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|  | | | Geneva, 21 December 2017 | |
| **Ref:** | **TSB Circular 38**  SG13/TK | | **To:**  - Administrations of Member States of the Union | |
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| **Subject:** | **Approval of revised Questions 19/13, 20/13 and 21/13** | | | |

Dear Sir/Madam,

1 At the request of the Chairman of Study Group 13, *Future networks, with focus on IMT‑2020, cloud computing and trusted network infrastructures*, I have the honour to inform you that, in accordance with the procedure described in Resolution 1, Section 7, § 7.2.2, of WTSA (Rev. Hammamet, 2016), Member States and Sector Members present at the first Study Group 13 meeting in this study period held in Geneva from 6 to 17 February 2017 agreed by reaching consensus to approve the revised Questions 19/13, 20/13 and 21/13:

1.1 Question 19/13 (*End-to-end cloud computing management, cloud security and big data governance*)

The text of revised Question 19/13 is in **Annex 1** to this Circular. The attached **Note** in Annex 1 summarizes the reasons for the revision.

1.2 Questions 20/13 *(IMT-2020: Network requirements and functional architecture)*

The text of revised Question 20/13 is in **Annex 2** to this Circular. The attached **Note** in Annex 2 summarizes the reasons for the revision.

1.3 Question 21/13 *(Network softwarization including software-defined networking, network slicing and orchestration)*

The text of revised Question 21/13 is in **Annex 3** to this Circular. The attached **Note** in Annex 3 summarizes the reasons for the revision.

2 Revised Questions 19/13, 20/13 and 21/13 are therefore approved.

Yours faithfully,

*(signed)*

Chaesub Lee  
Director of the Telecommunication  
Standardization Bureau

**Annexes**: **3**

**ANNEX 1**

**Question Q19/13 - End-to-end cloud computing management, cloud security and big data governance**

(Continuation of Question 19/13)

**Motivation**

Cloud computing is a model for enabling service user's ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services), that can be rapidly provisioned and released with minimal management effort or service provider interaction. The cloud computing model is composed of five essential characteristics (on-demand, delivery over a broad network access, resource pooling, rapid elasticity, self and measured services), five cloud computing service categories, i.e., Software as a Service (SaaS), Communication as a Service (CaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS) and Network as a Service (NaaS), and different deployment models (public, private, hybrid…).

The term multi-cloud is used to refer to cloud services where their applications (components) may be deployed on one or more Cloud Provider. In such scenarios inter-cloud exchange between the two Cloud Providers may occur. The actual architecture is specific to the application to each design.

Due to convergence of telecommunication and Information Technology services in the area of cloud computing, telecommunication players have an important role to play in the emerging cloud computing market and ecosystem. The telecommunication network is a central part for multi-tenant cloud computing architecture delivering composite services with high QoS and optimal resource allocation.

With the adoption of cloud services, the network, computing, storage and application boundary of an organization will extend into the Cloud Service Provider domain. As a result an organization's trust boundary will become dynamic and will move beyond their internal control. The organization's loss of control over who has access to what information and resources, regardless of where those resources reside, is an area of concern in cloud computing and a challenge to the management and security of cloud services and resources. This challenge can be addressed by sharing identity information with the Cloud Service Provider (CSP) through the use of cloud specific identity management solutions, including cloud identity federation. This work will be done in close collaboration with the security-related Questions.

The primary focus of this Question is cloud service and infrastructure management and the management of composite cloud services and components that use a variety of telecom and IT infrastructure resources. These cloud services are typically composed of individual services elements that may be acquired from or exposed to third parties. This is a very complex management environment and requires the study of standards that provide a means to enable consistent end-to-end, multi-cloud management and monitoring of services exposed by and across different service providers' domains and technologies. This Question also includes the study of security mechanisms and methods to streamline and manage service delivery mechanisms across the service life cycles so that services can be created and delivered efficiently.

The second focus of this Question is big data governance including data management, data preservation as well as lifecycle management of big data to provide the necessary overall frameworks, definitions, and ecosystems including requirements, capabilities related to the integration or support of the big data model and technologies in telecommunication ecosystem.

It should be noted that the term "end-to-end" is used here in the information technology context, and does not refer to the management of endpoints or user devices, as it would have otherwise been implied if the telecommunication technology context were used. The term end-to-end simply refers to a holistic, multi-layer, multi-component, and multi-cloud management and security, which is in the scope of this Question.

