

Seventh SG13 Regional Workshop on “Standardization of future networks building a better connected Africa”
(Abuja, Nigeria, 3-4 February 2020)

Standardization for Quantum Key Distribution Networks in ITU-T SG13

3 February 2020

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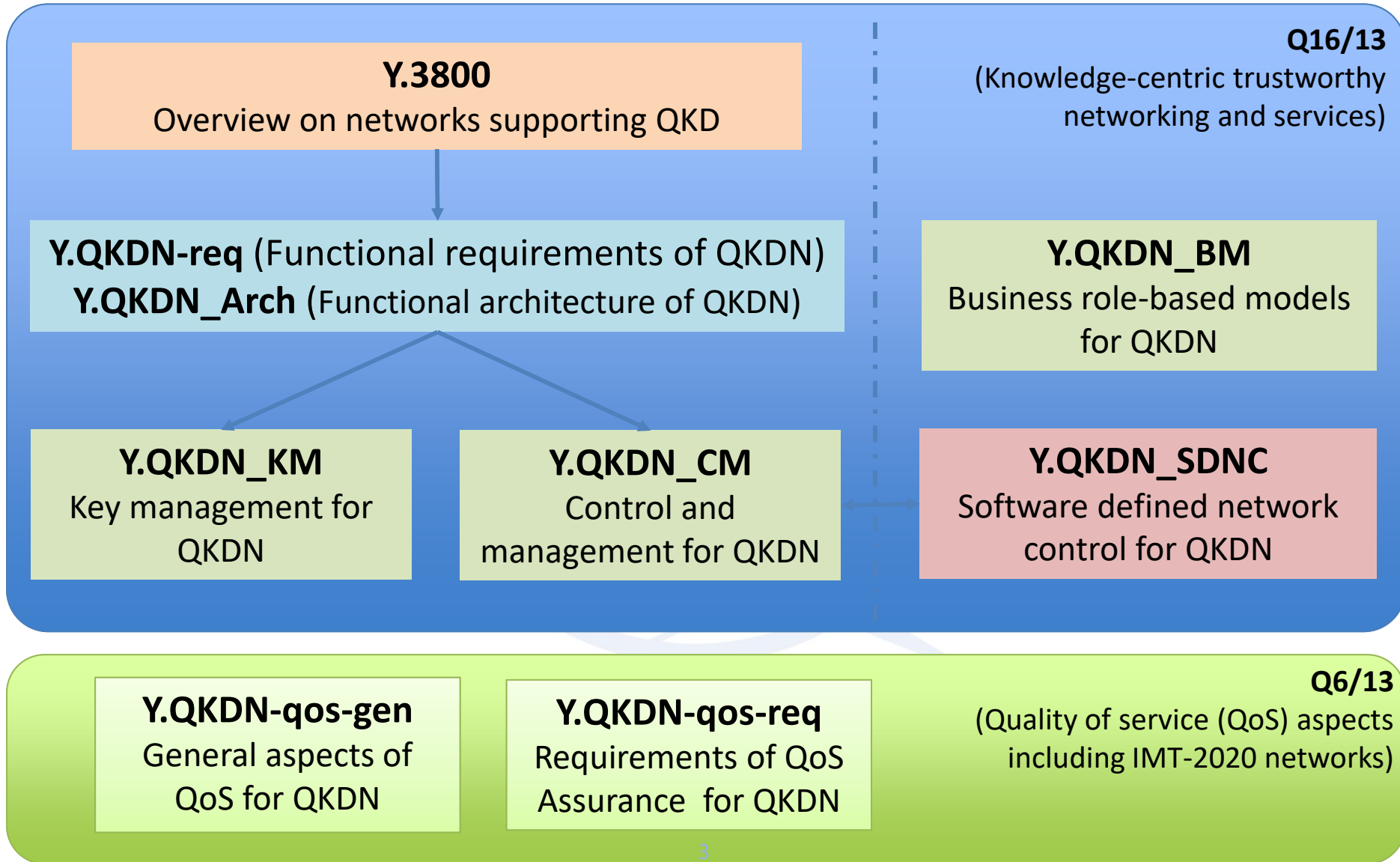
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Quantum Key Distribution Networks

