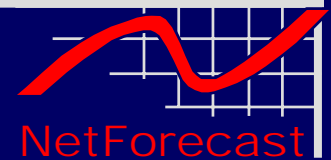


Alternative Visions of MPLS

NetForecast Report 5056

October, 2001



Peter Sevcik

John Bartlett

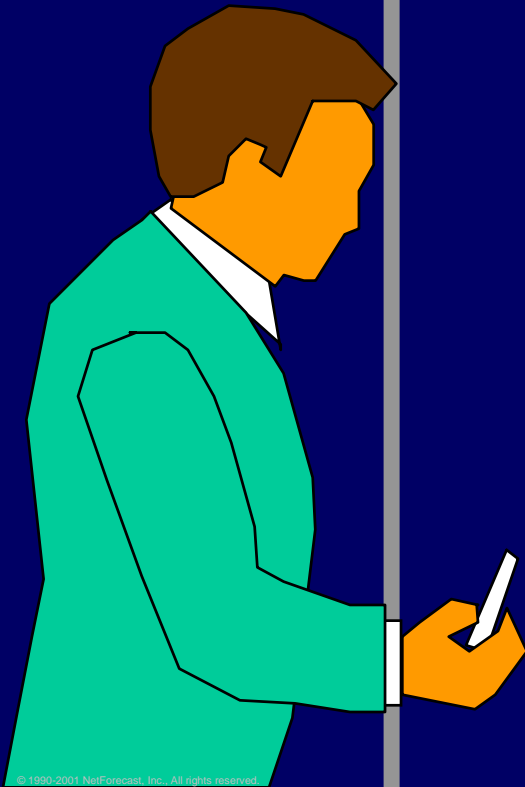
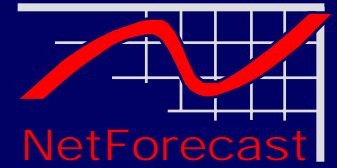
NetForecast, Inc.

77 Main Street

Andover, MA 01810

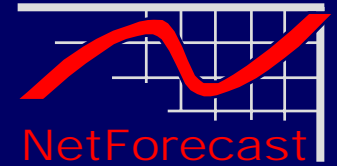
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Outline



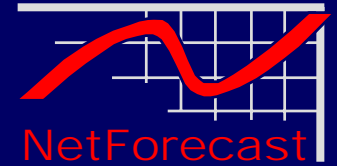
- **Telecom Industry Trends**
- **Benefits of MPLS-SONET**
- **Network Architecture Evolution**

Top Trends



- **Need division of responsibilities**
 - Separation of services and transport
- **Need convergence at transport**
 - Unifying transport interface
- **Need customer self-provisioning**
 - Easy to up-sell transport or services without sales staff
 - Faster to deploy new transport or services

What is Shifting



Enterprise

Service Provider

Services

Transport

**Client-facing
Services**

**Transport
Services**

**Client-facing
Services**

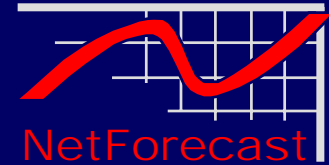
**Transport
Services**

**Client-facing
Services**

**Transport
Services**

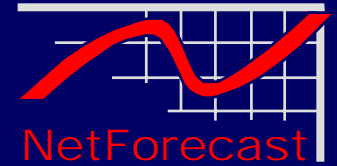
**Boundary
Under
Discussion**

Why Move to a New Model?

