

SDN Controller Requirement

draft-gu-sdnrg-sdn-controller-requirement-00

Rong Gu (Presenter)

Chen Li

China Mobile

Background

●Public Cloud && Private Cloud in China Mobile

- Public Cloud (ecloud.10086.cn) && Private Cloud are provided for the government customers, large enterprises and financial customers.

●Problems and motivations

- In the Large Lay2 network of cloud data center network, vlan number is the bottleneck.
- For VPC (virtual private cloud) service, not only switch should support isolated forwarding table, but also the FW/LB does.



Background

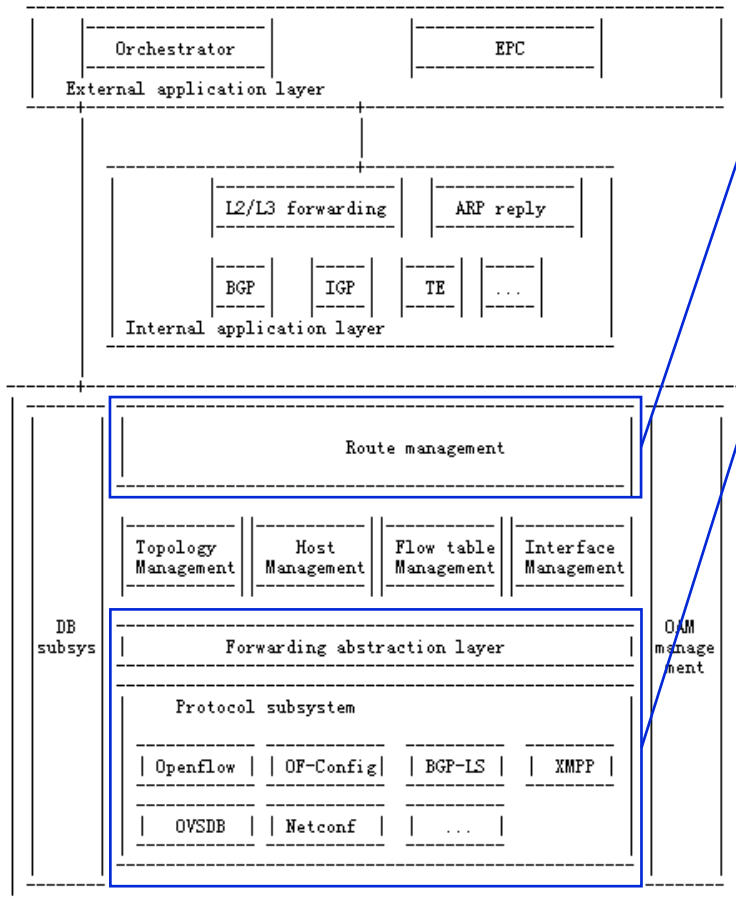
●Problems and motivations

- Concurrent configuration problems: In actual scenarios, multi-tenants configuring NE at the same time while push down the configurations too slow.
- Multi-vendor's NE has different CLI.
- Low utilization of the resources of physical devices such as FW and LB

●Search for a more intelligent and agile network solution with SDN technology (technical requirements)

- Scalability (such as extend the computing and controlling ability)
- Reliability (such as rapid fail-over mechanism)
- Programmability (standard protocols of one controller in interacting with other controllers)
- Intercommunity (such as communication security, access control security...)
- Security (basic network management and trouble diagnosis)

Requirement of Architecture



- **Protocol subsystem**

Sound-bound interface with protocols such as Openflow, OF-Config, BGP-LS, OVSDDB, Netconf, XMPP, and so on

