Data Center SDN
PRISM Edge – A new approach to data-center gateway
## Data Center SDN

### Problem

- Data Center L3 ➞ The playground of legacy players
- Closed & proprietary devices impact innovation
- Legacy Router interfaces ➞ Increase in Capex & Opex
- No elegant Openflow based L3 demarcation point available
- No programmatic APIs to dynamically distribute user routes as per routing protocol choice
- Default Openstack uses Linux based software L3 forwarding ➞ bottleneck
- Multi-L3 routers for bigger network results in multiple management plane headaches

### PRISM

- Leverage switch cluster made of white boxes
- 100s of ports of non-blocking 10GE scale
- Scalable up to multiple Tbps
- White boxes keep hardware costs at a minimum
- Use Openflow to abstract control plane
- Run controller & control plane in COTS boxes
- REST api based interface on top of Controller
- Necessary plugins and enhancements in Openstack
- Provide a single control plane implementation on top of Openflow with HA
- All components are based on Open standards
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PRISM Feature set

- Dynamic logically centralized router creation on top of Openflow switches
- Programmatic APIs for BGP/OSPF speakers and user routes distribution
- Transforms the switch cluster to single programmable domain
- Supports elastic addition/removal of switches in the cluster
- Dynamic gateway provisioning internal to data center network

Supports native Linux networking  Fully integrated with Openstack  All components supports HA
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PRISM Edge – An Industry First

LINUX abstracted on top of Openflow

• PRISM allows users to provision using stock Linux
• Users can use normal Linux networking commands (ifconfig, brctl, vconfig etc)
• All user-defined L2/L3 configurations on Linux
• E.g. Routing, VLAN, Bridging LAG etc
• Best of All – It works over any number of Openflow switches!!
• Distributed Data Plane enables game changing flexibility
• E.g. simple LAG configuration translates into MLAG
Deployment Scenario

Depending on Data-center L3 design, PRISM provides a number of deployment options:

- Stand-alone PRISM cluster on top of 3rd party leaf-spine tier
- Spine-tier as a single PRISM cluster
- Replace the whole leaf-spine fabric as a single SDN driven L3 cluster
1) Openstack managed data-center
2) Multi-tier application domains separated as tenants
3) Provider networks provisioned as VLANs
4) Each tenant is assigned a VLAN
5) VLAN bridges are mapped to the Openflow cluster using PRISM
6) VLANs have gateway IP addresses assigned
7) Inter-tenant traffic flows flawlessly driven by Openflow switches
8) PRISM peers with external legacy routers e.g. CISCO using legacy protocols
9) PRISM provides option to advertise inner tenant subnet to outer world using OSPF/BGP etc
PRISM Edge – Tackling the challenges

- **Optimized utilization of switch flow tables**
  - Openflow provides multiple flow tables.
  - PRISM uses multiple flow tables to group similar flows.
  - Leverages table-typing to export legacy switch tables using OF protocol.
  - Reduces flow state explosion.

- **Optimal inter-cluster path stitching**
  - Installing flows along the entire path for each route could be cumbersome.
  - PRISM segregates the flows by installing IP route related flows only in edge switches.

- **Resiliency and Integrity**
  - Fast failover feature is need of the hour where multiple paths to edge node are available.
  - Utilized advance Openflow features such as fast-failover and select groups.

- **Control Plane Protection**
  - Slow protocols like ARP needs control plane intervention.
  - ARP aging etc needs to handled properly to reduce control plane churn.
  - PRISM uses state-of-the-art ARP handling to offload the control plane.
  - Maintains next-hop liveliness by analyzing statistics.

- **Control Plane Recovery**
  - PRISM ensures the non-stop forwarding in the data plane.
  - Fast and lossless state recovery on control plane reboot.
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PRISM Edge Solution Partners

OpenMUL Controller, PRISM Control plane

White-box - Switches & Operating System