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SDN Practices in China Mobile

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SDN : Bandwidth improvement , Virtualization , Service-chaining

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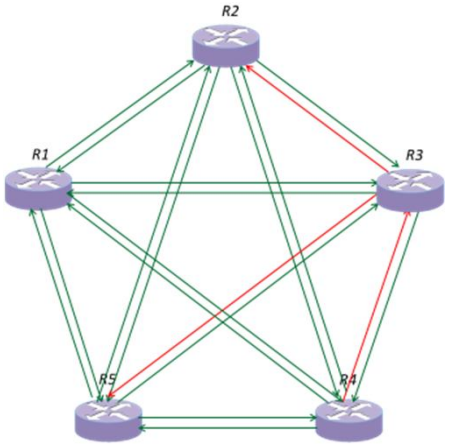
1.Average utility is lower than 50% , but partial links are congested



2.Tenant amounts of Public cloud is limited by vlan and the number of vfw and vlb

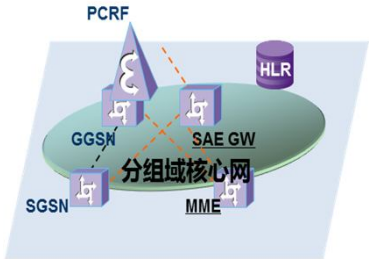
- Vlan number is limitness of a large L2 network in today' s cloud data center network
- For VPC(virtual private cloud) service, not only switch should support isolated forwarding table, but also the FW\LB does.

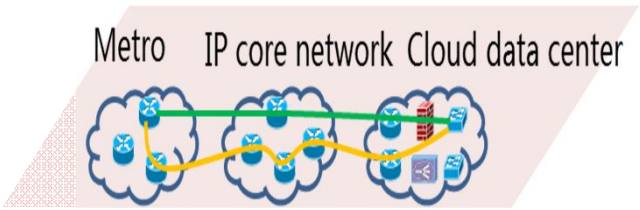
SDN contributes to improve the entire bandwidth utilization, network virtualization capabilities, and flexibility

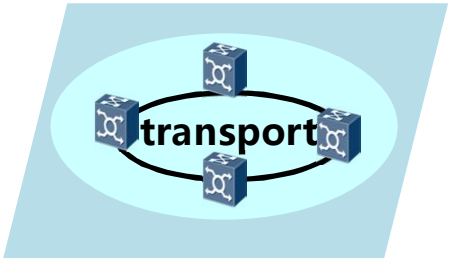
Mobile Core : Standard API for hardware, such as GGSN、PGW, Software controller. Flexible Gi service chain.

IP : improve utility , scheduling taffic ; provide on-demand E2E WAN + DC virtual network;

transport :
High Efficiency, Fast Provisioning







SDN use case 1：iPCN provides NaaS

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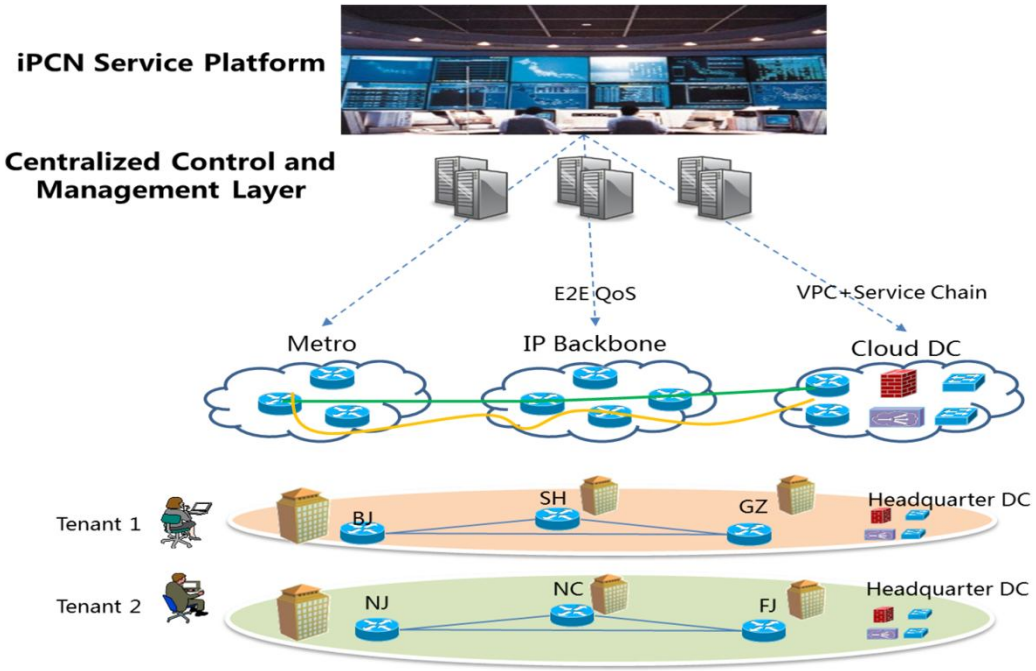
SDN provides on-demand, end to end guarantee QoS for High-value services in IP network

iPCN = intelligent Programmable Cloud Network

Virtualization： Tenants are able to subscribe WAN+Datacenter virtual Network on-demand，including specific cities，bandwidth, and VPC.

