COMPLETE

COMMUNICATION PLATFORM FOR TENDERS OF NOVEL TRANSPORT NETWORKS

HIGHLIGHTS

Newsletter No. 2

With the second COMPLETE newsletter project partners present the project proceedings and further vision. ADVA as a vendor and PSNC as a member of the NREN ecosystem highlight their future plans.

Vendors' corner: ADVA

In the Vendors' section the second newsletter presents current vision, equipment and networking solutions proposed by the ADVA company.

NREN's roadmaps—PSNC

In the second COMPLETE newsletter, PSNC as the project partner is presented and future directions described.

Dear Readers,

With hereby second newsletter we wish to present the COMPLETE project proceedings and the project consortium. COMPLETE is aimed at addressing the PCP/PPI (Pre-Commercial Procurement, Public Procurement of Innovation) in the area of optical networking technologies and infrastructures.

The second COMPLETE newsletter is aimed at presenting the project proceedings and further describe he project consortium. This newsletter is focused on the proposed solutions, vision from the ADVA company and PSNC NREN as the project coordinator. PSNC future plans and vision are presented and discussed. As it was describead earlier the project main concept is to create support and communications platform in the area of PPI/PCP procedures for Public and Government Institutions, Bodies, Organizations and Agencies. The platform will deliver information regarding latest and future solutions in the area of optical networking. The series of newsletters will present the latest information regarding the project, future roadmaps of vendors and information about the needs expressed by Procurers, i.e. operators of public networks.

Your sincerely,

Piotr Rydlichowski

Vendors' corner

Scalable Optical Transport Solutions With ADVA Optical Networking

ADVA Optical Networking design scalable WDM transport solutions specifically for service providers and large enterprises. These solutions are engineered to bring flexibility and cost-efficiency to optical transport, multiplexing, switching and data protection.

Its transponders are also designed for traffic in big data computing and video services, and it offers specific solutions for data center networking scenarios.

ADVA Optical Networking technology focuses on transmitting multiple 100Gbps optical signals on a single fiber. This is achieved using advanced digital signal processors that perform sophisticated encoding and coherent detection of a single carrier 100Gbps signal in a 50GHz wide optical channel. However, to satisfy increasing traffic demands, this technology is further developed to carry more sophisticated signal formats and modulations.

One of the main goals is to provide a software-defined networking (SDN) architecture that manages multiple layers of transport services over a network of high-capacity super-channel optical links. This enables operators to use a programmable, elastic network featuring, to reduce Capex and Opex, and to rapidly introduce new services.

Super-Channels

ADVA Optical Networking equipment supports super-channel technology. The equipment is FlexGrid ready and spectrum allocation shaping technologies can be used and further developed.

To enhance transmission capacity, equipment vendors use a technique called super-channel transmission. This involves ultra-dense encoding so that signal carriers can transmit multiple 100G signals. A compromise has to be met in order to balance the transmission capacity and the geographical range.

The super-channel transmission technique was tested and proved to be effective in the joint PSNC and ADVA Optical Networking tests carried out in the Polish National Research and Education Network PIONIER. ADVA Optical Networking successfully completed a rigorous trial of 400Gbit/s coherent data center interconnect (DCI) technology. The trial was conducted over 385km of fiber, spreading between two research and education centers in Poznań and Warsaw. The DCI technology transported data continuously for 14 hours without any block errors – something no one else in the industry has done. ADVA Optical Networking used software-defined optics to deliver flexible data rates and modulation. This means the network can intelligently scale from 200Gbit/s to 300Gbit/s to 400Gbit/s and from QPSK to 8QAM to 16QAM as required.

The 400Gbit/s trial was conducted using the live commercial PIONIER network. PIONIER is a consortium of Polish research and education organizations and its network is operated domestically by PSNC. For the purpose of the trial, ADVA Optical Networking's equipment was configured with two 200Gbit/s wavelengths operating at 16QAM within an optical super-channel. The system also featured reconfigurable add/drop multiplexers (ROADMs) and hybrid amplifiers. After 14 hours of testing, the trial resulted in complete error-free transmission with impressive optical-signal-to-noise ratios of approximately 20dB.

Flexible Spectrum

Super-channel transmission addresses the need to increase data rates, however, there is also a need in optical networks to maximize fiber capacity. Initially, the optical spectrum of the transport system was divided into fixed 50GHz channels to carry fixed wavelength lasers and multiplexers. In order to carry new advanced optical signal formats, the system needs to adapt to the required bandwidth of the signal and efficiently use the available system spectrum. Tunable technologies are regarded to be the future of optical transport systems as they allow system resources to be used more efficiently.

