The Next Wave of Virtual Leased Lines

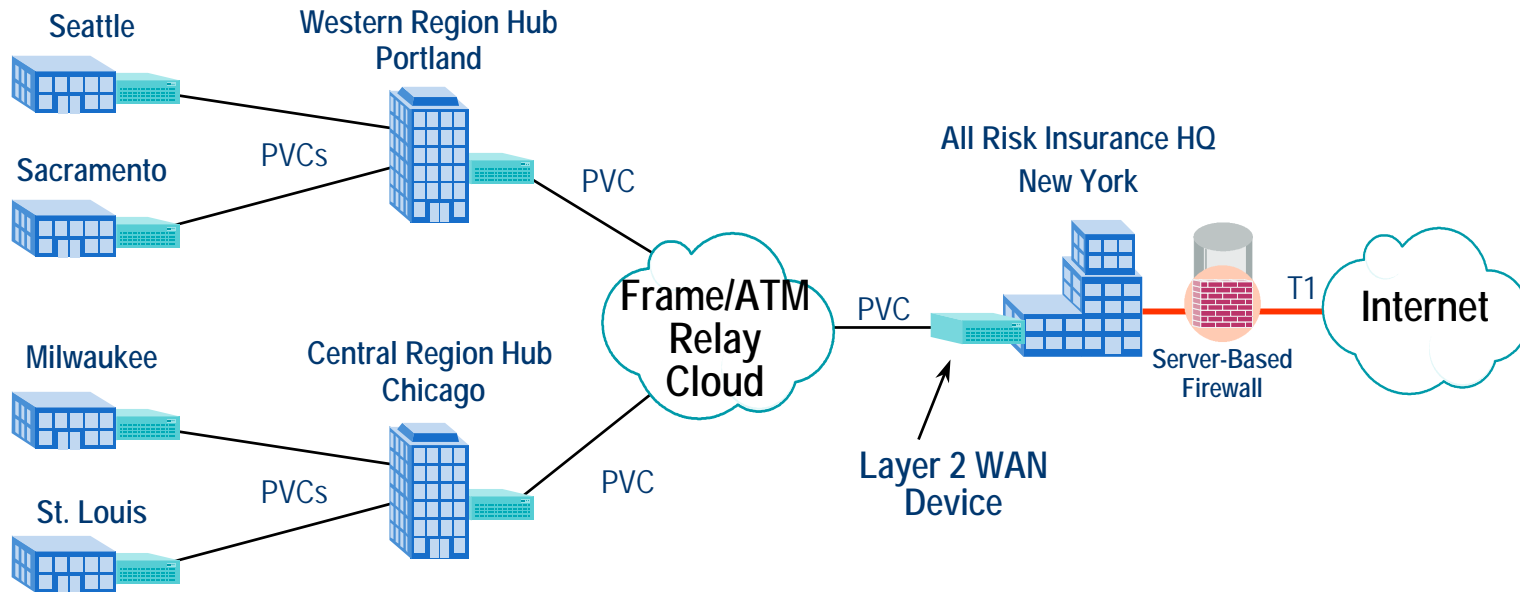David Messina

Director, Product Marketing

September 12, 2001

Agenda

- Challenges for Traditional Virtual Leased Lines (VLLs)
- New VLL Deployment Models
- Next Wave of VLLs
- Strengths of the Next Wave
- Summary

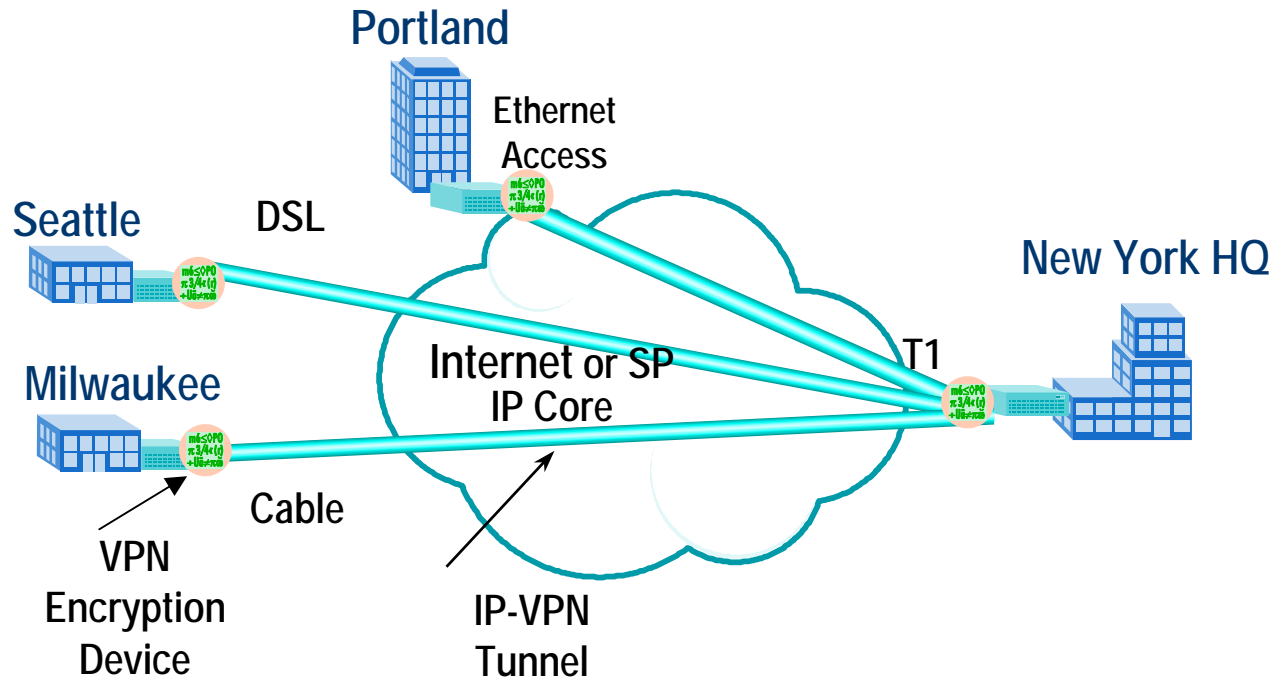# Frame Relay and ATM: Solid For Traditional VLL Applications; Challenged for New Ones

