

AT&T's SDN Controller Implementation Based on OpenDaylight

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D2.0 SDN-NFV Realization

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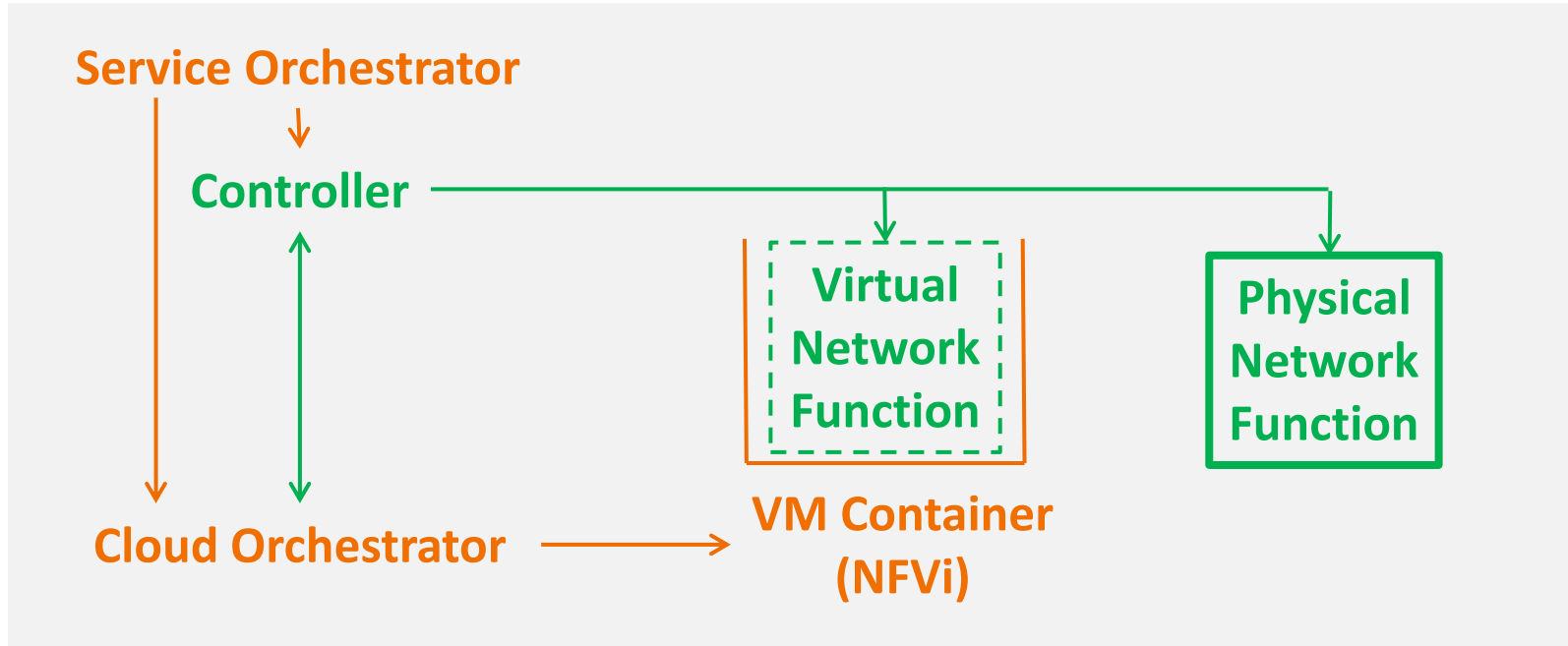


Agenda

- ❑ **The SDN+NFV Components & Common Use Cases**
- ❑ **Service Provider Use Cases – A Wish List**