Colorless, Directionless, Contentionless Routing

ADVA Optical Networking equipment supports the construction of fully colorless, directionless and contentionless routing system architecture and this enables super-channel and FlexGrid technologies to be utilized to their full advantage. Careful analysis must go into joining multiple point-to-point links of super-channel signals using flexible spectrum to create multi-node ring and mesh networks. ROADMs, together with programmable optical amplifiers, combine for colorless, directionless and contentionless use of any flexible spectrum allocation technique and route individual wavelengths without conversion back into the electrical domain.

Transport SDN

Like many in the industry, ADVA Optical Networking is committed to exploring and developing an elastic SDN architecture that optimizes networks for traffic and operations. SDN networks can be dynamically configured across multiple service layers to meet traffic and service requirements. Centralized management and intelligence optimizes network operation.

With SDN technology, control of the network can be programmable and separate from the actual physical forwarding and routing schemes. The control of each of the network devices is not confined to that unit but is also accessible and available to higher level applications and infrastructure. This allows for the abstraction of the physical infrastructure as the network can be treated as a virtual configurable entity. As a result, network operators can benefit from programmability, scalability and flexibility in the network.

SDN solutions use a centralized and programmable SDN controller, open interfaces in the network elements, and specific applications that run on the controller. The controller ensures centralized, programmable, and dynamic services setup, using intelligent, customizable multi-layer algorithms.

ADVA Optical Networking supports an ‘elastic network’ concept in its optical networking solutions. This enables a network to be built that is capable of using software-defined techniques on the system and component levels.

NRENs' roadmaps

Poznan Supercomputing and Networking Centre (PSNC) is affiliated to the Institute of Bioorganic Chemistry of the Polish Academy of Sciences (PAS) and is an active research and development centre specialized in new generation networking, media, Grids, digital libraries and cyber security, as well as technologies, applications and services for Information Society. Research and development activities are carried out in numerous national projects and in cooperation with European partners. PSNC is also responsible for the development and management of the national research network in Poland – PIONIER. The PIONIER infrastructure is connecting over 700 research and development institutions, more than 100 public universities and 5 HPC centres via 21 Metropolitan Area Networks through over 8000 km of own fibres. The international research cooperation is realized via the GÉANT network with 10Gbps connections and through own dark fibre cross border connections. PSNC represents Poland in numerous organizations and associations, including TERENA and RIPE NCC and is a partner in such activities as GÉANT and Internet2.

PSNC has been appointed as project coordinator. As part of its duties, PSNC will be responsible for the co-ordination of the activities. PSNC will coordinate actions connected with market vendor relations, support for public bodies public procurements especially synchronization of ECs funds with public procurements.

PSNC is the operator of Polish National Research and Education Network PIONIER (Polish Optical Internet – a nationwide broadband optical network for e-science) which includes all main Polish academic and research centers. PIONIER network is a nationwide broadband optical network represents a base for research and development in the area of information technology and telecommunications, computing sciences (grids, etc.), applications and services for the Information Society. Built entirely from the KBN (Committee for Scientific Research) funds, currently connects 21 Academic Network Centers Centers of Metropolitan Area Networks (MAN) and 5 of the HPC (High Performance Computing) Centers using their own fiber connections. PIONIER is Europe's first national academic network that uses its own dark fibers. The mission of the PIONIER Consortium is the construction of Polish Optical Network and the support of the statutory activities of the leading institutions and the development of the Information Society in general, using the network and IT infrastructure. To realize the mission, the consortium established the rules of the PIONIER research network, defining the ownership of the infrastructure, its exploitation and the cooperation with the private institutions, as well as the international cooperation etc. PIONIER network is the first National Research and Education Network in Europe which has its own fiber optic cables. Transmission is organized in DWDM system using 10 Gigabit Ethernet technology. Recently, work has been carried out to implement 100 Gigabit Ethernet technology in PIONIER network. Important element of PIONIER are direct fiber optic connections to international telecommunication operators. PIONIER network, similarly as other research networks in Western Europe is connected to European Research-Academic and educational network GEANT. PIONIER defined and constructed cross border connections (CBDF – Cross Border Dark Fiber) to neighbouring research networks.

Under national PO IG 2007-2013 programs: PLATON, NEWMAN, 100Net and MAN-HA, PSNC has conducted or is conducting complex national and international public procurement procedures for state of the art equipment including optical networking solutions. The established collaboration with optical equipment vendors and experience form extensive public procurement procedures will be a significant input to the COMPLETE project consortium.

PARTNERS

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