



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

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2017.4.2

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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

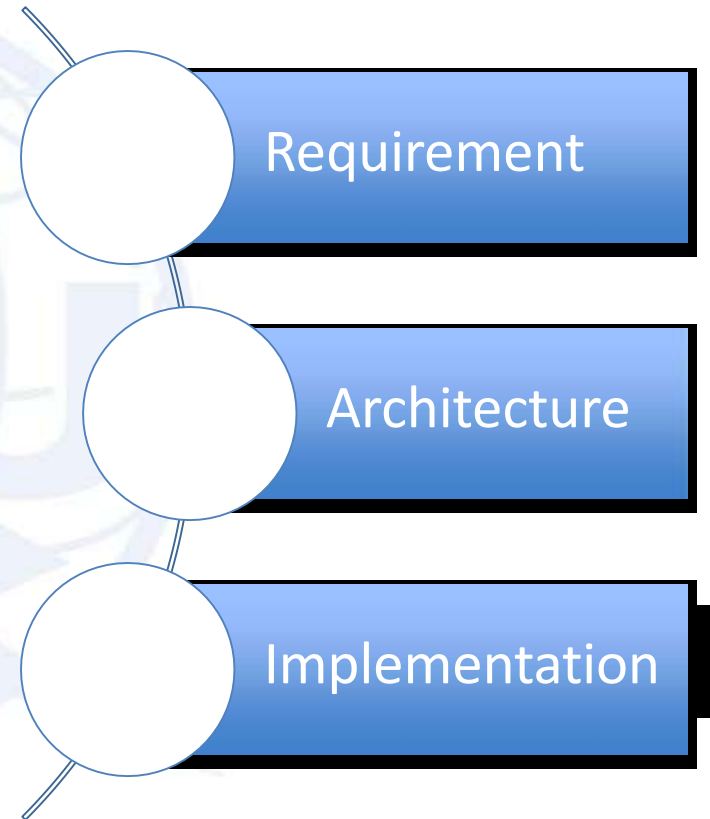
Q20

Q21

JCA-SDN

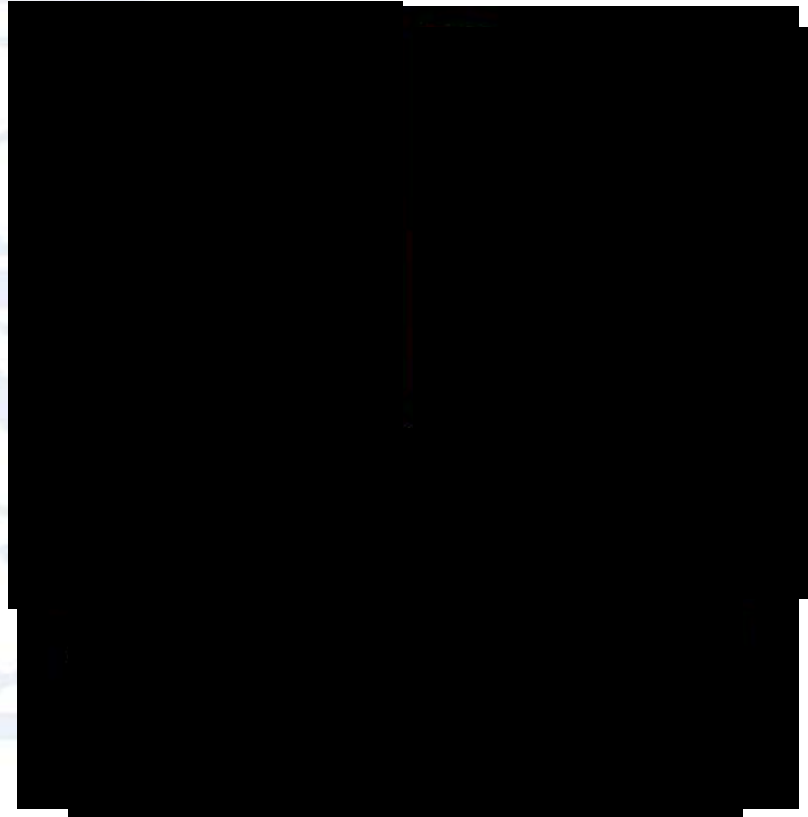
Published SDN Recommendations in ITU-T SG13

- **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 Q20
 - Orchestration Q21
 - Network evolution Q2
- Future research on SDN will focus on how to apply SDN technologies on different types of networks