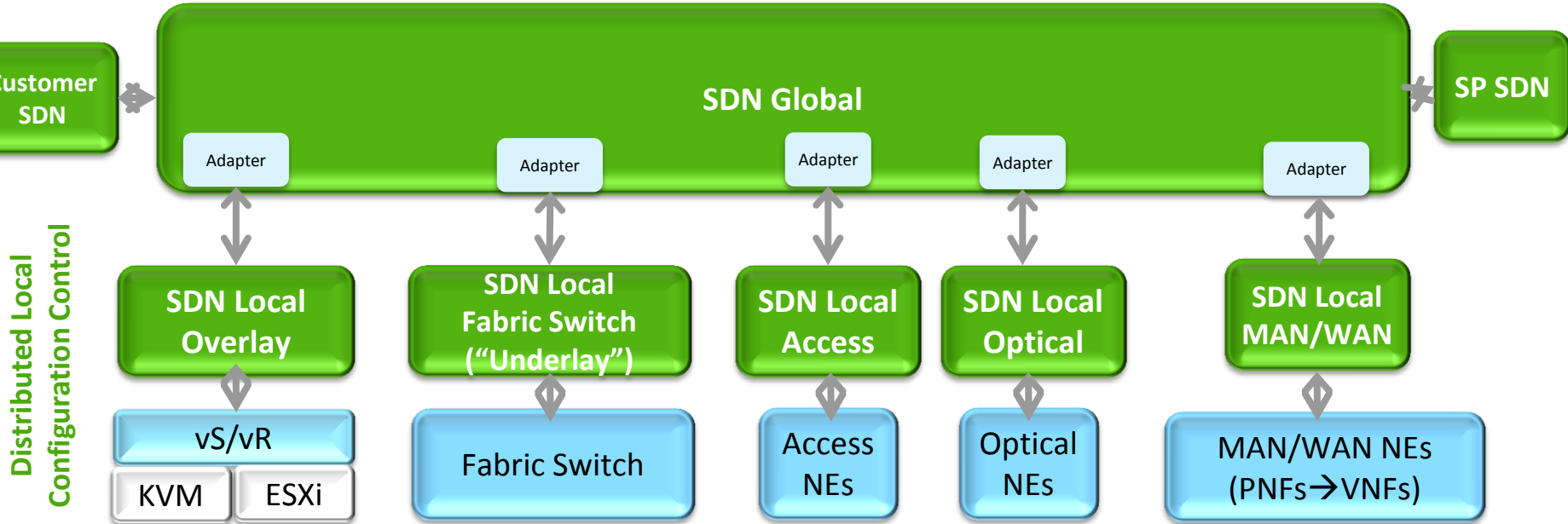


SDN in a Virtualized World

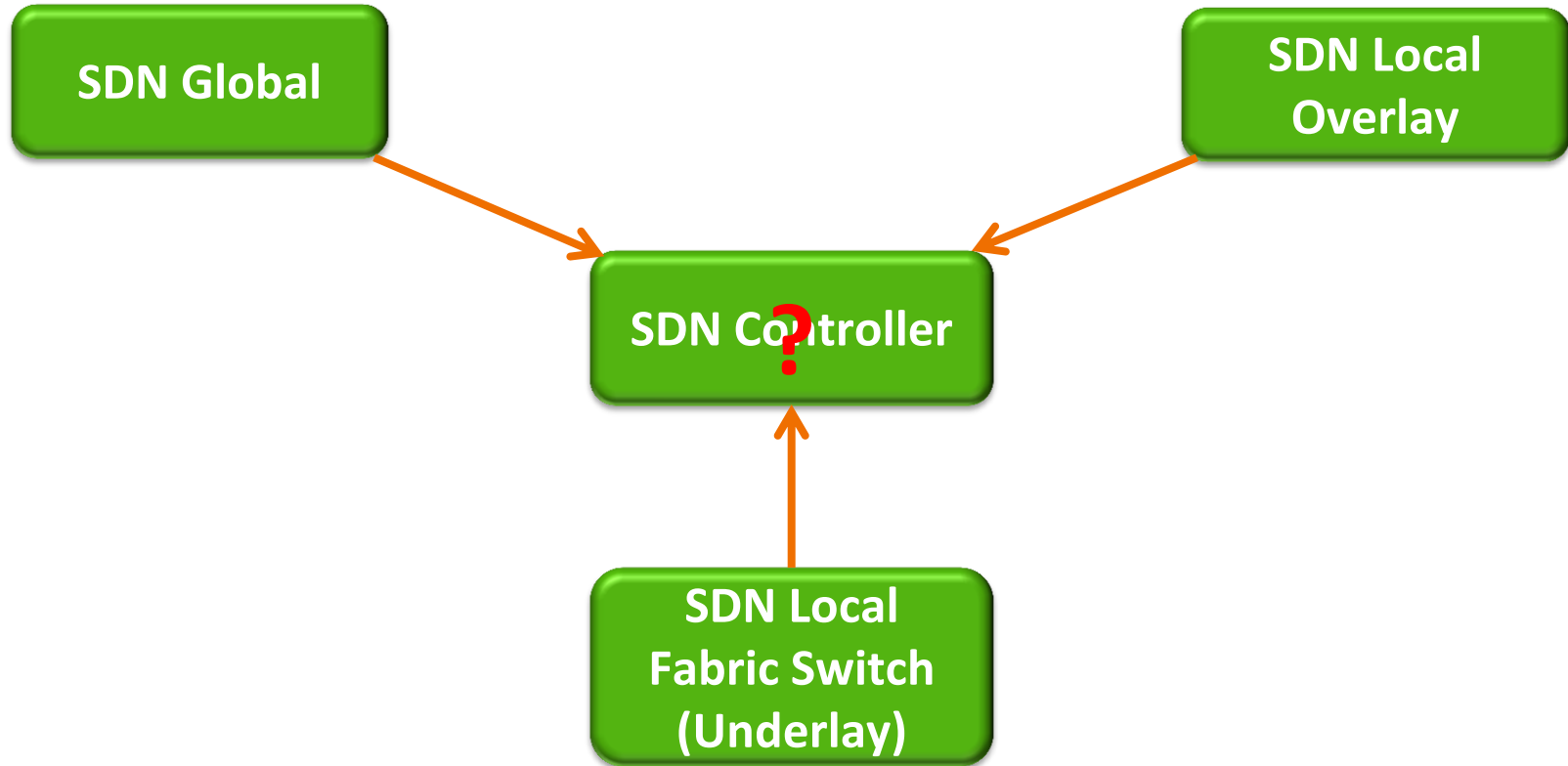


Controllers – How They Fit Together

Application/Service-aware
End-to-end Service Configuration
& Global Resource Optimization Controls



THE Controller?



Common Use Cases

Virtualize Function

Server Failover

Site Failover

Scale out/in/up/down VF – in one location or multiple locations based on time or traffic