Isolation： Tenants' networks are isolated

Self-management： Tenants are able to config and monitor logical network themselves



SDN use case 2 : Optimization of WAN Global Bandwidth

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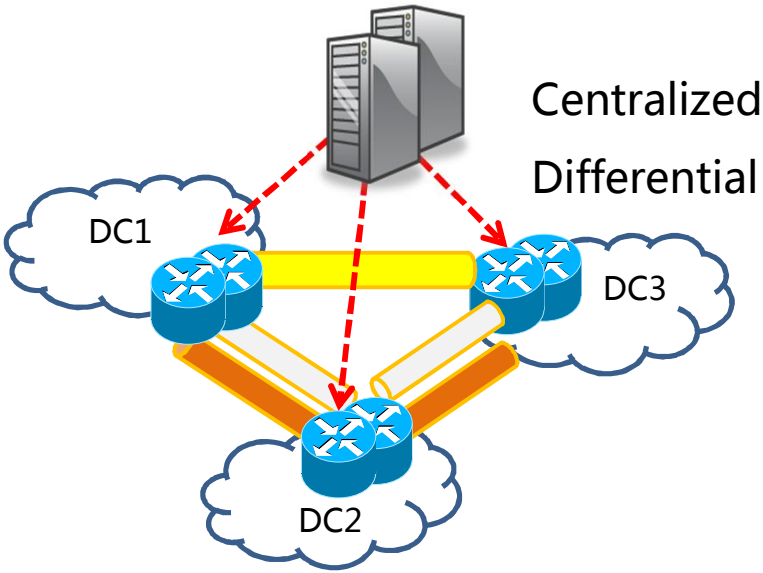
Schedule the entire traffic, improve the utilization of the entire network

Real-time monitoring of network traffic : real-time statistics network bandwidth utilization , packet loss, latency, visualization network traffic

Reserving bandwidth for high-value traffic : reserving bandwidth for periodically traffic in advance, such as CDN Synchronization traffic

Scheduling network traffic intelligently : intelligently and dynamic routing according to the load conditions and the business requirement, improve the entire network bandwidth utilization

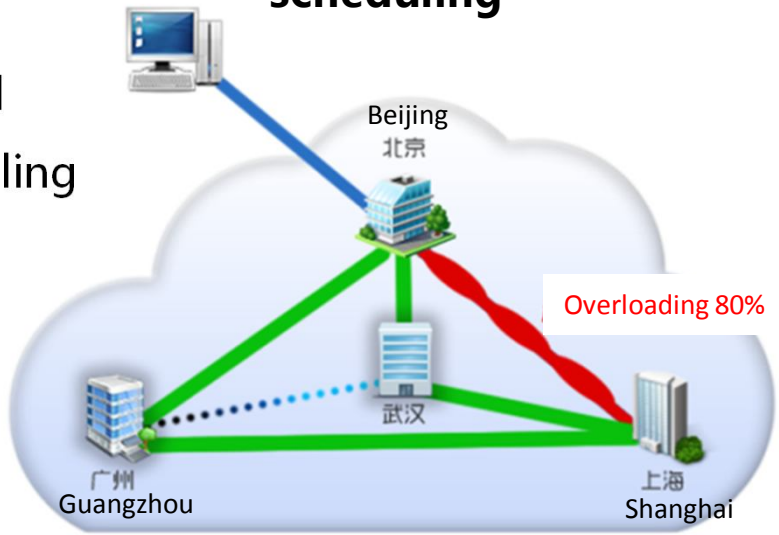
Inter data centers



Centralized control

Differential scheduling

Backbone network traffic scheduling



SDN use case 3: SPTN achieve “service-aware network."

