|  |  |  |
| --- | --- | --- |
| ITU logo | INTERNATIONAL TELECOMMUNICATION UNION**TELECOMMUNICATIONSTANDARDIZATION SECTOR**STUDY PERIOD 2017-2020 | TSAG-TD1313 |
| **TSAG** |
| **Original: English** |
| **Question(s):** | N/A | E-meeting, 10-17 January 2022 |
| **TD** |
| **Source:** | TSAG |
| **Title:** | Draft LS/o on the outcomes of FG QIT4N |
| **Purpose:** | Proposal |
| **LIAISON STATEMENT** |
| **For action to:** | ITU-T Study Groups |
| **For comment to:** | - |
| **For information to:** | - |
| **Approval:** | **TSAG (E-meeting, 10-17 January 2022)** |
| **Deadline:** | - |
| **Contact:** | Bruce GracieTSAG Chairman | E-mail: bruce.gracie@ericsson.com  |

|  |  |
| --- | --- |
| **Keywords:** | FG QIT4N; TSAG; quantum information technology; focus group; deliverables; |
| **Abstract:** | TSAG has approved the final report of FG QIT4N and is transferring the FG QIT4N deliverables to ITU-T study groups. |

TSAG in its E-meeting, 10-17 January 2022 considered and approved the final report ([TSAG-TD1192](https://www.itu.int/md/T17-TSAG-220110-TD-GEN-1192/en)) of ITU-T Focus Group on quantum information technology for networks (FG QIT4N).

FG QIT4N completed and adopted eight deliverables in the form of nine Technical Reports (see below) and TSAG invites all ITU-T study groups to consider the final report of FG QIT4N and its deliverables within their respective study group mandates for further development.

It should be noted that majority of the FG QIT4N deliverables have inputs from work in multiple ITU-T Study Groups as well as other inputs from Focus Group participants and have the potential to inform future work across these Study Groups. Therefore, all relevant Study Groups are invited to consider the specific suggested actions listed below per deliverable.

NOTE – In the ‘Relevant SG(s)’ columns below, **bold** font indicates the SG(s) deemed as most relevant in the near-term to a deliverable e.g., both SG13 and 17 of equal relevance to D1.1, SG13 of most relevance to D2.2 etc. SGs not indicated in bold font are listed in descending order of relevance.

**Distribution of the FG QIT4N deliverables to ITU-T Study Groups**

|  |  |  |
| --- | --- | --- |
| **Deliverable** | **Text** | **Relevant SG(s)** |
| D1.1 | Quantum information technology for networks terminology: Network aspects of quantum information technologies  | ​[PDF](https://www.itu.int/en/ITU-T/focusgroups/qit4n/Documents/D1.1.pdf)  | **13, 17** |

**Suggested actions:**

1) SG17 to receive terminology related to quantum random number generators (QRNGs) for further development while SG13 to receive all other aspects of the report for further discussion

2) SG13 and 17 to collaborate on the development of terminology related to QITs as needed

|  |  |  |
| --- | --- | --- |
| **Deliverable** | **Text** | **Relevant SG(s)** |
| D1.2 | Quantum information technology for networks use cases: Network aspects of quantum information technologies | ​[PDF](https://www.itu.int/en/ITU-T/focusgroups/qit4n/Documents/D1.2.pdf) | **11, 13, 17,** 15 |

**Suggested actions:**

1) SG11 to consider the study of signalling requirements and protocols for the identified use cases related to the networking aspects of QIT

2) SG13 to receive aspects related to quantum computing networks for further development and consider performing studies on additional computer network scenarios, key components, networking techniques and requirements in related areas of advanced computation and future networks

3) SG15 to receive aspects related to quantum time synchronization for further discussion

4) SG17 to receive aspects related to QRNG and use cases on quantum digital signatures, quantum anonymous transmission, quantum money for further discussion

|  |  |  |
| --- | --- | --- |
| **Deliverable** | **Text** | **Relevant SG(s)** |
| D1.4 | Standardization outlook and technology maturity: Network aspects of quantum information technologies | [PDF](https://www.itu.int/en/ITU-T/focusgroups/qit4n/Documents/D1.4.pdf) | **ALL** |

**Suggested actions:**

1) TSAG to consider for the future the standardization readiness level (SRL) approach and review the feasibility of adopting it as ITU-T practice in standardizing new and emerging technologies