Customer request causing VF spin up

Customer bandwidth on demand

Multi-tenancy to application

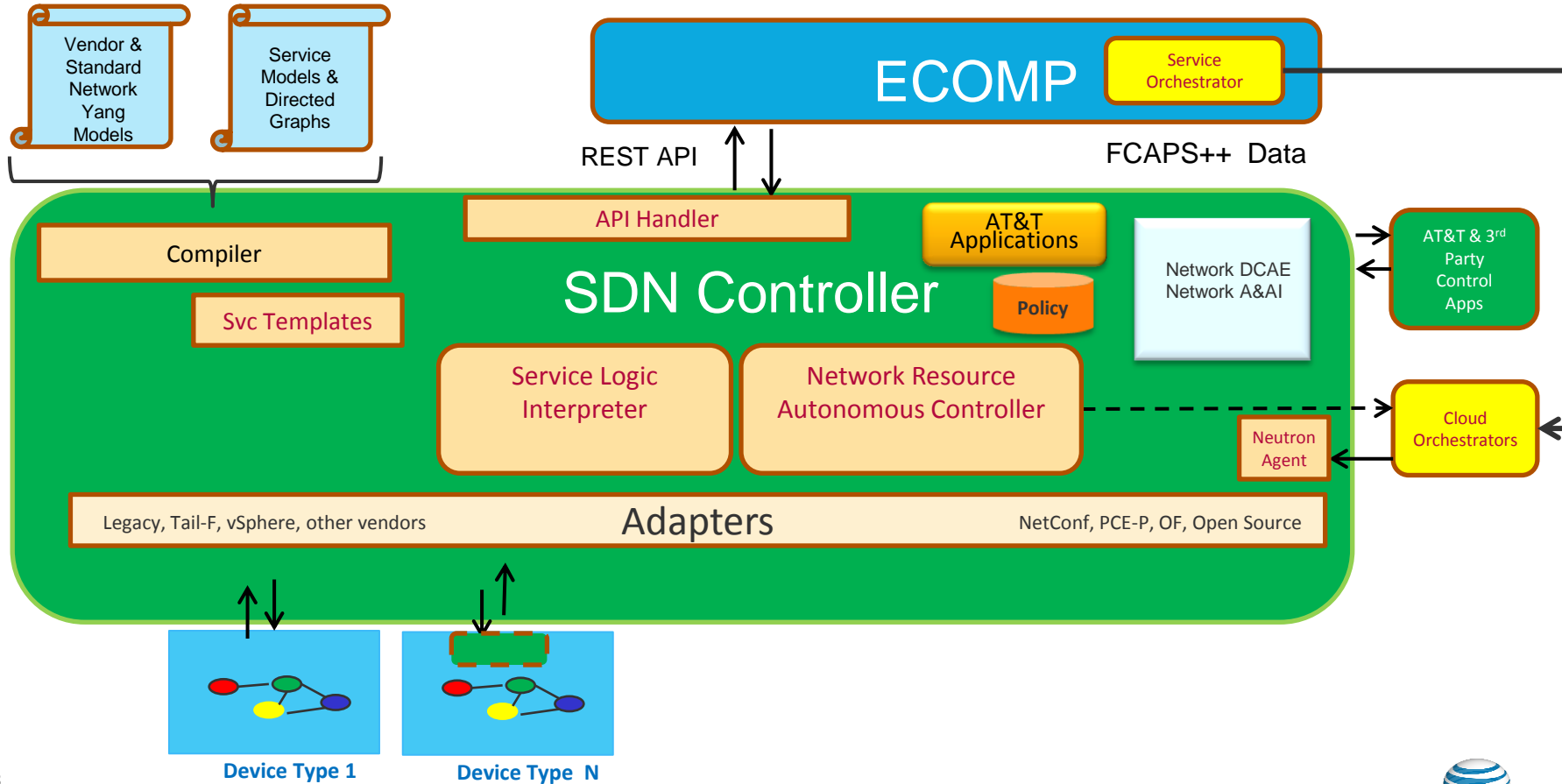


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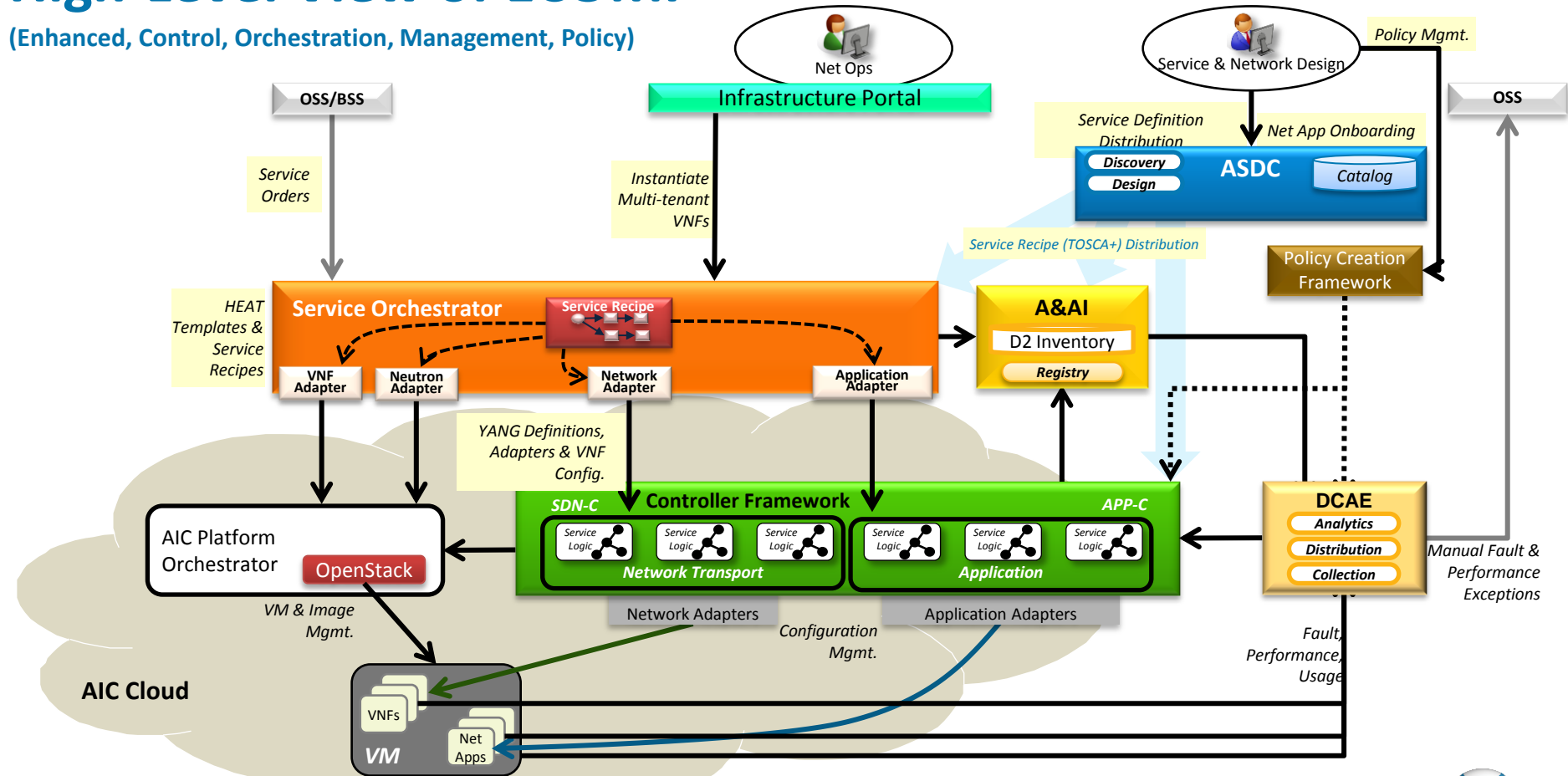


