

TeliaSonera

Implementation of Redundant Corporate Network

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Agenda

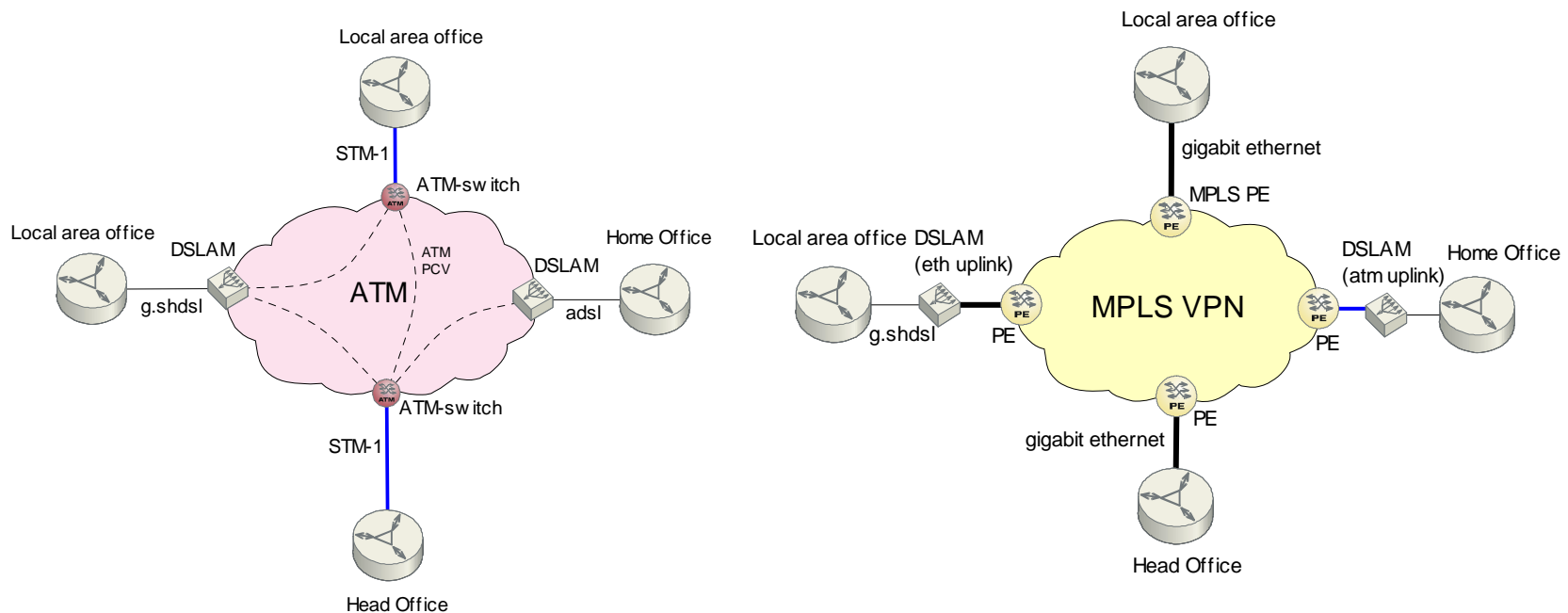
- The problem under discussion
- Basics and typical topologies of corporate networks
- Mechanism for redundancy sort by OSI-levels
- Discussion about the reference network
- Results, conclusions and improvement ideas

Definition of The Problem ?

- Find a technical solution of redundant corporate network from business-to-business network services offered and provided by Sonera.
- Design and build one real reference network
 - Analyse fault situations and realisation of Service-Level during 4 years contract period between 2001 and 2005.
 - Write down conclusions and experience

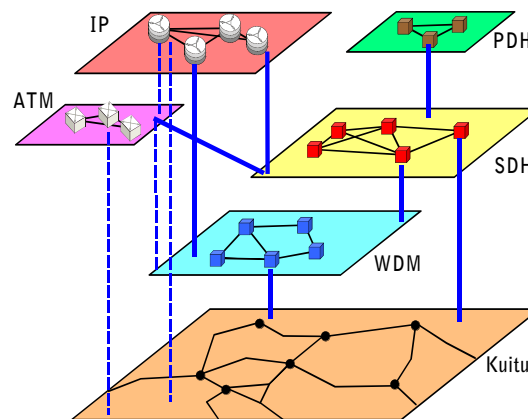
What is Corporate Network ?