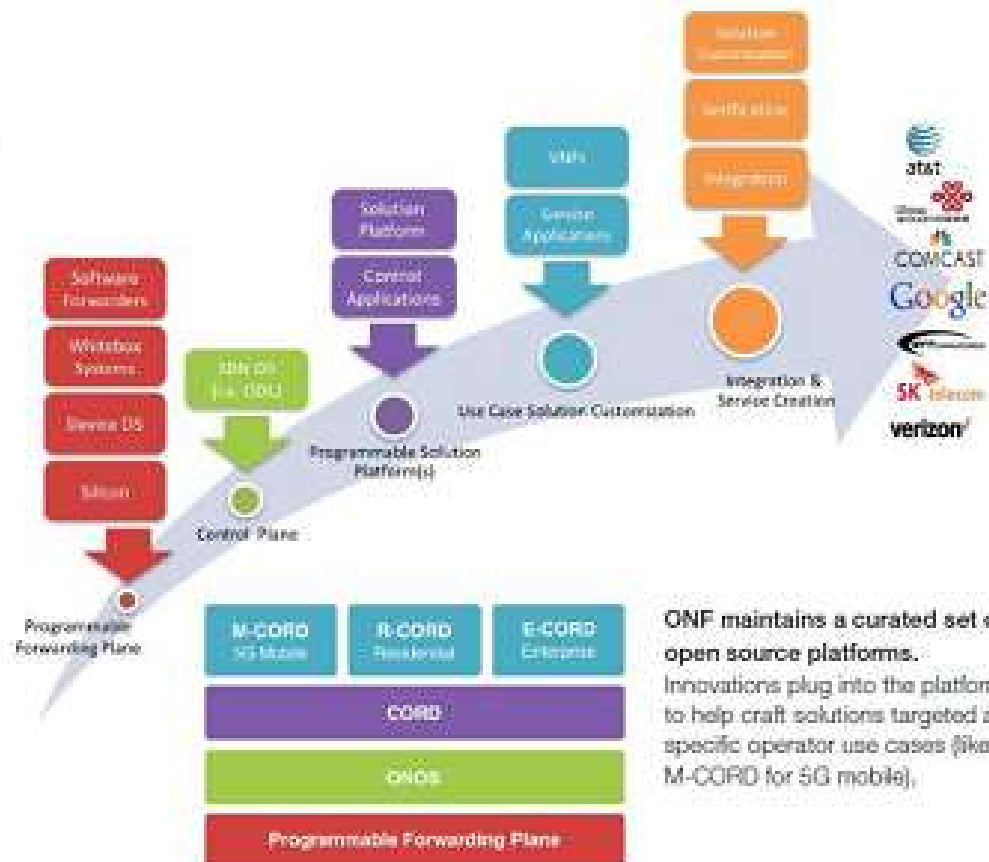


ONF: Accelerating Deployment with Open Innovation Pipeline

- <https://www.opennetworking.org/>

Open Innovation Pipeline

- 1 All ONF Members can bring value and introduce offerings into any active pipeline
- 2 Vendor innovations then have an opportunity to 'ride the pipeline' into use case focused operator trials with ONF operator members



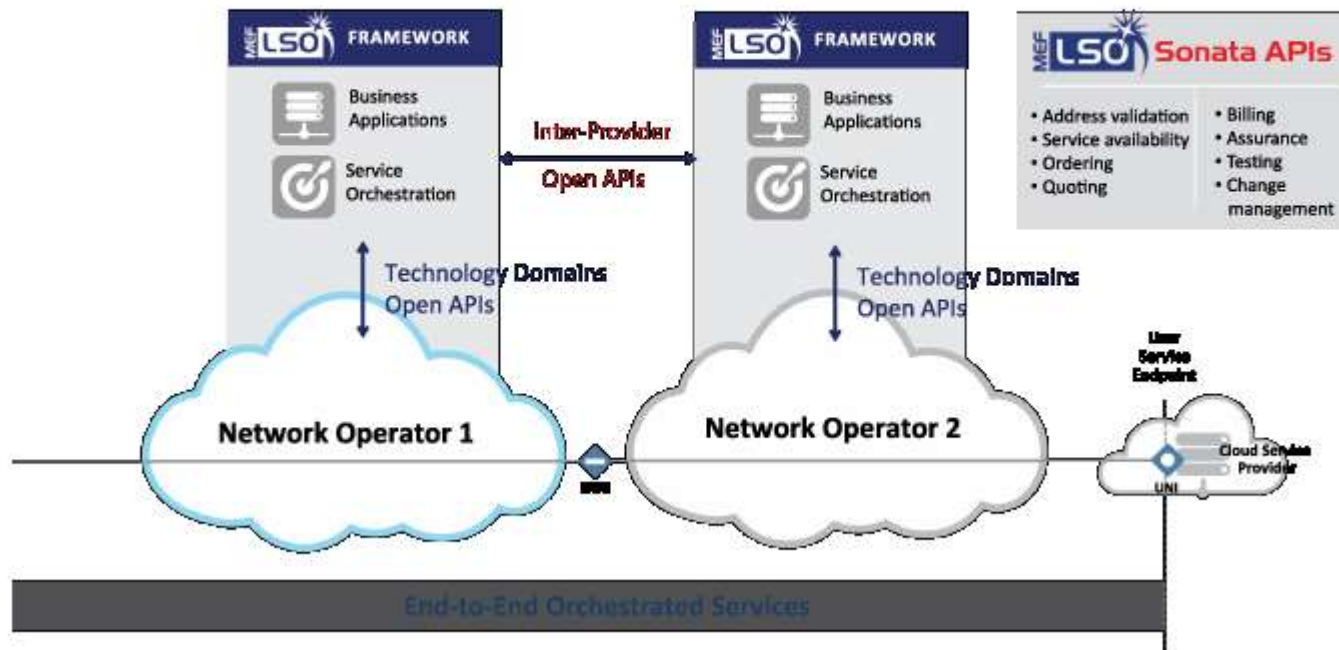
ONF maintains a curated set of open source platforms. Innovations plug into the platform to help craft solutions targeted at specific operator use cases (like M-CORD for 5G mobile).