AT&T Global SDN Controller Software Architecture



High-Level View of ECOMP

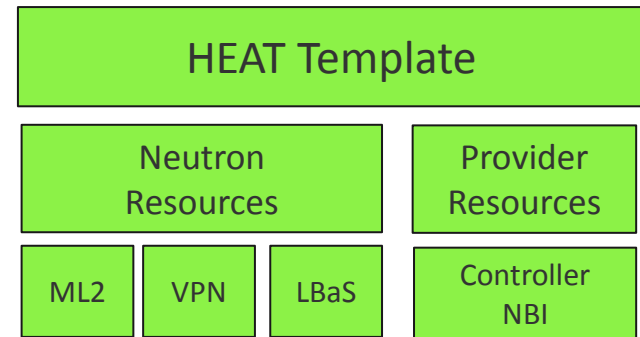
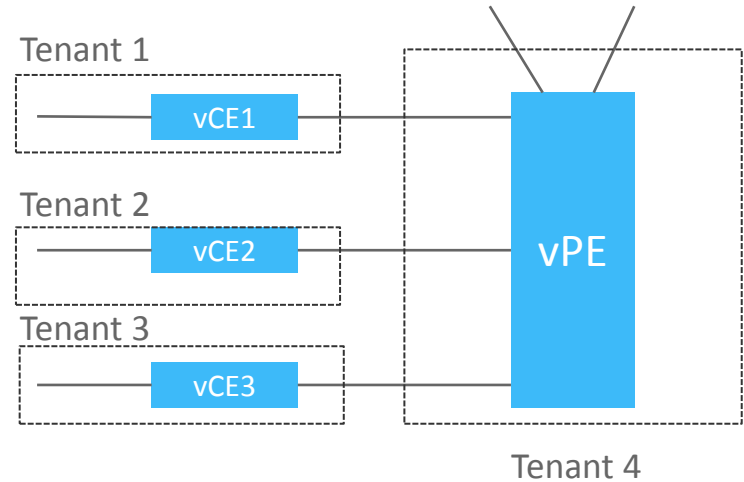
(Enhanced, Control, Orchestration, Management, Policy)



