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| ITU logo | INTERNATIONAL TELECOMMUNICATION UNION**TELECOMMUNICATION STANDARDIZATION SECTOR**STUDY PERIOD 2017-2020 | TSAG-TD799 |
| **TSAG** |
| **Original: English** |
| **Question(s):** | N/A | E-Meeting, 21-25 September 2020 |
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| **Source:** | ITU-T Study Group 5 |
| **Title:** | LS on ITU-T SG5 Lead Study Group Report [from ITU-T SG5] |
| **Purpose:** | Information |
| **LIAISON STATEMENT** |
| **For action to:** | - |
| **For comment to:** | - |
| **For information to:** | TSAG |
| **Approval:** | ITU-T Study Group 5 management team (14 August 2020 by correspondence) |
| **Deadline:** | N/A |
| **Contact:** | Shuguang Qi Acting Chairman ITU-T SG5 | Tel: +86 10 82053589-8858E-mail: qishuguang@caict.ac.cn  |
| **Contact:** | Fryderyk LewickiChairman of WP1/5 | Tel: +48 71 321 09 24E-mail: fryderyk.lewicki@orange.com  |
| **Contact:** | Paolo GemmaChairman of WP2/5 | Tel: +39 02 3999 4947Fax: +39 01119743499Email: paolo.gemma@huawei.com  |

A new liaison statement has been received from SG5.

This liaison statement follows and the original file can be downloaded from the ITU ftp server at <http://handle.itu.int/11.1002/ls/sp16-sg5-oLS-00158.docx>.

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| ITU logo | INTERNATIONAL TELECOMMUNICATION UNION**TELECOMMUNICATIONSTANDARDIZATION SECTOR**STUDY PERIOD 2017-2020 | **SG5-LS158** |
| **STUDY GROUP 5** |
| **Original: English** |
| **Question(s):** | All/5 |  |
| **LIAISON STATEMENT** |
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| **Title:** | LS on ITU-T Study Group 5 Lead Study Group Report  |
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| **Keywords:** | SG5; lead roles; electromagnetic compatibility; lightning protection; electromagnetic effects; ICTs; environment; climate change; energy efficiency; circular economy; e‑waste; |
| **Abstract:** | This liaison statement informs TSAG on SG5 lead roles and gives an update on SG5 activities from February until August 2020. |

ITU-T Study Group 5 is actively fulfilling its mandate as the lead study group on electromagnetic compatibility, lightning protection and electromagnetic effects; ICTs related to the environment, climate change, energy efficiency and clean energy and circular economy, including e‑waste.

# 1 Main achievements

The list of results pertaining to ITU-T SGs Recommendations on electromagnetic compatibility, lightning protection and electromagnetic effects; ICTs related to the environment, climate change, energy efficiency and clean energy and circular economy, including e‑waste, since February 2020, are provided in Annex 1 (status: until 14 August 2020).

The main highlights are described in the following text.

Taking into consideration the development and importance of 5G, ITU-T SG5 continues developing Technical Reports, Supplements and ITU-T Recommendations that study the environmental aspects of 5G including:

* Electromagnetic compatibility (EMC);
* Electromagnetic fields (EMF);
* Energy feeding and efficiency;
* Resistibility.

In this regard, from February 2020, Recommendations ITU-T L.1381 “Smart energy solution for data centre” and ITU-T L.1382 “Smart energy solution for telecommunication rooms” were approved. Additionally, Supplement 1 to Recommendation ITU-T K.91 on “Guide on electromagnetic fields and health” to include information concerning 5G mobile systems and new WHO ICNIRP and IEEE guidelines have been taken into account. Furthermore, the new work item on Draft Recommendation L.EE\_5G\_evo “Assessment of mobile network energy efficiency covering network slicing” was approved.

**Working Party 1/5** has developed and approved two new ITU-T Recommendations: ITU-T K.146 “Management of interferences on telecommunication transmissions on copper other than speech”, and ITU-T K.147 “Ethernet port resistibility testing for overvoltages and overcurrents”.

WP1/5 approved 5 revised Recommendations: ITU-T K.56 “Protection of radio base stations against lightning discharges”, ITU-T K.112 “Lightning protection, earthing and bonding: Practical procedures for radio base stations”, ITU-T K.64 “Safe working practices for outside equipment installed in particular environments”, ITU-T K.83 “Monitoring of electromagnetic field levels”, and ITU-T K.91 “Guidance for assessment, evaluation and monitoring of the human exposure to RF EMF”.

