BSNL: challenges overcome in implementing management for MPLS

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Speaker information

Norman Kincl, Solution Manager, Hewlett-Packard, is responsible for providing the technical and business direction for Hewlett-Packard's Integrated Service Management for Next Generation Networks. He is responsible for working with product divisions, partners, and architects to define and bring to market HP's OSS/BSS solution for next generation networks. Mr. Kincl has been with Hewlett-Packard since 1983. He has almost 30 years of experience in various aspects of IT. His focus is on architecting the service management systems and processes of network and service providers.

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" Carriers will probably not be able to successfully converge their networks on a common MPLS transport unless more attention is paid to the management of the MPLS infrastructure."

Leif Hoglund

RHK, August 2004






BSNL Overview
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Bharath Sanchar Nigam Ltd (BSNL)

- Largest Incumbent Telco Service provider in India
- Annual turnover – USD 8.6 billion (2005)
- Services and customer base
  - Fixed phone – 49 mil (8%/annum growth)
  - GSM – 27 mil (50%/annum growth)
  - WLL – 2.3 mil
  - ISP – 1.8 mil
  - Enterprise leased line
- Building National Information Backbone
  - MPLS/VPN services (3.5K sites, growing @ 15-20 sites/day)
  - DSL Broadband (450K subscribers, growing @ 50K/month)
  - IDC

BSNL Project 1 requirements

- National information backbone – II
  - expansion of existing 10 city MPLS network to 71 cities
- Common IP infrastructure for convergent services for ISPs, corporate, institutions, government bodies and retail users
- Diversified Intranet access services (VPN) for entire spectrum of medium to large customers
- Make the service very simple for customers to use
- Make the service very scalable and flexible
- Meet wide range of customer requirements—QOS, any-to-any connectivity
- Capability to offer fully managed services to customers
- Allow BSNL to introduce additional services such as BW-on-demand over same network

BSNL primary objectives for MPLS VPN

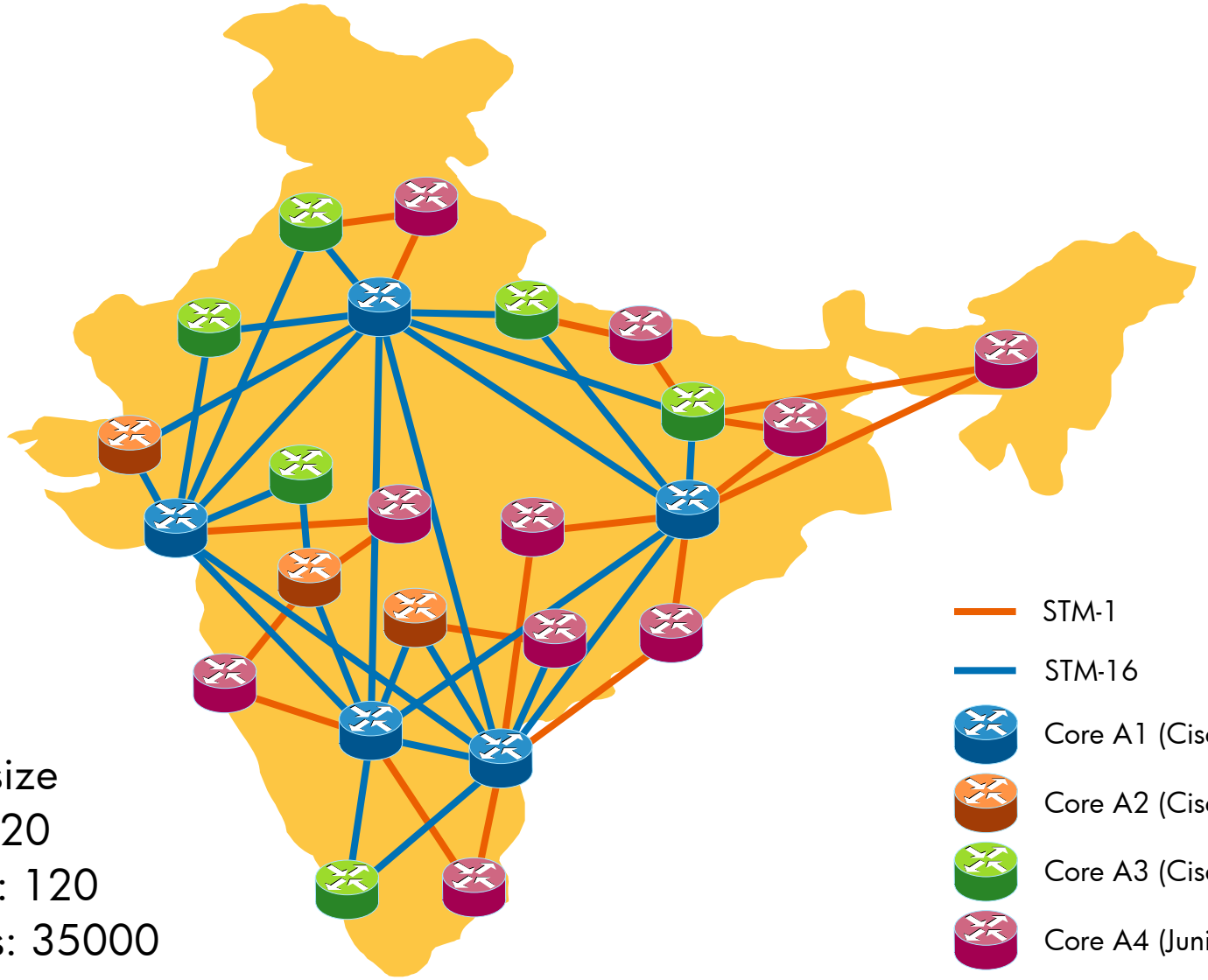
- Provide a diversified range of services (Layer 2, Layer 3 and Dial up VPNs) to meet the requirements of the entire spectrum of customers from Small and Medium to Large business enterprises and financial institutions.
- Make the service very simple for customers to use even if they lack experience in IP routing.
- Make the service very scalable and flexible to facilitate large-scale deployment.
- Provide a reliable and amenable service, offering SLA to customers
- Capable of meeting a wide range of customer requirements, including security, quality of Service (QOS) and any-to-any connectivity.
- Capable of offering fully managed services to customers.
- Allow BSNL to introduce additional services such as bandwidth on demand etc over the same network.

