



Backbone architecture for NLD / ILD: Design, Optimization and Services



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Agenda

- **Brief – NLD / ILD Policy Changes**
- **Impacts**
- **New Service Offerings**
- **Where does MPLS come in**

NLD & ILD : What has changed

- **Entry fee reduced from 100Cr for NLD and 25Cr for ILD to 2.5Cr each**
- **License fee reduced from 15% to 6% of revenue**
- **ISPs with IP-VPN licence to migrate to NLD / ILD licence**
- **IP-II licensee to move to NLD license**
- **Last Mile connectivity changes for NLD and ILD services.**
- **NLD and ILD licensee can establish last mile for leased line subscriber and not necessarily go through an access provider**
- **Ambit of The Access Service Provider [last mile owner] license enhanced to include internet, broadband and unrestricted [origination-termination on Indian PSTN] internet telephony thereby enabling them to offer full bouquet of triple play services.**

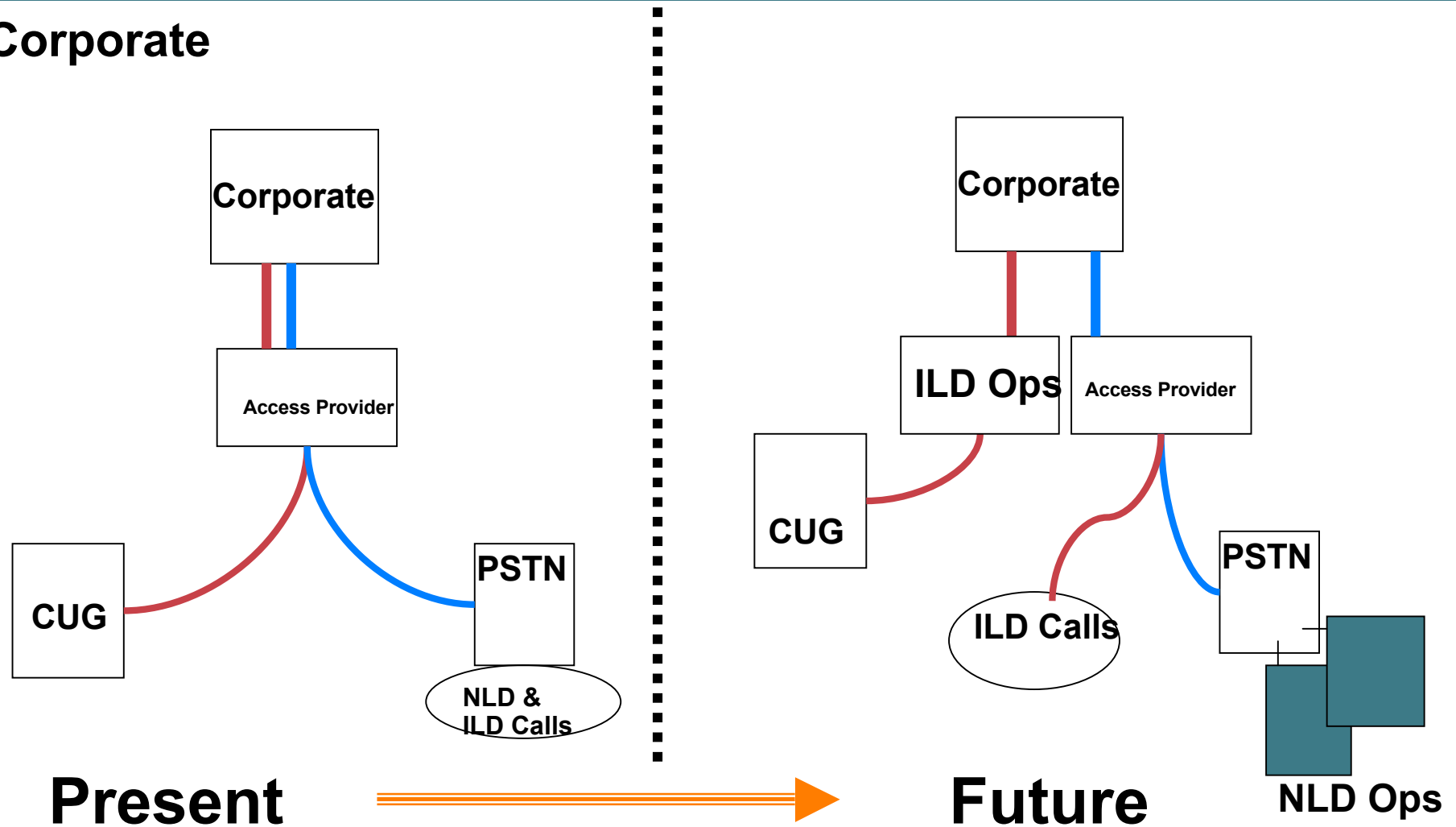
* <http://www.dotindia.com/ild/ILDNLD10NOV05.doc>

What has NOT changed ?

