DCFabric

The Efficient Network of OpenStack based on DCFabric

National Engineering Research Center for Broadband Networks & Applications

Shanghai Engineering Research Center for Broadband Technologies & Applications

BNC

Introduction of BNC

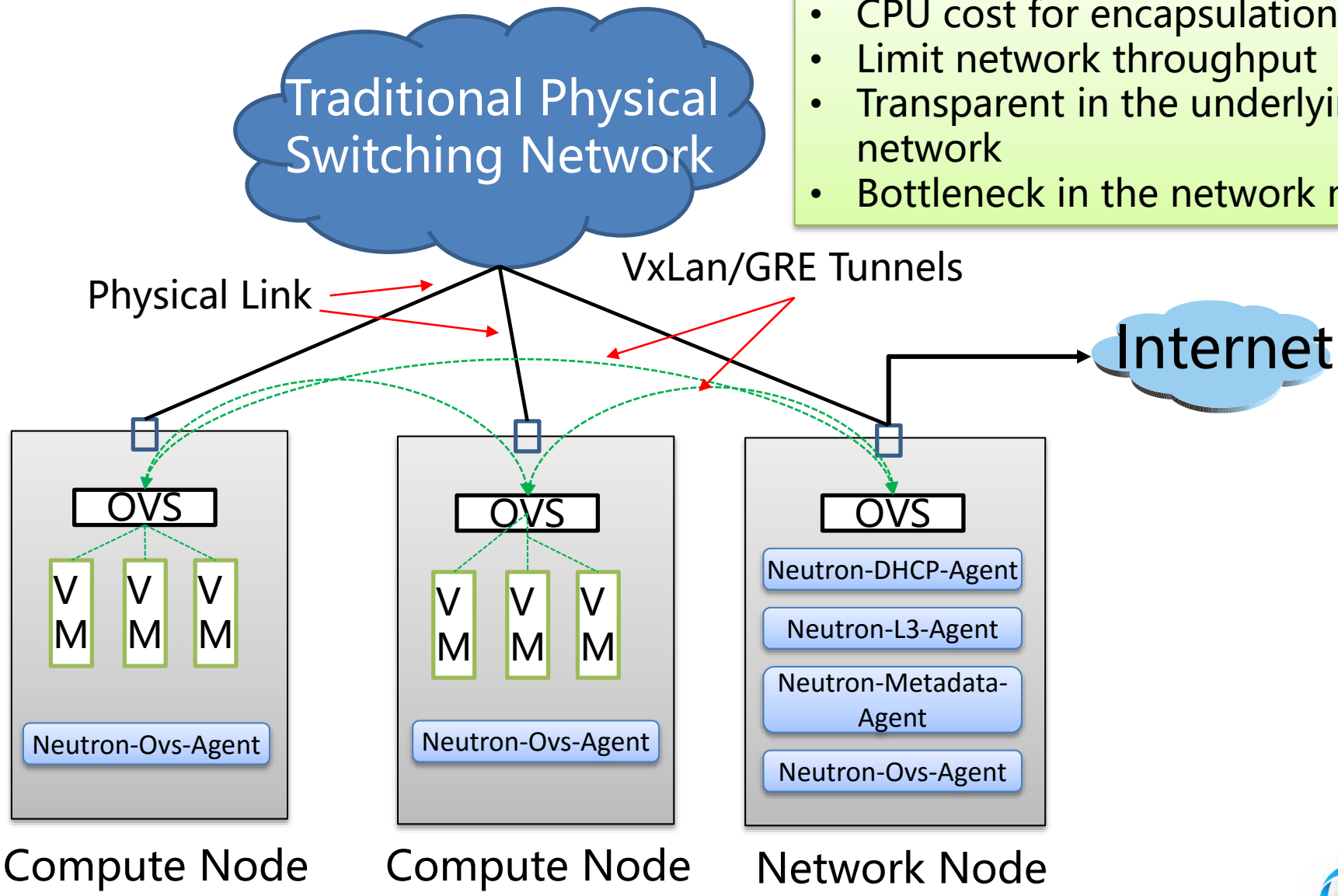
Shanghai Engineering Research Center for Broadband Networks & Applications is founded as a public research institutions under the approval of the Shanghai Science and Technology Commission(STCSM), and it established the National Engineering Research Center for Broadband Networks & Applications, which founds China's Next Generation Network and National Service Testbed.