- Closed OSI-2 level VPN (Virtual Privat Network) for corporate's internal data systems.
- Traditionally based on Frame Relay, ATM- or MPLS VPN-technologies over Service Provider's Core Network.



Requirements of Fault Tolerance Corporate network

- Corporate network's connections should be doubled.
- At least two physical access lines and a dynamic process for Data Link- and Network layer's Protocols is needed to guarantee recovery and redundancy.
- The redundancy between connections must be figured out case by case because different transmission networks may depend each other
- In highly business critical environments SLA (Service Level Agreement) ain't enough, because operators don't cover consequential losses. They just compensate unreachable service level in monthly charge.

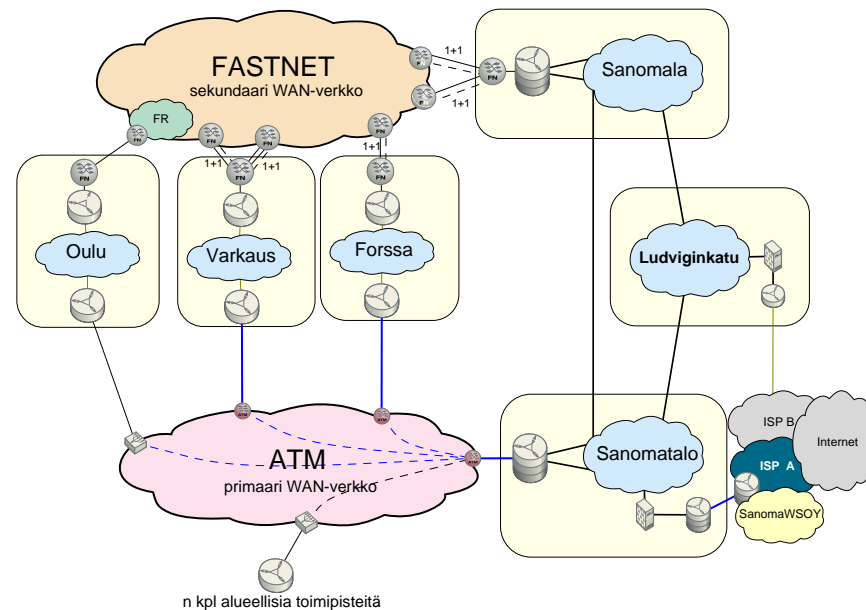


Mechanism for Redundancy sort by OSI-levels

- In OSI-1 level different optical or electrical transmission path exist. Path can be a cable or a radio link.
- In OSI-2 level there are lots of different transmission technologies and sub-systems, which all have their own methods for redundancy
 - SDH's Dynamic Restoration, SNCP (Sub Network Connection Protection), MSP (Multiplex Section Protection)
 - ATM's PNNI (Private Network-to-Network Interface)
 - Ethernet's RSTP (Rapid Spanning Tree Protocol), HSRP (Hot Stand Routing Protocol), VRRP (Virtual Router Redundancy Protocol)
- In OSI-3 Level dynamic IP routing by BGP (Border Gateway Protocol) or OSPF (Open Shortest Path First)
- To build up redundant corporate network it is NOT necessary to use redundant method in every layer if it's absolute sure that two redundant upper level connectios don't rely on same physical connection at lower level.

Analysis of The Reference Network

- Sanoma Corporates editorial offices network connections to printing plants.
- In the thesis Sanoma Corporates network redundancy is analysed by sites and OSI-levels.



Results, Conclusions and Improvement Ideas

- Implementation of the reference network is redundant as planned back in 2001.
- Service Level by sites has been 100 % during 4 years contract period.
- Occasional faults have happened, but none of them have affected to production traffic.
- Problems have been either technical or incused by operator's own mistakes.
- Improvement idea for MPLS VPN based network is introduced, but further study is needed.

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