Service Provider Use Cases

Working with cloud orchestration

- Closed User Group Networks
 - vCE to vPE network
 - vPE is an internal tenant
 - vCE is an external tenant per customer
 - The network between them crosses tenant boundaries
 - Its not shared across all tenants that might be on that node
 - Need better support for sets of tenants that can access a shared network (a form of extra-net in our parlance)
- HEAT templates are HOT for us !
 - We already use HEAT templates for our controller NBI and are increasing the number and variety of HEAT resources we will use.
 - Beside Neutron ML2, we think there may need to be resources defined both within Neutron and outside of Neutron to meet our needs in advance of OpenStack releases.



Service Provider Use Cases (1)

South West Cluster

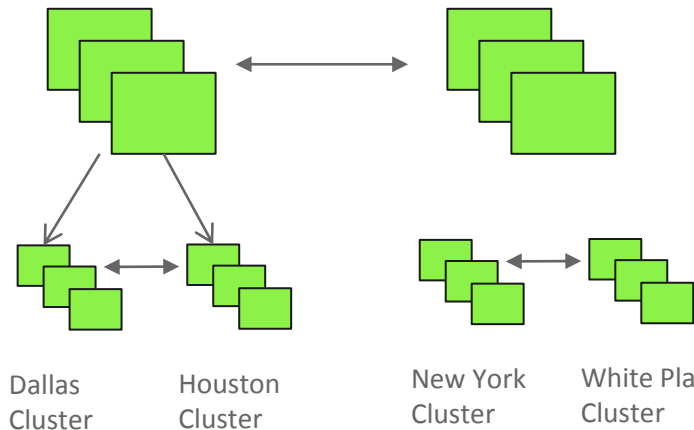
North East Cluster

Clustering

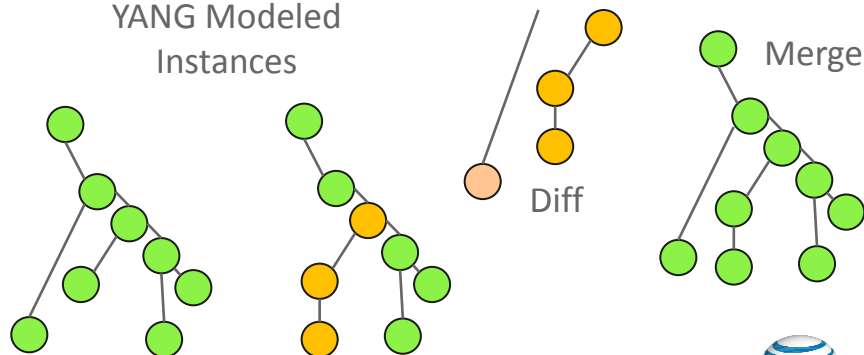
- Controllers will be in more than one site
- Local, Regional, National
- N-way cluster within a site is sufficient for HA but not disaster recovery
- Need cluster to cluster replication/synchronization

MD-SAL Utilities

- We have an application called the Service Logic Interpreter (SLI) that makes heavy use of MD-SAL and YANG Tools
- The SLI updates the config and operational trees depending on the service, feature and external system interactions (east/west).
- Need support for better “diff” and “merge” of the tree
 - Compare config to operational
 - Merge operational into config (sync from , synch to)
 - Merge this branch into the similar branch in another part of the tree
- Need support for “on data commit” so we can do things before the response goes back.



