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# Background on IP Networks

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# MPLS CONCEPT



# MPLS Concept

- Multiprotocol Label Switching (MPLS)
- Scalable and manageable IP VPN network.
- Use 'label' attached to IP packets to route packets through the provider's network.

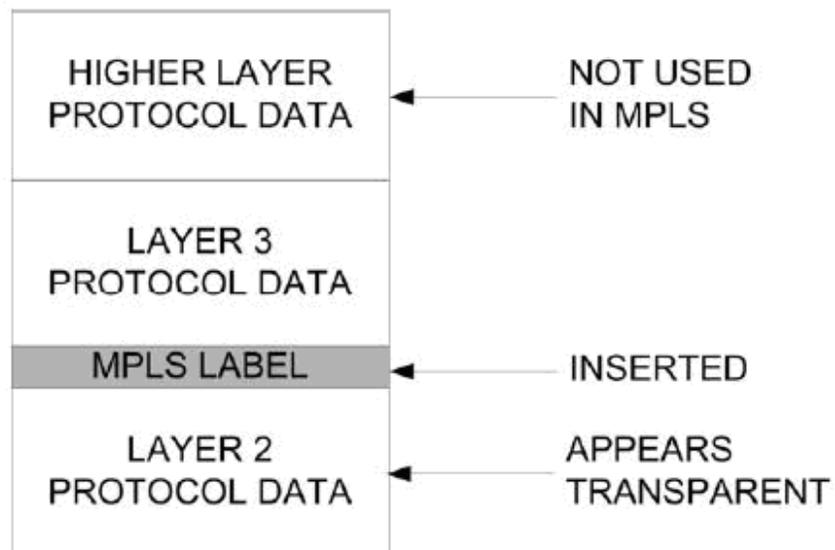


## MPLS Concept

- Can be used on different Data Link protocols; E1/T1, ATM, Frame Relay, etc.
- In the OSI model, MPLS operates between Layer 2 (Data Link) and Layer 3 (Network), or a Layer 2.5 protocol.



# MPLS Concept





## MPLS Concept

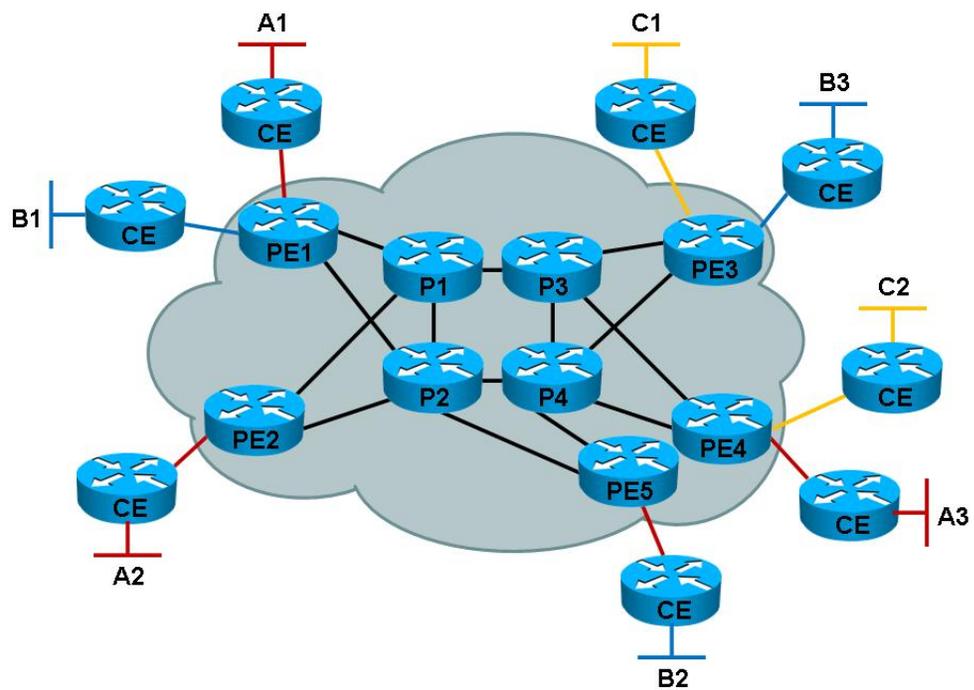
- Each 'label' is separated and won't interact with each other, therefore 'label' performs the virtual private network (VPN) function.
- Provider's network won't know what is inside each package. And each package won't interfere with each other.



# MPLS Concept

- **Components**

- Customer-Edge (CE) router – routers located at the facility of customer.
- Provider-Edge (PE) router – provider's 1<sup>st</sup> router that connects to the CE router.
- Provider router (P) – label switch routers internal to provider.



