

# Implementing OSS for IP/MPLS Networks and Services

## Requirements and Issues

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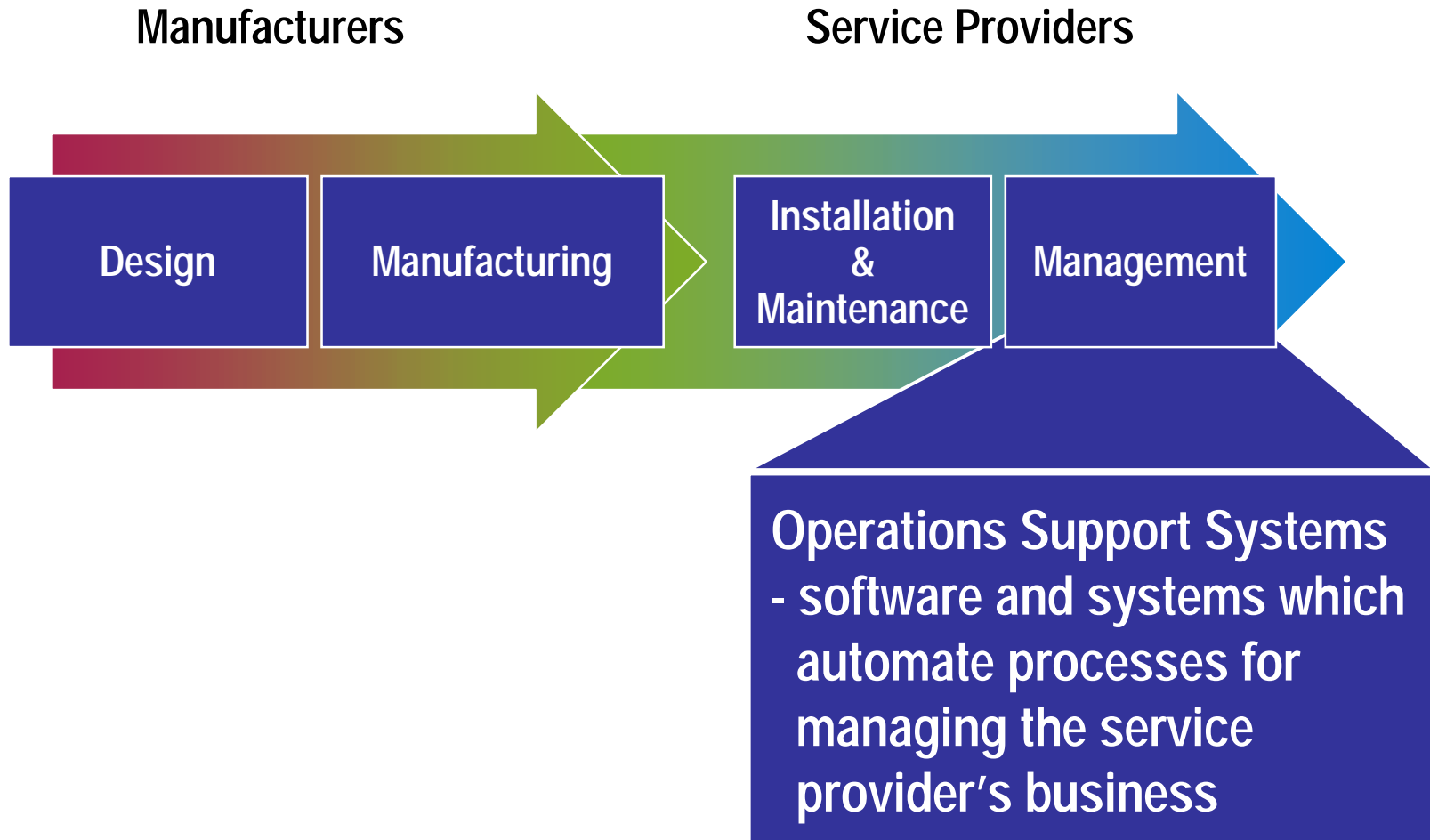
Vice Chairman, International  
Development

MPLS and Frame Relay Alliance



**Agilent Technologies**

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# Agenda

- **Service Provider Strategy and OSS Framework**
- **Requirements for Managed Service Providers and Network Operators**
- **IP/MPLS Network and Services**