- **Convergence of the last mile to a corporate / consumer for PSTN + CUG connectivity has not been allowed so far.**
- **CAC [Carrier Access Codes] : Policy has not been defined yet for choosing a carrier while accessing via the Access Provider.**
- **ISPs can continue to offer restricted internet telephony (IP device in India to PSTN world abroad) however with a 6% additional revenue share.**

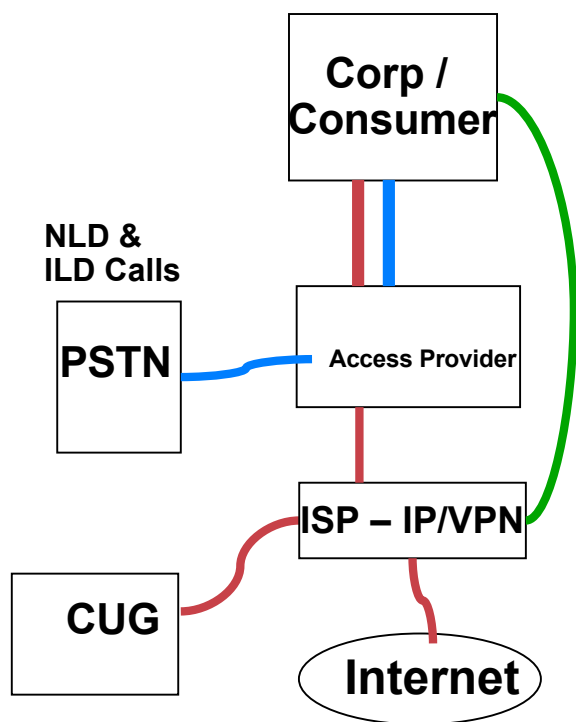
Impact : Enterprise Customers [incl. BPO/KPO]

1. Corporate

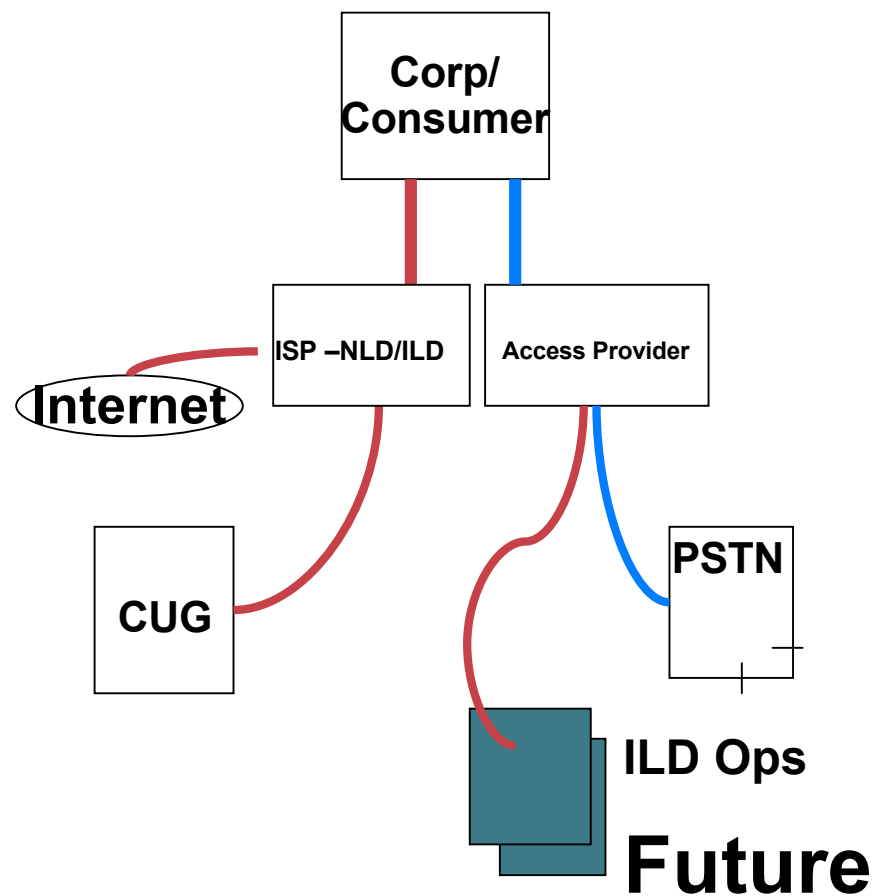


Impact : ISPs

3. ISP as last mile



Present



Future



New Services

- **New market segments being open**
 - Option of offering voice, video and data services in CUG
 - As and when CAC gets implemented, ISP can offer differential voice services based on tariff and QoS matrix
 - Depending on CAC - Calling Cards