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



Members: Governance |

A nighttime photograph of a city skyline, likely Shanghai, with several skyscrapers illuminated. Overlaid on the image is a network diagram consisting of glowing orange nodes connected by thin lines, representing a network topology.

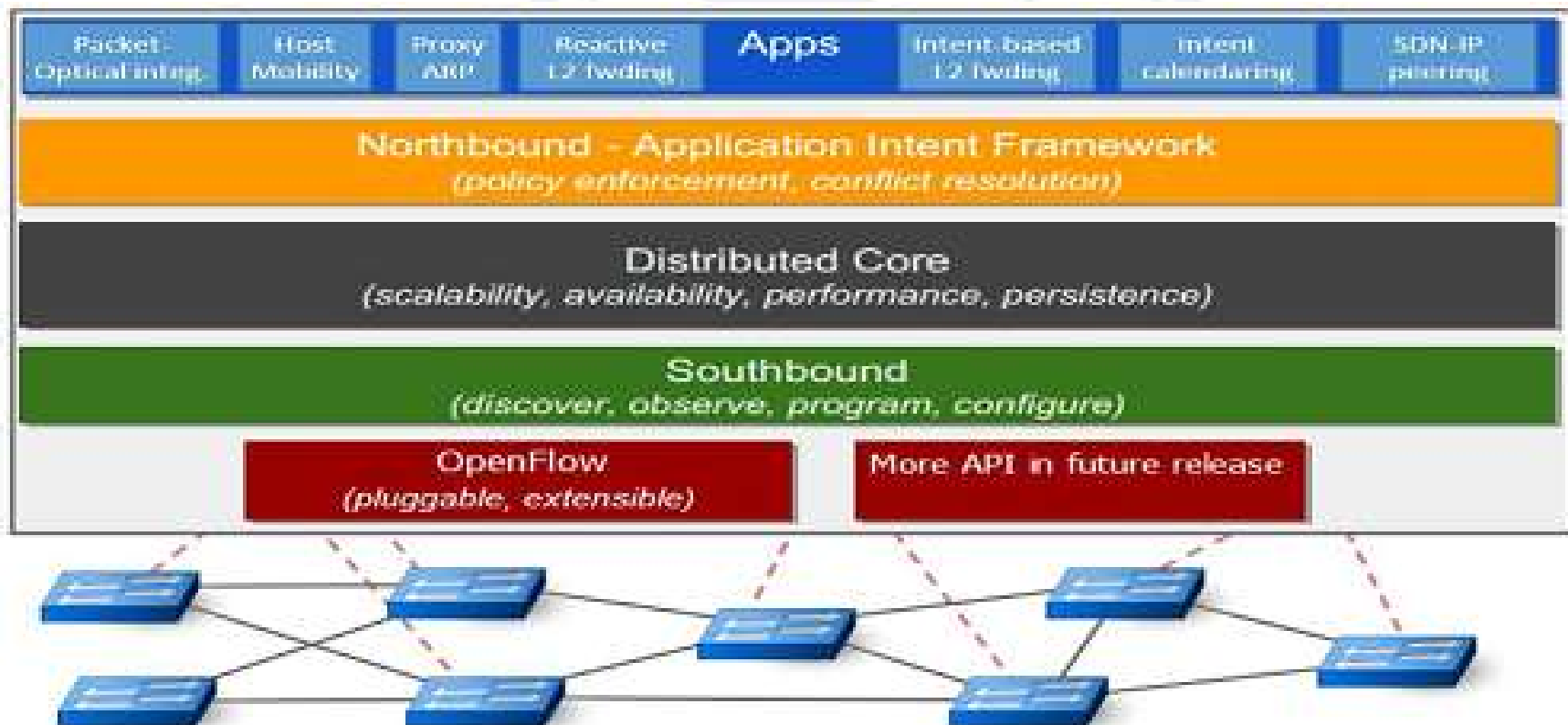
The Linux Foundation Announces Merger of Open Source ECOMP and OPEN-O to Form New Open Network Automation Platform (ONAP) Project

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.



