Question 4/11 – Protocols for control, management and orchestration of network resources

(Continuation of Question 4/11)

1   Motivation

This Question has developed a series of data models, signalling requirements and protocols related Recommendations on control, management and orchestration of bearer network resources. It is expected that the standardization on the above aspect continues, including but not limited to Software-Defined Networking (SDN), Network Function Virtualization (NFV), cloud computing networking, network slicing, IMT-2020 network and beyond, network virtualization, IPv6 transition, future networks (FN), and expands to new ITU-T study area, such as Artificial Intelligence/Machine Learning (AI/ML) and big data driven networking, Distributed Ledger Technology, distributed cloud, Multi-access Edge Computing (MEC), computing power networking, and other emerging IT supporting bearer network technologies.

The behaviour of the traffic which is generated by more and more new services, such as the service enabled by SDN, NFV, cloud computing networking, and other emerging IT supporting bearer network technologies, is very different from the traffic generated by the traditional NGN services. Accordingly, the architecture to control such new traffic may become more complicated. Bearer network signalling requirements are closely related to network resource control mechanisms and protocols.

Recommendations in force for which the Question is responsible: Q.1970, Q.1990, Q.2630, Q.2761-2764, Q.2920, Q.2931 and Q.2932.1, Q.3150/Y.1416, Q.3151/Y.1417, Q.3300, Q.3301.1, Q.3302.1, Q.3303.0, Q.3303.1, Q.3303.2, Q.3303.3, Q.3304.1, Q.3304.2, Q.Suppl.51, Q.Suppl.67, Q.3316, Q.3405, Q.3716, Q.3718, Q.3740, Q.3741.

2   Question

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

–   What data models, signalling requirements and protocols are required for control, management, and orchestration of network resources involving new types of transport protocols and transport networks (e.g., cloud computing networking, smart grid, FN, SDN, NFV, network virtualization, network slicing, MEC and IMT-2020 network and beyond)?

–   What data models, signalling requirements and protocols are required for big data and AI/ML driven networking?

–   What data models, signalling requirements and protocols are required for networking telemetry?

–   What data models, signalling requirements and protocols are required for Distributed Ledger Technology supported networking?

–   What data models, signalling requirements and protocols are required for cloud and distributed cloud networking?

–   What data models, signalling requirements and protocols are required for computing power networking?

–   What new Recommendations are required to support bearer and resource control for new application areas such as unicast/multicast flows for IPTV service, home networking, and mobility?

–   What new Recommendations are required to support handover control for mobility?

–   What new Recommendations are required to support security of bearer and resource control and signalling?

–   What new functional architecture and protocol enhancements are required to support bearer and resource control for services and applications of public interest, such as emergency call handling and disaster relief?

–   What new Recommendations are required to support signalling of quality of service (QoS) information, traffic management?

–   What enhancements to existing Recommendations are required to provide energy savings directly or indirectly and efficient resource utilization in information and communication technologies or in other industries?

–   What enhancements to new Recommendations are required to provide such energy savings and efficient resource utilization?

–   What new services can be identified for which the introduction of IPv6 is a necessary precondition?

–   What new protocol procedures are required to implement the services identified above?

–   What new Recommendations on information model and data model are required to collaborate with emerging open source communities?

3   Tasks

Tasks include, but are not limited to:

–   develop data models, signalling requirements and protocols for new bearer services to support traffic of new applications based on future network architectures, including SDN, NFV, network virtualization, MEC, network slicing, cloud and distributed cloud networking, IMT-2020 network and beyond, etc.;

–   develop data models, signalling requirements and protocols for big data and AI/ML driven networking;

–   develop data models, signalling requirements and protocols for networking telemetry;

–   Develop data models, signalling requirements and protocols for cloud and distributed cloud networking;

–   develop data models, signalling requirements and protocols for Distributed Ledger Technology supported networking, including Decentralized Trustworthy Network Infrastructure (DNI);

–   develop data models, signalling requirements and protocols for computing power networking;

–   develop signalling requirements and protocols for admission control coordination;

–   develop signalling requirements and protocols for bearer and resource control and traffic management supporting unicast/multicast flows for IPTV service;

–   develop signalling requirements and protocols for QoS signalling and traffic management;

–   develop signalling requirements and protocols for bearer and resource control supporting home networking;

–   develop signalling requirements and protocols to support handover for seamless session mobility;

–   develop signalling requirements and protocols for interaction among bearer and resource control domains;

–   develop specifications of interfaces to adjacent layers with relevant ITU-T SG Questions/groups;

–   enhance the existing bearer and resource control and signalling related Recommendations;

- study and develop Recommendations to identify requirements for service dependent bearer control and signalling related mechanisms;
- identify services for which new protocol procedures are required for the transition to IPv6;
- develop new protocol procedures for services identified above;
- develop informational model and data model based signalling requirements and protocols for further implementation using open source.

An up-to-date status of work under Q4/11 is contained in the SG11 work programme (https://www.itu.int/ITU-T/workprog/wp_search.aspx?sp=17&q=4/11).

4 Relationships

Recommendations:
- H.248, Q.1950, Y.1541, Y.1221, Y.2111, I.555, Q.1970, Q.1990, Q.263x-series, Q.29xx-series, Y.2121, Y.3300, Y.35xx-series, Q.37xx-series, Q.33xx-series, Q.34xx-series

Questions:
- All Questions of SG11

Study Groups:
- SG15 on transport and ASON technologies, especially on transport network architectures and management and control of transport systems and equipment
- SG16 on multimedia and AI aspects
- SG17 on security aspects
- SG13 on SDN, NFV, cloud and distributed cloud networking, network virtualization, network slicing, MEC, big data driven networking, AI/ML driven networking, IMT-2020 network and beyond

Other bodies:
- 3GPP
- ETSI
- IEEE
- IETF
- TIA
- Linux Foundation Edge
- Linux Foundation Networking (LFN)
- Linux Foundation Hyperledger
- OpenStack
- Open Network Operating System

WSIS action lines:
- C2, C11

Sustainable Development Goals:
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