
OPEN SOURCE SUMMIT
China 2019

Open Source Networking Technology in Inspur Cloud

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Outline

- Background
- Inspur Cloud Native Network
- Inspur Container Network
- Summary

Data Center Technology Tendency

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Legacy DC

System on bare metal HW w/o virtualization.

No Virtualization

No Orchestration

Clearly Defined Silos

Utilization ~30%

High TCO

Provision in Months

Virtualized DC

Part of DC building blocks virtualized.

Virtualization Enabled Consolidation

Virtual Server Orchestration

Forced Integration of Silos

Utilization ~60%

30% TCO reduction

Provision in Days/Hours

Software-defined DC

All DC building blocks virtualized & delivered as a service.

Virtualization Enabled Full Automations

Self-service, Policy-enabled IT provisioning

No IT Silos

Utilization 70~80%

80% TCO reduction

Provision in Minutes

Cloud Network Architecture

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Product Service Layer

VPC	EIP	SLB	Cloud Connection	DNS	VPC Connection	IPv4/v6 Service
NAT Gateway	Network Monitor	Networking Resource Pool	IPsec/SSL VPN	Traffic Monitor	vWAF	Anti-DDoS

Control Layer

Virtual Network
- Hybrid Interconnection
- Policy Route
- DCI
- VPC

Traffic Control
- SFC
- Multi-SFC
- Cross node
- Multi-Protocol

QoS
- Traffic Limited
- ACL
- QoS Guarantee
- Exception Analysis

AI Analysis
- Intent
- Self-healing
- Network Visualization
- Optimization

Infrastructure

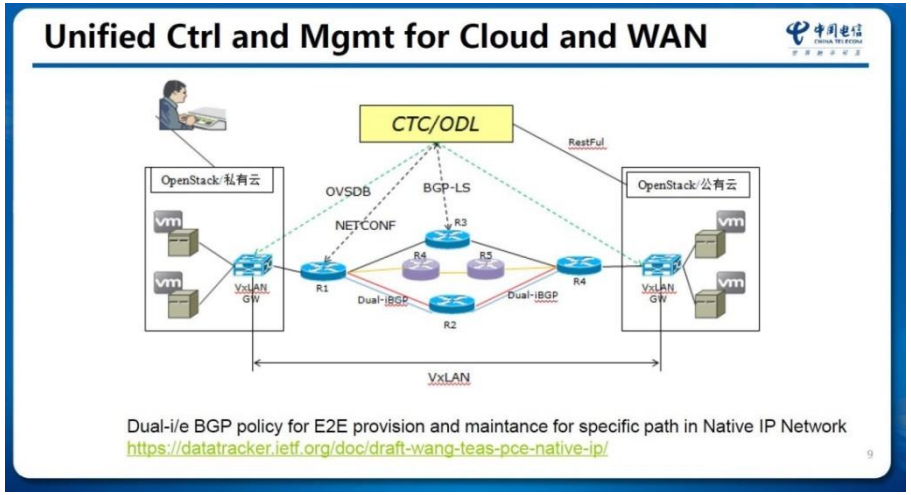
Compute: Bare Metal, Host

Network: Switch, Route

Security: Monitor, VPN, FW&WAF

ISP SDN Solution in China

AERO: SDN controller developed by China Mobile based on OpenDayLight
https://www.opendaylight.org/news/foundation-news/2016/09/china-mobile-leading-chinese-telecommunications-provider-joins



Unified Ctrl and Mgmt for Cloud and WAN by China Telecom based on OpenDayLight
http://www.georgezhao.org/blog/major-chinese-carriers-shared-their-experience-of-leveraging-opendaylight

OpenDayLight is a popular solution for ISP in China

Requirement analysis and best practices based on OpenDayLIght by China Unicom
http://www.georgezhao.org/blog/major-chinese-carriers-shared-their-experience-of-leveraging-opendaylight

Data Plane Technology Comparison

	OVS （ODL）	vRouter （OpenContrail）
Popularity (in China)	★★★★★	★
Richness of network function	★★★★★	★★
Working layer inside of TCP/IP stack	L2-L4	L3
Segmentation of virtualized networks	VLAN or Overlayed TUNNEL(GRE, VXLAN, etc)	Overlayed TUNNEL(MPLS over GRE, MPLS over UDP, VXLAN, etc)
Performance of virtualized network	High (in VLAN mode segmentation), Medium (in overlay mode segmentation)	Medium (in overlay mode segmentation)
Lines of code	300K	50K
OpenFlow protocol	Support	Not support
License	Apache v2.0	**GPL**
Open source community	Majority, Active	Minority, inactive
Interoperability with open source SDN controller	★★★★★	★
Recruiting corresponding staff	Easy	Hard

