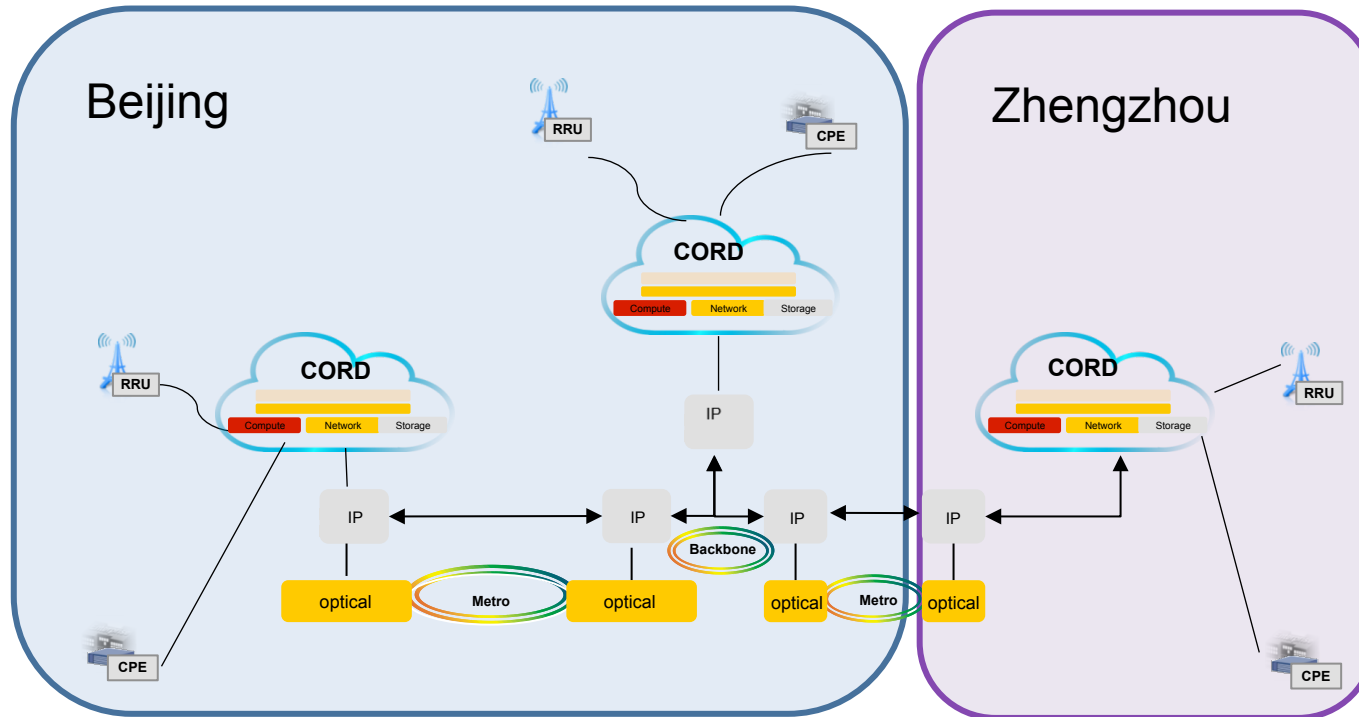


- 
- M-CORD Trials in China Unicom (CU)
  - CU's Proposed Next Step: New ONF RD(s)
  - Envisioned Use Cases for Multi-Access Edge Cloud