- July 2018
 - First initiative on QKDN – Y.QKDN_FR
- March 2019
 - Two new work items: Y.QKDN_Arch, Y.QKDN_KM
- June 2019
 - First Rec. Y.3800 was consented
 - Two new work items: Y.QKDN_CM, Y.QKDN_SDNC
- October 2019
 - First Rec. Y.3800 (i.e., Y.QKDN_FR) was approved
 - Four new work items: Y.QKDN-req, Y.QKDN-BM, Y.QKDN-qos-gen, Y.QKDN-qos-req
- Liaisons to all related groups for cooperation
 - ITU-T SG2, SG11, SG17 and ETSI ISG-QKD, ISO/IEC JTC1/SC27
- Interim meetings
 - Sep. 2018 (e-meeting), Jan. 2019 (Seoul), May 2019 (Tokyo), Aug. 2019 (Beijing), Dec. 2019 (Seoul), Jan. 2020 (Tokyo), Feb. 2020 (e-meetings)

QKD related documents in SG13



Y.3800 - "Overview on networks supporting quantum key distribution"

This Recommendation specifies an overview on networks to support quantum key distribution (QKD) to address network aspects to implement QKD technologies. In particular, this Recommendation addresses the followings:

- an overview of QKD technologies;
- network capabilities to support QKD;
- Conceptual structure and basic functions of QKD networks (QKDN).

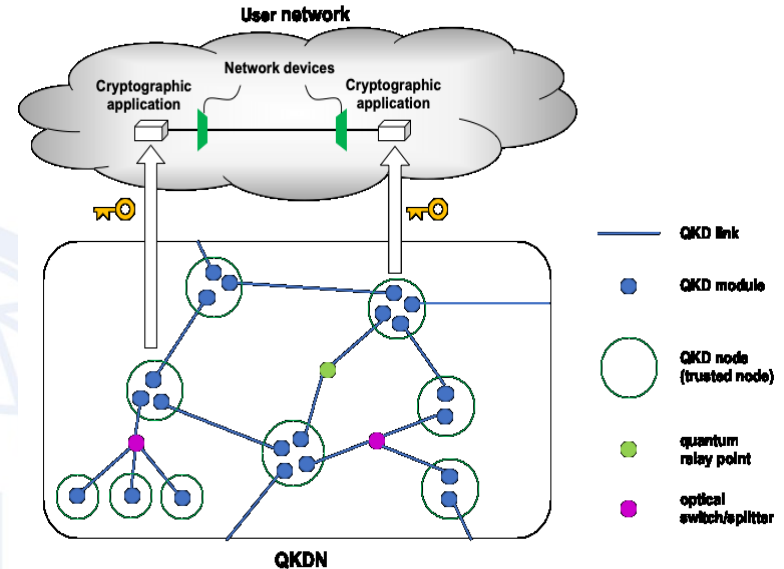


Illustration of QKDN concepts and their relation to a user network

QKDN design considerations:

- Security, scalability, stability, efficiency, application-oriented, robustness, integratability, interoperability, migratability, manageability

Basic functions of QKDN:

- Quantum key generation;
- Key management;
- QKDN control;
- QKDN management.

