MPLS deployment experience and perspective in developing countries

---

Outline

1. *Overview of the context and the current status of MPLS feature deployment.*

MPLS?

Advantages / Disadvantages

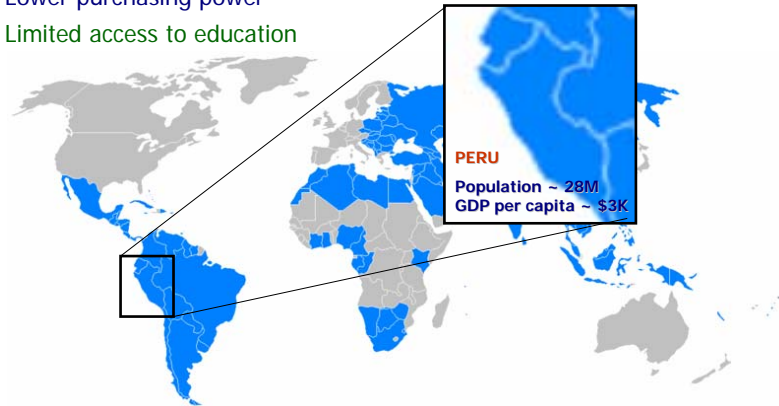2. *Main advantages and disadvantages perceived for SPs and the ImpSat Case Study.*

3. *Summary and recommendations.*

Overview and current status

Possible limitations on developing countries that could affect or delay technological development.-

- Lower purchasing power
- Limited access to education

PERU
Population ~ 28M
GDP per capita ~ $3K

Telecommunications technology deployment still propelled by:
Global corporations;   Internet as a source of information
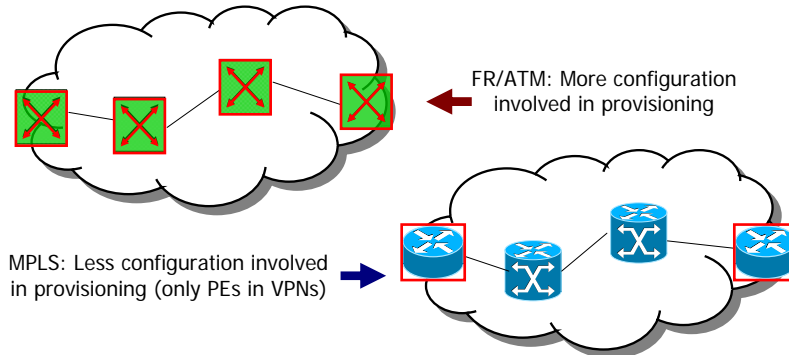

Overview and current status

Common features deployed in developing countries

Wide implemention	Main Reasons	Why widely?
MPLS L3 VPN	• Full-mesh-like VPN • Cost reduction	• Good and clear benefits • Easy and cheap to deploy

Moderate implementation	Main Reasons	Why moderately?
MPLS L3 VPN with OVERLAPPING VPNs	• Centralized services • Extranets	• Limited information, interest or particular needs • Limited specialization
MPLS TRAFFIC ENGINEERING	• Advanced traffic balancing in complex topologies	
PWE3 (Point-to-Point)	• All services brought together above MPLS	• Moderate market demand • Some SPs still prefer legacy
PWE3 (VPLS)	• PtP is easier to deploy but VPLS more flexible.	• Growing but moderate demand • Expensive upgrade

Low or non implementation	Main Reasons	Why low or not?
MULTICAST VPNs	• Multicast transport over MPLS VPNs	• Low market demand • Complex deployment
GMPLS	• Unify the control plane to simplify operation	• Limited information

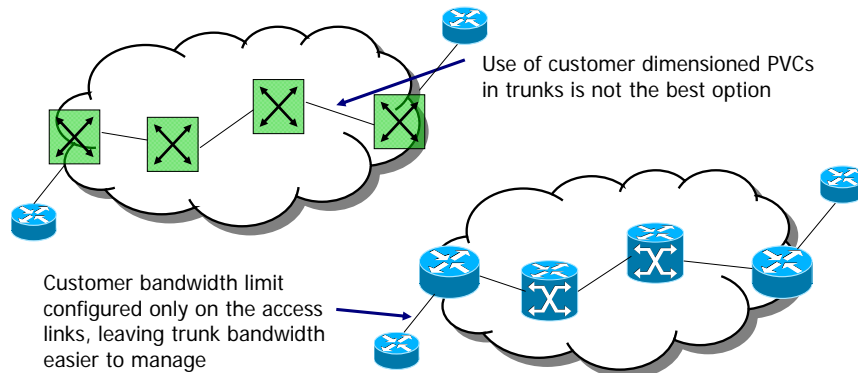# Advantages & Disadvantages perceived for SPs

