



India (Republic of)

**PROPOSED MODIFICATION TO WTSA-16 RESOLUTION 77:
ENHANCING THE STANDARDIZATION WORK IN THE ITU
TELECOMMUNICATION STANDARDIZATION SECTOR FOR SOFTWARE-
DEFINED NETWORKING**

PROPOSED MODIFICATION TO DRAFT PACP (APT WTSA20-WG3-IM/TMP-05)

1. Abstract

A draft proposal of China to Resolution 77 has been considered as candidate for draft PACP (APT WTSA20-WG3-IM/INP-05) by WG3. This contribution document has prepared by India to suggest some changes in the candidate for draft PACP for discussion in WG3 pertaining to Resolution 77 - Enhancing the standardization work in the ITU Telecommunication Standardization Sector for software-defined networking.

2. Introduction

SDN (Software-Defined Networking) is considered as a well-established shift in networking technology which will give network operators the ability to create and manage new virtualized resources and networks without deploying new hardware technologies. Over the last eight years, SDN related technologies has been witnessing many profound changes. Apart from SDN, other programming network technologies, including, but not limited to, network function virtualization (NFV), intent-based networking, network virtualization, network slicing, computing power networking, big data driven networking, are emerging and more and more mature. The abovementioned programmable network technologies can be collectively known as network softwarization.

The combination and inter-working of the network softwarization technologies are becoming more and more influential in the industry. We have reasons to envisage network softwarization as a long-term technical trend that is fundamentally reshaping the ICT industry in the decades to come.

ITU-T network softwarization achieved some gratifying successes in this ITU-T study period. Many network softwarization related activities are ongoing in various Study Groups (SGs) of ITU-T. Besides, there are plenty of network softwarization standardization activities in other standards development bodies outside ITU-T: ATIS, Broadband Forum (BBF), China Communications Standards Association (CCSA), Internet Engineering Task Force (IETF), and Internet Research Task Force (IRTF). Network softwarization related activities can also be found in 3GPP, ETSI ISG Network Function Virtualization (NFV), ETSI ISG Multi-access Edge Computing (MEC), and IEEE P1903 (Next Generation Service Overlay Network

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(NGSON)). Also, Open Source Software (OSS) projects, such as Linux Foundation Networking (LFN), Open Networking Foundation (ONF), and OpenStack, are becoming important players in network softwarization ecosystems by providing reference implementations, providing feedbacks to specifications, demonstrate proof of concept, and others.

In consideration of all the above changes, we would like to propose that ITU-T should continue to play a prominent role in the development of a system of network softwarization standards to facilitate its broad application in ICT industry.

It is clear that Resolution 77 has been playing a very instrumental role in the past eight years in guiding and facilitating SDN related study in ITU-T. Some of the tasks defined by current Resolution 77 may be close to being completed, but it doesn't mean we don't need this resolution any more. On the contrary, with the development of the programmable network technologies, we believe that ITU-T need extend SDN related study to network softwarization as a cluster of network technologies in this resolution after being updated and reinforced in its long-term strategies towards ICT convergence to provide constant guidance to specific work in ITU-T's various SGs and FGs, etc.

We would also like to propose that ITU-T should make the best use of WTSA-20 as an opportunity to review the existing Resolution 77 by adding new contents and instructs to it, so that it can be refreshed, enhanced and strengthened in order to be able to guide ITU-T's work in network softwarization related subjects in the next Study Period.

ITU-T network softwarization achieved some gratifying successes. SG 13 is leading the standardization of network softwarization's functional requirements and architectures; SG 11 is focusing on developing signalling requirements and protocols standards for network softwarization, closely working with SG 13; SG17 is progressing the security standards on network softwarization.

In ITU-T, the major work items related with network softwarization shown below are published or under study in study period 2017-2020, listed by Study Group:

1) ITU-T Study Group 13 (lead SG of network softwarization)

- Y.3302 (Functional architecture of software-defined networking)
- Y.2322 (The functional architecture of VCNMO (Virtualized Control Network entities Management and Orchestration) in NGN evolution)
- Y.3112 (Framework for the support of Multiple Network Slicing)
- Y.3515 (Cloud computing - Functional Architecture of Network as a Service)
- Y.3523 (Metadata framework for NaaS service lifecycle management)
- Y.3652 (Big data driven networking – requirements)
- Y.CPN-arch (Framework and architecture of Computing Power Network)
- Y.3MO(Requirements and Architectural Framework of Multi-layer, Multi-Domain, Multi-Technology Orchestration for SDN (3MO))
- Y.bDDN-FunArch (Functional architecture of big data driven networking)
- Y.bDDN-MLMec (Mechanisms of machine learning for big data driven networking)
- Y.ccvnf-dm (Cloud computing - Data model framework for NaaS OSS virtualized network function)
- Y.Suppl.MM-SDN (Supplement on use cases of mobility management over SDN)