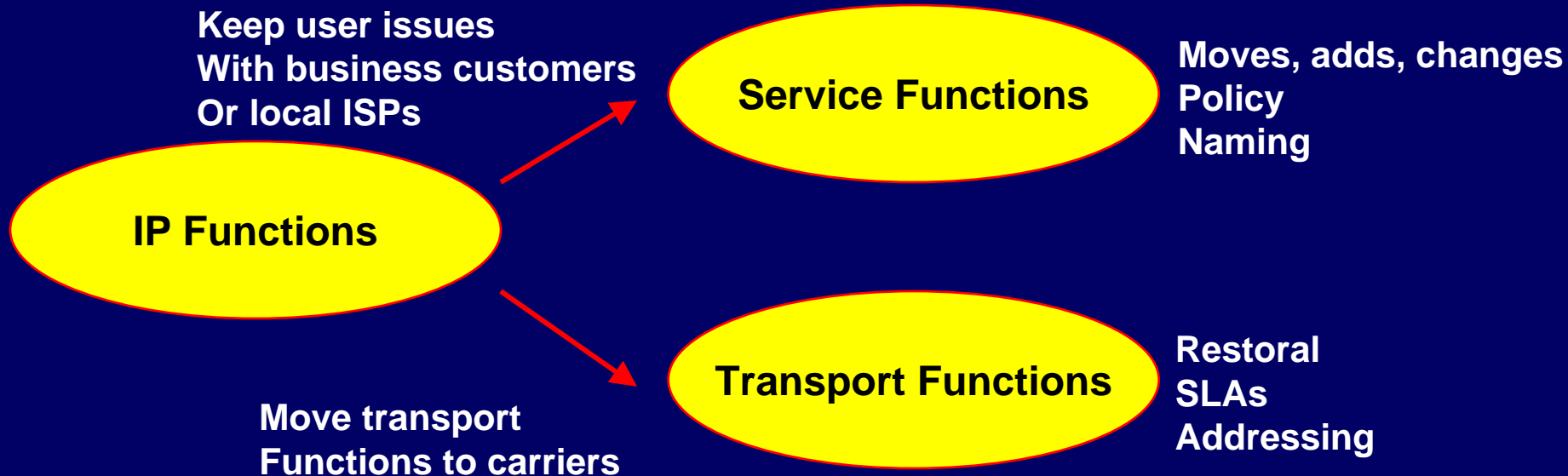


- **Used to be that IP worked fine**
 - Managed breaks and failures, re-routed data around the problem
- **IP now carrying eCommerce traffic (business!)**
 - Demands for speed and reliability are much higher than they used to be
- **Inefficient system has evolved**
 - Enterprises operate an IP network (with all functions)
 - Carriers operate an IP network (with all functions)
 - But Enterprises want high-grade transport from the carrier
 - Therefore, enterprises need to stop operating a complete transport level
- **Moving away from this model because**
 - IP traffic volume is much higher
 - IP traffic is of a more critical nature
 - Takes too long to redirect via OSPF and BGP
 - Carriers want to solve problem at level 2
 - Carriers are more familiar with the level 2 functions

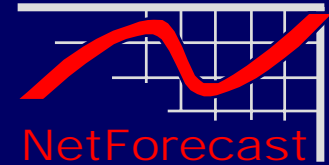
Starting to Split the IP Functions



Keeping IP integrated limits ability to scale

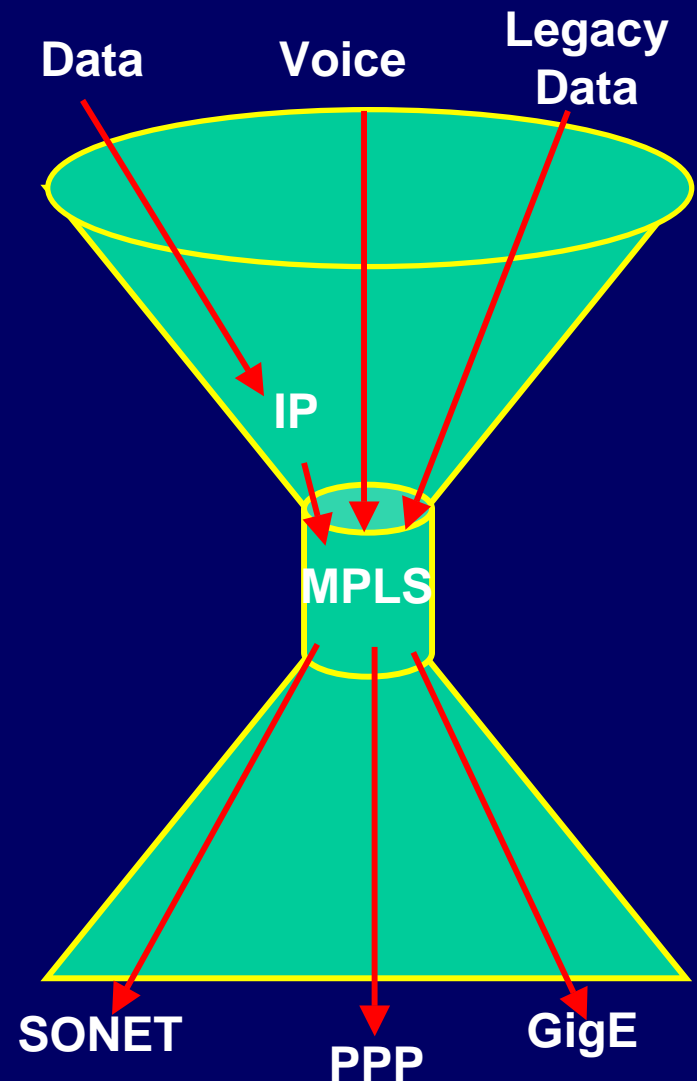
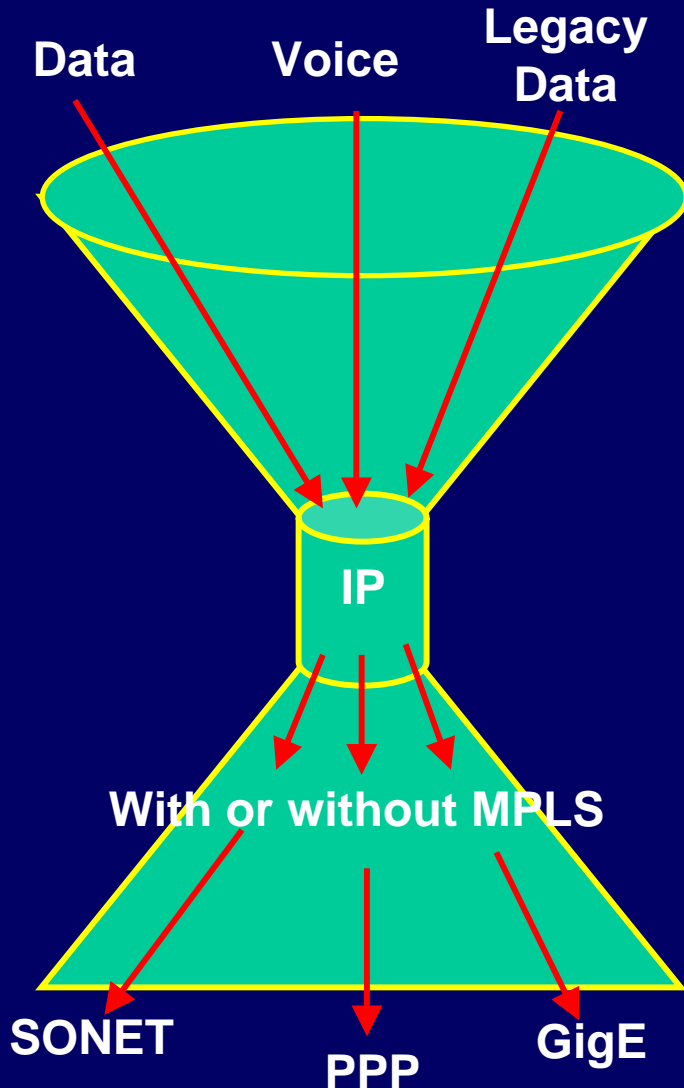


