FutureNet

Design and implementation of a Campus LAN SDN

Graduate

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Introduction: The healthcare sector is facing growing demands on IT infrastructure: rising device counts, stricter security requirements, and increasingly complex network requirements. Hospitals often operate critical, outdated and insecure medical equipment, which handles highly sensitive patient data.

At the Kantonsspital Graubünden (KSGR), the aging network infrastructure no longer met these requirements. Devices were reaching the end of their lifecycle, and the existing architecture could not provide the flexibility or security needed. To address this, the FutureNet project was launched: a full redesign and modernization of the hospital's network. This thesis focused on parts of the design and implementation of the campus area.

Approach / Technology: The new architecture is based on a Software-Defined Network using an EVPN-VXLAN fabric built with Aruba technology. This provides a flexible, scalable foundation that enables role-based access control across the entire network. Aruba's NetConductor platform allows devices to be dynamically assigned to security groups (roles), enforcing communication policies even within the same subnet. This marks a shift from traditional zone-based segmentation to true Zero Trust networking.

Enhanced Network Access Control (NAC) using 802.1X ensures that only authenticated devices can access the network. Role-based segmentation and policy enforcement enable secure coexistence of modern and legacy systems. Micro- and macro-segmentation strategies further reduce the attack surface, isolating devices and applications where needed.

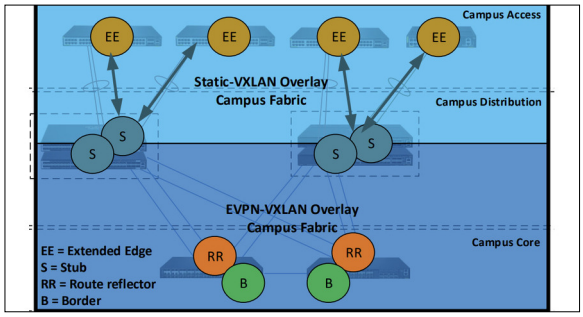
A major part of the project involved integrating a new hospital site into the EVPN fabric. This included deploying and connecting a distribution layer using Aruba's VSX clustering for high availability. Design choices were carefully aligned with the hospital's strict operational and security requirements.

Result: The entire implementation was carried out within a live, productive hospital network. After comprehensive design and testing phases, the new site was successfully integrated, and productive clients were migrated.

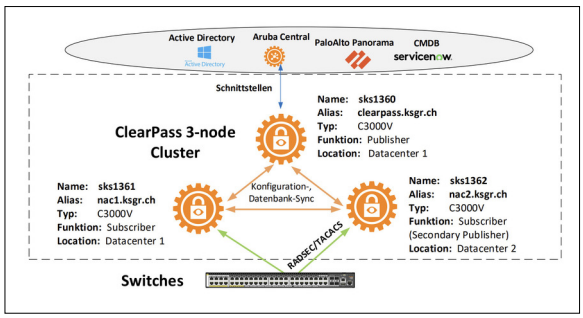
The new network not only meets modern performance and scalability standards but significantly enhances security. Clients are now protected by fine-grained access control and segmentation, and the network is now ready to adapt to future expansions and needs.

The FutureNet project demonstrates that even highly sensitive healthcare environments can adopt cutting-edge network technologies. With a forward-looking design and a carefully managed transition, hospitals can dramatically improve security, efficiency, and resilience — all while continuing to deliver critical care without interruption.

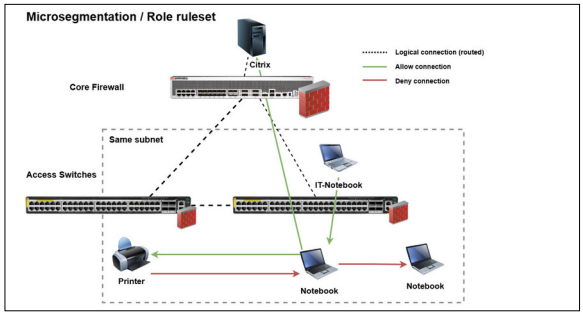
SDN Fabric Design
Own presentment



NAC (Clearpass) Design
Own presentment



Microsegmentation / Role ruleset in SDN fabric
Own presentment



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