Converged Networks (SDN/NFV+PNF) Oriented Next Generation OSS

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CMCC
1. History of CMCC OSS

2. Challenges of ICT convergence

3. Keywords of next generation OSS

4. A Case study of NG-OSS
The Development of China Mobile’s OSS

China Mobile’s OSS have a step by step development trail since 1999.

① **Vendor’s Terminal era.**

② **Dedicated network management era**: Multi vendor, focus on different network technology.

③ **General network management era**: also said “Operation function dedicated”, follow TMN’s FCAPS and TMF’s FAB function domain.

④ **Future network era**: SDN/NFV, Cloud computing based, converged network.
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The Architecture of The Future Network

New Operation Center
- Policy create & deploy
- E2E service monitor and control
- Service /Resource orchestration
- Traffic management and optimization

New DC
- Deployed on IaaS:
  - Telecom Function virtualized
  - CDN
  - Edge computing

New Network
- Decoupled control & forwarding layer
- Centralized route policy
- Smart traffic optimization
Core DC: control, management, scheduling functions centrally deployed in the core DC, to achieve more flexible network scheduling, mainly bearing control plane network element and centralized Media network element, CDN and backbone traffic forwarding.

Edge DC: For fixed-network, media, content three media services, flexible deployment to the edge DC, optimize the flow and user experience, improve network efficiency.

Support DC: Achieve company-level full-volume data storage and processing based on large data technology and provide data sharing services to internal and external applications.
Key Features of The Future Networks

Edge Cloud

Tele-function

Resource

Hardware

Agility

Virtualization

Pooling

Generalize
Key Challenges For The Future O&M

- Or-Chart: transformed from vertical to layered
- Focus of O&M: changed from Look after to DevOps
- Routine Task: from semi automatic (or manual intervention) to full automation
- Training/Skills: Software & cloud computing related knowledge
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Keywords for Future OSS

Features of The future Network

- Cloud Computing
- Big Data
- SDN
- NFV
- Hybrid AN

Feature of The future OSS

- Open API
- Federated
- DevOps
- Orchestration
- AI
- Cloud based
China Mobile and AT&T will lead the industry to develop the Open Network Automation Platform (ONAP, Feb, 2017) under the Linux foundation.

A first release of NFVO and VNFM will be published in this year.
Industry case: ONAP architecture 2
The Roadmap of China Mobile's Novonet

- Goals: explore the architecture, test application On-Boarding, catalyse the eco-system, training experts
- Four sites: Beijing, Shanghai, Guangzhou, Hangzhou

**201610-201705 (Phase I)**
- TIC integration and IoT
- EPC, vCPE
- Three scenario of E-BOD
- Verification on multiservice with sw/hw resource pool
- Integration on multi-vendors
- Interface define.

**201706-201709 (Phase II)**
- TIC connection and all scenario verification for SDN/NFV coordination orchestration in domain
- Introduce self developed products to lead integration

**201710-201712 (Phase III)**
- Coordination orchestration cross domain, multi-service dispatching, new type OSS and test on automation in the lab
- Introduce self developed products to lead integration
NG-OSS trial plan

- Based on micro service architecture, integrate traditional 4+1 and future OSS
- Decoupled HW/SW Mgmt
- VIM, VNFM, NFVO deploy
- Orchestration and policy Mgmt

- NFV FCAPS basic management.
- Develop and build Future OSS’s data model

China Mobile Group
2017.01

Requirement collecting and definition

Guang Dong and Zhe Jiang
2017.05

DevOps with the On site trial

China Mobile Group
2017.12

Summary o
CMCC has defined APIs based on its ‘4+1’ OSS: more than 280+ APIs in 6 categories and we are involved in the Forum’s Open API program.

Other attendees: E-commercial/OTT

Different apps

- Business requirement department 1
- Business management department 1
- OSS ability provider

Individual developer:

OSS vendor 1

OSS vendor 2

CMCC has defined APIs based on its ‘4+1’ OSS: more than 280+ APIs in 6 categories and we are involved in the Forum’s Open API program.
For the future network and future OSS, we still have a long way to go.....

- Promote the standardization of VNFD, NSD and VNFPackages
- Enhance collaboration with different SDO and open source community
- A new eco-system should be incubated by the industry together.
1. History of CMCC OSS
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BOCO is one of the largest OSS solution provider in China, also is CMCC’s largest partner in the field of OSS. In the telecom operators market, OSS solutions and market share ranked No.1.

**BOCO is CMCC's OSS partner**

<table>
<thead>
<tr>
<th>Year Range</th>
<th>CMCC Activities</th>
<th>BOCO Activities</th>
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<tbody>
<tr>
<td>2000 year ago</td>
<td>OMC</td>
<td>Traffic management</td>
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<td>2001 year ~ 2012 year</td>
<td>Dedicated network management</td>
<td>Switch NMS</td>
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<td>Data NMS</td>
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<td>Trans NMS</td>
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<td>EOMS</td>
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<td>Power monitor</td>
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<td>2013 year ~ 2015 year</td>
<td>Integrated network management</td>
<td>Operation and Maintenance Management System</td>
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<td>Configuration Mngt.</td>
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<td>Fault Mngt.</td>
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<td>Performance Mngt.</td>
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<td>Security Mngt.</td>
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<td>Network data collection</td>
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<td>After 2016 year</td>
<td>Future network management</td>
<td>NG - OSS</td>
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</tbody>
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Cooperative experiment and propose the NG-OSS solution iFOCUS.
The features of BOCO NG-OSS solution - iFOCUS

**Intelligent**
- Agile and On-demand network requires fast intelligent self-organize capability
- Routing optimization based on AI improve the routing optimization efficiency of transmission network by 10% and speed up by 50%

**Fusion**
- VNF/PNF/SDN constitute hybrid future network, the evolution will last for a long time
- Agile network make closed-loop and self-healing possible, OSS become the brain of the future network, and OSS and network get more close

**Cloud-native**
- Cloud-based networks require Cloud-native OSS
- Only Cloud-native OSS can support advanced feature of future network, such as, network slicing, self-healing, on-demand, etc

**Open**
- Open OSS is the key of future network ecosystem
- Micro-service based OSS architecture make all things work together easier

**aUtomate**
- Operation of future network is automatic
- Operation of NG-OSS is automatic too

**Smart**
- Agile networks need smart OSS
- Rapid iteration of network management applications should be achieved
Boco’s NG-OSS---Hybrid network management capabilities

- **Inventory Web App**
- **SF & ROFH Web App**
- **Alarm App**
- **Service Monitor App**
- **Mobile App**

**MicroService Bus**
- **Service orchestration**
- **Service routing**
- **Quality assessment**
- **Authentication**
- **registration and discovery**
- **load balancing**
- **Service Authorization**
- **billing**
- **Service Monitoring**
- **log**

**API Gateway**
- **Java SDK**
- **JS SDK**
- **Mobile SDK**

**SaaS Core**
- **Inventory Service**
- **Data Process Service**
- **SF & ROFH Service**
- **Alarm KPI Service**
- **Search Service**
- **Alarm Message Service**
- **Alarm Analytics Service**

**SaaS Apps**
- **NFV NM Service**
- **SDN NM Service**
- **Traditional NM Service**

**Service Gateway**

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Thank you!