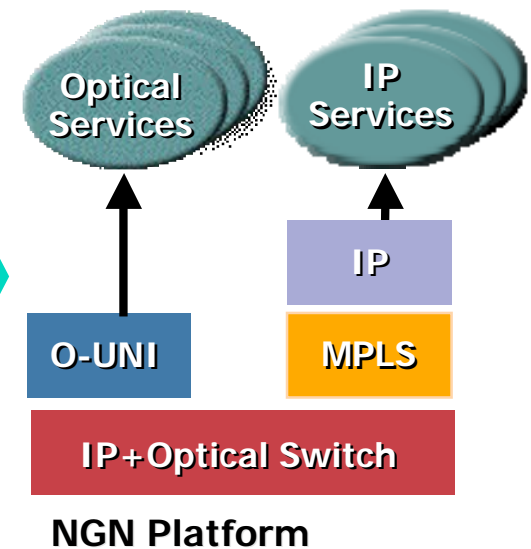
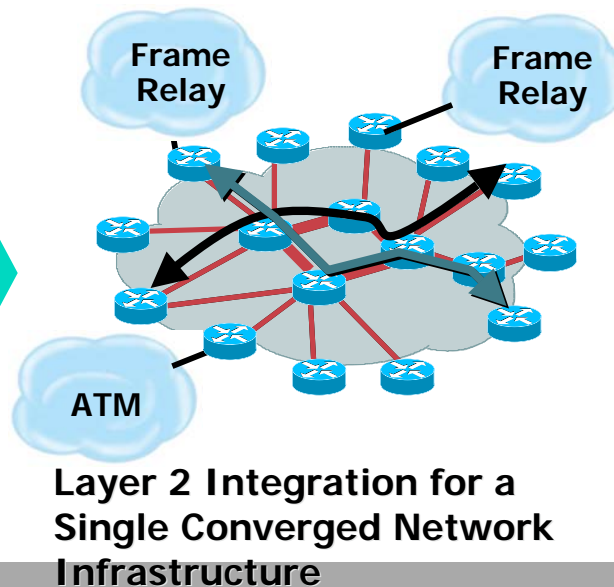
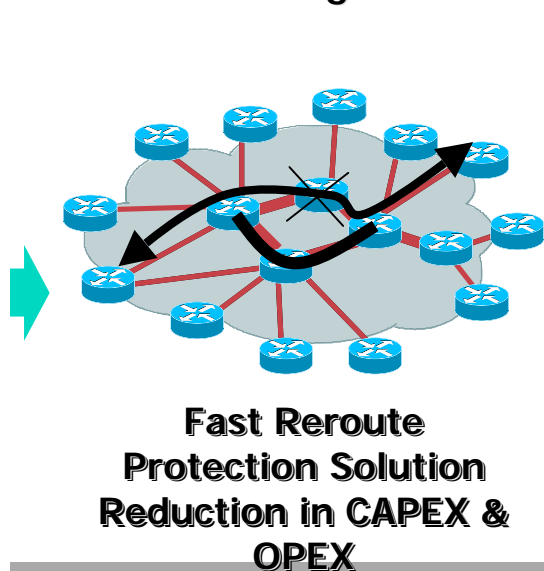
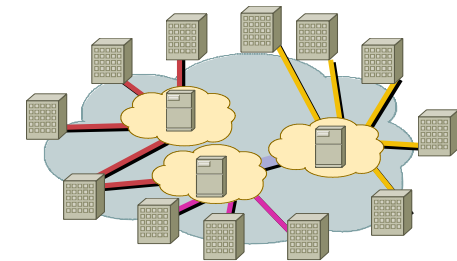
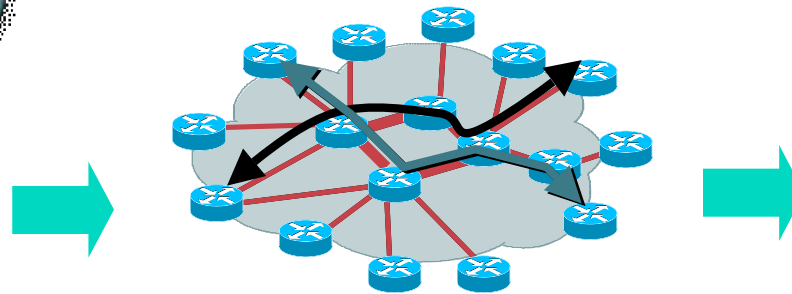
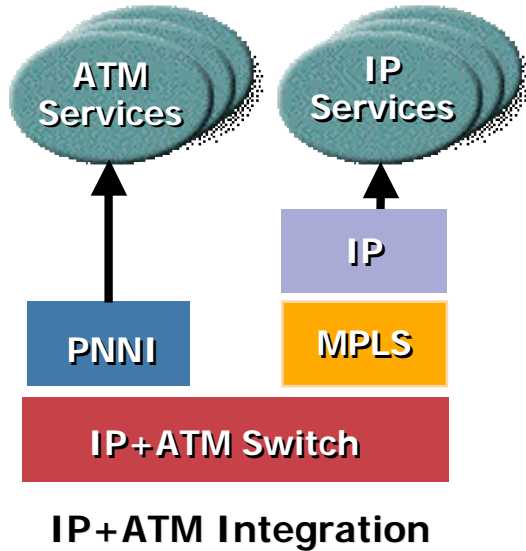
All these lead to one converged backbone offering multiple applications / services

How does MPLS help?

Some Common Misconceptions...

- **MPLS does NOT replace IP or ATM – uses IP Control Plane & ATM-like Forwarding Plane**
- **MPLS TE is NOT ATM QoS – do not deploy on per-subscriber basis like a VC**
- **MPLS VPNs does NOT replace IPsec – if encryption is required, IPsec & MPLS VPN should be deployed together**