Experts amended also the following Recommendations: ITU-T K.50 “Amendment 1 to Recommendation ITU-T K.50: Safe limits for operating voltages and currents of telecommunication systems powered over the network”, ITU-T K.21 “Amendment 1 to Recommendation ITU-T K.21: Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents”, and ITU-T K.45 “Amendment 1 to Recommendation ITU-T K.45: Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents”. Additionally, a Corrigendum 2 to Recommendation ITU-T K.98: Overvoltage protection guide for telecommunication equipment installed in customer premises was approved.

One new Supplement related to Electromagnetic Fields (EMF) was agreed: ITU-T K.Suppl.20 to ITU-T K.91 “Supplement on radiofrequency exposure evaluation around underground base stations”.

One revised Supplement relevant to EMF has been updated: ITU-T K.Sup.1 to ITU-T K.91 “Guide on electromagnetic fields and health”, to include information concerning 5G mobile systems and to take into consideration new WHO, ICNIRP and IEEE guidelines.

Under the umbrella of **Working Party 2/5**, three new ITU-T Recommendations were approved: ITU-T L.1381 “Smart energy solution for data centre”, ITU-T L.1371 “A methodology for assessing and scoring the sustainability performance of office buildings”, ITU-T L.1382 “Smart energy solution for telecommunication rooms”. Recommendation ITU-T L.1023 (ex. L.CE-2) “Assessment method for circular scoring” was consented.

WP2/5 consented two revised Recommendations ITU-T L.1310 “Energy efficiency metrics and measurement methods for telecommunication equipment” and ITU-T L.1331 “Assessment of mobile network energy efficiency” which were developed in close collaboration with ETSI TC Environmental Engineering (ETSI TC EE).

One new Supplement was agreed: ITU-T L.Suppl.37 to ITU-T L.1470 “Guidance to operators of mobile networks, fixed networks and data centres on setting 1.5°C aligned targets compliant with Recommendation ITU-T L.1470”. This Supplement was developed in close collaboration with GeSI, GSMA, SBTi and IEA.

**2 Plan of work for this study period and towards the next study period and progress**

The list of Recommendations and other texts on electromagnetic compatibility and electromagnetic effects, environment and circular economy that are currently under development in ITU-T SG5 can be found at: <https://www.itu.int/ITU-T/workprog/wp_search.aspx?isn_sp=3925&isn_sg=3928&isn_status=-1,1,3,7&details=0&field=acdefghijo>

**3 SG5 as Lead Study Group on electromagnetic compatibility lightning protection and electromagnetic effects; ICTs related to the environment, climate change, energy efficiency and clean energy and circular economy, including e‑waste**

**3.1 Protection of information and communication technology (ICT) infrastructure from electromagnetic surges**

The protection of the telecommunication network against lightning and adverse effects from power systems is studied by Question 1/5. The protection against lightning includes the protection of telecommunication systems against lightning flashes and the earthing and bonding configurations applied to telecommunications installations (telecommunication buildings, remote electronic sites and customer premises). The protection against adverse effects from power systems covers the electromagnetic interference experienced by telecommunications networks due to power systems and electrified railway systems.

Q1/5 is currently working on nine work items. During the last SG5 meeting, experts agreed to start working on draft Recommendation ITU-T K.SPDM “Performance requirements and test methods for surge protective device modules used in AC power port of telecommunication equipment”. This draft Recommendation will include the lightning protection and safety performance requirements, environmental adaptability requirements, installation requirements, and test methods for surge protective device modules used in AC power port of telecommunication equipment.

**3.2 Equipment resistibility and protective components**

The resistibility and safety applied to telecommunications equipment and infrastructure is studied by Question 2/5. The relevance of this subject resides on the fact that new types of ICT equipment are appearing in the network, as the means to provide larger bandwidth to meet the customer's needs. Moreover, different types of equipment are being interconnected at customers' premises (home network), hence, the protection requirements for their interfaces and the effects of these interconnections need to be studied and standardized.

It also covers the requirements for protective components and assemblies used to protect ICT equipment against electromagnetic disturbances. The objective is to develop Recommendations, which provide specifications, test methods, and principles of application for protective components and assemblies intended to mitigate the effects of lightning, power induction, ESD, fast transients and power contacts that may cause permanent damage. These protective components and assemblies are related to both telecommunication and power supply circuits of telecommunication equipment.

Q2/5 is currently working on eight work items. During the last SG5 meeting, experts agreed to start working on draft Recommendation ITU-T K.gm “Performance Parameters and Test Methods for Hybrid Integrated Circuits Containing a Gas Discharge Tube (GDT) and a Metal-Oxide Varistor (MOV)”.