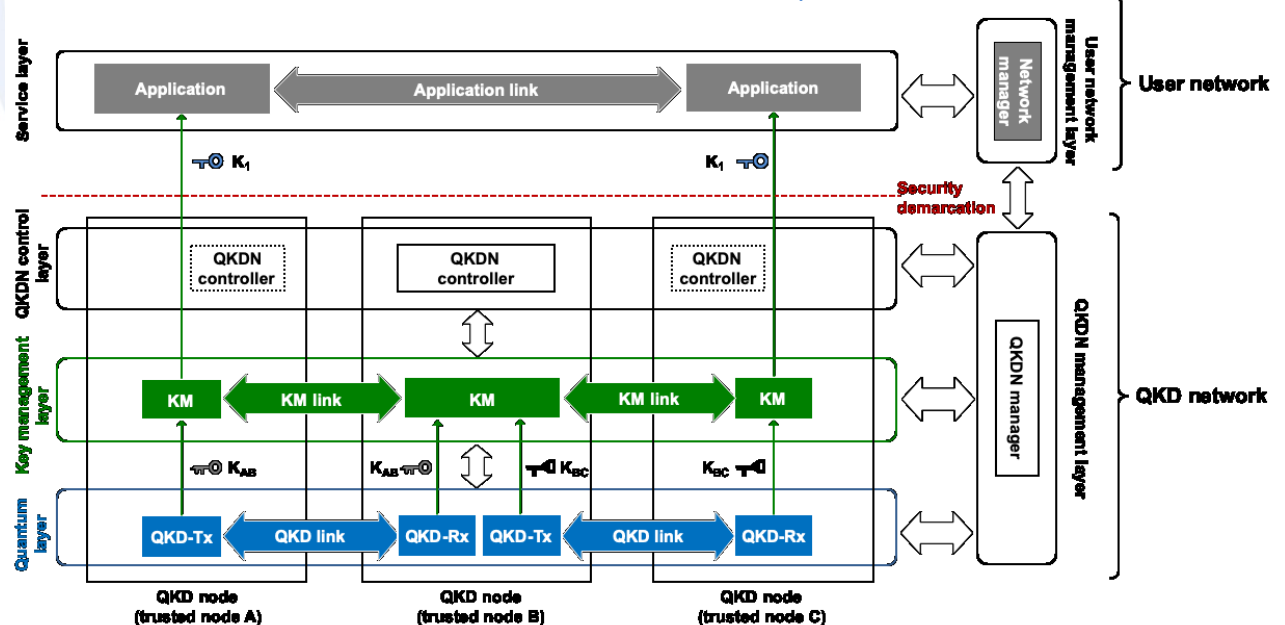


Illustration of the conceptual structures of a QKDN and a user network

Scope

This Recommendation is to specify functional requirements for Quantum Key Distribution network as follows:

- Functional requirements for capabilities of quantum/key management/QKDN control and management layers and other capabilities for QKDN

