



Operations and management of MPLS networks

Norman Kincl
Solution Manager, ISM for NGN
HP

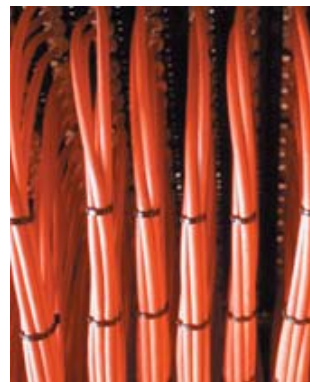


“Carriers will probably not be able to successfully converge their networks on a common MPLS transport unless more attention is paid to the management of the MPLS infrastructure.”



Leif Hoglund

RHK, August 2004

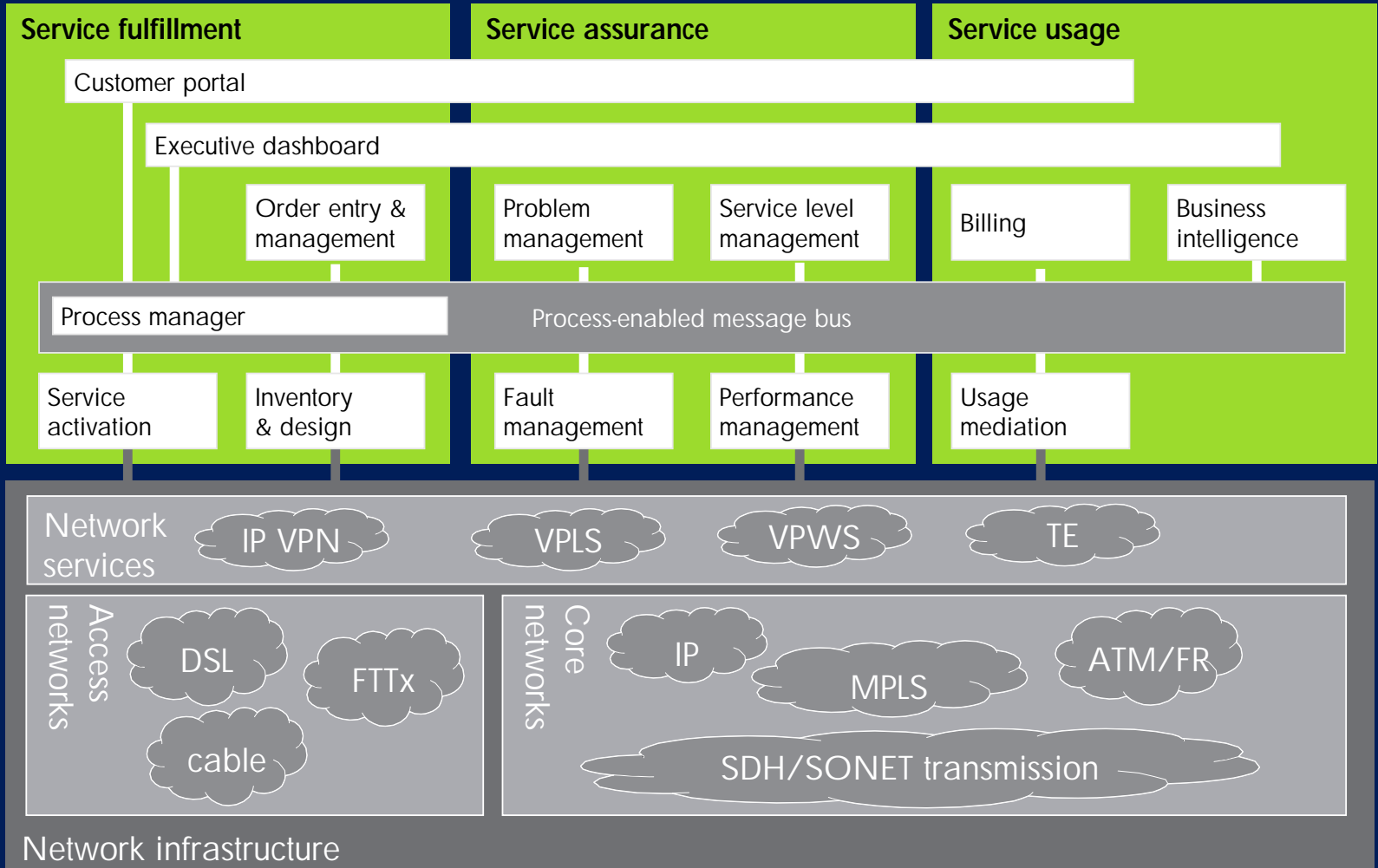


Dimensions of MPLS management

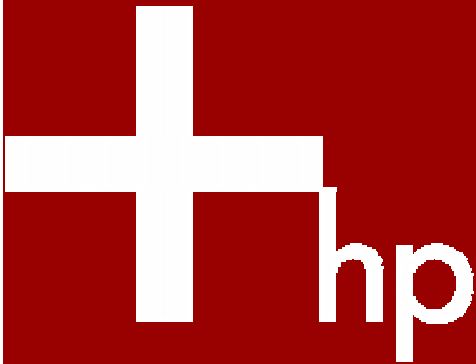
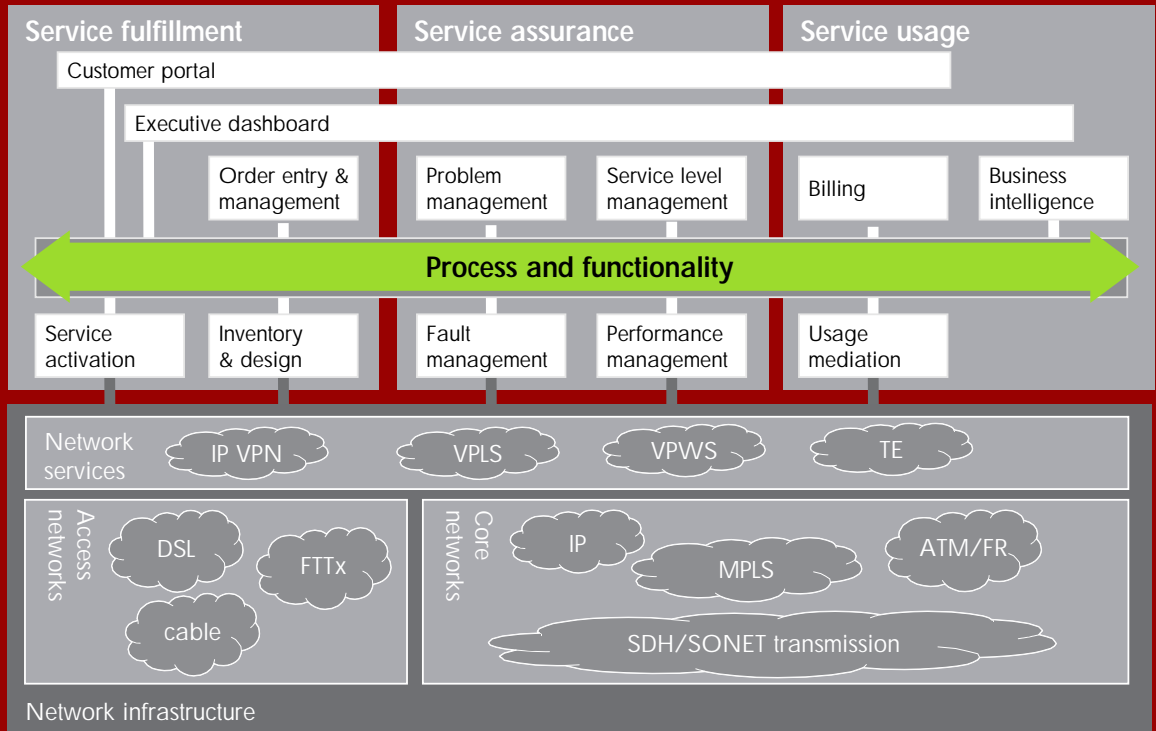
Attention needs to be paid to