**Question**Study items to be considered include what new Recommendations should be developed regarding:

* Cloud service management (in cooperation with SG2) as well as cloud infrastructure and resource management, utilizing ideally common underlying principles, best practices, fundamentals, frameworks and design, a requirement demanded by telecom operators and service developers
* The scope includes multi-cloud management, end-to-end management scenarios for cloud services and cloud infrastructure/resources
* Big data governance including data management, data preservation as well as lifecycle management of big data
* Study (in cooperation with SG17) of cloud specific identity, access and security mechanisms that enable effortless trusted access to cloud resources in multi-provider scenarios, to the extent that such cloud specific scenarios do exist (not yet established)

**Tasks**

Tasks include:

* Developing Recommendations for high level requirements and capabilities for end-to-end cloud computing service management including cloud infrastructure and resource management
* Developing Recommendations for cloud federated identity and access management if deemed necessary
* Developing Recommendations for big data governance including data management, data preservation as well as lifecycle management of big data
* Developing Recommendations required for cloud computing security as defined in the Cloud Computing security collaboration between SG13 and SG17 (COM 13-R 10, Annex 6)
* Providing the necessary collaboration with external SDOs, consortia and forums working on cloud computing architectures and infrastructures to minimize duplication of efforts

An up-to-date status of work under this Question is contained in the SG13 Work Programme:  
<http://www.itu.int/ITU-T/workprog/wp_search.aspx?Q=19/13>

**Relationships**

Questions:

* All cloud computing related SG13 Questions (Q6/13, Q16/13, Q17/13, Q18/13, and Q21/13, Q22/13), SG2 (Q5/2, Q7/2), SG17 (Q8/17, Q10/17)

Standardization bodies, forums and consortia:

* ISO/IEC JTC 1/SC 27
* ISO/IEC JTC 1/SC 38
* ISO/IEC JTC 1/SC 40
* Distributed Management Task Force (DMTF)
* Storage Networking Industry Association (SNIA)
* TM Forum
* OASIS
* IETF

**Note**: Question 19/13 deals with several activities on big data, such as big data governance including data management, data preservation, as well as lifecycle management of big data. The big data related activities of Question 19/13 were communicated to outside organizations such as ISO/IEC JTC 1 SC40. The big data activities therefore forms part of the scope of Question 19/13. To align the Question 19/13 text to these activities and to follow the trend of revisions to the cloud computing ecosystem within SG13 Questions, Q19/13 description was updated as shown above.

**ANNEX 2**

## Question 20/13 - IMT-2020: Network requirements and functional architecture

(Continuation of Question 20/13)

### Motivation

The objective of the development of IMT-2020 is to address the anticipated needs of users of mobile services in the years 2020 and beyond. The vision and service scenarios will have been identified by related SDOs (ITU-R, 3GPP, NGMN, etc.), e.g., Enhanced Mobile Broadband, ultra-reliable and low latency communications, massive machine type communications.

IMT-2020 systems will differentiate themselves from fourth generation (4G) systems not only through further evolution in radio-interfaces but also through greatly increased flexibility end-to-end. On one hand, requirements on service scenarios should be met by IMT-2020 function design. On the other hand, this end-to-end flexibility will bring the challenge to architecture and functional design of IMT-2020 considering diverse service requirement. And it comes in large part from the incorporation of network softwarization into every component. Well known techniques such as NFV, SDN will together allow unprecedented flexibility in the IMT-2020 system. Such flexibility will enable many new capabilities including network slicing.

This question focuses on the study of the requirements, capabilities, architecture and key technologies to realize the IMT-2020 network. And the ecosystem from business models and use cases should be promoted to build and realize the better cooperation with mobile customers. Open source projects should also be utilized and guide to meet the requirement of IMT-2020 network.

### Question

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

• What are the key requirements and capabilities of IMT-2020 networks based on the service scenarios of IMT-2020?

• What framework and architecture are required to realize networks of IMT-2020 based on the identified requirements and capabilities?

• What key technologies related to IMT-2020 are required to realize networks of IMT-2020?

• How to build and/or guide the ecosystem on IMT-2020 taking into account business models and use cases

• How to utilize and guide the open source software related to IMT-2020 to meet the requirements of IMT-2020

### Tasks

Tasks include, but are not limited to:

• Development of Recommendations on the requirements and capabilities for the networks of IMT-2020 based on the service scenarios of IMT-2020

• Development of Recommendations on the framework and architecture design of IMT-2020 based on, but not limited to, the above identified requirements, capabilities and the gap analysis identified by FG on IMT-2020

• Development of Recommendations and other relevant documents on overall requirements and functional architecture of IMT-2020 incorporating relationship with IMT-2020 technologies including network softwarization, network slicing, orchestration, capability exposure, etc.