2) ITU-T Study Group 11

- Q.3714 (Signalling requirements of SDN-based access networks with media-independent management capabilities)
- Q.3716 (Signalling requirements for mapping between physical and virtual networks)

- Q.3717 (Signalling requirements for automatic management of IP address pools by software-designed network technologies on a broadband network gateway)
 - Q.3718 (Signalling requirements of the Sew interface for virtual data centres)
 - Q.3719 (Signalling requirements for the separation of control plane and user plane in vBNG (Broadband Network Gateway))
 - Q.3740 (Signalling requirements for software-defined networking and network function virtualization-based central office services)
 - Q.3741(Signalling requirements for SD-WAN service)
 - Q.3745(Protocol for time constraint IoT-based applications over SDN)
 - Q.CPN (Signalling requirements for computing power network)
 - Q.SD-DCI (Signalling requirements and information model of SD-DCI service)
 - Q.telemetry-VBNS (Signalling requirements for telemetry of virtual broadband network services)
 - Q.VNFT-req (Signaling requirements for VNF lifecycle management under the testing environment)
- 3) ITU-T Study Group 15**
- G.7702 (Architecture for SDN control of transport networks)
 - G.7711/Y.1702 (Generic protocol-neutral information model for transport resources)
- 4) ITU-T Study Group 16**
- F.743.4 (Functional requirements for virtual content delivery networks)
 - F.743.8 (Requirements for cloud computing platform supporting a visual surveillance system)
 - H.626.2 (Architecture for cloud storage in visual surveillance)
 - H.644.1 (Functional architecture for virtual content delivery networks)
 - H.IPTV-TDES.6 (IPTV Terminal Device: Virtualized model)
- 5) ITU-T Study Group 17**
- X.1042 (Security services using software-defined networking)
 - X.1043 (Security framework and requirements for service function chaining based on software-defined networking)
 - X.1604 (Security Requirements of Network as a Service (NaaS) in Cloud Computing)
 - X.1044 (Security Requirements of Network Virtualization)
 - X.SDSec (Guideline on Software-defined Security in SDN/NFV Network)

In our opinion, ITU-T should consider to continue developing the required standards for network softwarization

- *Continuing expanding and accelerating the work on SDN and other network softwarization technologies standardization, especially carrier grade SDN and other network softwarization technologies implementation and testing*
- *Attracting technical contributions from academia given that ITU-T have been actively endeavoring to build a close relationship with academia;*
- *Pushing for the commercialization of SDN and other network softwarization technologies standards;*
- *Popularizing SDN and other network softwarization technologies in developing countries through a collaboration with ITU-D to develop an even bigger potential market for network softwarization;*

3. Proposal

This contribution proposes to continue and enhance SDN and other network softwarization technologies standardization work in ITU-T, and call for APT members to revise WTSA-16 Resolution 77 to reflect the common regional requirements for SDN and other network softwarization technologies standard activities.

Attached is the proposed revision of WTSA-16 Resolution 77 on SDN and other network softwarization technologies. The main purpose is to promote TSAG and related Study Groups in ITU-T to enhancing the cooperation and coordination on SDN and other network softwarization technologies standardization, and call for TSB to provide necessary and more support in this regard.

India proposes to supplement the efforts of P.R. of China to modify the WTSA Resolution 77 and proposes modifications highlighted in **yellow background** as below in section mentioned below:

resolves to instruct study groups of the ITU Telecommunication Standardization Sector

- 3 to study and research the advancements in network softwarisation technologies
- 4 to derive use cases for application of current and future network softwarisation technologies in future networks including IMT-2020, including those that are beneficial to developing countries.