The IP Routing Dilemma



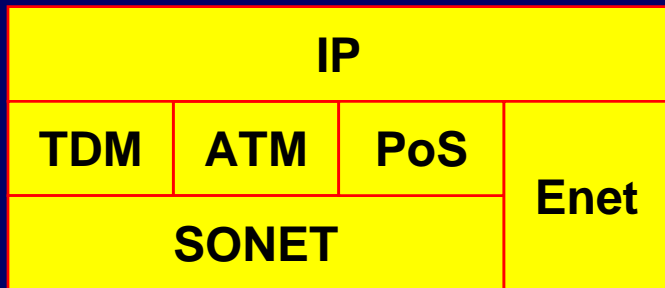
- **Carriers do not want IP to determine dynamic routing**
 - IP not sophisticated enough to support congestion avoidance and constant bandwidth requirements
 - BGP resolves slowly, not fast enough to correct link failures in a timely manner
 - Not all the traffic is IP!
 - TDM, ATM, FR still need to be carried
- **IP (BGP) still excellent to manage move/add/change problem**
 - Thousands of BGP updates per hour on internet as address ranges are added, deleted or moved
- **Carriers want more control**
 - Lost control of address space
 - Phone system -> Internet
 - Want to take back some of the control
 - Primarily a traffic engineering problem

What is the New Common Denominator?



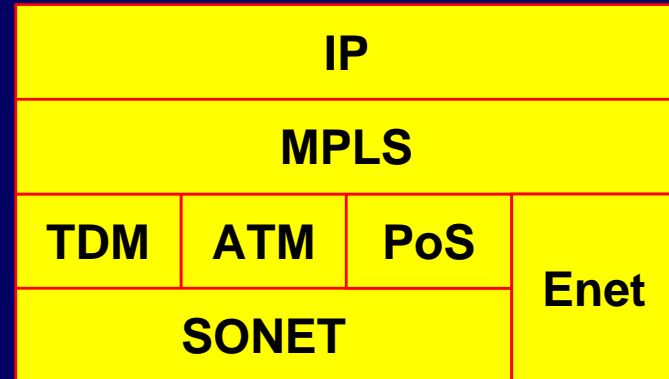
Greater Leverage for MPLS if Used at the SONET Layer

MPLS = new Layer 2.5
Supports IP

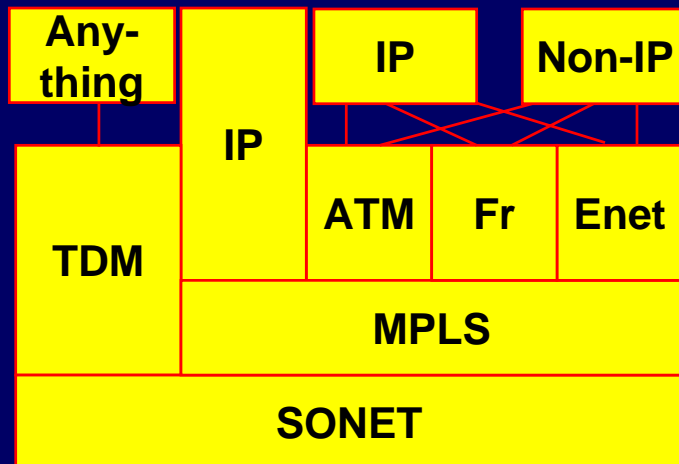


MPLS = new layer 1.5
Supports many services

The Router Vender View



The SONET Vender View

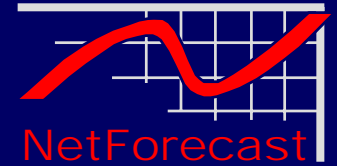




- Telecom Industry Trends
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General MPLS Benefits