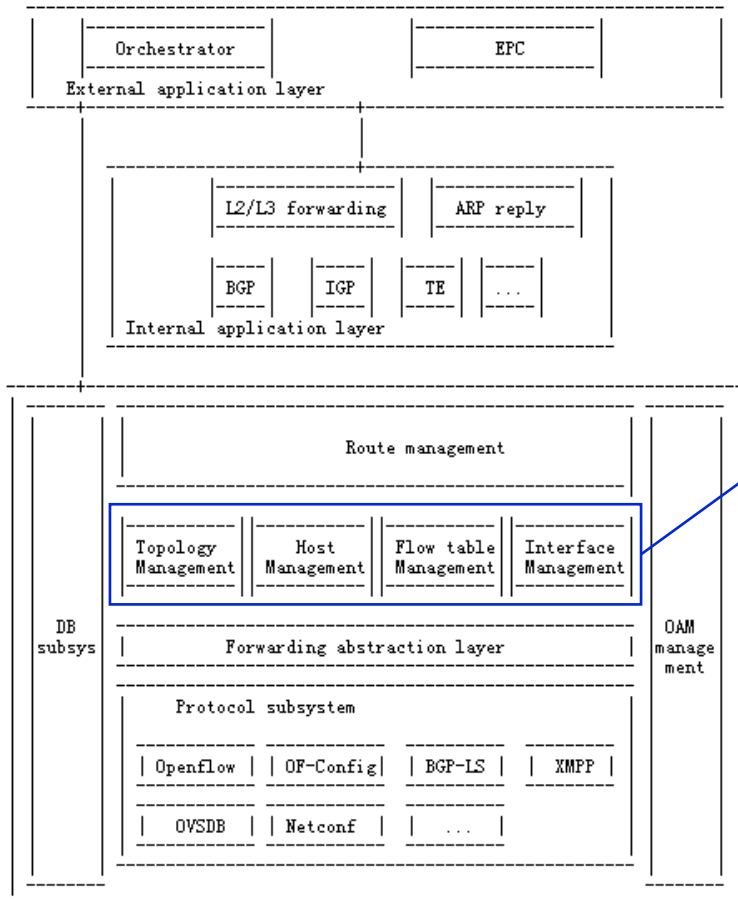
- **Forwarding abstraction layer**

Translating the different forwarding plane into the unified interface upside

- **Route management**

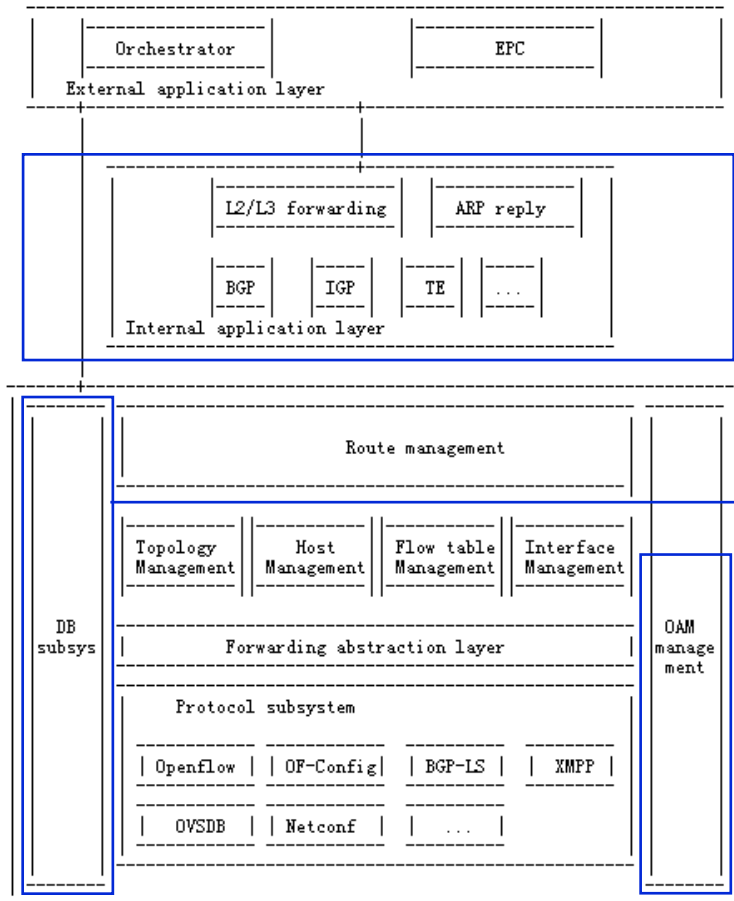
Centralized computing and calculating the forwarding path based on the ability of switch and the constraint conditions.