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RESOLUTION 77(REV. Hyderabad, 2020)

(, Hyderabad, 2020)Enhancing the standardization work in the ITU Telecommunication Standardization Sector for software-defined networking

The World Telecommunication Standardization Assembly (Hyderabad, 2020),

considering

- a) that, with the development and trend towards maturity of software-defined networking (SDN) and other related programmable network technologies, more and more organizations are involved in these technologies' standardization, which can be collectively known as network softwarization;
- b) that, apart from SDN, as a cluster of network technologies, network softwarization technologies includes, but not limited to, network function virtualization (NFV), intent-based networking, network virtualization, network slicing, computing power networking, big data driven networking;
- c) the fact that SDN and other network softwarization technologies are profoundly changing the telecommunication and information and communication technology (ICT) industry's landscape **and will continue to do so** in the decades to come, and may bring multiple benefits to the telecommunication/ICT industry;
- d) the rapidly growing interest of a significant number of ITU members in the application of SDN and other network softwarization technologies in the telecommunication/ICT industry;
- e) that the network orchestrator provides the important bond between a wide range of technologies that enable cloud-based network and telecommunication services, at the same time recognizing the work of other organizations such as the European Telecommunications Standards Institute (ETSI) Network Functions Virtualisation Industry Specification Group (NFV ISG), the Open Network Automation Platform (ONAP) and the ETSI Open-Source NFV Management and Orchestration (MANO) project (OSM);
- f) Several ITU Telecommunication Standardization Sector (ITU-T) study groups including SG11, SG13, SG15, SG16, SG17 have made great standardization achievements on SDN and other network softwarization technologies ranging from functional requirements, architecture, signalling and protocols, data models to security and multimedia application, and still have many standardization issues to deal with.
- g) Resolution 139 (Rev. Busan, 2014) of the Plenipotentiary Conference, on telecommunications/ICT to bridge the digital divide and build an inclusive information society;
- h) Resolution 199 (Busan, 2014) of the Plenipotentiary Conference, on promoting efforts for capacity building on SDN in developing countries,

noting

- a) that ITU-T should play a prominent role in the development of the above-mentioned system of deployable SDN and other network softwarization technologies standards;
- b) that a standards ecosystem should be enhanced, with ITU-T at its centre,

recognizing

- a) that ITU-T has unmatched advantages when it comes to requirements and architecture standards;
- b) that a solid foundation is required to continue developing and enhancing SDN and other network softwarization technologies requirements, architecture, signalling/protocol, data model and security standards, so that the whole set of standards may be built through an industry-wide synergy,

resolves to instruct study groups of the ITU Telecommunication Standardization Sector

1 to continue and enhance collaboration and cooperation with different standards development organizations (SDOs), industry forums, and open-source software projects on SDN and other network softwarization technologies, as appropriate, including, but not limit to, NFV, intent-based networking, network virtualization, computing power networking, network slicing, big data driven networking;

2 to continue to expand and accelerate the work on SDN and other network softwarization technologies standardization, especially carrier SDN ranging from functional requirements, architecture, signalling and protocols, data models to security and multimedia application;

3 to study and research the advancements in network softwarisation technologies

4 to derive use cases for application of current and future network softwarisation technologies in future networks including IMT-2020, including those that are beneficial to developing countries.

5 to continue to develop standards to coordinate the network orchestrator layer and ITU-T operation supporting system (OSS) related work;

instructs the Telecommunication Standardization Advisory Group

to examine the matter, consider the input of study groups and take the necessary actions, as appropriate, with a view to deciding on the necessary SDN and other network softwarization technologies standardization activities in ITU-T, with the following actions:

- to continue coordination and assistance in SDN and other network softwarization technologies standardization across different ITU-T study groups effectively and efficiently;
- to continue collaboration with other network softwarization technologies related standards bodies and forums;
- to coordinate the work on technical issues of SDN and other network softwarization technologies across the study groups according to their areas of expertise;
- to define a clear strategic vision for SDN and other network softwarization technologies standardization and an important active role that ITU-T should play,

instructs the Director of the Telecommunication Standardization Bureau

1 to provide the necessary assistance with a view to expediting such efforts, in particular using any opportunity within the allocated budget to exchange opinions with the telecommunication/ICT industry, including through the chief technology officer (CTO) meetings under Resolution 68 (Rev. Hammamet, 2016) of this assembly, and in particular to

promote participation of the industry in SDN and other network softwarization standardization work in ITU-T;

2 to conduct workshops, with other relevant organizations, for capacity building on SDN and other network softwarization technologies, so that the gap in technology adoption in developing countries may be bridged at the early stages of implementation of SDN and other network softwarization technologies based networks, and to organize the annual SDN and other network softwarization technologies workshop with open-source solutions representation to share the progress in SDN and other network softwarization technologies standards and real experience in the current carrier network,

invites Member States, Sector Members, Associates and academia

to submit contributions for developing SDN and other network softwarization standardization in ITU-T.