# Service Provider Strategy

## Platform approach for insight and productivity

Link Monitoring System

Service/Network Assurance Platform

RF Assurance Platform

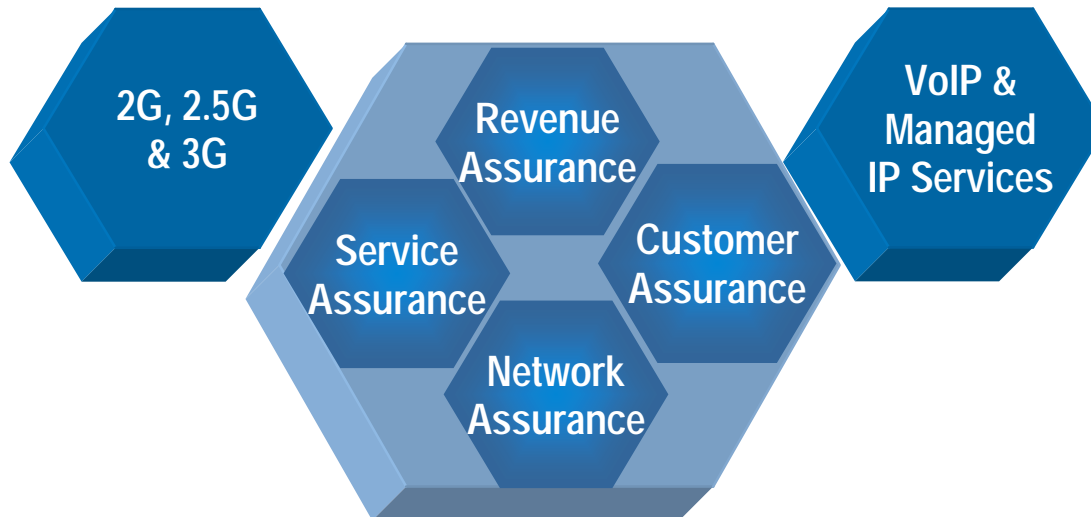
## Rich data sources

Passive probes – signaling and voice data

Network element data

Active test service data

Instruments, e.g., protocol analyzers

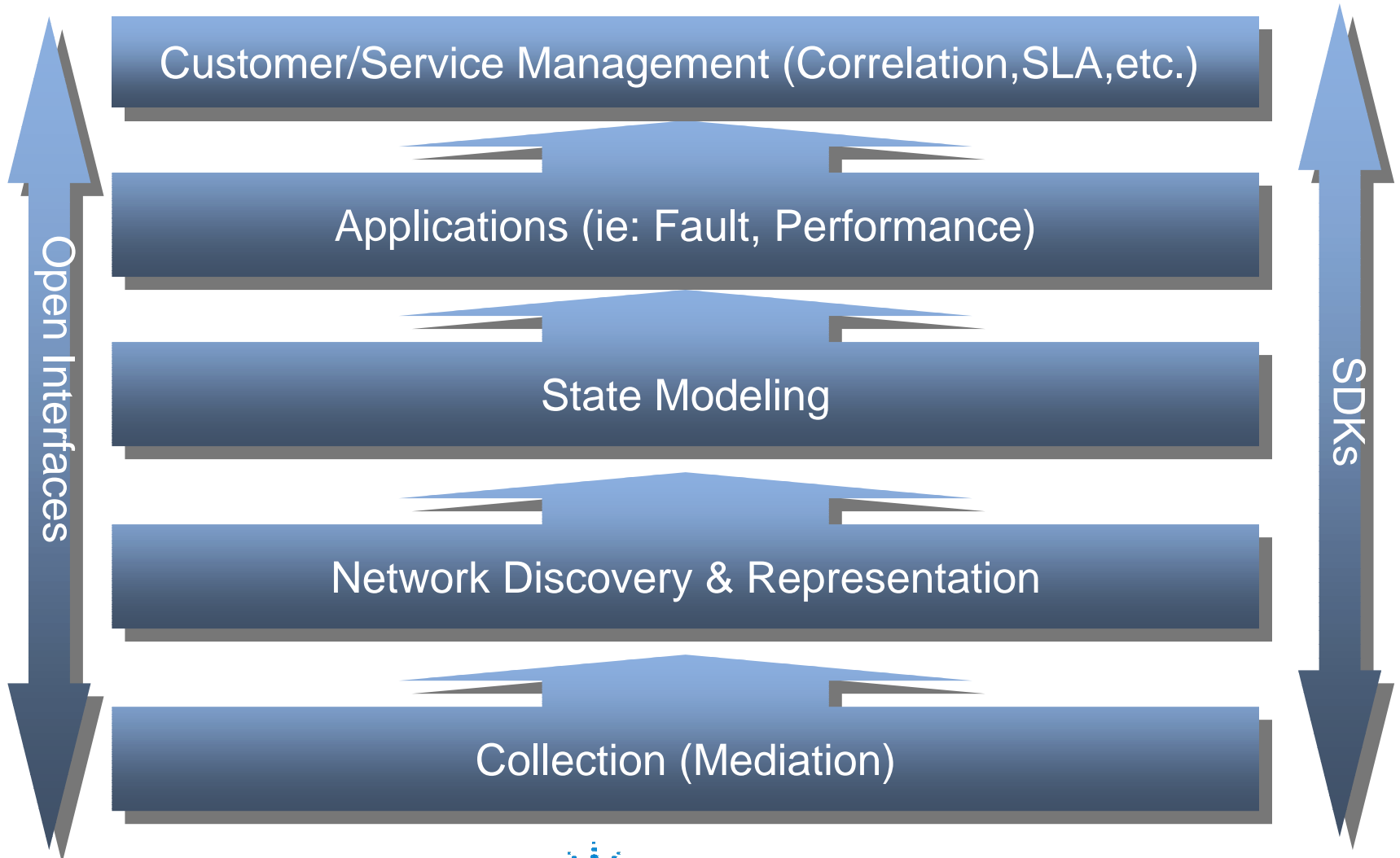


# OSS Framework

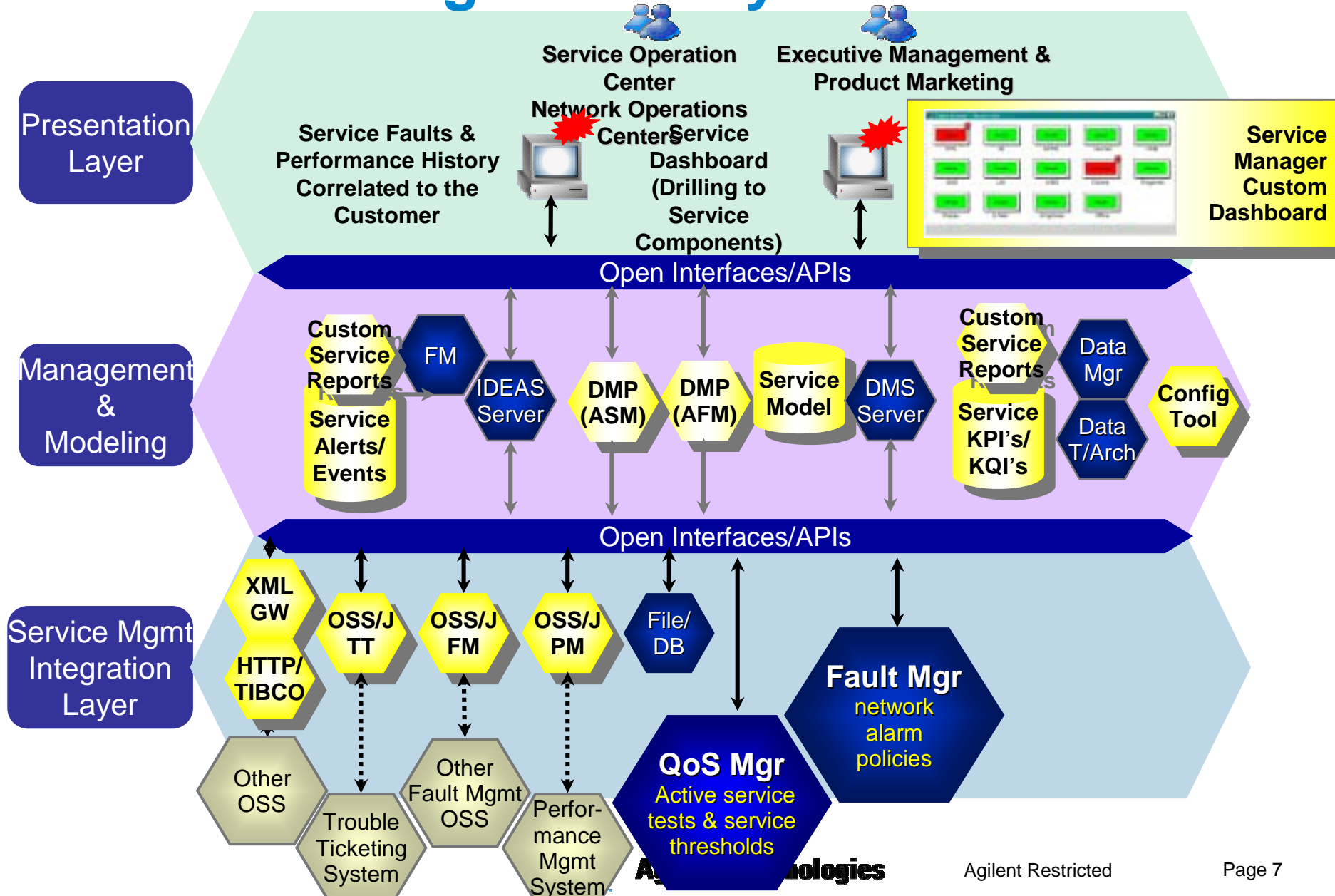
- Need an open OSS platform on the market with many different ways to talk to other platforms
- A rich development environment that allows the SP to build what it needs when it's needed
- Off The Shelf Applications for Next Generation Service Assurance rather than point solutions
- A framework that will allow the SP to plug in best of breed applications as needed –
  - working with other OSS solutions and sharing information from these diverse sources to build an integrated, correlated view of Network health.



# Typical OSS Layers



# Service Management Layer



# Managed Services SP requirements

- How do I differentiate my service offering?
- How do I retain my customers?
- How do I generate more revenue from my customers?

# Sample Questions Answered

- **Service Differentiation:**
  - With the Customer view GUI and the SLA report, the SP can quickly show the customer how the service will be handled, and how SLA parameters are tracked
- **Customer Retention:**
  - Regular SLA reports made available to customers and also interface with a CRM will help track customer issues vs. SLA violations if any – results in better customer service
- **Generate more revenues:**
  - By tracking the service QoS and usage of the customers, SP can recommend to the customers when to move to the higher category of service depending on the customer needs

# Network Operations customer requirements

- Converged network means great savings – how can I rapidly deploy these networks?
- How can I ensure service guarantees?
- How can I guarantee security?
- How do I quickly locate a problem?
- I have multiple NMS. How do I reduce that number?



# Sample Questions Answered

- **Rapid deployment roadblock:** uncertainty regarding network capacity & quality makes it difficult to deploy all services
  - Tools: Complete multi-layer network viewer and service quality tools give SP ability
  - Result: Know how every service and layer is performing, thus being sure about deploying new services, and knowing exactly how network behaves as the service is deployed
  - A per-Service quality view allows SP to know exactly how a particular a service in the network performs
- **Troubleshooting a problem quickly**
  - Complete network view as well as fault detection tool view gives SP ability to pinpoint the location of a fault in the network

# IP/MPLS Network and Service Market

Service Providers building MPLS networks to offer:

