

# Using the Path Computation Element to Enhance SDN for Elastic Optical Networks (EON).

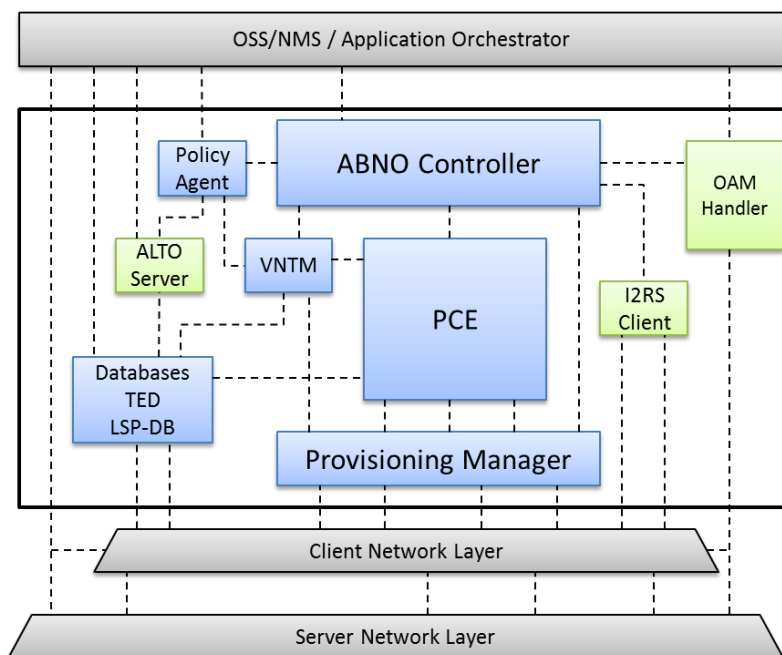
Daniel King – Old Dog Consulting

Victor Lopez, Juan Pedro Fernandez-Palacios, Oscar Gonzalez De Dios – Telefonica I+D

Quintin Zhao – Huawei

Elastic Optical Networks (EON) [1] provide scalable, flexible and spectrum-efficient optical transport, which may be used for a variety of high growth applications. These applications include large scale content distribution and data center inter-connectivity. EONs place a set of new requirements on the operation of the network, where existing network operation methods are simply not sufficiently capable. These include, on-demand and application-specific reservation of flexible optical network connectivity, reliability, resources (such as bandwidth) and policy.

Software Defined Networking (SDN) and network programmability offer the ability to direct application service requests towards the optical network. By combining the Path Computation Element (PCE), an application service request can utilize a well-defined set of path computation and traffic engineering (TE) features. This functionality can be categorized as Application-based Network Operations (ABNO) [1].



This presentation describes how SDN and PCE can be applied to enhance an EON [3]. It demonstrates how these technologies may be combined to solve a critical EON use case, Global Concurrent Optimization (GCO) [4] of network resources. We will detail how the ABNO key components and procedures may be used, including: policy control, resource (spectrum frequency) gathering, path computation and optimization of objective functions, traffic engineering and scheduling. Finally we will summarize the quantitative benefits of the ABNO-enabled GCO operation, in terms of capabilities, network utilization and operational efficiency.

**Technologies:** EON, ABNO, GCO, GMPLS, SDN, Network Programmability, Dynamic, Management, Automation, Policy.

**Acknowledgment:** This work was partially funded by the European Community's Seventh Framework Programme FP7/2007-2013 through the Integrated Project (IP) IDEALIST under grant agreement n° 317999.

## References

- [1] Elastic Optical Networks: the Vision of the ICT Project IDEALIST.
- [2] A PCE-based Architecture for Application-based Network Operations.
- [3] IDEALIST Control and Service Management Solutions for Dynamic and Adaptive Flexi-grid DWDM Networks.
- [4] Path Computation Element Communication Protocol (PCEP) Requirements and Protocol Extensions in Support of Global Concurrent Optimization.