Requirement of Architecture



- **Topology management**
logical topology calculating
- **Host management**
MAC and ARP learning
- **Flow table management**
forwarding table storage, routing coalescence and re-forwarding
- **Interface management**
maintaining the interface configuration

Requirement of Architecture



- **Internal application subsystems**

Interface to the openstack and cloud platform provided, L2/L3 forwarding, traffic engineering, and ARP reply features equipped, and IGP/BGP supported.

- **Database subsystems**

Forwarding table and openflow table

- **OAM management**

Configuration command is written into the database and management interface provided

Requirement of Functionality

- Scenario

There are hundreds of compute nodes nowadays in our data centers and will increase to thousands this year, where public cloud services are provided in order for customers running their websites. MC-LAG technology is used with large Layer2 network in one datacenter. VPC and NFV services will be introduced into the datacenters.

- Multi-tenants, self-service and network function requirement

Multi-tenants exist in data centers and tenants sharing the same IP are desired in data centers. VMs under one subnet can communicate with each other while VMs across subnets communicate with each other through one router. In order to access the public internet, floating IP and NAT need to be deployed. ARP broadcast storm should be suppressed in the whole network.

Requirement of Functionality

- **Administrator features and network management**

Tenants creation and deletion, network creation and deletion, Unbinding the relation between tenants and network, query for tenants' information and physical and virtual information and so on.

Topology information of switches, hosts and networks, monitoring on network traffic.

- **Reliability and Scalability**

Reliability: the active-standby mode of controller node, secure connection between switch and controller

Scalability: node upgrading without service interruption, and unique node upgrade in distribute systems with out influence on the whole system

Requirement of Functionality

- Performance

The number of forwarding nodes (virtual switches) supported per controller node/The capacity of flow table per controller node/Speed of forwarding table processing per node/Time of establishing the forwarding table/Standby time of controller node

Maybe some more indicators to be added here...

Part of the test results:

SDN controller Indicators	Speed of flow table processing	Capacity of flow table (ten thousands)	Number of forwarding nodes
baseline	5000	100	256
maximum	440000	1000	1000