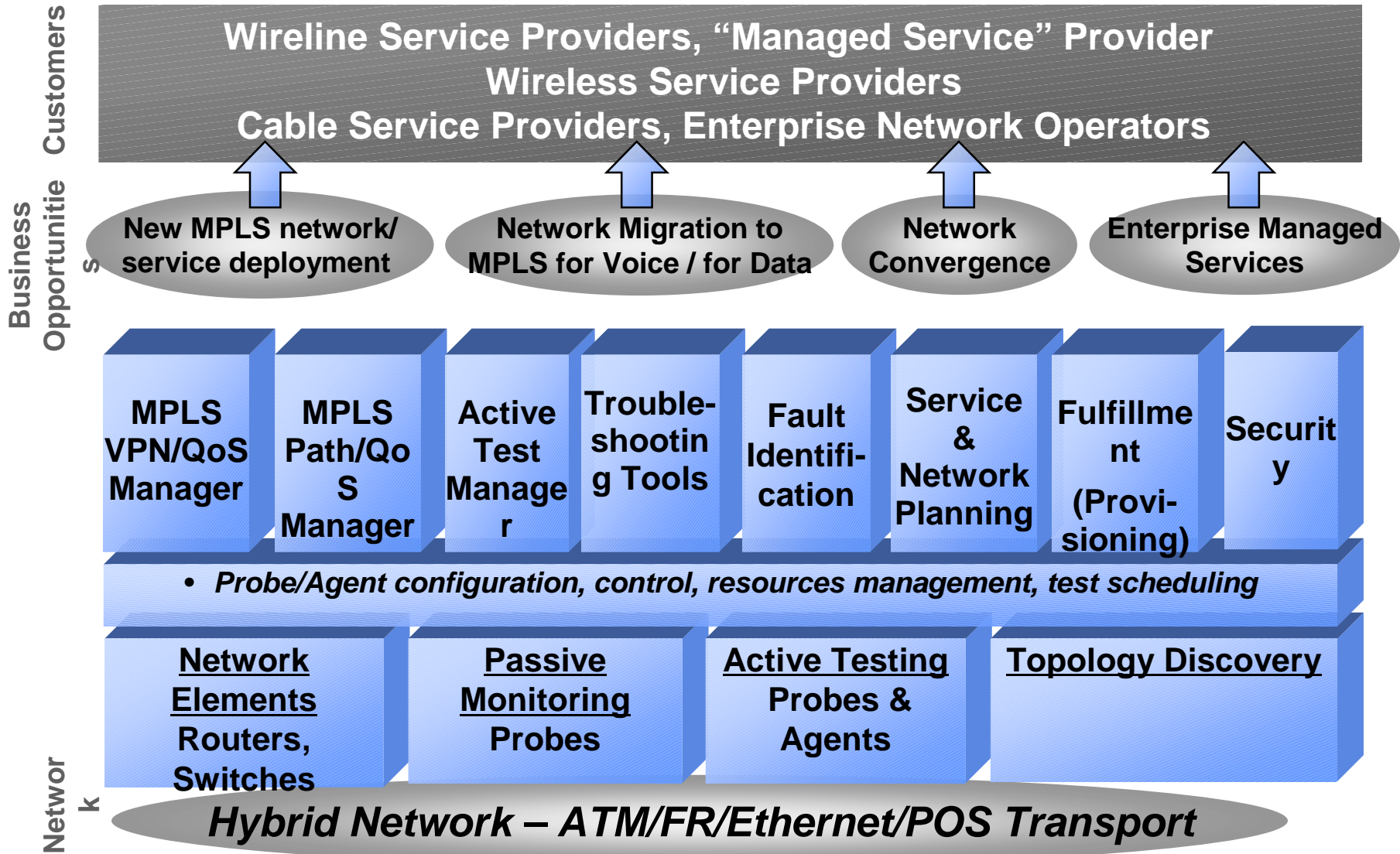
- IP/MPLS services for internal reasons
  - To support VoIP
  - To support IP/MPLS VPNs (a.k.a. BGP/MPLS VPN or Layer 3 VPN)
  - To allow convergence of non-IP (ATM/FR/Ethernet) networks over single IP/MPLS core using Layer 2 multi-point VPN or Layer 2 over MPLS transport
    - This includes wireless traffic convergence over IP/MPLS core
- IP/MPLS Services to external customers
  - Layer 3 VPN service
  - Layer 2 over MPLS support connecting multiple sites (VLAN, Ethernet)
  - Guaranteed QoS for all services using backup LSPs, Differentiated Services features

# Enterprise Customers Looking to Service Providers for IP/MPLS Managed Services

- IP/MPLS Services
  - Layer 3 MPLS VPNs
  - Virtual Leased Line
    - Layer 2 MPLS Point-to-Point Transport or LSP, with DiffServ
  - Virtual Private LAN Services (VPLS)
- Enterprise Roadblocks for Managed Services adoption – unavailability of:
  - Service Level Agreements (SLA) Tracking and Report
    - Network and service availability
    - Customer service response time
    - Throughput, Latency and Jitter requirements
  - Customer Network Management (CNM) – customer visibility into service



