Telecom Infra Project Team Completes Successful End-to-End Trial of Open Optical Networks

CANDI demonstrates end-to-end service operations and network visibility across partially disaggregated multi-vendor open optical networks

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June 3, 2021 - The Telecom Infra Project (TIP) Open Optical and Packet Transport Project Group has announced the successful demonstration of open optical networks control and management by the Converged Architectures for Network Disaggregation & Integration (CANDI) subgroup. The trial is a critical step to helping operators adopt best-in-breed solutions for increased vendor diversity and agility in their optical networks.

The primary goal of the CANDI Optical trial is to demonstrate unified SDN control and management of the disaggregated, multi-vendor components within an open optical network: Open line system (OLS), Open Terminals (OTs) and Optical Planning tools. Multi-vendor integration and service operations were achieved through open standard models and APIs supported by the Optical SDN Controller, including OpenConfig, Transport-API (TAPI) and Open REST. Integration was then validated across several functionalities: Network topology discovery of the open OLS and OTs into the Optical SDN controller; on-line provisioning of optical circuits including dynamic on-demand path computation using an external vendor-neutral planning tool; and the establishment of optical circuits between transponders and line interfaces from different vendors over partially disaggregated OLS.

The project succeeded due to the contributions and collaboration of multiple stakeholders:
- Optical SDN control was provided by Fujitsu's Virtuora® Network Controller based on OpenDaylight
- Open Line System/Domain control was provided by ADVA's FSP3000 microROADMs along with Ensemble as the optical domain controller
- Open Terminals were provided by Fujitsu's 1FINITY™ T600 and TIP white-box Cassinis supported by Edgecore with IP Infusion software
- Optical reach verification was made possible through the TIP-developed open-source optical planning tool GNPy, supported by Orange
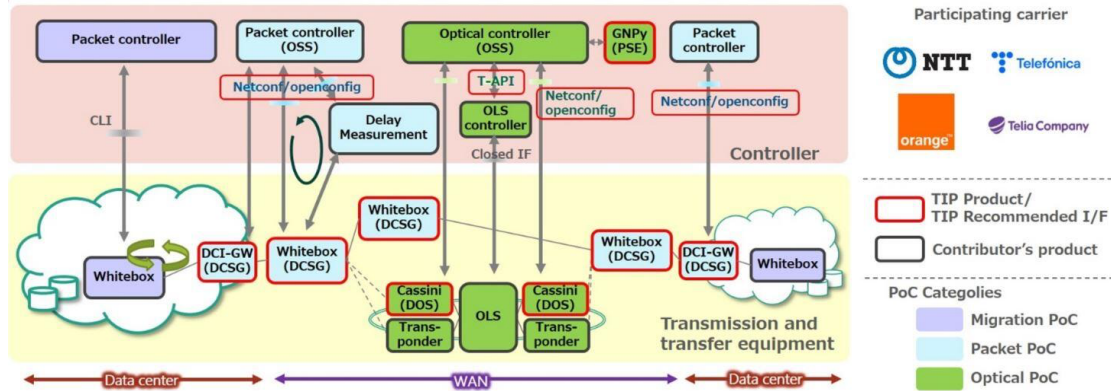
Figure 1 Overview of PoC 2021

Executive Comments:
- **ADVA:** "This PoC is an important milestone in the journey to fully open and disaggregated optical networking. It offers new levels of visibility and a way to manage the entire multi-vendor environment. With the power to seamlessly integrate components from different suppliers, network operators can confidently deploy best-in-class infrastructure that meets their exact requirements," said Christoph Glingener, CTO, ADVA. "Our FSP 3000 OLS was central to the demo. It's a truly open solution that gives operators the freedom to build multi-supplier architectures and then evolve and optimize each network layer separately. With our Ensemble Controller also playing a major role – providing network management and programmatic SDN control – this demo highlights the value of technology like ours that supports interoperability and disaggregation."
- **Fujitsu** "The TIP CANDI project shows the importance of industry collaboration to achieve a common goal," said Francois Lafontaine, Vice President of Software at Fujitsu Network Communications, Inc. "Together, we are helping service providers migrate to more open, innovative and flexible optical networks. Virtuora NC, the industry's leading open optical controller, is a critical component to open networking success."
- **IP Infusion:** Atsushi Ogata, President and CEO, IP Infusion says "This successful demonstration validates how network disaggregation can deliver faster innovation, multi-vendor choice and lower the operating costs that service providers are demanding. We are proud to have contributed in this collaboration with TIP and other industry partners, to demonstrate that unified SDN control and management can be achieved with our OcNOS® network operating system combined with Edgecore Networks hardware."
- **NTT:** Yoshikatsu Okazaki, Vice President and Head of NTT Network Service Systems Laboratories says, It is great honor that NTT has contributed as a co-

lead of CANDI to this successful experiment, showing the feasibility of TIP OOPT's Use-cases and several of TIP OOPT's products. NTT appreciates all contributors who agreed with CANDI's goal and supported this quite challengeable, full remote PoC."

- **Orange:** "Openness and interoperability are key to implement a flexible automation architecture. CANDI POC shows that international cooperation in standardization and open source is the way to reach this target", says Gilles Bourdon, VP Wireline Networks & Architecture, Orange Labs

- **Telefónica:** "Telefónica is promoting the openness in transport networks ensuring multi-vendor interoperability and network programmability. This PoC of concept has successfully demonstrated the automation with physical impairments validation in a multi-vendor network with different providers in the line system and transponder side. Thanks to the collaboration in the Telecom Infra Project, the operators can produce common specifications to guide the industry and speed up the adoption of open networks. ", says Oscar Gonzalez de Dios, OOPT CANDI co-chair and Head of SDN program in Telefónica CTIO.

- **Telia** "The co-operation in projects like the OOPT-CANDI optical PoC shows us the strength of working in the TIP community towards common goals. The PoC has verified requirements defined by the operator-driven OOPT-MUST for the common architecture and API targets of the open optical networks. The outcome of the PoC enables us to take the next steps towards fully open and operable Optical Networks, enabling a more competitive and efficient ecosystem, a faster time to market and finally demystifying the closeness of the Optical domain" says Mauro Costa Head of planning, strategy and architecture in Network Systems and Delivery, Common Products and Services in TeliaCompany

Participating companies and roles:
- Facebook (CANDI community lab responsible)
- Telia Company (Optical PoC Operator and PoC lead)
- Orange (Optical PoC operator, PoC co-lead and GNPy responsible)
- GEANT (Optical PoC operator)
- Telefonica (Optical PoC operator and CANDI co-chair)
- NTT (Operator and CANDI co-chair)
- Fujitsu (Optical SDN controller and Open Terminals (T600))
- ADVA (O-OLS (ROADMs) and O-OLS domain SDN controller)
- Edgecore (Cassini whitebox HW)
- IP Infusion (Cassini whitebox SW)
- CTTC (ONF T-API and OpenConfig expertise)