**3.3 Human exposure to electromagnetic fields (EMFs) from information and communication technologies (ICTs)**

Issues on assessment of human exposure to Radio Frequency Electromagnetic Fields (RF EMFs) are under the responsibility of Question 3/5. In this Question, Recommendations that provide guidance, best practices and assessment of human exposure to Electromagnetic Fields (EMFs) are being developed. The scope of this Question includes the development of methods to evaluate compliance of the radiocommunication installations with human exposure limits established by WHO based on ICNIRP guidance. Question 3/5 is also contributing to the process of standardization of 5G by considering EMF aspects related to: the impact of 5G technologies on the compliance assessment methodology; the deployment of smart antennas; the use of Software Defined Radio and the communication and understanding among stakeholders and the general public related to the EMF effect of 5G on human health.

Question 3/5 also develops software supporting the assessment of the human exposure (such as EMF-estimator, ITU-T K.52 calculator, EMFACDC, Watt Guard and Uncertainty calculator), supplements and mobile applications (such as “EMF-Guide” or “EMF-Exposure”). The outputs of Q3/5 are regularly being shared with ITU-D and ITU-R and liaisons are being exchanged with these Sectors. Q3/5 is also working closely with WHO, ICNIRP and IEC TC106.

Q3/5 is currently working on six work items.

**3.4 Electromagnetic compatibility (EMC) issues arising in the telecommunication environment**

EMC requirements and mitigation methods for telecommunications equipment and facility are studied under Question 4/5. The scope includes coexistence of wired and wireless systems and EMC requirements for electrical/electric equipment and telecommunication equipment specifically installed in telecommunication centre. It also includes EMC issues connected with the implementation of 5G system and the extension of the frequency range used in mobile communication. There is close collaboration with ITU-R SG1, SG5 and SG6, ITU-T SG9, IEC ACEC (Advisory Committee on Electromagnetic Compatibility), IEC CISPR and SC77B.

Q4/5 is currently working on nine work items. During the last SG5 meeting, experts agreed to start working on draft Recommendation ITU-T K.power\_emc “Electromagnetic compatibility requirements for power equipment in telecommunication facilities”.

**3.5 Security and reliability of information and communication technology (ICT) systems from electromagnetic and particle radiations**

Security and reliability of information and communication technology (ICT) systems from electromagnetic and particle radiations are studied under Question 5/5. The Recommendations developed under this Question provide guidance on design and countermeasures against thread of security by lightning, high-altitude electromagnetic pulse (HEMP), high-power electromagnetic (HPEM) and information leakage through unintentional emission. There is a close collaboration between Question 5/5, IEC TC77/SC77C and IEC ACEC. The new part of the responsibility covers design, test, and mitigation methods regarding “soft error” caused by particle radiations such as neutron rays and the quality and reliability requirements of telecommunication equipment/system.

Q5/5 is currently working on three work items.

**3.6 Achieving energy efficiency and smart energy**

Aspects related to energy efficiency for the ICT sector are studied under Question 6/5. Q6/5 develops Recommendations and Supplements on energy efficiency solutions and related methodologies and metrics on ICT equipment, networks and data centres for the ICT sector. It also includes topics on energy saving solutions for the widespread implementation of ICT network in order to improve the efficient use of energy and resources including IoT and 5G/IMT-2020 networks.

The main focus of Q6/5 is to study and develop energy efficiency metrics, KPIs, measurement methods, technical requirements related to ICT infrastructures, guidelines to reduce environmental impacts, and best practices on low cost and reduced environmental impact solutions.

Q6/5 also develops Recommendations and Supplements on aspects related to power feeding in an efficient and innovative way in ICT installations with a special focus on issues related to the powering of 5G/IMT2020 networks. Smart energy solutions are also considered and developed in Q6/5. In addition, Q6/5 is working on energy efficiency KPIs to evaluate the efficiency of different networks architecture before their implementation with a special focus on 5G technologies and architectures.

This Question also covers topics related to data centres. It also studies how AI and other emerging technologies can be used to create an environmentally friendly supply chain and green infrastructure management.

