**Question 1/11 – Signalling and protocol architectures for telecommunication networks and guidelines for implementations**

(Continuation of Question 1/11)

# 1      Motivation

The desire to support services within networks and supported by networks has resulted in a number of architectural solutions being worked on in numerous standardization bodies and forums. A standardized architectural model for a control signalling with regard to the voice and video over LTE based networks (VoLTE/ViLTE), network virtualization, cloud computing, ML/AI, Distributed Ledger Technology, QKDN and related technologies and other emerging telecommunication/ICT technologies which might be applied in IMT-2020, IMT-2020 network and beyond is needed.

A standard reference model for the control plane is required to identify a set of interfaces which provide interoperability between telecommunication networks, between equipment from different suppliers, between the cloud computing networks, between the virtualized and the physical networks and between networks evolve in different phases such as IMT-2020 network and beyond.

As ITU-T has developed the standards for existing public networks, including services and control protocols, this Question plans to develop the signalling and protocol architectures for telecommunication networks with emerging technologies including ML/AI, Distributed Ledger Technology, QKDN and related technologies and so on. Furthermore, this Question will study the enhancements to the signalling and control architecture to support the distributed ENUM signalling system.

Cooperation with the ITU-T study groups and with other standards development organizations (SDOs) is required to gather any relevant information from these organizations and take an important role to coordinate them to achieve the global interoperability.

In addition, ongoing studies and results achieved by various international standardization bodies have led to the emergence of different solutions to address convergence and interoperability due to the evolution of protocols in packet-based networks. For this reason, ITU Member States, particularly those in developing countries, have expressed the needs for assistance in understanding network and service deployment strategies and scenarios by developing Guidelines on signalling protocols implementations for networks and services.

This Question will maintain the previous Technical Reports and Guidelines on implementation of signalling and protocols developed to support developing countries. In addition, it will maintain Recommendations in force for which the Question is responsible, e.g., ITU-T Q.3030, Q.3040, Q.3050, Q.3051 and Q.3052.

# 2      Question

Study items to be considered include, but are not limited to:

–       What enhancements to the signalling and control architecture are required to model the control plane for telecommunication networks with emerging technologies such as ML/AI, Distributed Ledger Technology, QKDN and related technologies and the technologies applied in IMT-2020 network and beyond, taking into account new services and new applications and all types of wireline and wireless public access networks over which these services may be delivered?

–       What enhancements to the signalling and control architecture are required to support the distributed ENUM signalling system?

–       What enhancements to the signalling and control architecture are required to support VoLTE/ViLTE and IMT-2020 services including eMBB, mMTC and uRLLC, and other new value-added services?

–       What enhancements to the signalling and control architecture are required to assure security of signalling and control, and to support services and/or applications of public interest such as emergency call handling, number portability, privacy, etc.?

–       What activity is needed to prepare common Guidelines by the ITU-T and ITU-D Sectors, containing different aspects related to network and service deployment strategies and scenarios to support the implementation of signalling protocols in networks and services?

–       What coordination mechanisms are needed in regards of the signalling and protocol development for emerging telecommunication networks in cooperation with the ITU-T study groups and with other standards development organizations (SDOs)?

## 3       Tasks

Tasks include, but are not limited to:

–       determine the requirements that the generic, access-technology-independent telecommunication network signalling control protocol architecture is intended to support. It is anticipated that these requirements will need to be periodically refined to reflecting the evolution of telecommunications and computer communication technologies taking into consideration the signalling control protocol architectures available from ITU-T and other SDOs;

–       identify modifications and enhancements to the signalling control protocol architecture that will enable the architecture to meet the requirements of the emerging network architecture (including IMT2020, IMT-2020 network and beyond, etc.);

–       study the signalling and control architecture to model the control plane for telecommunication networks with emerging technologies such as ML/AI, Distributed Ledger Technology, QKDN and related technologies and the technologies applied in IMT-2020 network and beyond;

–       identify enhancements to the signalling control protocol architecture to support the distributed ENUM signalling system;

–       identify enhancements to the signalling control protocol architecture in support of the telecommunication networks evolving to future networks;

–       identify a set of interfaces for which interoperability and interworking between different network equipment is desirable and for which detailed signalling requirements need to be studied and control protocols need to be standardized;

–       study and prepare common Guidelines containing different aspects related to network and service deployment strategies and scenarios to support the implementation of signalling protocols in networks and services, especially to support developing countries;

–       ensure communication and cooperation amongst study groups and forums related to signalling and protocol development for emerging networks.

An up-to-date status of work under Q1/11 is contained in the SG11 work programme (https://www.itu.int/ITU-T/workprog/wp_search.aspx?sp=17&q=1/11).

## 4       Relationships

**Recommendations:**
–       Y.2012, Y.3015, Y.3510, Y.3104

**Questions:**

– All Questions of SG11, especially Questions related to signalling architectures and protocols

**Study Groups:**

– SG2 on ENUM aspects

– SG13 on architecture of the existing and emerging networks

– SG15 on transport

– SG16 on multimedia services and coding

– SG17 on security framework

– SG20 on IoT and its applications

– ITU-D SG1 and SG2

**Other bodies:**

– ATIS

– Broadband Forum

– CCSA

– ETSI

– IETF

– IEEE

– W3C

**WSIS action lines:**

– C2, C11

**Sustainable Development Goals:**

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