

Question 6/5 – Environmental efficiency of digital technologies

(Continuation of Question 6/5)

1 Motivation

Artificial intelligence, blockchain, 5G, the Internet of Things (IoT), autonomous vehicles, robotics, virtual and augmented reality, digital twins, along with other digital and frontier technologies brought on by the Fourth Industrial Revolution are transforming the way in which the current production systems operate. These technologies are capable of unlocking the next level of efficiency for the public and manufacturing sector while accelerating progress on the Sustainable Development Goals (SDGs).

However, the environmental performance of digital and frontier technologies themselves is often overlooked. Digital technologies utilize ICT equipment and installation to communicate with one another. Routers, servers, switches are needed to enable high speed, large-scale broadband services, and computational activities. Additional radio base stations and data centres are also needed to power the next generation wireless networks and other IoT applications. These equipment and installations consume a huge amount of energy to operate, which contribute significantly to global carbon emissions.

This Question identifies the environmental efficiency requirements of digital and frontier technologies, including their water, materials, and energy efficiency. It focuses on studying technical solutions, enhancements, metrics, key performance indicators and related accurate measurement methods and reference values for different type of technologies.

This Question is also in line with the following Sustainable Development Goals: SDG 9 "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation"; SDG 11 "Make cities and human settlement inclusive, safe, resilient and sustainable" and SDG 13 "Take urgent action to combat climate change and its impact".

The following Recommendations and Supplements, in force at the time of approval of this Question, fall under its responsibility:

- ITU-T L.1300, L.1301, L.1302, L.1303, L.1310, L.1315, L.1316, L.1317, L.1320, L.1321, L.1330, L.1331, L.1330, L.1331, L.1332, L.1340, L.1350, L.1351;
- L-series Supplements 1, 6, 7, 8, 9, 10, 11, 12, 33, 36, 41, 42, 43 and 44;
- Technical Paper on Study on methods and metrics to evaluate energy efficiency for future 5G systems.

2 Questions

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

- Study areas and related Recommendations dealing with energy consumption and environmental efficiency;
- Develop Metrics/KPIs related to the material, water and energy efficiency of ICT networks and digital technologies;
- Metrics/KPIs, related measurement methods and reference values to be developed, power/cooling systems, renewable energy use and interconnection in smart grids, etc.;
- Technical specifications and best practices for energy consumption/efficiency of digital and frontier technologies and related components (e.g., the next generation telecommunication networks, data centre infrastructures, radio sites etc.);
- Energy efficiency control and monitoring solutions for ICT networks and digital technologies;

- Define energy efficiency metrics, measurements, and solutions for digital technologies;
- Define efficient architectures and facility solutions for digital technologies (e.g., AI, IoT, 5G/IMT-2020) network implementation taking into consideration the efficient use of energy and resources;
- Identify environmentally efficient technologies and solutions for ICT and digital technologies (including 5G/IMT-2020, big data, artificial intelligence, blockchain, etc.) and other industries;
- Evaluate the environmental performance and study the requirements for energy efficiency of 5G networks;
- Study and promote the integration and reuse of existing network elements (even if they are of a previous generation) in order to be compatible with the latest digital technologies.

3 Tasks

Tasks include, but are not limited to:

- Develop Recommendations and Supplements on material, water and energy efficiency metrics, measurements and solutions for ICT networks and digital technologies;
- Develop Recommendations and Supplements on material, water and energy efficiency metrics, measurements and solutions for new radio mobile access and the related supporting networks;
- Develop Recommendations and Supplements on the sustainable use of ICT networks and digital technologies (including 5G/IMT-2020, big data, artificial intelligence, blockchain, etc.);
- Develop best practices, use cases on items related to water, material and energy efficiency of ICT networks and digital technologies;
- Develop Recommendations on water, material, and energy efficient solutions for spread ICT network implementation in order to improve the efficient use of energy and resources including IoT and 5G/IMT-2020 networks;
- Develop Recommendations, Supplements and Technical Reports on water, material and energy efficiency control and monitoring solutions for ICT networks and digital technologies;
- Develop Recommendations, Supplements and Technical Reports on energy efficiency of 5G networks;
- Develop Recommendations, Supplements and Technical Reports on the integration and reuse of existing network elements (even if they are of a previous generation) in order to be compatible with the latest digital technologies;
- Maintain and revise existing Recommendations and other deliverables as needed.

An up-to-date status of work under this Question is contained in the ITU-T SG5 work programme (https://www.itu.int/ITU-T/workprog/wp_search.aspx?sp=17&q=6/5).

4 Relationships

WSIS Action Lines:

- C2, C7

Sustainable Development Goals:

- 7, 11, 13

Recommendations:

- ITU-T K-series
- ITU-T L-series

Questions:

- Q7/5, Q9/5, Q11/5, Q12/5, Q13/5

Study Groups:

- ITU-T SGs
- ITU-D SGs
- ITU-R SGs

Other bodies:

- ATIS
- CCSA
- ETSI
- ECMA
- IEC
- IETF
- ISO
- CIAJ
- GISFI
- 3GPP
- TSDSI
- IEEE
- CESI