

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

COSIGN project has reached its next stage of Data Centre Network (DCN) development, and is ready to showcase optical switching and dynamically reconfigurable overlay on a conventional Ethernet network, fully integrated with SDN control and orchestration mechanisms.

Two demonstrator test cases are described in this newsletter, which will be showcased at ECOC 2016 in Düsseldorf, 19-21 October 2016.

COSIGN features several hardware and software advances, including but not limited to:

- SDN control and orchestration leveraging existing open-source elements, including OpenFlow, OpenStack, OpenDaylight and Open Virtual Network
- Novel fibres and optical switches for increased DC network capacity and reduced latency

Come and visit us at ECOC - Polatis Stand No. 616 to deep dive into our COSIGN solutions.

Showcase - the COSIGN Virtual Data Centre

The **COSIGN Virtual Data Centre (VDC) demonstrator** shows provisioning and configuration of virtual infrastructures over the shared data plane. The architecture, composed of servers, TU/e and Polatis switches, is summarized in Figure 1.

Virtual nodes with computational capabilities are interconnected by virtual links, guaranteeing the desired capacity and QoS requirements. Co-existing VDC instances are mapped into physical resources, thus providing the requested **virtual resources** and guaranteeing **segregation** between different tenants. Moreover, in order to fully exploit the capabilities of the underlying physical infrastructure, the COSIGN VDC orchestrator implements **provisioning algorithms that ensure optimal mapping of the virtual infrastructures** onto the physical resources by minimising utilisation of compute and network resources.

We show the creation of VDC instances from the OpenStack dashboard, automated creation of VMs and the joint configuration of network flows in the hybrid data plane via the OpenDaylight controller and OpenFlow protocol.

The VDC demonstrator optimizes the time to provision a new VDC instance, minimizing the time for orchestrator decisions, configure and deploy Virtual Machines (VMs) and provision network resources via SDN controller. As such, our COSIGN VDC provisioning outperforms current commercial solutions in terms of deployment time.

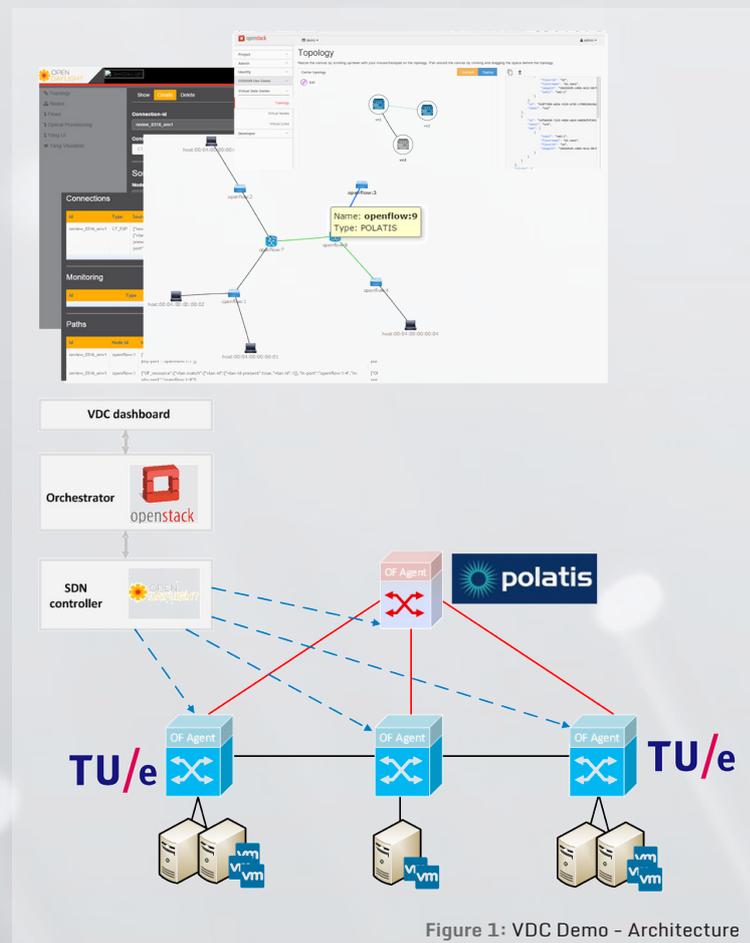


Figure 1: VDC Demo - Architecture

Showcase - the COSIGN Virtual Application

The **COSIGN Virtual Application (vApp) demonstrator** presents the concept of **optical circuit sharing** to optimize utilisation of legacy optical circuits.

