The standardization of SDN and Chinatelecom network restructure based on SDN & NFV

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SDN standardization in ITU-T SG13

- SG13 has paid high attention to SDN related topics since the last study period, and becomes the leading study group for SDN in ITU-T.
- SG13 will continue the research in SDN areas in this study period.

Involved questions and research group from 2013-2016

| Q2 | Q3 | Q14 | JCA-SDN |

Involved questions and research group from 2017-2020

| Q2 | Q20 | Q21 | JCA-SDN |
Published SDN Recommendations in ITU-T SG13

- **Y.3300**: Framework of software-defined networking
- **Y.3301**: Functional requirements of software-defined networking
- **Y.3302**: Functional architecture of software-defined networking
- **Y.3320**: Requirements for applying formal methods to software-defined networking
- **Y.3321**: Requirements and capability framework for NICE implementation making use of software-defined networking technologies
- **Y.3322**: Functional architecture for NICE implementation making use of software-defined networking technologies
Future researches related to SDN in ITU-T SG13

• Three major research areas in ITU-T SG13 require further study on SDN
  – IMT-2020
  – Orchestration
  – Network evolution

• Future research on SDN will focus on how to apply SDN technologies on different types of networks
ONF: Accelerating Deployment with Open Innovation Pipeline

- https://www.opennetworking.org/
MEF、TM Forum are Teaming up with SP to Standardize LSO API

- standardize Lifecycle Services Orchestration (LSO) APIs to orchestrate services across multiple networks
- The providers also leading the effort include AT&T, Orange, Colt, Comcast, Level 3, PCCW, Sparkle, Verizon, CableLabs, and Kyrio, to develop a suite of inter-provider LSO APIs that use the MEF LSO Framework and the TM Forum Open API framework.

Inter-Provider LSO APIs
IETF: SDN standards / Southbound protocols, NFV, service chains

- The IETF SDN standards group, I2RS, work on southbound programming protocols, NFV and network service chains.

- By the end of 2016, Request Publication of Protocol Independent Topology Data Models

  draft-ietf-i2rs-yang-l2-network-topology
  draft-ietf-i2rs-yang-l3-topology
  draft-ietf-i2rs-yang-network-topo
ONAP: Open-O Merges with ECOMP

- The goal (Open Network Automation Platform) of ONAP is to enable end users to design, orchestrate, manage, and automate network services and virtual functions.
- Open-O and ECOMP codes combining and transmitting are in process.

The Linux Foundation Announces Merger of Open Source ECOMP and OPEN-O to Form New Open Network Automation Platform (ONAP) Project

Alignment of the two projects creates a harmonized and comprehensive framework for real-time, policy-driven software automation of virtual network functions that will enable software, network, IT and cloud providers and developers to rapidly create new services. By consolidating member resources, ONAP is well positioned to deliver a unified architecture and implementation, with an open standards upstream focus, faster than any one project could on its own.
ODL: the open source platform for programmable, software-defined networks

- New Features in ODL Boron (5th Release)
  1. **YangIDE**, led by AT&T, provides support for building new YANG models
  2. Telefonica and Intel-led NetIDE, which makes it easier to share apps across controller deployments
  3. EMAN, led by Comcast, for improved energy efficiency for the network
ONOS: ON.Lab + CORD + ONOS

- **February 14, 2017** ON.Lab, with CORD® and ONOS®, brought together operators, vendors and integrators to build solutions for carrier networks by leveraging SDN, NFV and Cloud technologies through an open source approach to solution creation.
Chinatelecom’s New Strategy: To be Intelligent information Service Provider
Network Transformation Based on New Technologies

Legacy Network

- Passive
  - Proprietary device
- Operation Complicated
  - Vertical divided
- PSTN as a Core

Future Network

- Proactive、Agile、Flexible & Adaptive
  - General equipment, software-defined
- Horizontally Integrated
  - Flat architecture, Universal management of resources
- DC as a Core
Network Transformation Road Map

SDN/NFV for New Network, Properly Handle Legacy, Step by step, Moving towards DevOps
Network Transformation: CTNet2025 Target Network

80% NF Virtualized

Large-scale on-demand Service

Deploy New Operation System

- Network Function Orchestration
- Service Orchestration
- Virtualized Network Function
- Integrated Resource Management
- Generalized Virtual Resource & Standardized Hardware
- High-performance Traffic Forwarding

Own Services

3rd party APPs

Orchestration

IT Platform

Orchestrator

Network Function

MANO

VNFM

Controller

EMS/NMS

vIMS

vEPC

vBRAS

vCPE

Infrastructure

Computing

Storage

Network

Objective

Dedicated Device (High-Performance)

WhiteBox

X86 Server

Elements

...
Characteristics for CTNet2025

01 Concise
- Simplify Layer / Type / Number / Interface
  - E.g.: less than 30ms transport latency for over 90% region

02 Agile
- SDN, Resources Fast Scaling
  - E.g.: On-demand services, activate and adjust in mins

03 Open
- Rich capabilities, Convenient exposure, Actively adapt to Apps
  - E.g.: “Product, Network, Service, Resource” 4-dimension

04 Integrated
- Integrated Deploy/Resource Provisioning, E2E Orchestration
  - E.g.: Place all service platform in DC
Realization of CTNet2025: 3 Main Categories of Projects

- **Fundamental Research**
  - Solve fundamental technical problems, provide prospective/systematic strategy

- **Network Deployment**
  - Based on mature industry chain, technology ready for trial or scale commercial deployment

- **Product Development**
  - Provide new product and user experience by innovation, build up DevOps system
Create CTNet2025 Ecosystem

- Introduce Open Source Software
- Build up a new generation of Operation System
- Encapsulate Network Capability for Exposure
- Build up Network with rich Apps
- Collaboration between Industry/ Academic/ Research Institute
- Create a new Cooperation Paradigm
Conclusion

- ITU-T, ONF, IETF, MEF are focusing on SDN standardizations, including architecture, interface, Lifecycle Services Orchestration etc.
- Open source organization become more important
- Operator use SDN/NFV technologies to restructure networks
Thank you for attention!