- managing across business processes
- managing the customer's service end to end
- managing top to bottom

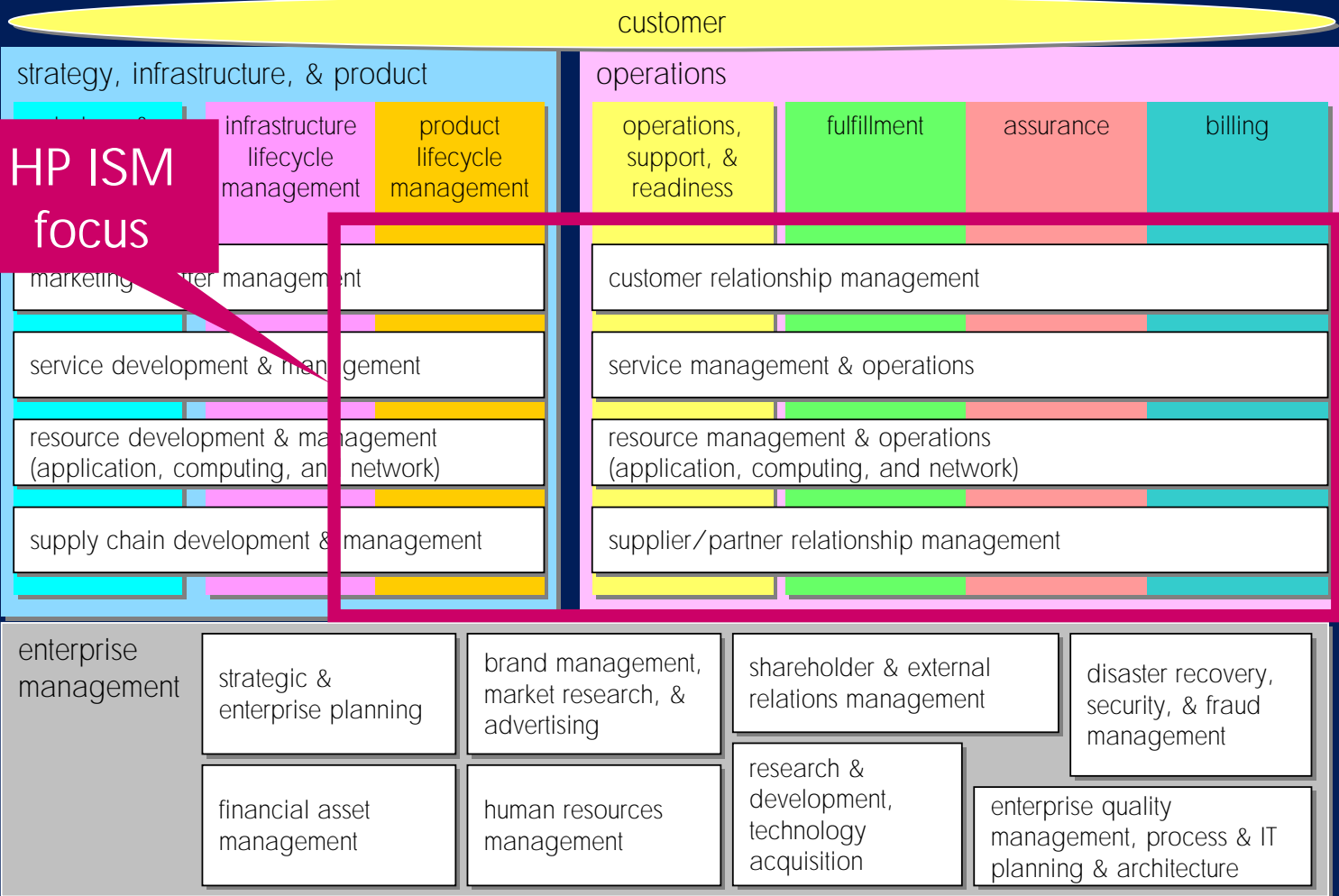
Management model—ISM for Next Generation Networks



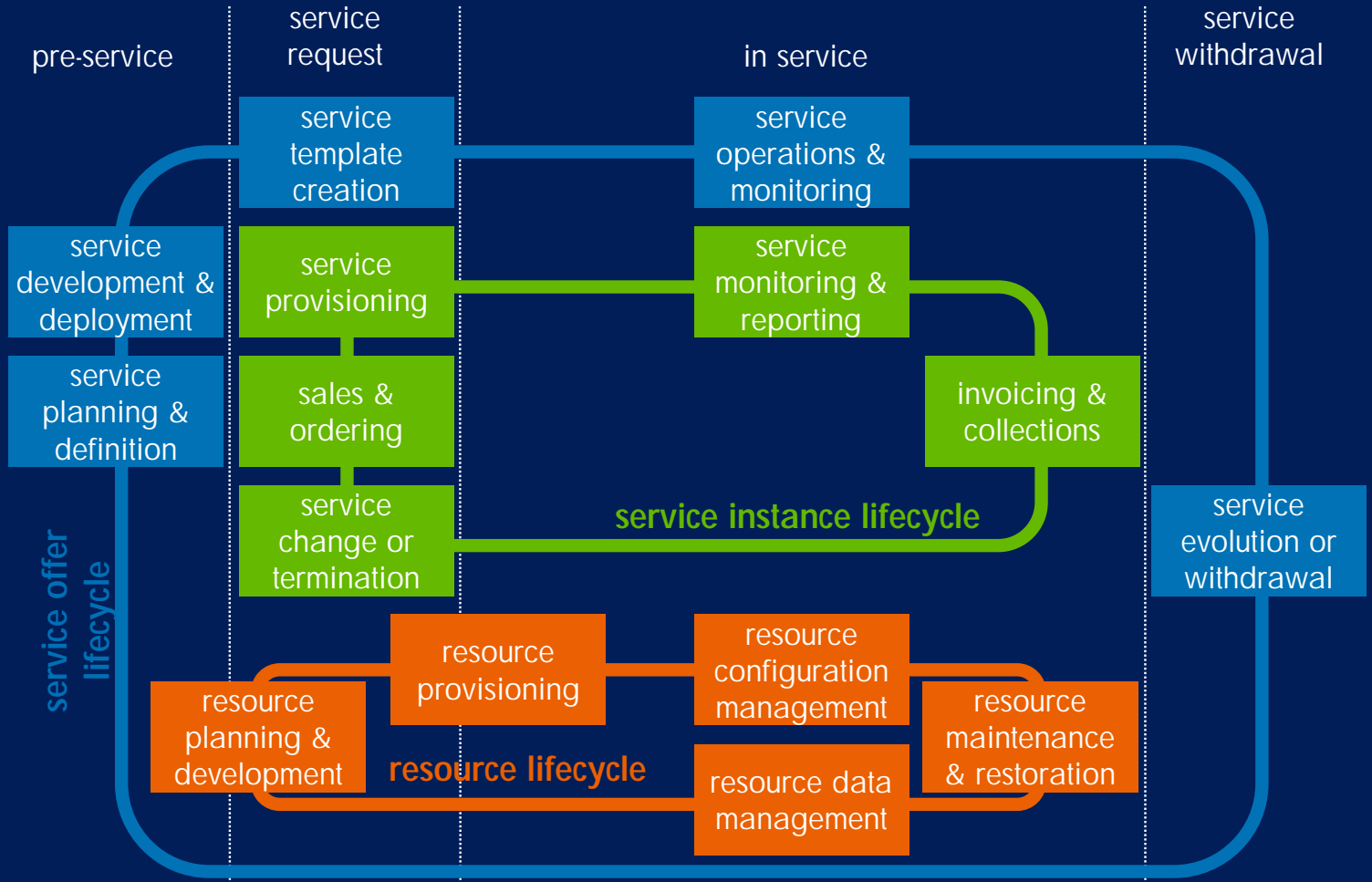
Managing across all the business processes



