

New 10 Gb network for Swedish University Network (SUNET)

Customized, high-performance nationwide network



Case Study from IPnett

Research and education (R&E) institutions, such as the Swedish University Computer Network (SUNET), are faced with unique challenges to support their mission of network-based scientific computing and research. Frequently, they require high-performance, high-bandwidth connectivity between multiple laboratories and universities, either regionally or on a global scale. At the same time, they need high levels of network reliability to support production traffic and back office applications for a large contingent of end users.

Facilitating Research and Collaboration

To meet the unique requirements of the research and education community, IPnett and technology partners Ciena® Corporation and Juniper Networks partnered to build a customized, high-performance nationwide network for SUNET, which provides 24/7 connectivity for 32 universities in Sweden. The new 10-Gigabit Ethernet network, OptoSUNET, replaced SUNET's existing leased network and has been in operation since March 2007 to support growing demand for higher bandwidth applications.

University staff, students and researchers are now benefiting from highcapacity connectivity and greater network scalability and reliability to meet their unique learning and research requirements. A robust and flexible network, OptoSUNET enables universities to optimise bandwidth usage and share the workload of research projects and simulations that require tremendous processing power and speed. The new network transports traffic between Stockholm (central hub) and major cities or points of presence (POPs) while delivering GbE and 10 GbE point-to-point connectivity to each POP and major city.

Working in Partnership

As the main contractor and systems integrator to SUNET, IPnett deployed the new network as a turnkey solution in just under a year, working in partnership with Ciena and Juniper Networks to deliver a best-of-breed solution. IPnett responsible for installation, testing services and field maintenance of the systems while Juniper

Networks T-series core routers and Ciena's optical transmission, multi-service transport, Ethernet services and network management solutions formed the foundation of the network. Built on Ciena's FlexSelect™ Architecture, OptoSUNET is the first optical research and education network in Scandinavia to be based on wavelength division multiplexing (WDM) technology.

"IPnett has helped us build a powerful and sophisticated next generation network that will allow educational institutions to optimise bandwidth usage and improve collaboration on research projects and simulations"

Hans Wallberg,

Chief of operations for OptoSUNET.

About SUNET

- Swedish University Computer Network
- Research and education institution
- Requires high performance, high-bandwidth connectivity between 32 laboratories and universities in Sweden

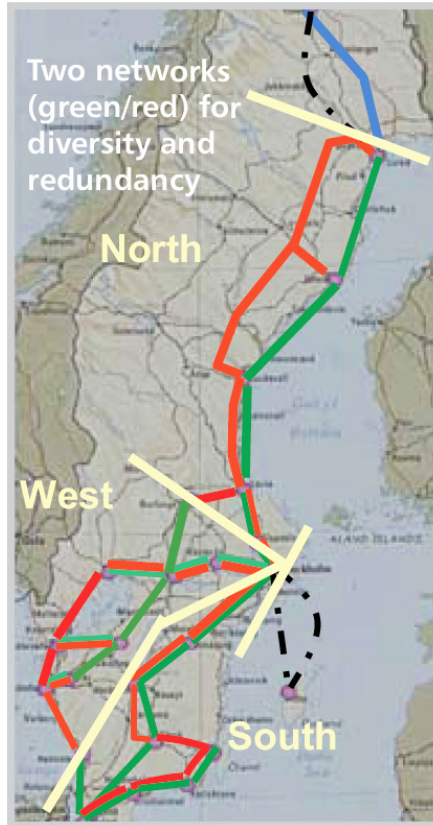
About the solution

- Customised, high-performance nationwide network - 10-Gigabit Ethernet network (OptoSUNET)
- High-capacity connectivity and high scalability and reliability
- Robust and flexible
- Provides 24/7 connectivity for all 32 universities in Sweden

Improving Network Performance, Scalability and Reliability

Supporting the needs of more than 32 universities, it's critical that OptoSUNET delivers the control and flexibility to allocate GbE and 10GbE bandwidth on demand to meet evolving user requirements. OptoSUNET is fully redundant with two independent optical links connecting Stockholm to each major city. This gives universities up to 80 channels with 10 Gbps per channel capacity and scalability to 40 Gbps per channel - for a total of 3.2 Tbps of capacity - as demand grows. Finally, for effective network and service management that allows channels between sites to be easily added, changed or disconnected, OptoSUNET takes advantage of Ciena's point-and-click network and service management platform, ON-Center.

The OptoSUNET deployment builds on IPnett and Ciena's success in building customised research and education networks around the globe. In Europe, Ciena's technology is also utilised in JANET, RENATER and the London Metropolitan Network.



Centralised Layer3 functionality

Optosunet has been designed as a centralised solution where the Ciena DWDM system acts as Layer 1 transport to Stockholm from all university cities throughout Sweden. In Stockholm, all Layer 3 functionality resides in the constellation of five Juniper T640 routers.

Regarding the access and core layer of the central router design all 10GE customers are redundant connected to 2 of the 3 top Juniper T640 routers. If one University has a 10GE connection on the Red network on one T640 it has a redundant connection to another T640 green side. Between Access and Core the T640's are connected with a Ethernet Link aggregation bundle of up to 4x10GE. All 1GE customers are connected, also redundant to the 2 core T640 routers.

At the customer's premises a Ciena CN4350 Layer2 Ethernet switch acts as a 10GE Ethernet switch for 10GE-ready customers or as a 1GE switch if the customer is not yet ready for a 10GE connection. The customer has the option to connect either 1x10GE or 10x1GE per CN4350 interface card with up to 8 interface cards per CN4350. All these ports will end up in the central T640 as a tagged VLAN (VLAN 101-109 for 1GE and vlan 201 for 10GE).

Why VLAN's?

When all connections are partitioned with VLAN's it is very easy to provide logical connections to customers and external parties centrally in and outgoing from Stockholm. Also at the University premises ethernet switches can add VLAN's for external parties like local and national ISPs.

Why design central routing?

Having all Layer3 functionality centrally enables very flexible external connection possibilities. As an example Sunet can connect to Nordunet with a local fiberpatch which allows a possible dedicated connection within Nordunet. IPnett collapsed 50 Cisco routers down to 5 Juniper which significantly helps saving on CAPEX and OPEX.