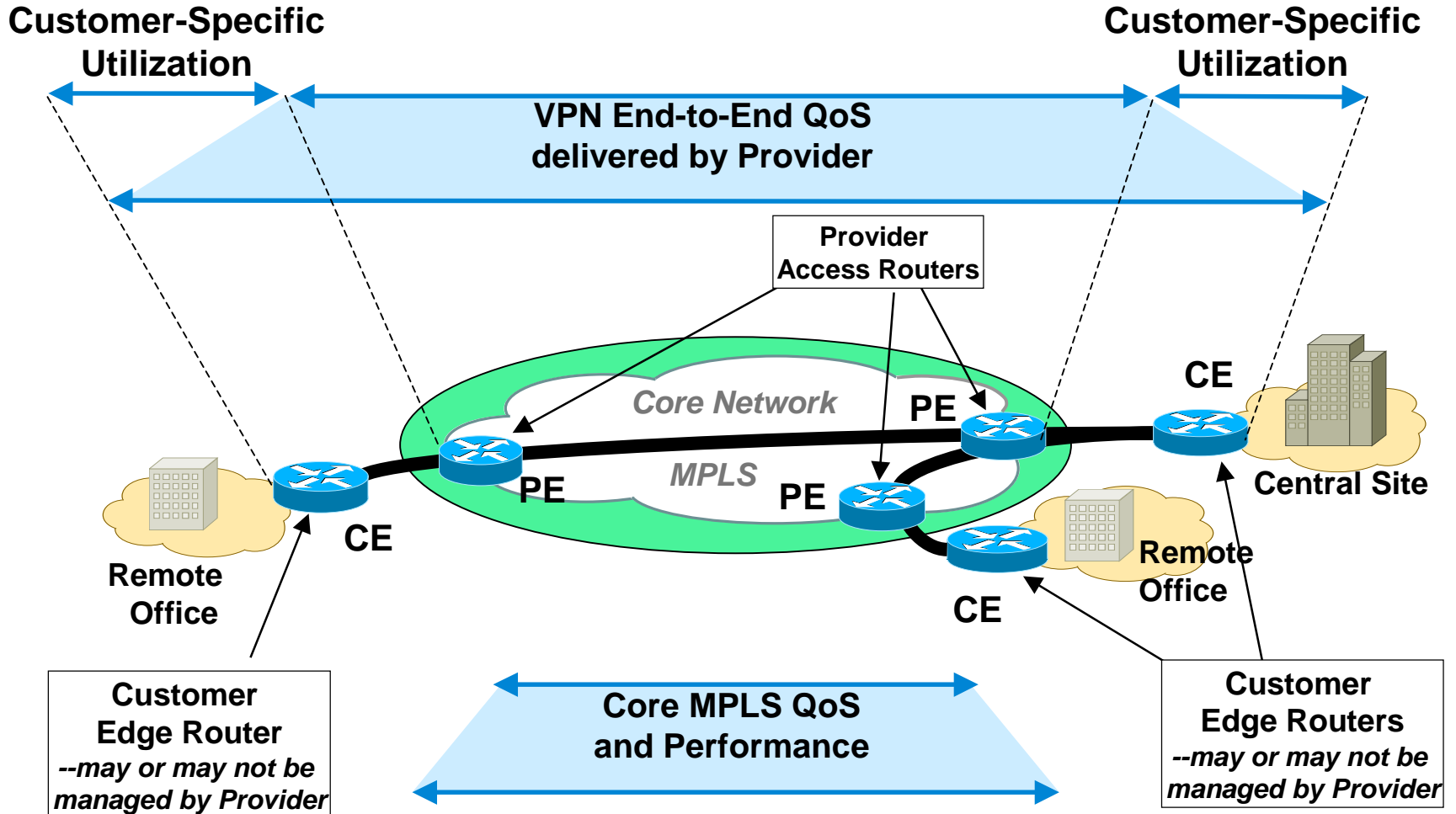
# MPLS Network/Service Mgmt



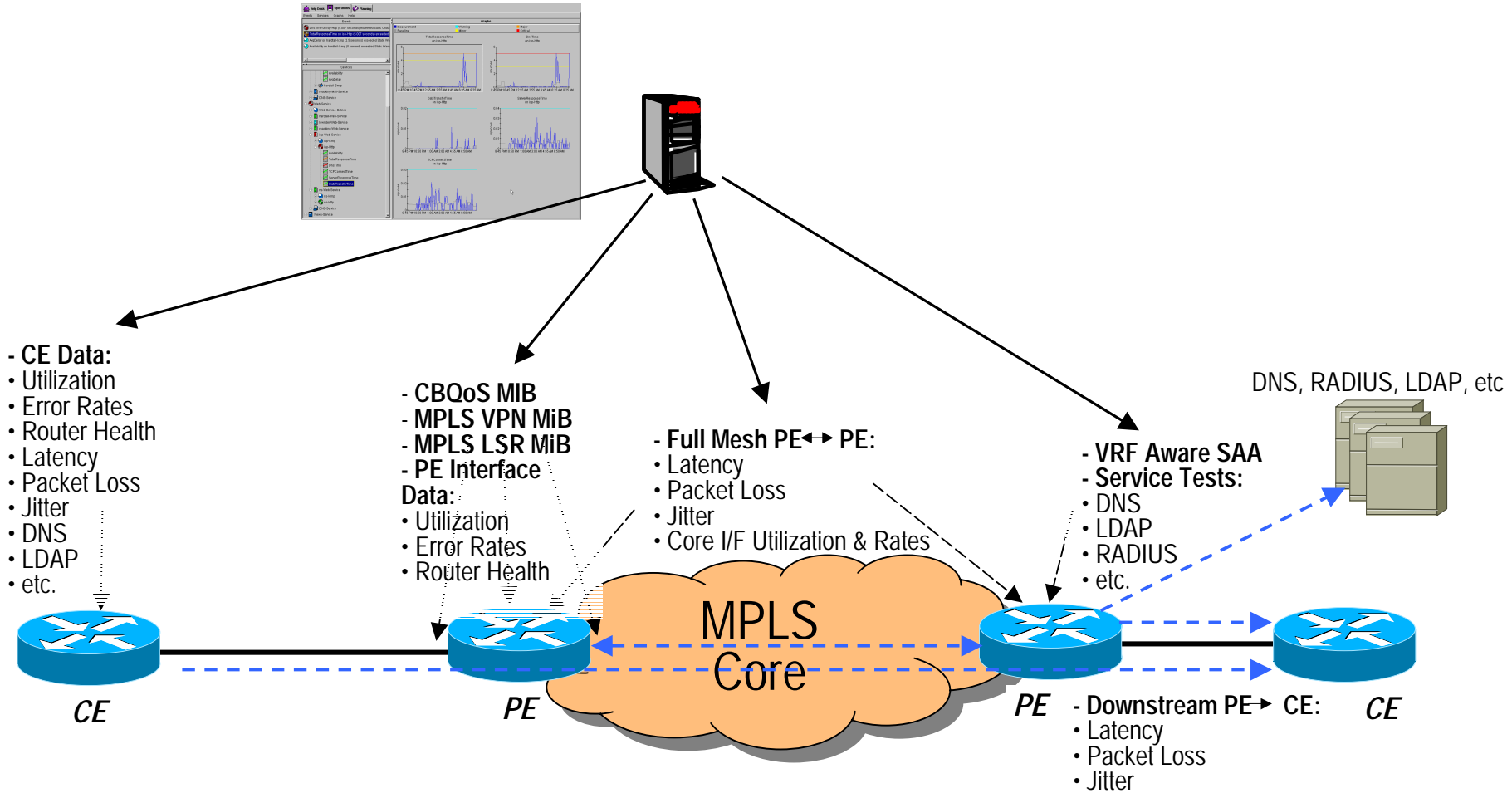
# MPLS Service Assurance

- Three critical problems to be solved
  - Customer Service Quality
    - Service mapping to SLA signed with individual customers
  - Network Service Quality
    - QoS of the traffic flowing through LSP's and VPN's
  - Discovery and Tracking
    - Know what the physical network is
    - Know what the Routing Topology is
    - Know where the LSP's are
    - Know where the VPN's are