STRENGTHS

- Price/performance vs. leased line
- Built in security
- Interworking capabilities
- Strong Service Level Agreements (SLAs)

CHALLENGES

- Price/performance in the broadband era
- Internet inflexibility
- Lack of broadband interworking
- Application blindness

IP-VPNs Provide Network Independent VLLs

Portland

Ethernet Access

Seattle

DSL

New York HQ

Milwaukee

Internet or SP IP Core

T1

Cable

VPN Encryption Device

IP-VPN Tunnel

- IP-VPNs convert any network into a VLL
- Network reach is as vast as the Internet
- Internet access and WAN services leveraged over same connection

CPE-Based IP Service Deployment Model: An Operational Challenge
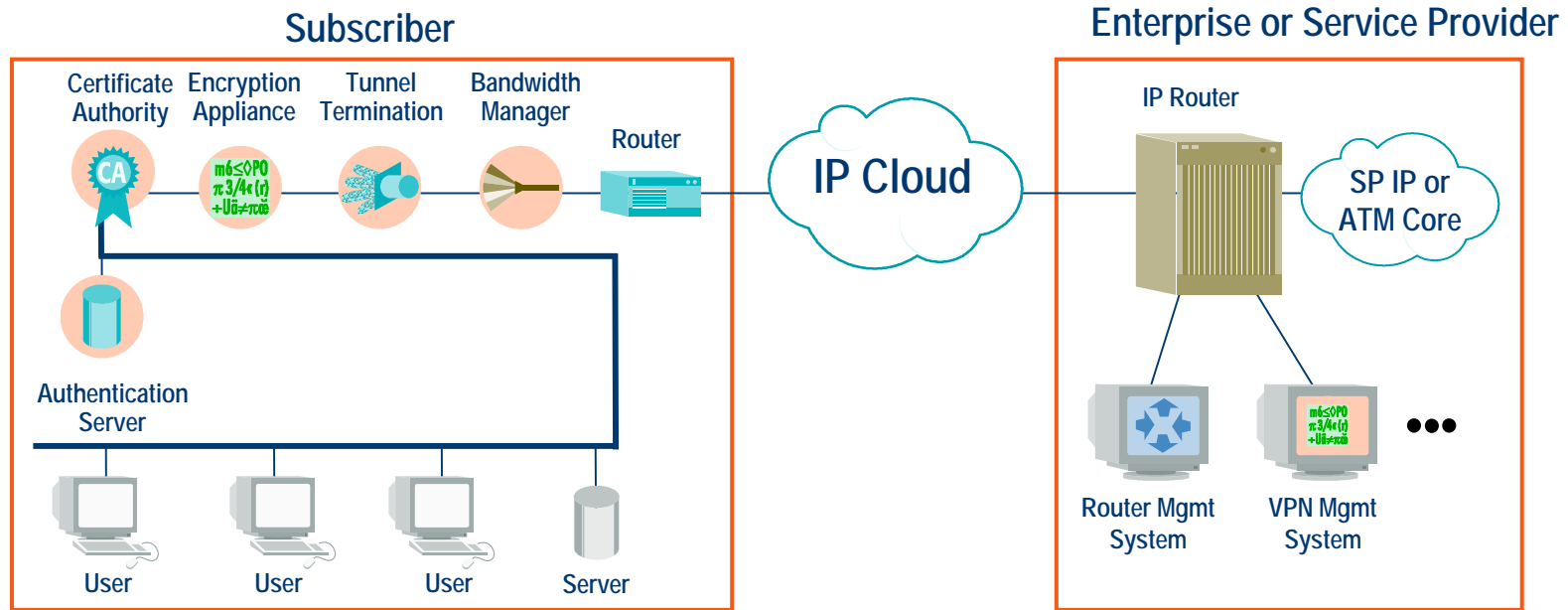
- Multiple self-managed devices on-site tax scarce it resources