General main advantages

- **Simplified provisioning / Core-routers not aware of VPNs**
- Better & cost-effective use of trunks
- Lower cost CPEs
- Easier customer management

FR/ATM: More configuration involved in provisioning

MPLS: Less configuration involved in provisioning (only PEs in VPNs)

Advantages & Disadvantages perceived for SPs

General main advantages

- Simplified provisioning / Core-routers are not aware of VPNs
- **Better & cost-effective use of trunks**
- Lower cost CPEs
- Easier customer management

Use of customer dimensioned PVCs in trunks is not the best option

Customer bandwidth limit configured only on the access links, leaving trunk bandwidth easier to manage

Advantages & Disadvantages perceived for SPs

General main advantages
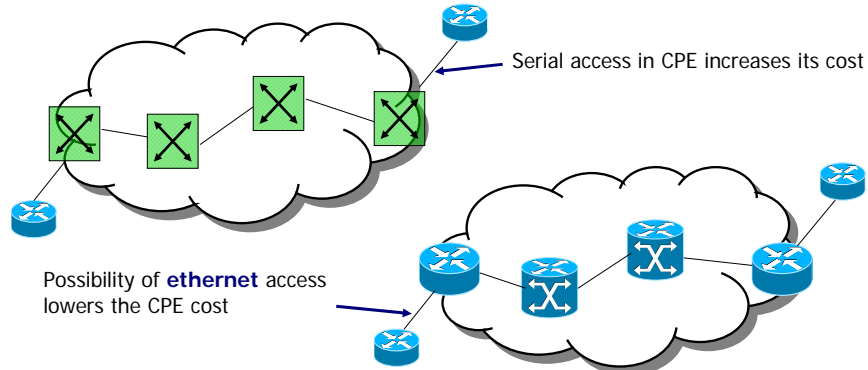
- Simplified provisioning / Core-routers are not aware of VPNs
- Better & cost-effective use of trunks
- **Lower cost CPEs**
- Easier customer management

Serial access in CPE increases its cost

Possibility of **ethernet** access lowers the CPE cost

Advantages & Disadvantages perceived for SPs

General main advantages

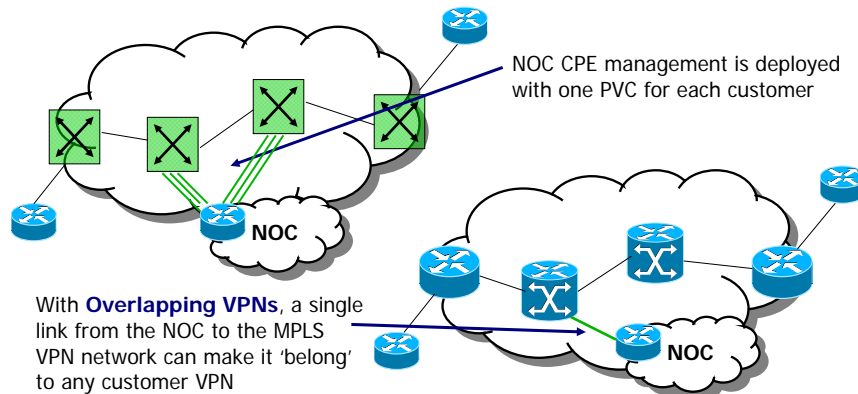- Simplified provisioning / Core-routers are not aware of VPNs
- Better & cost-effective use of trunks
- Lower cost CPEs
- **Easier customer management**

NOC CPE management is deployed with one PVC for each customer

NOC

With **Overlapping VPNs**, a single link from the NOC to the MPLS VPN network can make it 'belong' to any customer VPN

NOC

Advantages & Disadvantages perceived for SPs

But, what main disadvantages are perceived for MPLS deployment?

