



## Network infrastructure ready for the cloud!

### Challenge

The BMW data centre requires an upgrade in order to implement a forward-looking, innovative and efficient IT infrastructure and architecture. This upgrade should incorporate the virtualisation of the data centre and the introduction of a private cloud, as well as implementing measures to meet the ever increasing availability and security requirements.

### Solution

In the BMW data centre, the network infrastructure was modernised using Nexus 2000, Nexus 5000 and Nexus 7000. The wiring in the data centre was also improved to enable more efficient use of available resources such as electricity and space. Thanks to Nexus 7000 and NX-OS, the infrastructure is now equipped for new technologies such as FCoE and for the cloud.

### Benefits

- Structured wiring for improved use of resources
- Infrastructure ready for future technologies such as FCoE
- Less downtime thanks to software update during live operation (ISSU)
- Modern technology at lower operating costs than before

### A data centre equipped for the future thanks to Cisco Nexus

Cloud computing is becoming an increasingly important topic in the data centres of large companies. As such, it seems evident that current IT infrastructure measures should also pave the way towards enabling private cloud computing. Cisco provided support to the BMW AG data centre in revising the flexibility and modularisation of their network design in order to prepare the infrastructure for the cloud. This work also included the virtualisation of the data centre and implementing measures to meet the increasing availability and security requirements. Future security played an important role: In addition to the optimisation of the existing platform, the data centre was prepared for the new FCoE protocol (Fibre Channel over Ethernet), which enables the transport of fibre-channel data streams from memory systems via Ethernet.

### New structures for the network

The network structures in the data centre are divided into networks for live operation, administration and backup in the conventional three-layer network design consisting of core, distribution and access. The servers had five active interfaces in order to physically separate the infrastructures. The central star formation of the server wiring resulted in long copper patch channels between the access switches and the servers for the relevant areas of the data centres. A review of the architecture and the design indicated that a comprehensive replacement of the hardware was required, as Cisco Catalyst 6509 components, which had since been shut down, were in use at the distribution level and in access. Furthermore, the wiring in the data centre was to be restructured to make optimum use of the power supply, air conditioning systems and the available space in the Enterprise Data Centre.

These prerequisites formed the basis of the concrete requirements for the new hardware: It must be able to rapidly provide 10 gigabits in the infrastructure and be scalable to 40 and 100 gigabits. With regard to access, the new hardware must initially offer non-blocking 1GE (Gigabit Ethernet) ports with the option of extension to 10GE. The new components had to be cheaper to operate, demonstrate lower power consumption and be suitable for in-house operation.



BMW AG production hall in Munich



The Cisco Nexus architecture with the Cisco NX-OS operating system is scalable to over 15 terabits per second and in future will combine Ethernet with the transport of storage data on a single platform.

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### Forward-looking hardware

A significant proportion of the network at BMW AG has been based on Cisco components for several years. In terms of cost-effectiveness, power consumption and enabling a future-capable network infrastructure in the Enterprise Data Center, the Cisco Nexus platform proved to be the ideal replacement for the previous Catalyst components. The Cisco Nexus architecture with the Cisco NX-OS operating system is scalable to over 15 terabits per second and in future will combine Ethernet with the transport of storage data on a single platform. With this "unified fabric", each server can then access all resources — paving the way for a complete virtualisation of the data centre.

The new network design involves the use of external line cards in dedicated network racks. For each of the five required infrastructures, including double high availability, integrated Lights-Out (iLO), administration and backup, one Nexus 2248T is used as a "fabric extender" in each of the dedicated network racks. These fabric extenders are connected via Multimode using two or four 10GB links to the Nexus 5548 in the relevant star points of the total 14 smoke sections. The Nexus 5548 are connected to the Nexus 7010 on the distribution level in a V formation, each with four 10GB links. The network headquarters, in turn, are connected to the relevant smoke sections via single-mode fibreglass cables. Both the access level and the distribution level are configured in the vPC design (Virtual Port Channelling) in order to guarantee high availability. Due to vPC, two physical switches appear as the same end point to a connected device. The advantages of this include more effective use of the available bandwidth. The installation of the new network took almost a full year from the end of 2010 to the end of 2011. The complete reconfiguration using parallel provision of the new infrastructure will continue for at least another year.

### Benefits resulting from the operating system

Cisco provided support to BMW in the architecture approach, in compiling the desired configuration and in the selection of the final optimum design. Additional quality assurance was secured through close cooperation in the configuration of the components. The selected solution components from the Nexus 7000, Nexus 5000 and Nexus 2000 series were tested extensively in a customer proof of concept in October 2010. The Cisco solution offers the advantage of installing access ports in different places within a smoke section using non-modular components without simultaneously increasing the number of active components. As a result, the hardware management is significantly more efficient. The modular concept of Cisco NX-OS, the operating system for the Nexus 7000 series, offers high redundancy, with the ability to isolate error sources. Further strengths of the solution include more efficient use of resources, process modularity and the uninterrupted software update ISSU (In-Service Software Upgrade). ISSU increases the availability of the network infrastructure in the Enterprise Data Centre and reduces the downtime required for software updates. In comparison to a similarly configured constellation based on Catalyst, the new IT infrastructure based on Nexus has lower power consumption and is therefore more energy-efficient. The capital and maintenance costs are also considerably lower. On-going support for the solution is provided by the Cisco Technical Assistance Centre (TAC).



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