These apply to both the Router and SONET views of the world



● IP

- **MPLS was first designed to offload IP forwarding problems**
- **Clear benefits in scaling, performance and traffic engineering**

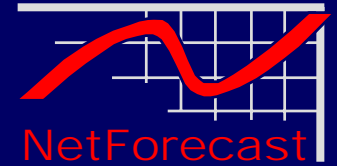
● Ethernet

- **MPLS to support Ethernet VPNs**
 - Take advantage of MPLS enabled GigE switches
 - Transition to standards (e.g. Martini spec)

● FR and ATM support – 2 Alternatives:

- **Use new multi-service access switches**
 - Replace FR and ATM switches with next generation platforms
 - Put ATM and FR onto GigE trunking for transport
 - Add MPLS labels to the ATM and FR packets
- **MPLS LSPs as the standards define them (e.g. Martini spec)**
 - FR over LSPs
 - ATM over LSPs

MPLS-SONET Benefits



- **Granular use of SONET Bandwidth**

- **Better use of SONET bandwidth**

- Allocate BW closer to demand (Ethernet BW values vs. OCN values)
- Allocate larger BW pipes, take advantage of statistical nature of packet traffic

- **Allows carrier more control**

- **Over transport**

- **Permits wider application of MPLS**

- **Collapses layers**

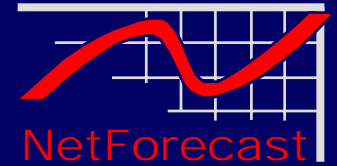
- **Let carriers build a management approach that eliminates a layer**

- **Hence a layer of management at the carrier**

- **Which results in:**

- Faster provisioning
- More efficient infrastructure use
- Lower op-ex

Value of Tight MPLS-SONET Integration

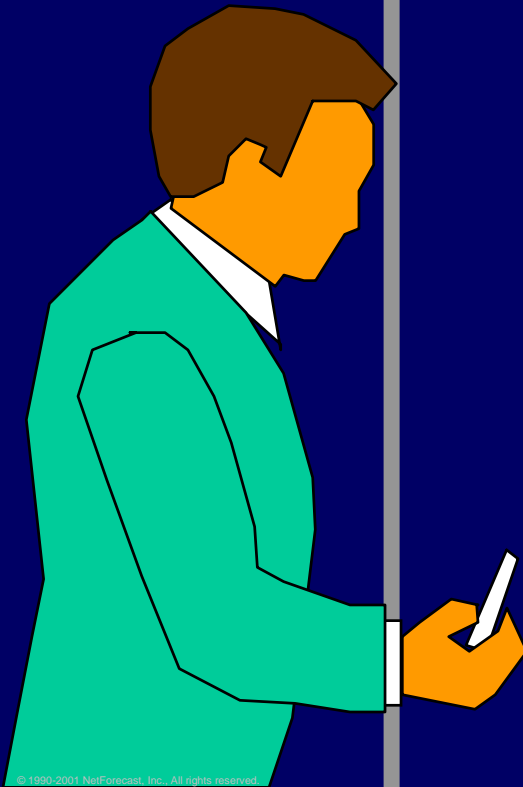


- **Using MPLS internally**

- Perform internal routing on the network but transparent to the end-services
- Ability to operate logical paths over the physical rings
 - Logical rings
 - Logical mesh

