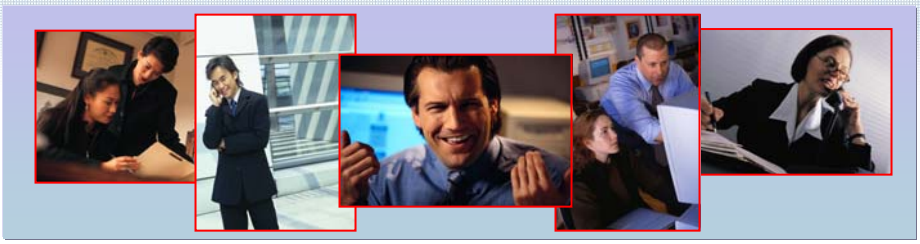
Source: Aug 2, 2005 Gartner Report – The Future of Network Service Is Managed MPLS

Technical Challenges to Performance

- Complex implementations of today's global networks
  - Countless applications, users, and transactions
  - Continued march toward convergence of voice, video & data
  - Migration in WAN access for improved budgeting, better quality for convergence and higher-speeds
- Decisions based on utilization statistics can be costly
- Increased complexity in today's applications requires deeper visibility
  - Ex: ***Web-based business applications*** and ***web browsing*** are very different activities

Visibility and control

- Monitor all ***applications*** and services
  - Application visibility is no longer a “nice to have” – it is a “need to have!”
  - Monitor continuously and in real time across any topology
  - Proactively alarm on problem indicators
  - Troubleshoot degradation source
- Fine-tune use of network resources
  - Baseline traffic patterns to understand normal behavior
  - Analyze forecast to plan for growth
- Support complexity
  - Global coverage and scalability
  - All application types
  - Extend to emerging technologies



MPLS Monitoring from the Service Provider Perspective

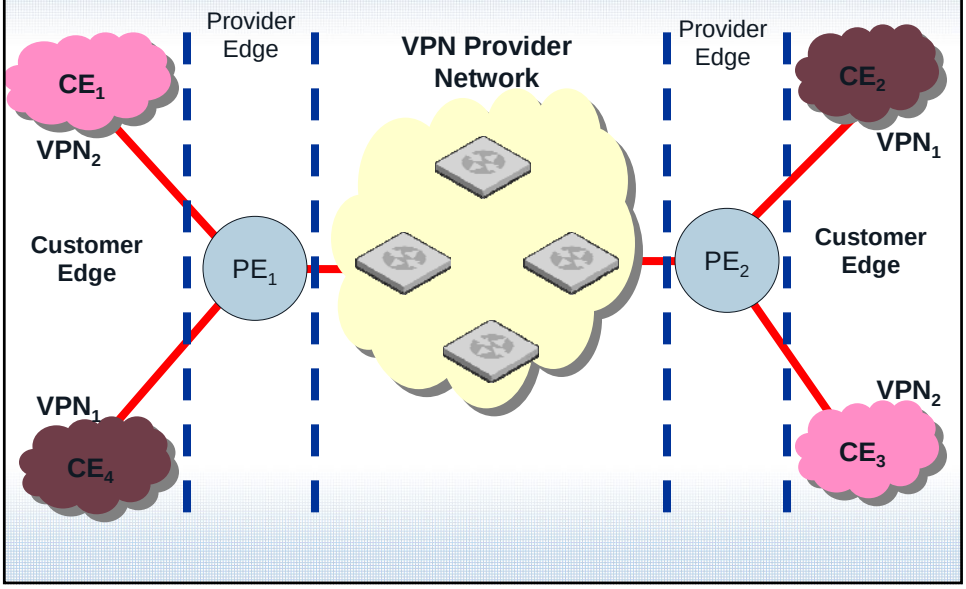
Challenges in Monitoring MPLS from the Carrier Perspective

- In a provider environment, subnets for different customers can be the *same.*
  - Due to the nature of MPLS, this can be addressed and dealt with and traffic routed without any problem.
  - The challenge is if they need to monitor the traffic based on the individual customers, it is hard to distinguish
- Label Distribution Protocol (LDP) does not guarantee that the MPLS label remains the same if a change in the MPLS core has occurred.
- Carriers need visibility into customer and application information
  - To consult with customers on multi-tiered service offerings
  - To design internal capacity planning changes

Objectives of MPLS Offerings to Enterprises

- Provide IP backbone for the customers
- Make the service very simple for the customers to use (no IP routing knowledge required)
- Scalable & flexible to deploy
- VPNs policies are controlled by SP but working together with the customers
- Deals with overlapping IP address space
- Allows SP to deliver different level of service – Gold, Silver, Bronze

Network Diagram of CEs, PEs and P (SP Model)