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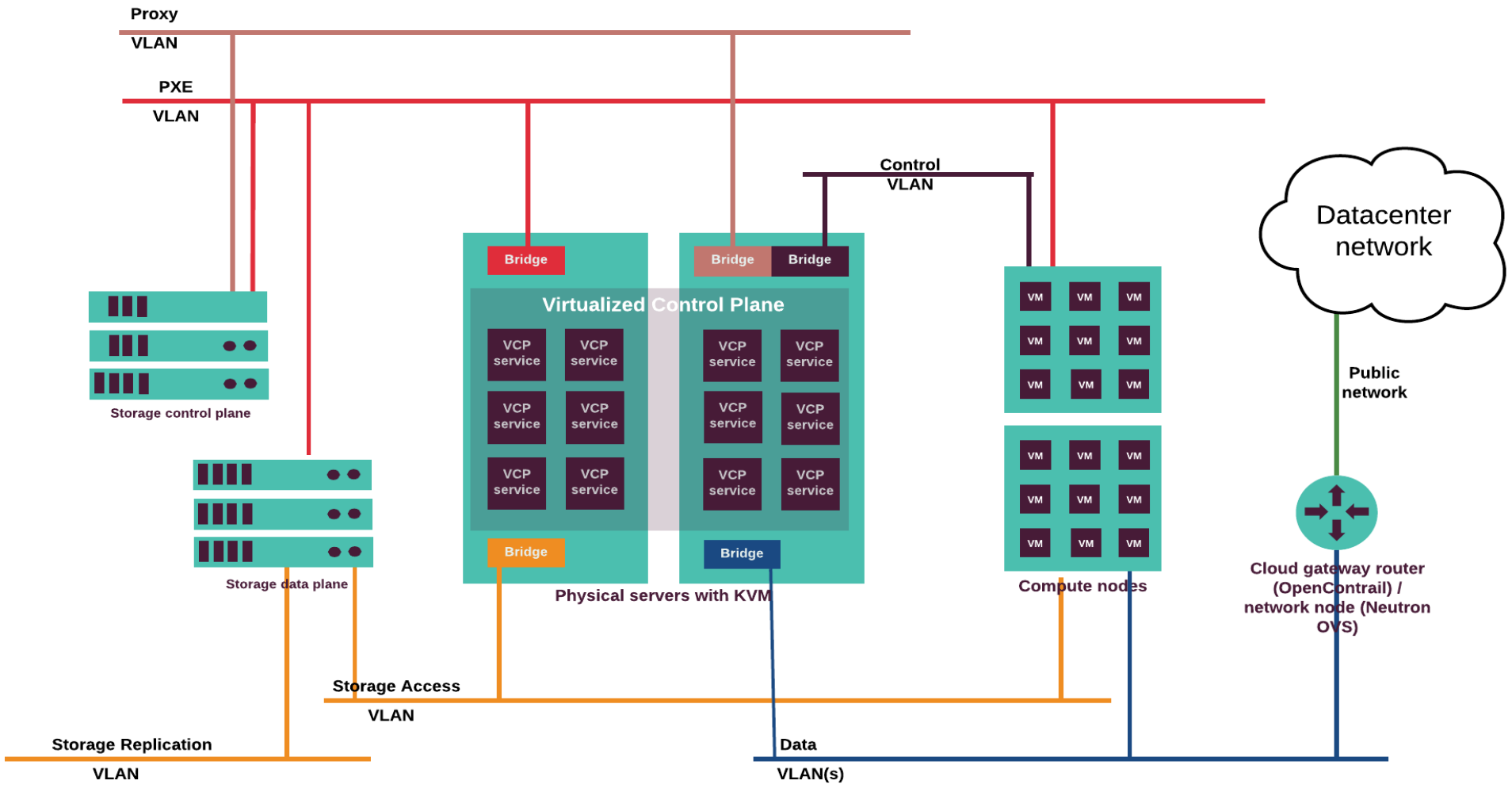
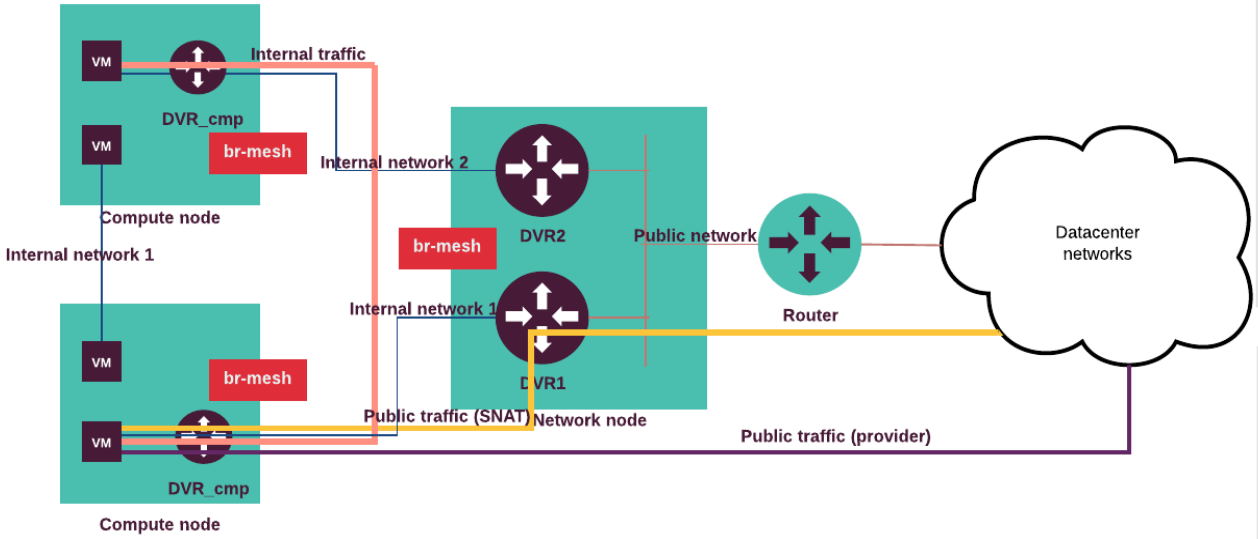
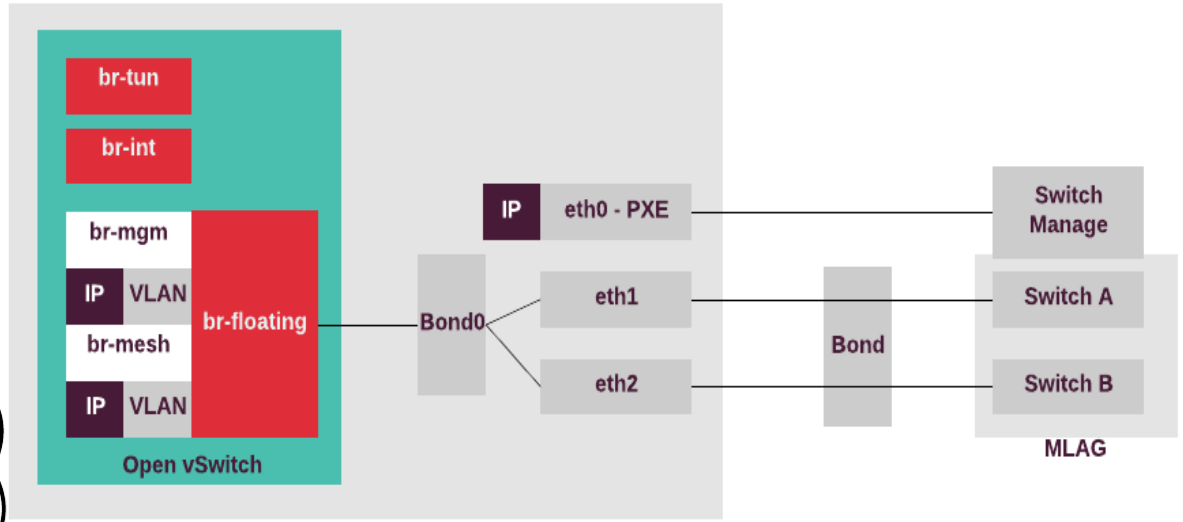
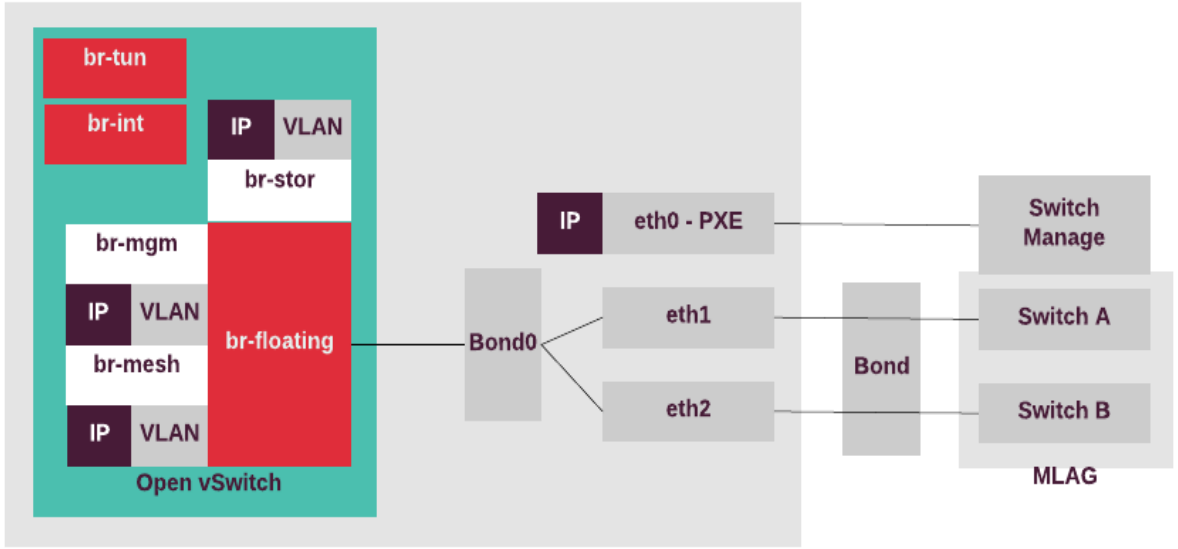
Infrastructure of Inspur Cloud



