



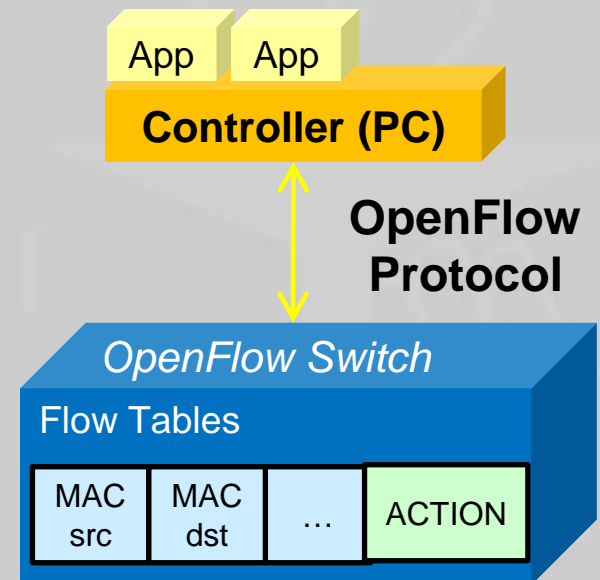
SDN/OPENFLOW IN LHCONE

A discussion



Some words of introduction

- Software Defined Networking (SDN): Simply put – physical separation of control and data planes
- Openflow: a protocol between controller entity and the network devices
- The potential is clear: a network operator (or even user) can write applications which determine how the network behaves



However, it's not complete...

- Openflow defines/standardizes the “southbound” interface
- To be complete, a system needs
 - “Northbound” interface (to the application)
 - “east-west” interface (inter-controller and/or inter-domain)
- Another factor limiting deployment (potentially): Only a limited choice of controllers
 - But plenty of resources should you wish to write one...



ideas (and questions) for this get-together

Most of us have an SDN or Openflow project going

- I am sure we will profit from exchange of ideas

More concretely, regarding SDN and/or Openflow in particular:

- Can it be used in LHCONE? If so, what way?
 - As a better management tool used by providers?
 - Exposed to the user community?
 - Why? Why not?

And – is Openflow the right answer?

Or some other form of SDN?





And there's certainly other questions you have – let's talk





OLIMPS

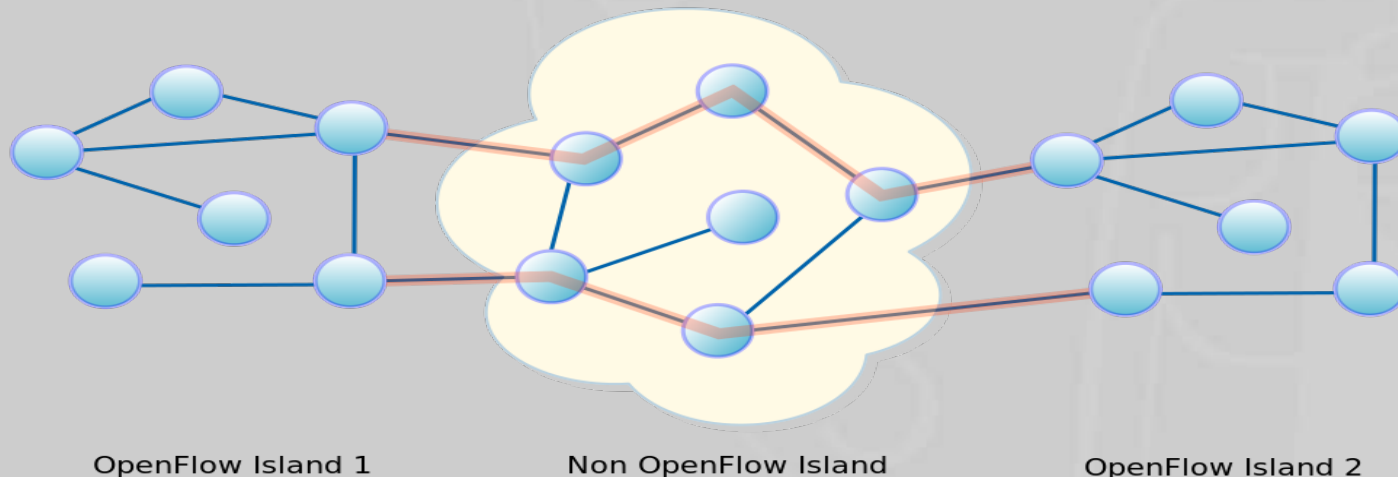
Caltech's Openflow project



- OLiMPS: Openflow Link-layer MultiPath Switching
 - with a centralized, out-of-band control, we can construct a robust multi-path system without modifications to the Layer 2 frame structure
 - Big plus: using Openflow, no need for new HW or feature support (other than Openflow)
 - 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
 - Increase the robustness and
 - Increase efficiency and
 - Simplify management of layer 2 network resources