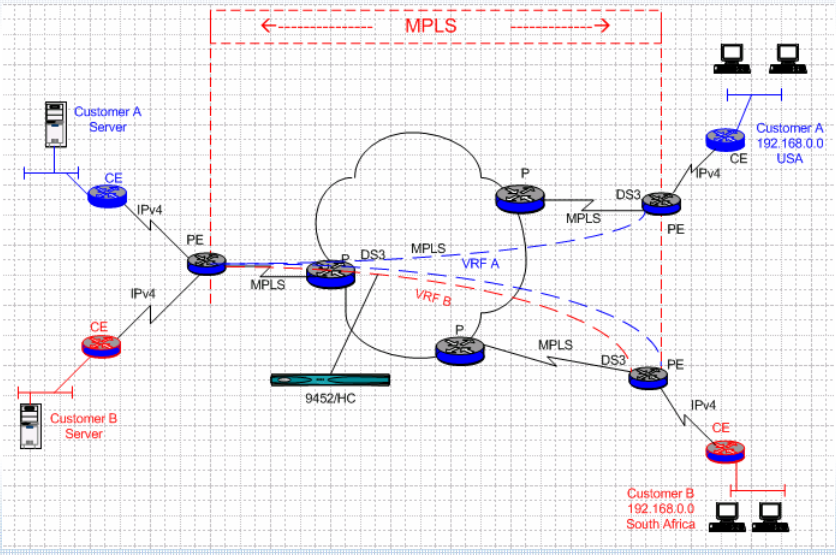
What is Needed to Monitor MPLS Networks from the Carrier Perspective

- Need visibility or access to the BGP updates that are sent through the backbone
- Within these updates there is a correlation as to which Labels belong to which Route Descriptor.
- The *only* unique identifier allocated to a customer is the Route Descriptor, configured per vrf, as seen next in the example

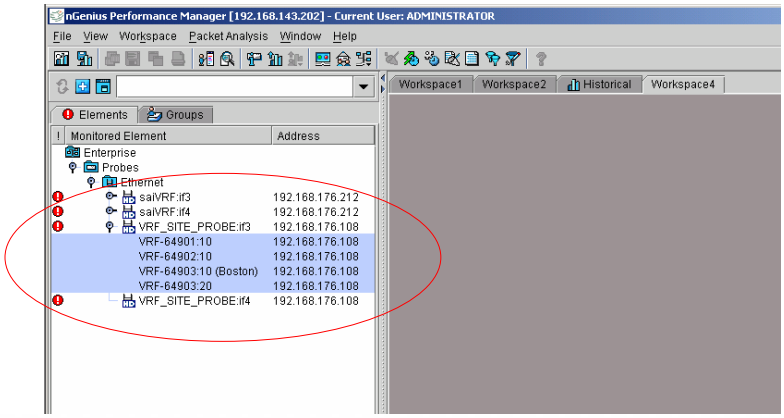
Implementing MPLS Monitoring

- Monitoring links in the MPLS Network Between PE and P routers
- Only MPLS Labels will be visible in the packets crossing the MPLS backbone
- Only differentitation between Customers, is the RD (Route Descriptor) - but the RD is not present in the packets, only Labels are seen
- The monitoring devices MUST see the BGP updates
- Within BGP updates is a mapping between RD and Label
- Once BGP update is seen the probe will create one virtual interface (VRF) per Route Descriptor.