Q6/5 is currently working on sixteen work items. During the last SG5 meeting, experts agreed to start working on draft Recommendations: ITU-T L.EE\_sgpu “Energy Efficiency measurement methodology and metrics for servers: Graphical Processor Unit solution based”, ITU-T L.GAL\_3 “Power management capabilities of the future energy telecommunication fixed network nodes. Enhanced Interface for power management in Network Function Virtualization environments”, ITU-T L.EE\_dse “Energy efficiency metrics and measurement methods for data-storage equipment”, ITU-T L.EE\_serv “Energy Efficiency measurement methodology and metrics for servers”, ITU-T L.10kVAC\_up to 400VDC “Specifications of 10kV AC input and up to 400VDC output integrated power system in data centre and telecommunication room”, ITU-T L.EE\_5G\_evo “Assessment of mobile network energy efficiency covering network slicing”.

Some of these studies are conducted in collaboration with other relevant entities. SG5 is actively exchanging information with other standard developing organizations such as ETSI and IEC.

**3.7 Circular economy including e-waste**

Circular economy including e-waste is studied by Question 7/5. The activities under this Question aim at developing Recommendations for the reduction and management of e-waste with the objective of reducing the overall environment impacts of e-waste and providing guidance to reduce e-waste generation. Q7/5 also focuses on the development of Recommendations and Supplements on Circular Economy in order to promote the transition to Circular Economy within the ICT sector and develop more environmentally friendly ICT solutions.

Q7/5 also aims to study and develop Recommendations on evaluating the implications of 5G/IMT2020 and the spread ICT networks especially on the e-waste and circular economy aspects.

Q7/5 is currently working on eighteen work items. During the last SG5 meeting, experts agreed to start working ITU-T L.HL\_e-waste “Guide for the institutions of higher learning to contribute in the effective management of e-waste”, ITU-T L.E-waste-collection “Guidelines on the collection, pre-treatment, dismantling, valourization and final disposal of WEEE”, ITU-T L.Mat\_frame “Assessment of material efficiency of ICT network goods Circular economy - Part 1 General for server and data-storage equipment”, ITU-T L.ME\_DD “Assessment of material efficiency of ICT network infrastructure goods (circular economy)- Part - 2: server and data-storage product secure data-deletion functionality”, ITU-T L.ME\_AF “Assessment of material efficiency of ICT network infrastructure goods (circular economy) part 3- server and data-storage product availability of firmware and of security updates to firmware”, ITU-T L.ME\_RM “Assessment of material efficiency of ICT network infrastructure goods (circular economy) part 4- server and data-storage product critical raw materials”, and ITU-T L.ME\_DIS “Assessment of material efficiency of ICT network infrastructure goods (circular economy) part 5- server and data-storage product disassembly and disassembly instruction”.

Some of these studies are conducted in collaboration with ETSI TC EE.

**3.8 Climate change and assessment of information and communication technology (ICT) in the framework of the Sustainable Development Goals (SDGs)**

The activities on climate change and assessment of information and communication technology (ICT) in the framework of the Sustainable Development Goals (SDGs) fall under Question 9/5. Q9/5 develops assessment methodologies that allow the objective, transparent and practical assessments of the sustainability impacts of information and communication technologies (ICTs). It also aims to study how environmental assessments may be used in the framework of broader sustainable development assessments including economic, environmental and social assessments. Q9/5 also covers the topic of resilient ICTs, which will include their ability to collect data on climate (such as temperature, humidity, precipitation and sea level changes).

This Question also aims to identify best practices in setting up low cost climate change adaptive infrastructure in all areas and mainstreaming adaptation to climate change using ICTs at the point of manufacture. Q9/5 focuses also on topics related to climate neutrality and biodiversity.

Q9/5 is currently working on four work items including: ITU-T L.Sup.TrajectoriesManSupp “Guidance to ICT manufacturers and ICT suppliers on setting 1.5°C aligned targets compliant with Recommendation ITU-T L.1470”, ITU-T L.SupDecarbonisation “Decarbonisation strategies to implement Recommendation ITU-T L.1470 trajectories” and ITU-T L.Sup.Enablement “GHG emissions reductions enabled by actual implementation of ICT projects”.

The Supplement on L.Sup.TrajectoriesManSupp is being developed in collaboration with GSMA, GeSI, SBTi and IEA.

**3.9 Guides and terminology on environment and climate change**

The activities on the development of Guides and terminology on environment and climate change fall under Question 8/5.

Q8/5 is tasked to work on all terms, definitions, abbreviations, letter symbols and schematic symbols used in the ITU-T Study Group 5 Recommendations, Supplements, Handbooks and Directives; harmonize with terminology used by other parties outside of ITU-T Study Group 5; and liaise with other bodies regarding terminology used in the Study Group 5 Recommendations, among others.