# M-CORD Trial: System Architecture



- **Three Instances of M-CORD**

- Beijing: a Physical PoD & a CIAB instance
- Zhengzhou: Physical PoD

- **Multiple cross-domain collaboration**

- Beijing to Zhengzhou

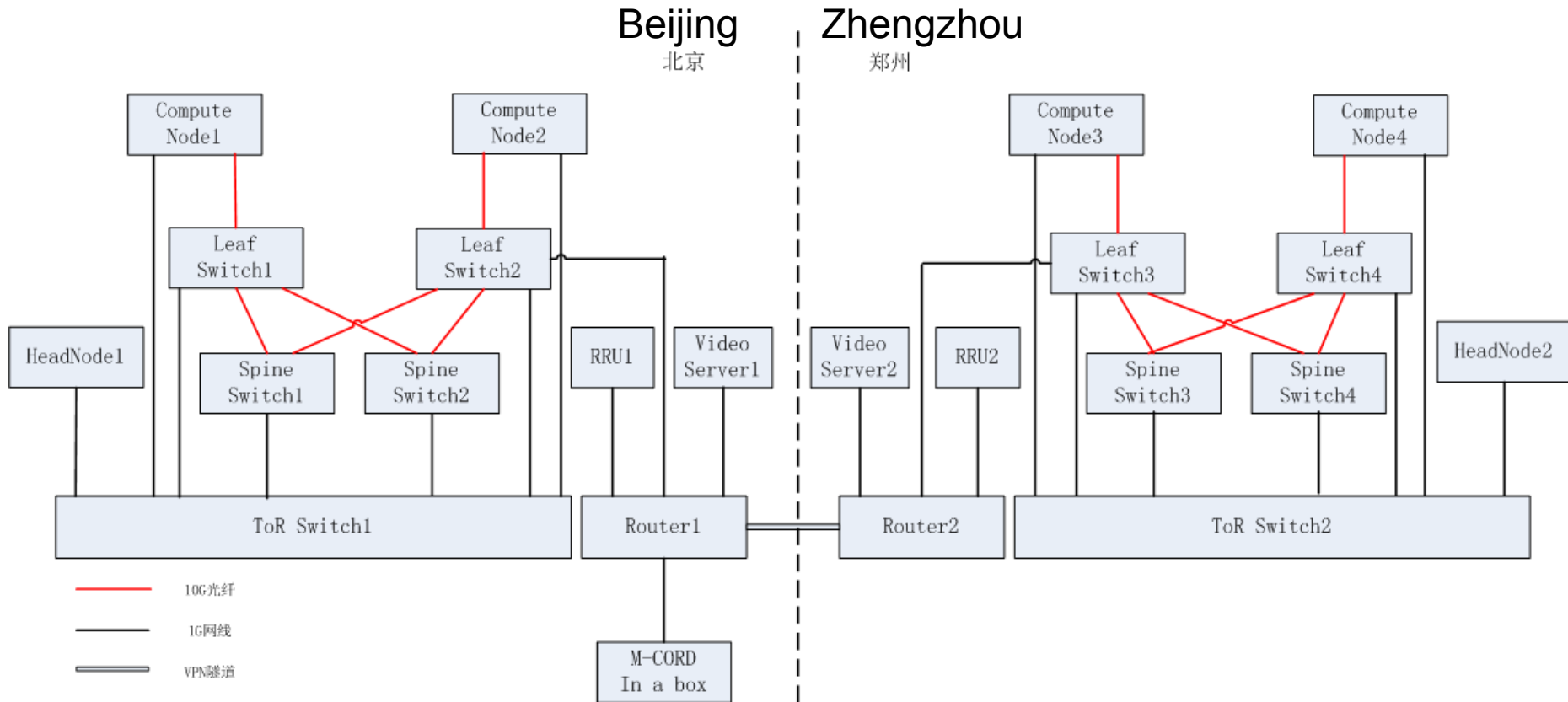
- **Network Slicing**

- Support E2E network slice

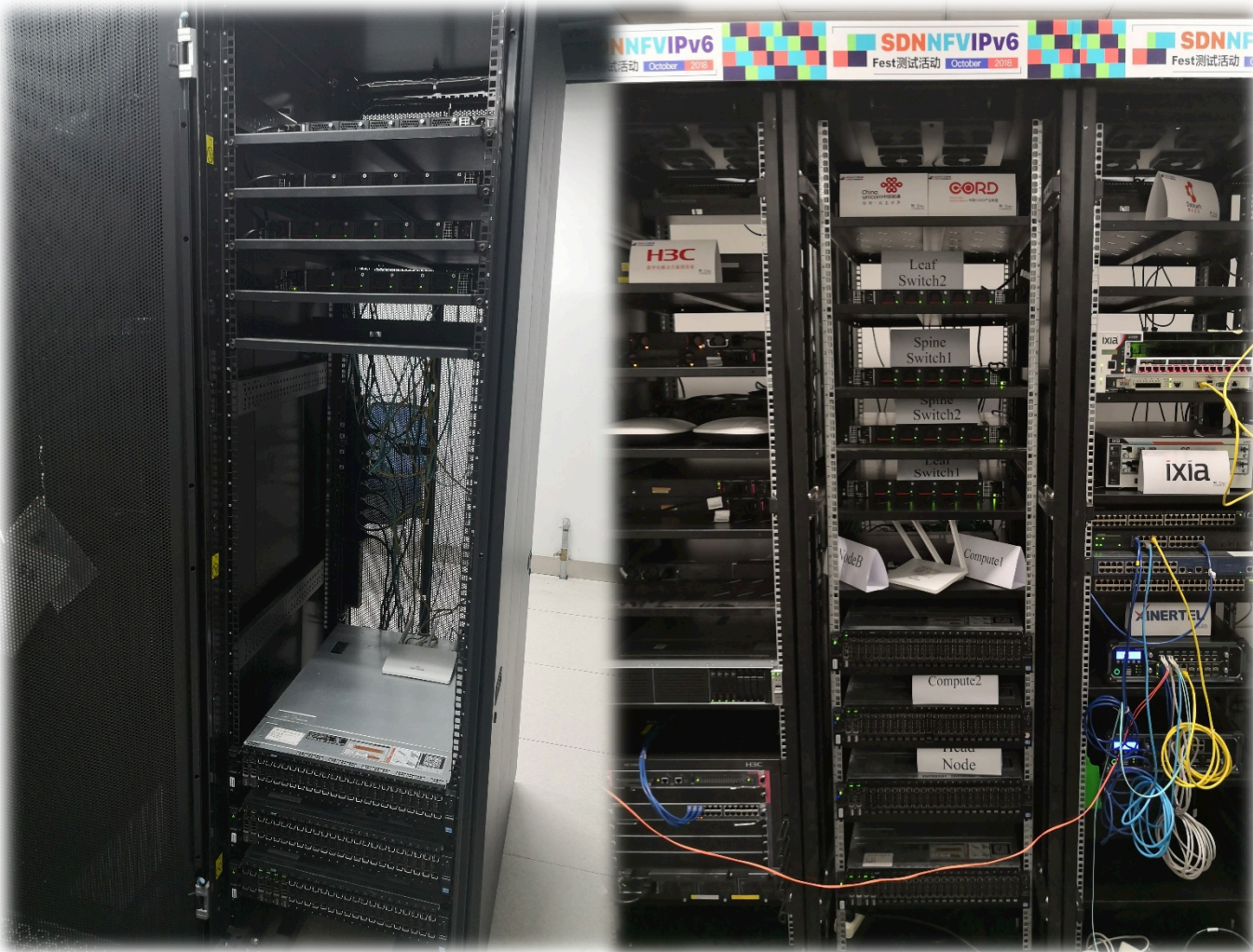
- **Enhanced PCC function**

- Achieve 5G PCC architecture
- Provide network capabilities

# M-CORD Trial: Physical Architecture

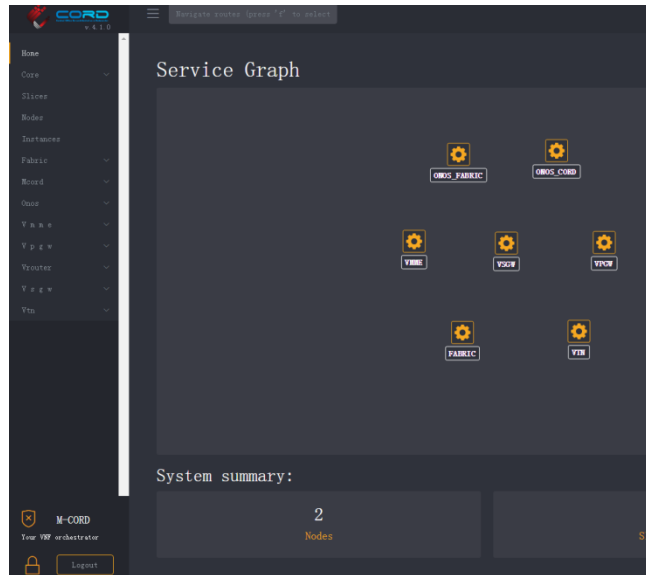


# System Hardware of M-CORD at CU



- 7 Dell R720 Servers
- 8 EdgeCore Accton 5712 White box switch
- 2 ToR Switch
- 2 Smallcell

# ONOS & CORD Displays of M-CORD at CU



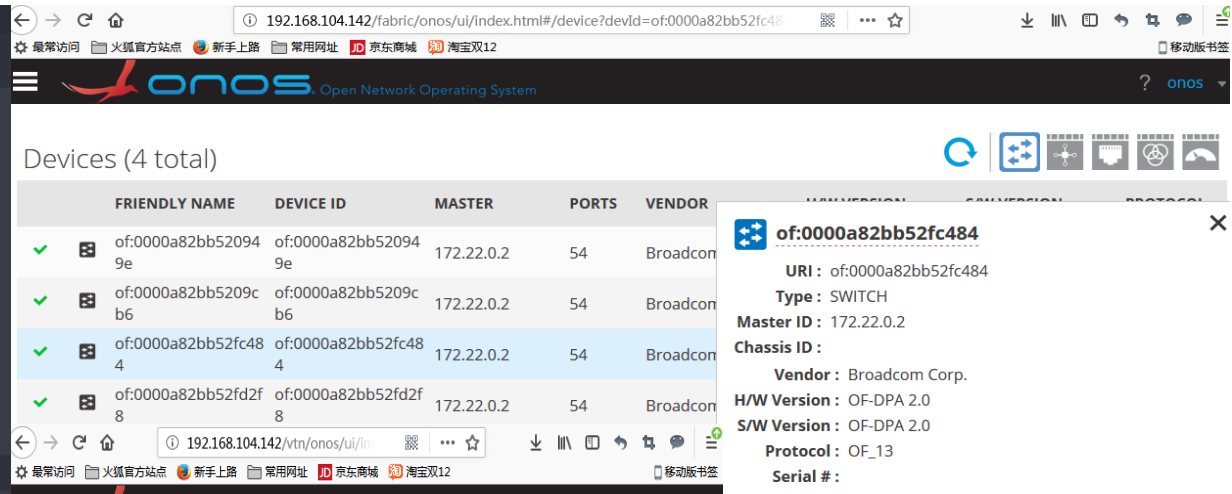
**Service Graph**

System summary:

M-CORD  
Your NW orchestrator

2 Nodes

Logout



192.168.104.142/fabric/onos/ui/index.html#/device?device=of:0000a82bb52fc48

ONOS Open Network Operating System

Devices (4 total)

	FRIENDLY NAME	DEVICE ID	MASTER	PORTS	VENDOR
✓	of:0000a82bb520949e	of:0000a82bb520949e	172.22.0.2	54	Broadcom
✓	of:0000a82bb5209cb6	of:0000a82bb5209cb6	172.22.0.2	54	Broadcom
✓	of:0000a82bb52fc484	of:0000a82bb52fc484	172.22.0.2	54	Broadcom
✓	of:0000a82bb52fd2f8	of:0000a82bb52fd2f8	172.22.0.2	54	Broadcom

of:0000a82bb52fc484

URI : of:0000a82bb52fc484

Type : SWITCH

Master ID : 172.22.0.2

Chassis ID :

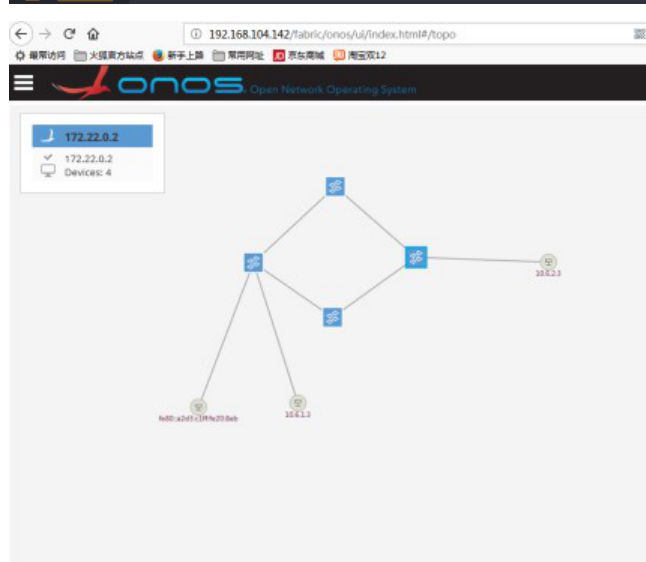
Vendor : Broadcom Corp.

H/W Version : OF-DPA 2.0

S/W Version : OF-DPA 2.0

Protocol : OF\_13

Serial # :



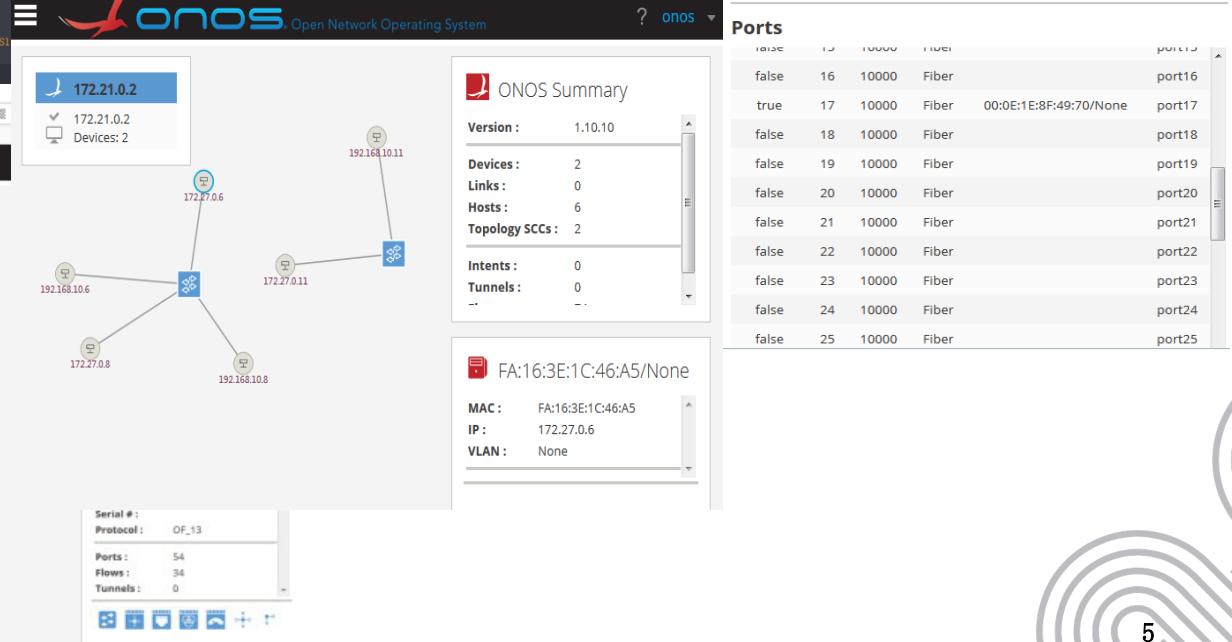
192.168.104.142/fabric/onos/ui/index.html#/topo

ONOS Open Network Operating System

172.22.0.2

172.22.0.2

Devices: 4



172.21.0.2

172.21.0.2

Devices: 2

ONOS Summary

Version : 1.10.10

Devices : 2

Links : 0

Hosts : 6

Topology SCCs : 2

Intents : 0

Tunnels : 0

FA:16:3E:1C:46:A5/None

MAC : FA:16:3E:1C:46:A5

IP : 172.27.0.6

VLAN : None

Serial # :