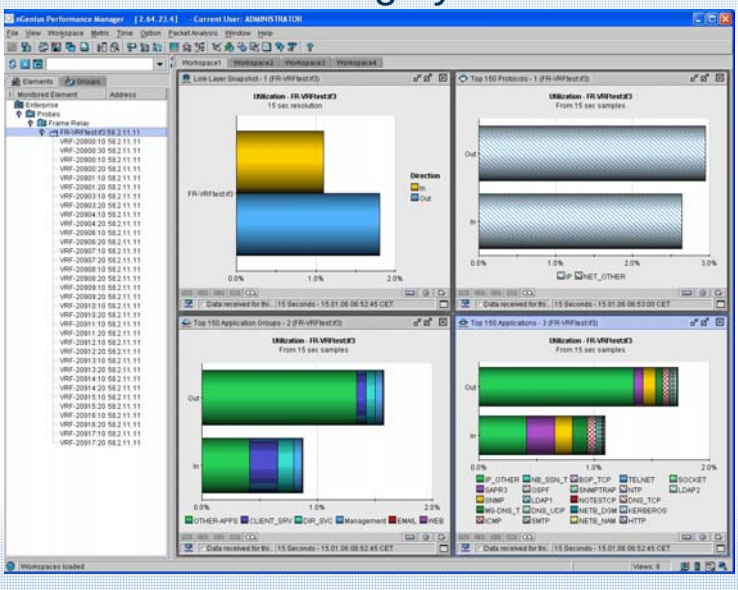
MPLS monitoring – Solution



Tracking the discovered VRFs discovered from BGP updates



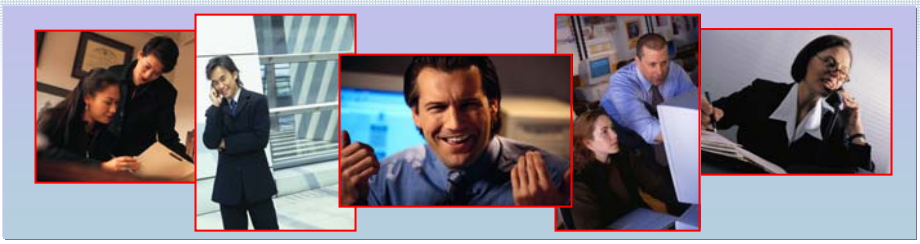
Real-Time Monitoring by VRF



Customer Story – Telecommunications Carrier

- A fixed-line operator and wireless provider (PTT) in Europe with operations and mobile phone offerings throughout Europe, as well as Central and South America
- Visibility Pain Point – IT needed:
  - More extensive instrumentation to create and secure the service assurance customers would demand over the new network.
  - More than NetFlow or MIB II because they needed the BGP route table updates which is not maintained by these data sources.
  - Real-time, application level analysis of individual customer's activity across the MPLS cloud

The nGenius Solution is effective in monitoring critical customer paths across MPLS networks. Most importantly, the nGenius Probes can track which customer was represented by which MPLS label at a given time, store the information by VRF, collect BGP updates, and mix and match labels to identify the customer. The solution can then be integral in providing service assurance and troubleshooting capabilities on a per-customer basis .

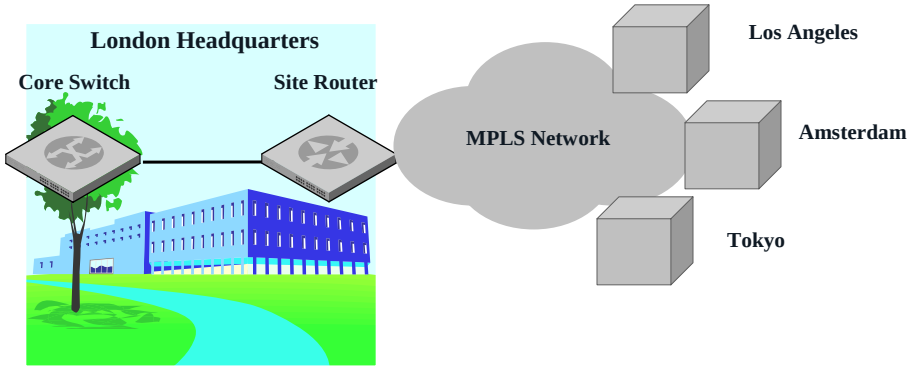


MPLS Monitoring from an Enterprise Perspective

Converged Network Challenges

- Primary Business Concern
  - High level of expectations surrounding voice services
- Technical
  - Voice traffic overwhelming existing network resources
  - Voice is a real-time application, with increased sensitivity to delay, jitter and packet loss
  - Proper traffic prioritization (QoS) to ensure other applications do not contend with voice-allocated bandwidth
  - Adding complexity to already very complex enterprise networks
- Deployment
  - Widespread use of VoIP throughout an enterprise may require changes to the existing network
  - MPLS adoption on the rise . . .

Challenges of MPLS, VPN and Encrypted Technologies



- No application visibility across the service provider environment
- Hinders your ability to manage performance

Site Monitoring for MPLS and VPNs

View remote site application level traffic

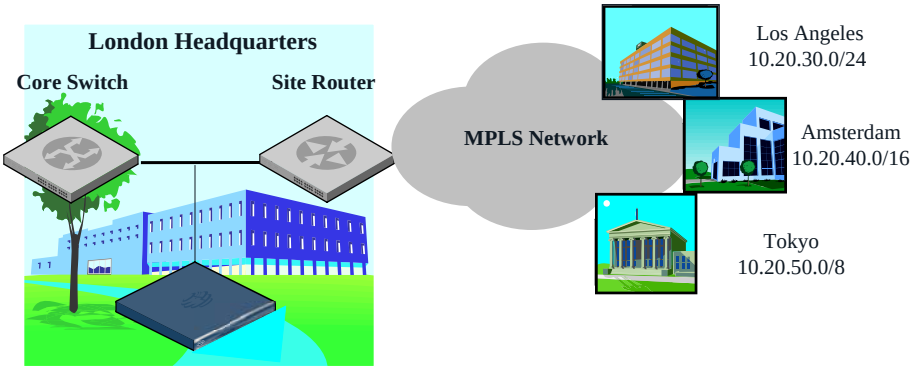
- Restore ability to view and report on application traffic to and from a remote location
- Deliver application visibility into MPLS/VPN or encrypted environments
  - Subnets allow you to focus on a site using a unique identifier
- Investment protection as you change technologies
  - Example: Can use same probe when you move from Channelized E3 to MPLS or IP VPNs to MPLS VPNs

