MPLS, Segment Routing, SD-WAN

let's do some clarity

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A bit of history: why MPLS?

- **A standard**
  - To evolve the traditional IP routing model towards new traffic management functions (i.e. MPLS Traffic Engineering)
  - To allow the creation of more scalable IP networks
  - **To expand the offer of network services** (i.e. L3VPN, L2VPN, IPv6 transport, etc.)

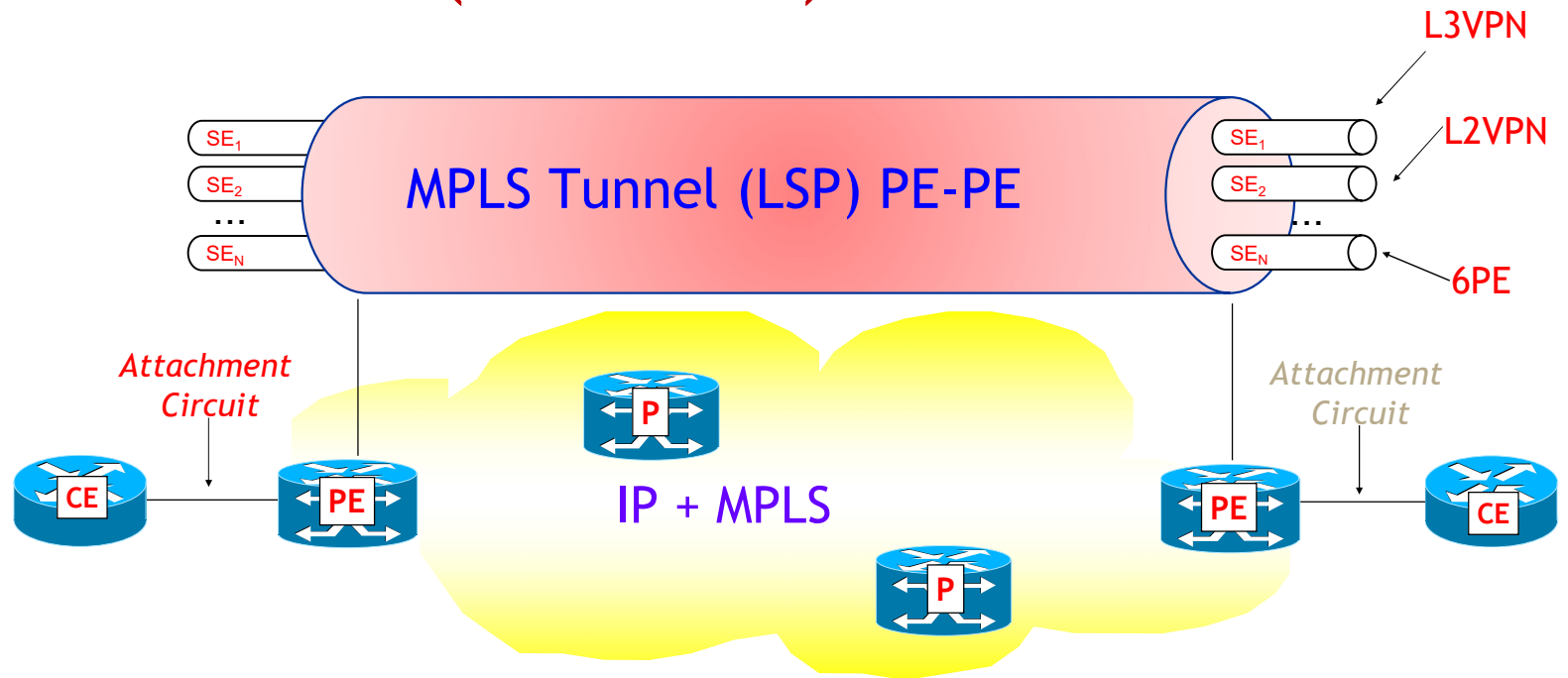MPLS → **M**ulti **P**rotocol **L**abel **S**witching

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One tunnel fits all (services)!