Requirement of Functionality

- **North-bound and south-bound interface**

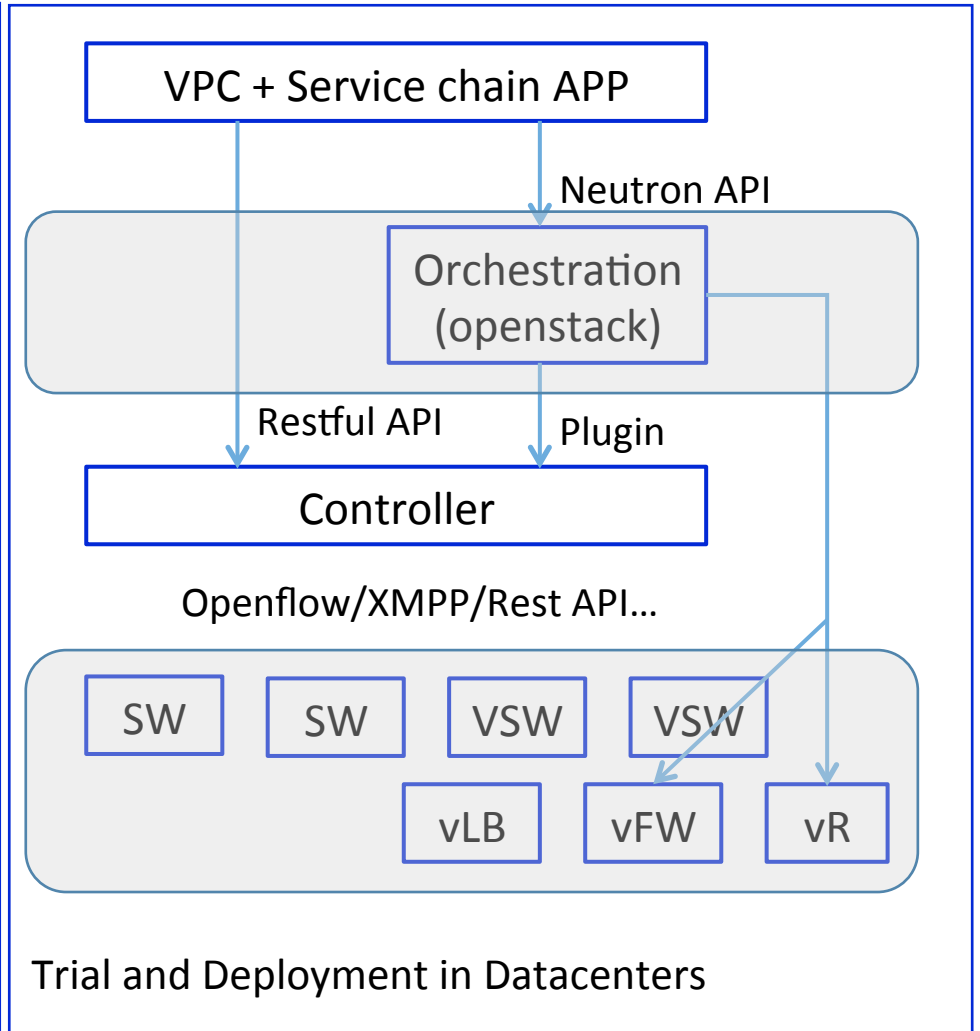
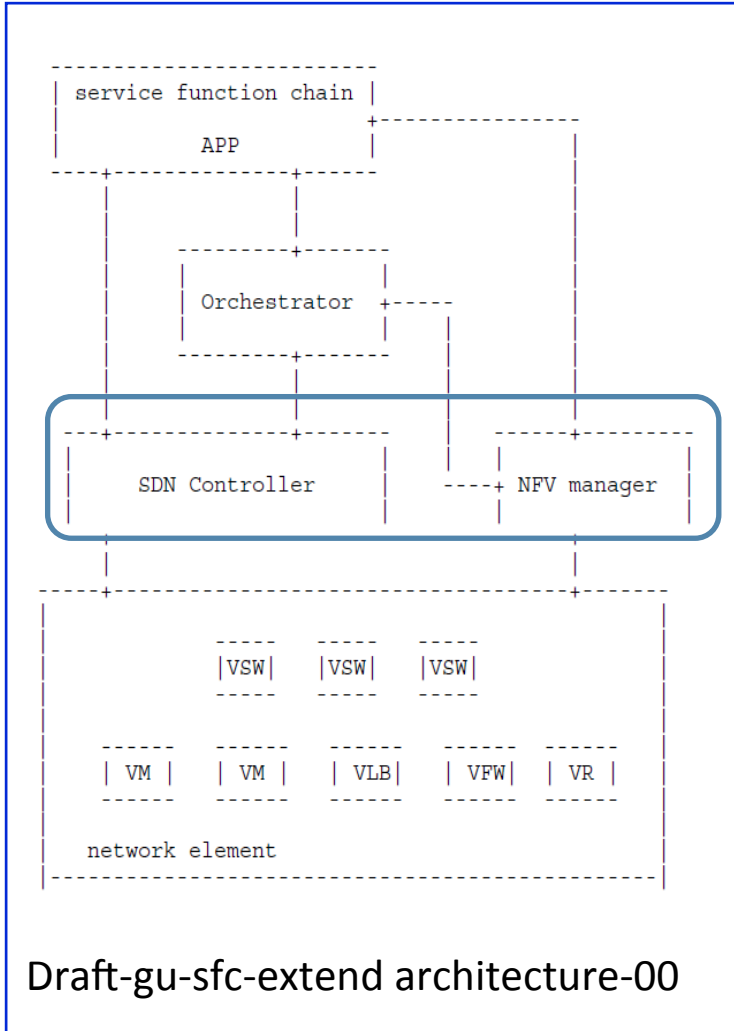
North-bound interface: Restful for the administrators and network management