Found the Shanghai SDN Innovation Strategic Alliance, more than 30 members from the industry and academic.

- **Main member of China National 863 project "SDN Key Technology Research and Demonstration"**
- **Found the National 863 SDN Open Source Community**

Main Network Architecture of OpenStack: Overlay

- CPU cost for encapsulation
- Limit network throughput
- Transparent in the underlying network
- Bottleneck in the network node



SDN + Neutron Are Coming

SDN Can Provide Ideal Flexibility for OpenStack

- Network Visibility
- Network Seamlessly
- Network Scalability

Most of the SDN Controllers Support Neutron Plugin Now

https://osrg.github.io/ryu/

OPEN DAYLIGHT

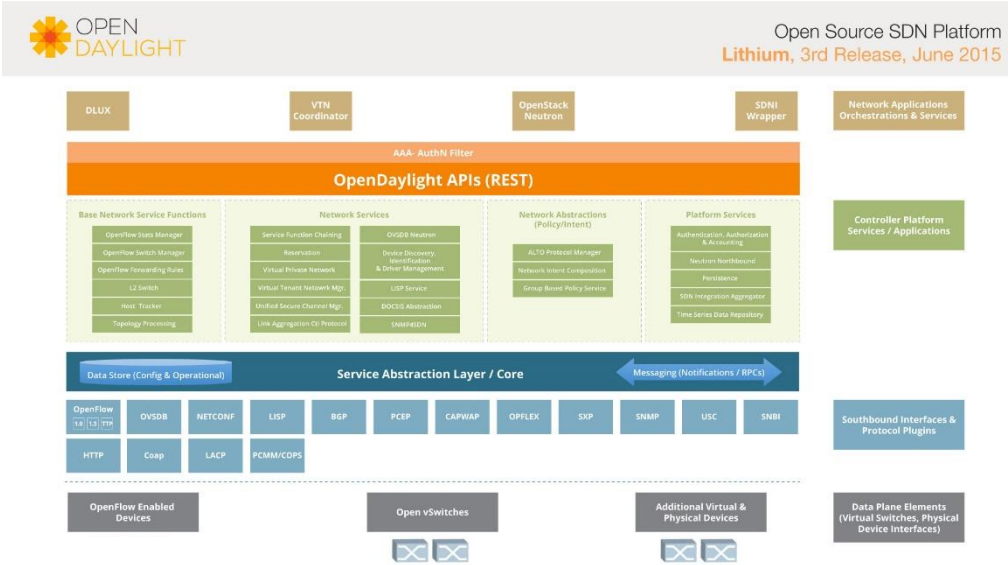
ONOS
Open Network Operating System

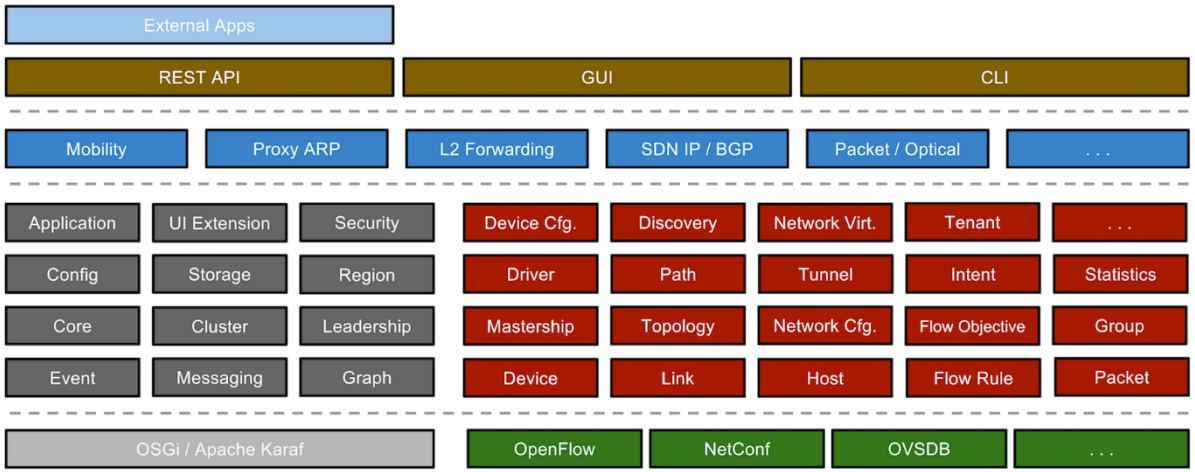
Project Floodlight

Challenges of SDN based OpenStack Network

Controller Efficiency | Flow Entry Number Limit | Flow Installation Efficiency

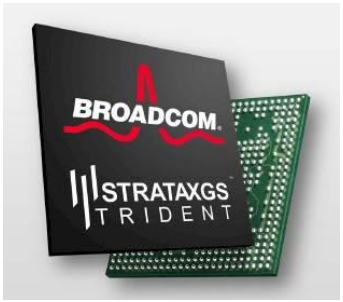
- Complex Structure
- Poor Stability
- Inefficiency in Message Handling





Challenges of SDN based OpenStack Network

Controller Efficiency | Flow Entry Number Limit | Flow Installation Efficiency



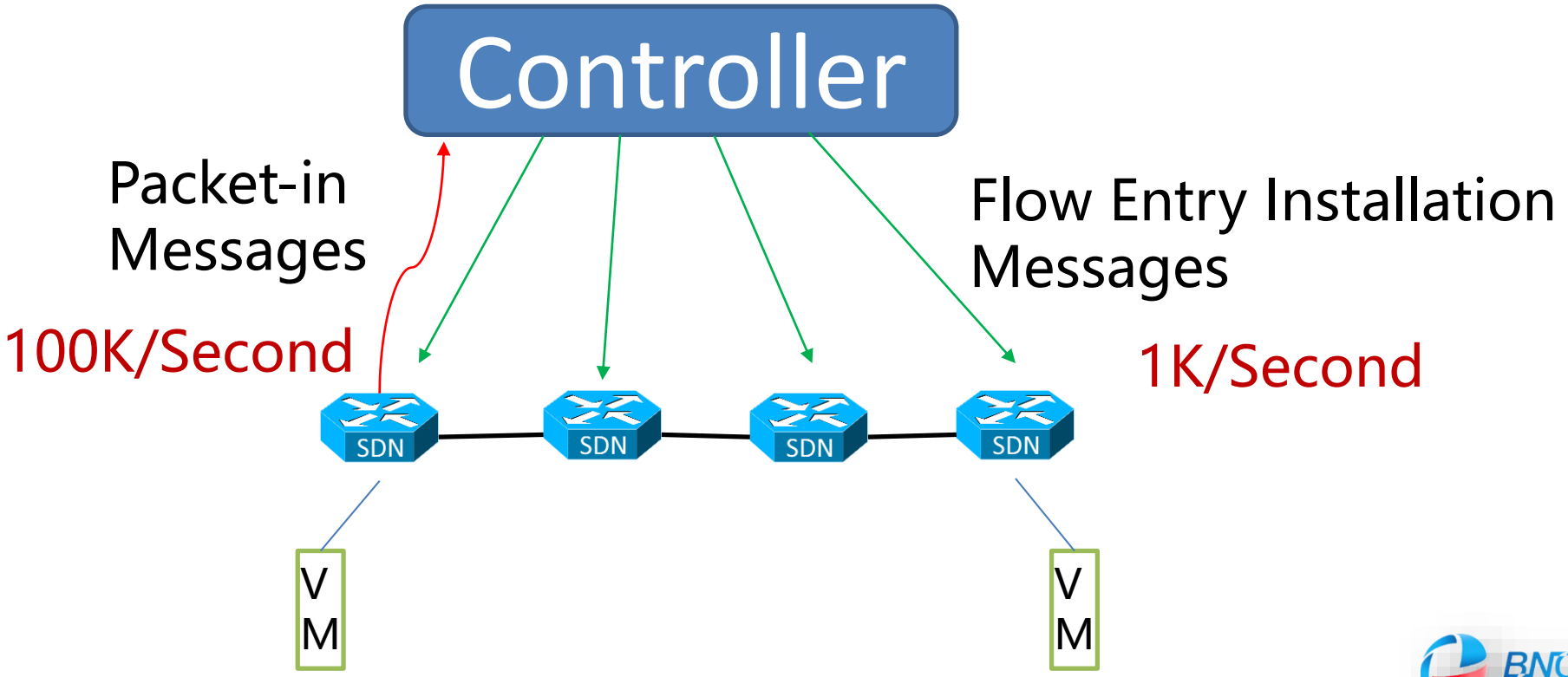
TCAM based Flow Table Capacity: <5K

Existing Flow Entry Pattern: One Host→One Flow

MAC_SRC=00:00:00:00:00:01	Actions=output:2
MAC_SRC=00:00:00:00:00:02	Actions=output:3
…	…