Why MPLS/VPN? Cost advantage

No. of Sites	No. of Links	Cost on Leased Line	Cost on MPLS	Cost per site on Leased	Cost per site on MPLS
2	2	1.36 L	1.26 L	0.6 L	0.63 L
3	3	2.04 L	1.89 L	1.2 L	0.63 L
4	4	2.72 L	2.52 L	1.8 L	0.63 L
5	5	3.40 L	3.15 L	2.4 L	0.63 L
6	6	4.08 L	3.78 L	3.75 L	0.63 L

1 L = 100,000 INR ≈ 2,245 USD

BSNL MPLS core network



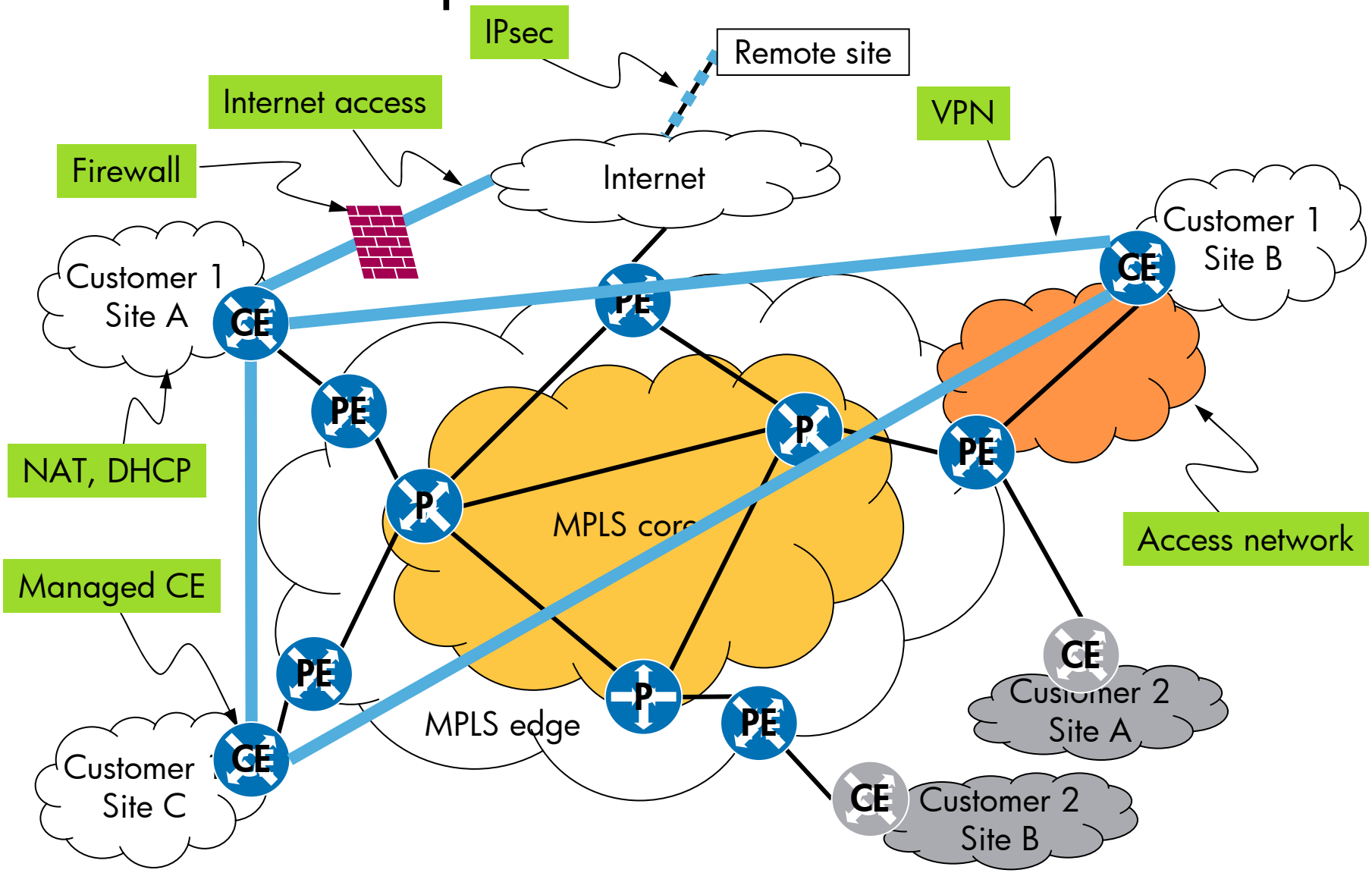
Network size
P routers: 20
PE routers: 120
CE routers: 35000