Using Site Monitoring in MPLS and VPN networks

How it works

- Define a remote office using a subnet or group of subnets as unique identifiers
  - Configurable on individual ports on the probe
  - Assign WAN interface speed to the monitoring port
- Treat the “Sites” as virtual interfaces
  - Custom-define the interface speed of each Site
  - Appears in the monitored element tree as a virtual interface
  - All views and reports available for a virtual circuit are available for a subnet Site, such as applications, host and conversations

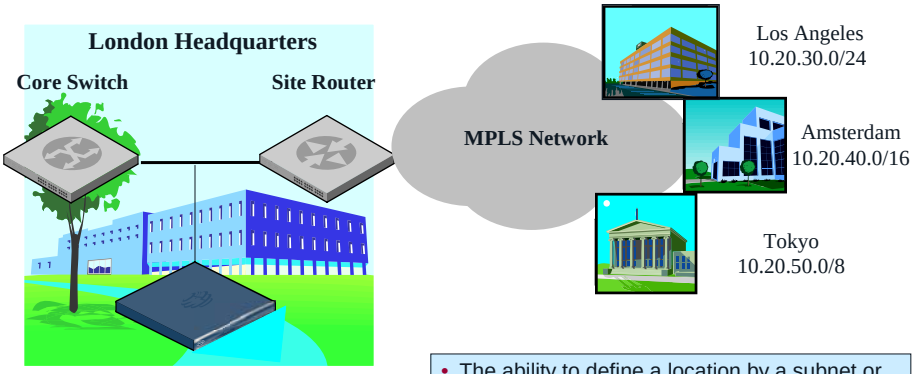
Monitoring Remote Sites over MPLS



Add monitoring devices…

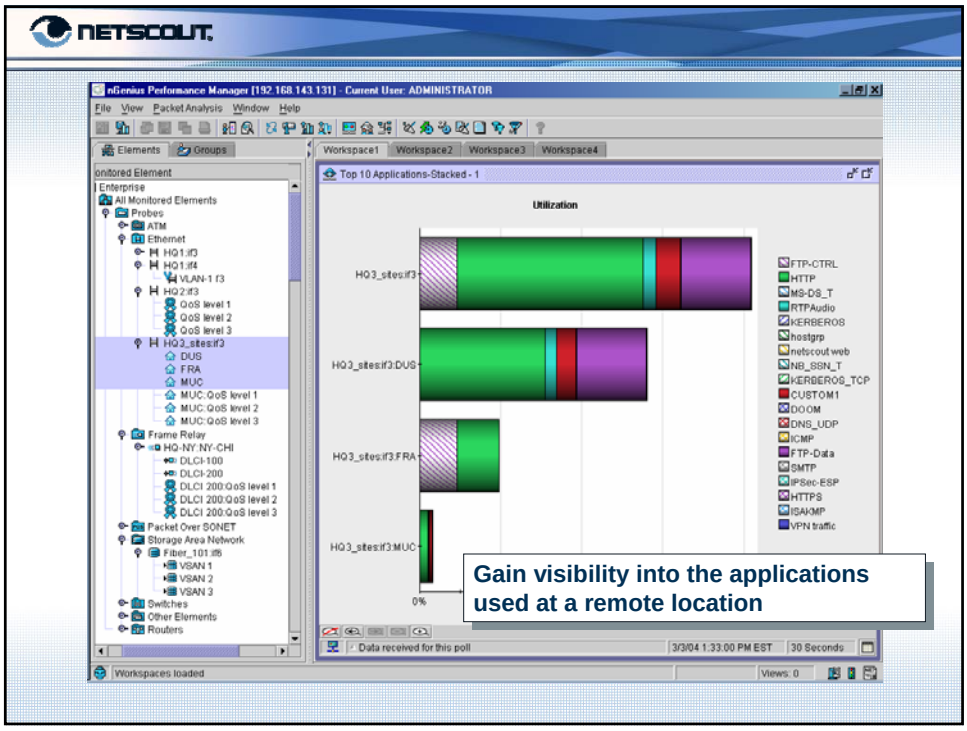
…and gain visibility into remote site traffic!