2) All Study Groups to review the standardization outlook and technology maturity on the network aspects of quantum information technologies and discuss its impact, if any, to their respective mandates

|  |  |  |
| --- | --- | --- |
| **Deliverable** | **Text** | **Relevant SG(s)** |
| D2.1 | Quantum information technology for networks terminology: Quantum key distribution network | [PDF](https://www.itu.int/en/ITU-T/focusgroups/qit4n/Documents/D2.1.pdf)​ | **13, 17, 11** |

**Suggested actions:**

1) SG11, 13 and 17 to discuss further development of the deliverable and collaborate on the development of QKDN terminology as needed

|  |  |  |
| --- | --- | --- |
| **Deliverable** | **Text** | **Relevant SG(s)** |
| D2.2 | Quantum information technology for networks use cases: Quantum key distribution network | [PDF](https://www.itu.int/en/ITU-T/focusgroups/qit4n/Documents/D2.2.pdf) | **13**, 17, 15, 11 |

**Suggested actions:**

1) SG13 to explore studies on the integration of QKDN into current and future networks

2) SG17 to perform further studies on the integration of QKDN into various security applications

3) SG15 to review the possibility of studying transport aspects of QKDN

4) SG11 to perform studies on signalling requirements and protocols for the integration of QKDN into current and future networks

|  |  |  |
| --- | --- | --- |
| **Deliverable** | **Text** | **Relevant SG(s)** |
| D2.3  | Quantum key distribution network protocols: Quantum layer | ​[PDF](https://www.itu.int/en/ITU-T/focusgroups/qit4n/Documents/D2.3%20part%201.pdf) | **17**, 13, 11, 15 |

**Suggested actions:**

1) SG17 to study security aspects of QKD protocols

2) SG13 to study network aspects e.g., QKD protocol parameters reported to other layers in QKDNs, status of quantum layer: QBER, key rate etc., network control and management, quality of service

3) SG11 to study protocol and test aspects e.g., non-security related protocols in quantum layer and sub-protocols in QKD protocols, post processing protocol & testing

4) SG11, 13 and 17 to collaborate on work related to QKDN protocols where needed

|  |  |  |
| --- | --- | --- |
| **Deliverable** | **Text** | **Relevant SG(s)** |
| D2.3 | Quantum key distribution network protocols: Key management layer, QKDN control layer and QKDN management layer  | ​[PDF](https://www.itu.int/en/ITU-T/focusgroups/qit4n/Documents/D2.3%20part%202.pdf)​ | **11**, 13, 17, 2 |

**Suggested actions:**

1) SG11 and 13 to collaborate with SG17 on work related to QKDN protocols in the management and control layers and relevancy to security of these network layers

2) SG11 to initiate relevant studies related to protocols for key management, QKDN control-related protocols and QKDN management-related protocols

3) SG13 to study the network aspects e.g., network control and management, including quality of service

4) SG17 to perform further studies on aspects related to the authentication and authorization of QKDN protocols

5) SG2 to explore studies on management architectures for QKDN

|  |  |  |
| --- | --- | --- |
| **Deliverable** | **Text** | **Relevant SG(s)** |
| D2.4 | Quantum key distribution network transport technologies | ​[PDF](file:///C%3A%5CUsers%5Cmakamara%5CDesktop%5Citu.int%5Cen%5CITU-T%5Cfocusgroups%5Cqit4n%5CDocuments%5CD2.4.pdf)  | 15 |

**Suggested actions:**

1) SG15 to consider and explore the study of:

* QKD transport system architecture, reference points, technical requirements for key components (e.g., single photon detector)
* Technical requirements for implementing Co-Existing Quantum and Classical (CEQC) solutions e.g., central wavelength distribution for various signals and their wavelength intervals, the isolation requirements between quantum signal and classic signal, reasonable optical transmission power limitation

|  |  |  |
| --- | --- | --- |
| **Deliverable** | **Text** | **Relevant SG(s)** |
| D2.5 | Standardization outlook and technology maturity​​​: Quantum key distribution network​ | [PDF](https://www.itu.int/en/ITU-T/focusgroups/qit4n/Documents/D2.5.pdf) | ALL |

**Suggested actions:**

1) All Study Groups to review the standardization outlook and technology maturity of QKDN and discuss its impact, if any, to their respective mandates

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_