BSNL services offered

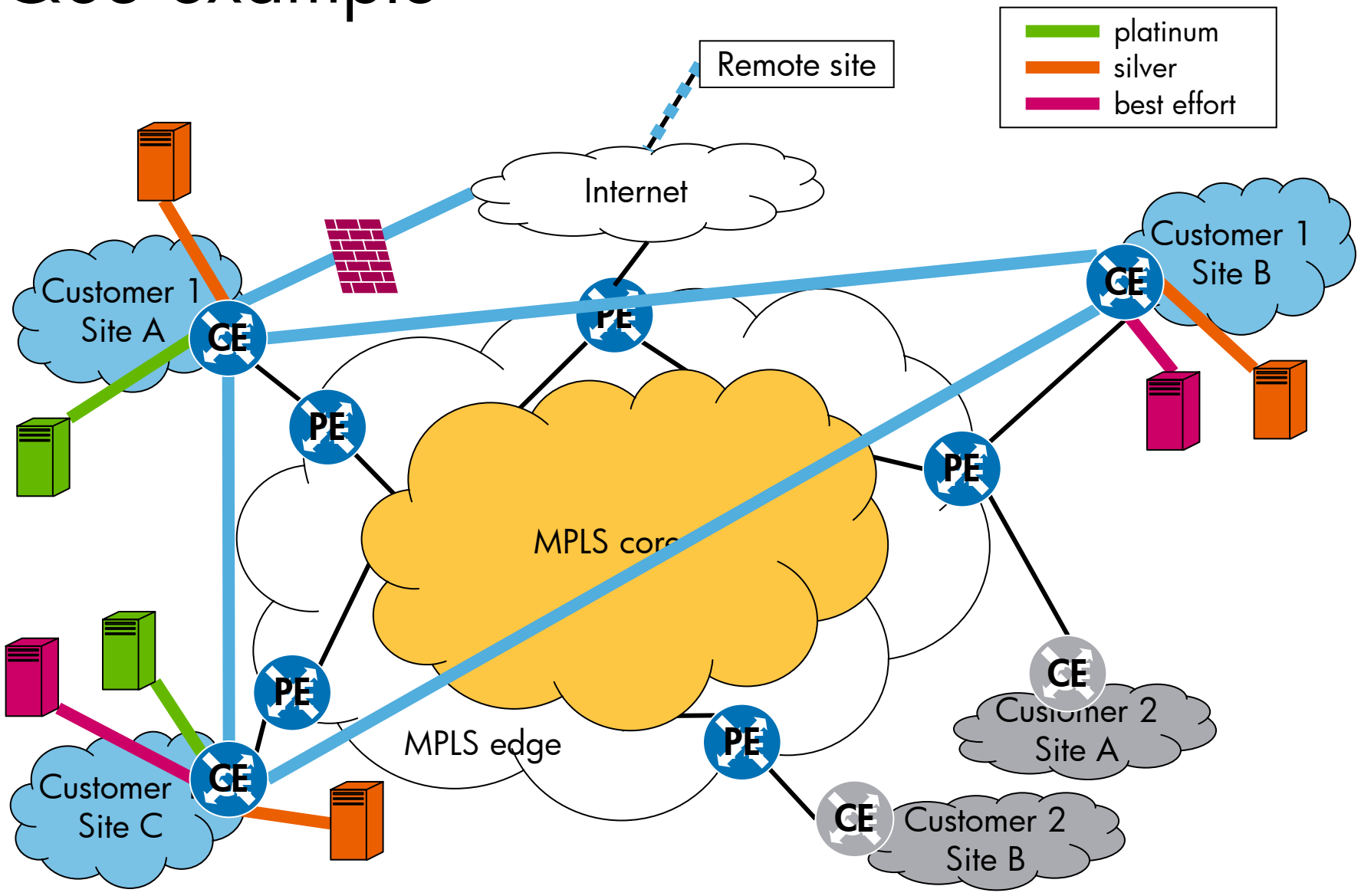
- MPLS/VPN—Layer 3
  - Intranet
    - managed and unmanaged CE
  - Extranet
  - Internet access
  - NAT and Firewall service
  - Multicast VPN service
  - IPSec service
  - Inter-AS VPN
  - Layer 3 QOS
- MPLS/VPN—Layer 2
  - Ethernet over MPLS
  - Frame Relay over MPLS
  - PPP over MPLS
  - Any-to-Any over MPLS
  - VPLS
  - Layer 2 QOS

- SLA KPIs supported
  - Availability
  - Packet loss
  - Latency
  - Jitter
  - Throughput