- CE: Customer Equipment
- PE: Provider Edge
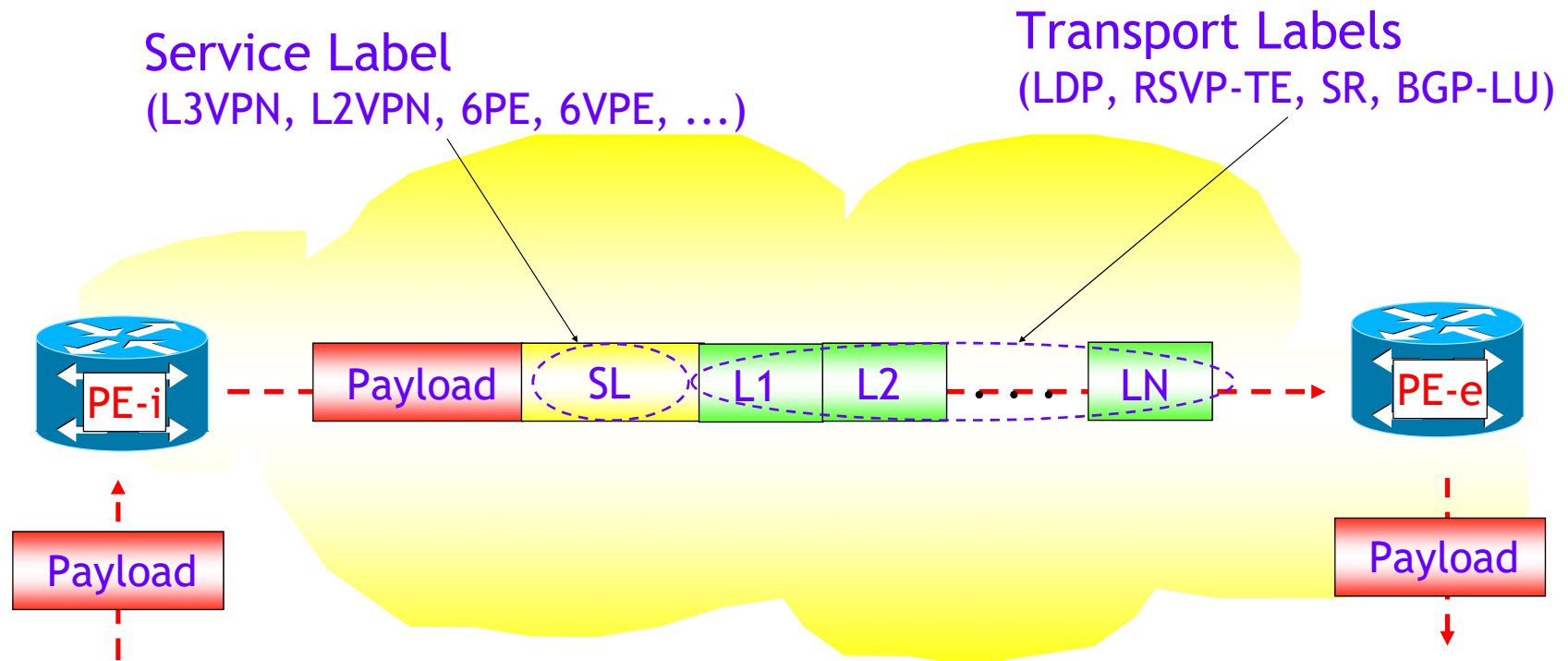- P: Provider (transit router)