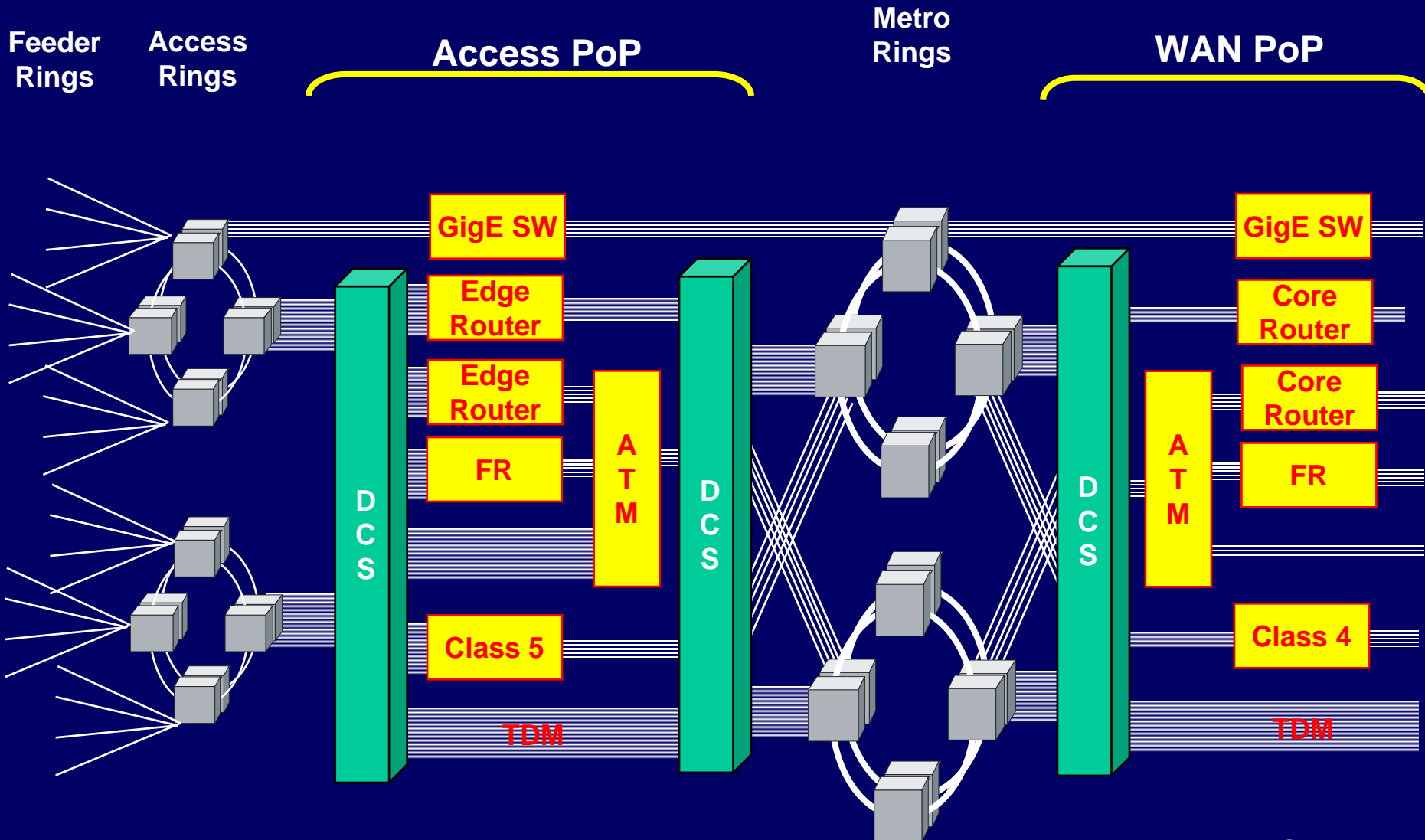
- **Using MPLS externally**

- Transfer and show IP OSPF and BGP from edge and core systems
- Operate LSPs as a trunking method over the network
- Enable and participate in MPLS labeling that is supplied by the edge routers
- Support for LSPs eliminate many core routers
 - Few still needed for peering
- LSPs reduce the number of trunk ports on edge routers