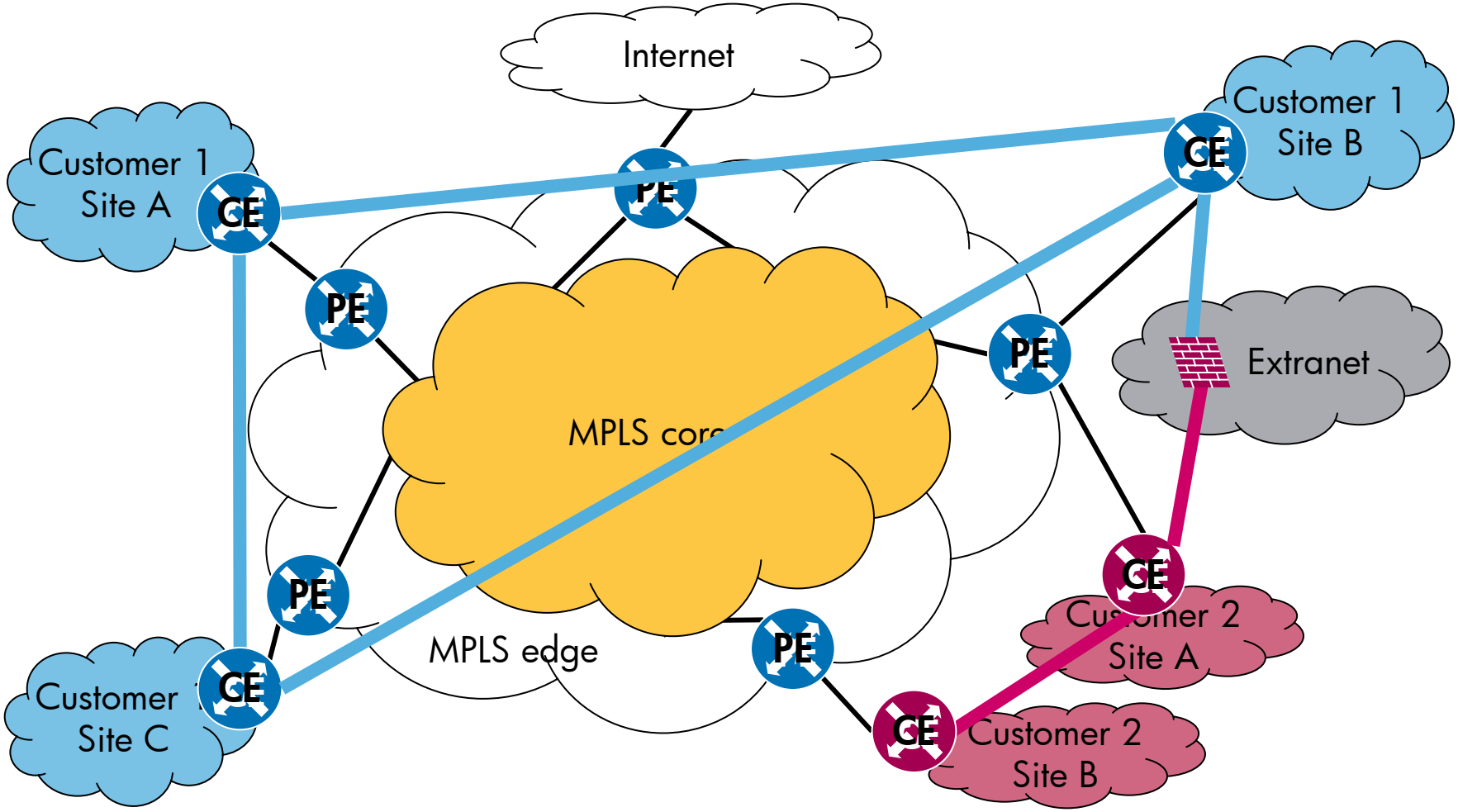
IP VPN example



QoS example


platinum
silver
best effort
Remote site
Internet
Customer 1
Site A
CE
PE
PE
MPLS core
MPLS edge
PE
CE
Customer 1
Site B
PE
PE
CE
Customer 2
Site A
Customer
Site C