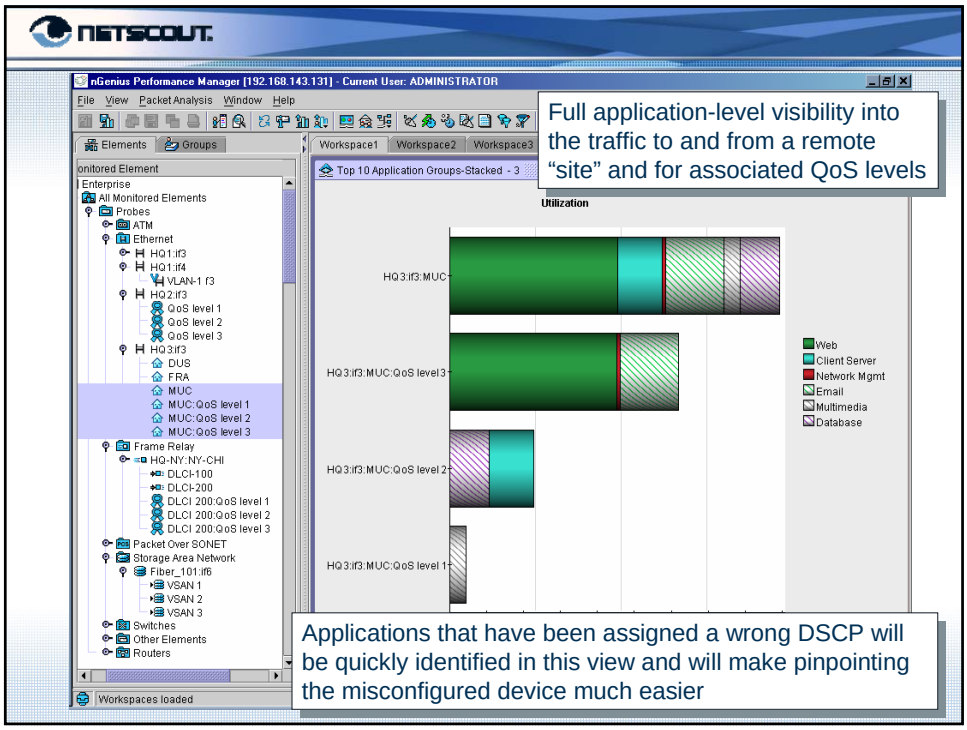
Monitoring Remote Sites over MPLS

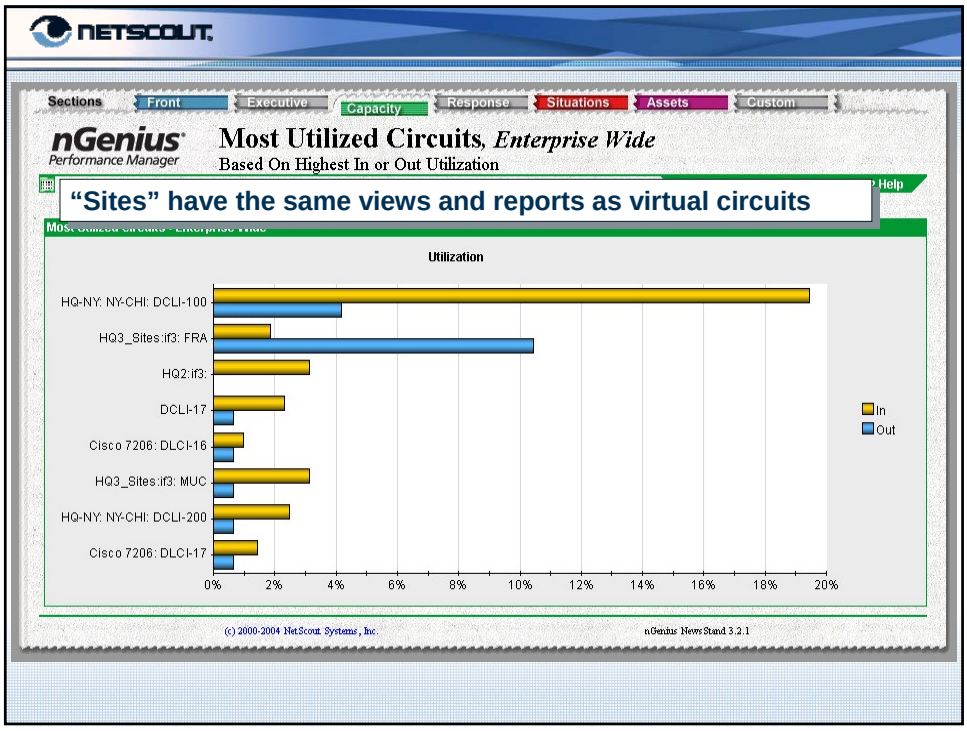


Add monitoring devices…

- The ability to define a location by a subnet or group of subnets
- Supported on physical and NetFlow/sFlow interfaces
- A “Site ID” is treated like a virtual interface


NETSCOUT
nGenius Performance Manager [192.168.143.131] - Current User: ADMINISTRATOR
File View Packet Analysis Window Help
Elements Groups
Workspace1 Workspace2 Workspace3 Workspace4
Top 10 Applications-Stacked - 1
Utilization
HQ3_sites:if3
HQ3_sites:if3:DUS
HQ3_sites:if3:FRA
HQ3_sites:if3:MUC
0%
FTP-CTRL
HTTP
MS-DS_T
RTPAudio
KERBEROS
hostgrp
netscout web
NB_SSN_T
KERBEROS_TCP
CUSTOM1
DOOM
DNS_UDP
ICMP
FTP-Data
SMTP
IPSec-ESP
HTTPS
ISAKMP
VPN traffic
Gain visibility into the applications used at a remote location
Data received for this poll
3/3/04 1:33:00 PM EST
30 Seconds
Workspaces loaded
Views: 0


