

Cisco Service Oriented Data Center Networking Architecture



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Case study NASK



SAN Infrastructure Virtualization in the NASK Data Centre



"The idea to implement Storage Area Network (SAN) architecture using the functionality of the Cisco virtual SAN network (VSAN) in NASK arose from the need to guarantee the maximum reliability, security and flexibility in the context of data processing in information systems critical to NASK operations"

– describes the project
Tomasz Zygmuntowicz,
manager of the Domain Technical Support Team in NASK.



The aim of implementation

So far the architecture of digital storage system in NASK has been based on the DAS (Direct Attached Storage) solutions. The implemented SAN network infrastructure constitutes one of the critical elements of the deployed Data Centre architecture. This solution enables consolidation of the disc and infrastructure resources as well as increases the level of flexibility reliability and secure access to central resources. Thanks to virtualization mechanisms the SAN network infrastructure in NASK provides high scalability and easy adaptation to new environment conditions as well as to changes taking place within the organisation.

Implementation

NASK has implemented synchronous replication of data between the primary centre and the backup data centre. The implemented solution is based on two 3PAR disk storage arrays (each placed in a different location), tape libraries (backup applications based on IBM's Tivoli Storage Manager) and Cisco MDS9000 Fibre Channel switches. The infrastructure in the primary data centre is fully redundant, both in terms of connections and devices. Replication between the centres is executed through two independent fibre-optic channels. The backup connection uses the Fibre Channel over IP (FCIP) transmission mechanism (fig.1).

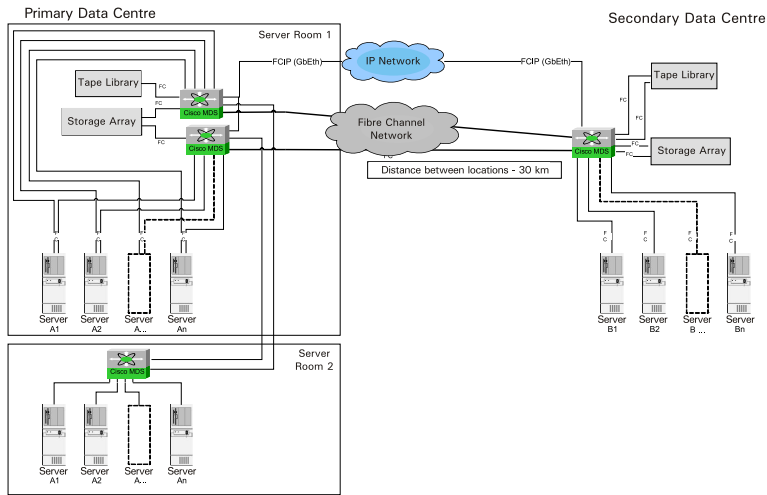


Fig. 1 Physical topology

A traditional SAN infrastructure based on "flat architecture". Especially between Data Center Fibre Channel communication, the "flat architecture" may result in the loss of resource accessibility or transmission interruptions due to the appearance of some negative factors including:

- routing topology scaling and recalculation,
- errors resulting from zoning configuration,
- instabilities resulting from the domain name services, etc.

NASK uses a virtual SAN network mechanism (VSAN) together with InterVSAN Routing (IVR) solution (fig.2) that limit the impact of the above mentioned factors to local systems. This solution enables high system scalability and segmentation of network into logical elements. The system allows up to 256 VSAN networks to be defined. The VSAN mechanism guarantees that no network instabilities in a particular virtual SAN network are spread to other SAN structures, while IVR mechanism allows smooth communication between some hosts and disks from different VSAN networks, without the necessity to connect them into one VSAN network. Therefore, this function provides a higher level of accessibility to resources stored in the distributed Data Centre.

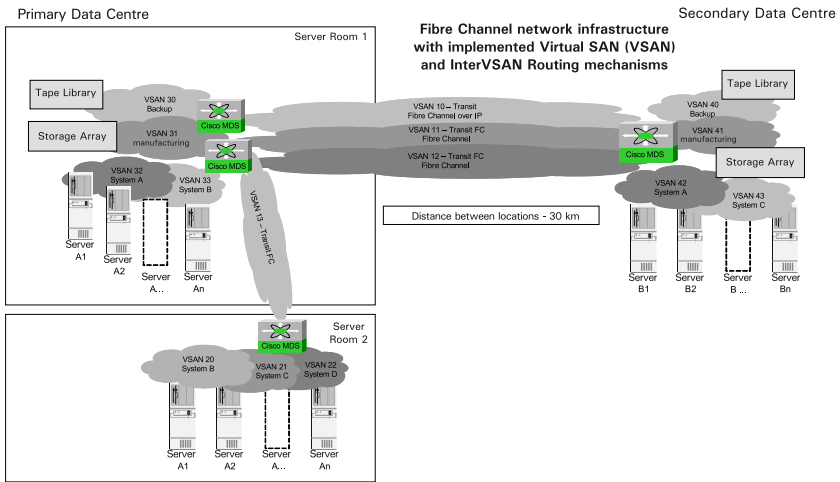


Fig. 2 Logical topology

Functionality obtained

The deployed solution based on the Cisco MDS9000 Series devices and Cisco VSAN architecture. The implemented topology has opened possibility of using unique for this system quality of service mechanisms. This method of implementing SAN structures involves transferring of the familiar mechanisms from the IP network to SAN structures. VSAN solution is a mechanism whose main task is to eliminate negative effects of the so called "flat" architecture. The Cisco solution means to NASK, among others:

- the possibility of consolidating the storage networking infrastructure using virtual networks SAN (VSAN) – lower implementation costs and higher utilization of the deployed fabric resources,
- management simplification and the possibility of using advanced mechanisms of SAN network monitoring (Fibre Channel protocol analyser, consolidated management of VSAN networks),
- high availability - the possibility of constructing a hierarchical structure of the SAN network using InterVSAN routing mechanisms,
- high scalability - logical configuration of the VSAN network on demand
- the possibility of movement prioritization and a guarantee of band quality for the critical systems – Quality of Service (QoS) mechanisms dedicated for any VSAN structure,
- the possibility of implementing traffic-engineering services for Fibre-Channel movement,
- the possibility of transmission based on FCIP and iSCSI protocols

NASK

NASK has been a research-development organisation operating on the Polish market since December 1993. NASK is the pioneer of the Polish Internet, currently one of the leading Polish data networks operators. It offers comprehensive services within the scope of corporate networks and high-quality access to Internet for business, administration and academic clients. NASK serves as the Polish national registry of Internet names in the .pl domain. It carries out scientific as well as research & development activities in cooperation with the Warsaw University of Technology. NASK undertakes many initiatives which aim at providing security to the Internet users, especially children and young people. As part of the NASK organisation there are CERT Polska teams and Dyżurnet.pl. CERT Polska deals with the registration and classification of network security incidents. Dyżurnet.pl is a hotline responding to illegal contents in the Internet. For many years now, NASK has been collecting resources for the Polska.pl portal and its English language version - Poland.pl. The sites present the heritage of the Polish culture and nature.