Protocol : OF\_13

Ports : 54

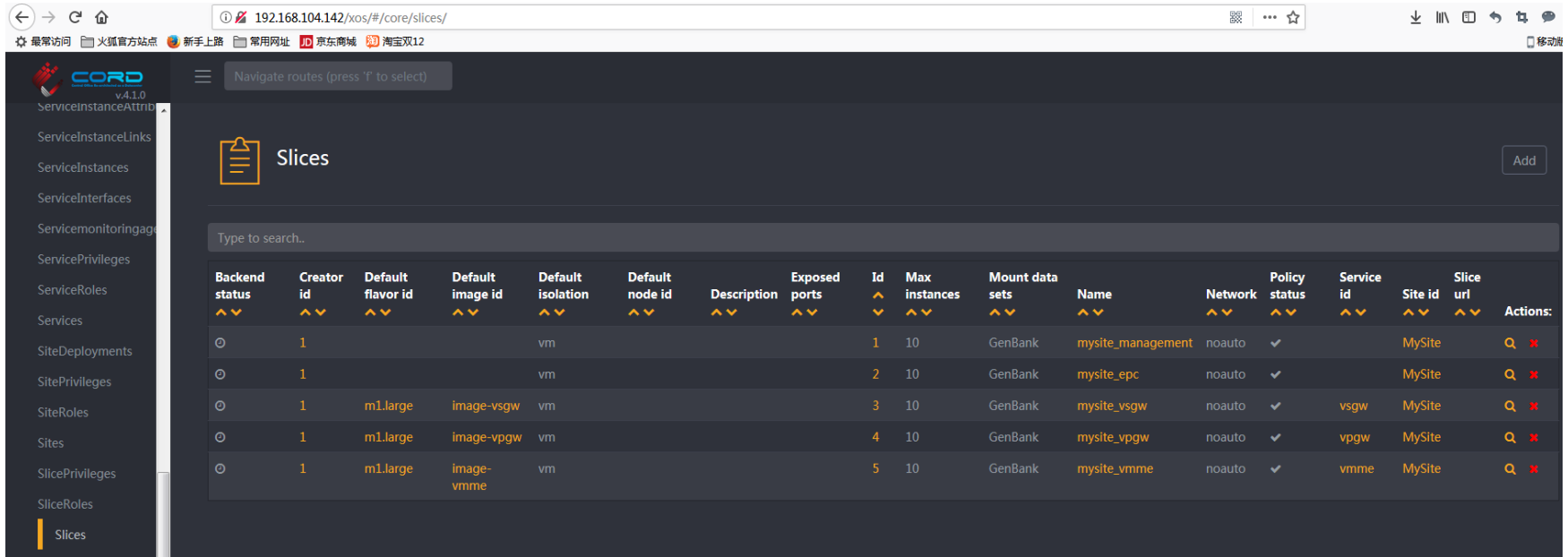
Floors : 34

Tunnels : 0

Ports

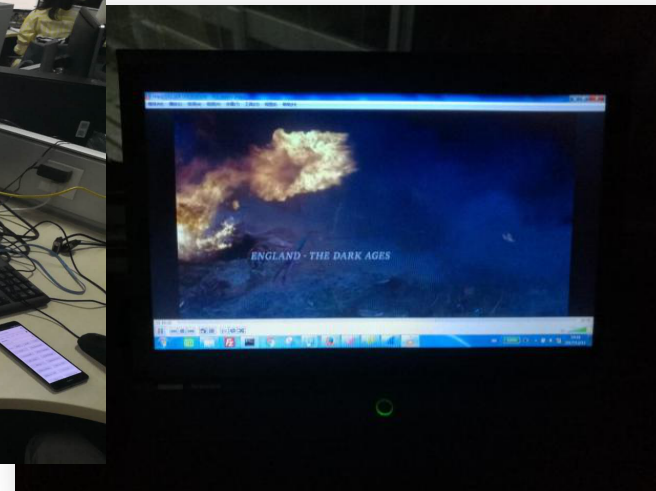
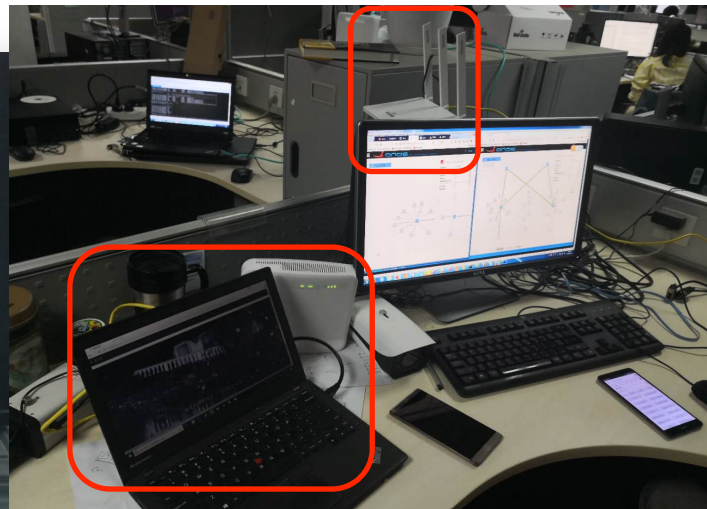
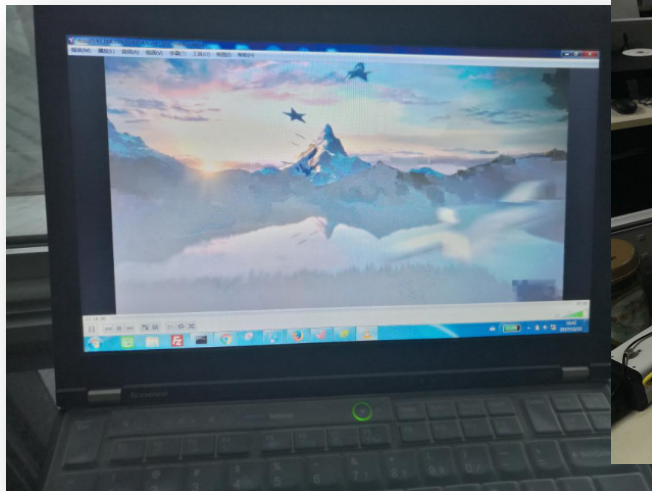
Port	State	Speed	Type	MAC	Port
port15	false	10000	Fiber		port15
port16	false	10000	Fiber		port16
port17	true	10000	Fiber	00:0E:1E:8F:49:70/None	port17
port18	false	10000	Fiber		port18
port19	false	10000	Fiber		port19
port20	false	10000	Fiber		port20
port21	false	10000	Fiber		port21
port22	false	10000	Fiber		port22
port23	false	10000	Fiber		port23
port24	false	10000	Fiber		port24
port25	false	10000	Fiber		port25