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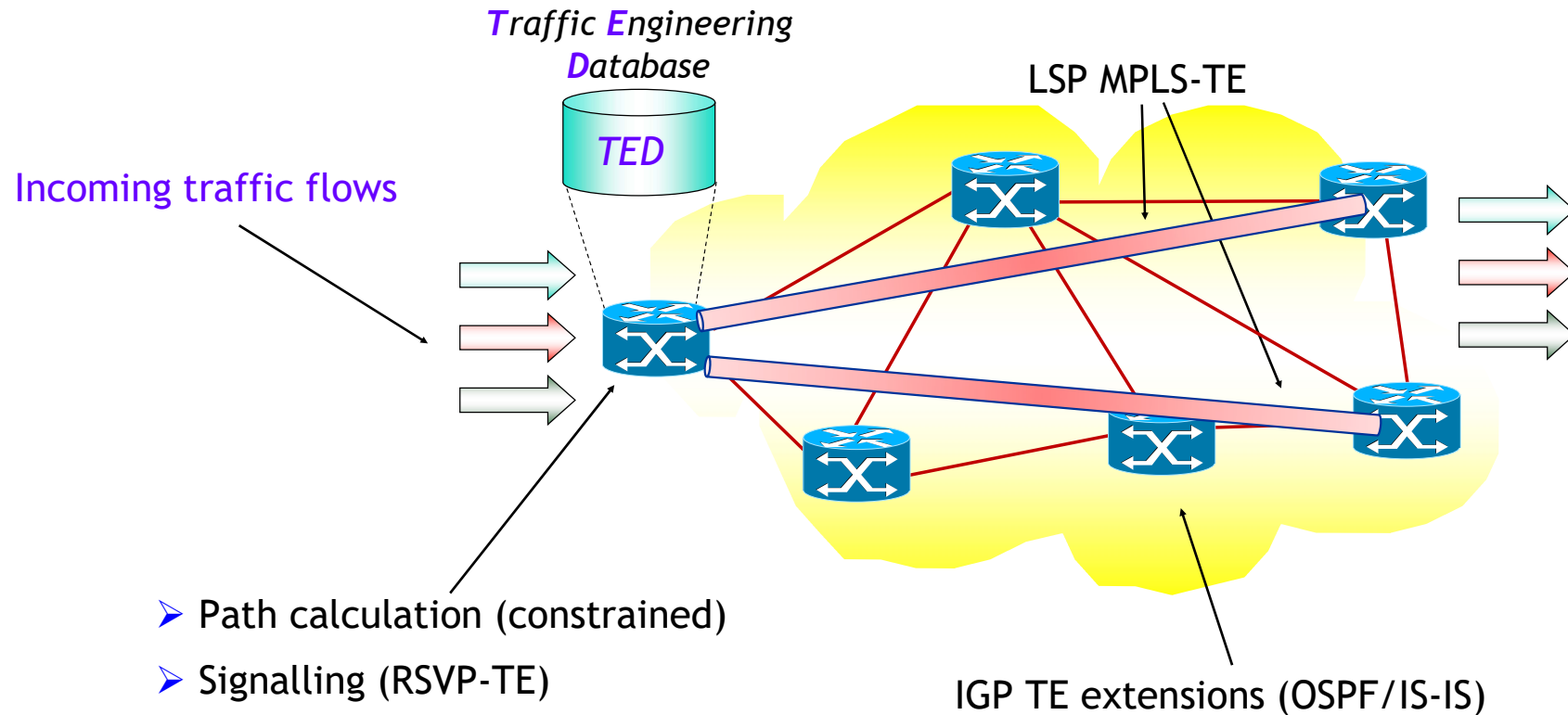
Service and Transport Labels

Service Label
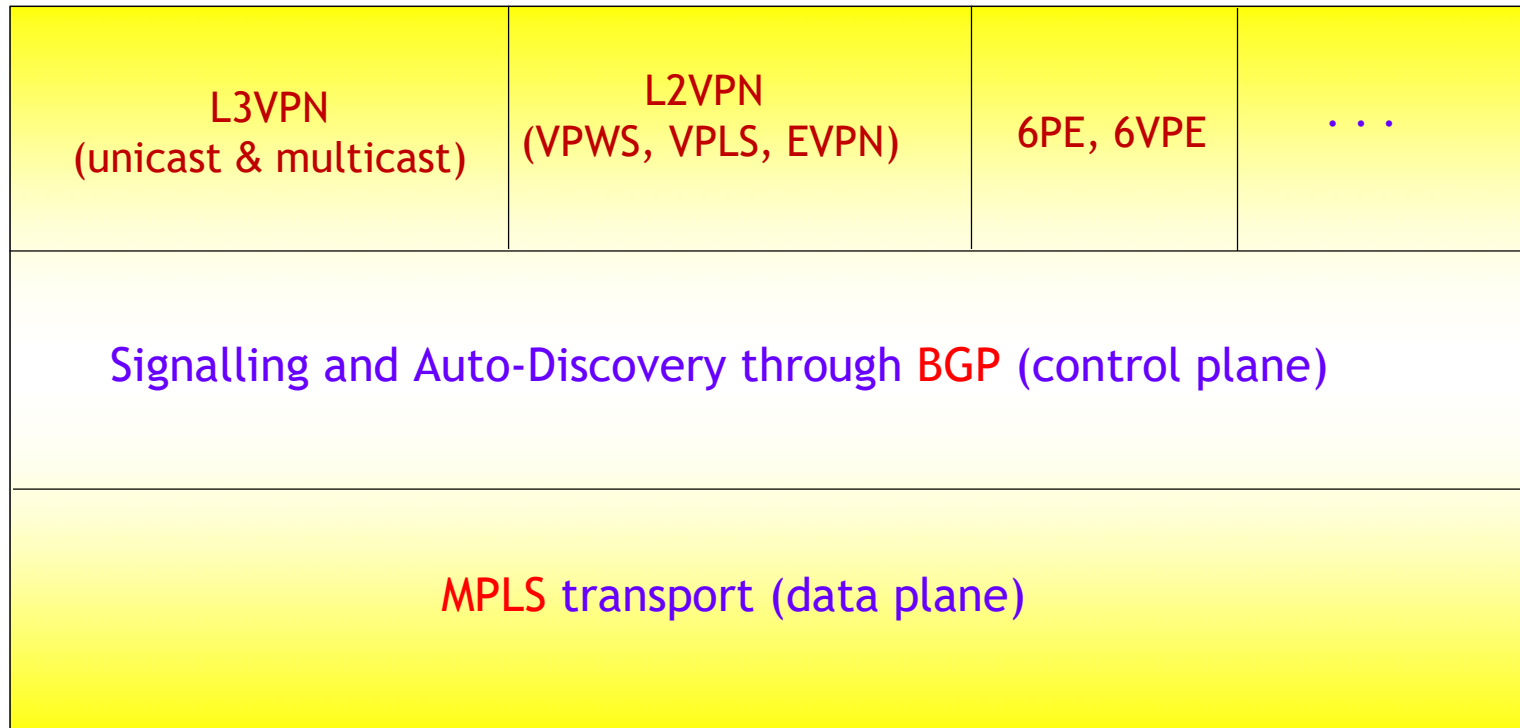(L3VPN, L2VPN, 6PE, 6VPE, …)