South-bound interface: Openflow, OVSDB, Of-config, SNMP and so on

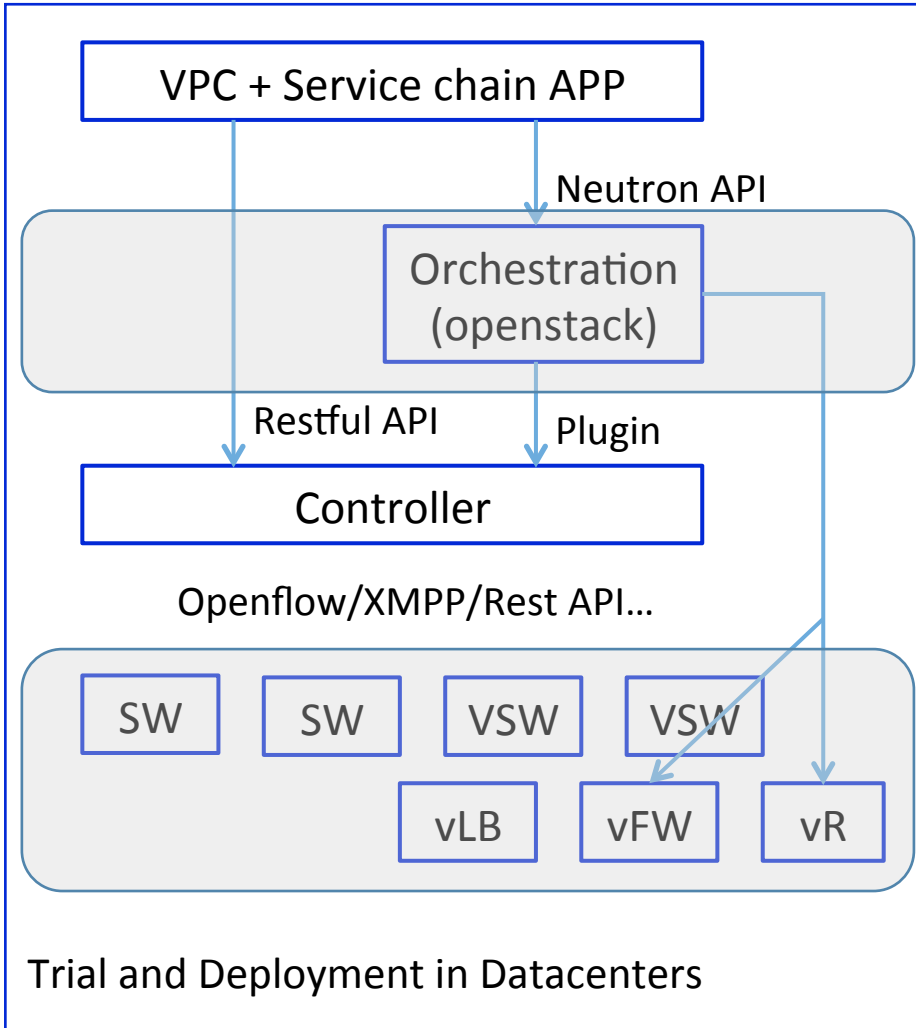
- **Processing procedures of the controller**

Add or modify packet-forwarding network elements, physical network topology discovered by such as LLDP, flow table forwarding and forwarding elements network port changes advertised.

SDN use case in datacenters



SDN use case in datacenters



Issues and challenges:

1. Centos and redhat are adopted in our trail as the HostOS in the openstack controlling and computing node, while it turns out to be that ubuntu is more mature.
2. It turns out that the existing interface of openstack is limited so extension of NBI need to be taken into consideration.
3. Service function chain should also be taken into consideration in designing the architecture.

Next step...

- Keeping researching on the standardize north-bound interface of controller
- Besides we are focusing on the architecture combing SDN and NFV

[Draft-gu-sfc-extend architecture-00](#)

- Comments/ feedback are welcomed

MANY THANKS

Rong Gu
Chen Li
China Mobile