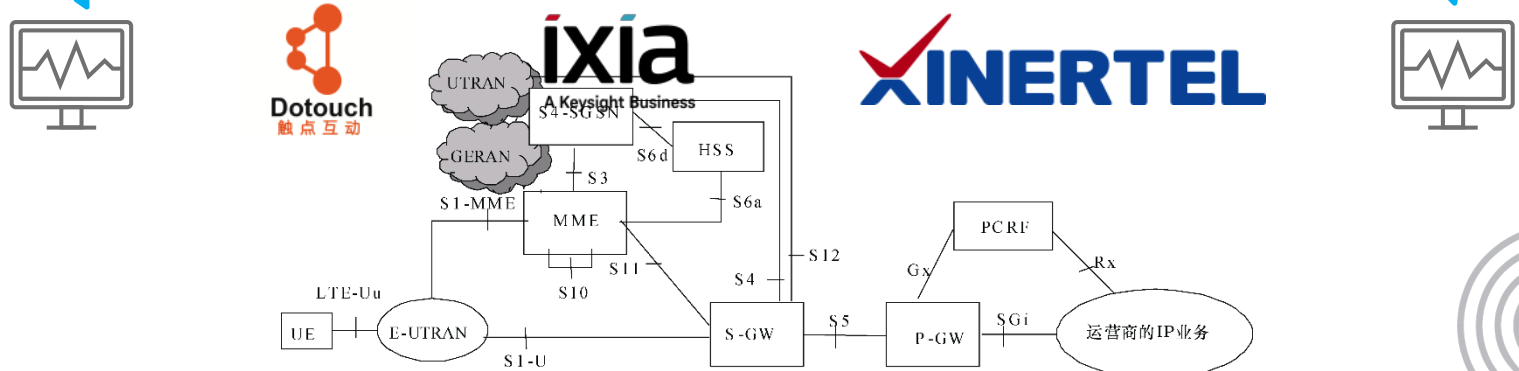
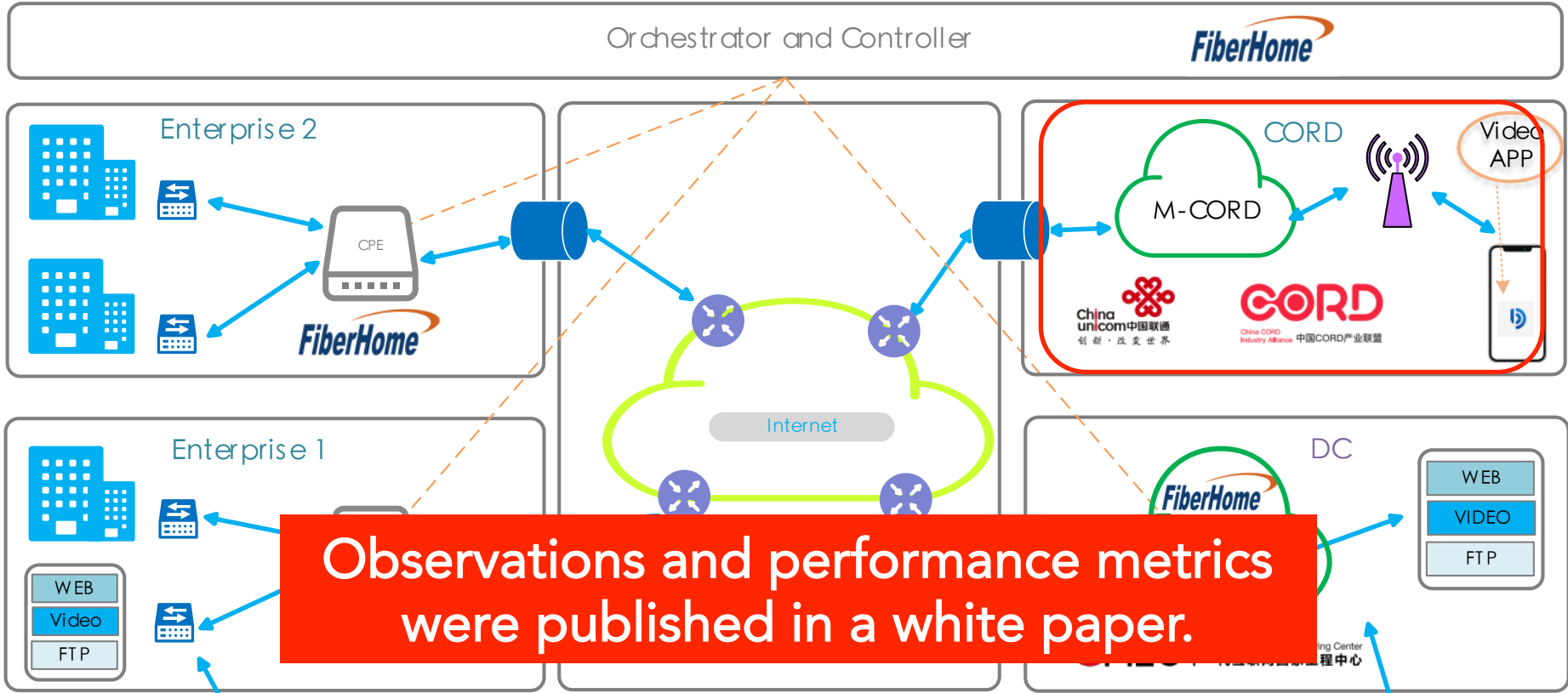
# Network Slicing at CU: XOS of M-CORD Display



The screenshot shows the XOS M-CORD interface for network slicing. The browser address bar displays `192.168.104.142/xos/#/core/slices/`. The interface includes a sidebar with navigation options and a main panel titled "Slices" with a search bar and a table of slice configurations.

Backend status	Creator id	Default flavor id	Default image id	Default isolation	Default node id	Description	Exposed ports	Id	Max instances	Mount data sets	Name	Network	Policy status	Service id	Site id	Slice url	Actions:
⊙	1			vm				1	10	GenBank	mysite_management	noauto	✓		MySite		Q ✕
⊙	1			vm				2	10	GenBank	mysite_epc	noauto	✓		MySite		Q ✕
⊙	1	m1.large	image-vsgw	vm				3	10	GenBank	mysite_vsgw	noauto	✓	vsgw	MySite		Q ✕
⊙	1	m1.large	image-vpgw	vm				4	10	GenBank	mysite_vpgw	noauto	✓	vpgw	MySite		Q ✕
⊙	1	m1.large	image-vmme	vm				5	10	GenBank	mysite_vmme	noauto	✓	vmme	MySite		Q ✕

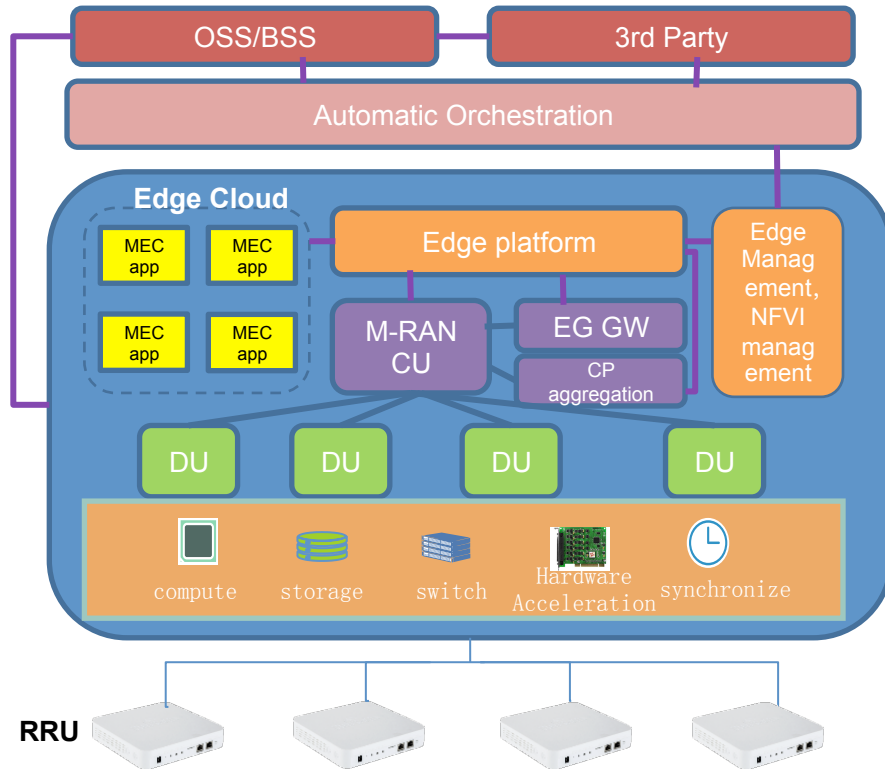




- 
- M-GORD Trials in China Unicom (CU)
  - CU's Proposed Next Step: New ONF RD(s)
  - Envisioned Use Cases for Multi-Access Edge Cloud