Transport Labels
(LDP, RSVP-TE, SR, BGP-LU)

PE-i | Payload | SL | L1 | L2 | … | LN | PE-e

Payload

Payload

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Service # 1: MPLS Traffic Engineering

Traffic Engineering Database

TED

Incoming traffic flows

LSP MPLS-TE

- ➢ Path calculation (constrained)
- ➢ Signalling (RSVP-TE)

IGP TE extensions (OSPF/IS-IS)

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BGP/MPLS services

| L3VPN (unicast & multicast)	L2VPN (VPWS, VPLS, EVPN)	6PE, 6VPE	. . .
Signalling and Auto-Discovery through BGP (control plane)			
MPLS transport (data plane)			

Service # 2: L3VPN (the great success ...)
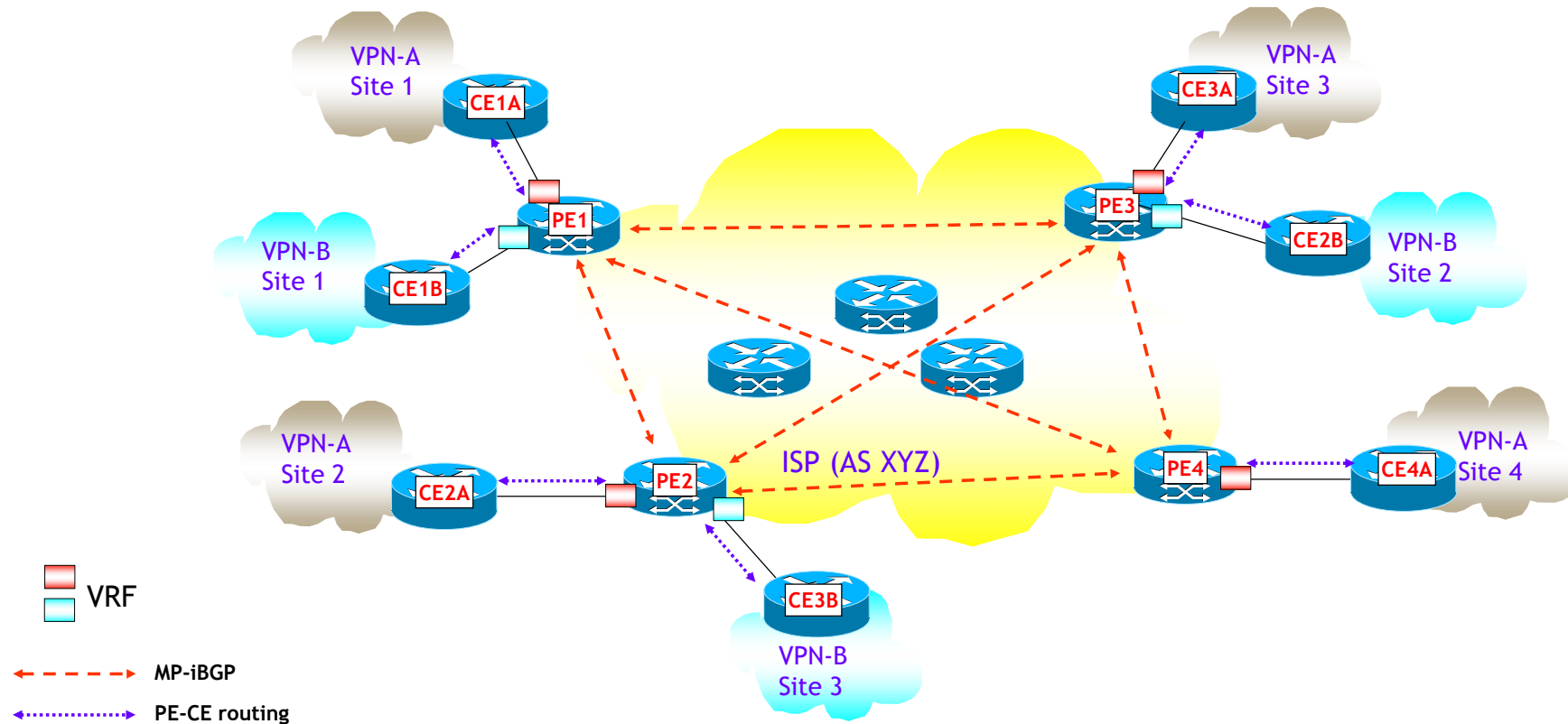
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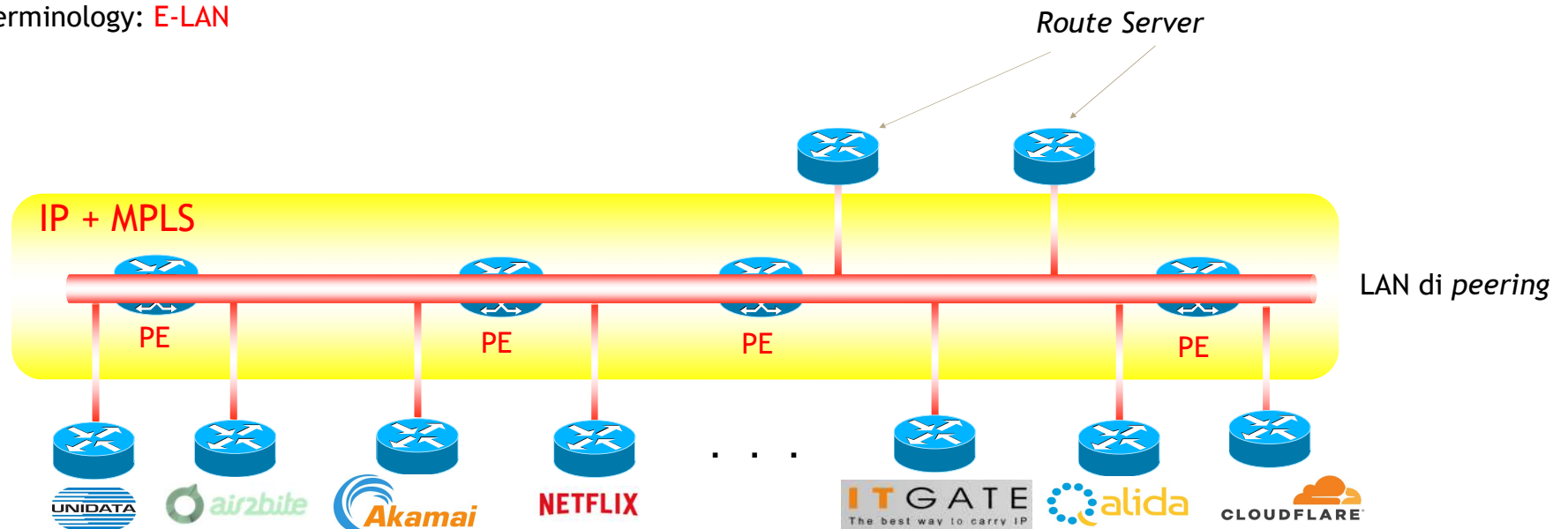
Service # 3: L2VPN point-to-point

- Circuit emulation services (*point-to-point*)
  - Can transport any Layer 2: Ethernet, ATM, Frame Relay, PPP, etc.
  - IETF terminology: VPWS (Virtual Private Wire Service)
  - MEF terminologiy: E-Line