NETSCOUT
nGenius Performance Manager [192.168.143.131] - Current User: ADMINISTRATOR
File View Packet Analysis Window Help
Elements Groups
Workspace1 Workspace2 Workspace3
Top 10 Application Groups-Stacked - 3
Utilization
HQ3:if3:MUC
HQ3:if3:MUC:QoS level 3
HQ3:if3:MUC:QoS level 2
HQ3:if3:MUC:QoS level 1
Web
Client Server
Network Mgmt
Email
Multimedia
Database
Full application-level visibility into the traffic to and from a remote "site" and for associated QoS levels
Applications that have been assigned a wrong DSCP will be quickly identified in this view and will make pinpointing the misconfigured device much easier
Workspaces loaded


NETSCOUT
Sections
Front
Executive
Capacity
Response
Situations
Assets
Custom
nGenius Performance Manager
Most Utilized Circuits, Enterprise Wide
Based On Highest In or Out Utilization
"Sites" have the same views and reports as virtual circuits
Utilization
HQ-NY: NY-CHI: DCLI-100
HQ3_Sites:if3: FRA
HQ2:if3:
DCLI-17
Cisco 7206: DLCI-16
HQ3_Sites:if3: MUC
HQ-NY: NY-CHI: DCLI-200
Cisco 7206: DLCI-17
0%
2%
4%
6%
8%
10%
12%
14%
16%
18%
20%
In
Out
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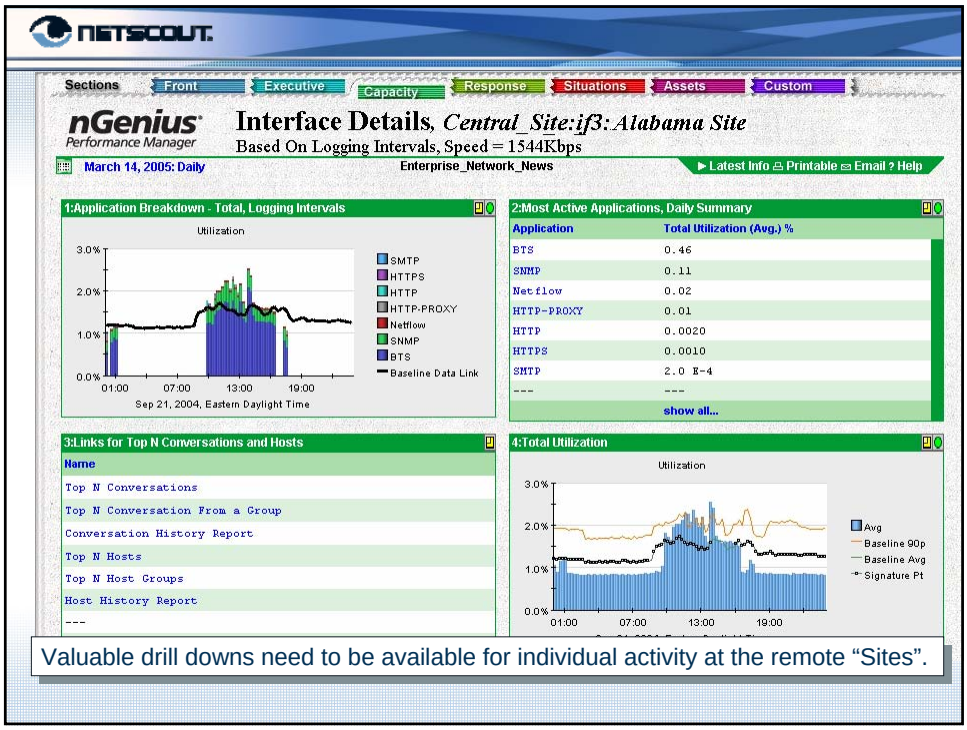
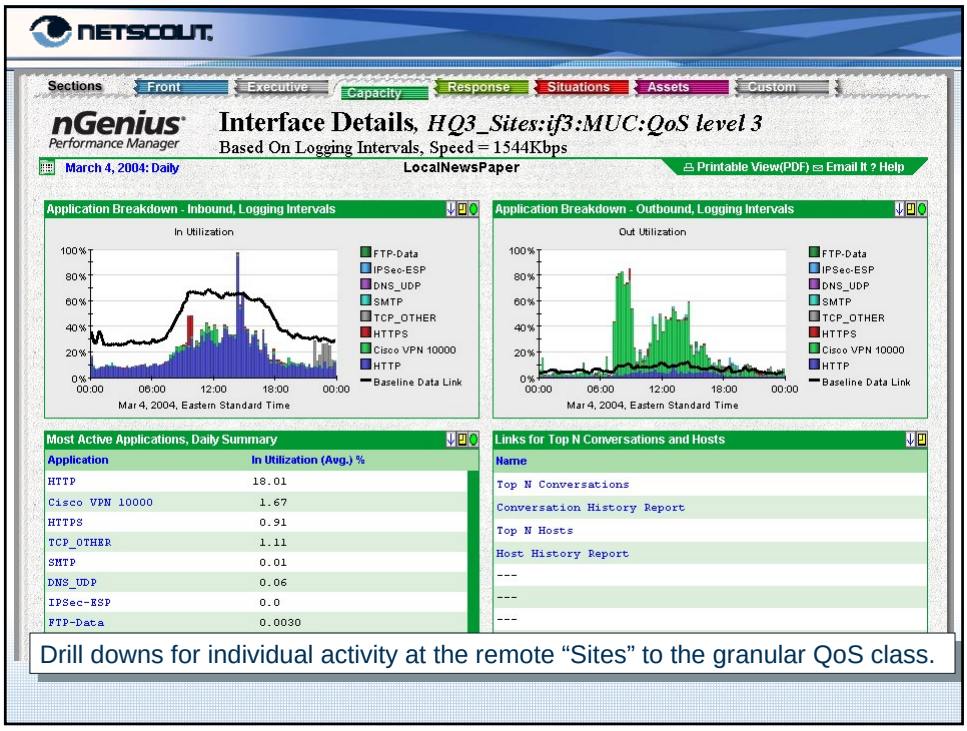
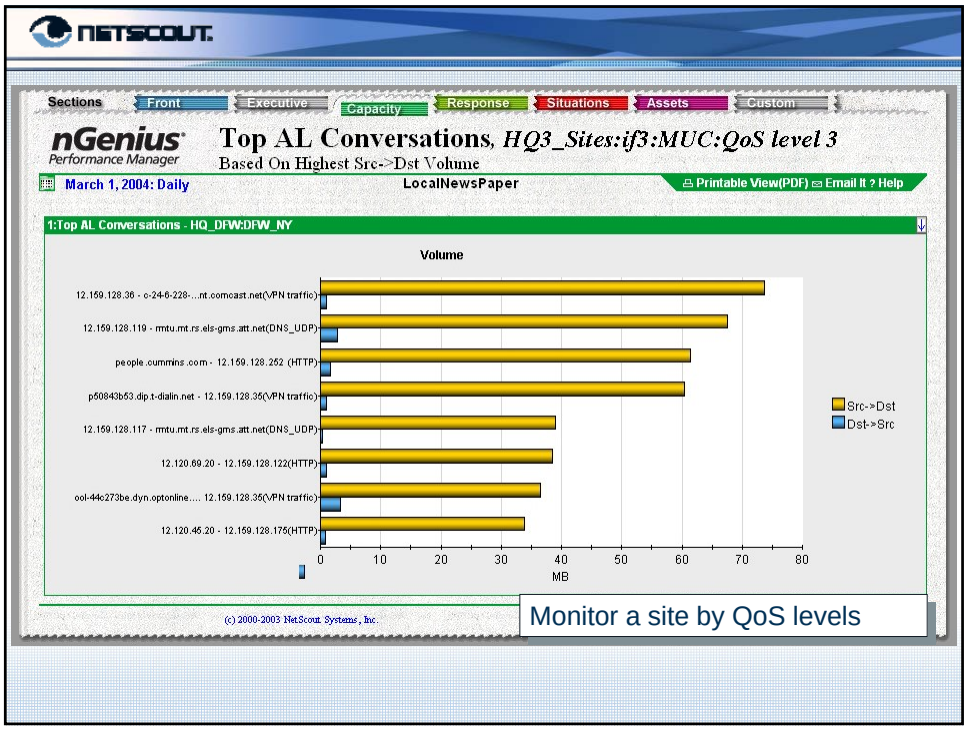
nGenius NewsStand 3.2.1


