



CUSTOMER CASE STUDY

NSO DEVELOPERS DAYS STOCKHOLM 7TH JUNE 2017

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Telia Company



MYSELF – JOHAN HJORTÅS

TRANSPORT NETWORK CHIEF ARCHITECT TELIA COMPANY

- **Key facts and figures**

- Born 1977
- Joined Telia in 2002
- Held different positions ranging from sales, ops and development
- Currently managing a team focusing on transport, SDN and fixed access
- Member of TIP operator council Open Packet Optical Transport

- **Key focus areas 2017/2018**

- Network automation beyond service provisioning
- Disaggregation of software and hardware
- Virtualization of networking functions
- Drastic simplification of transport networks



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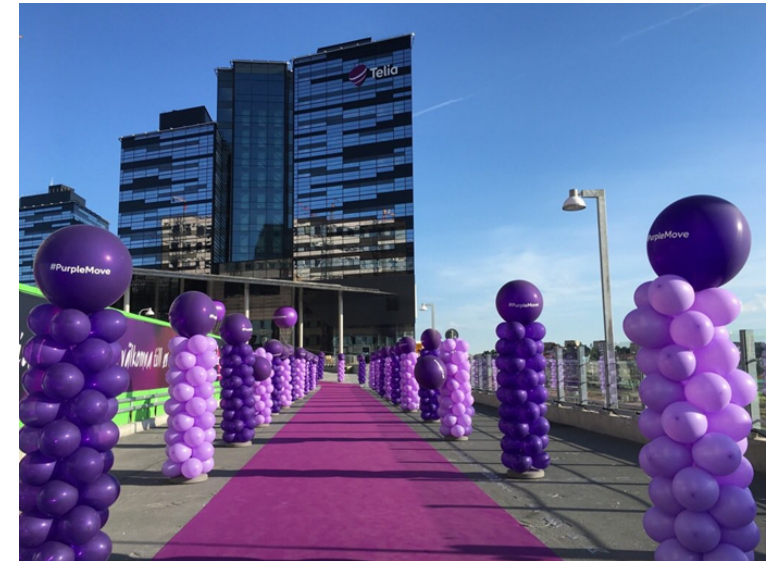
TELIA COMPANY – BRIEF FACTS

- **Key facts and figures**

- Founded in 1853
- The share is listed at Nasdaq Stockholm and Nasdaq Helsinki
- Approximately 512,800 shareholders
- From Norway to Turkey, we are present in Azerbaijan, Denmark, Estonia, Finland, Georgia, Kazakhstan, Latvia, Lithuania, Moldova, Norway, Russia, Sweden, Turkey and Uzbekistan.
- Included in some of the most recognized sustainability indices, FTSE4Good, and oekomPrime

- **As of year-end 2016 for continuing operations**

- Net sales SEK 84,178 million
- EBITDA* SEK 25,836 million
- CAPEX SEK 15,625 million
- Earnings per share SEK 3.76
- 23.5 million subscriptions
- 21,000 employees