We demonstrate how an optical circuit configured between **two top-of-the-rack (ToR) switches** can also serve **elephant flows** (larger, often longer-lived data flows) not arriving from or delivered to these ToR switches directly connected to the circuit's endpoints. When elephant flows are transmitted through the optical circuit using the sharing of optical circuits, we manage to improve mouse/elephant flow separation in the network, leading to increased performance of both types of flow and better overall network utilization. Our solution is highly scalable and SDN-based, with elephant flow rerouting requiring only a single OpenFlow rule per circuit.

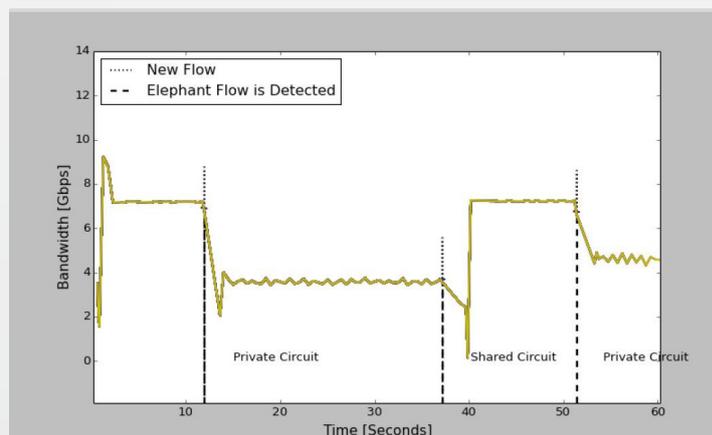


Figure 2: vApp Demo - Detection of Elephant flows

COSIGN Shared Testbed Infrastructure

All COSIGN solutions are validated in a laboratory testbed installed at the University of Bristol and the Technical University of Denmark. These two laboratories have world-class facilities for testing COSIGN data plane components in different set-ups and traffic sources.

In addition, COSIGN experimental validation is also carried out in a small scale industrial demonstrator hosted at Interoute's Data Centre facility.

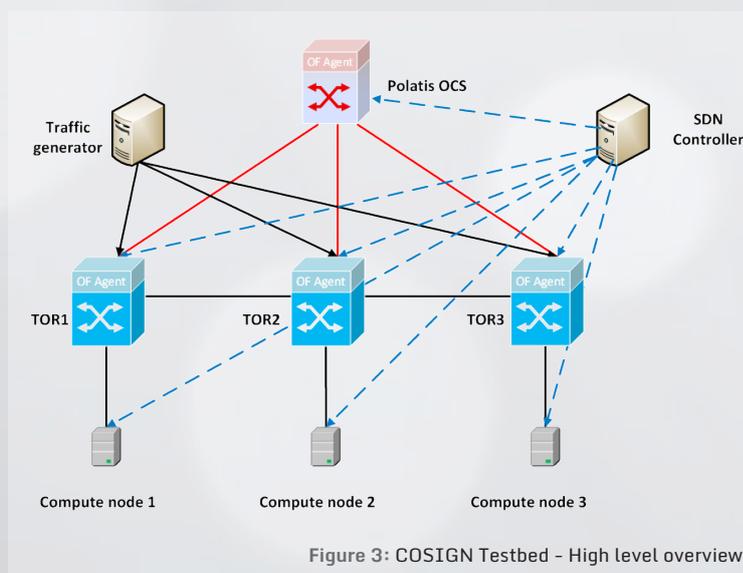


Figure 3: COSIGN Testbed - High Level overview

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