Challenges of SDN based OpenStack Network

- Inevitable Reactive Flow Entry Installation (e.g. NAT)
- Synchronization in Clusters

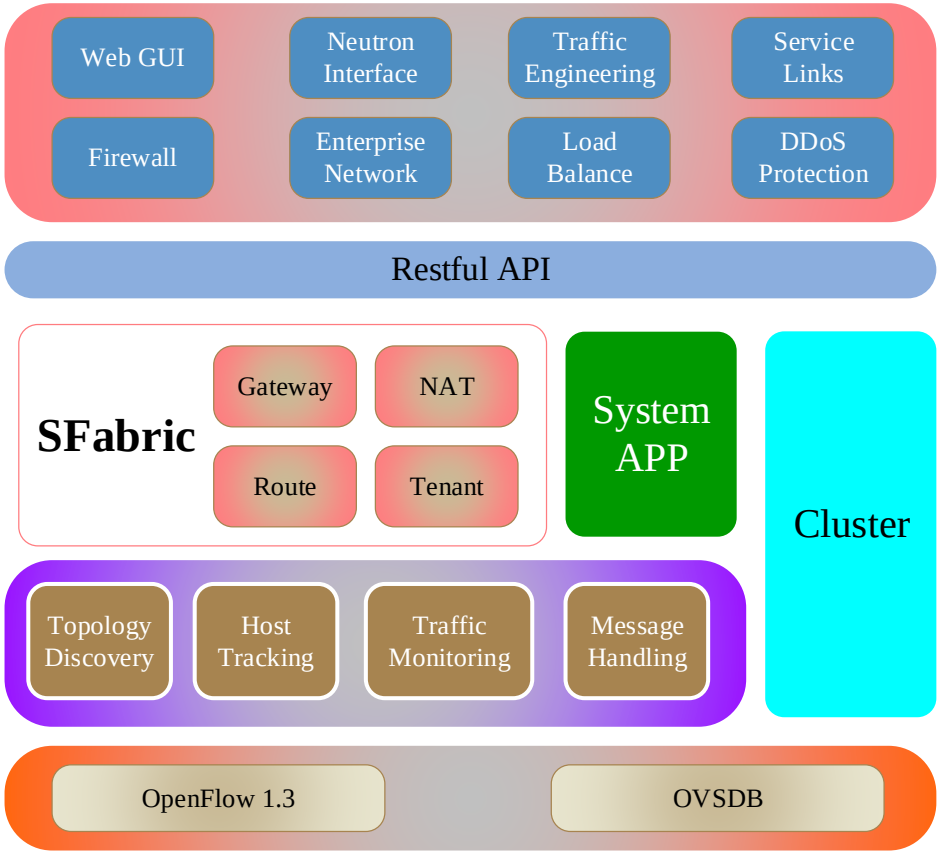


China 863 Open Source SDN Controller

The First Cloud Data Center Oriented Open Source SDN Controller

DCFabric

www.sdn863.org.cn



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中国电信 CHINA TELECOM

GREENET

BNC

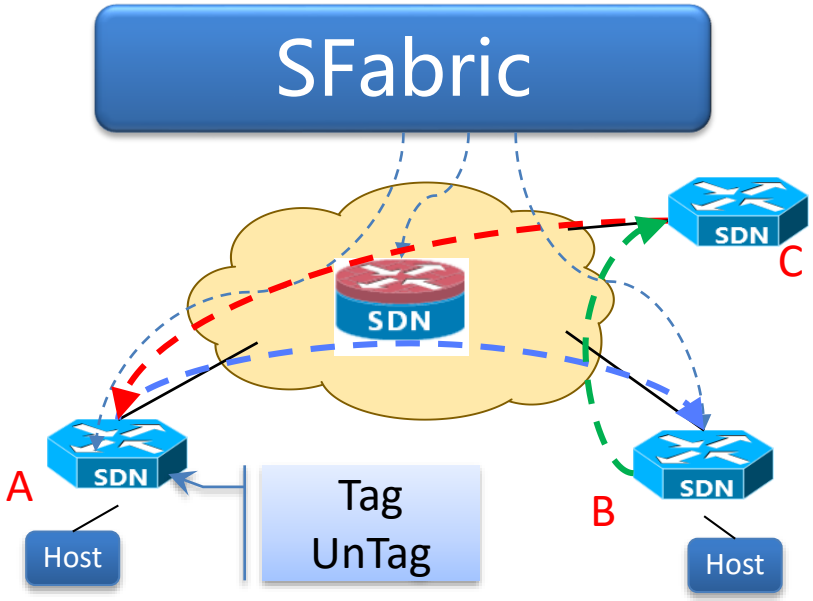
Large-Scale Switching Network based on SFabric

Large number of switches (>1000)

Massive Hosts (100K)

Fast Path Establishment (<100 ms)

High Throughput (>10000 Packet-in/Sec/Instance)