- More ownership of support than traditional VLL solutions

- Service provider managed services have yet to be truly priced competitively with Frame Relay

- SLAs through solid QoS solution not available

Network-Based Service Delivery: The Intelligent Data Network
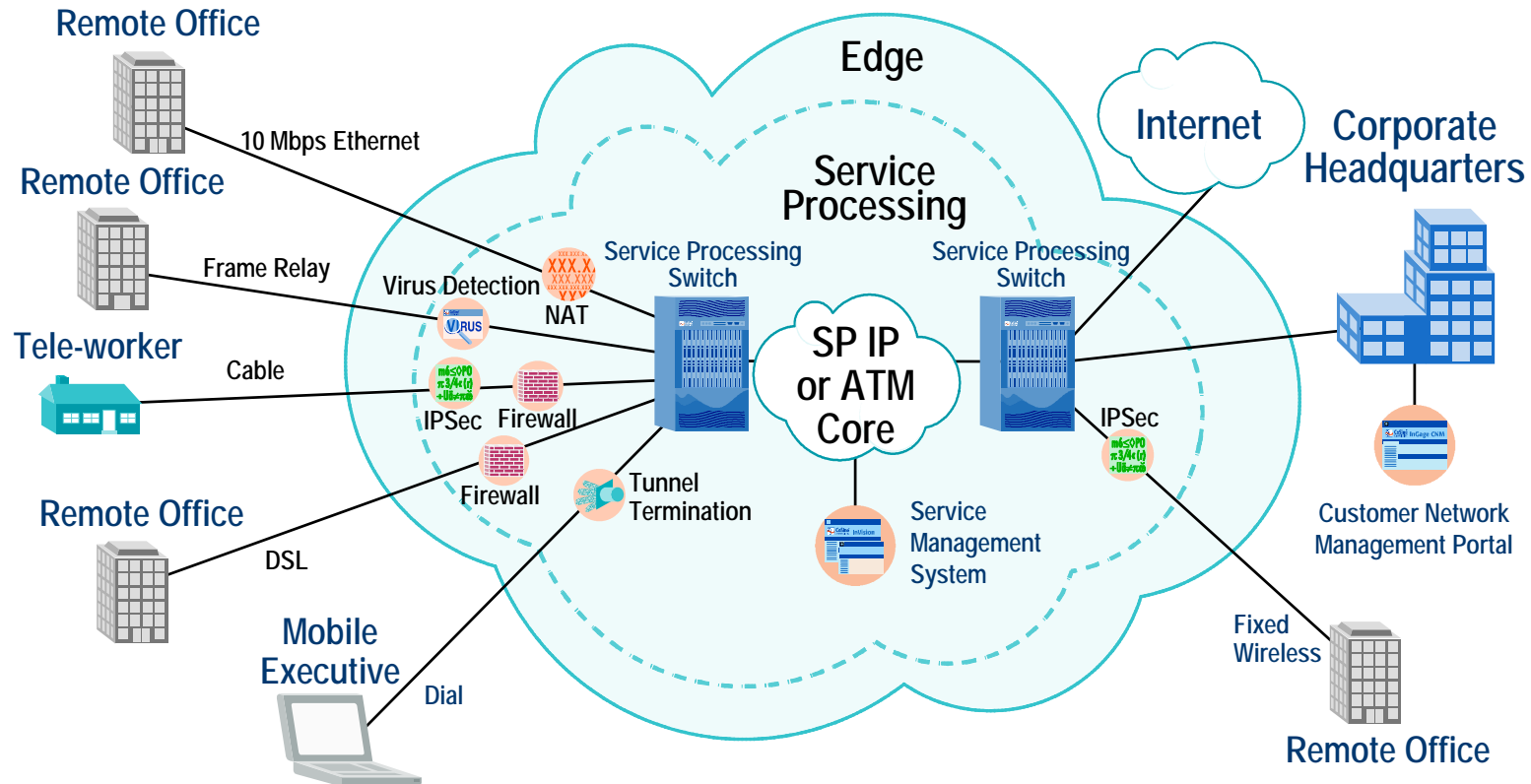
- VLL service bundled with your access service
- Managed in a scalable and reliable fashion by your service provider
- Priced attractively- 40% VLL savings over Frame Relay
- And furthermore, managed service network can be overlaid onto your existing SP-delivered WAN infrastructure (e.g. leased line, Frame Relay, ATM, DSL)
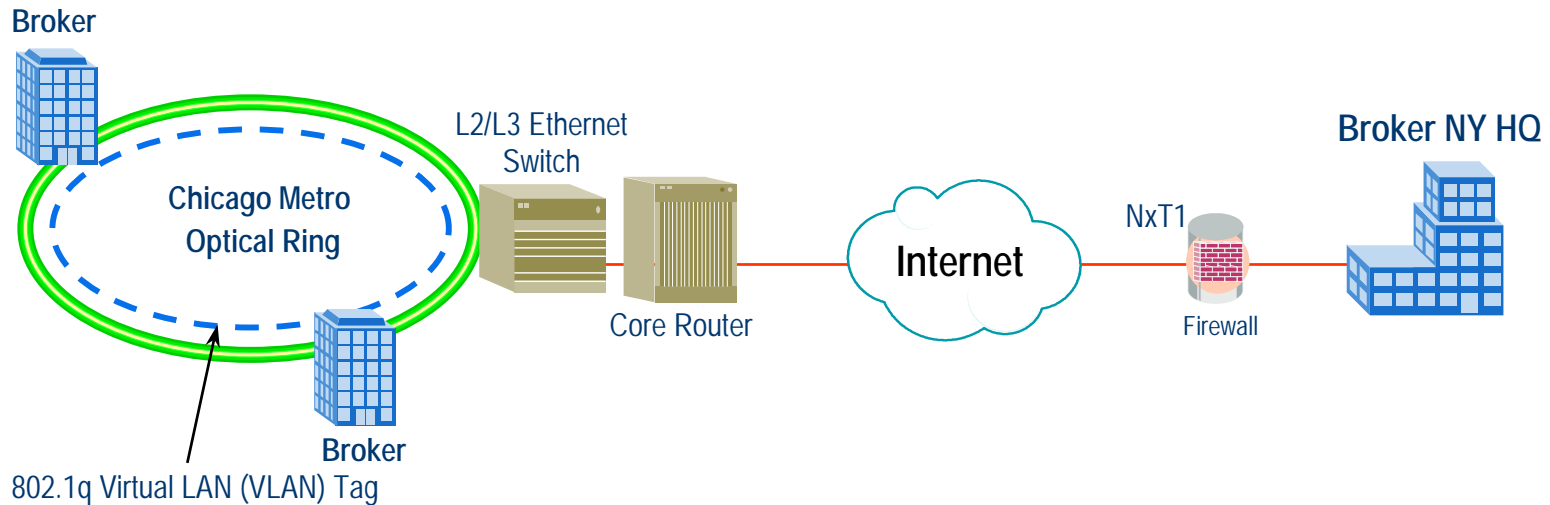
Network-Based VPNs: IPSec and/or MPLS