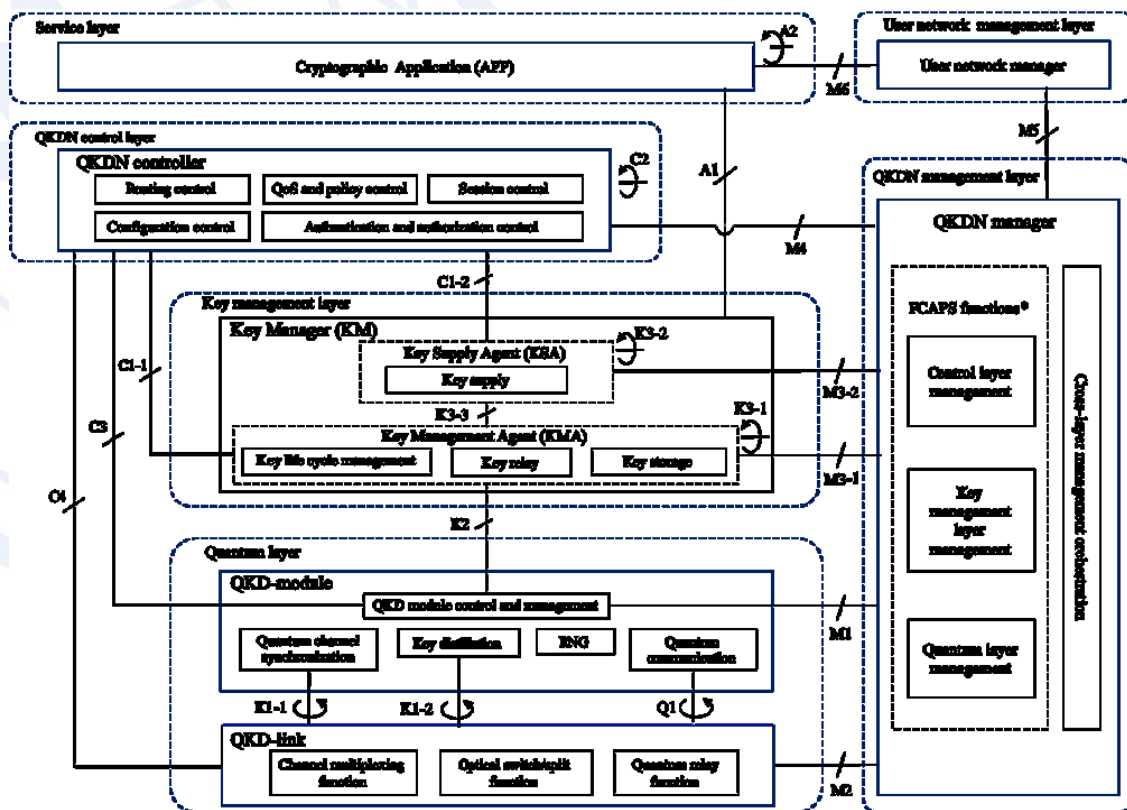
Scope:

This Recommendation specifies functional architectures of the Quantum Key Distribution (QKD) network.

In particular, the scope of this draft Recommendation includes:

- Functional architecture model
- Functional elements and reference points
- Architectural configurations
- Overall operational procedures

NOTE – This Recommendation addresses the architecture of the QKD network based on the general structure defined in Recommendation ITU-T Y.3800 as a foundation for further QKD network studies.