MPLS is Key Technology for Delivery of Layer 2 & Layer 3 Services



MPLS Layer 3 VPNs

- Provides full mesh connectivity at layer3
- Benefits

Scalable VPNs

IP QoS and Traffic Engineering

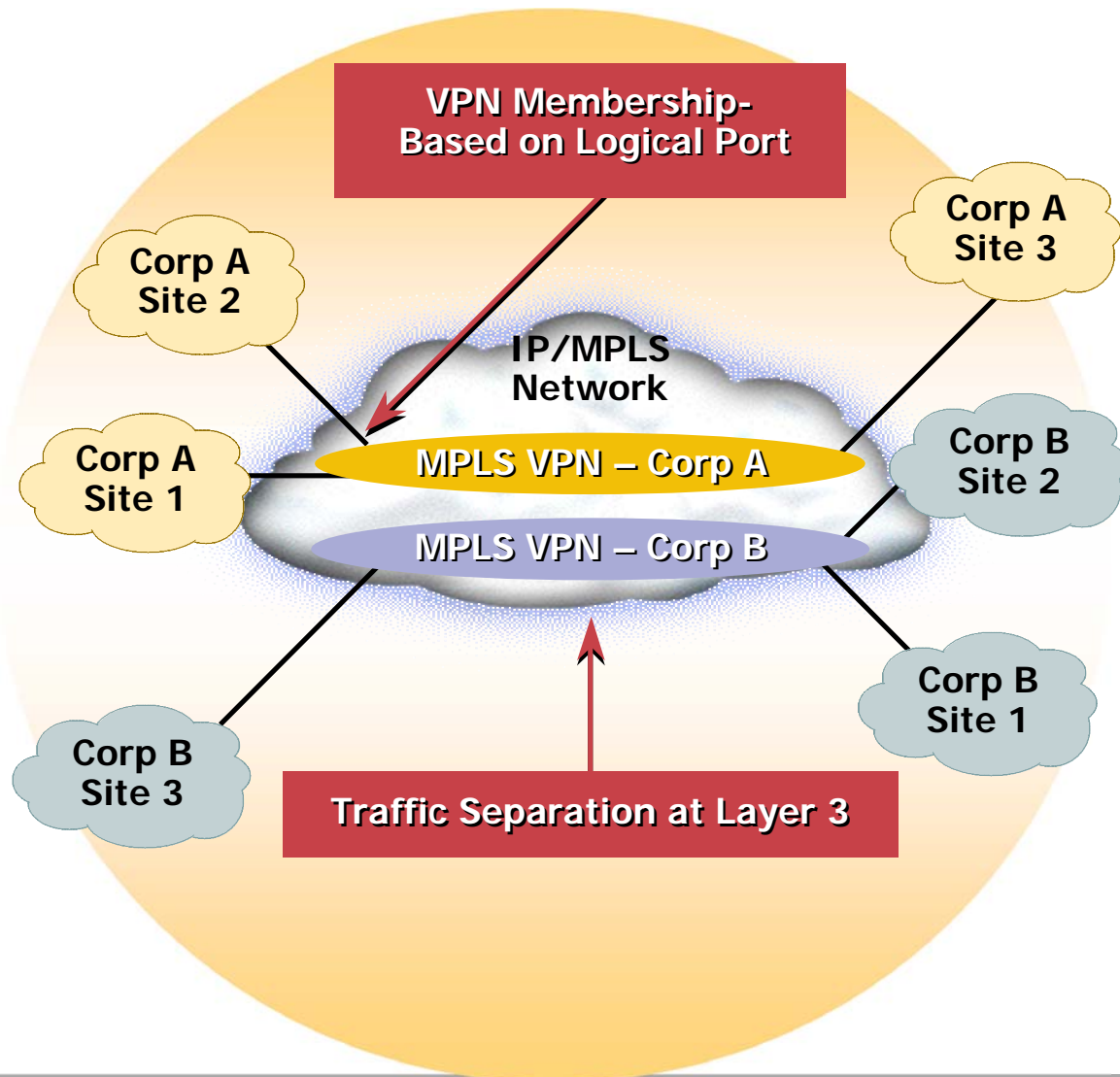
Easy to manage and No VC provisioning required

Hub/Spoke or Mesh Topologies can easily be deployed

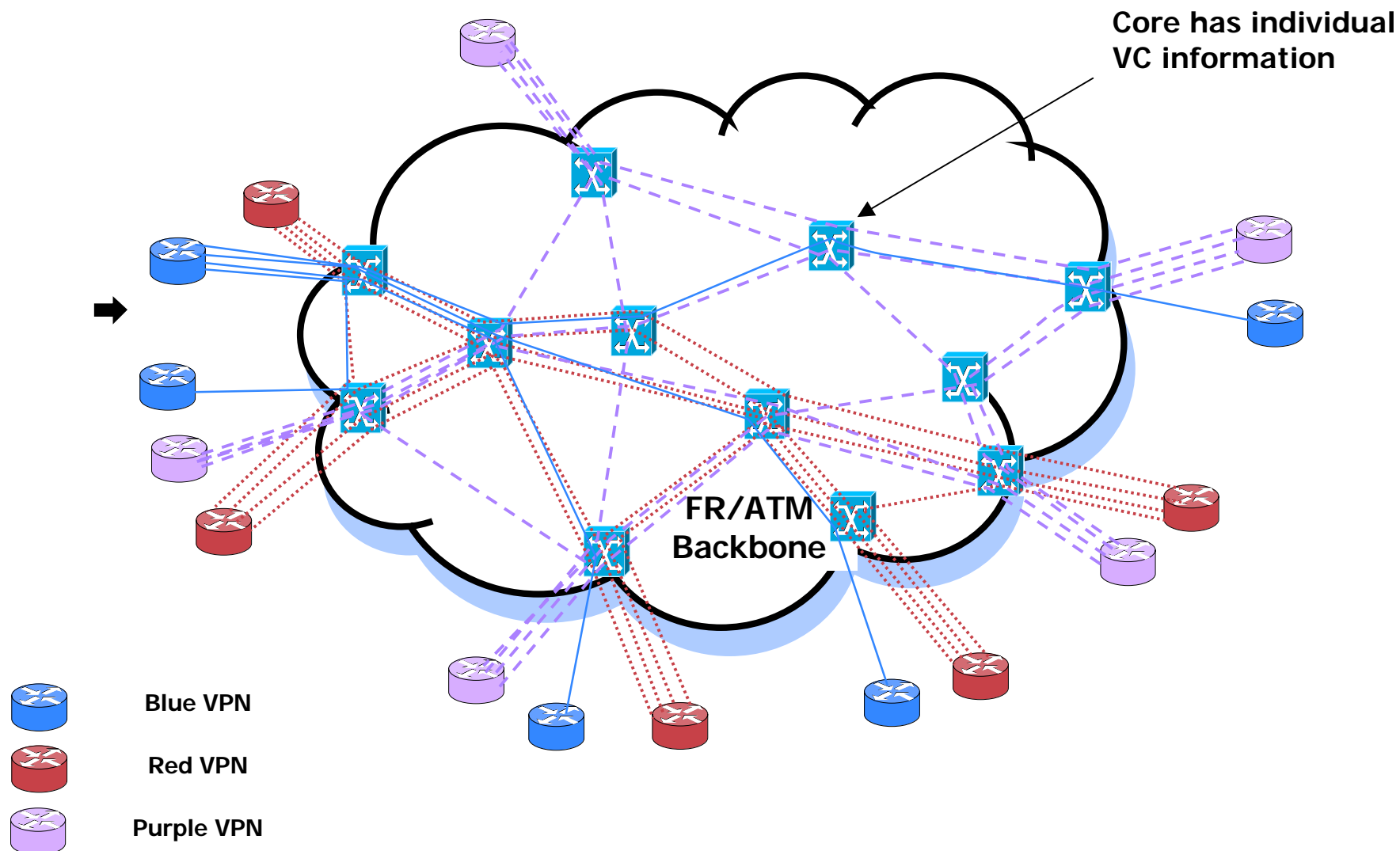
Provides a level of Security equivalent to Frame-relay and ATM

