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| Title: ITU logo | INTERNATIONAL TELECOMMUNICATION UNION**TELECOMMUNICATION STANDARDIZATION SECTOR**STUDY PERIOD 2022-2024 | TSAG-TD365 |
| TSAG |
| **Original: English** |
| **Question(s):** | N/A | Geneva, 22-26 January 2024 |
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| **Source:** | ITU-T Study Group 11 |
| **Title:** | LS/r on the activities and studies on sustainable digital transformation (reply to TSAG-LS22) [from ITU-T SG11] |
| **LIAISON STATEMENT** |
| **For action to:** | - |
| **For information to:** | TSAG |
| **Approval:** | ITU-T Study Group 11 meeting (Geneva, 20 October 2023) |
| **Deadline:** | N/A |
| **Contact:** | Ritu Ranjan MITTARSG11 Chairman, India | E-mail: rr.mittar@gov.in |
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This liaison statement answers [TSAG-LS22](https://www.itu.int/ifa/t/2022/ls/tsag/sp17-tsag-oLS-00022.docx).

A new liaison statement has been received from SG11.

This liaison statement follows and the original file can be downloaded from the ITU ftp server at <http://handle.itu.int/11.1002/ls/sp17-sg11-oLS-00118.docx>.

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|  | INTERNATIONAL TELECOMMUNICATION UNION**TELECOMMUNICATIONSTANDARDIZATION SECTOR**STUDY PERIOD 2022-2024 | **SG11-LS118** |
| **STUDY GROUP 11** |
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| **Source:** | ITU-T Study Group 11 |
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| **Abstract:** | The liaison statement aims to inform TSAG RG-DT on the ITU-T SG11 activities and studies related to sustainable digital transformation. |

ITU-T SG11 would like to thank the TSAG’s rapporteur group on sustainable digital transformation (RG-DT) on the iLS ([TSAG-LS22](https://www.itu.int/net/itu-t/ls/ls.aspx?isn=29477)).

SG11 considers the definition of sector’s digital transformation term which is defined in [ITU-T Y.4906](https://www.itu.int/itu-t/recommendations/rec.aspx?rec=13922) – *“A process during which, by advanced applications of ICTs in sectors' business activities such as R&D, production, services, etc., the sectors' business activities are optimized, reconstructed and integrated, and sectors' development modes are disruptively reformed and innovated. The digital transformation is vitally useful for sectors to optimize resource configuration, improve operational efficiency and innovation capability, and hence realize sectors' sustainable development”*.

The ITU-T SG11 activities on digital transformation are highlighted in the table below (see Annex 1).

ITU-T SG11 looks forward to collaborating with TSAG RG-DT on this subject matter.

**Annex 1
ITU-T SG11 Activities and studies related to sustainable digital transformation**

| **Sector/Domain** | **Study group or****SDO** | **Title of deliverable** | **Scope of deliverable** | **Current status** | **Reference/URI** |
| --- | --- | --- | --- | --- | --- |
| Data center | ITU-T SG11 | Testing requirements and procedures for Internet of Things based green data centres (ITU-T Q.4069) | This Recommendation describes green data centres (GDCs) based on the Internet of things (IoT), which includes multiple IoT devices, monitoring systems and the energy management platform, to save energy. This Recommendation specifies testing requirements for: interoperability; functions; and self-optimization, as well as the related testing procedures for IoT-based GDCs | In force | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=15046> |
| Agriculture | ITU-T SG11 | Data management interfaces for intelligent edge computing-based smart agriculture service (ITU-T Q.5028) | As data and artificial intelligence (AI) technologies have emerged, smart agriculture can be aided by edge-cloud platform service which provides low delay service from edge server and powerful performance service from cloud server. As an edge cloud infrastructure realizing the edge cloud-aided smart agriculture system, intelligent edge computing (IEC) is a well-defined foundation. Among the reference points defined for IEC, reference points between terminal entity (TE) and edge networking entity (ENE) can be used for the interaction between agricultural entities, such as sensors and actuators used for smart agriculture, and an edge server. By use of the reference points, agricultural entities can report the crop-growth related data including configuration and measurement data to an edge server. Then the edge server can analyze and generate the optimal operation model for the smart greenhouse and the optimal growth model for crops on the basis of the analysis result. For deep analysis requiring high computation power, the analysis and generation can be performed by the cloud. The edge server, then, sends the generated optimal models to terminal entities. To support the above operations, a method to interact on the defined reference points. Rec. ITU-T Q.5001 defines signalling messages for network functions and intelligent data processing. However, in addition to the defined signalling messages, it is needed to support an API such as Web API in order to accommodate legacy devices which only support Web-based communications. In addition, service-specific API will be helpful to support service-specific functions.This draft Recommendation defines data management interfaces for intelligent edge computing-based smart agriculture service. | Consented | <https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18481> |
| Edge computing | ITU-T SG11 | Signalling architecture for microservices based intelligent edge computing (Q.5007) | For development of the IEC architecture, there are couple of software-oriented architectural ways to build flexible protocol architecture achieved by deploying and operating the architecture, for instance, an unified software oriented architecture, which is composing logically modular functions to tightly coupled way as a monolithic architecture and microservice architecture which is loosely composing logically or physically separated own processing functions as microservices.Because IEC has developed on different hardware specifications and various functionalities that each business wants, it is standardized based on microservices and used as a reference standard for implementation. As a result of microservices based IEC architecture, it can be continuously developed and operated by updating microservices. This Recommendation specifies signalling architecture, protocol interfaces and protocol procedures for microservices based intelligent edge computing. | Consented | <https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18481> |
| Aquaculture | ITU-T SG11 | Data management interfaces for intelligent edge computing-based flowing-water smart aquaculture system (Q.IEC-FWINF) | The smart aquaculture system aims to increase the productivity of aquaculture and promote eco-friendly aquaculture technology by applying IoT, ICT, big data, and AI technologies to traditional aquaculture systems. With the emergence of big data, AI, and cloud technologies, intelligent edge cloud platform services provide powerful performance and resources for managing and analyzing vast amounts of data, enabling support for smart aquaculture technology. The intelligent edge cloud-supported flowing-water smart aquaculture system can be realized using the Rec. ITU-T Q.5001 intelligent edge computing (IEC). The TE of IEC can be used in the sensor and actuator parts of the flowing-water smart aquaculture system, and the reference points in IEC can be used for interaction with the edge server. By using these reference points, water quality, growth, energy, and environmental data collected in the aquaculture field can be transmitted to the edge server. Additionally, the edge server can generate essential settings and control values necessary for the growth of fish and the operation of aquaculture facilities using the collected data. For in-depth analysis that requires high computational power, such as fish disease diagnosis or productivity enhancement, cloud-based analysis and generation can be performed. Then, the edge server transmits the generated optimal model to the driving part.This draft recommendation defines the data management interfaces for intelligent edge computing-based flowing-water smart aquaculture systems. | Under study | <https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18918> |
| Home | ITU-T SG11 | Signalling requirements and interfaces of edge-aided energy management agent at intelligent edge computing (Q.IEC-EEMA) | This Recommendation describes the Signalling requirements and interfaces of edge-aided energy management agent at intelligent edge computing. This Recommendation focuses on the signalling functionality of the edge-aided energy management agent (EEMA) and interfaces among EEMAs. | Under study | <https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18482> |

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