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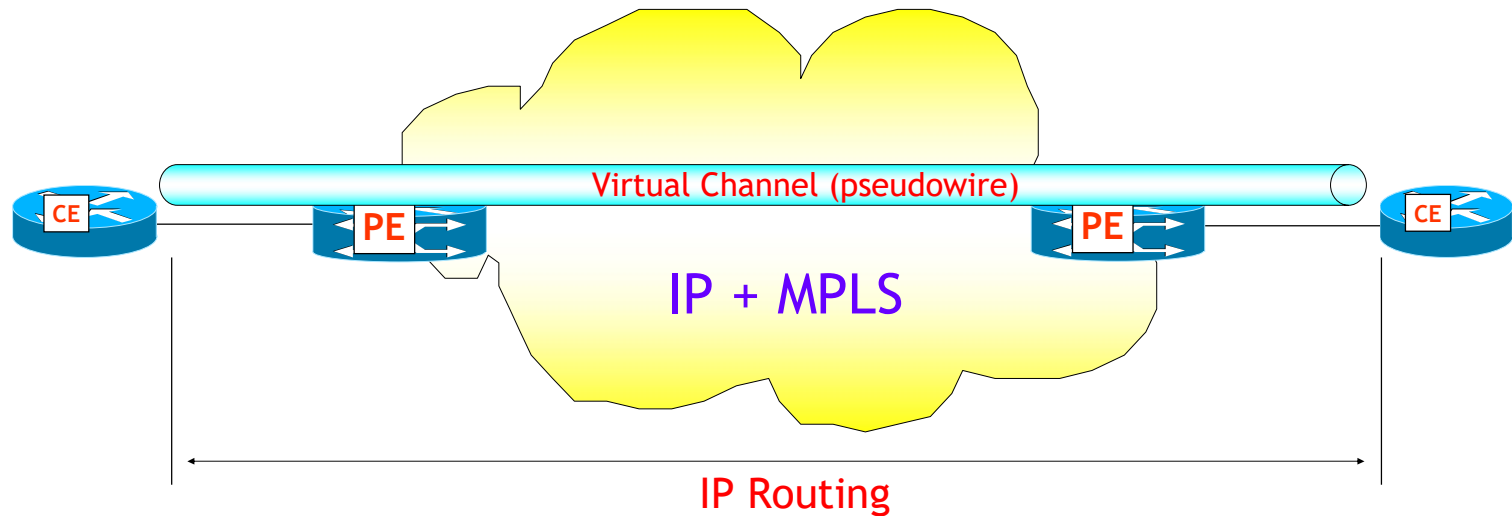
Service # 4: L2VPN multipoint-to-multipoint

■ LAN Ethernet emulation services (*multipoint-to-multipoint*)

  ● IETF terminology: VPLS (Virtual Private LAN Service) / EVPN (Ethernet VPN)

  ● MEF terminology: E-LAN

Route Server

IP + MPLS

PE   PE   PE   PE

LAN di *peering*

. . .

UNIDATA   air2bite   Akamai   NETFLIX   ITGATE The best way to carry IP   alida   CLOUDFLARE
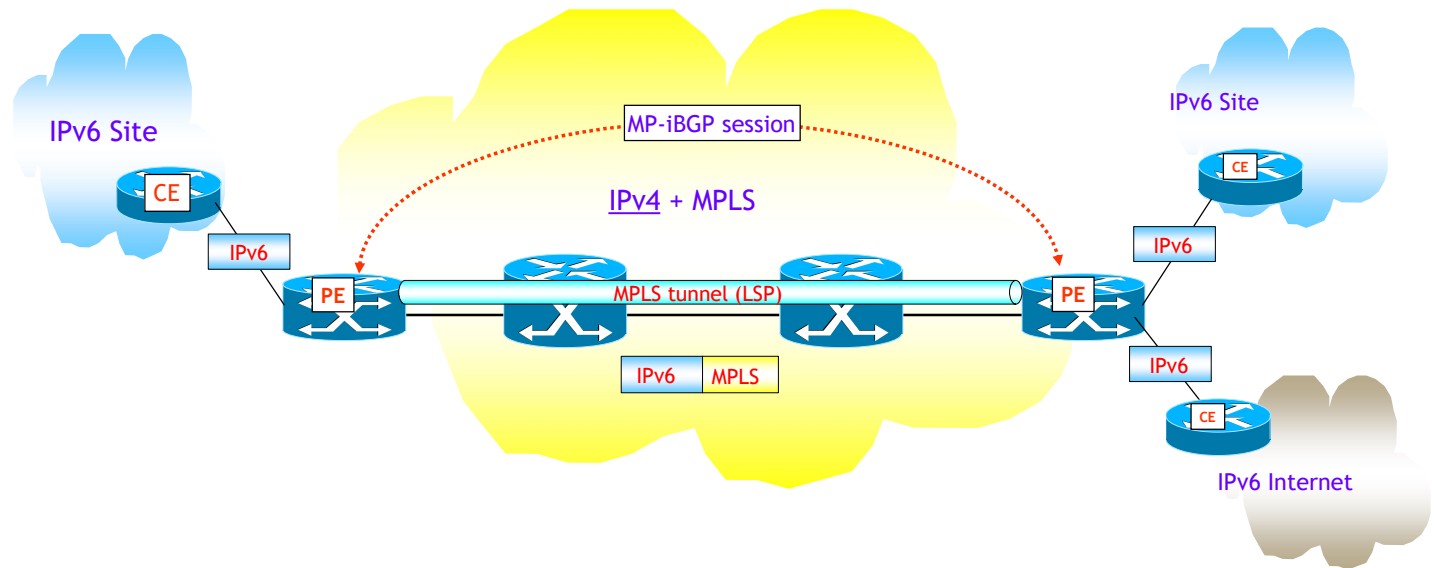
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Service # 5: IPv6 transport