Network Model in Inspur Cloud

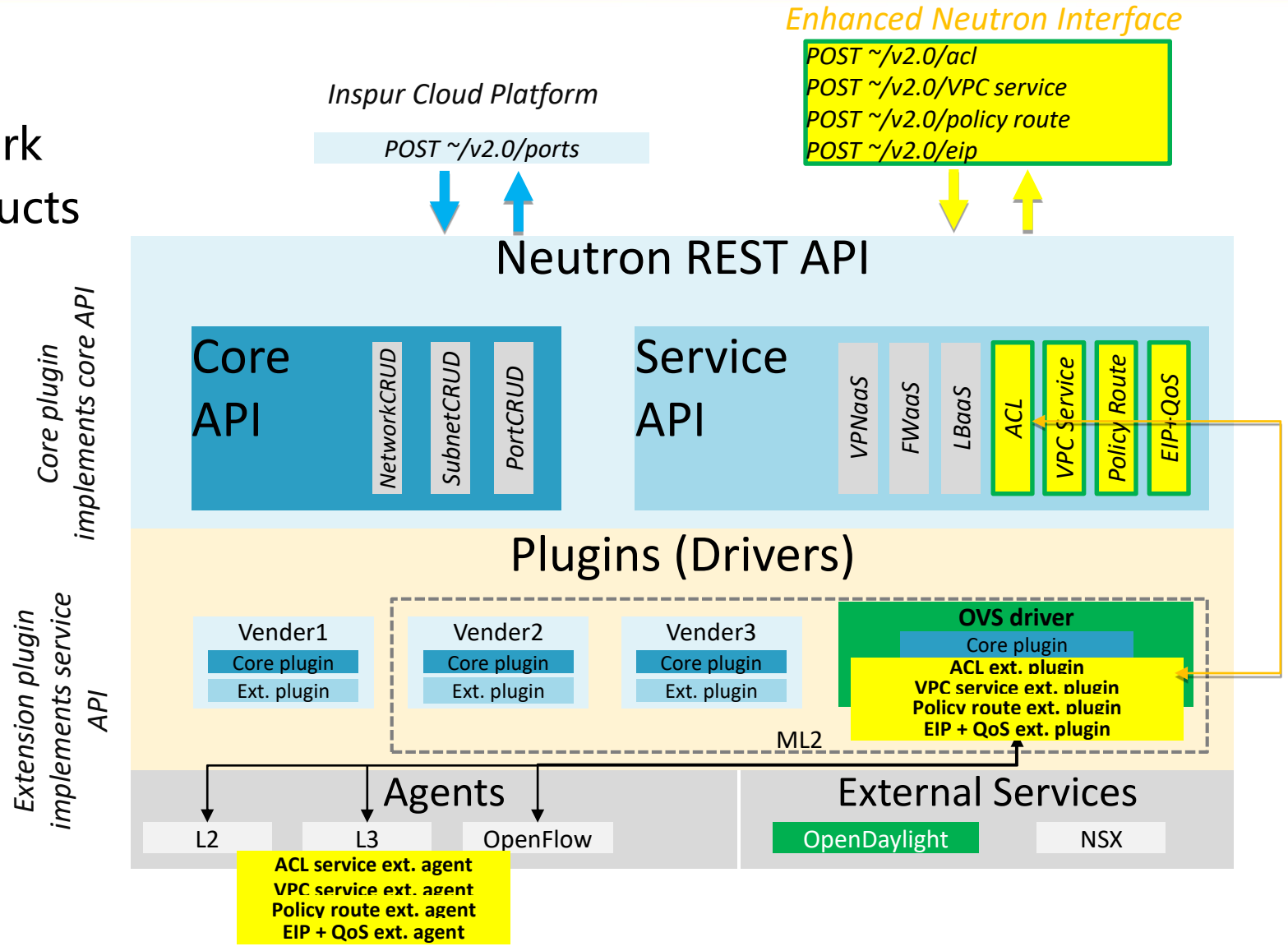




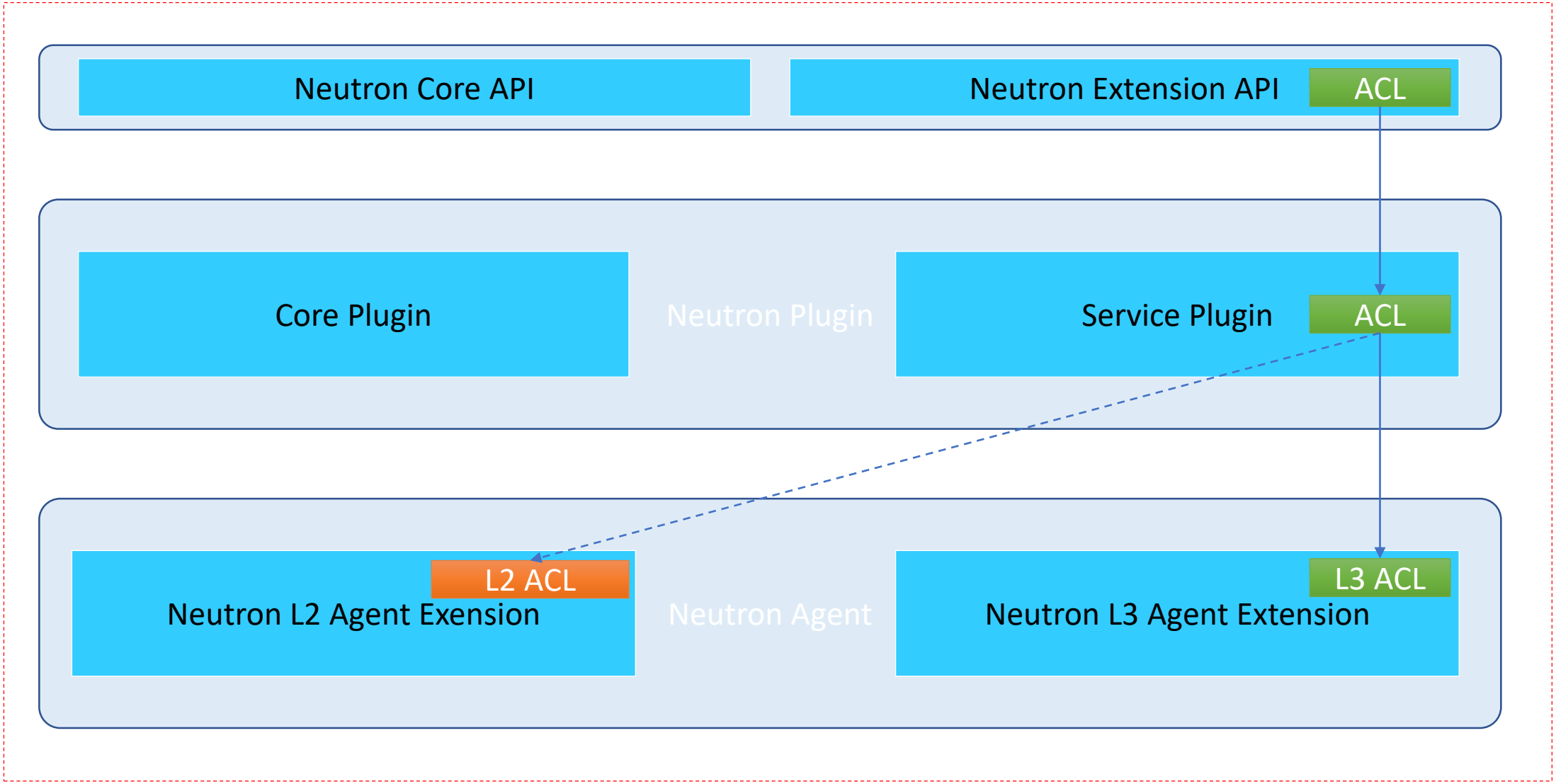


Inspur Open Source Networking Scheme

- Support large scale out network
- Support rich networking products
  - SLB
  - VPC
  - EIP/SBW
  - IPv6
  - NAT
  - VPC Connection
  - VPN
- Enhanced Neutron Dev.
  - ACL
  - VPC Service
  - Policy Route
  - EIP Cluster