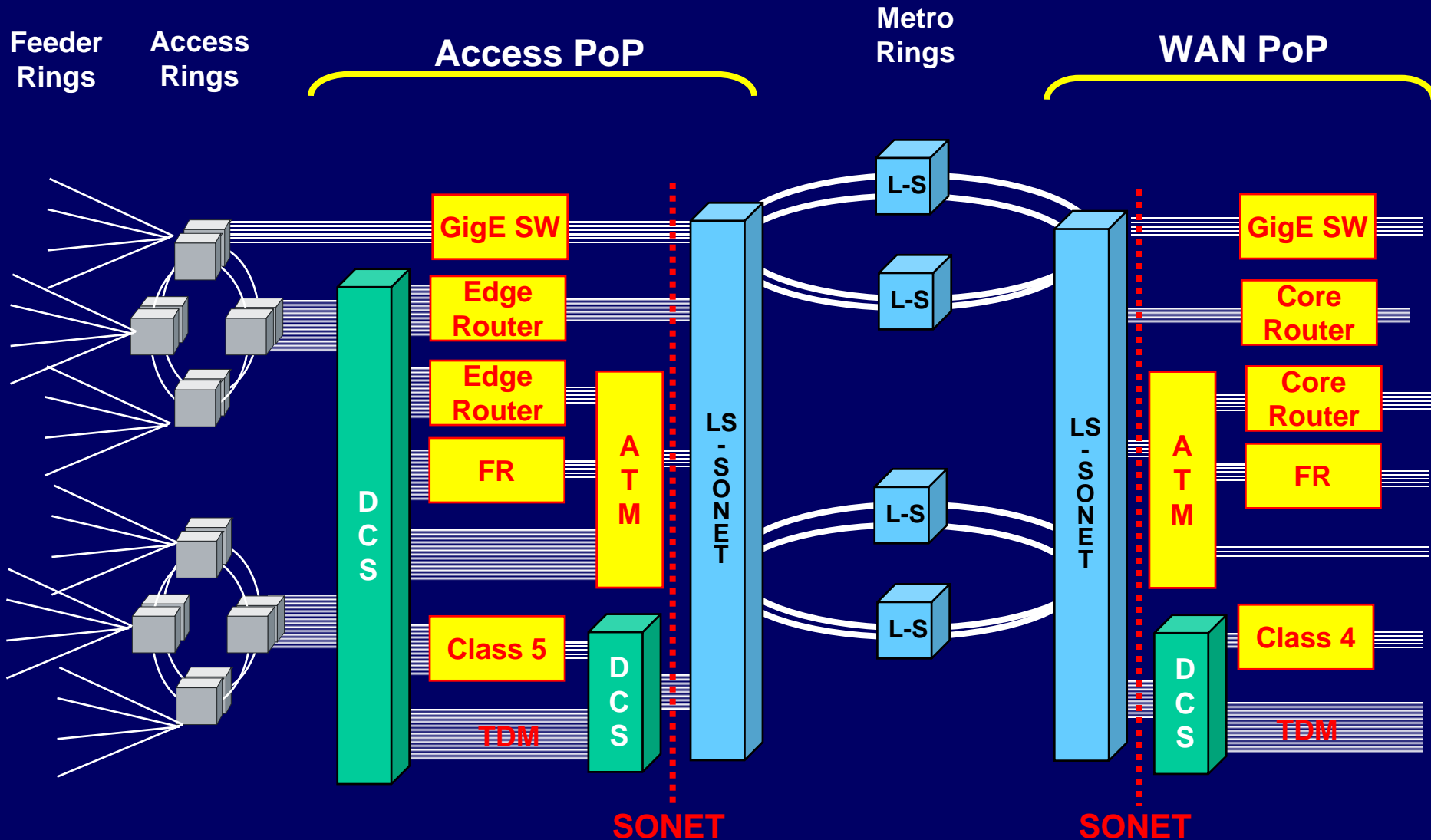
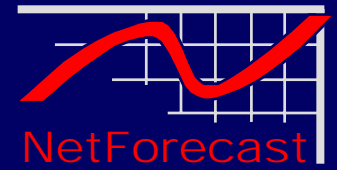


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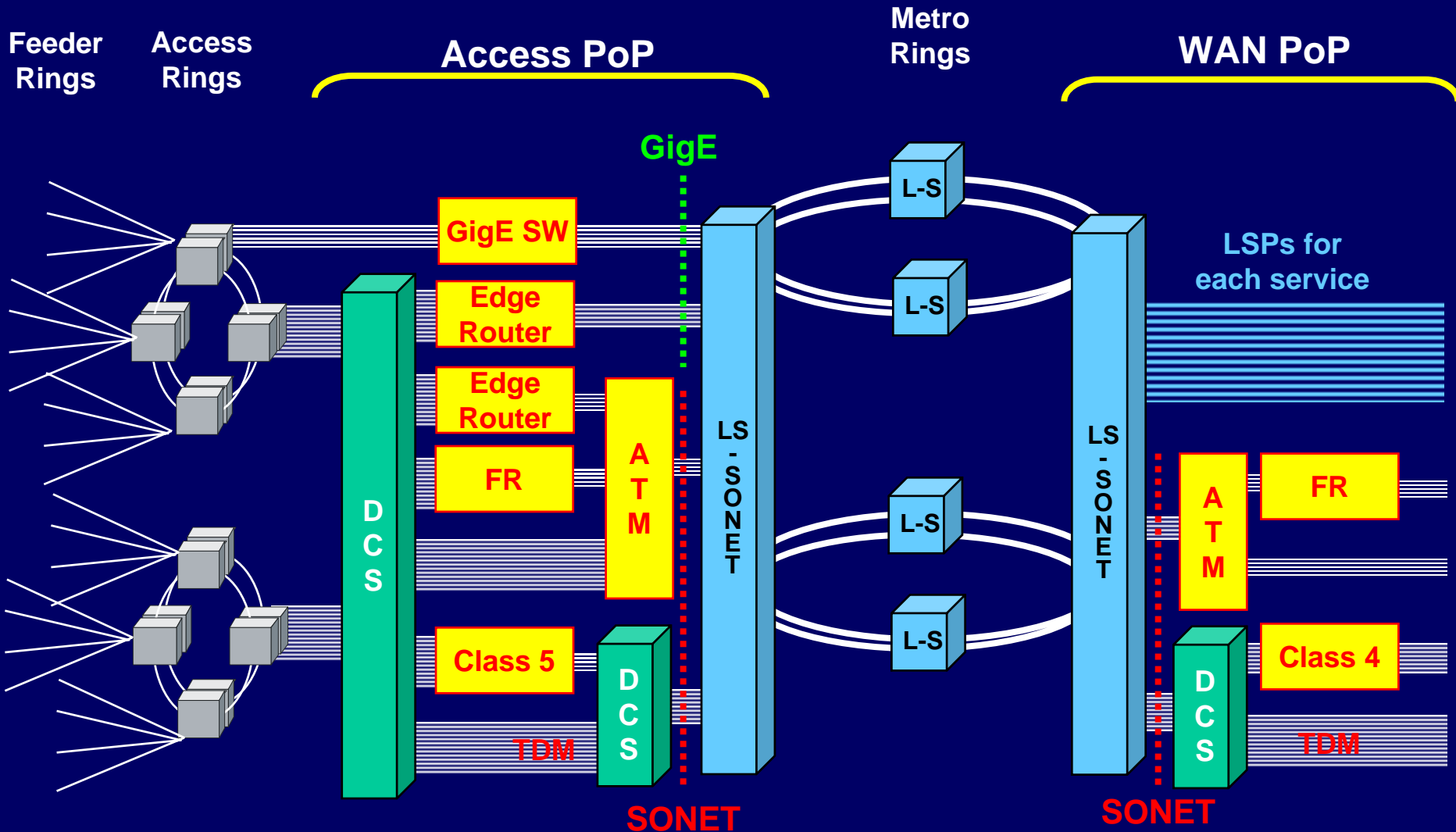
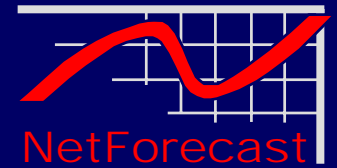
Current Architecture: Non-Integrated Edge Services