- **MPLS is multiprotocol, therefore can also transport IPv6 packets**
  - The big plus: a single backbone for all types of traffic (L2/L3)
  - Two basic services
    - **6PE**: transport of IPv6 packets over an IPv4 + MPLS backbone
    - **6VPE**: IPv6 L3VPN

The myth ...

MPLS is dead
(long live to MPLS ...)

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The alleged MPLS killers ...
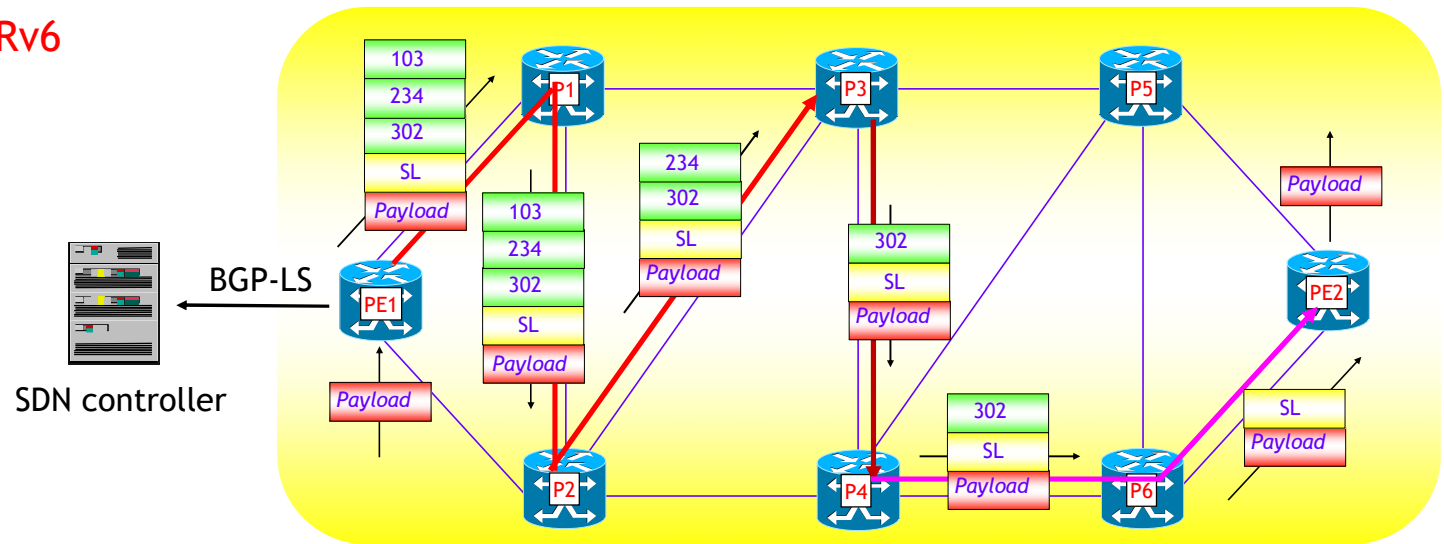

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Killer #1: Segment Routing (1/2)

- Segment routing is a modern variant of source routing

- In a segment routed network, an ingress node may prepend a header to packets that contain a list of labels (segments), which are instructions that are executed on subsequent nodes in the network
  - Labels are advertised using IGP protocols extensions (OSPF, IS-IS)