YANG Modeled Instances



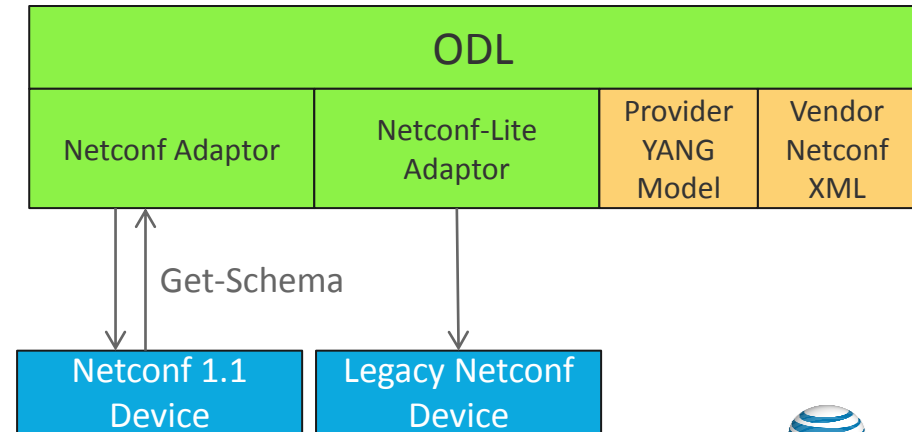
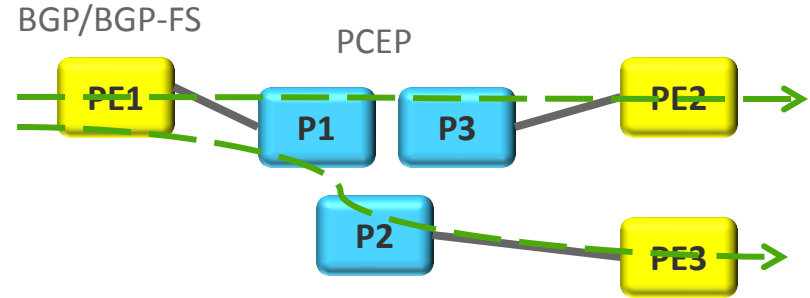
SDN Controller South-Bound Interfaces/Protocols

Traffic Routing Control with BGP & PCEP

- Use BGP/BGP-Flow-Spec for flow redirection (selection of egress point “BGP-Next-Hop” for a targeted flow) at ingress PE
 - Need extension of BGP Flow-spec for support of address families (AFI/SAFI) other than IPv4/v6
 - Need controller logic for support of multiple simultaneous “best paths” (BGP Add-Path)
- Use PCEP for optimal routing/re-routing of MPLS LSPs
 - Need extension for use with Segmented-Routing

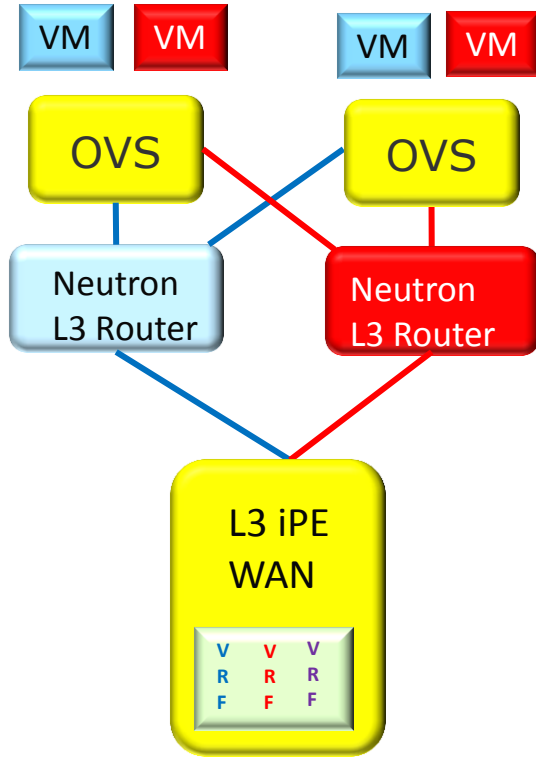
Service Control with NETCONF

- Too stringent to use get-schema
- Need a lighter weight NETCONF integration when vendor supports Netconf but doesn't have a YANG model