CE
CE
Customer 2
Site B

Extranet example




Managing MPLS
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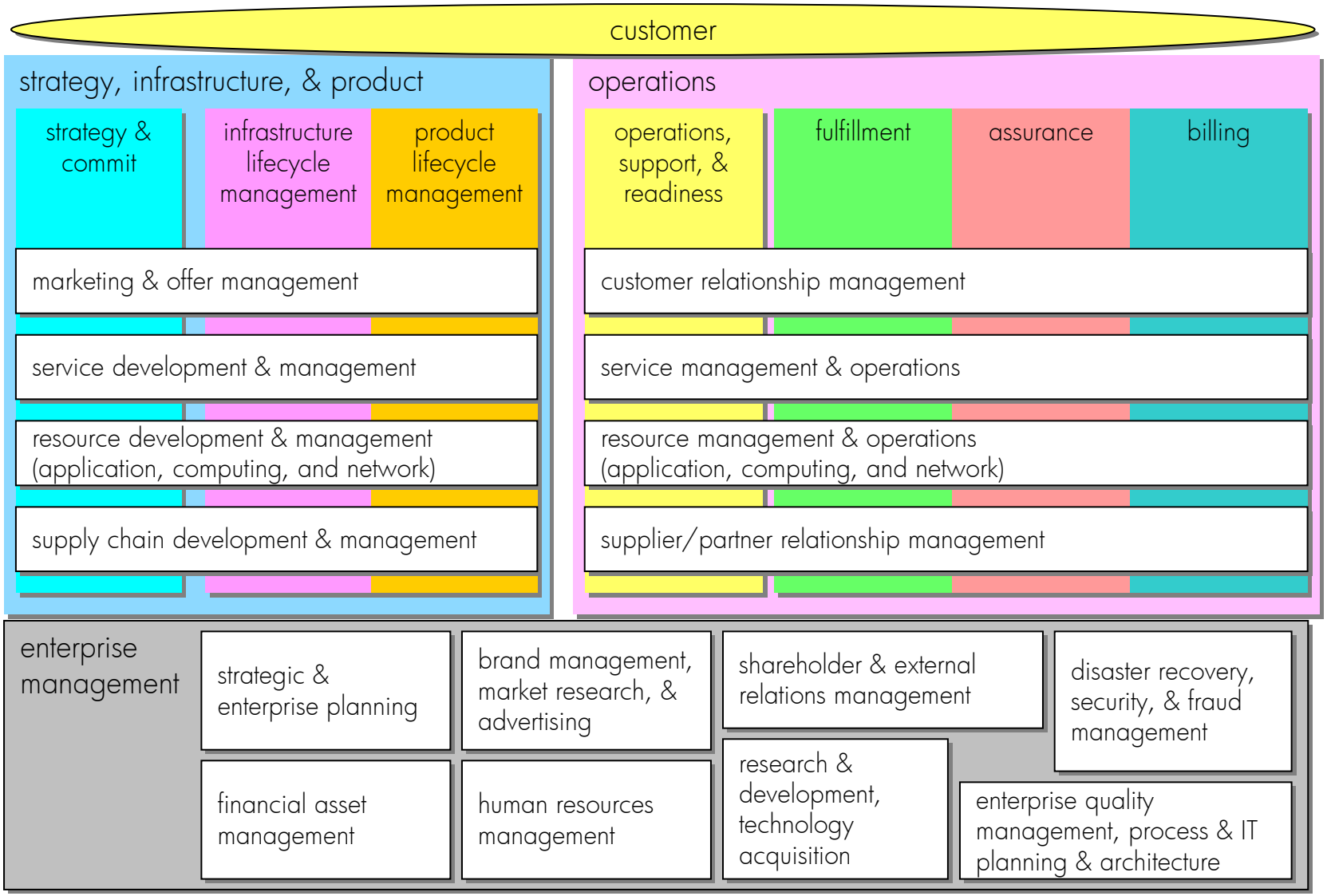
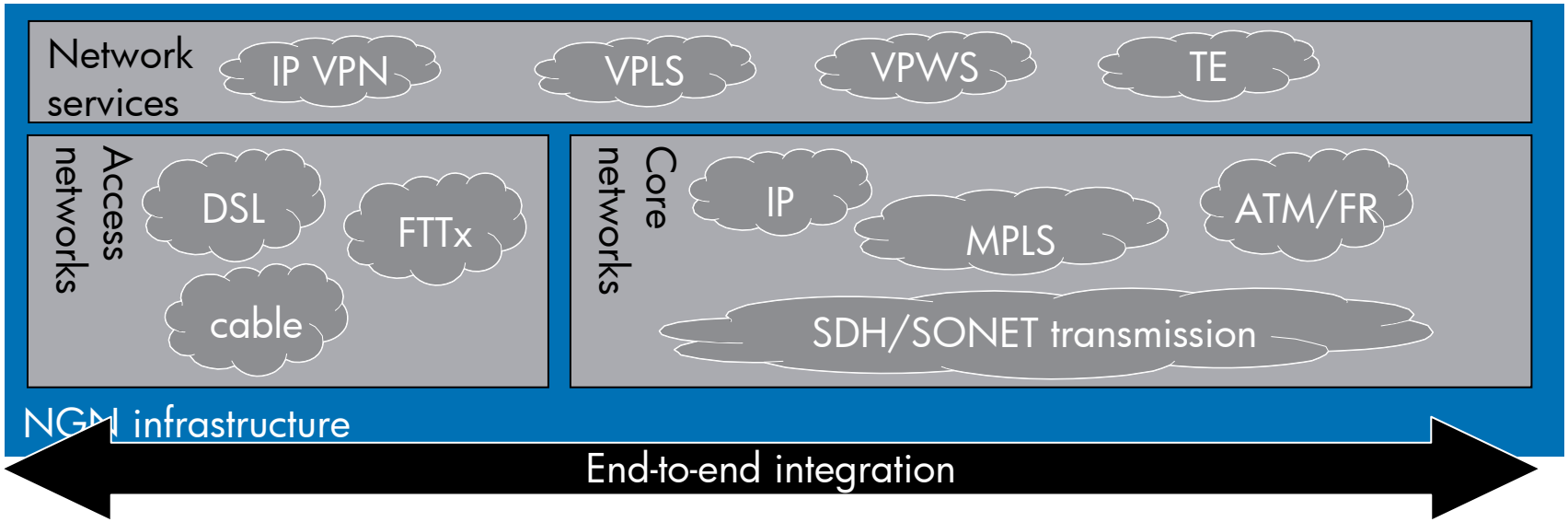
Manage across business processes: TMF eTOM