TMF eTOM



Lifecycles



BSNL overview

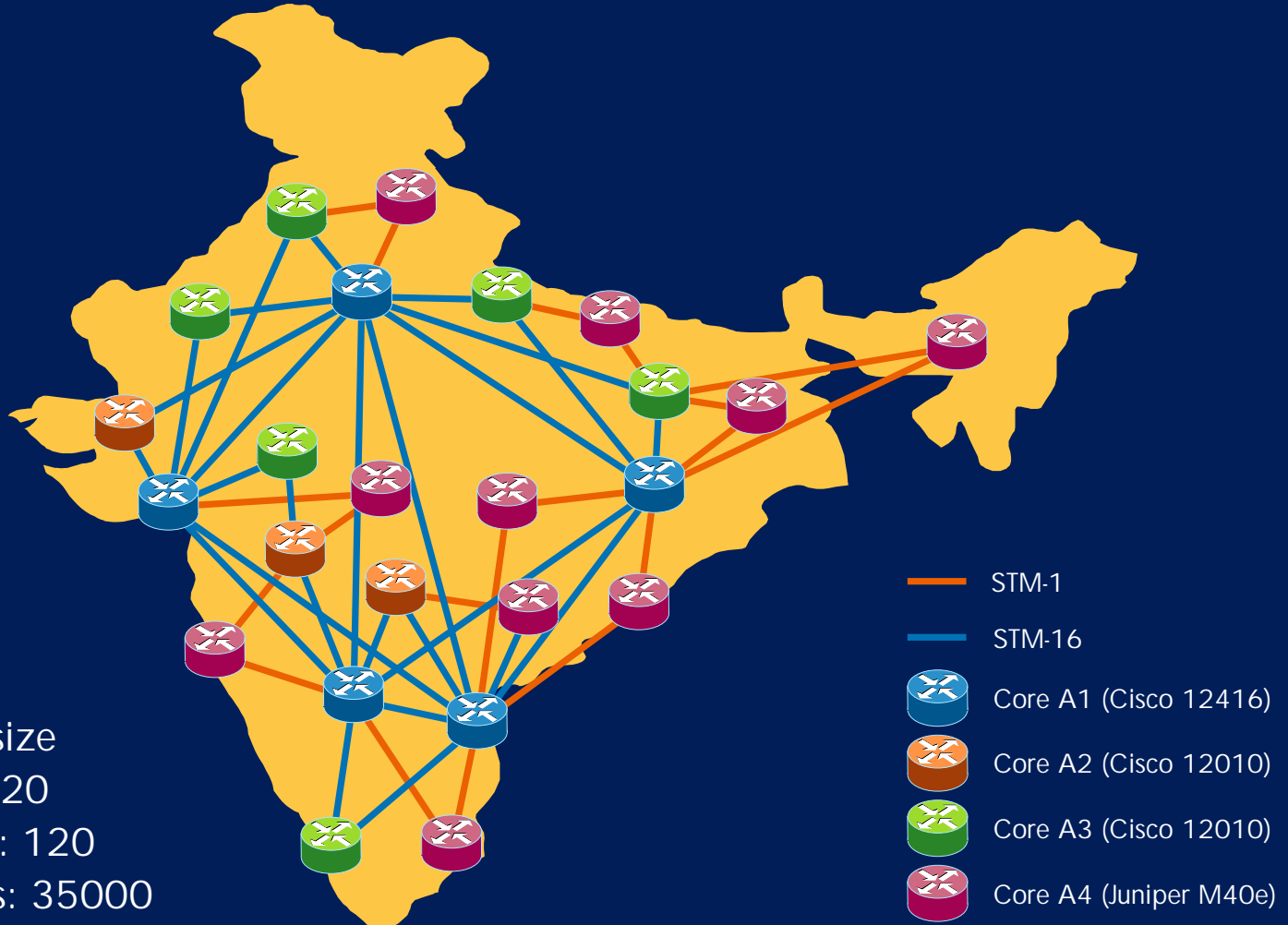


- Largest Incumbent Telco Service provider in India
- Annual turnover – USD 7 billion
- Services and customer base
 - Fixed phone – 25mil
 - GSM – 5mil
 - WLL – 1mil
 - ISP – 1.5 mil
 - Enterprise leased line
- Building National Information Backbone
 - MPLS/VPN services
 - DSL broadband
 - Dialup narrowband
 - IDC

Business requirements

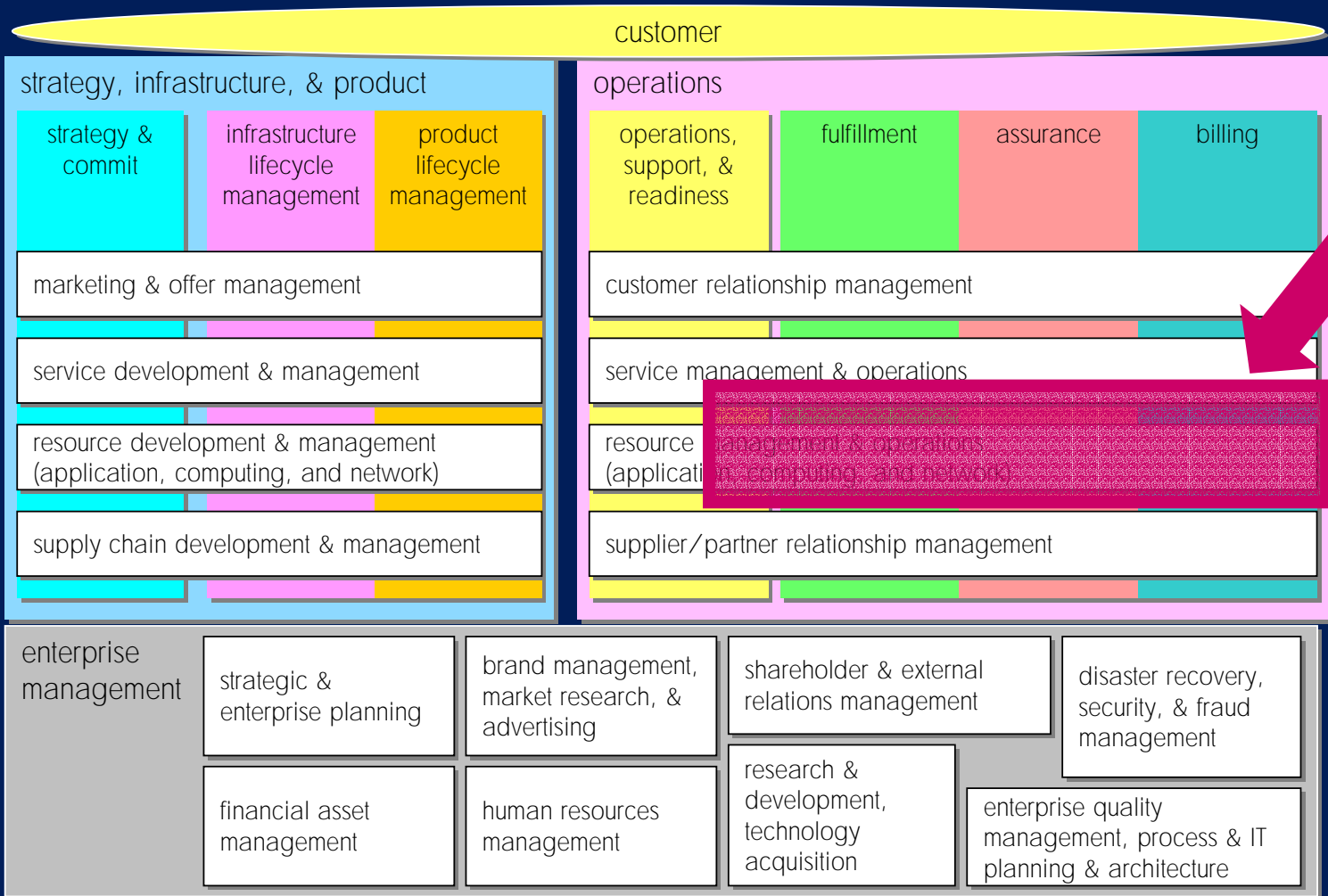
- Common IP infrastructure
- Diversified Intranet access services (VPN)
- Make the service very simple for customers to use
- Make the service very scalable and flexible
- Meet wide range of QoS and connectivity requirements
- Offer fully managed services to customers
- Allow BSNL to introduce additional services over same network