# End-to-End MPLS/VPN QoS



# MPLS/VPN Management



# QoS Solution Needs for VPN Services

- Service Management based on Class-of-Service for converged networks
  - CoS monitoring for Data (best effort, business, priority), Voice, Video
  - End-to-end monitoring of service health, per VPN with active tests
  - Correlate performance events with Service and Customer impact
- QoS Reporting per VPN, per application by CoS
  - Latency, Jitter, Packet Loss
  - Availability
  - In/Out traffic policy including drops
- Monitor and report on VPN Device Health
  - Configurable device availability and performance data reports via MIB collection
  - Management platform health monitoring

# QoS Solution Needs for VPN Services...

- SLA management and Reporting by CoS
  - Active SLA management per VPN, customer
  - Real-time SLA alerting and reporting
  - Historical SLA reporting per customer, service
- Performance alerting and analysis
  - Configurable alerting thresholds
  - Performance metric Baselines and trend reports
  - Configurable Notification and Action services



# Sample of MPLS MIB Tests

- **MPLS-LSR-MIB Tests**

## MPLS Interface Utilization

- Interface Failed Label Lookups
- Interface In Discards
- Interface In Labels Used
- Interface In Packets
- Interface Out Discards
- Interface Out Fragments
- Interface Out Labels Used
- Interface Out Packets

- **MPLS-VPN-MIB Tests**

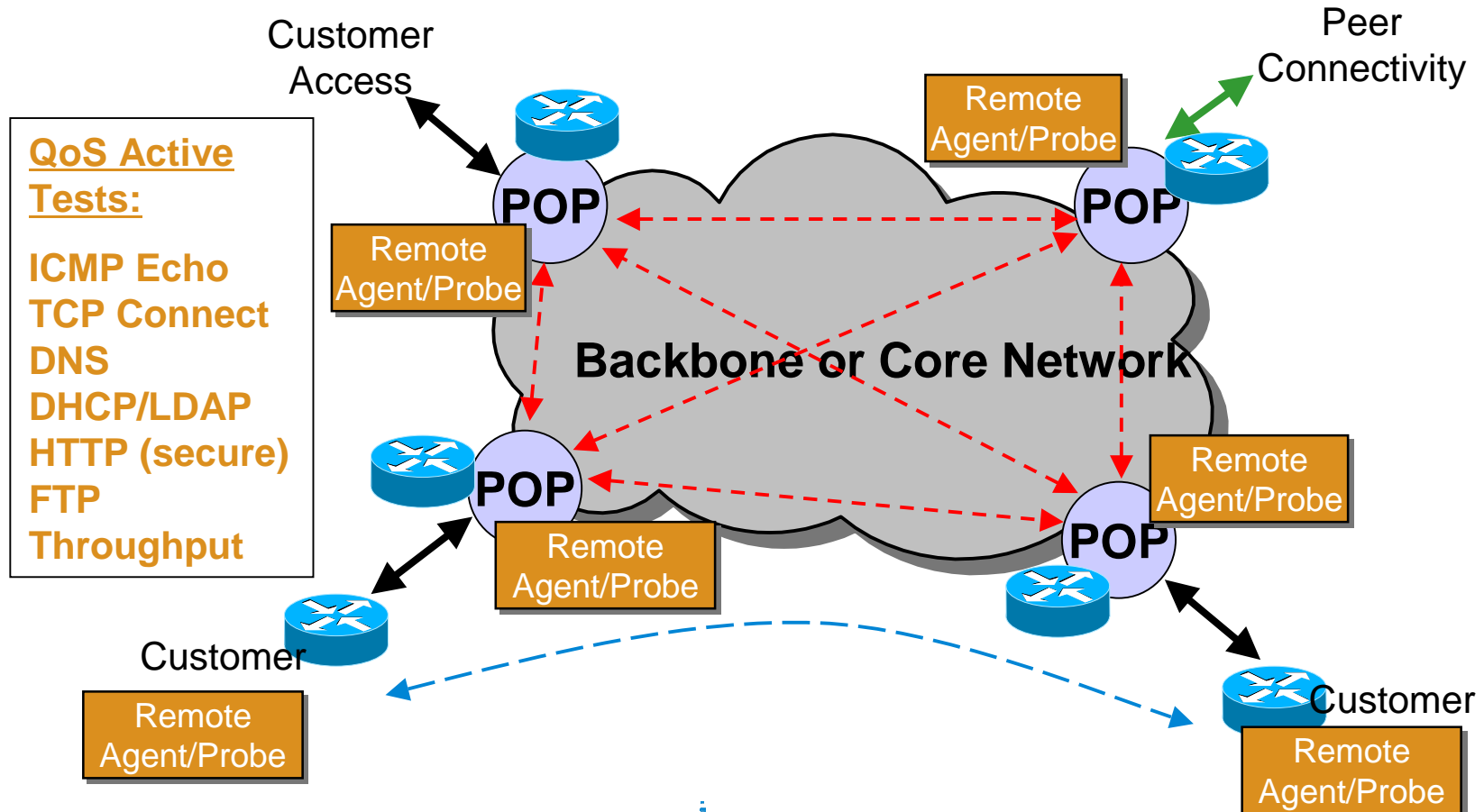
## MPLS VPN Route Statistics

- Routes Added
- Routes Deleted
- Current Number of Routes



# Network embedded & software agents active tests

- End to end active testing to measure availability, performance and quality metrics