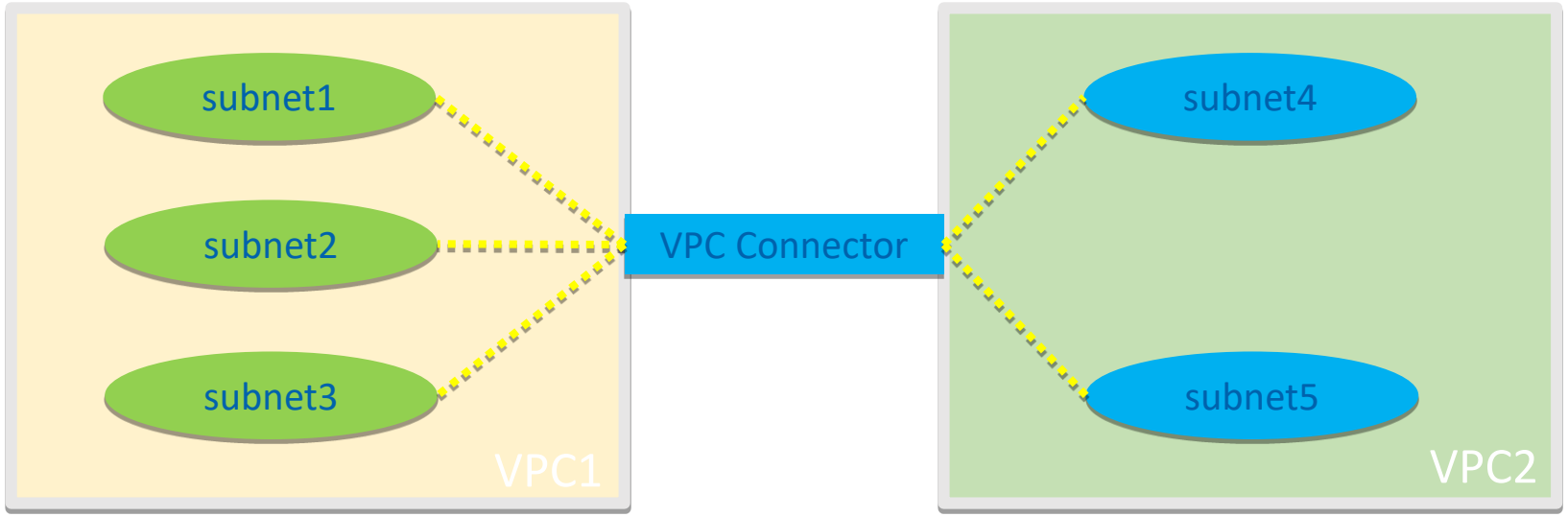
ACL Module Implementation

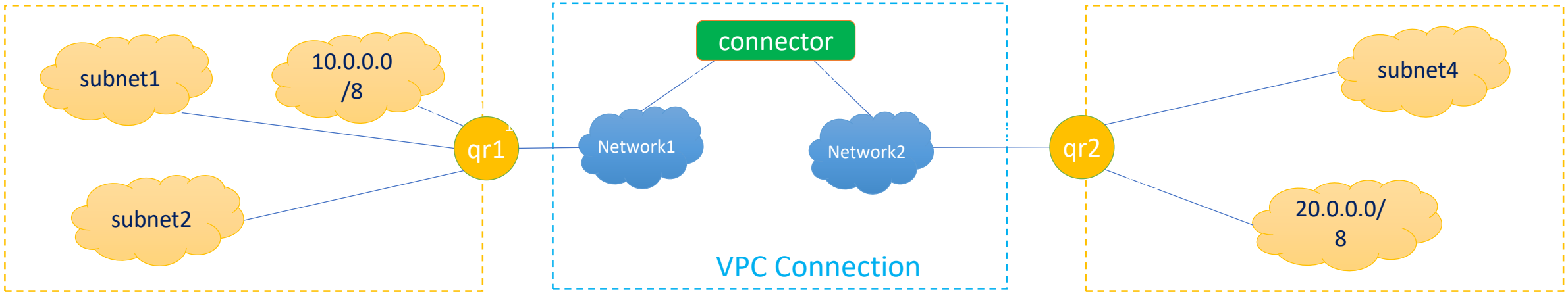


VPC Connection Module

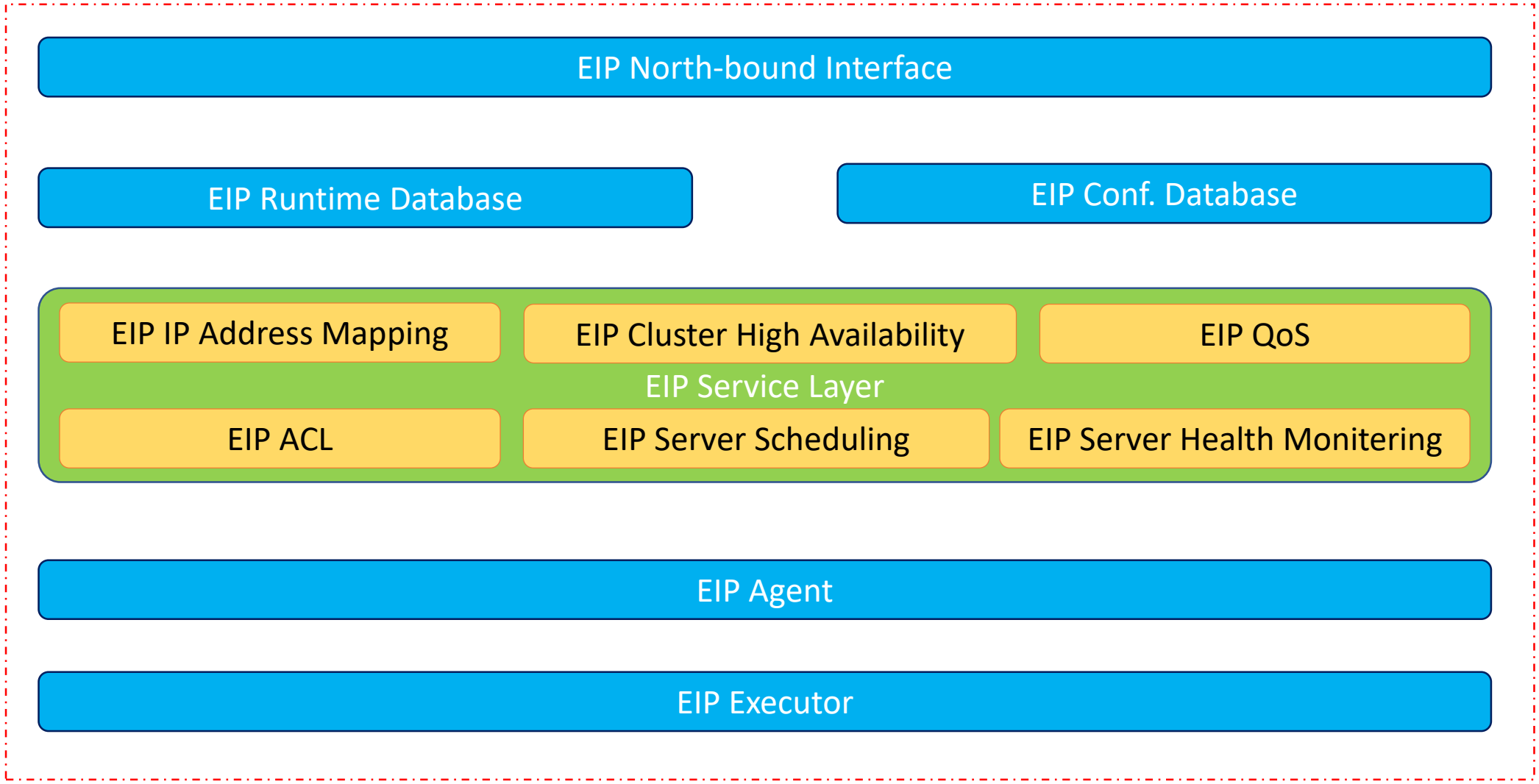
VPC Connection is to solve communication among VMs in different VPC:

- Add VPC connection
- Add static route table
- Scale out and high availability





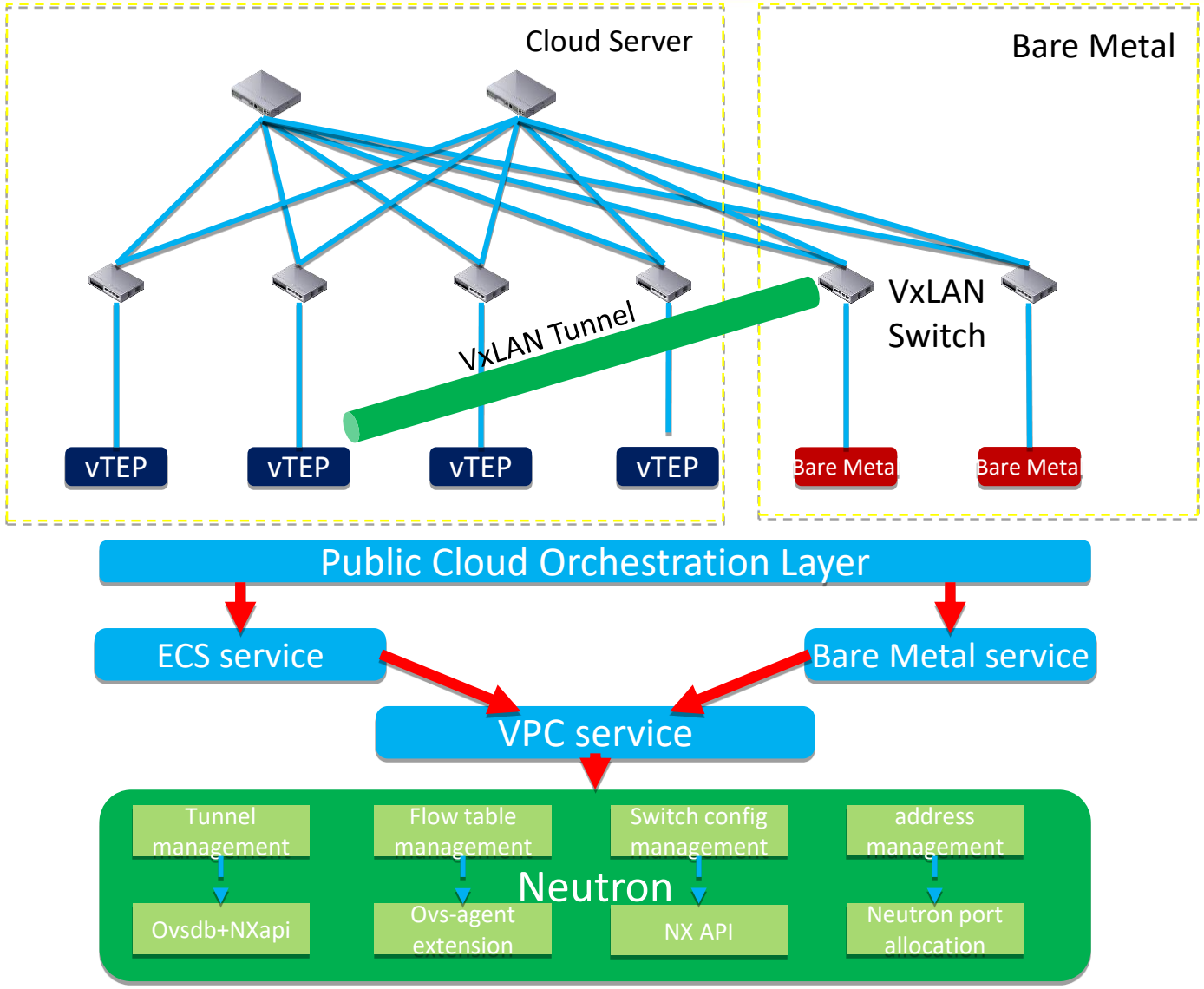
EIP Clustering Service



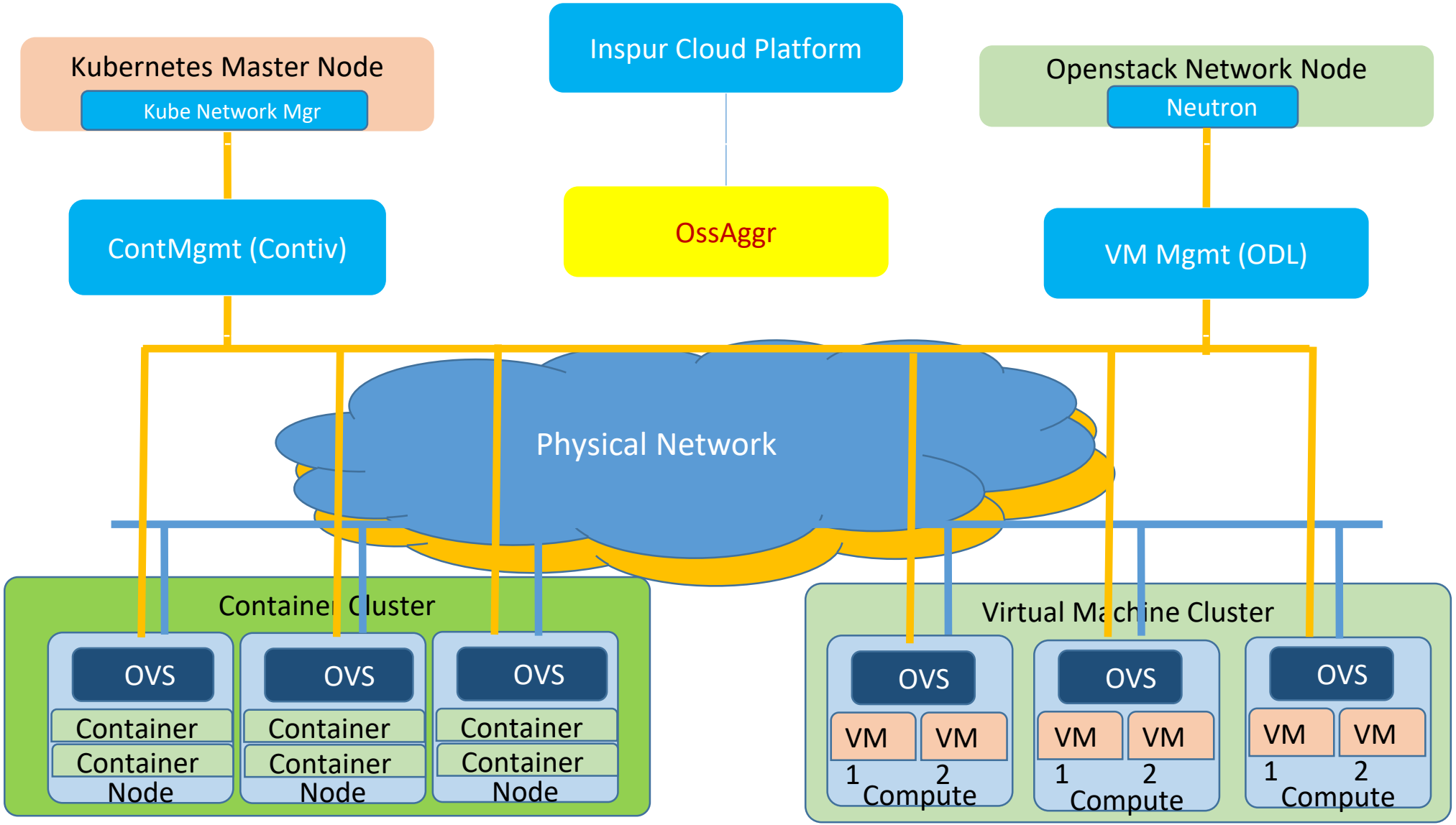
Hybrid VxLAN Interconnection

Module Feature

- Leverage Hardware SW to access Bare Metal machine, and connect Hardware SW with OVS vTEP in Virtual node through enhanced Neutron module to import related flow table to realize reachable tunnel between VM and Bare Metal in cloud platform
- Uniform tunnel management
- Uniform address management
- Auto configuration and OVS flow table management



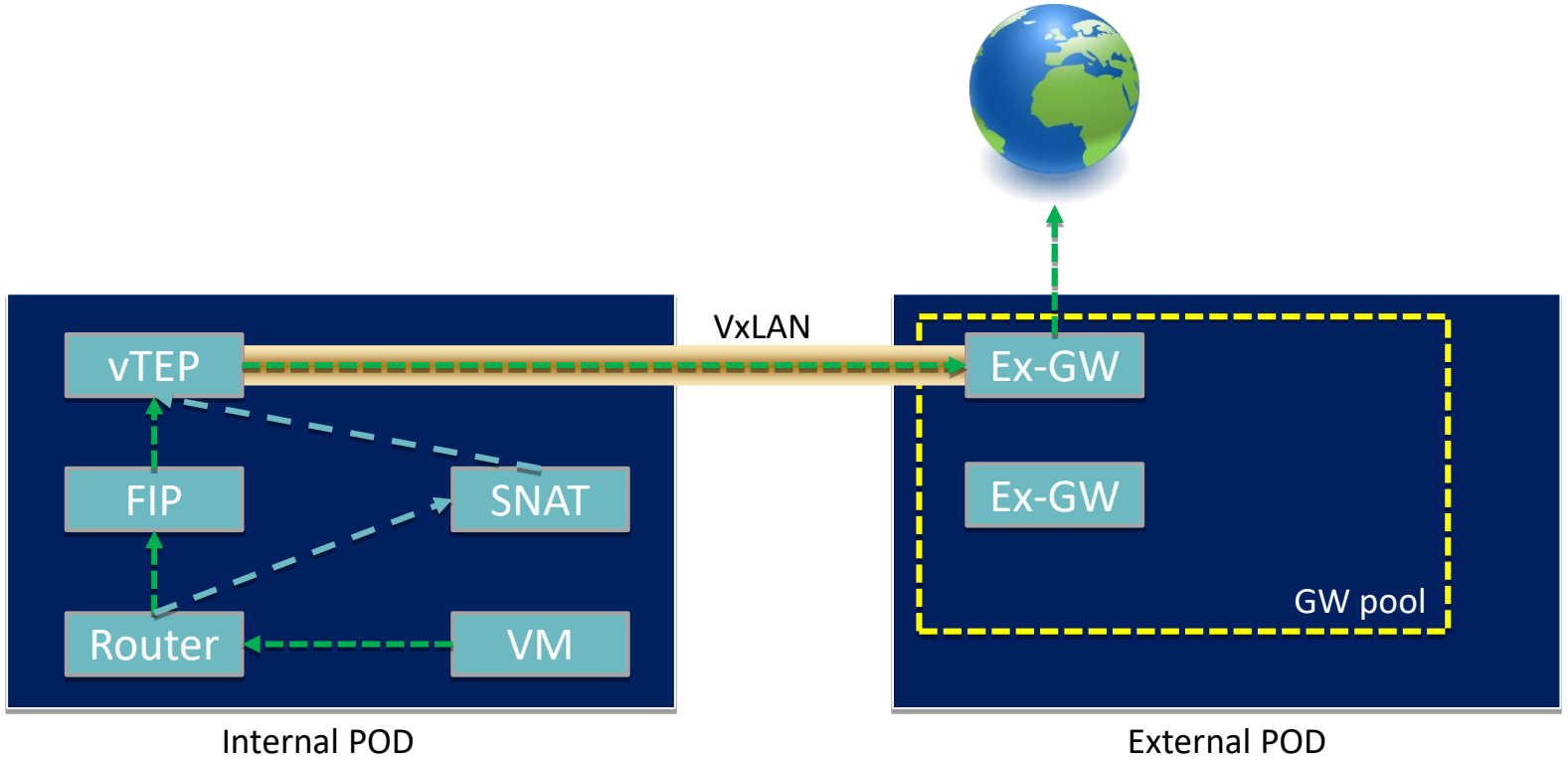
Hybrid Container & VM network



DVR Module Re-design for L3 Underlay

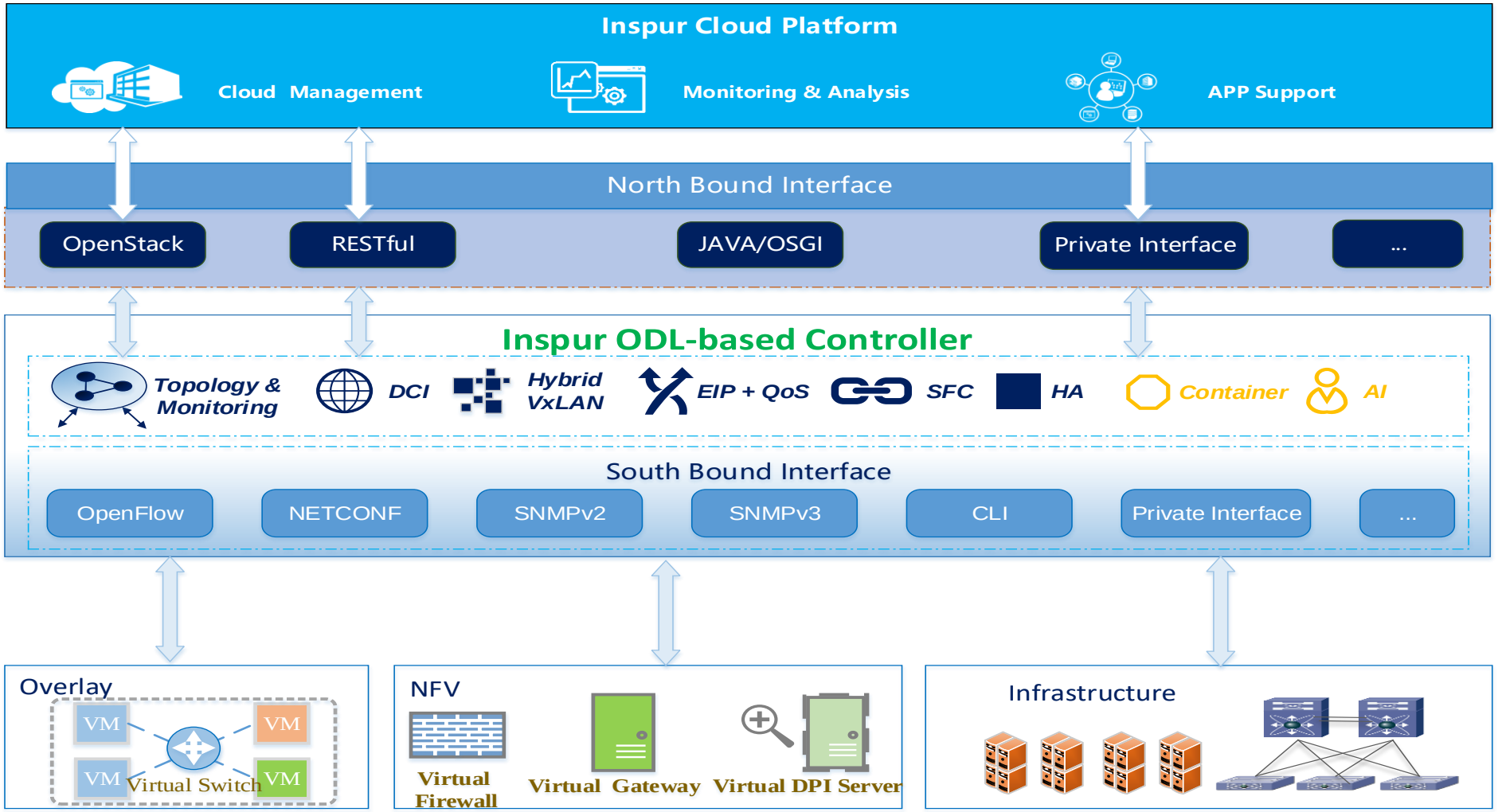
L3 underlay leads to complicated route table configuration for north-south bound traffic under DVR network model