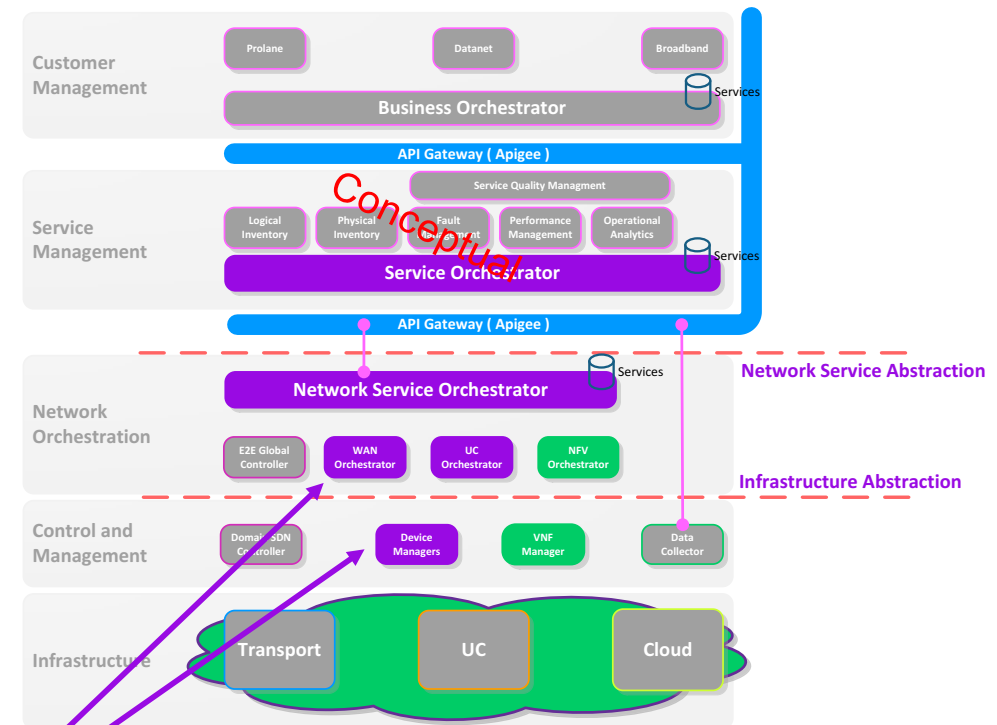


<https://www.teliacompany.com/en/about-the-company/>

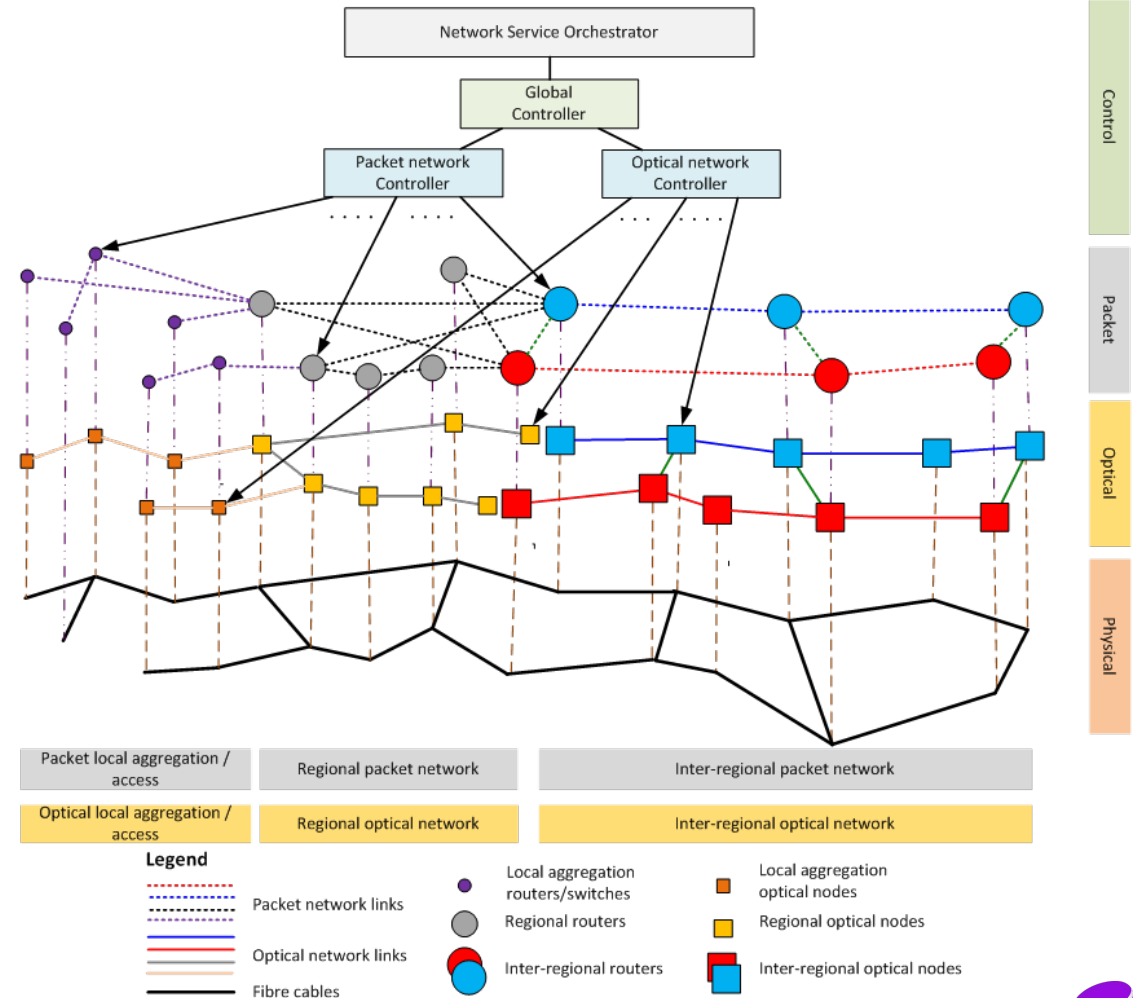
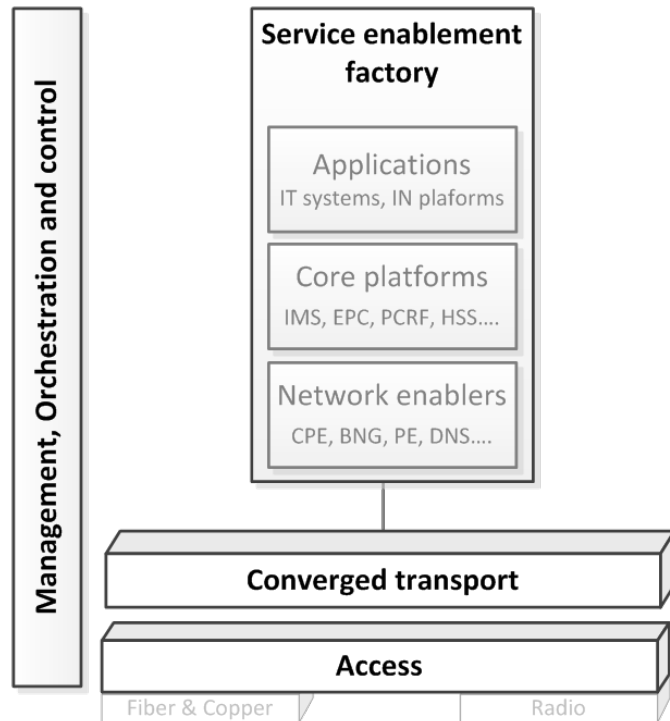