| Protocol	Applications	Security Level	Security Mechanisms
IPSec	Site-to-site VPNs, off-net VPNs, multi-service provider VPNs, extranets, sessions (DSL, dial etc.)	High	Strong encryption (3DES), data authentication (HMAC and SHA-1), user authentication (RADIUS and PKI)
MPLS	Site-to-site VPNs	Medium	Tunnel is established only between end-points with same VPN ID administered by SP

Ethernet MANs: Discontinuous MAN Price/Performance

Broker

L2/L3 Ethernet Switch

Broker NY HQ

Chicago Metro
Optical Ring

Internet

NxT1

Core Router

Firewall

Broker

802.1q Virtual LAN (VLAN) Tag

- Metro area Ethernet offerings enable high-speed local WANs (70km-150km distance limitation)
- VLANs securely segment networks in-metro, similar to Frame Relay PVCs
- Roughly $500 for 3 Mbps

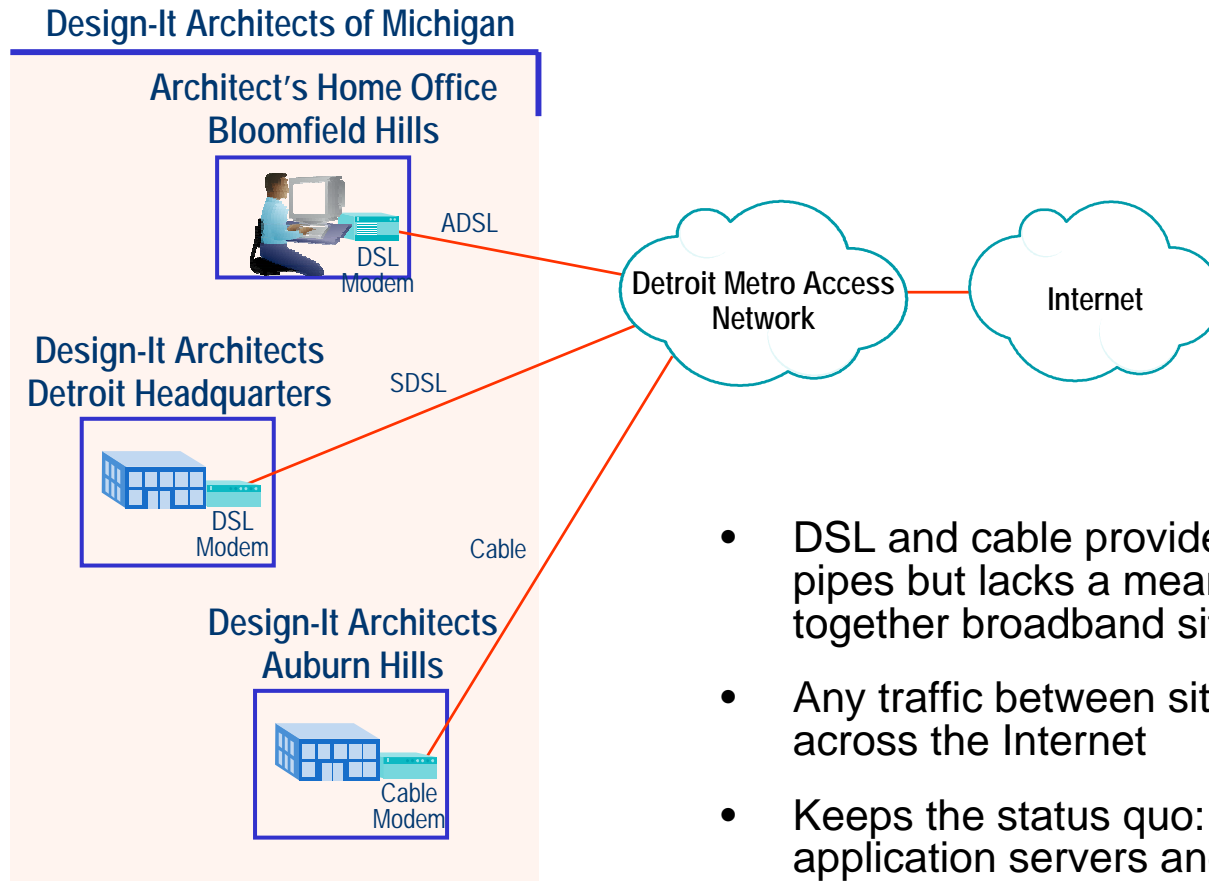- Long haul connectivity to HQ is over the unsecure Internet

# Ethernet Becomes a Long Haul VLL
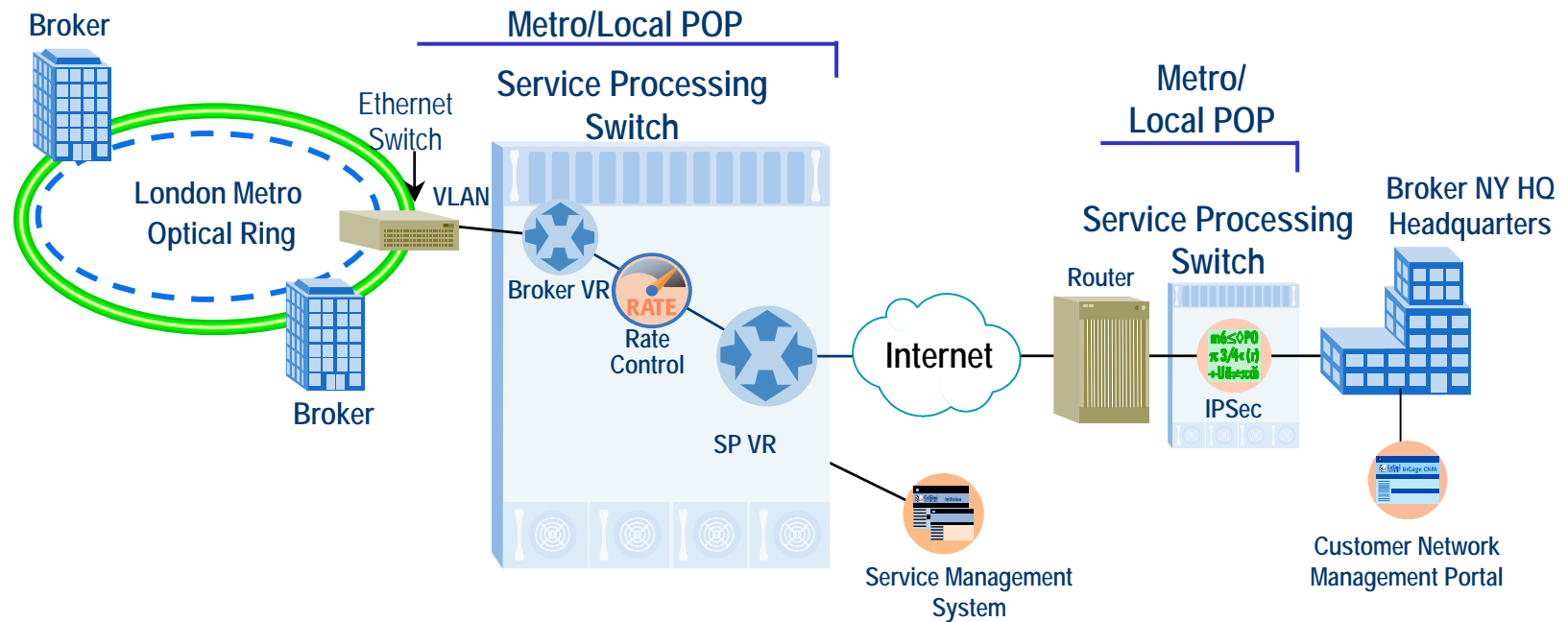
- IP-VPNS (IPSec or MPLS) turn an EMAN into an EWAN
- Access rates can be dynamically adjusted