- Create external VxLAN network, and set it as default external path
- Develop external VxLAN resource pool to realize encapsulation/de-capsulation for north-south bound traffic

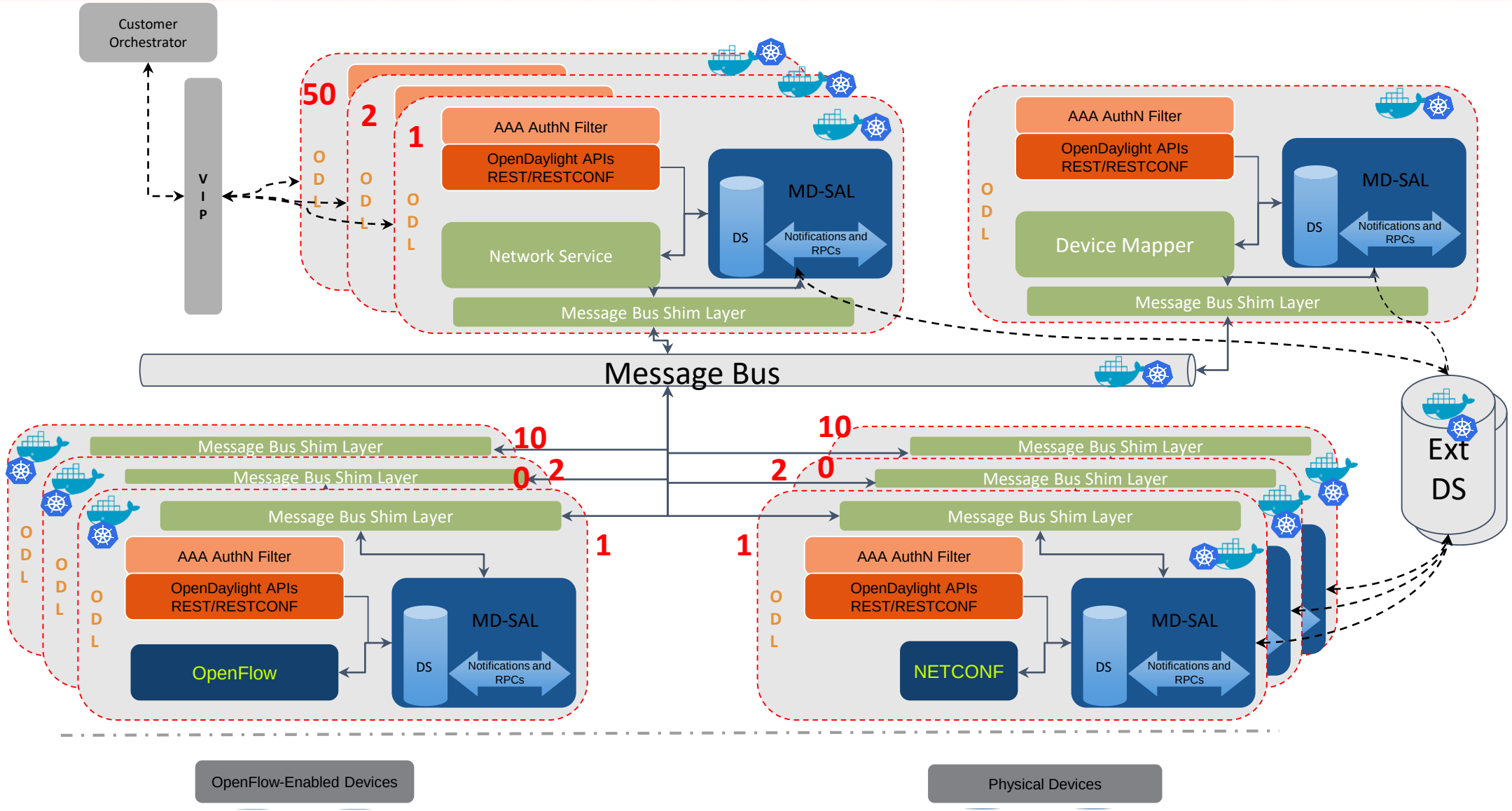


Inspur Network(Long-term)

- DCI
- Traffic Tracy
- SFC
- Networking High Availability
- Large Scale Network(10000+)
- Failure Recovery based on AI
- Uniform container & VM network



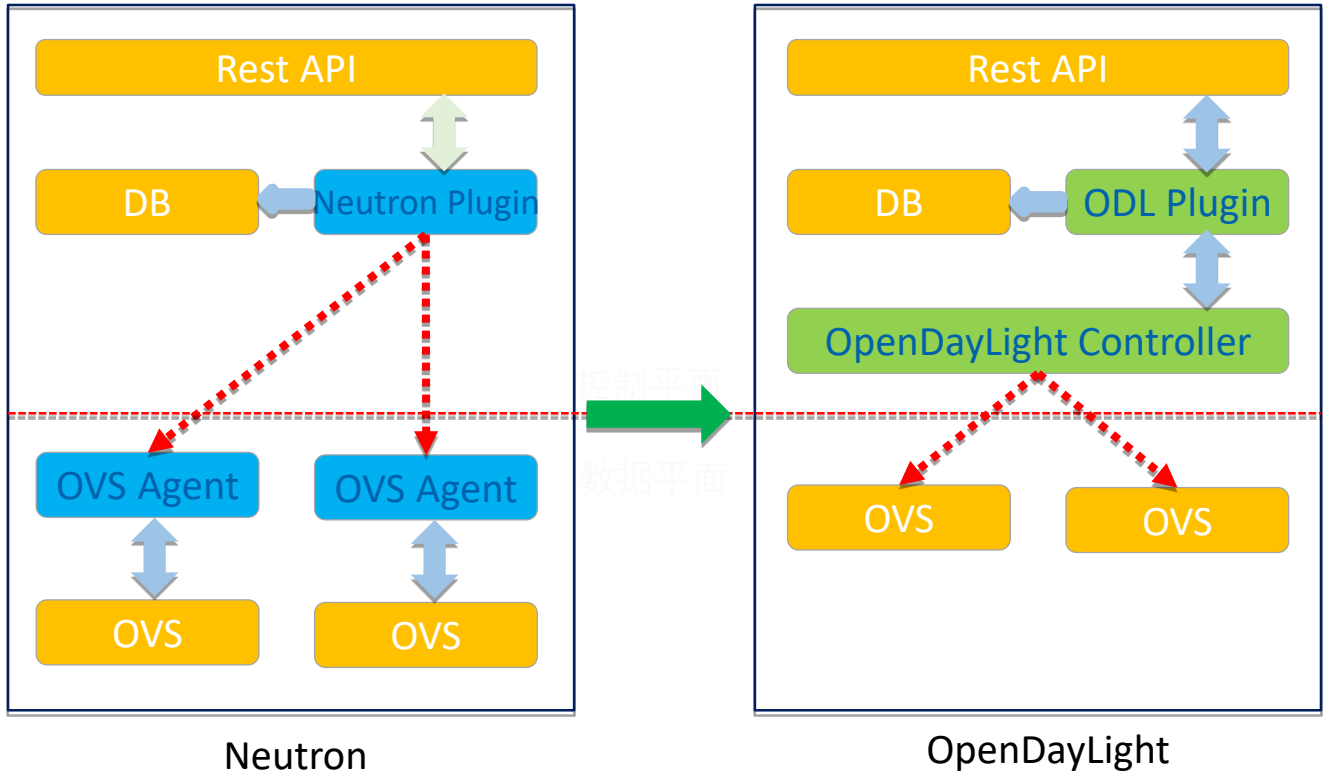
Large Scale Out for ODL



Transparent Migration

Migration to ODL smoothly:

- Reserve compatibility on Rest API and Data structure layer
- Develop new Plugin and Agent to support incremental features based on Neutron
- Replace neutron with stable ODL controller to manage North-bound interface and South-bound interface later
- SLA Guarantee
- Large Scale-out migration support



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Inspur Container Network Architecture

- Multi-cluster management:

Realize the functions of purchasing, expanding, shrinking, deleting, binding/unbinding eip, renewing, closing/soft deleting of overdue fees, upgrading, etc.