Supports the deployment of new value-added applications

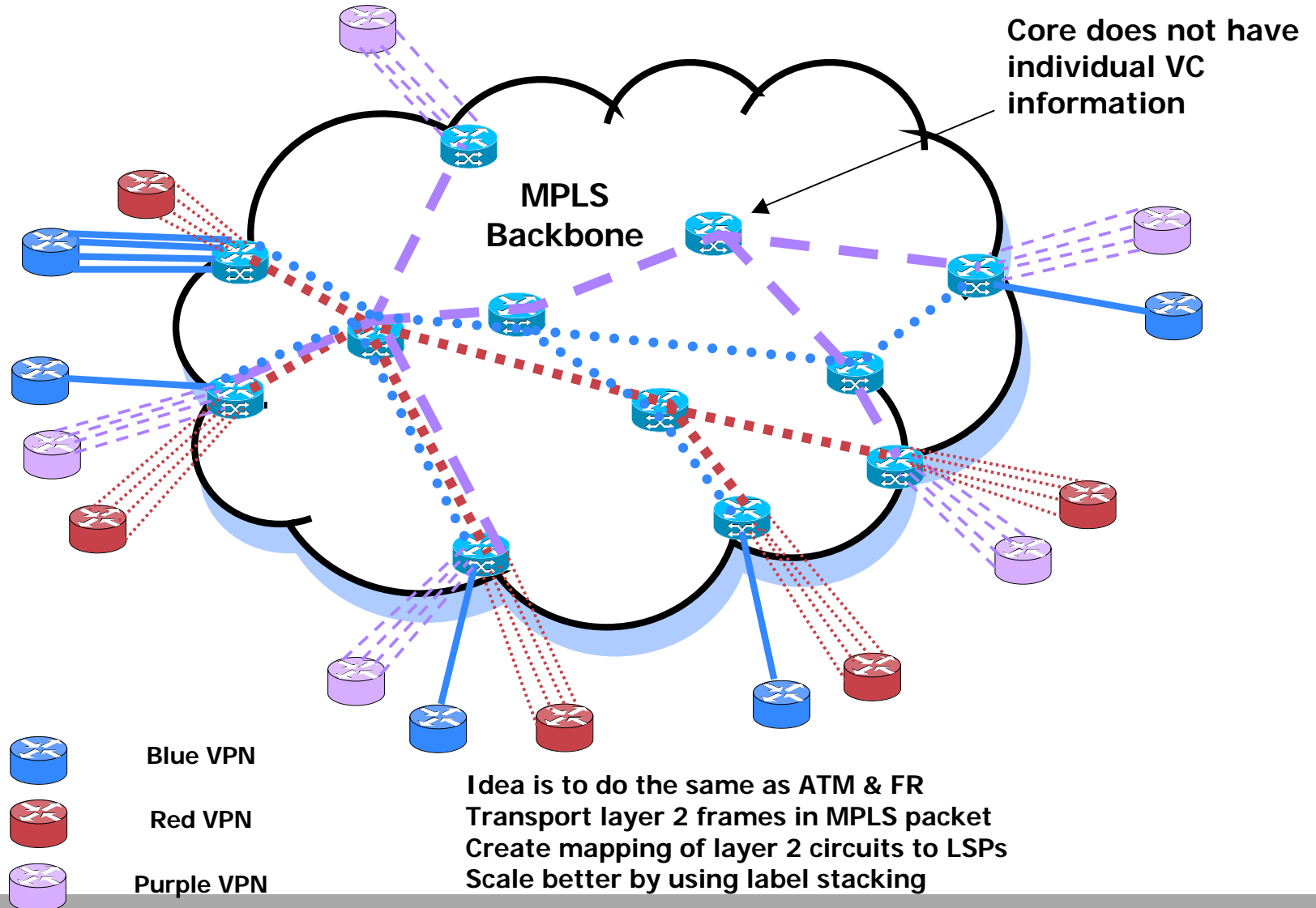
Customer IP address freedom



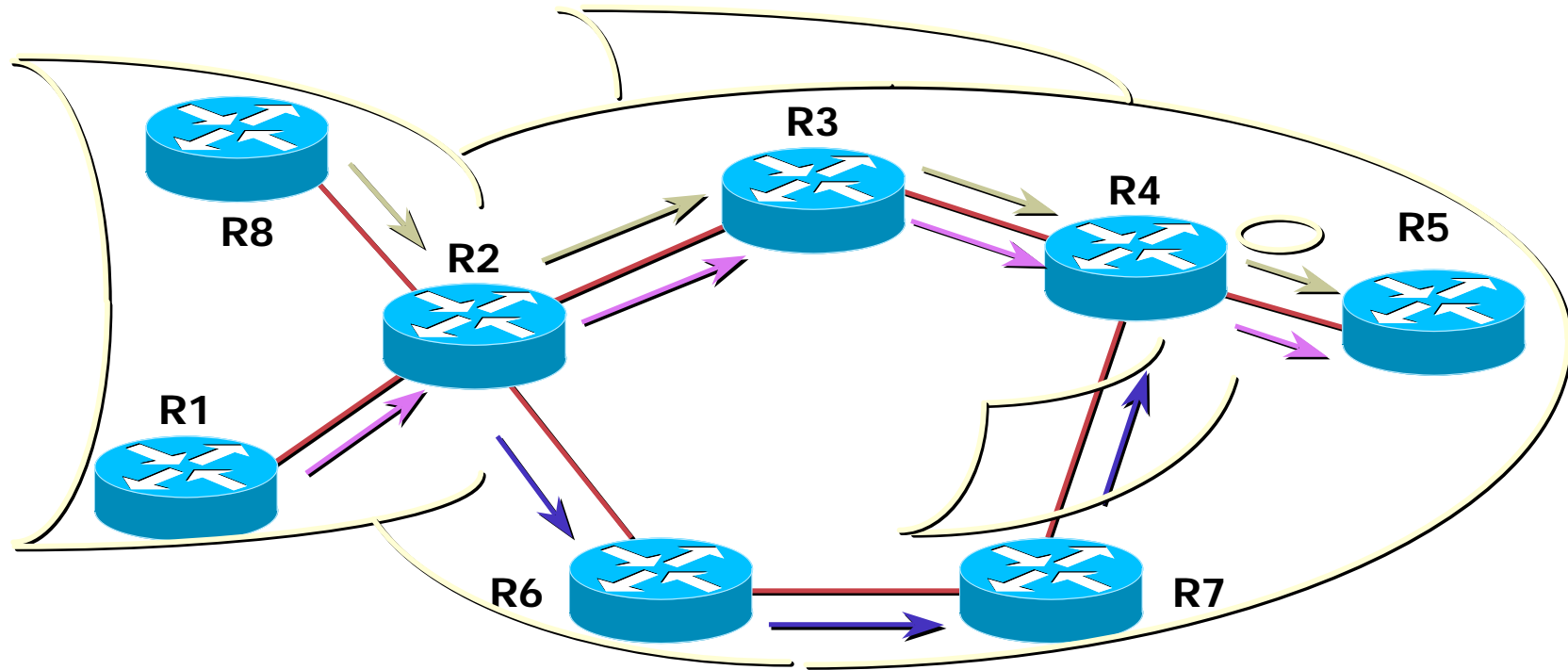
Current Layer 2 VPNs – With FR & ATM



MPLS Layer 2 VPNs – Any Transport over MPLS (AToM)



