telemach

TELE(2)MACH

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AGENDA

1. Tele2 -> Telemach
2. MPLS Inter AS network connecting
3. Internet access

How it started…

Acquisition

- 14 years on market as Tele2
- UG made acquisition end of 2019.
- Change of brand 11/2020.

Start position

- Shared IP/MPLS network at the level of the entire Tele2 group
- The same ASN from Sweden through Latvia to Croatia
- Shared address plans
- Shared BGP
- IGP (OSPF and ISIS) by country
- Service platforms from Sweden to Croatia
- Mobile only provider

Desired position

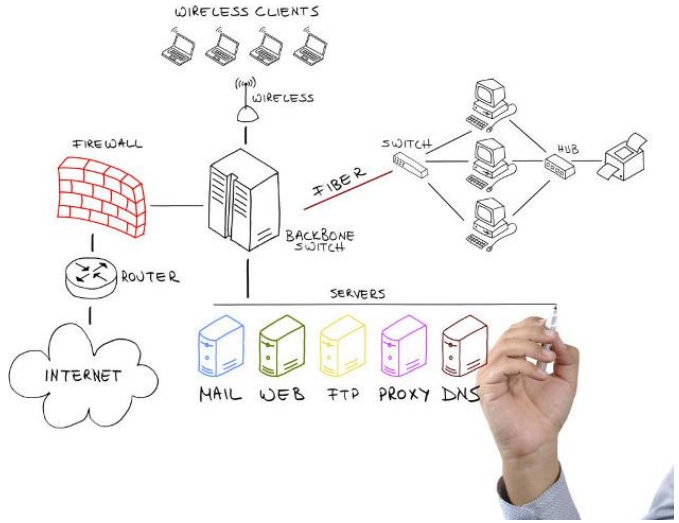
- Unified MPLS for mobile and fixed customers
- Own service platforms
- Own access to the Internet
- Mobile and fixed provider (triple-play)

Opportunities and challenges

Investment wave by entering to UG:

Parallel activities:

- Building of new MPLS network: design, procurement, implementation…
- Internet access
- RAN swap
- Service platforms swap(IT, Voice Core, Packet core) plus migration of existing ones
- Entering te fixed market



MPLS Inter AS network connecting

For interconnectivity between 2 network in different ASNs there are 3 different options:

- Inter-AS option A
- Inter-AS option B
- Inter-AS option C

Option A

- Back-to-back connection of vrfs, per (sub)interface
- Pure IP between ASBRs, without changing the label
- Chosen as an interconnection solution considering that we are leaving the Tele2 network world
- Interconnections in 3 DATA Centers

Option B

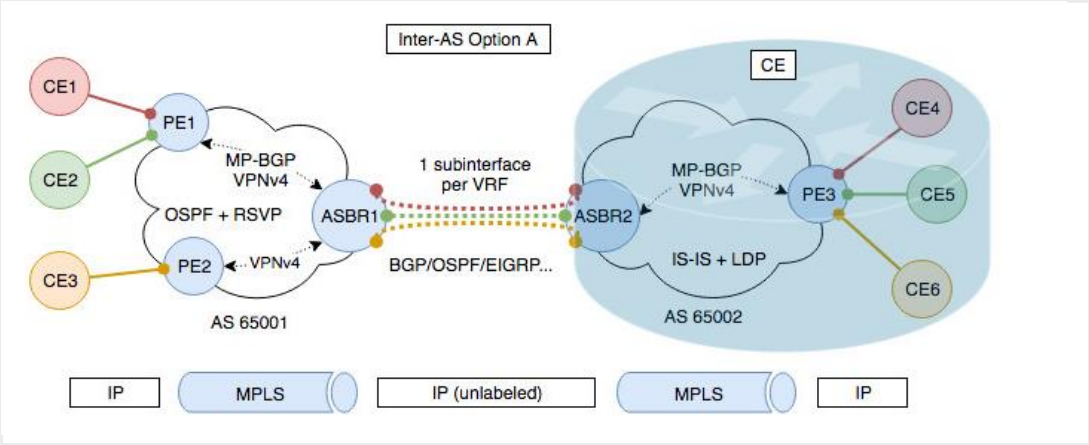
- Evolution of option A
- One single interface between ASBRs
- One BGP session to transport all VPN routes
- It uses MP-BGP between ASBRs to transport labeled VPN routes
- No need for IGP nor LDP: service providers do not need to understand the internal addressing structure of one another
- ASBRs store all of the VPN prefixes, which requires to be resource intensive

Option C

- The most scalable option
- The way to go for the same SP multi-AS networks – used for integration of ex Optima Telekom