SPTN will be used in enterprise service access, provide fast service provisioning, and achieve customer-service oriented SPTNaaS

Service requirements

PTN challenge

- Service provisioning limited to the static configuration
- Manually Configuration across cities/provinces Line
- Tidal effects and traffic uneven distribution

SPTN scenarios

- Centralized intelligent control, fast Provisioning
- Open platform, multi-vendor interoperability
- BOD, efficient use of resources

APP @ Operator

- Service provisioning
- Traffic Monitoring
- Resources Statistics
- Customer Management

APP @ Customer

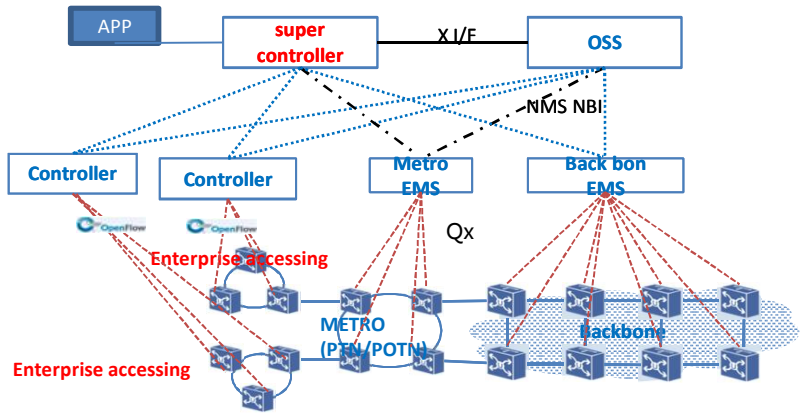
- Apply online
- Bandwidth adjustment
- Quality Visualization
- Network reports

Implementation effect

OSS/EMS

Services Configuration and traffic adjustment is base on EMS manually, and services provisioning is slow.

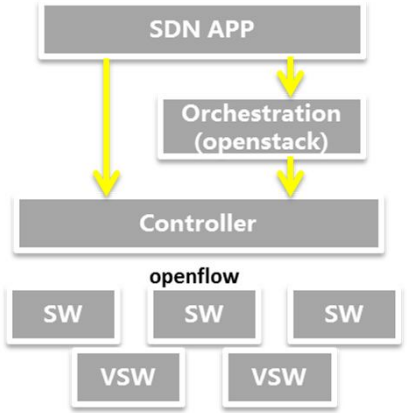
S-PTN network architecture



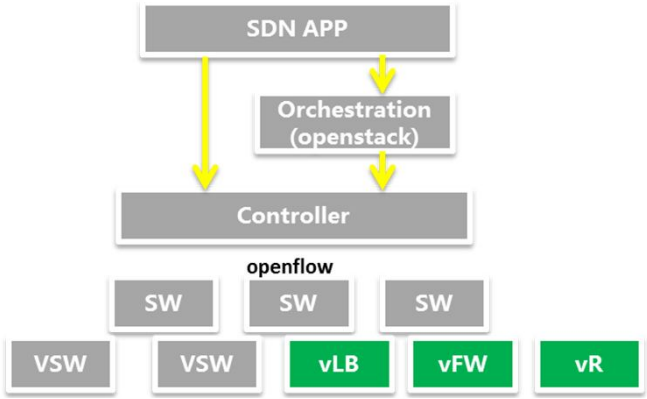
SDN Practice 1： in Cloud Data Center Networking

Developing Cloud Data Center SDN APP，fulfill VPC+Service Chain

APP Phase I : Based on Openstack and Openflow，fulfill VPC(Virtual Private Cloud)



APP Phase II : Combined with NFV, such as vLB/vFW/vR，fulfill VPC+Service chain



20+ SDN Vendors Test，Complete the first SDN system test specification in 2013

- Vendors : Including **8** controller vendors，**11** OpenFlow switch vendors，**2** test instrument vedors
- Test Content： Openflow function、Performance、GW and QoS、SDN APP

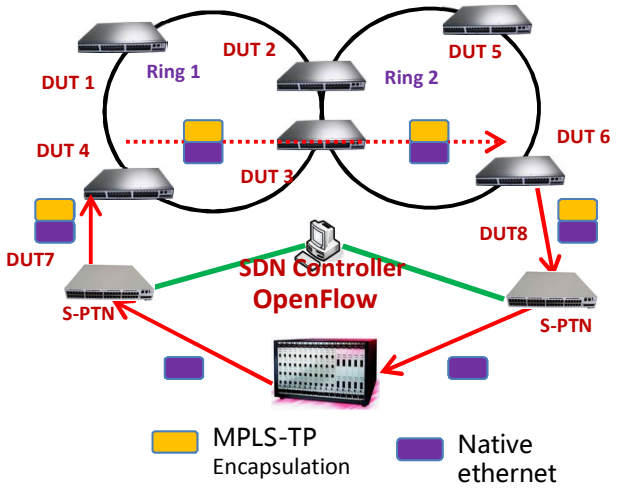
Funtion	Performance	GW and QoS	SDN APP
U/M/B cast	Thoughput	**With traditional network**	**FW aaS/LBaaS**
Topology Discovery(same vendor)	Latency	QoS mark	VPC
Topology Discovery(Multi vendor)	**Flow table**	QoS scheduling	**Smart TE**
	reliability		