NETSCOUT
Sections
Front
Executive
Capacity
Response
Situations
Assets
Custom
nGenius Performance Manager
Interface Details, Central_Site:if3:Alabama Site
Based On Logging Intervals, Speed = 1544Kbps
March 14, 2005: Daily
Enterprise_Network_News
Latest Info Printable Email ? Help
1:Application Breakdown - Total, Logging Intervals
Utilization
3.0%
2.0%
1.0%
0.0%
01:00
07:00
13:00
19:00
Sep 21, 2004, Eastern Daylight Time
SMTP
HTTPS
HTTP
HTTP-PROXY
Netflow
SNMP
BTS
Baseline Data Link
2:Most Active Applications, Daily Summary
Application
Total Utilization (Avg.) %
BTS 0.46
SNMP 0.11
Netflow 0.02
HTTP-PROXY 0.01
HTTP 0.0020
HTTPS 0.0010
SMTP 2.0 E-4
show all...
3:Links for Top N Conversations and Hosts
Name
Top N Conversations
Top N Conversation From a Group
Conversation History Report
Top N Hosts
Top N Host Groups
Host History Report
4:Total Utilization
Utilization
Avg
Baseline 90p
Baseline Avg
Signature Pt
Valuable drill downs need to be available for individual activity at the remote "Sites".