• Development of Recommendations on the interworking with current networks including IMT-Advanced, etc.

• Study of potential utilization and guide of open source software activities in IMT-2020 networks

• Development of Recommendations on ecosystem aspects taking into account business models and use cases

An up-to-date status of work under this Question will contained in the SG13 Work Programme.

<http://www.itu.int/itu-t/workprog/wp_search.aspx?sg=13>

### Relationships

**Recommendations:**

• Y-series in SG13

**Questions**:

• All SG13 related Questions, such as Q6/13, Q16/13, Q21/13, Q22/13, Q23/13

**Study Groups:**

• ITU Study Groups involved with IMT-2020 studies

**Standardization bodies:**

• ITU-R

• 3GPP

• NGMN

• IETF

**Note**: The text of Question 20/13 was revised in order to align its text with that one of the updated Q21/13. The latter incorporates now the network softwarization in its title and body.

**ANNEX 3**

## Question 21/13 – Network softwarization including software-defined networking, network slicing and orchestration

(Continuation of Q21/13)

### Motivation

With the emergence of various new services such as industrial control, self-automated driving, mission critical communications, cloud-based services and others, Software Defined Networking (SDN), network slicing and orchestration are considered as key technological enablers for networks of the future, and have been studied in Y.3000 and Y.3300-series. Coming from the SDN technological perspectives these recommendations describe the logically isolated network partition (LINP)/network slice, orchestration and data plane programmability as enabler for network operators to control their networks in unified, flexible and programmable manner. Ability to orchestrate various functions and applications in a programmatic manner helps the integrated operation and simplifies the operational complexity of underlying networks. In other words, SDN and orchestration contribute to easier operation through integrating management and control into management-control continuum, and enabling autonomous operation. All these technologies represent the emerging trend to introduce software-based flexibility, agility and dynamicity in the network, namely network softwarization. Since the network softwarization consists of the key technologies for networks of the future including IMT-2020, various SDOs and open source activities have started to study these technologies in an intensive manner. But the industry’s understandings of these technologies, in particular orchestration, its management-control continuum, their applicability to distributed networking technologies varies between each community and industry-wide, generic understandings applicable to the telecommunication industry still need to be studied.

The Recommendations that specify framework, service scenarios, requirements, and architecture of network softwarization including SDN, network virtualization, network slicing, orchestration and data plane programmability technologies, their management-control continuum, fall under the responsibility of this question.

### 2 Question

Study items to be considered, but not limited to:

• What are the requirements and architecture of SDN and data plane programmability to support functions such as network virtualization and network slicing necessary for exploding and diversifying services taking into account scalability, security and distribution of functions?

• What are the key requirements and architecture of orchestration, related management-control continuum capability, and their exposure, especially on distributed networks, softwarized network and network slices, taking into account energy saving, high efficient resource utilization and others?

• What are the gaps in standardization effort for SDN, network virtualization, network slicing approach and orchestration as well as in open source activities?

### 3 Tasks

Tasks include, but are not limited to:

• Considering open source activities, development and maintenance of Recommendations on requirements, functional architecture and mechanisms for network softwarization including generic SDN and their profiles, network virtualization, network slicing, and its application to networks

• Development of Recommendations on the orchestration and related management-control continuum capabilities/policies of network function components, slices and infrastructure including enhancement and support of distributed networking capabilities

• Development of Recommendations on the capability of network slicing and related management-control continuum

An up-to-date status of work under this Question is contained in the SG13 Work Programme:  
<http://www.itu.int/itu-t/workprog/wp_search.aspx?sg=13>

### 4 Relationships

**Recommendations:**

• Y-series Recommendations, in particular Y.3000 and Y.3300-series

• SDN, network virtualization, network slicing, orchestration-related G, H, Q and X‑series Recommendations

**Questions:**

• All SDN including network virtualization, network slicing and orchestration related Questions

**Study Groups:**

• ITU-T Study Groups involved in SDN including network virtualization, network slicing and orchestration studies and testing

**Standardization bodies, fora and consortia:**

• ISO/IEC JTC1 SC 6

• ETSI ISG Network Functions Virtualization (NFV)

• Open Networking Foundation

• 3GPP

• IETF/IRTF

• TMF

• BBF

• Open-source activities involved in SDN including network virtualization, network slicing and orchestration studies

**Note**: Q21/13 was carefully crafted to include the network softwarization term into the Question title and description in light with the emphasis WTSA-16 made on the studies of this technical topic in SG13.

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