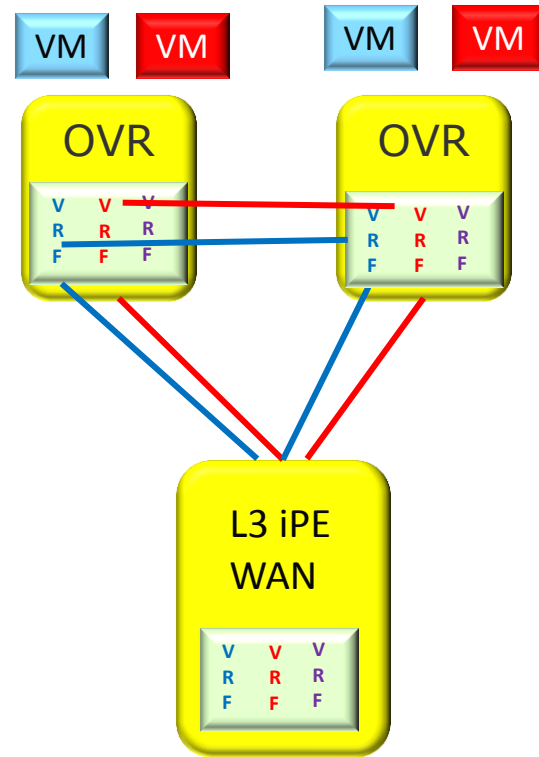


L3 Multi-Tenancy Models

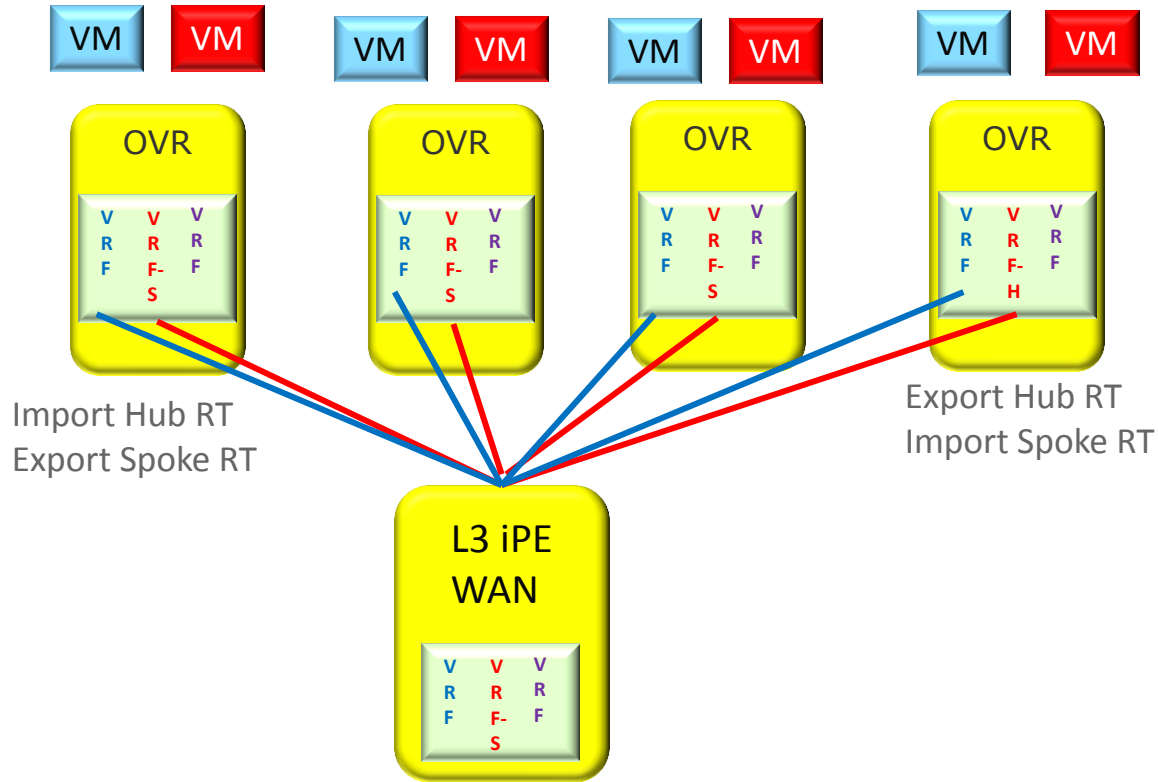
TODAY



TARGET



L3 Hub-Spoke Model



Q&A