# Next step: Reference Design Proposal-1



## 2019 Reference Designs & Exemplars

**Multi-Access Edge Cloud**

+

**Converged Access & Core RD**

PROPOSED TO ONF TLT  
in November, 2018



Reference Design:  
Multi-access Edge Cloud based on M-CORD

First Draft of proposed new RD

November 2018

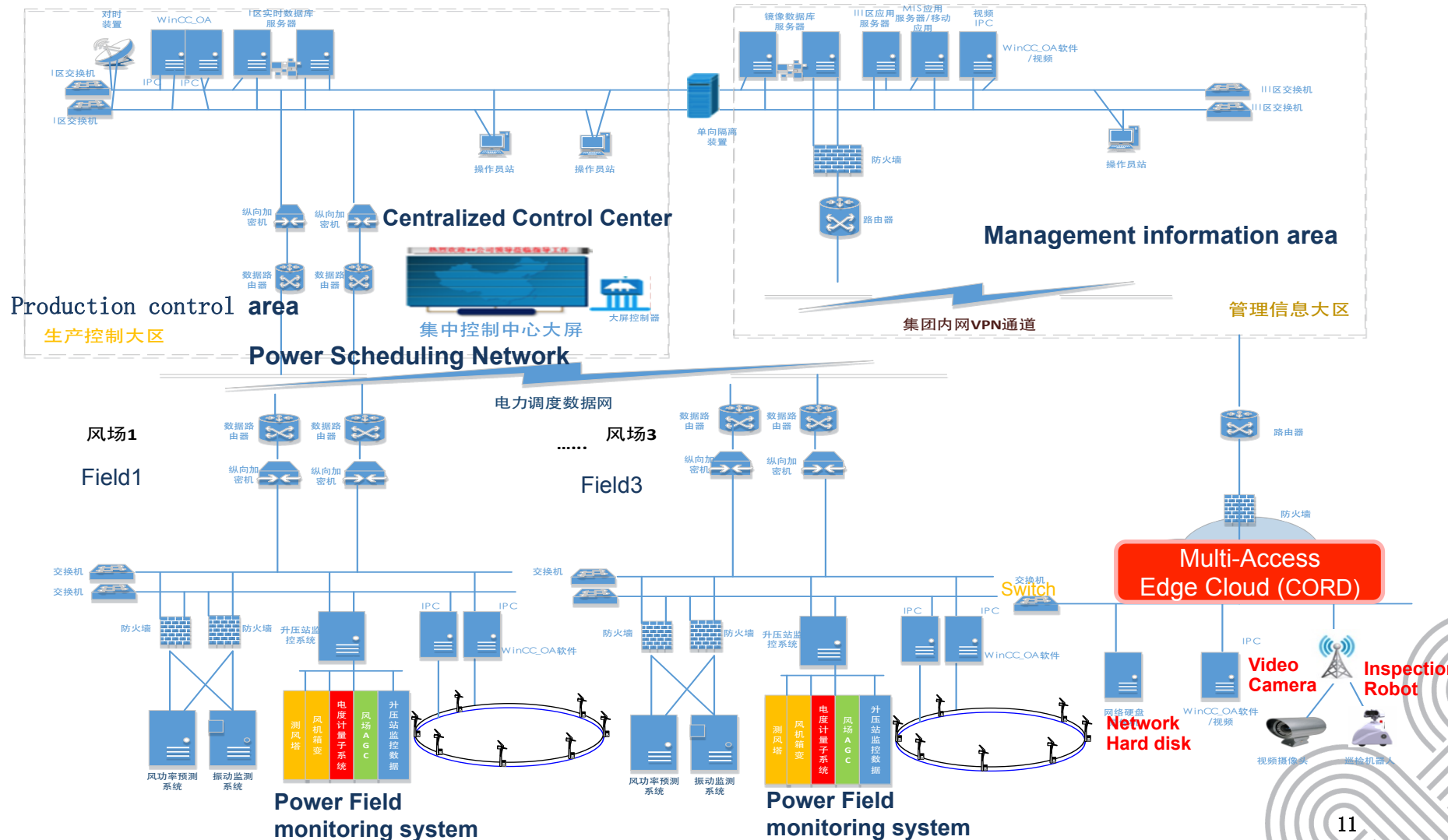
# Next step: Reference Design Proposal-2

- What resources are needed from the ONF?
  - Stable and secure vEPC function
  - Support joint testing of vEPC and white-boxed small cell
  
- Key components to be leveraged by the Reference Design & Exemplar Platform:
  - NFV Fabric RD(Trellis EP)
  - UPAN RD(UPAN) Unified Programmable Automated Network
  
- Anticipated timeline to achieve DRAFT status:
  - 12-24 months

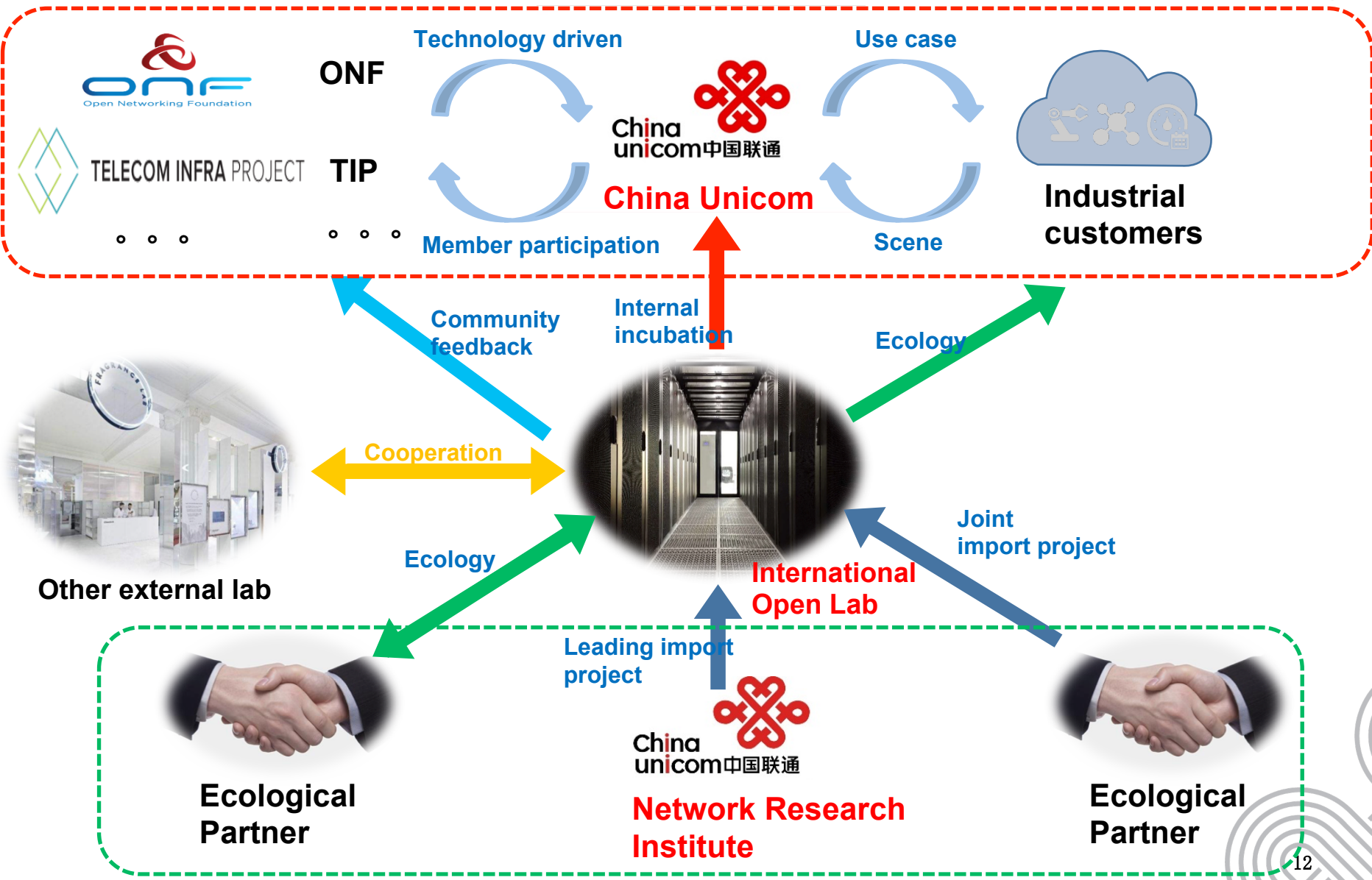
# Next step: Pilot Industrial Application

