

Combined advanced Optics and SDN technologies for Next Generation DC Network - Showcases of COSIGN solutions

The COSIGN project is in its final year and presently focusing on the long-term demonstrator to be set up, tested and evaluated at University of Bristol and the Technical University of Denmark.

The three-month extension of the project duration until 31 March 2017 will allow the COSIGN consortium to showcase the final demonstrators at the Optical Fibre Communication Conference and Exhibition in Los Angeles, California, in March 2017.

The flat, scalable Data Centre (DC) Network architecture exploits novel optical technologies, an SDN-based network controller and an Orchestrator for the joint optimisation of IT and DC network resources.

Virtual Data Centre (VDC) providers will be able to support multiple simultaneous tenants with isolated networks on the same physical substrate, making efficient use of their available physical resources whilst providing high-bandwidth, low-latency connections to tenants with a variety of VDC configurations.

COSIGN at ECOC 2016

In September 2016 the COSIGN project presented a live demonstrator at the European Conference on Optical Communication in Düsseldorf, Germany.

The demonstrator successfully showed working examples of several key developments from the project, both in hardware and in software. The physical demonstrator setup was a small-scale version of the hybrid COSIGN data plane network comprising both novel electrical Ethernet switches developed at the Technical University of Eindhoven and an optical fibre switch developed by Polatis. This network allows for dynamic reconfiguration of optical connections, providing flexibility in hardware used by high-level applications in the concrete use cases.

Two of the use cases addressed by the project were demonstrated at ECOC.

The Virtual Data Centre demonstrator showed the full integration between the COSIGN data plane, SDN controller and orchestrator enabling the efficient provisioning of flexible VDC instances from a unified web user interface.. Real-time operation of algorithms calculating the optimal placement of VDCs and subsequent configuration of the network was shown.

The virtual application (vApp) demonstrator addressed the coexistence of multiple applications on the same infrastructure and illustrated the benefits of monitoring network traffic using sFlow and switching optical connections to offload congested links. Significant improvement in throughput was shown in a real-time implementation continuously adapting the network to changing traffic conditions.

The COSIGN demonstration was hosted by Polatis on their stand at the ECOC exhibition and was very well received by numerous commercial and academic visitors to the stand. The demonstration at ECOC was a great success, both in terms of public dissemination of European research and as a research achievement.

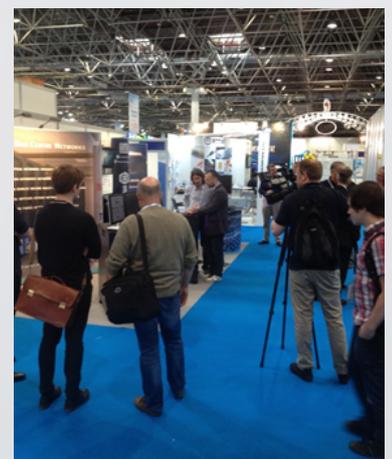


Figure 1: COSIGN booth at ECOC 2017

COSIGN long-term demonstrator @ OFC 2017

This year the Optical Fibre Communication Conference and Exhibition (OFC) in Los Angeles will host a new Open Platform Summit featuring interactive SDN and NFV demonstrations. Here COSIGN will present its final achievements in the largest global conference and exhibition for optical communications (13,000 attendees in OFC 2016).

The COSIGN demonstrator in OFC will focus on an all-optical network architecture for the long-term evolution of data centres. The data plane combines sub-wavelength bandwidth division, TDM fast switches and both Single and Multi-Core fibre switches, everything managed by an SDN control plane and a cloud orchestrator. The complete deployment of the COSIGN software stack includes OpenFlow agents for optical devices, an extended OpenDaylight Lithium Controller and an OpenStack orchestrator integrating algorithms for optimal VDC resource allocation.

This architecture enables the provisioning of isolated optical VDC services, coexisting on the same physical infrastructure and operated by multiple tenants. Sub-wavelength bandwidth division guarantees an efficient usage of the optical resources and a flexible customization of the VDC instances, an essential feature to fit requirements for a wide variety of cloud applications.

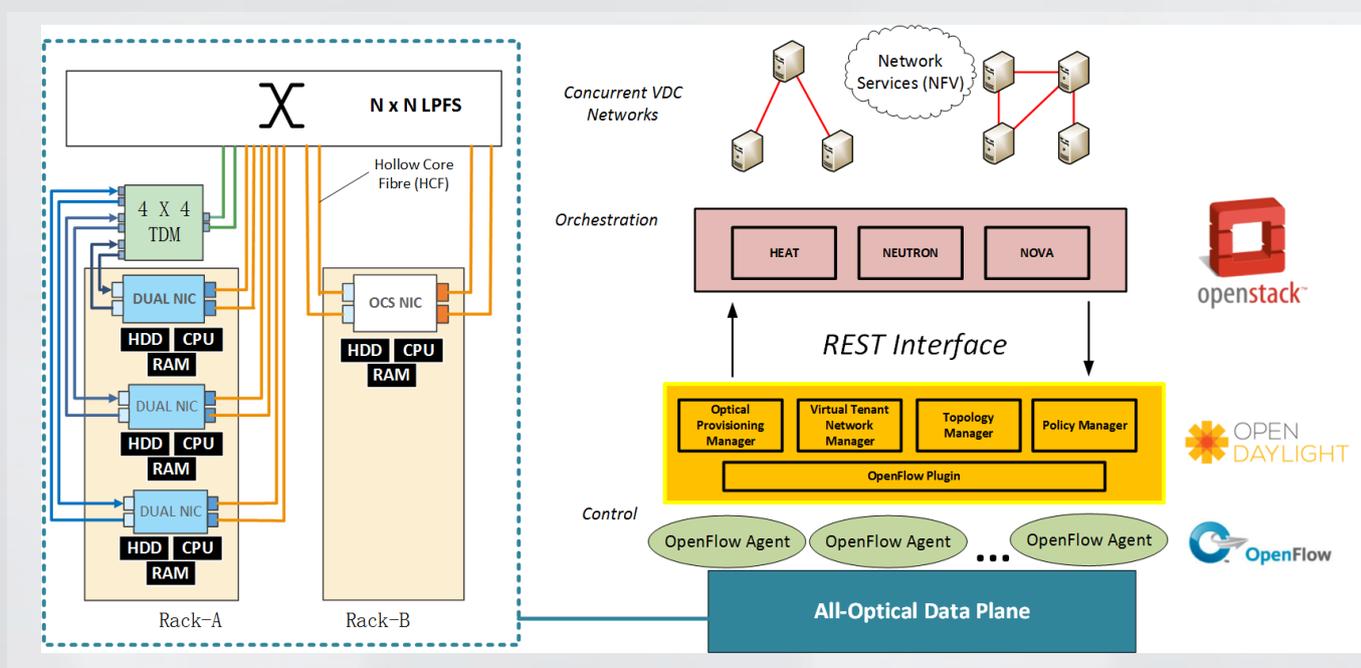


Figure 2: COSIGN - Long Term Demonstrator

Latest publications

- H. C. Mulvad, A. Parker, B. King, D. Smith, M. Kovacs, S. Jain, J. Hayes, M. Petrovich, D. Richardson and N. Parsons, "Beam-Steering All-Optical Switch for Multi-Core Fibers". OFC 2017, Los Angeles, CA, USA
- Pilimon, A. Fagertun, A. Zeimpeki, S. Ruepp: "Energy efficiency in WDM-switched Data-center networks". Workshop on Computing, Networking and Communications at ICNC 2017.

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