BSNL MPLS core network

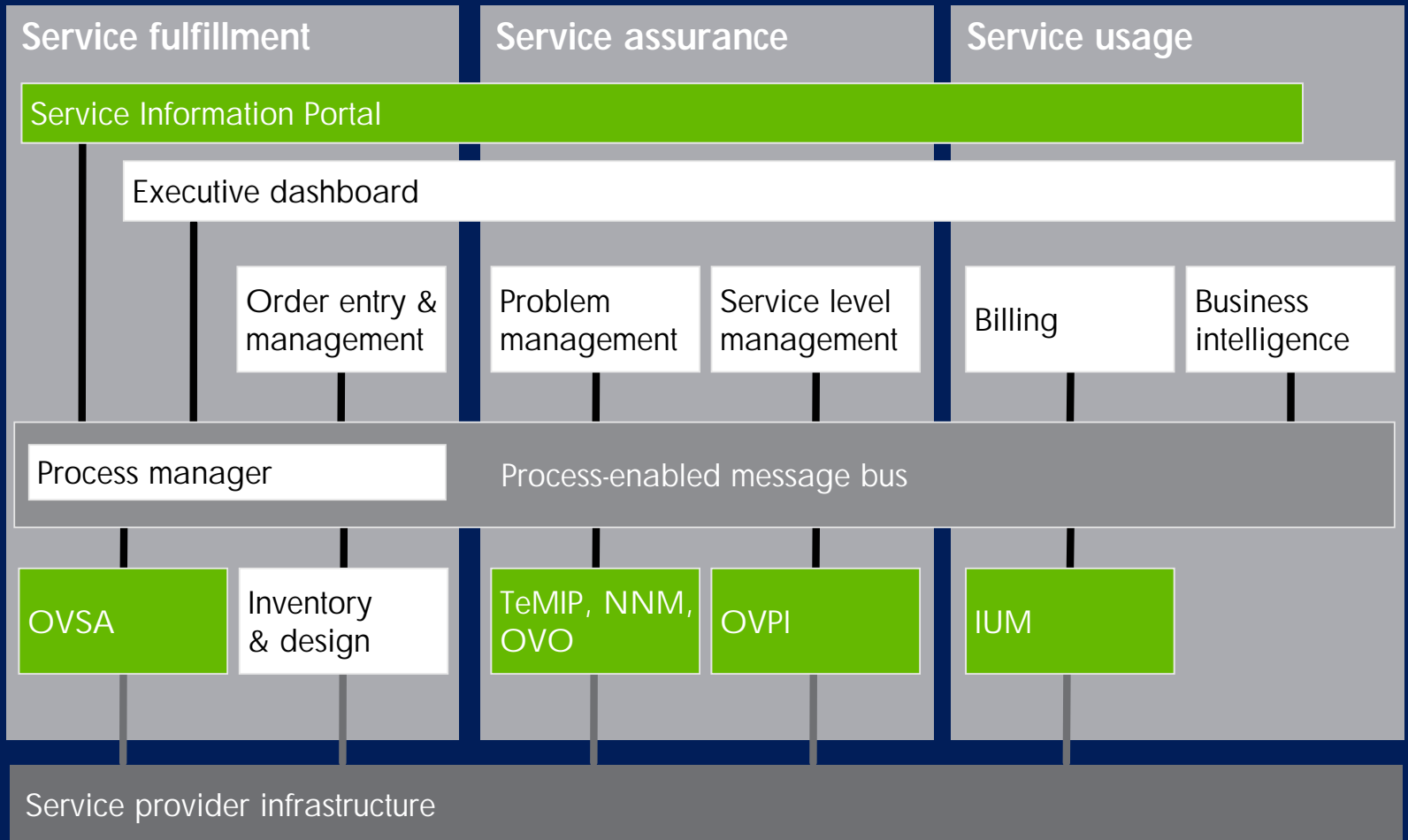


Network size
P routers: 20
PE routers: 120
CE routers: 35000

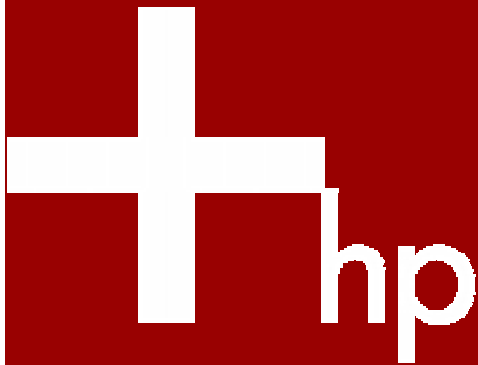
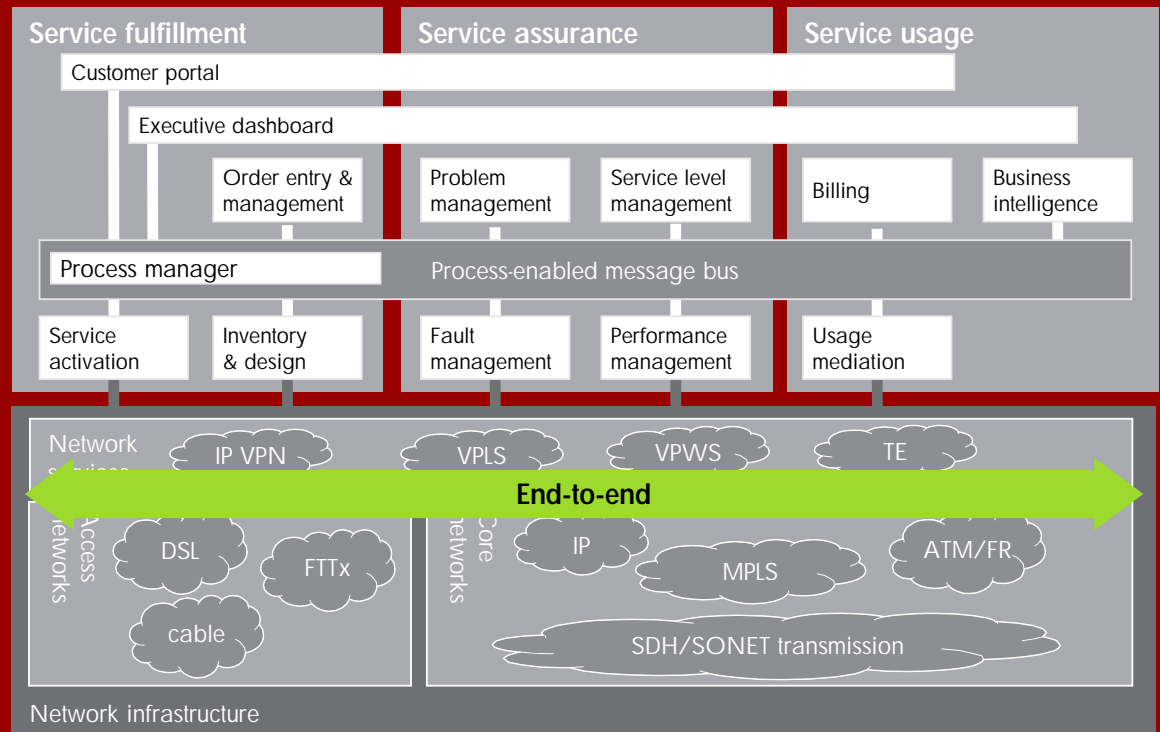
BSNL solution focus