Drill downs for individual activity at the remote “Sites” to the granular QoS class.



Monitor a site by QoS levels

Customer Story – Transportation Outsourcer

- Provider of IT integration and outsourcing services to numerous industries, including the international airline industry
- Visibility Pain Point:
  - New MPLS network roll out for cost effective WAN connectivity, but lost application level visibility.
  - "SNMP has its limitations for application performance management." Need visibility to handle "application tracking, bottlenecks, spikes and other events affecting responsiveness or resource needs to easily isolated for corrective action."

CSC EXPERIENCE. RESULTS.
Airline Solutions

"With nGenius Performance Manager's new site monitoring, the impact of MPLS or any other new wide area technology, application tracking is a non-issue. . . . we are able to generate detailed reports for regional users that explain utilization and responsiveness for each type of application, site and resource requirements. In addition, we can drill seamlessly between reports and real time views to packet capture and response time, solving any problem on the fly in a matter of minutes."

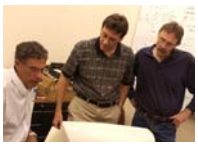
Translate network data into business-relevant information

- Show how the network relates to the business
  - Report to executives in a language they understand - services
  - Pinpoint use and misuse of resources
  - Justify upgrade and policy decisions
- Report to stakeholders in meaningful terms
  - Tailor information to each individual's needs
  - Group information logically, e.g., enterprise-wide, by department, region, business unit, or project team

About NetScout Systems

Our Company

- Technology leader with a clear vision
- The most experienced team in the industry
  - Founded in 1984
  - Over 360 employees
- Growing, profitable
  - $100M revenue run rate
  - $77M in cash, no debt
- World-wide distribution and support



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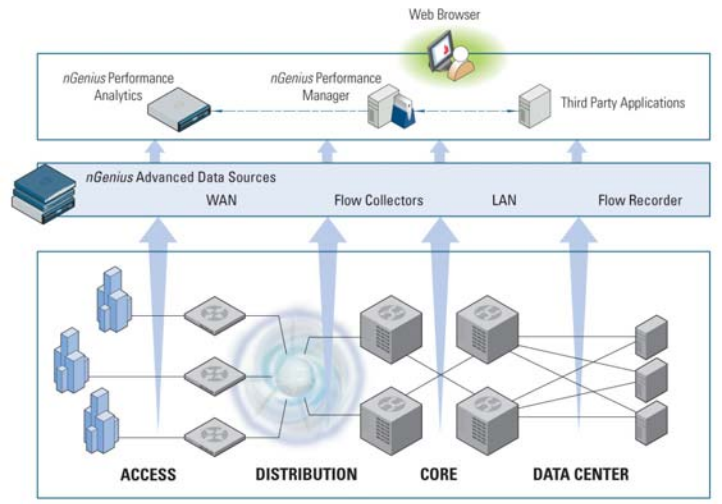
Our Customers

Liberty Mutual. · T-Mobile Get more from life · vodafone · Internal Revenue Service · LEHMAN BROTHERS · Goldman Sachs · verizon · Deutsche Telekom · U.S. AIR FORCE · Merrill Lynch · CIBC · JPMorgan · AT&T Wireless · The Federal Reserve Board · BNP PARIBAS · cingular raising the bar · GM · 経済産業省 Ministry of Economy, Trade and Industry · METI · DISCOVER CARD · RBC Royal Bank · Consumers Energy Count on Us · CN · Discovery COMMUNICATIONS · WACHOVIA · MBNA AMERICA · MITRE · ABN·AMRO · citigroup · TARGET · STARBUCKS COFFEE · ALLTEL

Financial ✦ Government ✦ High Tech ✦ Manufacturing ✦ Medical ✦ Telecom ✦ Retail ✦ Education ✦ Energy ✦ Consulting ✦ Entertainment ✦ Serv. Provider ✦

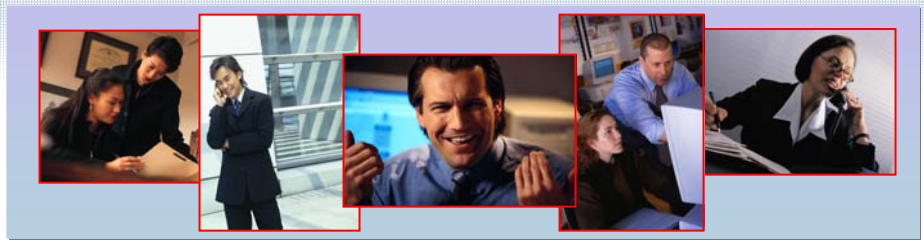
NETSCOUT.

Our Solutions



Our Value Proposition

Assuring availability and performance of business services in the face of increasing complexity due to rapidly converging IT infrastructure through automated, early problem detection and rapid resolution



Thank you