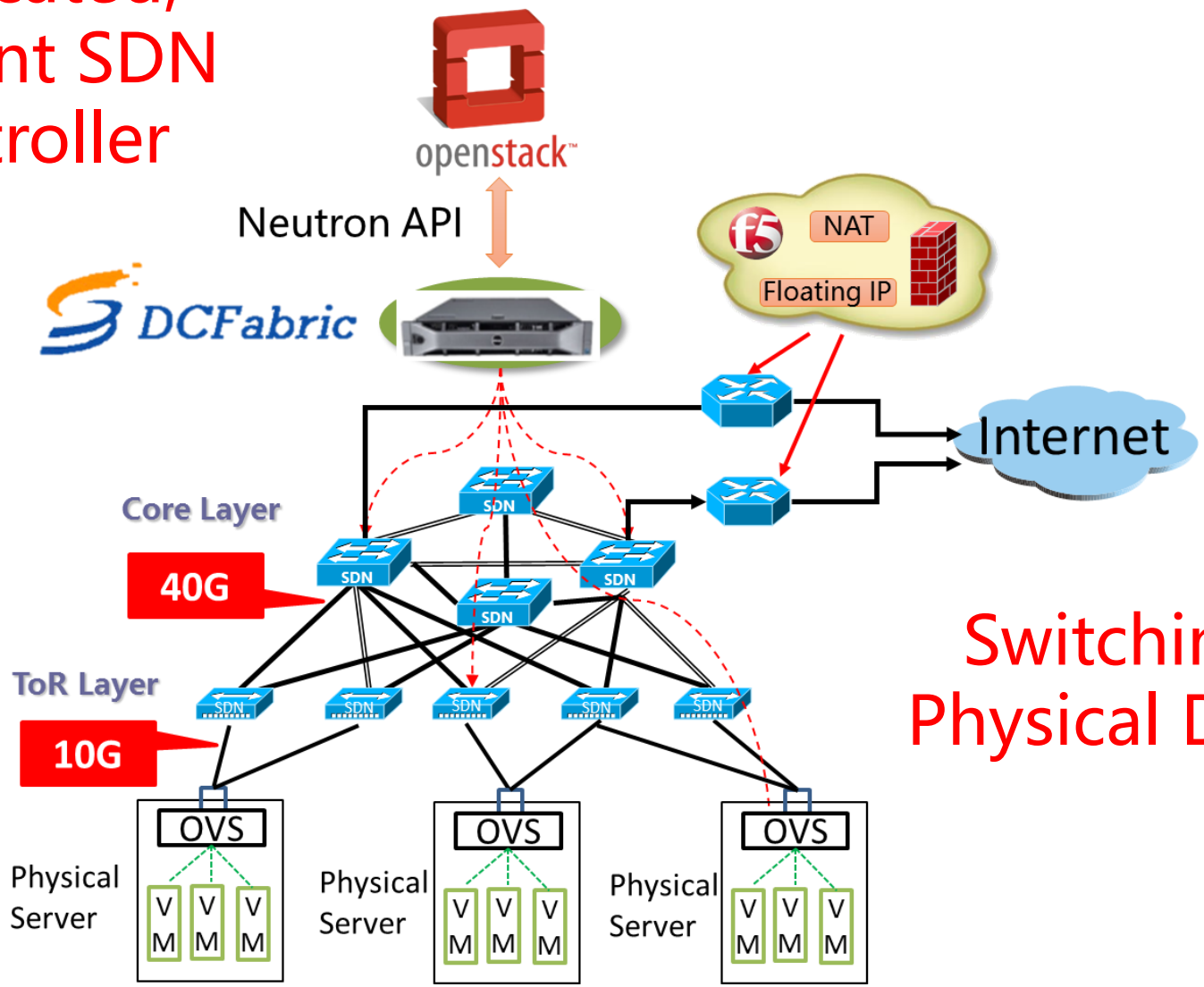


- Proactively install the switching flows
- Reactively install flows for tagging and un-tagging
- Using switch ids for tags

LU Xiaoyuan, Xu Yanwei: SFabric: A Scalable SDN Based Large Layer 2 Data Center Network Fabric, Proceeding of IWQoS 2015.