Inter AS Option A

- PE routers in different ASNs
- ASBRs communicate per vrf, per (sub)interface
- The advantage is the simplicity and speed of implementation
- The limitation of this solution is scalability
- CPU and memory requirements
- In Telemach's case separation from Tele2 Option A was selected



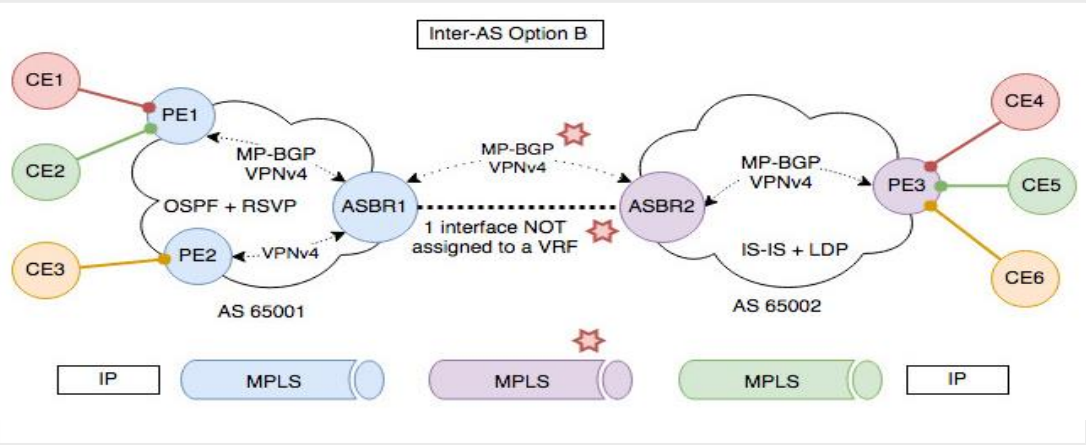
Building of new MPLS Network and migration of service platforms:

Construction of a new MPLS network + upgrade of the RAN part of the network, while the service platforms remained in the Tele2 part of the network

In parallel, new service platforms were built in the new TMHR ASN

Inter AS Option B

- Accomplished using ONE BGP VPNv4 session between ASBRs exchanging labels with eBGP.
- The VPNv4 session between ASBRs is used to exchange the VPNv4 prefixes
- ASBRs have to have all of the VPN prefixes, which requires to be resource intensive.
- RD & RT have global significance between adjacent SPs
- All the customers of the service providers could run different routing protocols at different sites
- Partially solve scalability problems and simplifies deployment

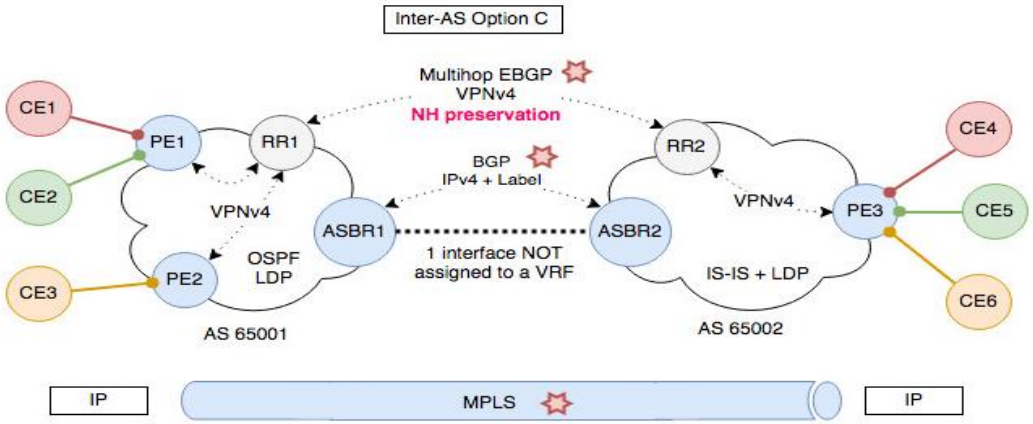


MPLS enabled, but without LDP

The Inter AS link need to be MPLS enabled, but there is no need to enable any label distribution protocol because the label is embedded into the VPNv4 updates

Inter AS Option C

- ASBRs doesn’t carry any of the VPN routes
- ASBRs only take care of distribution of labeled IPv4 routes of the PEs within their own AS
- one MP-EBGP VPNv4 session transports all VPN routes (external routes) between PEs or RR
- The ASBR use EBGP to exchange the internal PE routing information between AS



Where to implement this?