- Two flavors: SR-MPLS and SRv6

Killer #1: Segment Routing (2/2)

The reality (of SR-MPLS)

- Segment Routing is just a simplification of the MPLS control plane
  - No MPLS protocols (LDP/RSVP-TE), labels are advertised through IGP protocols (OSPF or IS-IS) extensions
  - Better traffic protection within the backbone (i.e. backup coverage 100% through TI-LFA)
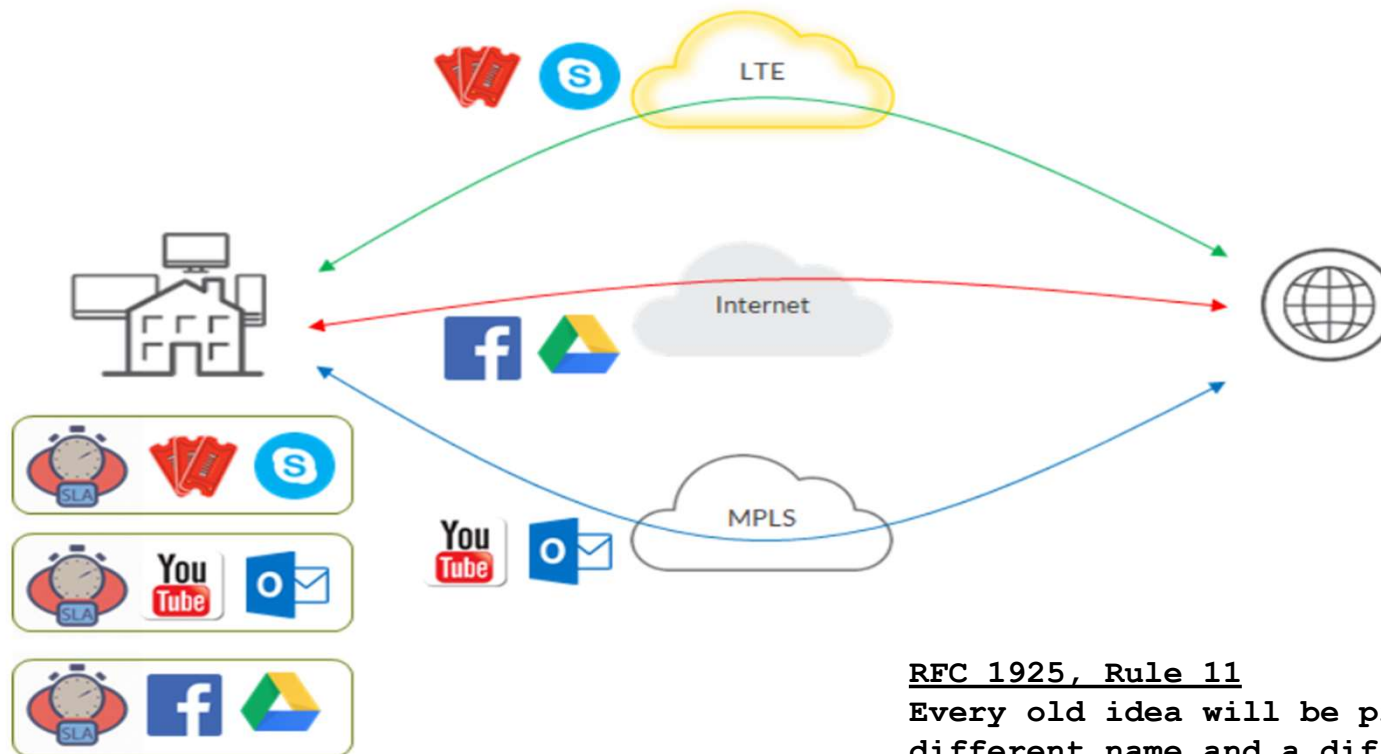
- It has no influence on MPLS services

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Killer #2: SD-WAN (1/2)

RFC 1925, Rule 11
Every old idea will be proposed again with a different name and a different presentation, regardless of whether it works.

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Killer #2: SD-WAN (2/2)

Jérôme Nicolle
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That should be interesting.

My point has been for years that SD-WAN's sole purpose is to shift value and shackles from ISPs to vendors.

Please prove me wrong ! @ioshints

- Use case (customer): replace expensive MPLS/VPN with Internet based transport

- Use case (SP): keep charging for expensive services

- Use case (vendor): create a network wide lock in with proprietary high margin product

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Time is over ...

Thank you for your kind attention

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