IP Routing and the Fish Problem

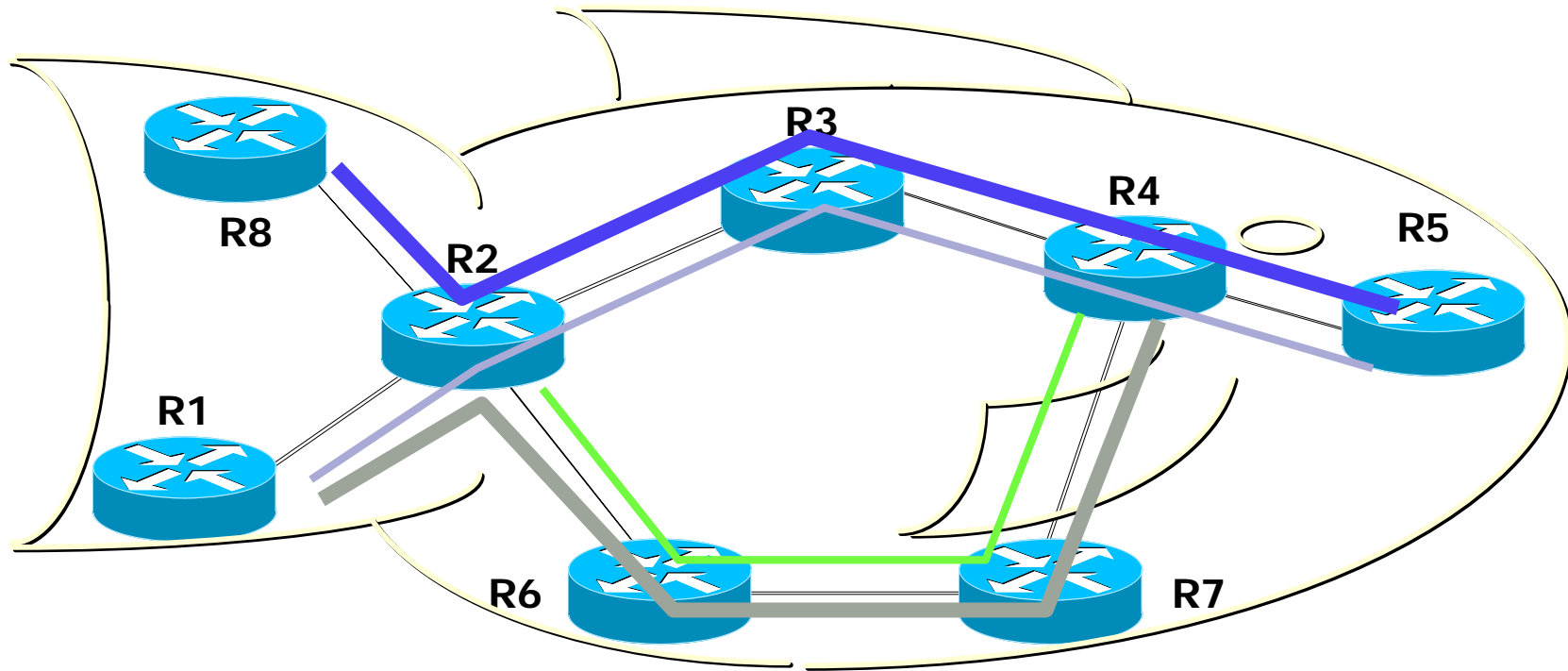


IP (Mostly) Uses Destination-Based Least-Cost Routing
Flows from R8 and R1 Merge at R2 and Become Indistinguishable
From R2, Traffic to R3, R4, R5 Use Upper Route