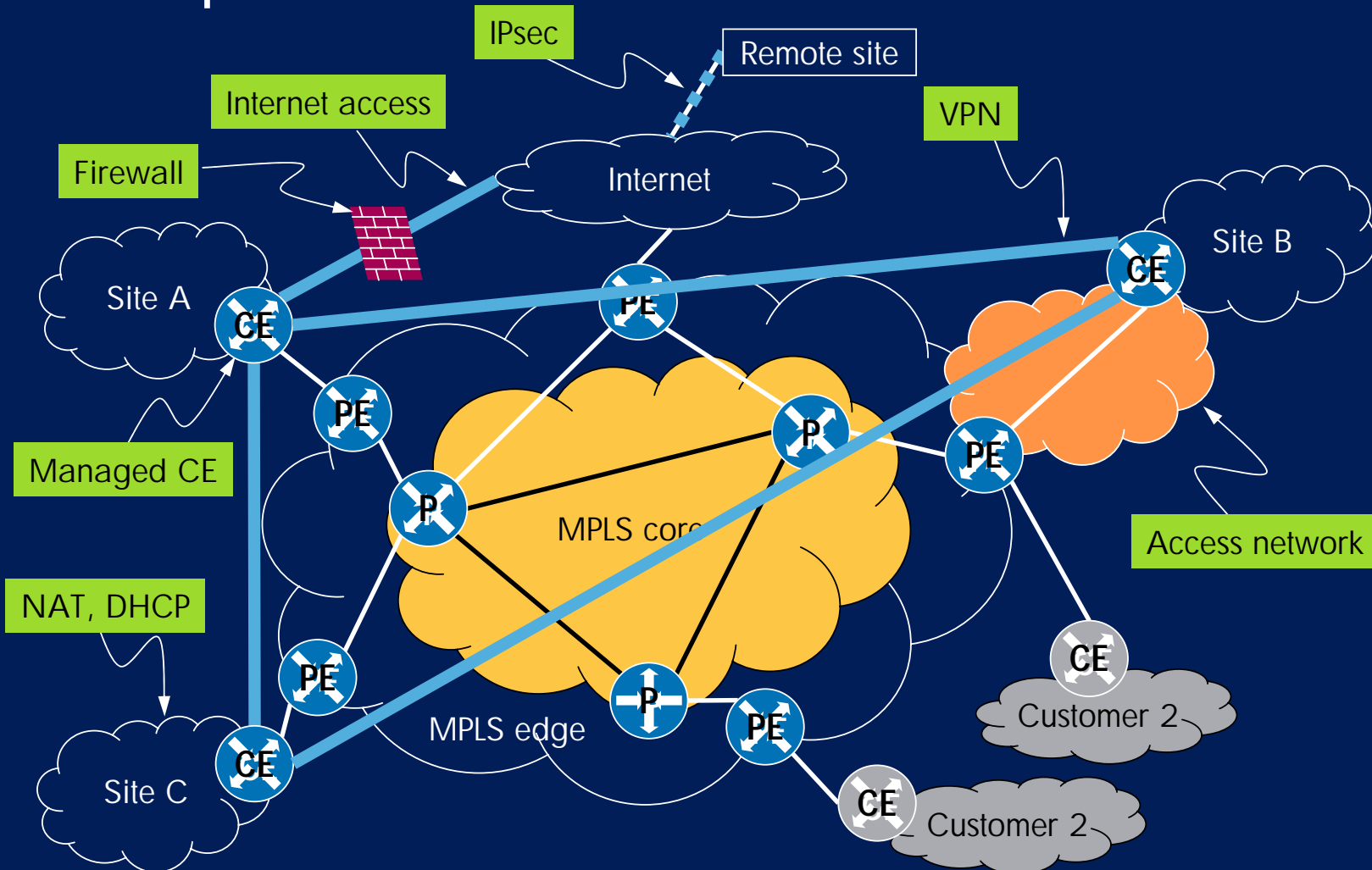
The BSNL solution



Managing the customer's service end-to-end



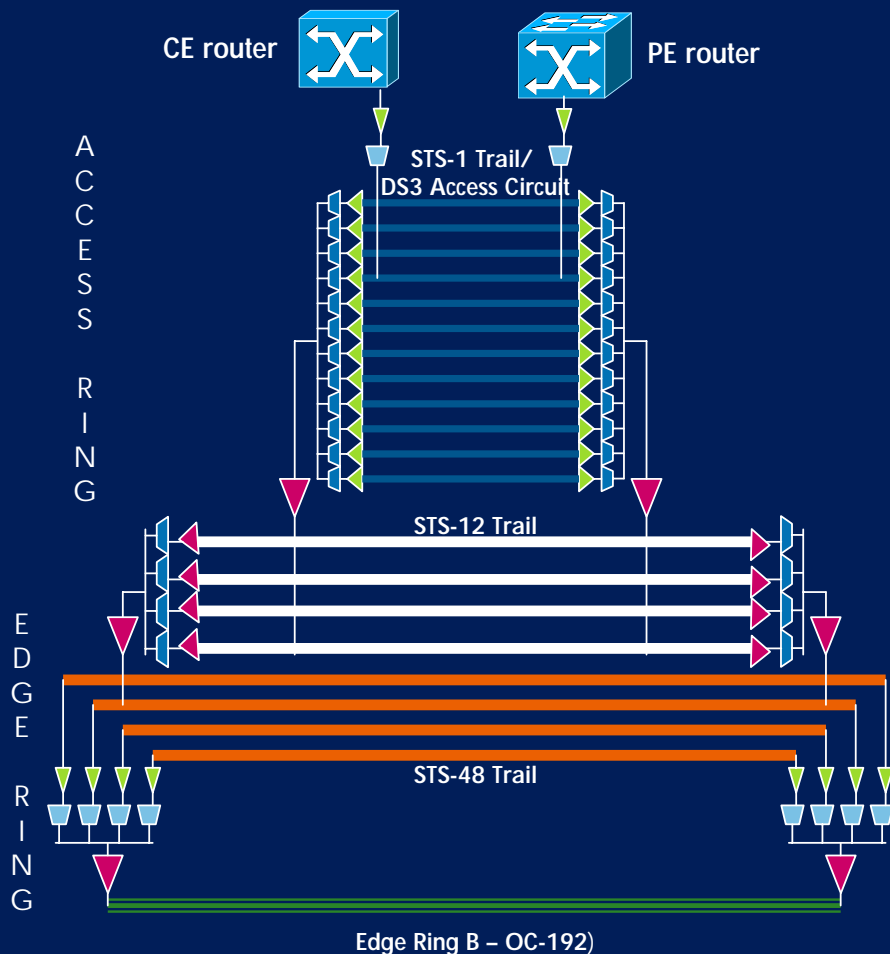
The end-to-end service—IP VPN example



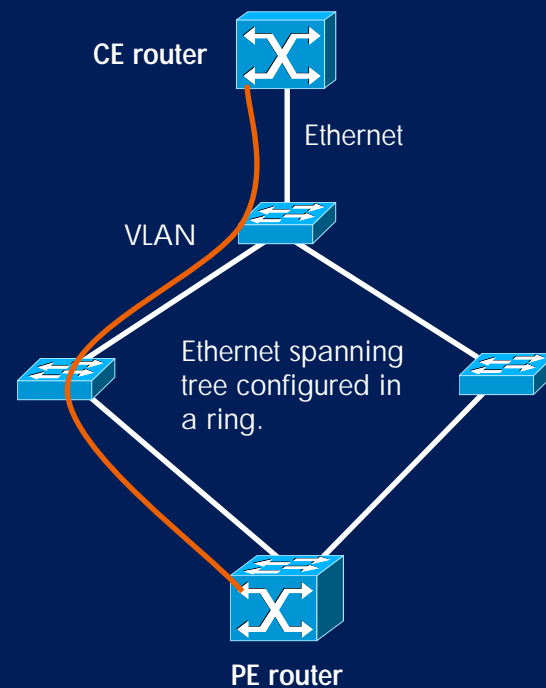
Sample access networks—CE to PE connection



DS3 Access circuit



Ethernet VLAN access circuit



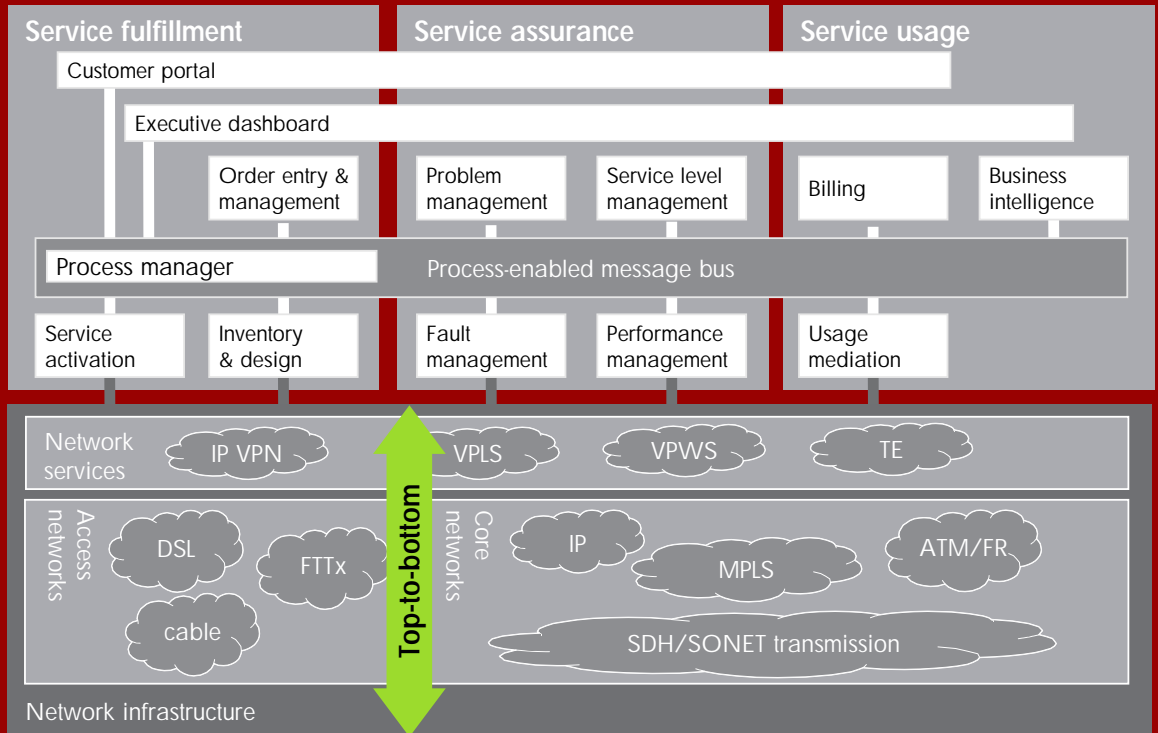
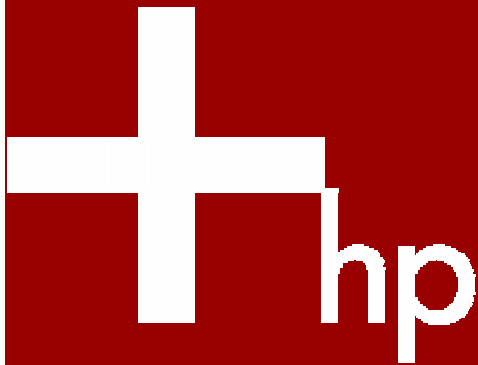