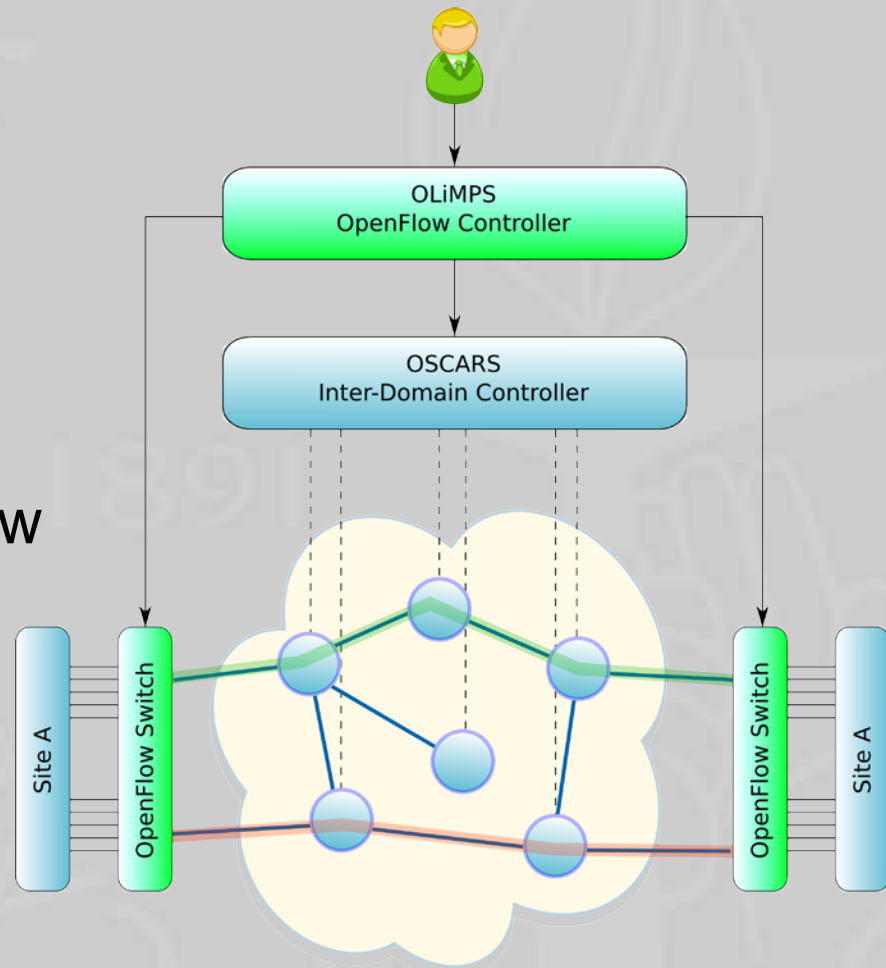
- OLiMPS controller is based on Floodlight
 - Written in JAVA
 - Supported by Big Switch and a large open source community
 - Open Source
- Floodlight implements a set of OpenFlow applications
 - Link Discovery
 - Topology and spanning tree calculation
 - Simple packet forwarding and learning switch



Future work: OLiMPS and OSCARS

OLiMPS/OSCARS interface

- User (or application) requests network setup from OLiMPS controller
- OLiMPS requests setup of multiple paths from OSCARS-IDC
- OLiMPS will connect OpenFlow switches to OSCARS termination points, i.e. VLANs
- OLiMPS will transparently map the site traffic to the VLANs



Potential use in LHCONe

- Discussion ongoing on the utilisation and efficiency of the transatlantic links
 - LAG seems inefficient (static hashing)
 - other out-of-the-box methods for multipath aren't promising either
- Based on OLiMPS, we (Michael and I) have proposed a possible solution, which would necessitate
 - collaboration
 - will to experiment
- Also: A good use of the transatlantic circuit links?