OpenStack Network Architecture based on DCFabric

Dedicated, Efficient SDN Controller

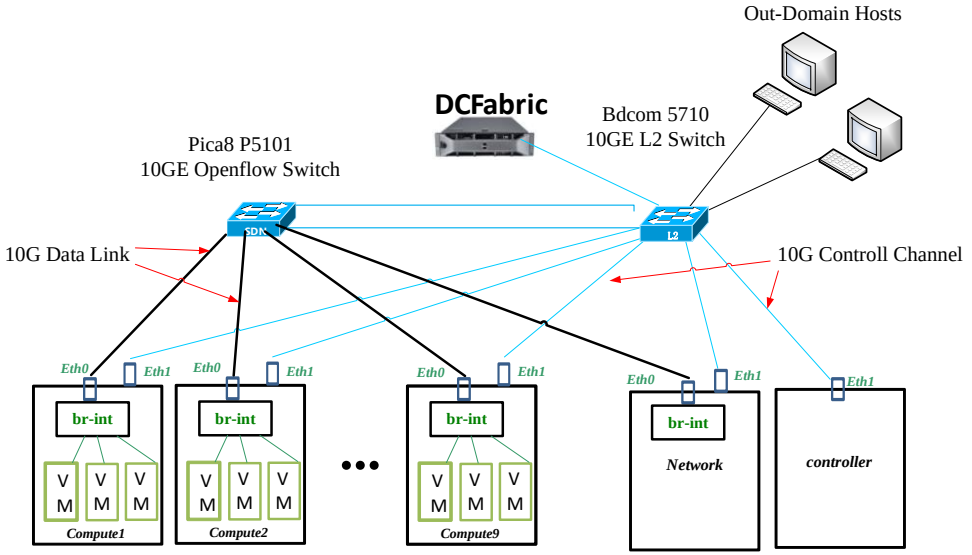


Switching by Physical Devices

Comparison of OpenStack Network Efficiency

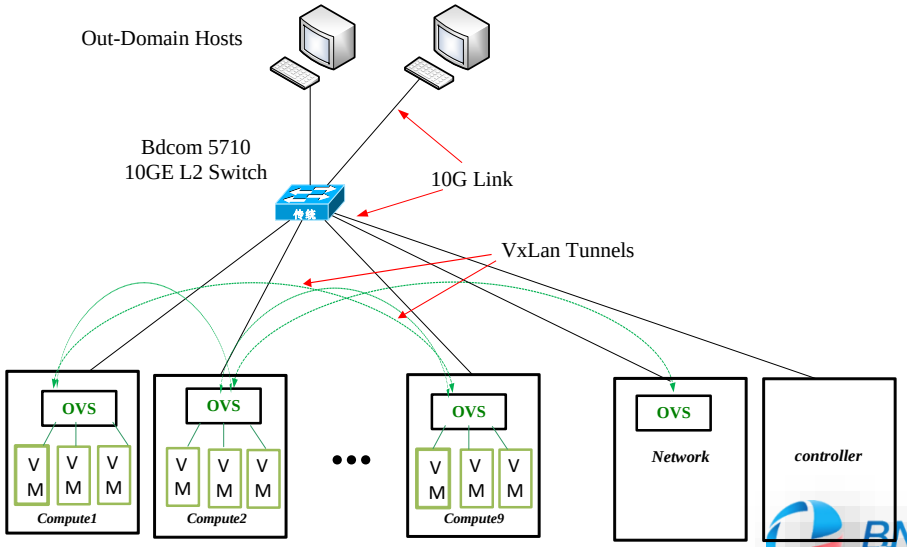
DCFabric-OpenStack

- 10G OpenFlow Data Link
- 10G SDN Controll Channel

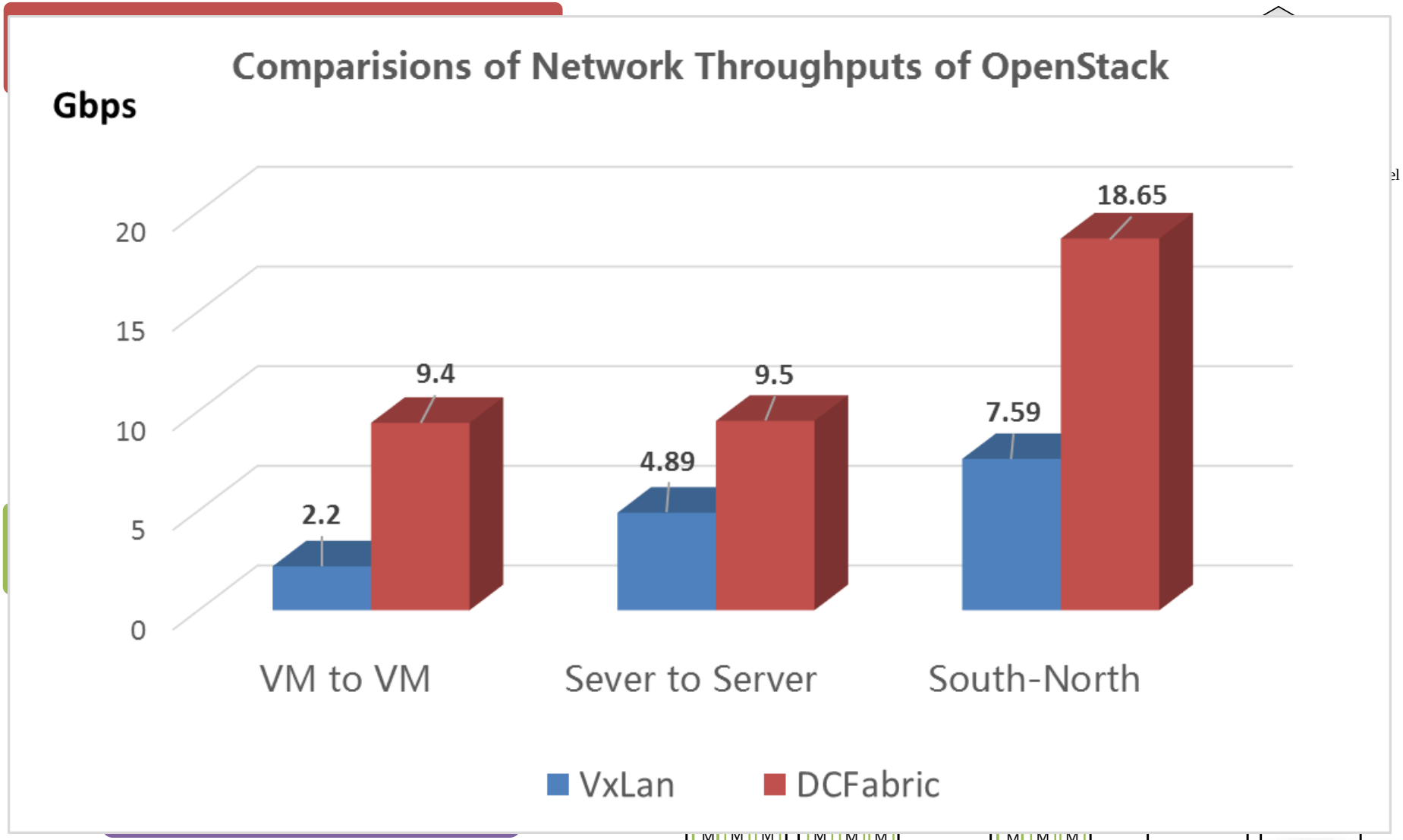


OpenStack Open vSwitch Plugin

- 10G Data Link
- VxLan Tunnels



Comparison of OpenStack Network Efficiency