BSNL solution highlights

The HP solution

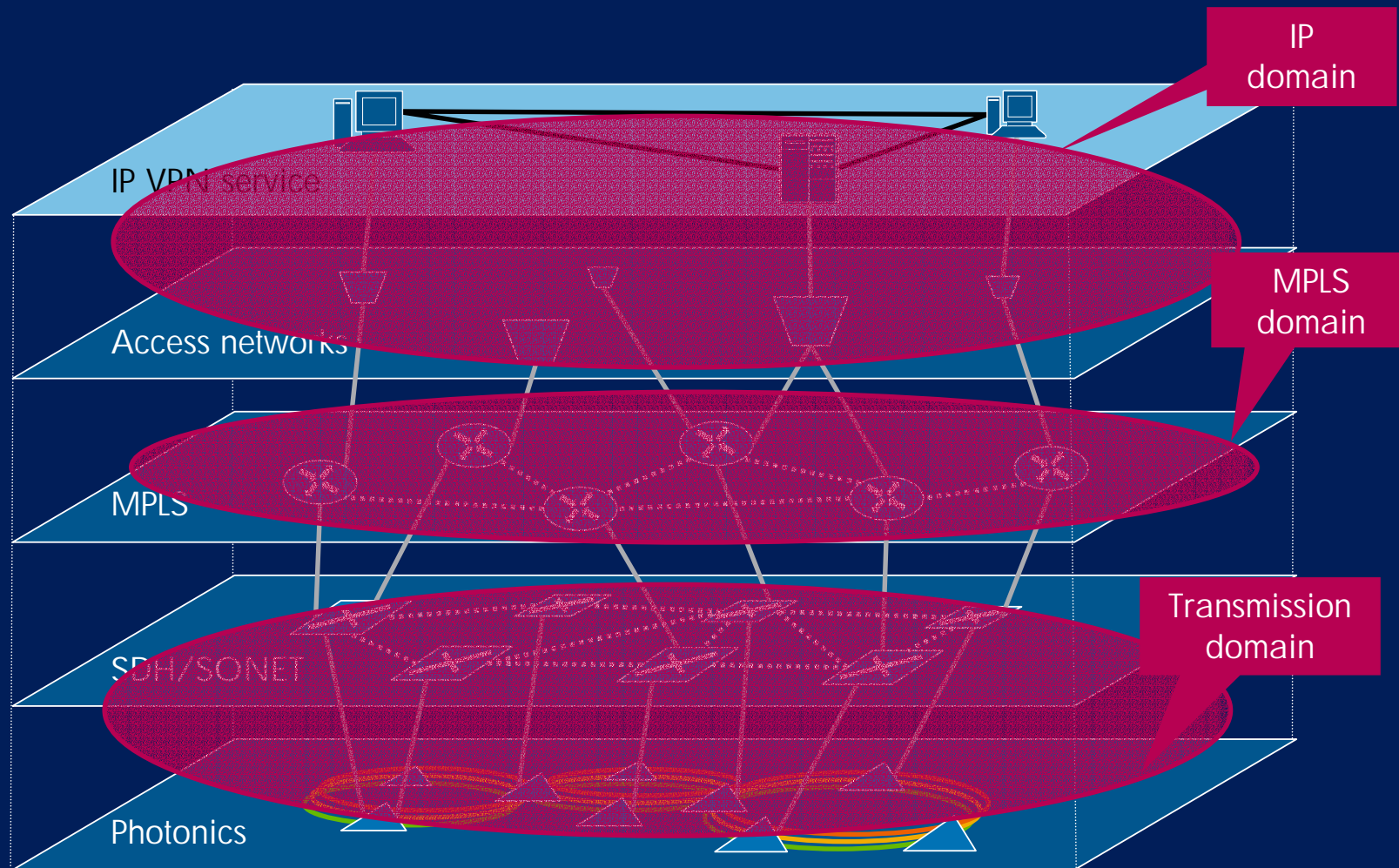
- Supports
 - Layer 3 VPN
 - Intranet Unmanaged CE
 - Intranet Managed CE
 - Extranet
 - Layer 2 VPN
 - Cisco HDLC
 - PPP
 - Frame Relay
 - Ethernet
 - Any-to-Any
 - VPLS
 - Value Added Services
 - Internet Access to L3 VPN
 - Firewall Services
 - NAT Services
 - IP Sec
 - Remote Access
 - MPLS
 - Multicast