Conclusion : Openflow Switch performance is much lower than traditional NE, such as less flow entries, slower learning time, reliability of Controller. And few of SDN APPs

SDN Practice 2: SPTN、IP core network

Set up the first OpenFlow-based SPTN demonstration in 2013

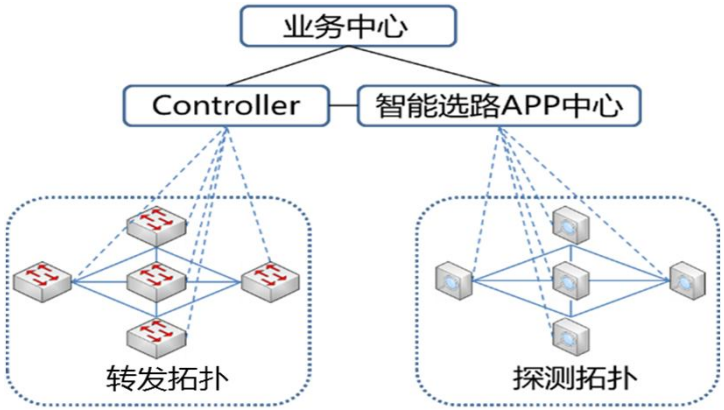
- **Verified the technical feasibility of large-scale SPTN networking**
- Demonstrated the APPs which can adaptively adjust the CIR and PIR value based on the real-time network load monitoring.
- Implemented the automatic services provisioning system which can achieve end to end business-aware ability.



SPTN demo network

Develop SDN IP network traffic scheduling APP, trial this year

- Demo this APP in 2013 IMIC：
  - Based SDN architecture, openflow
  - Steering traffic based on bandwidth utility, latency and packet loss
  - provide a virtual network in real time.
- Plan to do a trial in 2014 Q3

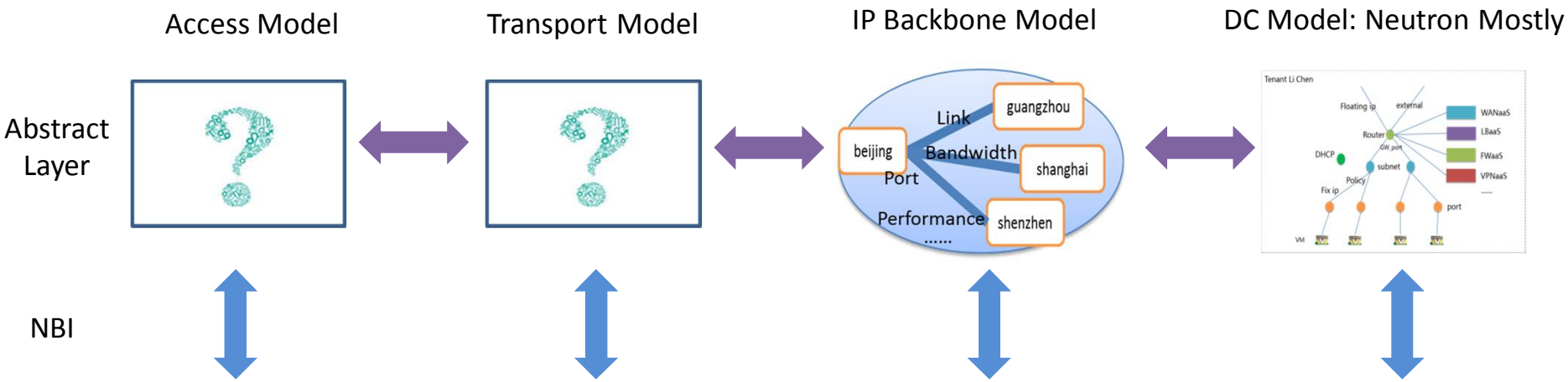


SDN Practice 3 : Standard

CMCC has been working very hard to build the carrier grade SDN DG in ONF

- 2013.10, CMCC make a speech 《Migration Considerations about Carrier-grade SDN》, drive to establish Carrier Grade SDN DG
- 2014.3 , CMCC introduce 《Outline of Carrier-grade SDN framework 》 in CG SDN DG、《MPLS-TP based packet transport with SDN support 》in transport SDN BOF

NBI is the next key standard



Discussion

- Could China Mobile involve in OmniRAN/SDN or 802.1CF work ?
- What could we do in OmniRAN work?

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Thank you