# SLA Deployment with QoS tools

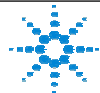
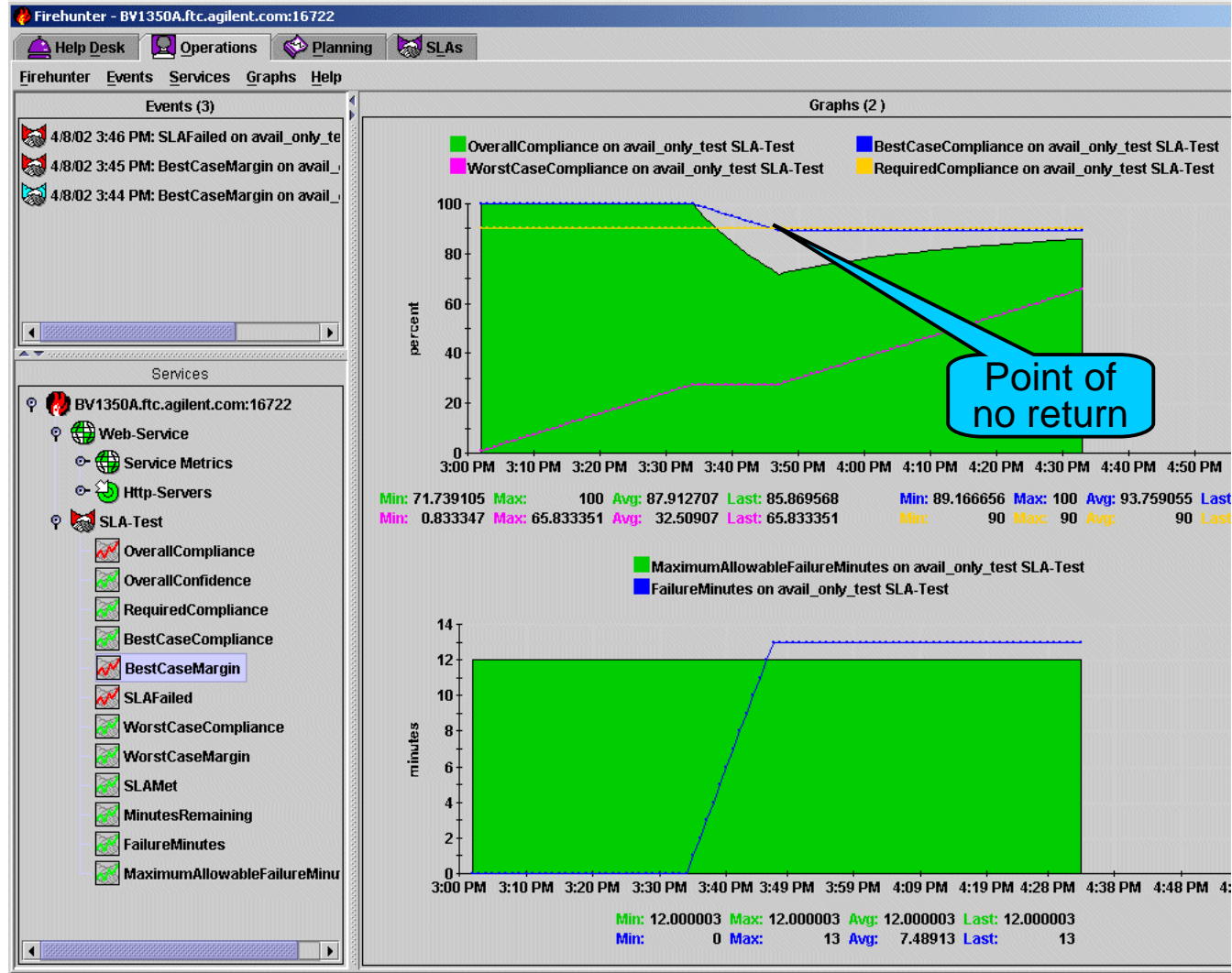
- Set realistic levels of service goals
  - Collect real data about the performance of the services
  - Determine behavior of services over time
  - Define service levels (SLAs) that can be guaranteed
- Define different levels of service for each customer
  - Model each customer and of the Customer's services independently
- Deliver customer expectations
  - Identify, isolate and fix potential problems before they become SLA violations
- Verify customer compliance, not just service provider compliance
  - Measure customer throughput and equipment availability
  - Report on their usage behavior



# Real-Time SLA Monitoring

## Preemptive SLA Alerting

- Determine if an SLA is in/out of compliance *prior* to completion of compliance period
- Take remedial action *before* SLA is violated
- Prioritize troubleshooting with knowledge of SLA compliance failure severity levels
- Multiple ways to view status