Other Broadband Technologies Are Not Inherently VLLs

Design-It Architects of Michigan

Architect's Home Office Bloomfield Hills

DSL Modem

ADSL

Design-It Architects Detroit Headquarters

SDSL

DSL Modem

Cable

Design-It Architects Auburn Hills

Cable Modem
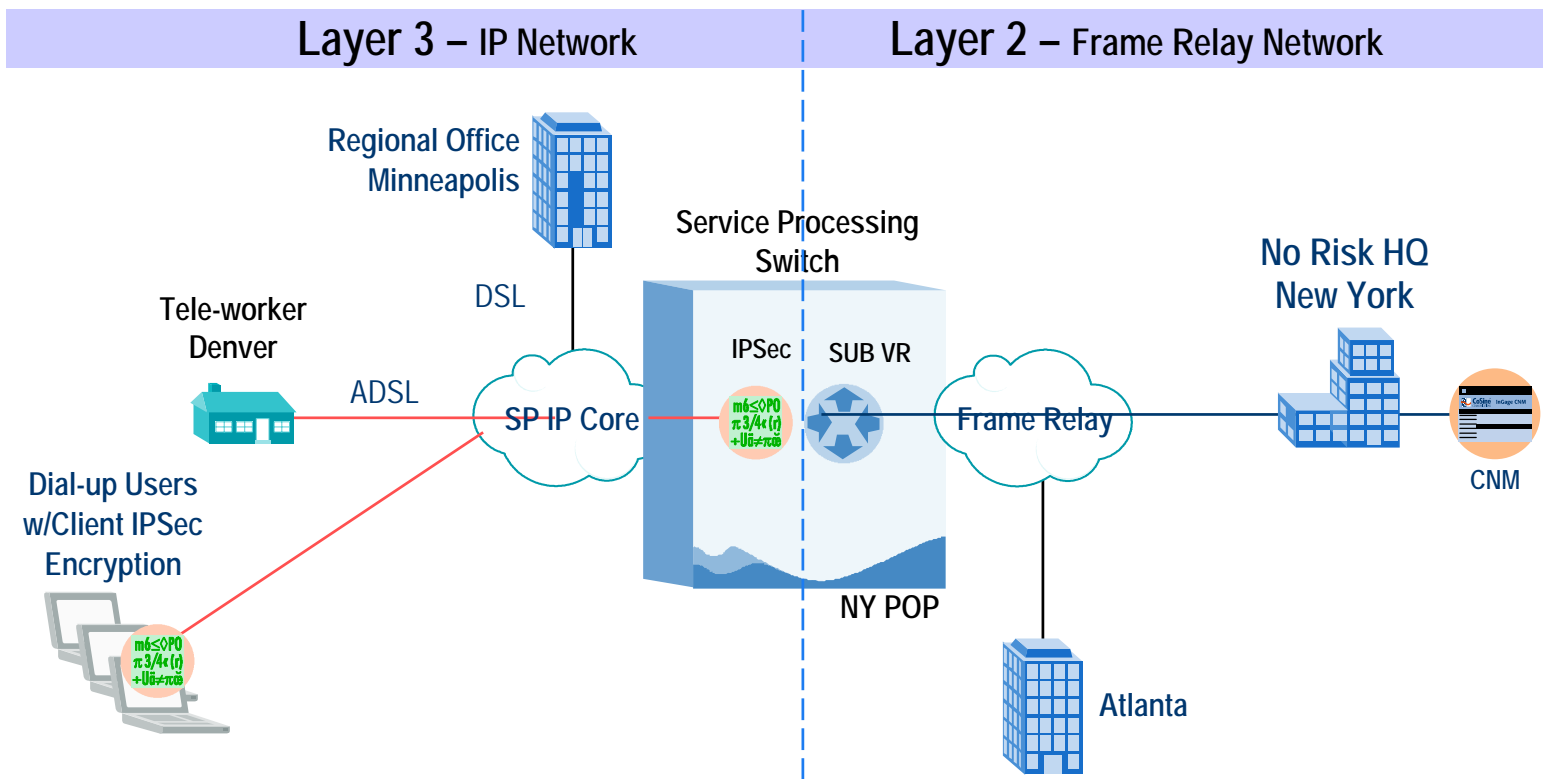
Detroit Metro Access Network