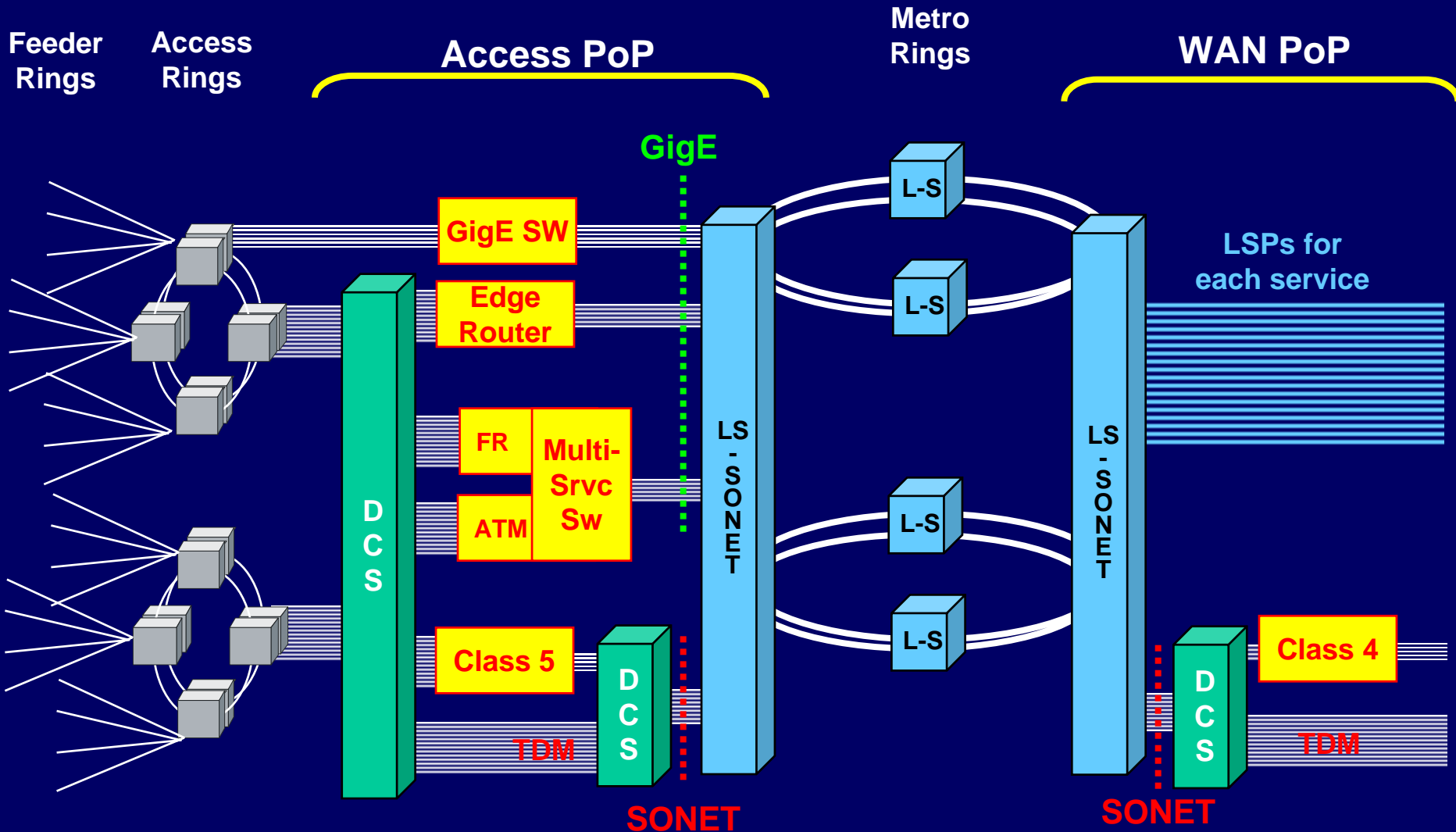
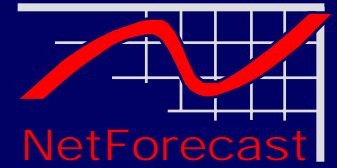
Transparent Replacement of SONET