## Power Field Asset Inspection & Monitoring

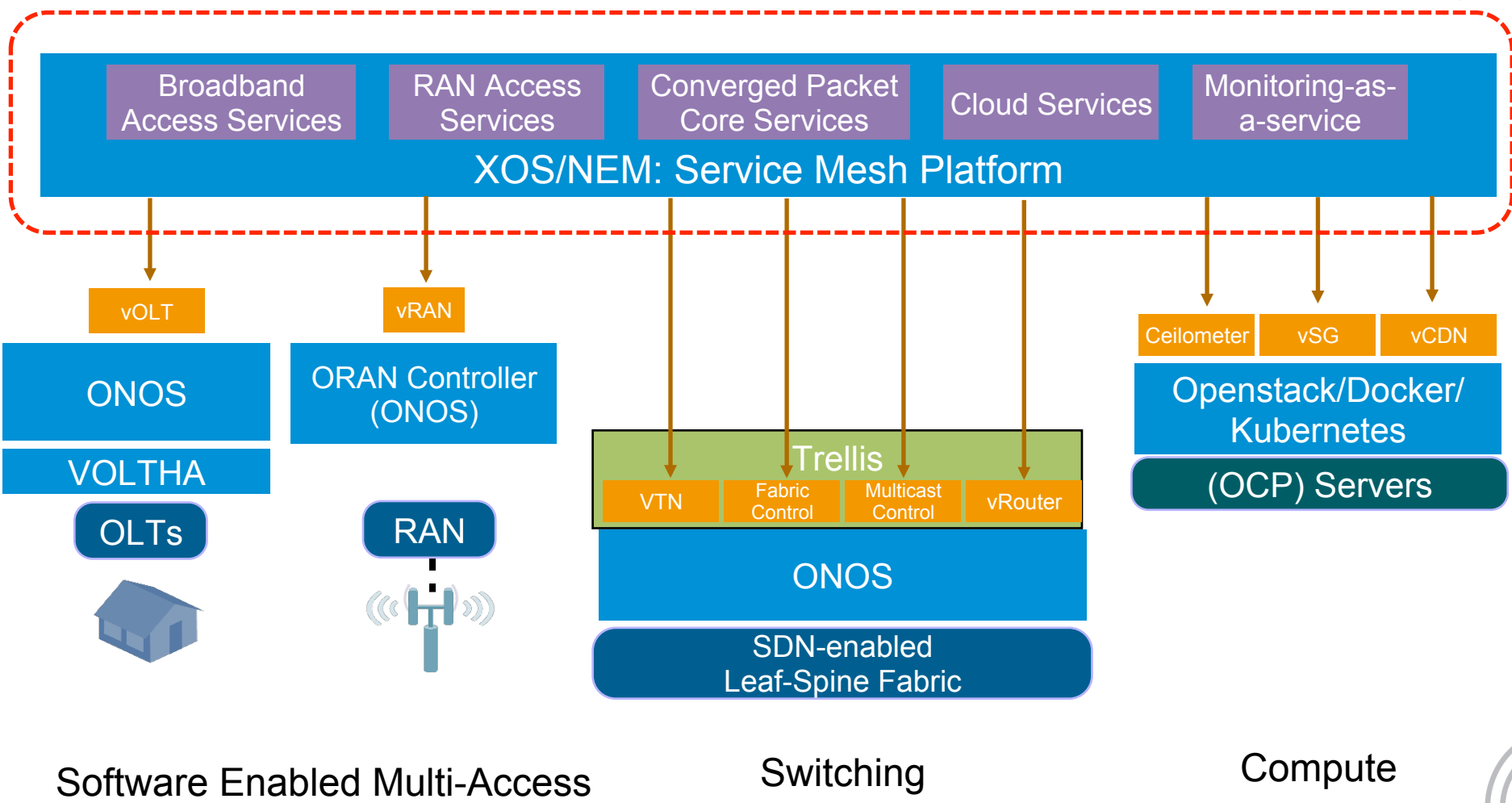
### Edge Architecture based on CORD



# Next step: International Open Lab



# Final step: PON+vRAN Integrated Edge Platform



**Our Vision for the ONF Multi-Access Edge Cloud Platform**



- 
- M-GORD Trials in China Unicom (CU)
  - CU's Proposed Next Step: New ONF RD(s)
  - **Envisioned Use Cases for Multi-Access Edge Cloud**