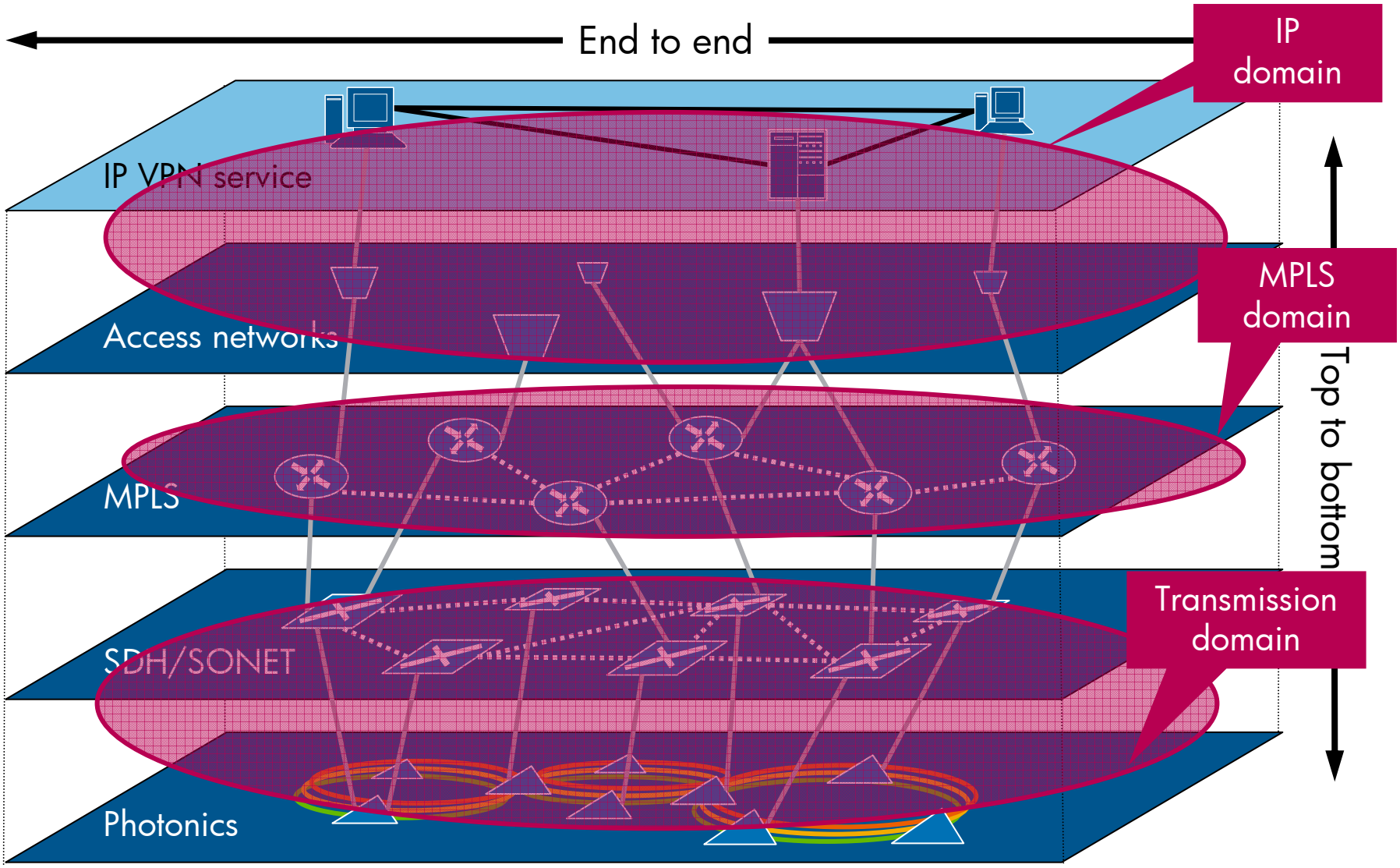


Manage the customer's end-to-end service

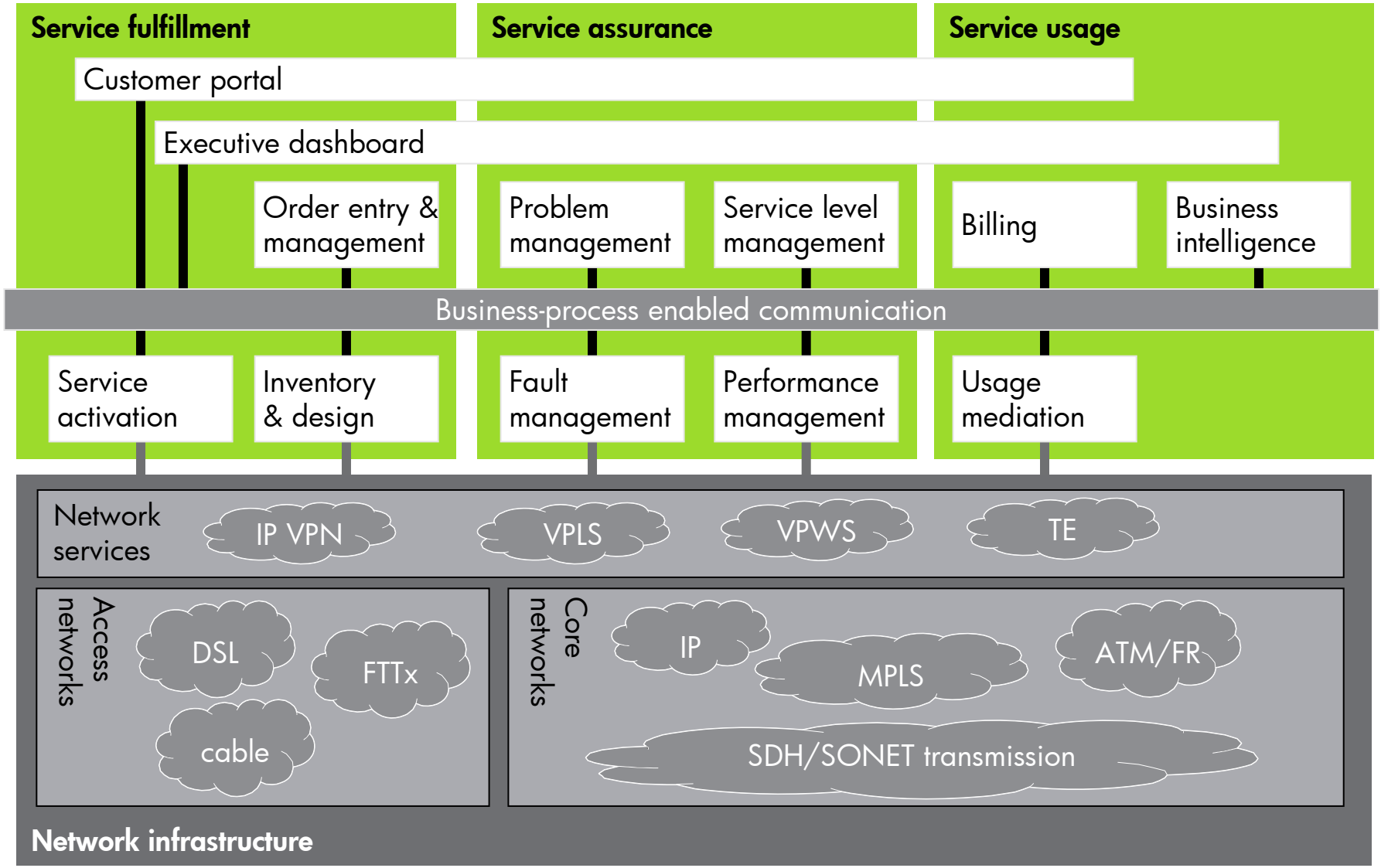
- Customer's perspective of end-to-end service
  - Access device → access network → core network → Value-added service→ IT systems → content
- Support move to
  - complex network services (e.g., VPN, VPLS)
  - triple- and quadruple-play services
  - converged networks over MPLS core