AMBITION LEVEL FOR TRANSPORT NETWORKS 2018

- 100% WAN automation readiness
 - Devices modeled: Access, Aggregation, Regional and Inter-regional packet and optical
 - Services modeled: L2, L3 VPN and Internet services including overlay
 - Both PNF and VNF
- Integration roadmap with OSS
- Selective replacement of legacy scripts and manual routines for network/capacity deployment
- Empower Network and IT engineers by adopting DevOps/NoOps/agile methods and tooling



REFERENCE ARCHITECTURE AND TRANSPORT TOPOLOGY



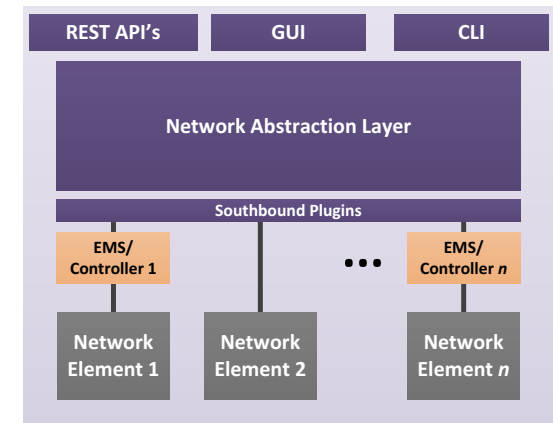
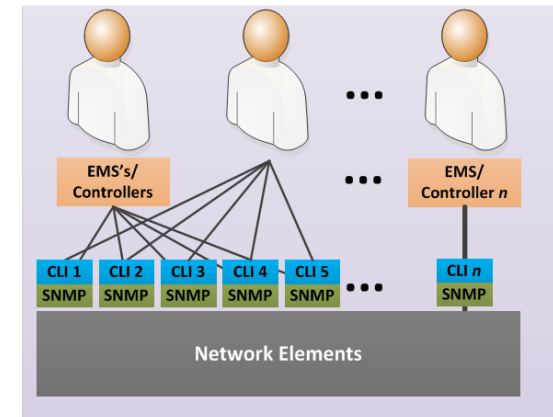
STARTING POINT

- **Problems to solve**

- Fairly low level of automaton across the OpCo's (or hardcoded...)
- Network vendor and service complexity similar across the OpCo's
- Service development and product lifecycle centralized in Group
- Long lead-times primarily due to IT dev
- Incidents caused by humans

- **Our solution**

- Be opportunistic, attack the “easy wins” i.e. increase level of automation in service delivery
- Abstract the services from the devices (Cisco NSO)
- API driven integration towards OSS
- Develop once deploy many
- Liaisons with Commercial
- IT... (next slide...)



CHALLENGES...

- **Networks are advancing very fast, IT has a lot of legacy to maintain/transform.**
 - When tempo is not in harmony = missed opportunities or?
- **IT and Networks did not speak same language in 2013... honestly we still don't...**
 - But we are getting there
- **Top down approach is KEY to achieve desired speed of implementation**
- **Bringing clever people together i.e. commercial, network and IT = WIN!**
 - Be opportunistic
- **And realistic, there is always a firewall somewhere...**



SO FAR...

- We done most of the work in-house
- We are hiring
- Automation/virtualization/programming is recognized as core competence in networks
- We have a good relationship with Cisco (*pro tip, involve them early and be transparent*)
- Achievements
 - Several NSO instances deployed across the OpCo's
 - A couple of services modelled
 - Established network automation team
 - Passed security audits...
 - NSO in early production state





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