# Use Case 1: Edge Streaming Service

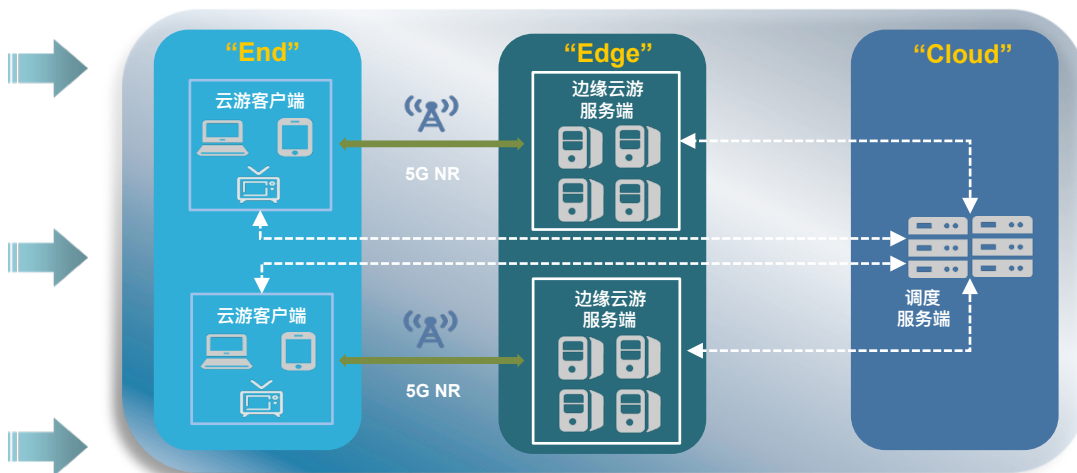
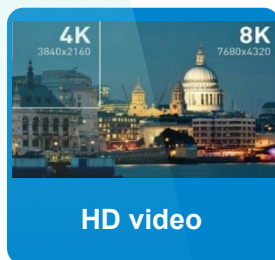
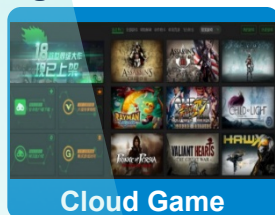
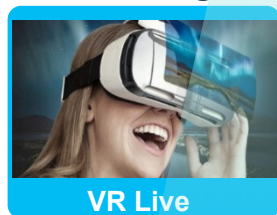
At the "2018 Edge Cloud Eco-Partners Conference" China Unicom unveiled "Edge-Video" business with Tencent, Ali and Baidu

- Completed Cloud VR live broadcast, Cloud Game, 4K/8K and other business verification based on MEC edge cloud. , paving the way for 5G scale commercials.

Edge-Video



## Edge Streaming Service



# Use Case 2: Smart Winter Olympics



## As the key technology of 5G, Edge Cloud helps realize smart Winter Olympics

- High-bandwidth video transmission, low-latency synchronization control, and edge-side real-time rendering.

### Smart

Human flow intelligent sensing control, logistics intelligent tracking and monitoring



### Brilliant

360\* full landscape game, portable wear high speed shooting



### Safe

Drone face recognition, wireless high speed video probe



5G new railway

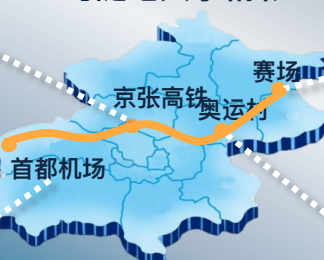


5G无缝覆盖，随时随地共享精彩

Smart new venue



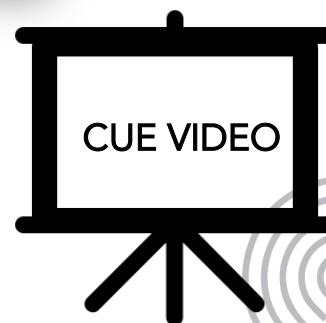
5G new airport



Peaceful new winter Olympics



# Use Case 2: Smart Winter Olympics

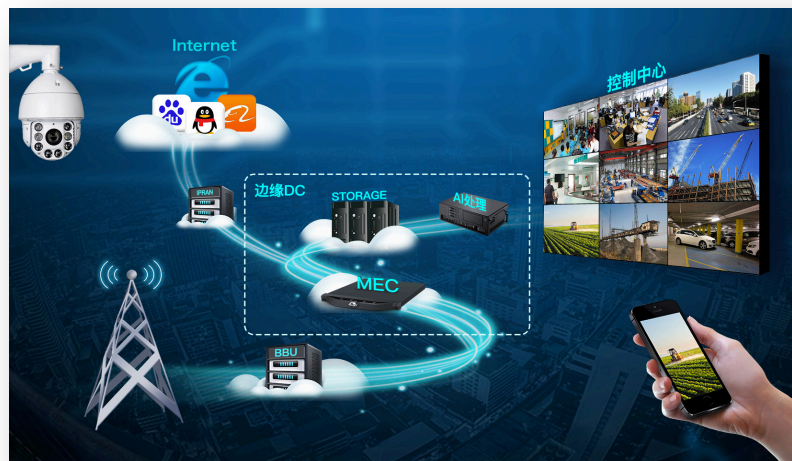


# Use Case 3: Edge AI Smart Security

## Goal: Rebuilding the network system of security monitoring system with Edge Cloud

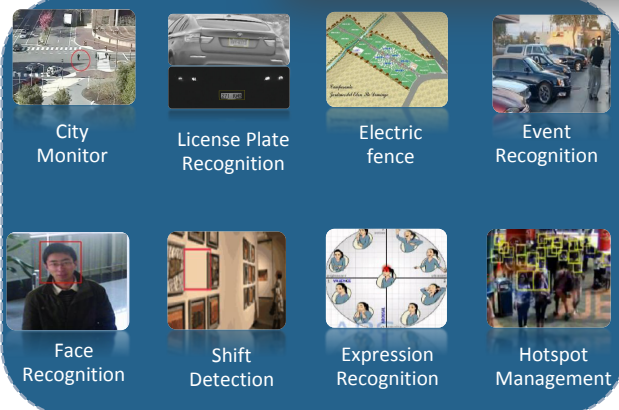
- Video preprocessing at the edge, local decision on AI Inference, real-time response; cloud center for AI Training, side cloud collaboration.

Edge-eye



## Commercial Applications

### Zhejiang Hangzhou Xueliang Project



### Hubei Qianjiang Crayfish Breeding Base

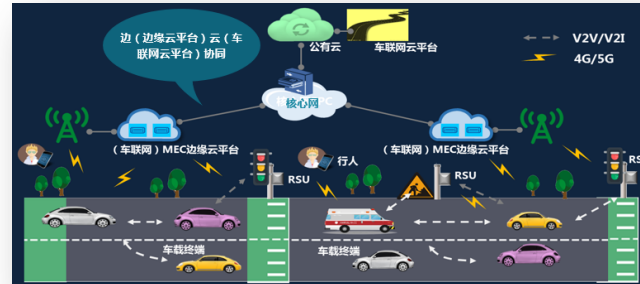


Partner:



# Other Use Cases for Multi-Access Edge Cloud

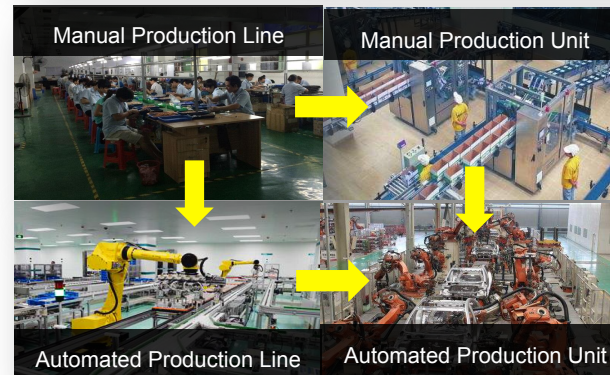
## Smart Traffic



## Smart Ports



## Smart Manufacturing



- In 2019, China Unicom will actively participate in ONF activities: Multi-Access Edge Cloud, and Converged Access & Core, based on M-CORD
- CU has identified multiple use cases where these ONF platforms may be deployed in our networks
- We welcome the ONF ecosystem to join us at the China CORD Industry Alliance

Thanks !