Operations Support Systems
Session #1207
Issues for IP Network Management

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We develop and deploy applications for world-wide telecommunications market

TMN & Standards based, Mission-Critical, Quality, Scalability, Reliability, Availability, Off-the-Shelf

80% of the USA telecommunications network depends on software invented, developed, implemented, and/or maintained by Telcordia

Approach to IP Network Management

“Dual-Mode OSS”

Single set of systems that simultaneously supports both:

Current Circuit-Switched networks and New World / IP / Packet-Switched networks
Telcordia OSS

Vision and Strategy

OSS Vision for Next Generation Networks

Dual-Mode for Old and New

CIRCUIT SWITCH

Open Service Application Layer

Open Call Control Layer

Standards-Based Service Elements and Platform Layers
Key Drivers to NGN OSS Evolution

Customer Demands

- Offer rapid, new competitive services
- Lower anticipated operations costs
- Upgrade network without impacting service delivery to customers
- Eliminate gaps in mission-critical systems
- Provide overall Next Generation Network management solution

NGN Network Layering

“The Bell Heads Meet the Net Heads”

Legend
- ADMs/SONET X-connects
- ATM switches/VP x-connects
- Routers/servers

Virtual Connectivity
- 10MegEthernet
- FDDI
- FR128
- FR512
- VP/VCs

Physical Connectivity
- STS
- STS1
- STS12
- STS192
- Ocirc1Ring
- Ocirc2Ring
- OC292Link
- Fiber/DWDM/RF
Telcordia OSS
Approach to Networks

Cross Domain Management

- DWDM
- SONET and SDH Transport
- ATM - SONET/SDH
- FR - SONET/SDH
- IP - FR - SONET/SDH
- FR - ATM - SONET/SDH
- Voice - IP - SONET/SDH
- Voice - ATM - SONET/SDH
- Voice - IP - ATM - SONET/SDH
- VoDSL - ATM - SONET/SDH
- VoDSL - ATM - SONET/SDH (DSLAM model)
- VoDSL - ATM - SONET/SDH (Integrated Line Card model)
- Wireless local access
- Broadband (HFC) local access

Operations Impacts of NGN

Myth: Operations Processes are So Much Simpler

- Our Studies Show:
  Customers will expect service levels and performance to be “Carrier-Class”
  Operations Standards of today’s PSTN Voice Networks will be applied to VoP
  OSSs for VoP need to perform many of the same functions needed in PSTN
### Operations Impacts of NGN

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Assignment/Activation</td>
<td>Activation/Provisioning support for IP routers, ATM switches, and servers. PVC/SVC configuration management. End-to-end cross-domain solutions. Customer network management.</td>
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<tr>
<td>Fault/Performance Mgmt.</td>
<td>End-to-end management of multi-layer, heterogeneous network (event correlation), IP/ATM traffic monitoring, surveillance on new NEs (e.g., routers and ATM switches), QoS monitoring, customer network monitoring.</td>
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<tr>
<td>Testing</td>
<td>Testing of new network elements, testing of virtual connections/services, interfaces to new Element Management systems, new network management protocols (SNMP).</td>
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<tr>
<td>Customer Num./Address Mgmt.</td>
<td>IP and ATM (E.164, TCD and DCC) address management, IP address/TN relationships, network access locations (POP).</td>
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<tr>
<td>Work Flow Mgmt.</td>
<td>New flows to support new services, networks and devices, client programmability.</td>
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<tr>
<td>Network/Equipment Inv.</td>
<td>New network elements. Planning based on new service and traffic considerations.</td>
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<tr>
<td>Customer Care/Billing</td>
<td>Interactive ordering from the internet, packet billing and separations, single bill for all services.</td>
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<td>Trouble Ticket Mgmt.</td>
<td>Manage customer troubles in the new network, packet telephony (QoS), ensure rapid repair/restoral.</td>
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<tr>
<td>Wholesale/Retail Gateway</td>
<td>Provide secure access, competitive parity.</td>
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### Operations Costs and NGN

In volume, operations costs could erase profits.

Access line operations costs have declined dramatically from 1970 to 1995.

- **Network Creation**
- **Service Activation**
- **Service Negotiation and CC**
- **Service Assurance**

![Operations Costs Chart](chart.png)

- **1970**: $728
- **1996**: $208
- **2000**: $?