Informational disadvantages

- Most of the knowledge base comes in a non-native language.

- Operating and network troubleshooting know-how, is an expensive and in-demand resource.

  "A bad workman blames his tools"

Operational disadvantages

- Integrating different MPLS SPs services as products could be difficult, leading some customers to prefer only one SP.

- Some previously defined products may be harder to initially implement in MPLS.

Financial disadvantages

- The large initial investment for feature deployment, for example regarding VPLS, could be an obstacle for wide implementation.

→ However: These disadvantages do not prevent deployment, but simply postpone it.

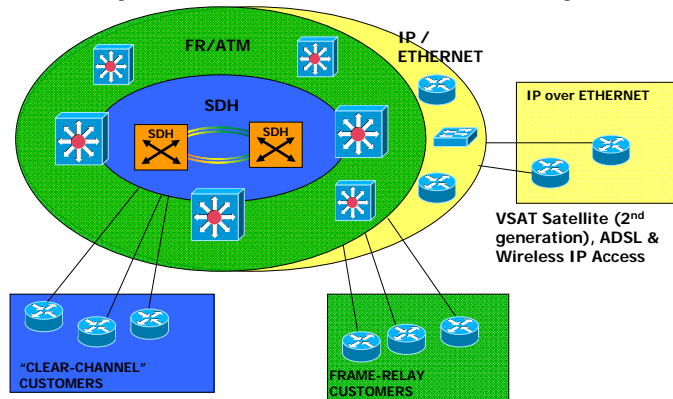# SP Case Study: Migration to MPLS

ImpSat *Latin American service provider with more than 10 years in the market, offering Internet, Private networks, Telephony & Datacenter services across the whole region.*
Think>Ahead

The beginning: Where were we before? Before IP/MPLS was deployed, the backbone for providing private networks was formed only by FR/ATM & SDH Switches
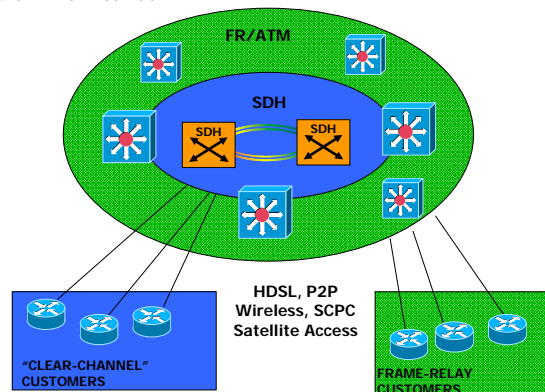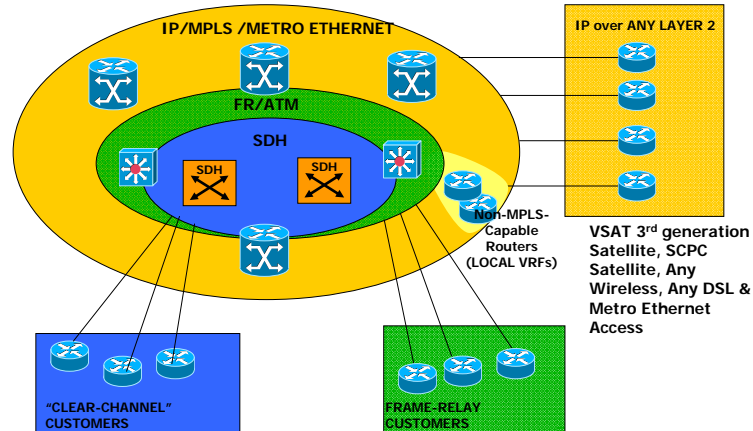
SP Case Study: Migration to MPLS

IP… in the backbone? when certain types of ethernet accesses became more popular and cost-effective, routers had to be deployed on the backbone to give these customers access to the existing network.

At this point, the alternatives to maintain customer IP network co-existence on routers were **too** complicated (Local VRFs, source address routing, etc)

SP Case Study: Migration to MPLS

The MPLS age: With MPLS deployed, backbone routers became easier to manage. Ethernet-type accesses started receiving more preference.

Still keeping non-MPLS-capable routers using local VRFs on very small nodes (economic reasons)

SP Case Study: Migration to MPLS

Current features fully & globally deployed: **L3 VPN** and **L2 VPN** (ETH P2P)

What was it like getting there?