- The HP solution provides integrated
 - Provisioning management
 - Configuration management
 - Audit management
 - Fault management
 - Performance management
 - SLA management
 - Security management
 - Usage data collection
- Configured as high-availability solution with geographically-distributed disaster recovery

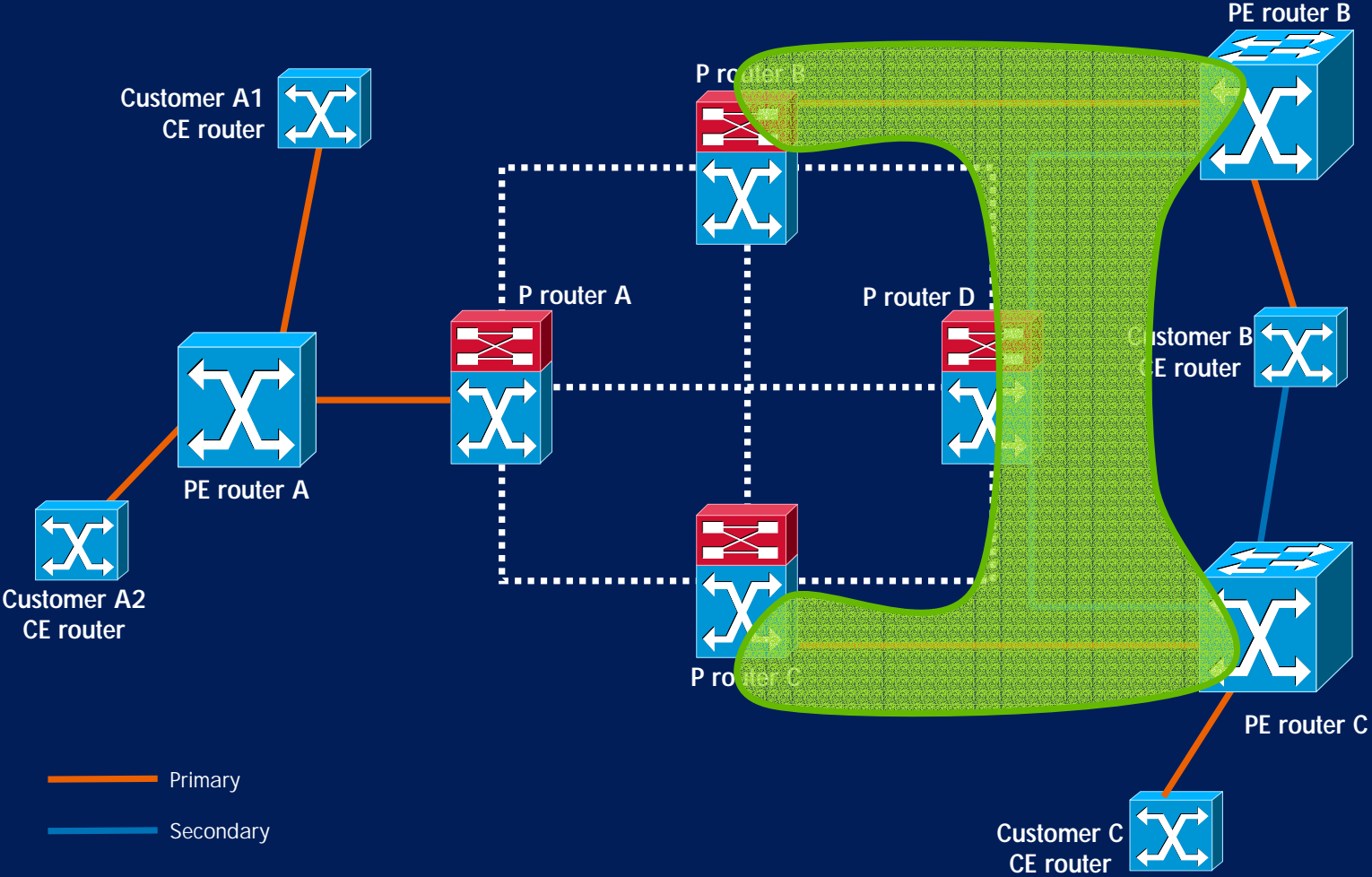
Managing the network top-to-bottom



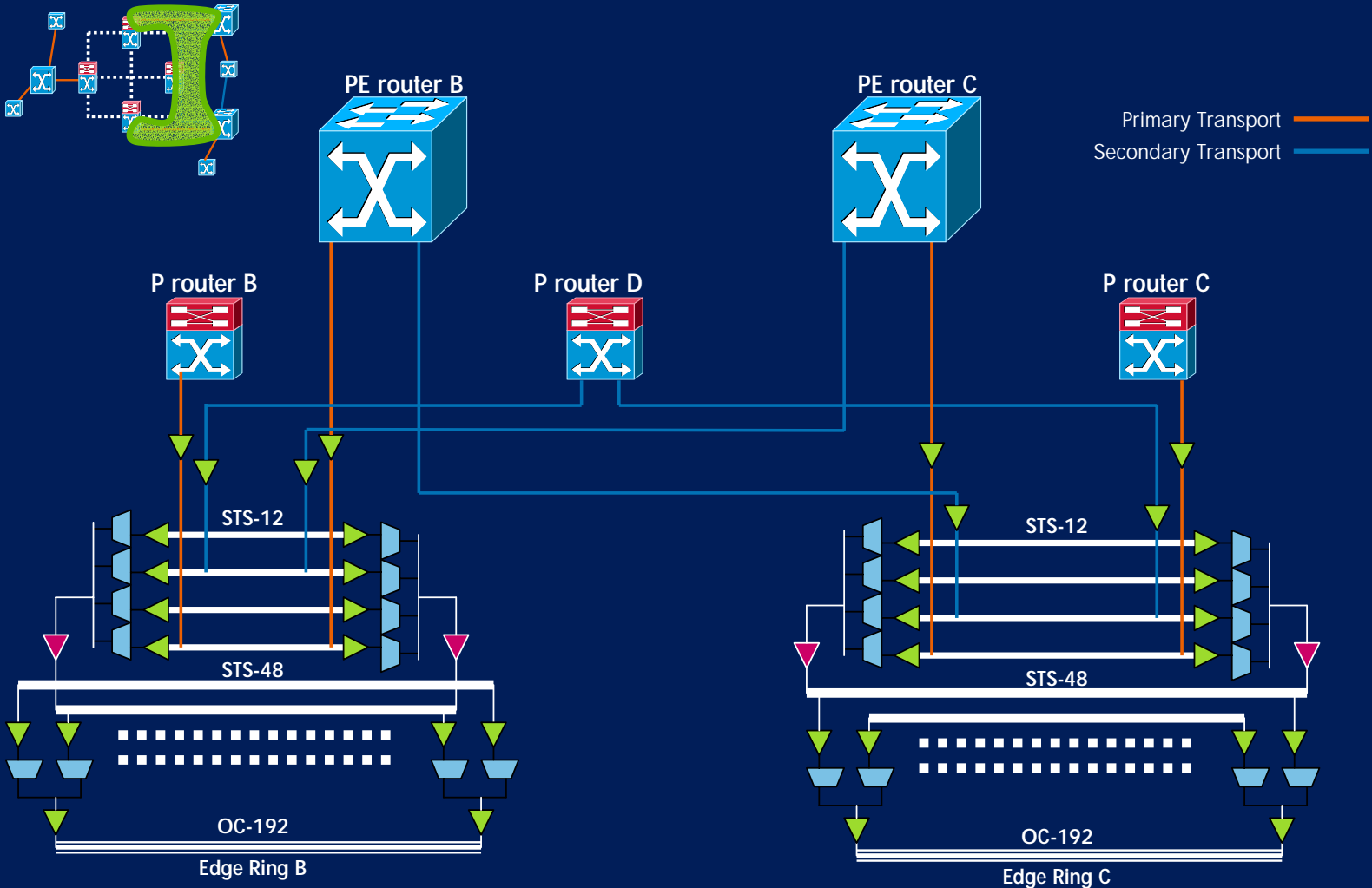
Inside the MPLS cloud—an IP VPN example



Example MPLS logical connections



Sample PE to P protected connection



Use case: fault management surveillance and analysis

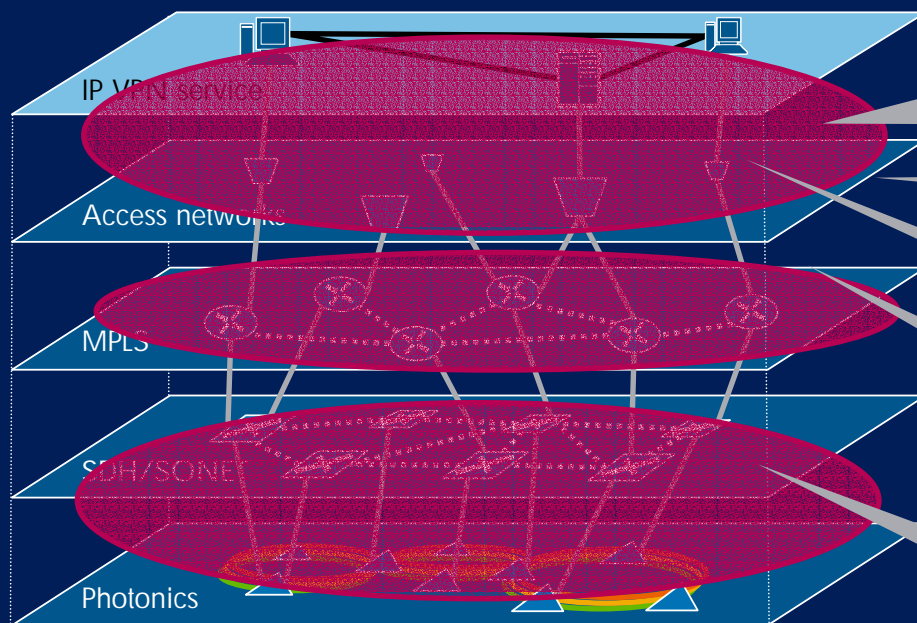


Scenario:

- OC48 link fails
- Link is used for PE to P router connection

What is needed:

- Identify root cause alarm
- Suppress related alarms
- Across technologies
- Across management domains (multi-NOC)



IP domain problems:

- VPN down
- Route change
- Link down
- ...

Potentially many thousands of alarms

Routing events:

- Adjacency loss
- Route flap
- Route change
- ...