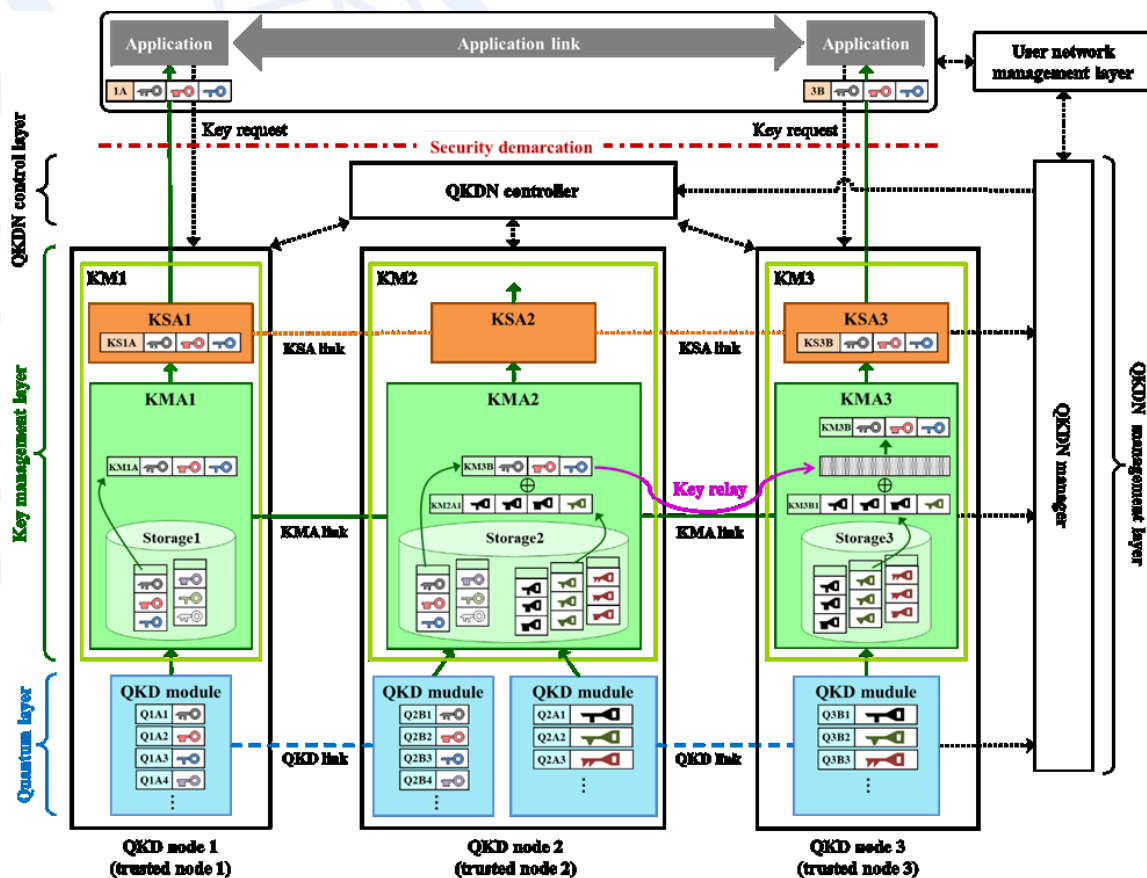
Functional architecture model of QKDN

Scope:

This Recommendation describes key management for Quantum Key Distribution (QKD) network which addresses technical specifications to help the implementation and operation. In particular, the scope of this draft Recommendation includes:

- Requirements of key management
- Functional elements of key management
- Procedures of key management
- Key formats (key data and meta-data)

NOTE – This document refers the overall structure and basic architecture of QKD network which are defined in the Recommendation ITU-T Y.3800.

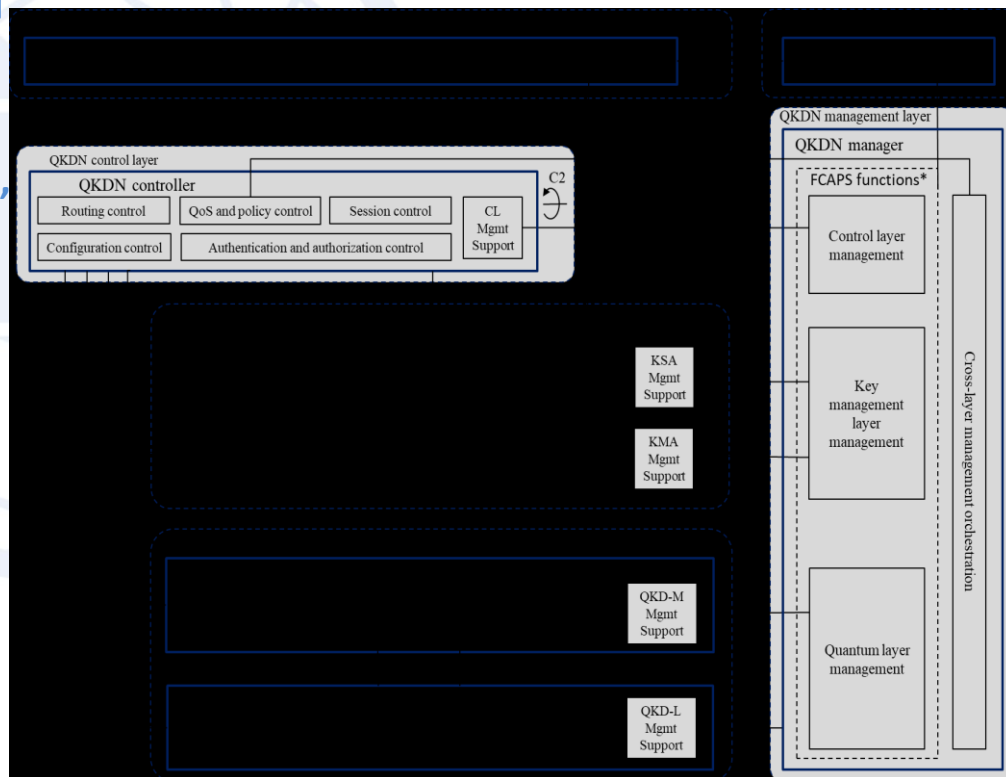


Scope:

This Recommendation is to specify the control, management, and orchestration for Quantum Key Distribution network. This recommendation covers:

- Functional requirements of QKDN control, management, and orchestration
- Functional architecture of QKDN control, management, and orchestration
- Management information model for QKDN
- Reference points of QKDN control, management, and orchestration
- Procedures of QKDN control, management, and orchestration
- Appendix: Implementation use cases of QKDN control, management, and orchestration

Note - Traditional FCAPS functionality which is not specific to QKDN is out of scope of this Recommendation. If necessary, the document will, instead, reference the existing works appropriately.



Scope:

This recommendation specifies the QKDN control functions with the concepts of software defined networks (SDN). The scope of this recommendation includes the following:

- General concepts for introducing SDN into QKDN
- Function requirements of SDN control for QKDN
- SDN-based control architecture for QKDN
- Hierarchical SDN controller for multi-domain QKDN
- Procedures of SDN control functions
- Applications scenarios for SDN controlled QKDN
- Security considerations

Scope:

This draft Recommendation describes business roles, business role-based models, and service scenarios in Quantum Key Distribution Network (QKDN) from different deployment and operation perspectives. Especially, this draft Recommendation identifies various business models that require secure communications with QKDN and existing user networks as follows:

- general QKDN applications;
- financial sector;
- healthcare sector;
- transportation sector;
- etc.

This draft Recommendation can be used as a guideline for design of service scenarios that utilize QKDN from business point of views as well as for deployment and operation of QKDN from telecom operators’ point of views.

NOTE – This draft Recommendation does not identify, in an exhaustive manner, all business roles, business role-based models, and service scenarios of QKDN.

Y.QKDN_qos-gen “General Aspects of QoS on the Quantum Key Distribution Network”

Scope:

This Recommendation is to specify General Aspects of QoS on the Quantum Key Distribution Network as follows:

- Descriptions of QoS (Quality of Service) and NP (network performance) on QKD network
 - Illustration of how the QoS and the NP concepts are applied in QKD network
 - Identification of the features of, and the relationship between these concepts
 - Classification of performance concerns for which parameters may be needed
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Y.QKDN_qos-req “Requirements for QoS Assurance of QoS on the Quantum Key Distribution Network”

Scope:

This Recommendation is to specify requirements for QoS assurance of Quantum Key Distribution network as follows:

- Use cases for QoS assurance of Quantum Key Distribution network
- High-level requirements for QoS assurance of Quantum Key Distribution network
- Functional requirements for QoS assurance of Quantum Key Distribution network

Future plan – this study period

- Finalize the development of core QKD related draft Recommendations
 - Y.QKDN-req, Y.QKDN_Arch and Y.QKDN_KM, Y.QKDN_CM, Y.QKDN-BM: by July 2020
- Work progress on related draft Recommendations
 - Y.QKDN_SDNC, Y.QKDN-qos-gen, Y.QKDN-qos-req: by 2021
- Invite new work items on QKD
- Close collaboration with related groups
 - Organize a co-located RGM with SG17 Questions
 - Organize a joint workshop with ITU-T and ETSI

Future plan – next study period

- QKDN
 - QKDN core recommendations
- QENS (Quantum Enhanced Networks and services)
 - FG-QIT4N's results
 - QEN supporting technology
 - User networks and related applications

Meeting plan

Date	Meeting	Venue
10 February 2020	Q16/13 interim	E-meeting
2-13 March 2020	SG13	Geneva
20-31 July 2020	SG13	Geneva