Alternate Path Under-Utilized

MPLS Traffic Engineering



Assume all Physical Links are OC3 (155Mbps)

TE Tunnel @ 100Mbps via → R8-R2-R3-R4-R5

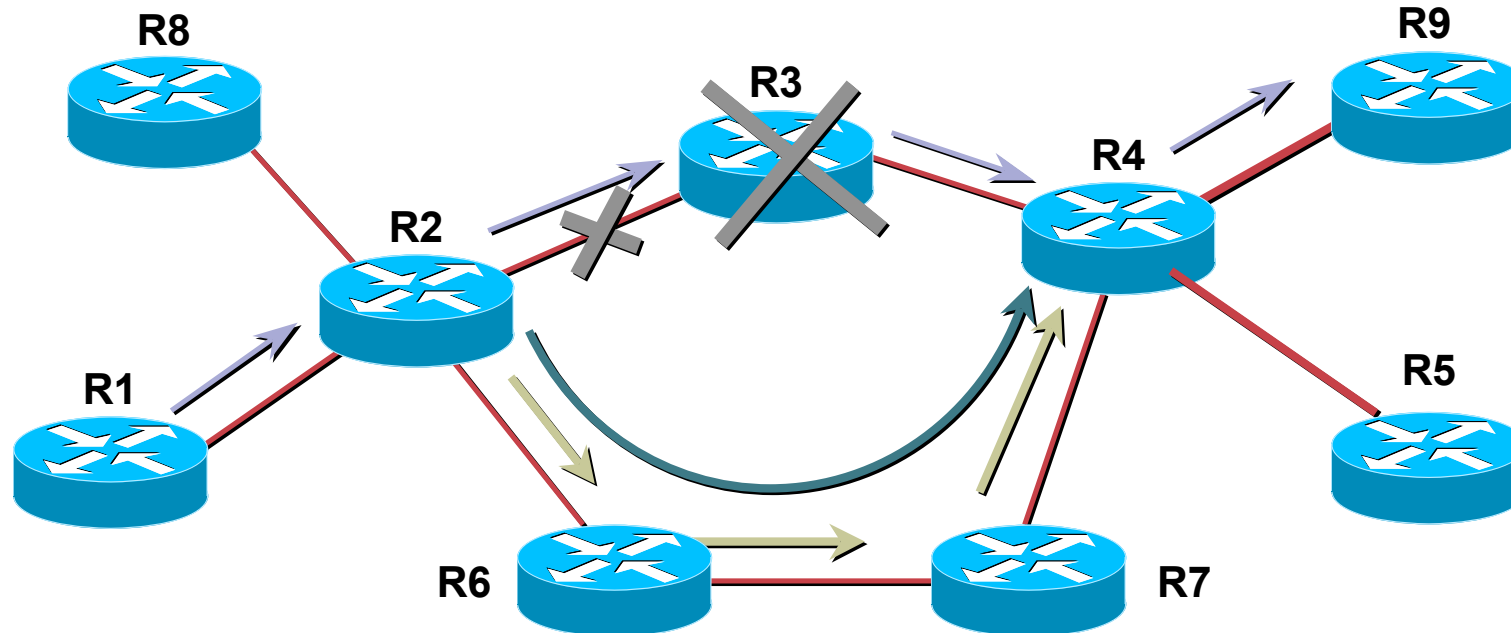
TE Tunnel @ 55Mbps via → R1-R2-R3-R4-R5

TE Tunnel @ 100Mbps via → R1-R2-R6-R7-R4

TE Tunnel @ 55Mbps via → R2-R6-R7-R4



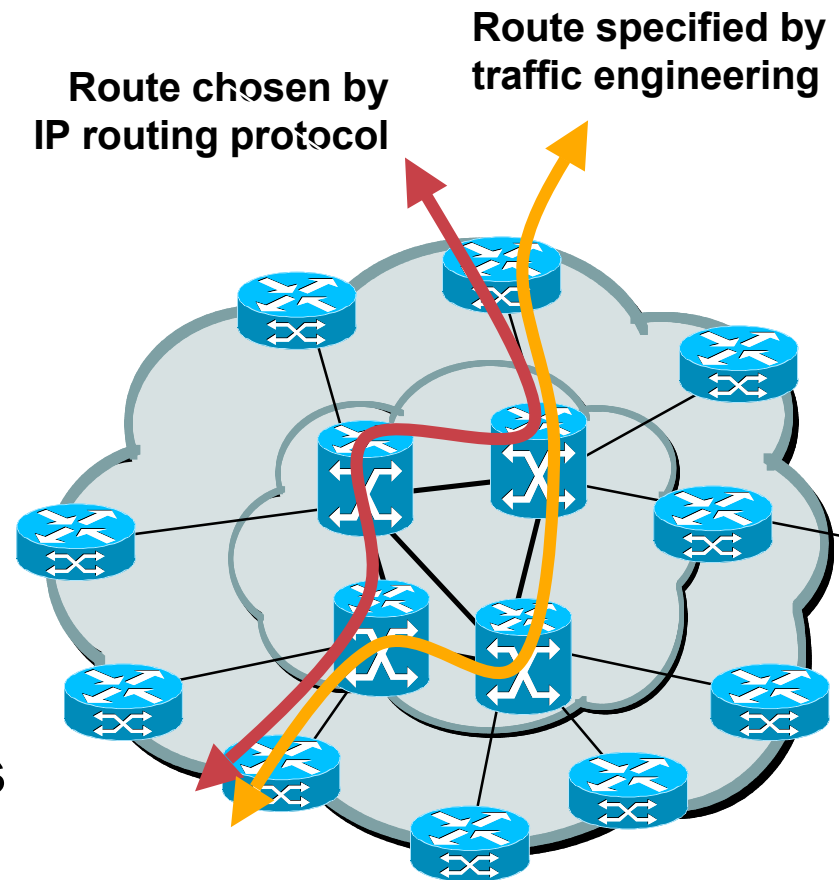
MPLS Fast Reroute - Link and Node Protection