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

Intelligent Information Services

Intelligent technology

- Cloud, Big Data, IoT, Mobile Internet, Artificial Intelligence ...

Integrated Cloud

- SDN, NFV, Universal Hardware, Network Capability Platform ...

Value of Data

- Data Integration, Precision Marketing, Smart Operations, Data Services ...

Ubiquitous Terminals

- ALL Network Mobiles, IoT Terminals, Smart Home GW ...

Service Transformation

Network Transformation

Operation Transformation

Management Transformation

Network Transformation Based on New Technologies

Legacy Network

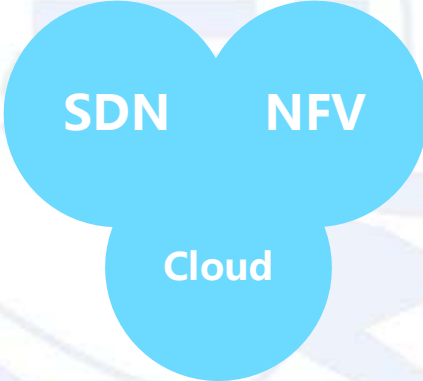
Passive

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

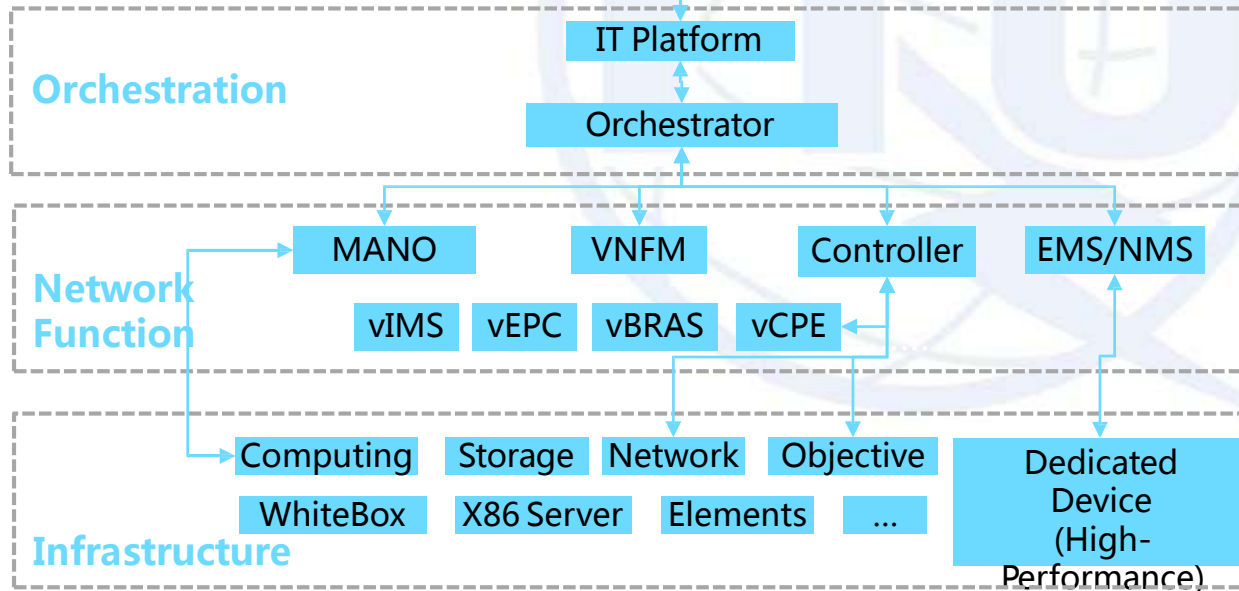
80% NF Virtualized

Large-scale on-demand Service

Deploy New Operation System

Own Services

3rd party APPs



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



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



**Open
Source**

- **Introduce Open Source Software**
- **Build up a new generation of Operation System**



**Integrated
Platform**

- **Encapsulate Network Capability for Exposure**
- **Build up Network with rich Apps**



Win-Win

- **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

A large, light blue watermark of the ITU logo is centered on the page. It features a globe with a lightning bolt and the letters 'ITU' overlaid.

Thank you for attention!