Internet

- DSL and cable provide Internet stove pipes but lacks a means to bind together broadband sites

- Any traffic between sites is in the clear across the Internet

- Keeps the status quo: decentralized application servers and resources

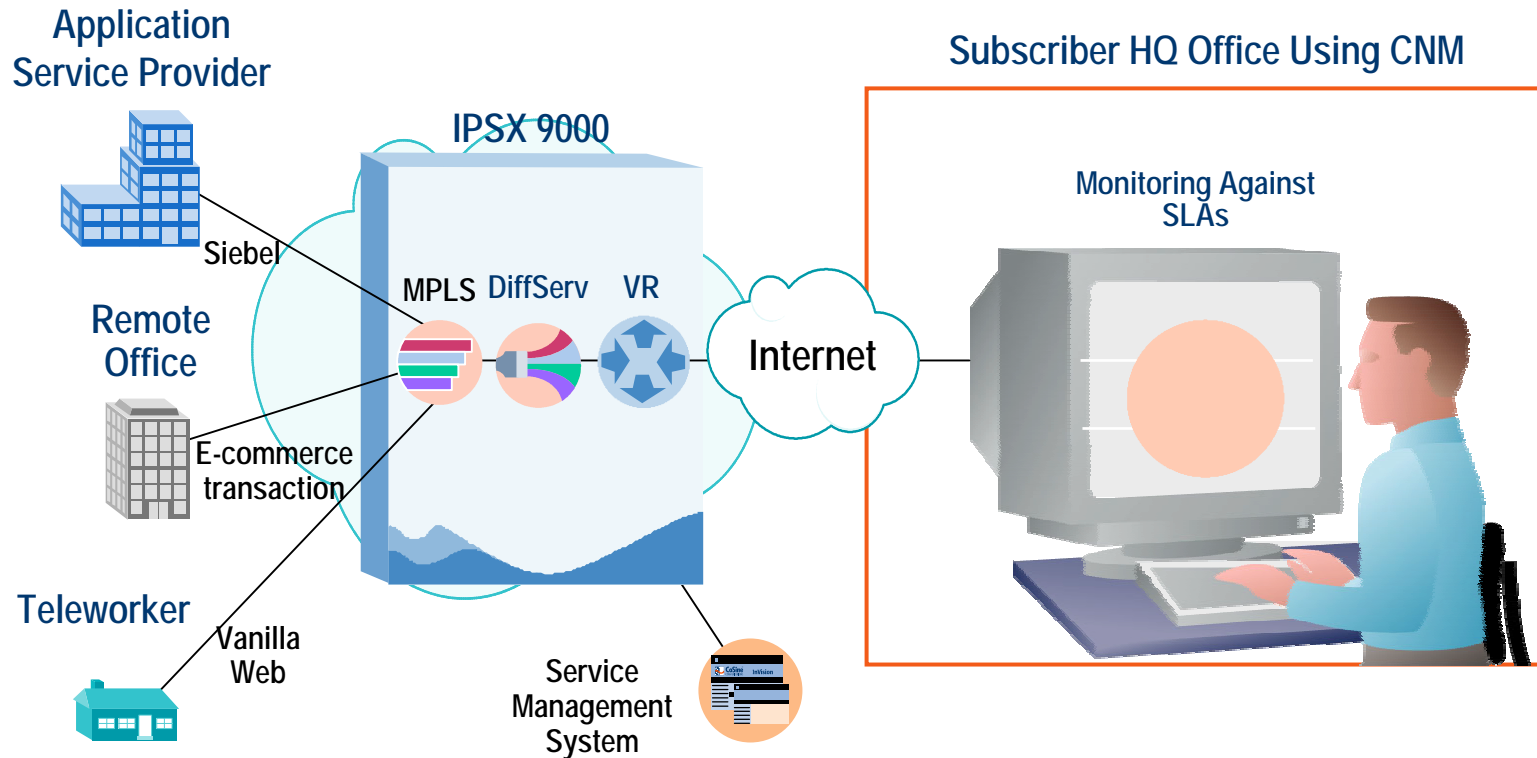# Routed Private Networks: Broadband Metro VLL Solution