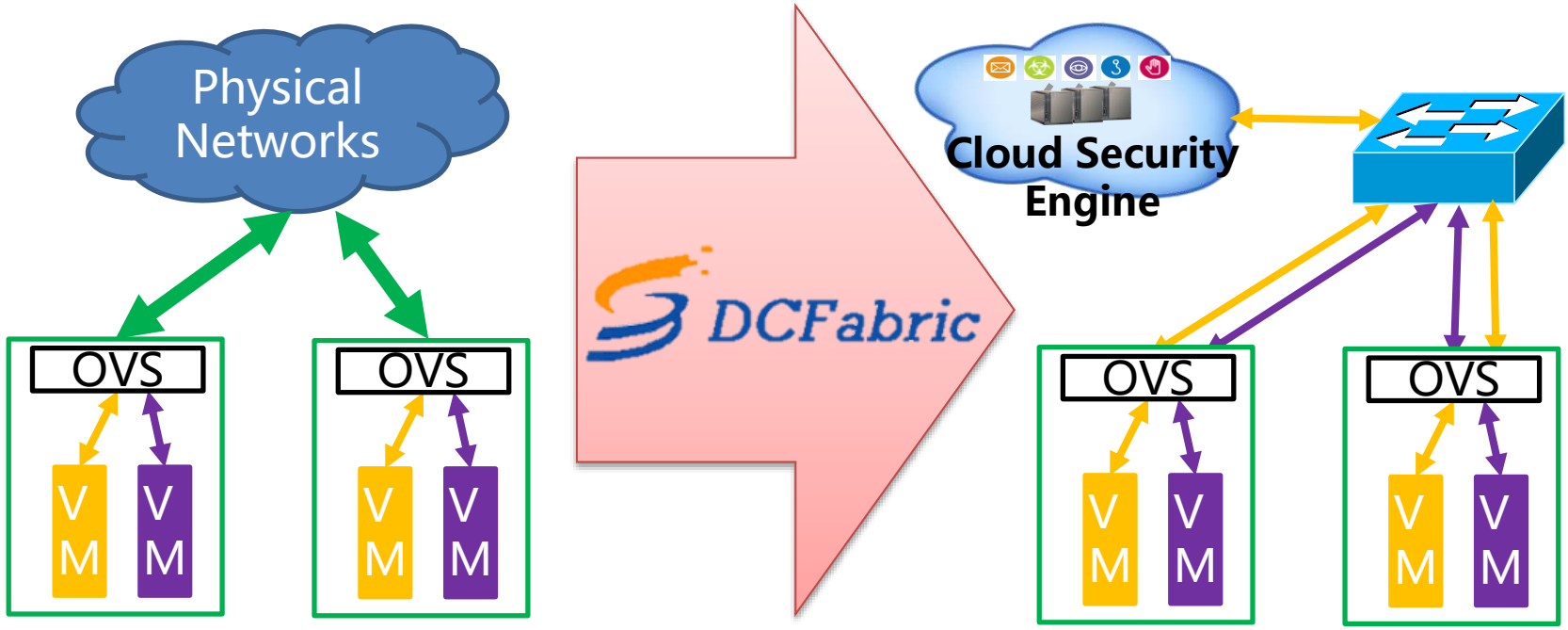
Out-Domain Hosts

Compute1 Compute2 Compute9

Traffic Visualization of Cloud Hosts

Overlay Networking

DCFabric Networking



- Imperceptible of the communication process
- Uncontrollable traffic switching

Traffic Visable in whole network

Security service based on traffic traction

Multi-granularity traffic engineering

Openness & Cost-effectiveness

- Northbound Interface: OpenStack Neutron API
- Southbound Interface: OpenFlow 1.3 & OvsDB

Hardware independence

Support almost all the OpenFlow commercial switches

High Cost-Effective

Much cheaper to achieve 10G full non-blocking switching network

10GE Switch Compatibility List

- P-5101
- 博达通信 S-5701
- centec networks V580
- H3C S-6800

40GE Switch Compatibility List

- P-5401
- centec networks V580

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Thanks !

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