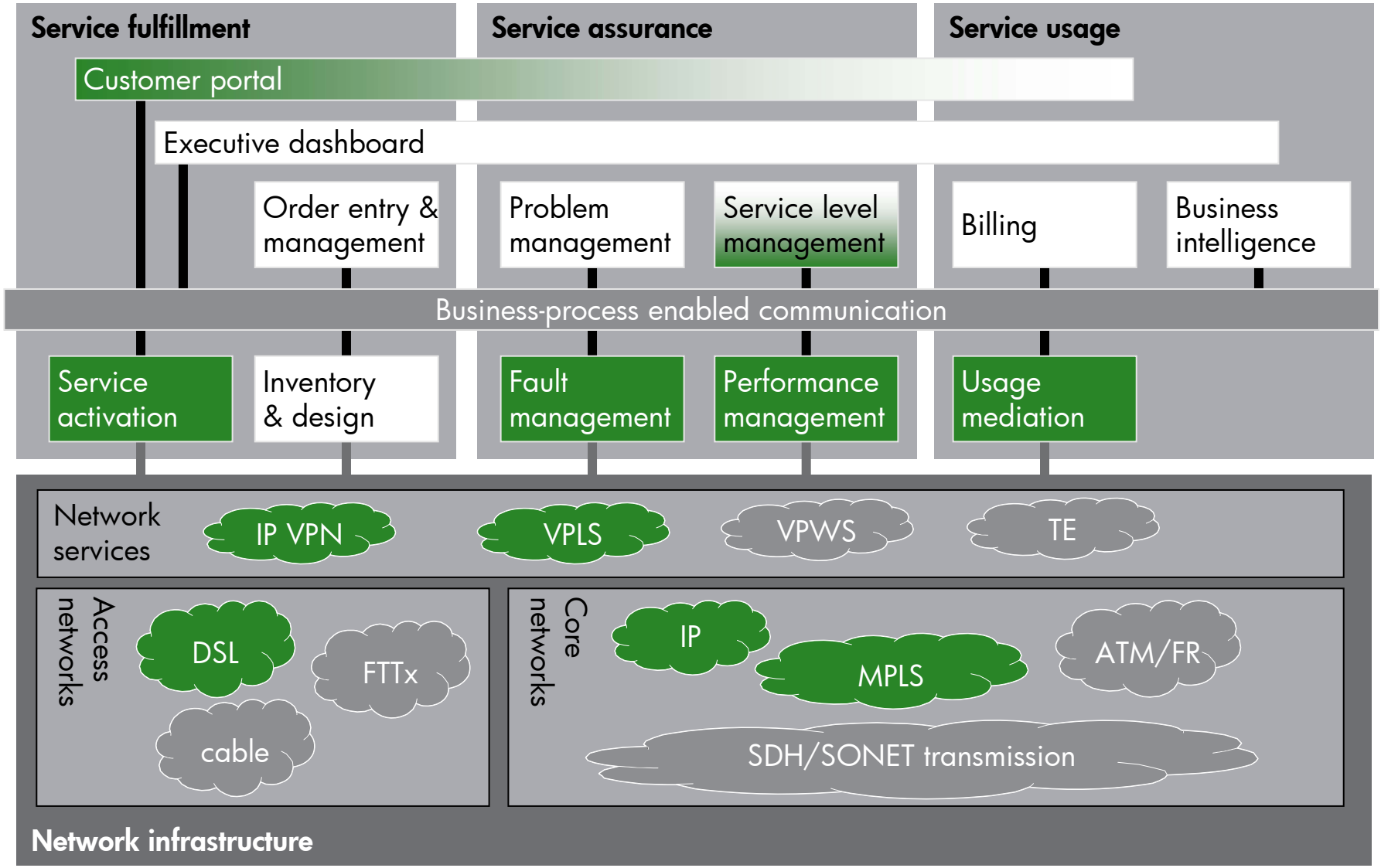
Manage the technology top-to-bottom



ISM for Next Generation Networks model



The BSNL functional requirements




The solution
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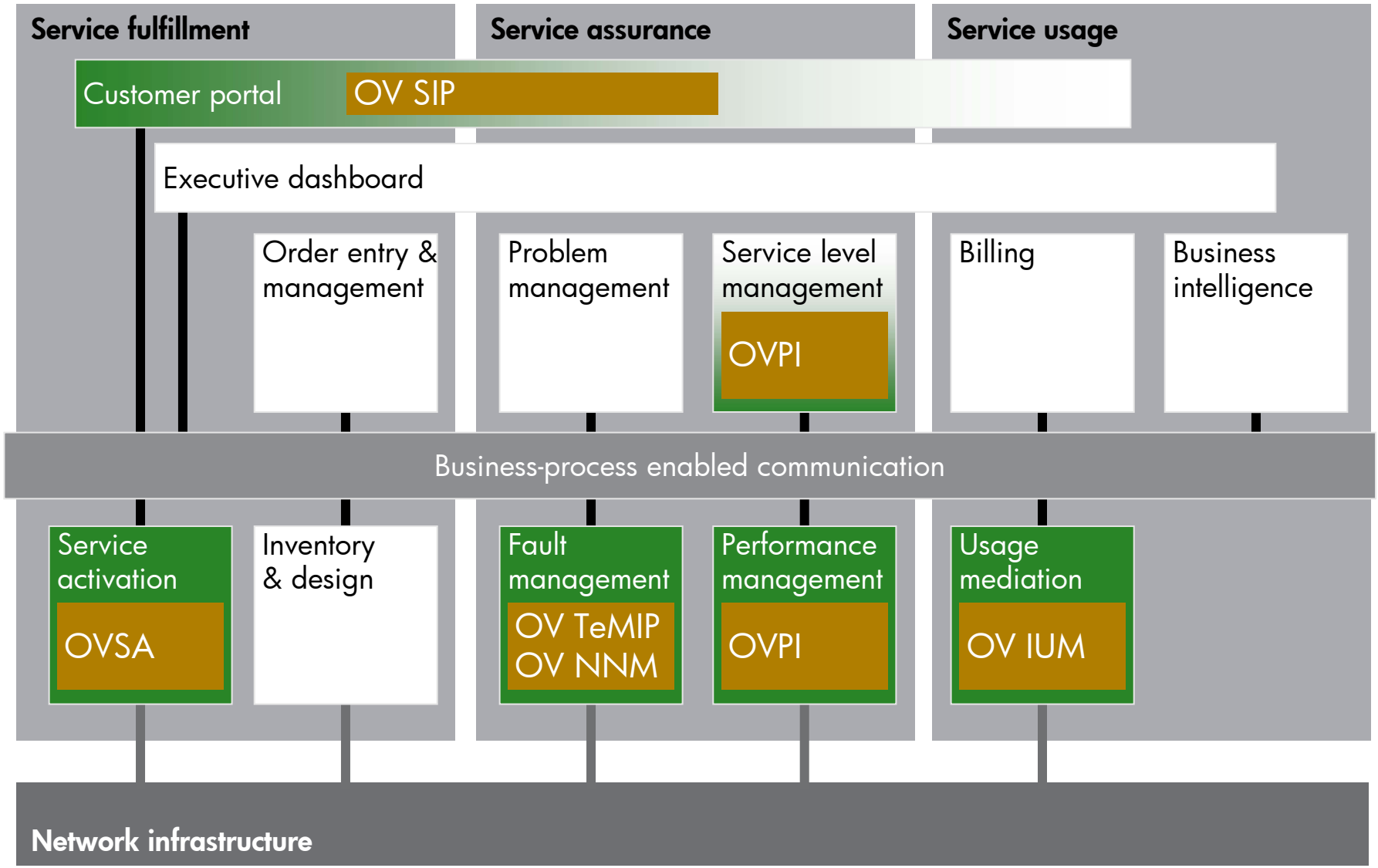
The BSNL solution



Service fulfillment requirements

- Automated flow-through provisioning
  - Support full set of layer 2 and layer 3 VPN services
  - Support new service as well as modification of existing service
    - Add new site to existing VPN or new VPN to existing site
  - Provision and activate complete service
  - Suspension and resumption of service
  - Configure service assurance and usage systems
- Can be expanded to provision/activate access network

Service fulfillment at BSNL

- HP OpenView Service Activator configures the complete end-to-end service, not just the network
  - PE routers for layer 2 and layer 3 VPN
    - star and mesh VPN topologies
    - Cisco & Juniper
  - CE
    - For managed CE, configures CE router
    - For unmanaged CE, provides the customer with configuration parameters in OpenView Service Information Portal
  - Site firewall policies, supporting Intranet and Extranet configurations
  - NAT for a site (static/dynamic/PAT)
  - IPsec access
  - Internet service
  - Multicast service
  - Bandwidth on demand
  - OpenView Network Node Manager and OpenView Performance Insight to enable monitoring new site/service

Service assurance requirements

- Fault monitoring
  - Monitor
    - MPLS network
    - Broadband
    - Narrowband
    - NIB-I ISP Infrastructure
  - Alarm actions based on Class of Service
- Performance and SLA monitoring
  - Monitor MPLS/VPN (all KPIs)
  - Performance thresholds based on Class of Service
  - Varied report types
    - Customer VPN
    - Carrier transition
    - End-to-end network
    - Business-hours only
- Ready to manage Transport Network and Broad Band Multi Play network