MPLS events:

- LSP events
- ...

Threshold alarms:

- Latency exceeded
- Jitter out of bounds
- ...

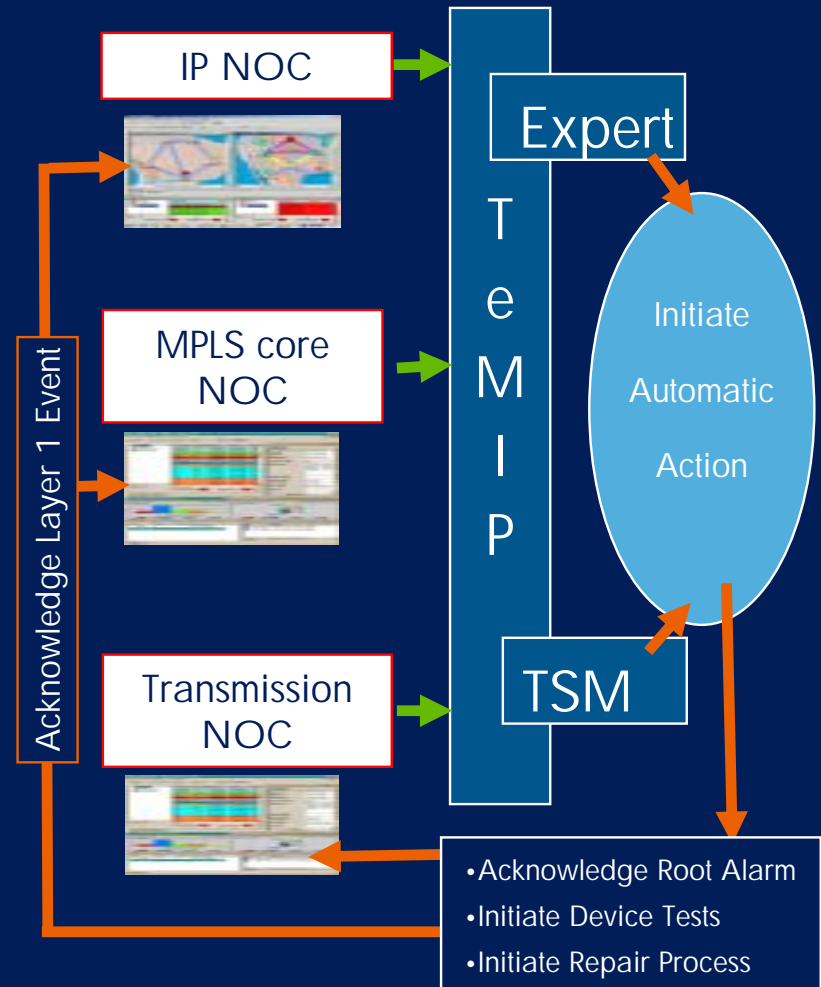
OC48 link fails:

- 242 SONET OAM alarms
- ...

TeMIP root-cause correlation with multiple NOCs

Transport layer 1 device failure:

- TeMIP receives alarm streams from transmission, MPLS, and IP layers
- TeMIP identifies root alarm as a transport failure
- TeMIP recognizes related cascading MPLS and IP alarms
- TeMIP reduce MPLS and IP related alarms to zero
- TeMIP notifies MPLS and IP NOCs of event acknowledged at transmission layer



Conclusion

change



hp

Why do I need an NGOSS when I am building an NGN?

- Converging on a next-generation network introduces management challenges
- Not addressing the challenges introduces significant risk of failure
- With proper attention, the management challenges can be addressed
- A New Generation OSS like HP Integrated Service Management provides the management system needed to succeed



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