**Operations cost per access line**

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OSS Issues for IP Network Management
Telcordia’s OSS Architecture Principles

Next Generation OSS Characteristics

- Multi-Vendor (Network Suppliers) support by Network Management Layer
- Flexible NML/EML interfaces supported – CORBA, CMIP, TL1, etc.
- Total flow-through operations supported
- Inter-Domain Management integrate multiple technology domains
- Network as the database
- Dynamic path selection
- Flexible service requests de-coupled from billing
- Break down stove pipes – access, connection, transport
- Real-time service negotiation access to network data
- Distributed computing

OSS Generic Functional Architecture
Telcordia’s OSS Solution
Offering

Dual-Mode OSS for Existing Networks and New World Networks

Telcordia’s OSS Product Line
The Telcordia 3 S Strategy for OSS Infrastructure Change

**SURROUND**
- Modernize User Interfaces to Existing Production Systems

**SUPPLEMENT**
- Add new systems as Adjunct Processors to Legacy Architecture to manage new business and operations challenges

**SUPPLANT**
- Where Legacy is out of “Stretch”, replace old with new

Telcordia OSS Solutions for NGN

Supporting NGN Services & Networks

- ATM, Frame Relay, and IP Solutions:
  - VToP (Voice Trunking over Packet) — Tandem Replacement
  - PLoP (Private Line over Packet)
  - Integrated Access for Small, Medium, and Large Business Customers (e.g. xDSL)
  - Frame Relay Services
  - Integrated Access to Large Carriers, IXCs
  - Local Circuit Switch (Class 5) Replacement
  - IP Services (e.g. VPN, DEN Services)
  - RAS (Remote Access Server) and VoIP Gateway
Functional Components of IP VPNs for OSS

- Service Provider’s Core ATM/SONET (WDM) Network
- VPN Customer’s Access Network

IP - VPN

Security Management

Tunneling

Encryption

Authentication & Authorization

User Profile

Application Profile

Digital Certificates

Directory Enabled Networks (DEN)

VPN Customer’s Routing Network

QoS Policy Routing

Policy Server

LDAP Directory

IP VPN Services & Networks

from an OSS Perspective

IP-VPN Carrier Network

Service Provider NOC

+ Configuration Management
+ Fault Management
+ Service Assurance Management
+ Performance Management
+ Capacity Management

IP-VPN Enterprise Network

Enterprise Customer or Service Provider Enterprise Network Management NOC

+ LAN Network Management
+ User Profiles - Services
- Authentication - Class of Service
- Authorization - Policy Routing
- Encryption - Application
- Public Keys - Profiles
- Access Privileges
Telcordia OSS Differentiators

The Power of Telcordia plus Cisco

Certified Quality

Cumulative Fault Density

Telcordia results are 10 times better than Industry Average
Telcordia OSS
On-Time Delivery

- Releases Shipped
- Releases Shipped On-Time

1995: Releases Shipped 67, On-Time 61
1996: Releases Shipped 77, On-Time 77
1997: Releases Shipped 145, On-Time 142
1998: Releases Shipped 166, On-Time 162

91% On-Time in 1995

Why Telcordia plus Cisco?

Telcordia is the leader in software, engineering, and professional services for telecommunications
Cisco Systems is the leader in networking for the Internet

Unique and Complementary Talent Pools

New World
Telcordia’s Local Switch (Class 5) Replacement

Differentiation

Customer Care & Billing (Customer Intimacy)

Operations Support Systems (Operational Excellence)

Network Technologies (Technical Excellence)
“Best of Suite” Approach to OSS Integration

Growing complexity is forcing carriers to look for turnkey software solutions. The software marketplace is switching from best-of-breed to best-of-suite.

Chandan Sarkar, SoundView Financial Group

Conclusion

Value Today — Flexibility for Tomorrow

- **COST**: OSSs must provide industrial strength solutions
- **GROWTH**: OSSs must solve complex problems
- **QUALITY**: Your OSS provider must be experienced
- **NETWORK UTILIZATION**: Your OSS provider must be vendor neutral
- **INTEGRATION**: Your OSS provider must have experience in resilient systems
- **ENABLE ‘GREENFIELD’ START**: Your OSS provider must have scaleable products
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