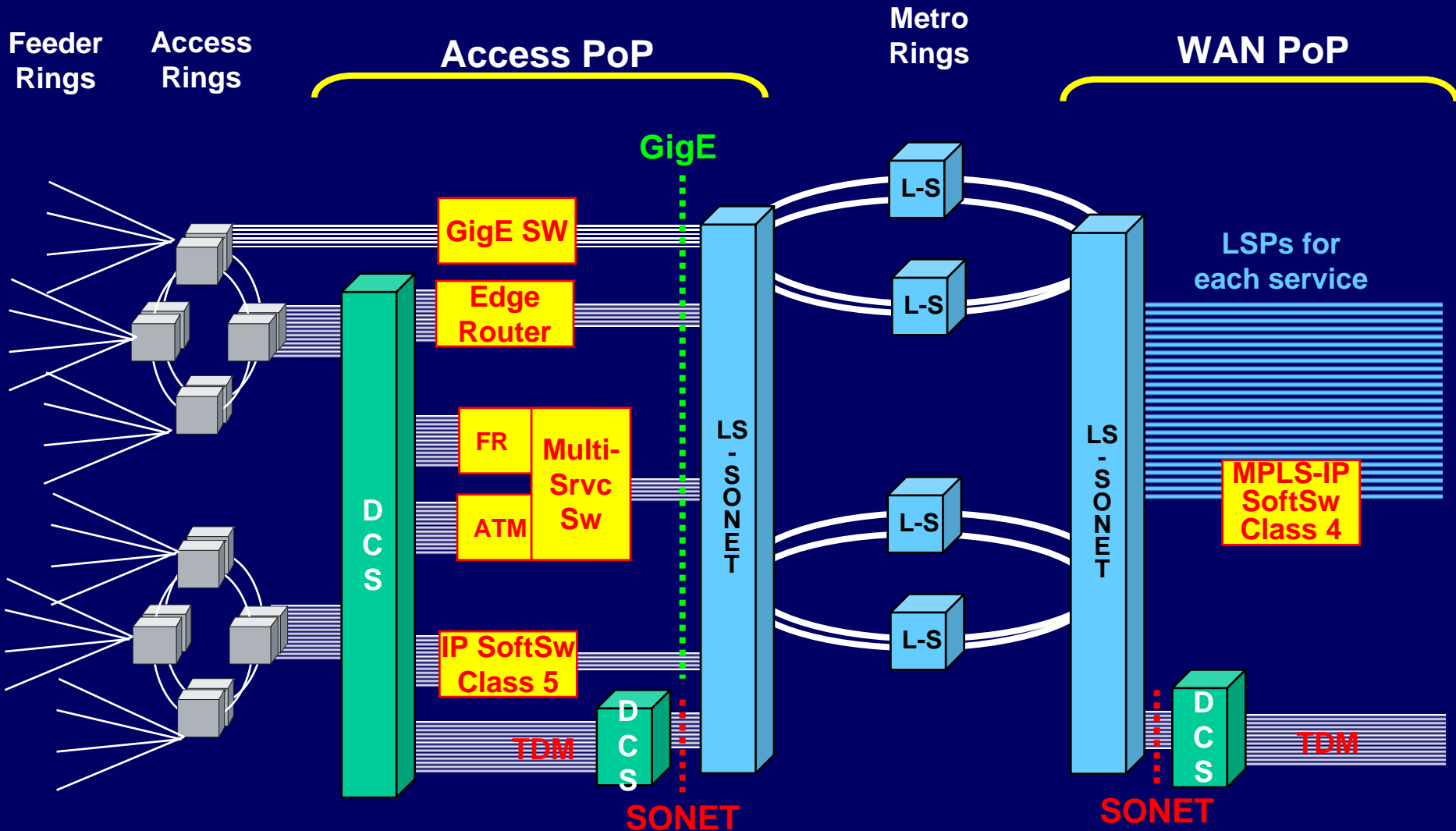
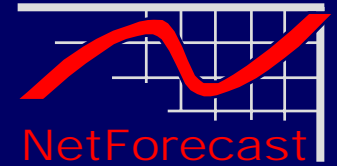
GigE for New Data Services



GigE for All Data Services



GigE for All Data & Voice Services



Thank You

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