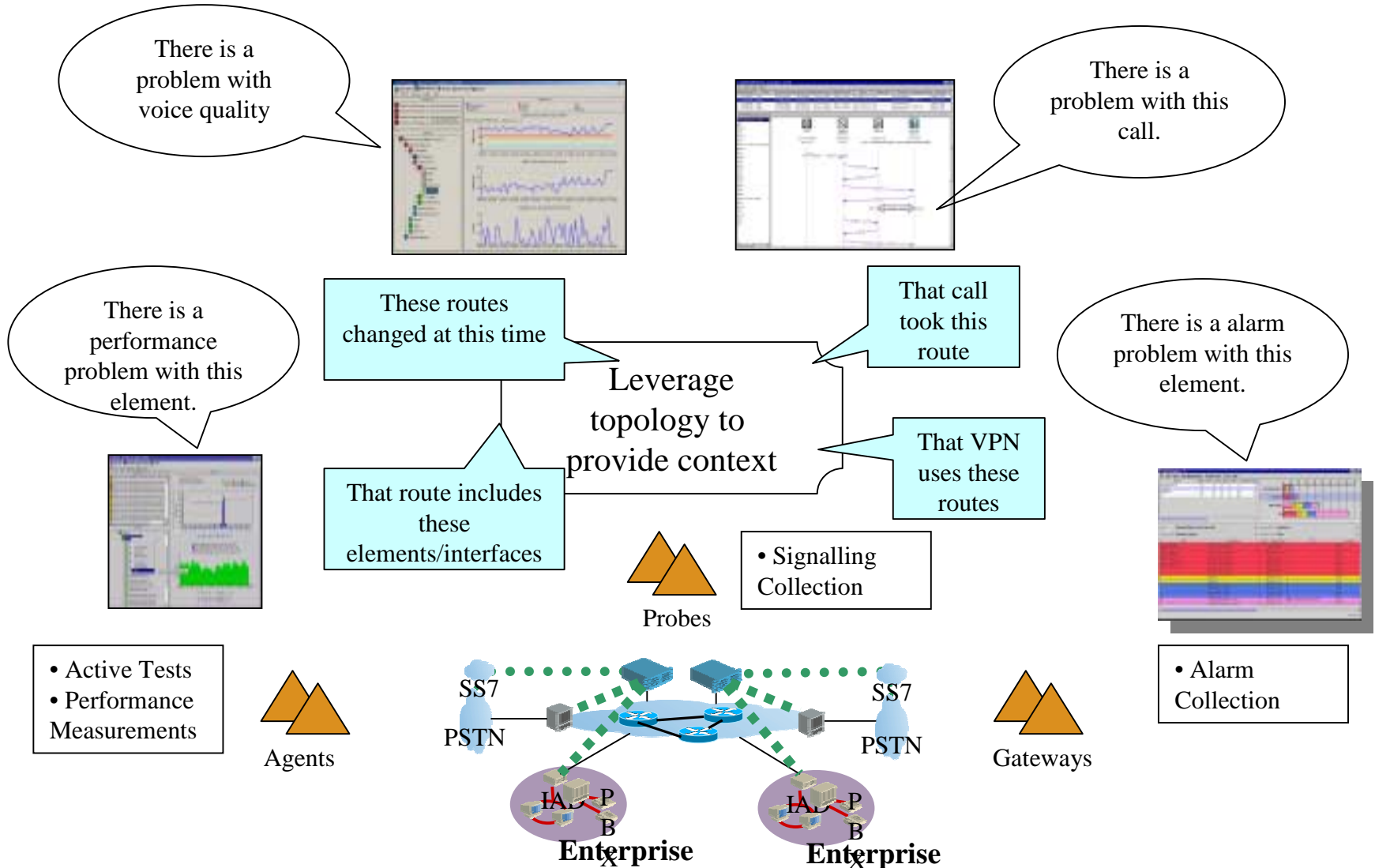


# Topology Tracking

- Discover the IP, MPLS and VPN topology
- Track topology changes and emit change notifications for event correlation and root cause analysis
- Provide GUIs to visualize the topology and service
- Provide context and APIs for integrating OSS components



# IP/MPLS Topology: Providing Context



# Voice Quality Troubleshooting Scenario

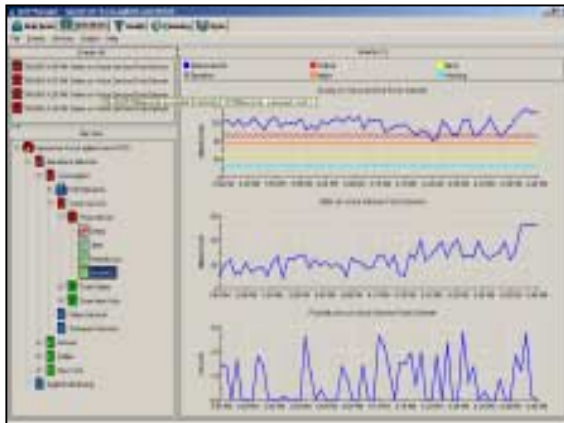
Launch a root cause query by selecting the packet loss interval for the given source/dest

Launch topology, performance or fault in context for those elements, time, and problem identified

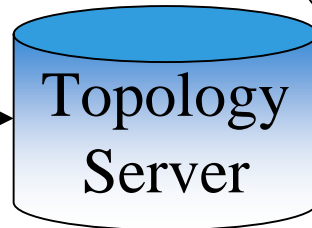
Display unidirectional routes/paths of the RTP packets at the time of the call

Display measurements specific to the problem on elements identified and during the timeframe of the call

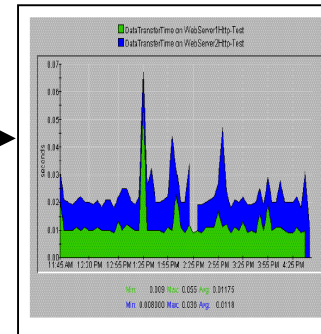
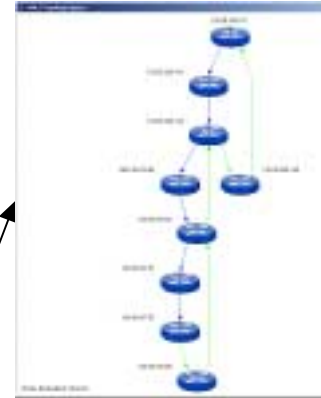
Display alarms specific to the problem on elements identified and during timeframe of the call



Identify voice quality degradation in a given measurement period



Given IP end points, time window and problem retrieve routes/paths that this call took at that time



# Work Flow Example

Actual problem: No VoIP calls going through (due to VPN misconfiguration)

Proactive Mode (a full running system):

1. Inventory System “is informed” that a VPN is being set up for customer X so that VoIP calls can be run over it
2. MPLS QoS test tool gets this information (through automated or manual means) and is set up to check QoS of the VPN and track SLA parameters
3. As the VPN QoS falls below the SLA requirements (due to zero traffic!), MPLS QoS tool sends an alarm to the Fault Management System
4. The Topology Tracking tool finds that the VPN does not exist
5. The device is re-configured correctly
6. The tools re-check the network and service to ensure all calls are up and running and getting the requisite QoS



# Summary

- A strong OSS strategy and implementation is key to rapid deployment of MPLS networks and applications
- No need for large single OSS solution block
- Service Providers need to have toolkits with open API's so that they can be integrated with existing OSS solutions
- The toolkit has to be able to provide interface to the Service Provider Network operations as well as the customers using the services
- A complete service assurance solution will need to look at both performance and fault to ensure service quality





**Questions & Answers**

**Thank You!**

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