At first we experienced some Informational difficulties

- Harder topics**:** QoS, Inter-AS MPLS within confederation, label-thinking vs route-thinking.

  → Created specialist certification programs

We also experienced some Operational difficulties

- Bandwidth limit for international customer links (as it was being sold before).

  → Configuration became more complex in order to keep the product ("International VPNs")

- Customers with backup access links wanting to load-balance using both links.

  → Deployed different VPNs per access (instead of interferring with BGP in the core)

- Global BGP topology, consisting on a single confederation formed by each country AS, represented, at first, an unusual scenario for deploying MPLS VPNs.

  → Successfully deployed MP-EBGP VPNv4 for Inter-AS MPLS VPNs

Could not escape some Financial difficulties

- Less attractive to invest in regions where forecasting is difficult.

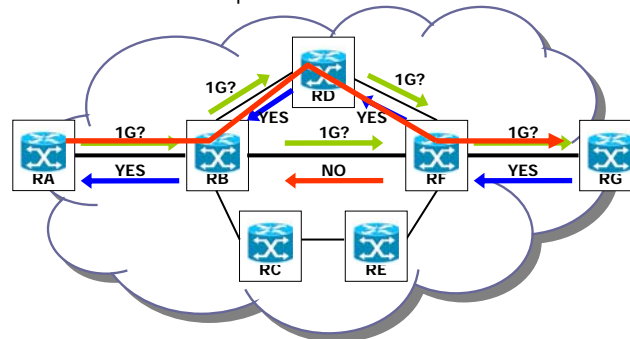 → Succesfully deploying small PEs using Cisco ISRs (28xx) to keep the migration on.

SP Case Study: Migration to MPLS

Where are we going?   (1)

MPLS Traffic Engineering

→ Global operations migrating to a single BGP AS, so IGP-driven utilization of multiple international trunks is not the best option.
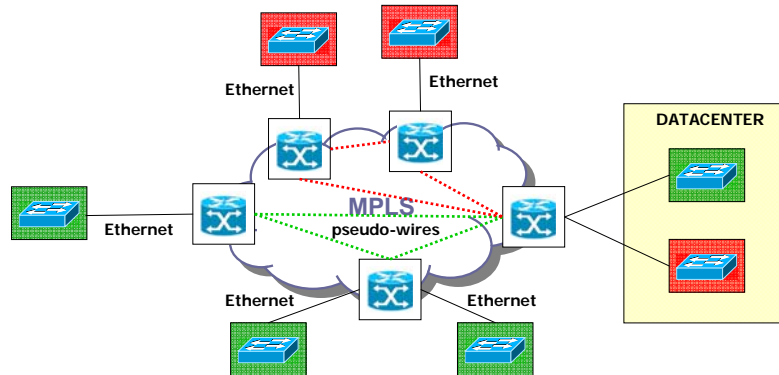
SP Case Study: Migration to MPLS

Where are we going? (2)

VPLS

→ The increasing number of customers preferring our housing and hosting Datacenter services need a much more flexible multipoint 'LAN-like' connection.

Summary

Scope for growth

Service providers in developing countries have deployed almost all existing MPLS features, but deployment is not yet as widespread as in other parts of the world.

Challenging, but not impossible

Common difficulties observed in developing countries are mostly related to lack of know-how and high costs.   This fact, along with common operational difficulties, represent a challenging scenario, but this is by far outweighed by the clear advantages.

Recommendations

Strategic training

Vital that proper training on MPLS applications should be focused not only on Technical Staff but also on Project Managers and Sales Representatives.

This accelerates the implementation of new MPLS features, such as VPLS, as customers become more aware of technological improvements.

Strategic deployment

Metro Ethernet accesses and VPLS, whilst being moderately deployed in most developing countries, are becoming the norm for most Service Providers.

Might this be leading us to upcoming technologies such as PBT and T-MPLS?

Strategic investment

IP, MPLS and Ethernet related technologies make for a solid investment as backbone technologies.

Contact

Thank you

http://www.new7wonders.com/

Further information about this and related topics

Gianpietro Lavado Chiarella

glavado@impsat.com

(51-1) 7055750