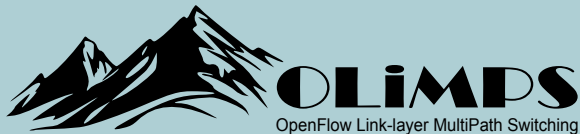


OpenFlow Multipath Switching for LHConc

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SDN, OpenFlow, Floodlight - Terminology

OLiMPS - OpenFlow Link Layer MultiPath Switching

- ▶ OLiMPS OpenFlow controller
- ▶ International multipath OpenFlow testbed
- ▶ Roadmap

OLiMPS and beyond - OpenFlow for LHCone

- ▶ R&D deployment in LHCone
- ▶ Towards operation

SDN-Domain

- ▶ No general definition available. However, it might be all the SDN-capable network equipment governed by one operator. This, of course, may comprises several SDN controllers.

OpenFlow-Domain

- ▶ Comprises all switches that are controlled by one OpenFlow controller.

OpenFlow-Island

- ▶ All directly connected OpenFlow Switches under the control of a single OpenFlow controller.
- ▶ Also known as OpenFlow-Cluster

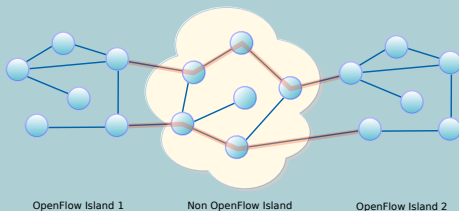
OLiMPS - OpenFlow Link-layer MultiPath Switching

- ▶ Addresses the problem of topology limitations in large-scale layer 2 networks
- ▶ Remove the necessity of a tree structure in the topology achieved though the use of Spanning Tree Protocol
- ▶ Allow for per-flow multipath switching and increase the robustness and efficiency of layer 2 network resources
- ▶ Integrate dynamic circuit provisioning systems like OSCARS and OpenFlow

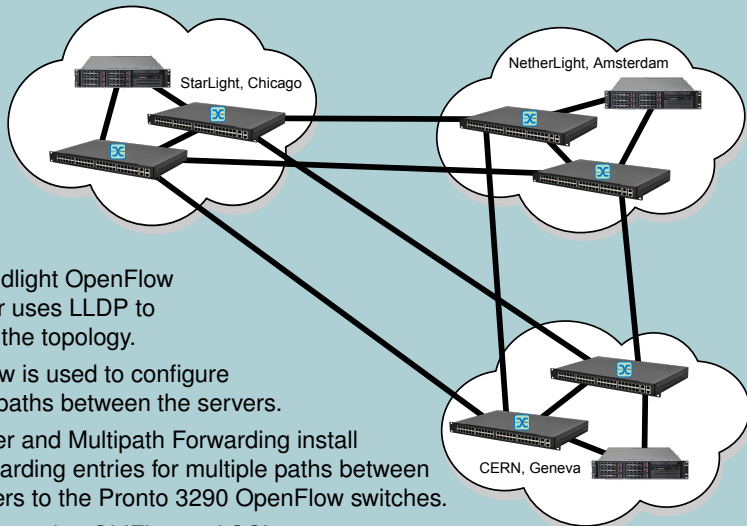


OLiMPS OpenFlow Controller

- ▶ Based on Floodlight
- ▶ Implements new modules
 - ▶ ProxyARP
 - ▶ Pathfinder
 - ▶ Multipath Forwarding
- ▶ Allows for multiple paths within as well as between OpenFlow islands
- ▶ Maps new flows to multiple paths in round-robin manner



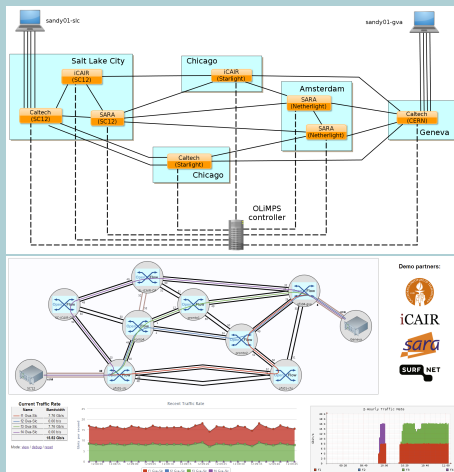
OLiMPS - International Multipath OpenFlow Network



- ▶ The Floodlight OpenFlow controller uses LLDP to discover the topology.
- ▶ OpenFlow is used to configure multiple paths between the servers.
- ▶ Pathfinder and Multipath Forwarding install flow forwarding entries for multiple paths between the servers to the Pronto 3290 OpenFlow switches.
- ▶ Demonstrated at GLIF'12 and SC'12.

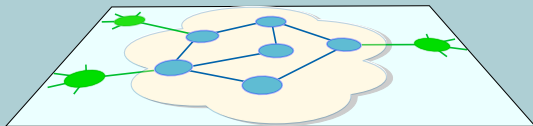
OLiMPS - International Multipath OpenFlow Network

SuperComputing 2012



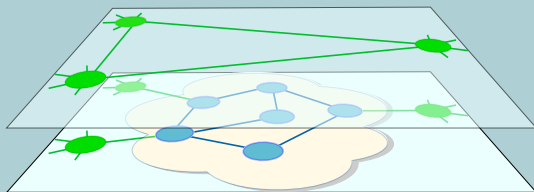
OLiMPS Roadmap

- ▶ Implement intelligent path selection, e.g. based on measurements
- ▶ Implement load balancing and integrate QoS functionality
- ▶ Extend the error handling, e.g. seamless flow redirection
- ▶ Virtual switch abstraction: Expose OpenFlow API to northbound (ESnet)



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