- Functions:

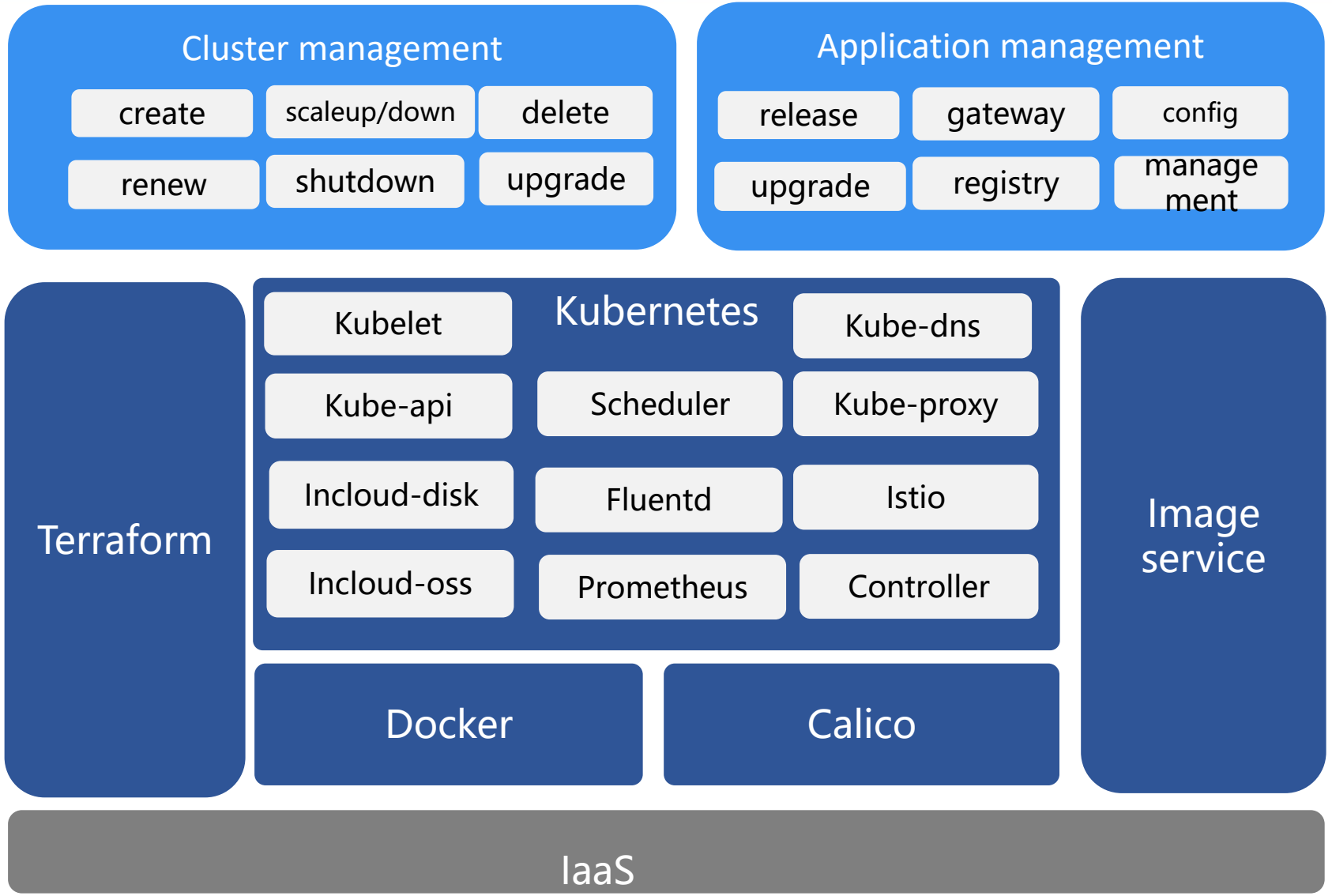
External access, mount inspur cloud disk/object storage, monitoring, log collection and other self-developed core functions.

- IaaS resource management:

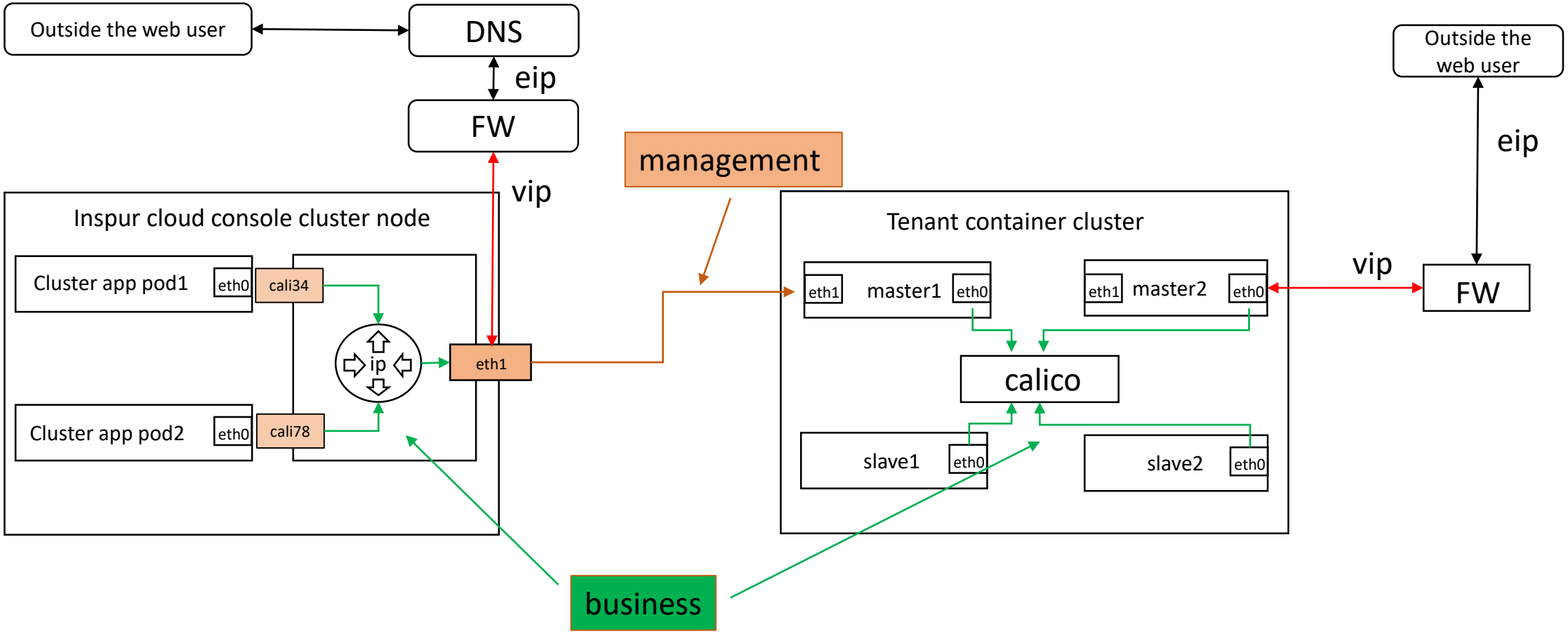
Terraform manages IaaS resources.

- Image management :

Self-research inspur image warehouse management cluster images .