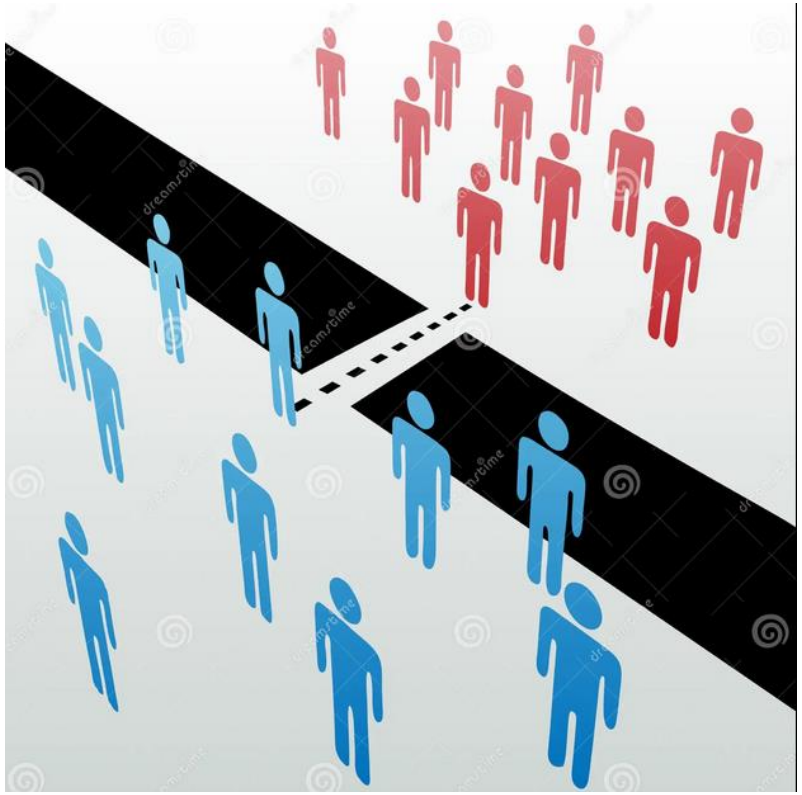
When aquisiting another company and quick merge is not so easy

When there is strong trust relationship between 2 ASNs

What to choose?

	Option A	Option B	Option C
Feature Availability	1st	2nd	3rd
Scalability	Low	Medium	High
ASBR hold VPNv4 rts	Yes	Yes	No
Technical Simplicity	High	Medium	Low
Security	High	Medium	Low
Protocol between ASBRs	Any PE-CE	MP-eBGP	eBGP
Visibility into other AS	None	ASBR	PE loopback, RR
VPN user must Trust	All providers	All providers	All providers
Service Provider must Trust	None	None	Peer Provider

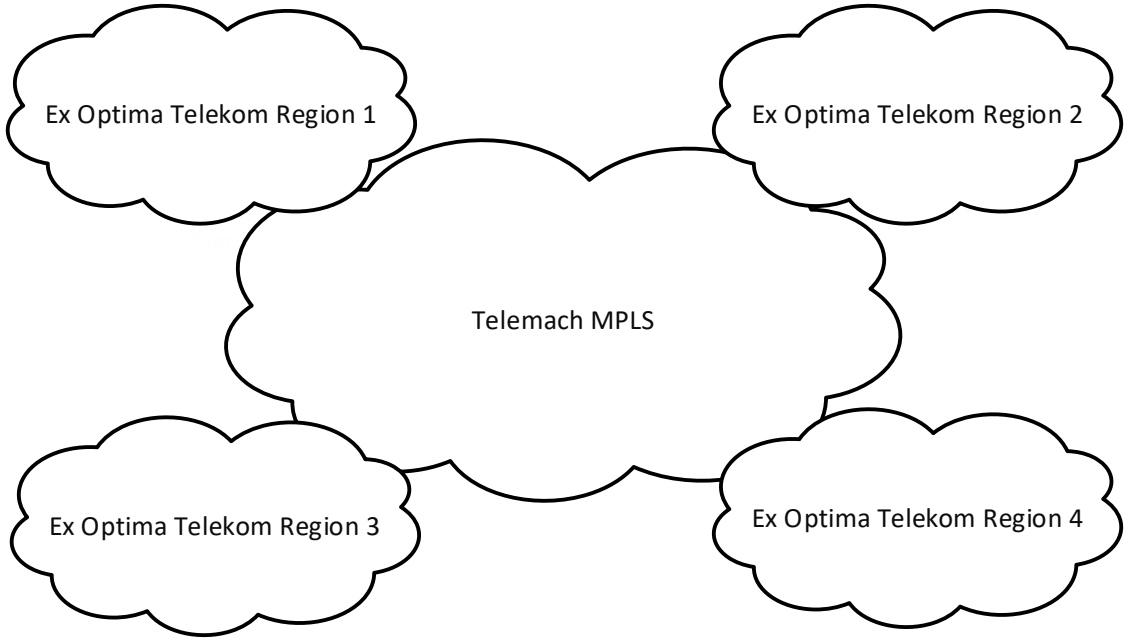
- Depending on whether you are separating or merging networks…
- Option A for leaving some network and Option C for company merger design