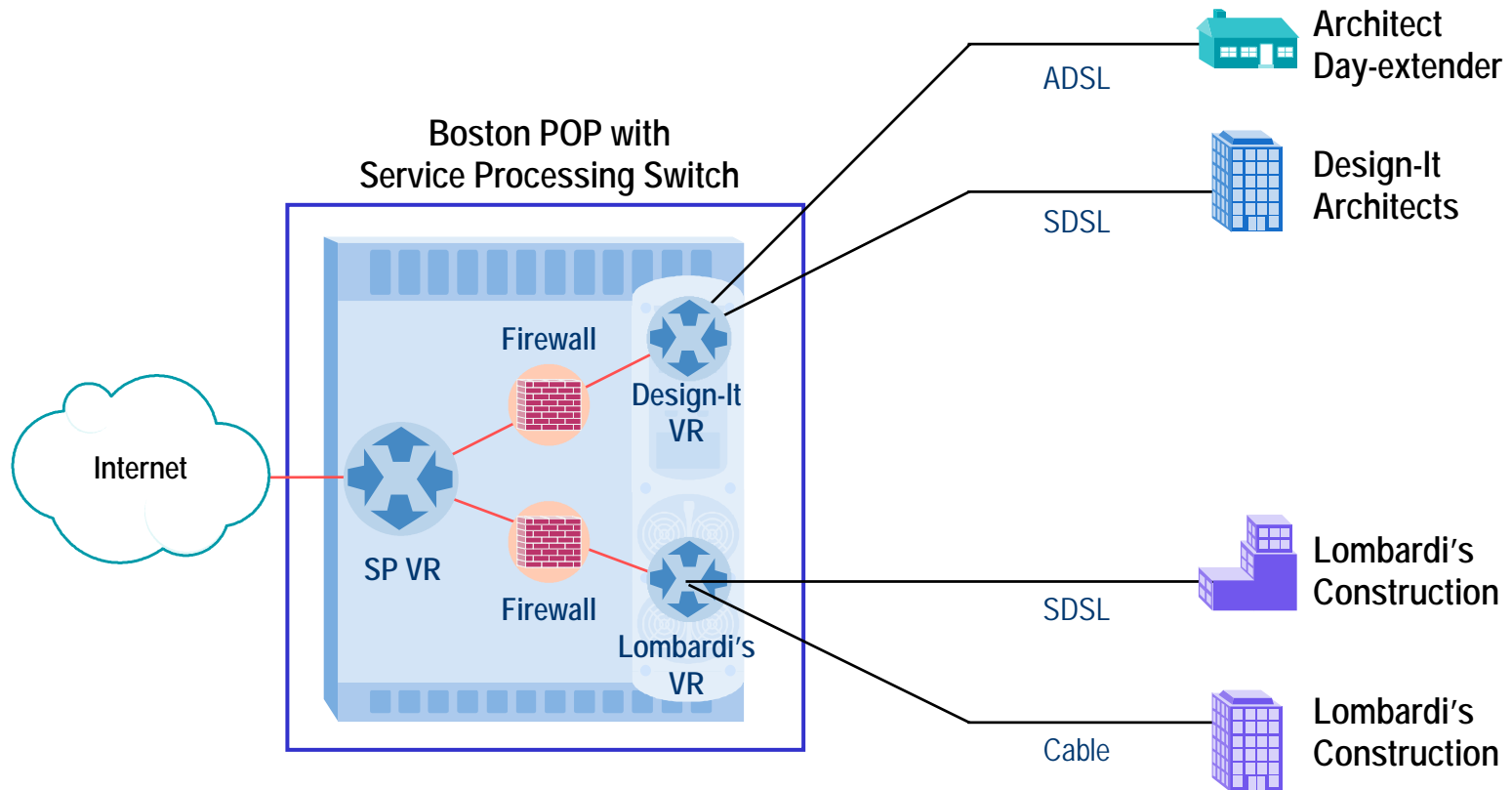
- Consolidates broadband access pipes into a unified VLL intranet
- VR is the backbone of a WAN
- Offices can securely share networked resources
- Firewall layered onto VR enables secure integrated Internet access for broadband metro