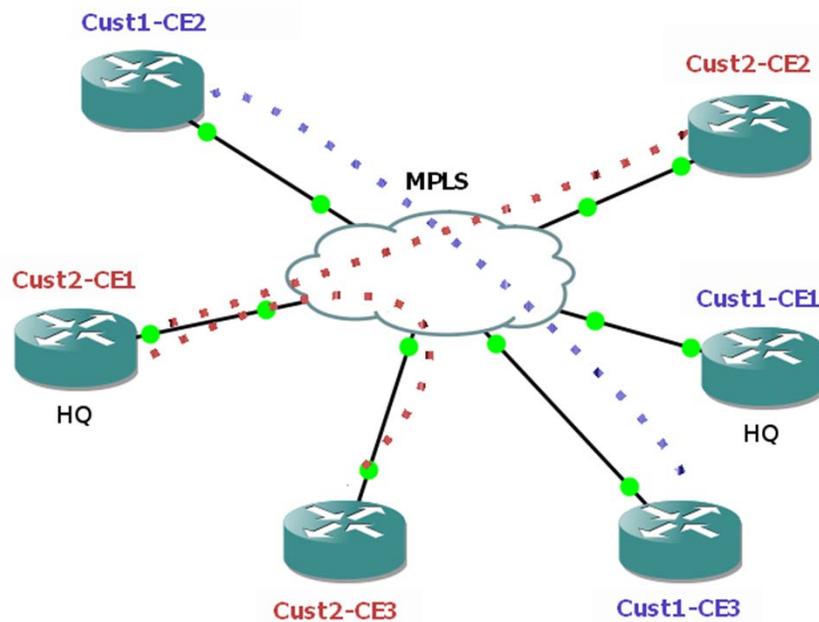


## MPLS Concept

- MPLS provides pseudo-wire (VPN tunnel) connectivity between end systems.
- Can support multiple applications such as voice (VoIP), data communication with different QoS, etc.



# Example of MPLS network usage





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# VSAT AND TERRESTRIAL IP



## VSAT / Terrestrial MPLS

- Both VSAT and Terrestrial MPLS can provide end-to-end connectivity (any to any).
- Depend upon the geographical requirements, one technology may perform better than the other.
  - Islands / Mountainous area – maybe VSAT / MPLS over fiber (if available)
  - Large cities / flat terrain – maybe terrestrial MPLS / VSAT (as backups)



# VSAT and traditional IP network

- MPLS can be used over VSAT and traditional terrestrial IP networks. They are treated as data link network layer.
- Different usage requirements provide parameters (bandwidth, latency, etc.) to configure the use of different networks under MPLS.
  - Voice via VoIP
  - Different classes of data communication, e.g. high-priority, low-priority, etc.



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# QUALITY OF SERVICE (QOS)

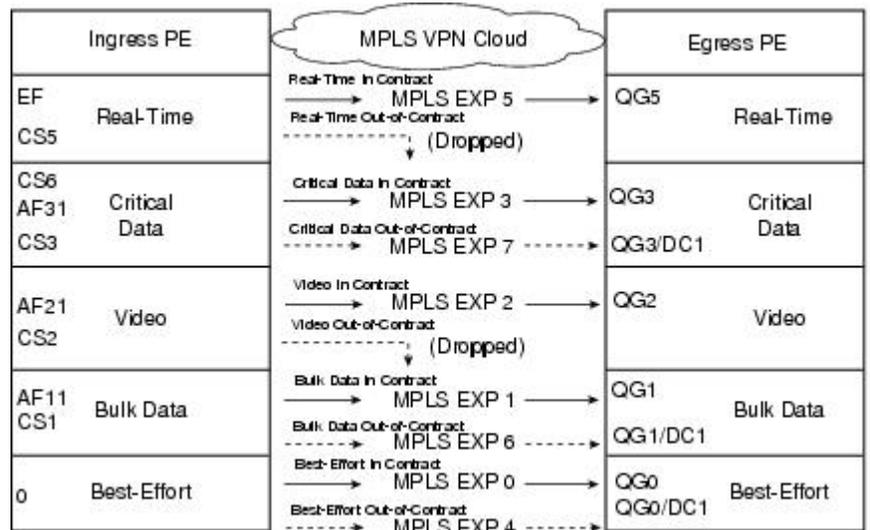


## Quality of Service (QoS)

- MPLS 'label' can provide QoS information.
- IP QoS parameters (DiffServ) are mapped to the 'Label' QoS levels.
- Different applications are then mapped to the available IP DiffServ classes.



# Example of MPLS QoS mapping





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# SECURITY



# Security

- MPLS Security is result from the nature of private network of MPLS.
- The network core will be secured by the provider.
- Encryption can be performed on the end-to-end systems to enhance security.



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