Transport vs service network

New MPLS network in production -> acquisition of Optima Telekom -> new challenge

- New Telemach IP MPLS network is DWDM based
- Present in large number of cities – since build for mobile customers
- Ex Optima Telekom network is service based network
- OPEX/CAPEX savings: using of Telemach transport network for immiadetely for ex Optima



Internet access

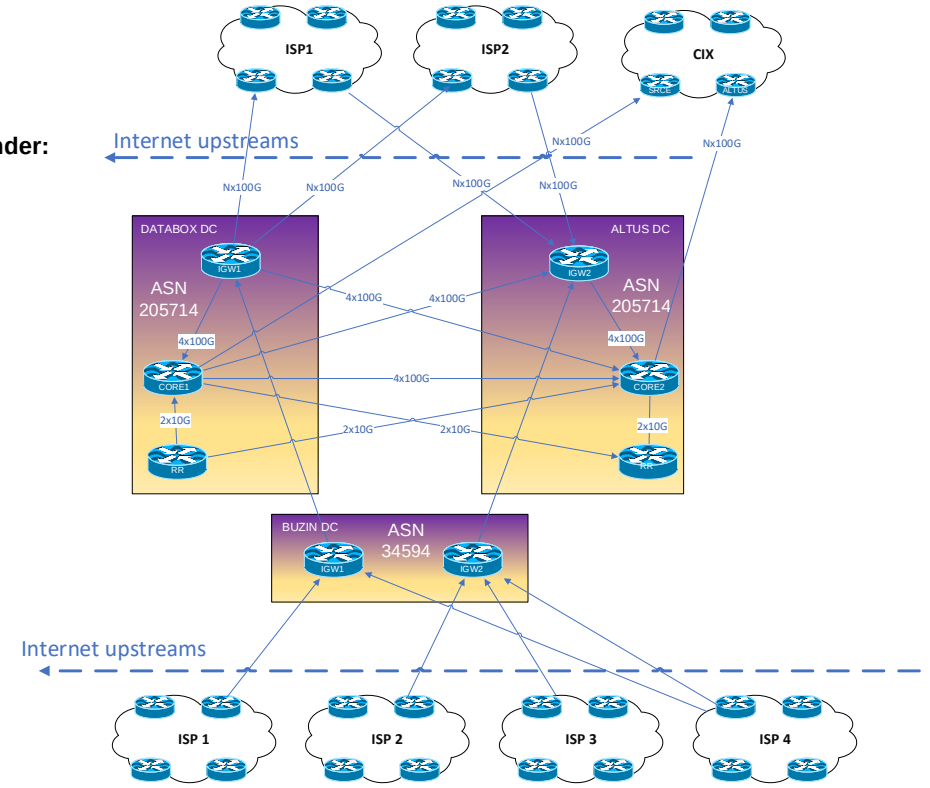
Same challenges as for MPLS part of network…

Tele2 – and Telemach Internet access

- Challenges:
  - Same ASN -> Internet upstreams in Vienna, Frankfurt, Sweden, Amsterdam…
  - OLD service platform in Tele2 ASN
    - With OLD Tele2 public address pools
    - With NEW TMHR public address pools
  - NEW service platforms with new TMHR address pools
- How to steer traffic?

BGP Attributes and Path Selection quick reminder:

- Weight
- Local Preference
- Originate
- AS path length
- Origin code
- MED
- eBGP path over iBGP path
- Shortest IGP path to BGP next hop
- Oldest Path
- Router ID
- Neighbor IP address



New modern convergent IP MPLS network

At the end, after 2 years we have fully redundant, N x 100Gbps based network:

- Seamless MPLS: ready for EVPN, SR,…
- Services: l2vpn, l3vpn, DCI network
- Redundant Internet upstream, GRX network, Cache servers
- Converged network for fixed and mobile customers
  - Triple play services: 300Mbps, 1Gbps, 2Gbps and 10Gbps Internet, EON TV, telephony
  - Mobile services
  - FWA
- Ready for ex Optima Telekom business customers

Thank You!
Questions?

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