- **Routing Convergence after failure takes minutes – advertise, computation time**
- **Mimic SONET/SDH Protection - Reroute in 50ms or Less**
- **Connectivity Protection (FRR) => Bandwidth Protection (FRR + TBCPro/ISC 3.1)**

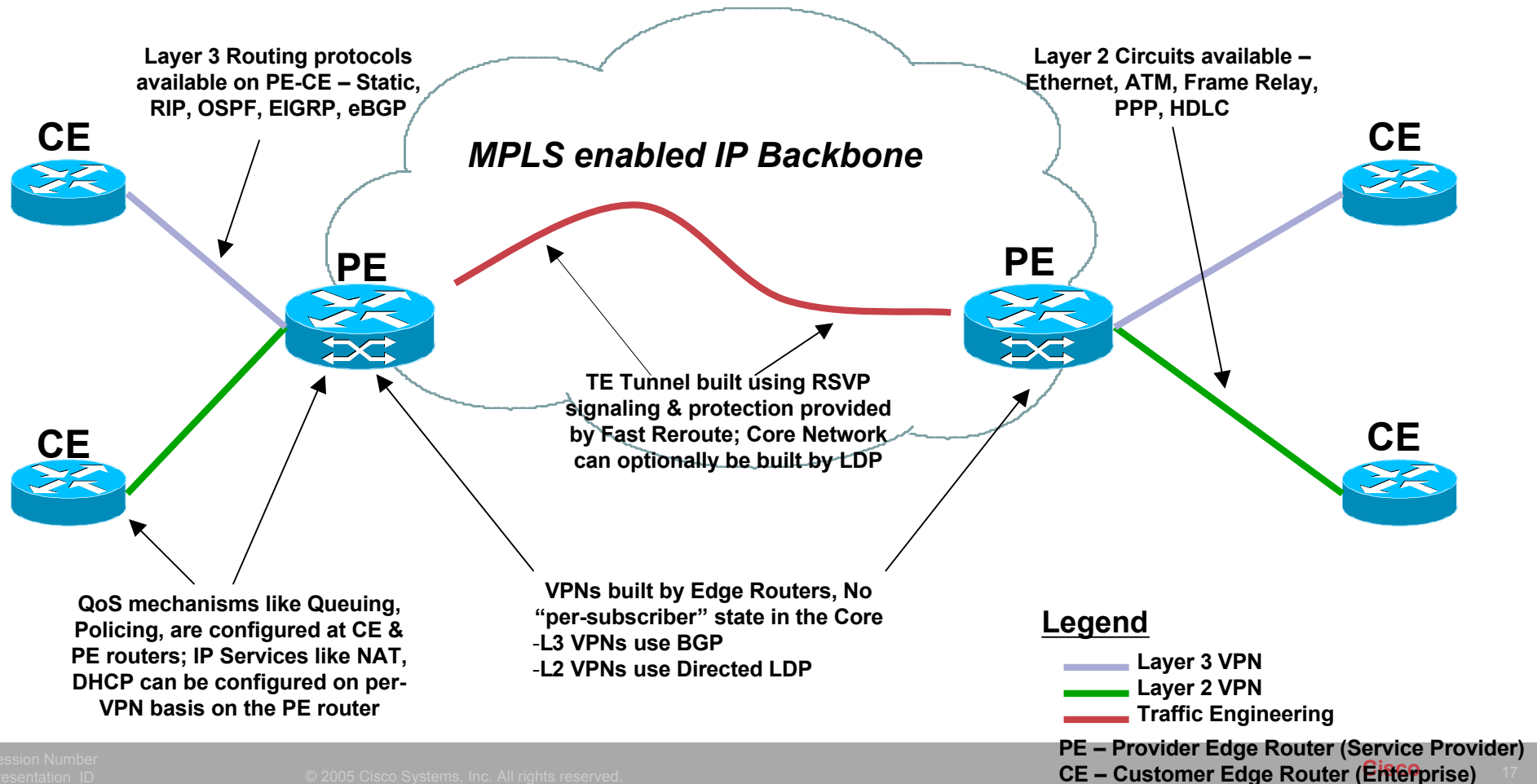
Traffic Engineering

- **Why traffic engineer?**
 - Optimise link utilisation
 - Specific paths by customer or class
 - Balance traffic load
- **Traffic follows pre-specified path**
- **Path differs from normally routed path**
- **Controls packet flows across a L2 or L3 network**



MPLS Offerings Today – Putting It Together

Layer 3 VPNs + Layer 2 VPNs + Traffic Engineering + QoS + IP Services



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