Service assurance at BSNL

- Fault management
  - OpenView Network Node Manager
    - Element management system for MPLS/VPN infrastructure
    - Supports Cisco and Juniper equipment
    - Integrated with Cisco RWAN manager
  - OpenView TeMIP
    - Umbrella alarm management system for MPLS, Broadband, Narrowband and ISP networks
    - Integrates with NNM (MPLS) and other NNM (3Com network from BB and NB)
- Performance management
  - OpenView Performance Insight
    - Deployment of distributed architecture with five Satellite servers and one Central server
    - Reports customization to meet MPLS/VPN performance management requirements
    - Integration with NNM, OVSA and OVSIP

Service usage requirements

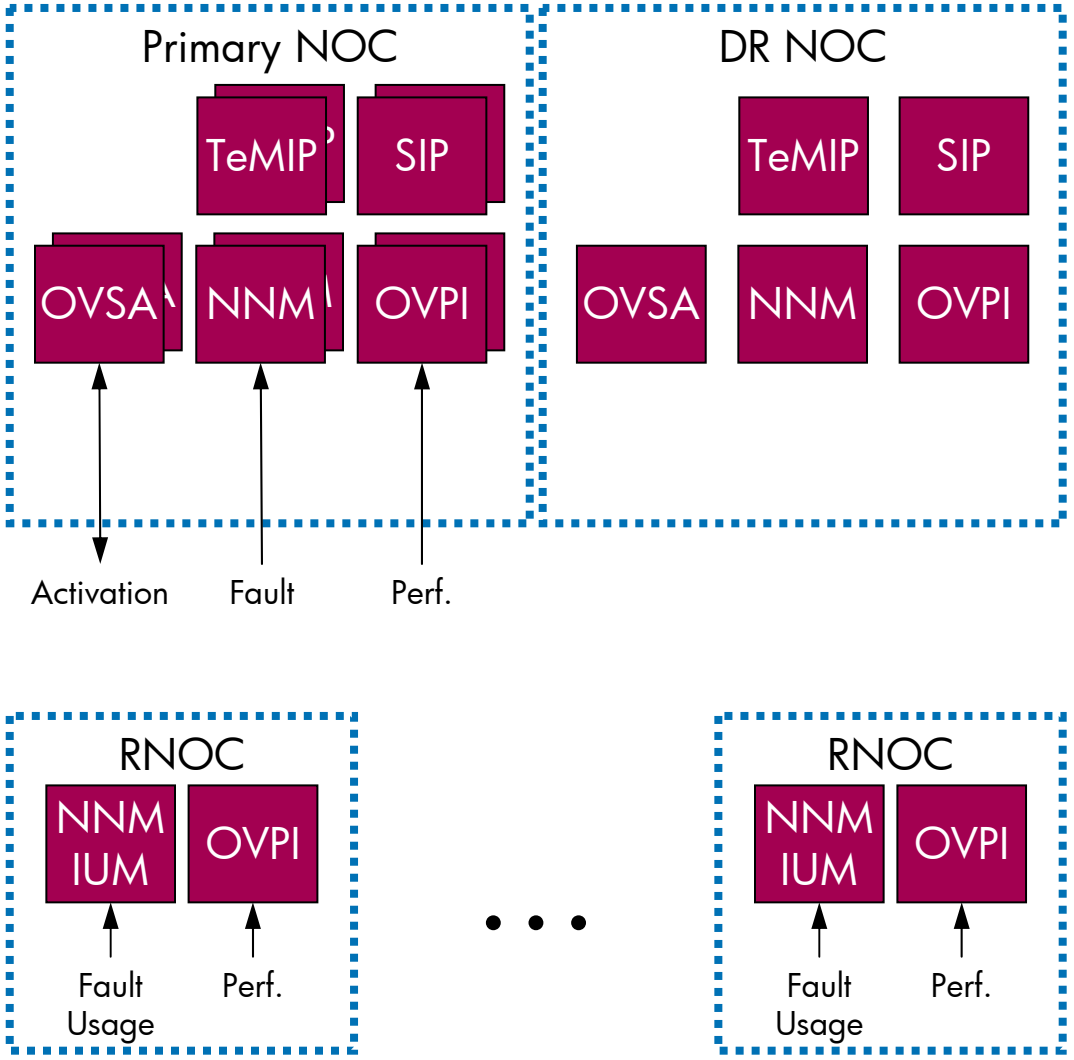
- Usage Mediation objectives
  - To be able to understand the type of traffic flowing thru VPN
  - Ability to charge/bill based on traffic volume, bandwidth, application type and TOS
- Usage Mediation requirements
  - Collect flow records from provider edge
  - Aggregate based on various fields of flow record
  - Generate reports based on aggregated flow records
  - Support northbound interface for integration with billing system

Service usage at BSNL

- OpenView Internet Usage Manager
  - Usage mediation for MPLS/VPN network
  - Usage records enriched with VPN information
  - Aggregation of usage records at interface level and based on TOS bits

Scalability and availability

- Scalability requirement
  - 200K VPN sites
  - 40K managed CE sites
  - NMS to support DSL BB and Narrowband networks
- Solution
  - Five regional NOCs
  - Redundant central NOCs
  - High-availability implemented for all systems at Primary NOC and RNOCs.
  - All applications run on two-node cluster in load distribution mode, with Oracle database running on second node.



Challenges

- Being a new domain, requirements were understood and defined only at a very high level
- Delay and continuous changes to network and services design - dependency management
- Coordination with various teams (Network deployment and Network testing teams) in order to test various features of provisioning and assurance components

Benefits seen

- Capability of PMS to support whole range of L2 and L3 services ensured BSNL as industry leader in terms of service offerings
- Flow-thru provisioning has resulted in improved operational efficiency and zero-error
- TeMIP as umbrella network management has enabled them to have a common fault management system across IP/Backbone, Narrow-band and Broad-band networks
- Report builder has enabled system administrators to quickly create and deploy new performance reports
- Disaster recovery solution has enabled system administrators to perform "planned outages" of systems at primary site by switch-over of operations to DR site. Thereby readiness of DR site also tested.

Questions?

For more information, go to
http://www.hp.com/go/ism
and
http://www.openview.hp.com/solutions/telm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