Seamless Integration of Frame Relay with IP VPN Intranets

Layer 3 – IP Network	Layer 2 – Frame Relay Network

Regional Office
Minneapolis

Service Processing
Switch

No Risk HQ
New York

Tele-worker
Denver

DSL

IPSec

SUB VR

ADSL

SP IP Core

Frame Relay

CNM

Dial-up Users
w/Client IPSec
Encryption

NY POP

Atlanta

- VR is used to connect Frame Relay and IP network
- Allows enterprises to adopt new broadband Internet technologies and integrate seamlessly with Frame Relay intranets
- Teleworkers over DSL and cable can be brought into the corporate WAN

Application Aware VLLs

Application Service Provider

Subscriber HQ Office Using CNM

IPSX 9000

Siebel

Remote Office

MPLS DiffServ VR

E-commerce transaction

Internet

Monitoring Against SLAs

Teleworker

Vanilla Web

Service Management System

- MPLS traffic engineering coupled with DiffServ provide end-to-end service level guarantees for IP-VPNs
- CNM provides enterprise subscribers with visibility and control of their VLL
- Monitoring of SLAs versus commitments
- Modify priority policies in real-time

The Next Wave of VLLs Are:

- Driving New Price/Performance Metrics

- Leveraging the Internet

- Interworking Seamlessly Across Any Network

- Supporting Application-Level Requirements