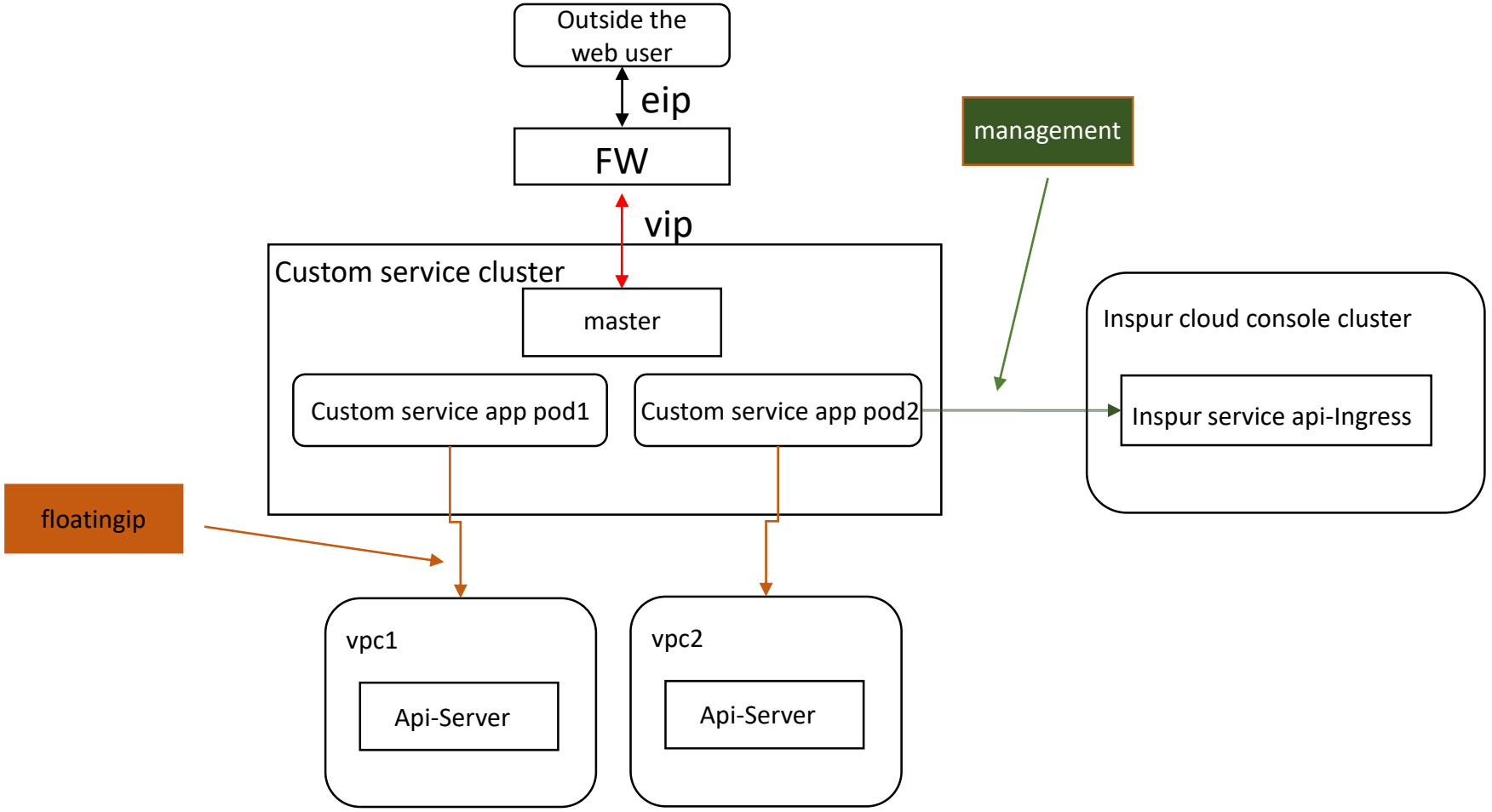


Inspur Container Engine Network Topology



- Container Engine consist of two networks: management and business.
- The management network is used for cluster management applications and cluster communication.
- Business networks are used for intra-cluster pod communication .

Inspur Cloud Custom Service Network Topology Based on Containers



- External network users access custom container-based services through eip.
- Custom services access the inspur cloud console cluster through the management network .
- Custom service accesses the services of the different tenants via floatingip .

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Embrace Convergence and Open Source

Cloud Computing

Standard

Hardware

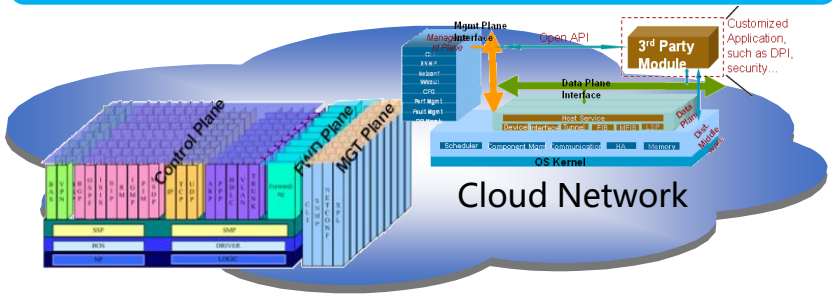
Software

Opening Technical Architecture

IETF · IEEE · MEF · ITU · 中国通信标准化协会 China Communications Standards Association · DELL IBM hp openstack

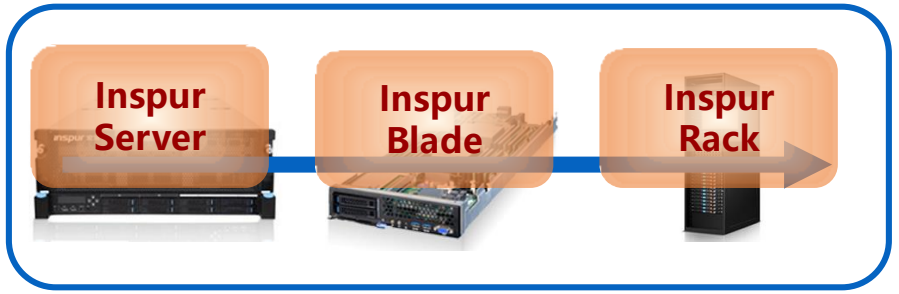
Participate Many Standard organizations，OpenStack Gold Member，Patents & Standards related to Cloud Computing Rank First in China

ICP for Future Cloud DC



Multi-Layer virtualization and Convergent Architecture

Series of Inspur Server



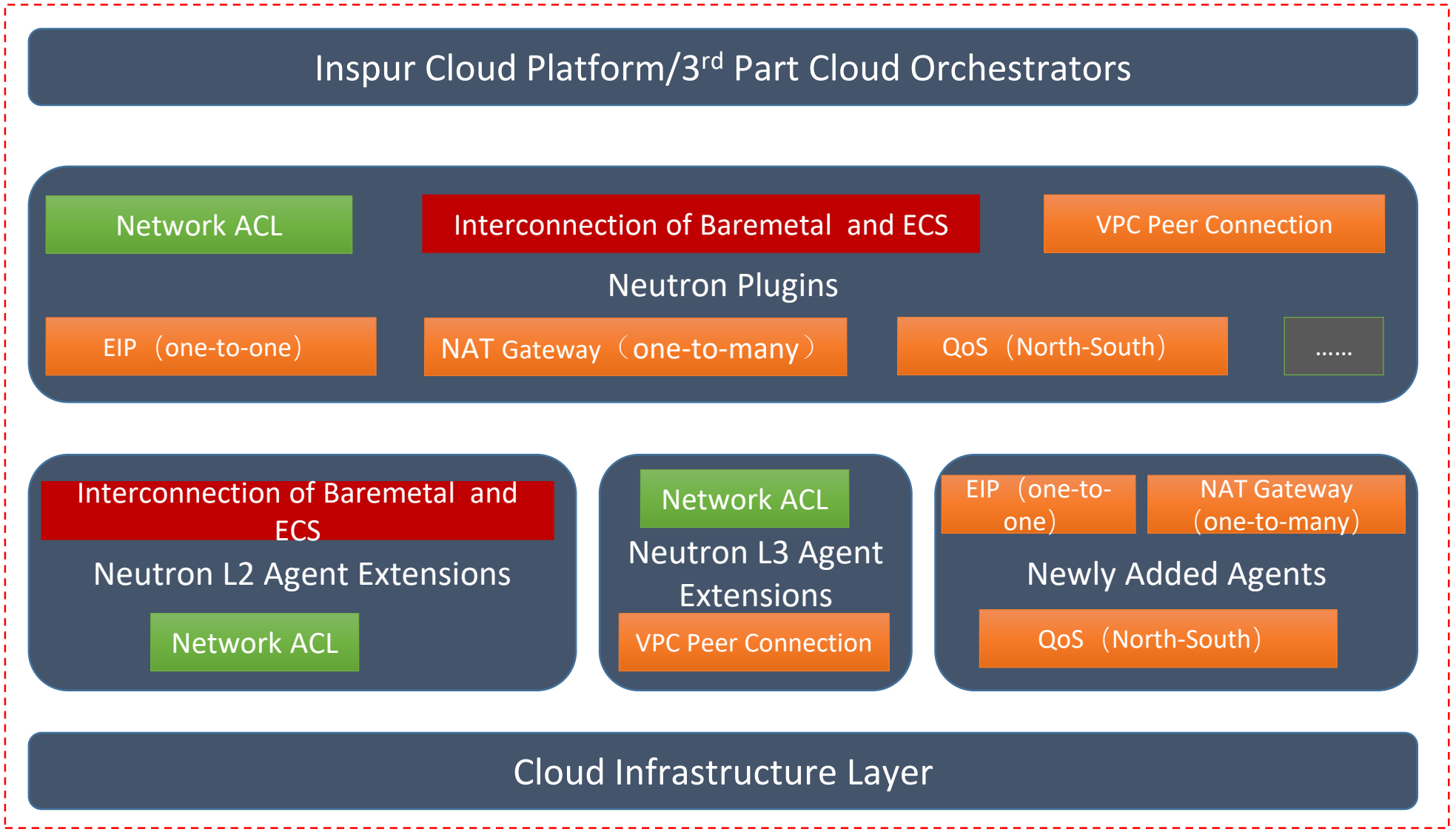
Inspur Server Products

Open Source Culture

Open Source Culture

- Open Source Program Office
- Open Source Interest Group
- Happy employees mean bigger profits
- ....

Inspur Potential Contributions to Neutron



Thanks for Your Listening