Q8/5 is currently working on four work items including: Guide to the K & relevant L-series Recommendations “Extension of the Guide to cover relevant L-series Recommendations”; Mitigation Handbook - Additional case studies “Additional case studies to be added”; Terminology Handbook “Extension of the Terminology Handbook to cover relevant L-series terminologies” and Terminology Handbook - web version “Web version of the Terminology Handbook”.

Q8/5 works closely with ITU-T Standardization Committee for Vocabulary (SCV).

**4 Collaboration with other SGs and external organizations**

WP1/5 maintains collaboration with ITU-T SG15 on conformance and interoperability, IEC TC81 and CENELEC TC 81X on lightning protection, IEC TC 108 on safety (especially on remote power feeding), IEC SC 37A and 37B on surge protective devices, IEC SC 77B on high frequency transients, and ETSI ERM on lightning protection, CIGRÉ, CIRED and UIC on power frequency interference, IEC TC 64 on safety (protection against electric shock), and IEEE PES SPDC on surge protective devices.

It also maintains collaboration with ITU-T SG9 and ITU-R WP1A, WP1C, WP4A, WP4C, WP5A, WP5B, WP5C, WP5D and WP6A on EMC issues; with ITU-D, WHO, ICNRIP and IEC TC106 on topics on assessment of human exposure to electromagnetic fields (RF EMF); with ITU-T SG17 and IEC SC77C on topics on security of telecommunication and information systems concerning the electromagnetic environment. WP1/5 collaborates also with ITU-T SG12, IEC TC47 and IEC TC 107 for studies on soft error by particle radiations. Additionally, WP1/5 exchanges information with IEC SC77B, SC77C, TC106 and CISPR through liaisons with IEC ACEC. WP1/5 also maintains collaboration with CISPR/I.

WP2/5 maintains close collaboration with ETSI TC EE, ITU-T SG11; ITU-T SG2; FAO, and the World Bank on ICTs and adaptation to the effects of climate change topics; with IEC SEG4 on advance and low impact power feeding solutions and with 3GPP; ATIS; CCSA; CEDARE; ETNO; ETSI EE; ETSI TC ATTM, FG AI4H; FG ML5G; FG NET2030; FG-VM; ISO; IEC; IEEE; CEN/CLC/JTC 10; JCA-IMT2020; JCA-IoT and SC&C; ITU-T SG2; ITU-T SG3; ITU-T SG9; ITU-T SG11; ITU-T SG12; ITU-T SG13; ITU-T SG15; ITU-T SG16; ITU-T SG17; ITU-T SG20 and SCV on e-waste management, energy efficiency, circular economy and other green ICT standard topics. WP2/5 is establishing collaboration with ISO TC323 “Circular Economy”.

Additionally, WP2/5 collaborates closely with GSMA, GESI, SBTi and IEA on the topics related to GHG emissions trajectories for the ICT sector. ITU-T SG5 collaborates and cooperates with the Basel Convention and UNIDO on e-waste management. Additionally, SG5 is working together with UNIDO in a project in Latin America in the implementation of the Recommendations on e-waste management.

ITU-T SG5 recently worked with the Basel Convention, Climate KIC and other partners to include ITU’s green ICT standards in [the world’s first Massive Open Online Course (MOOC) on e-waste management](https://learning.climate-kic.org/en/programmes-and-courses/e-waste), which include lessons on the role of ICT standardization in circular economy.

ITU-T SG5 is currently part of the Circular Economy Partnership which is being led by the WBCSD. This partnership aims to drive a coordinated transition towards an economically viable circular industry that maximizes value of products and materials throughout the full life cycle, using safe and fair labor, and depending only on circular resources. Leveraging circular design principles, closed loop and data-driven systems, responsible business models and advanced partnership, the industry will transition to a new normal with greater positive environmental and social impact throughout the entire value chain. The work of the CEP is being carried out in 6 pathway which are: Circular Design, Demand for Circular Products, Distribution and use of circular products, Take-back & collection, Reverse Supply Chains and Recycling & Sourcing. The other partners of the initiative include WEF, PACE, Green Electronics Council, Responsible Business Alliance and GeSI.

**5 ITU-T Study Group 5 Regional Groups**

ITU-T Study Group 5 has the following Regional Groups:

* [SG5 Regional Group for the Africa Region](https://www.itu.int/en/ITU-T/studygroups/2017-2020/05/sg5rgafr/Pages/default.aspx) (SG5RG-AFR) held its first meeting in Zanzibar, Tanzania on 9 April 2018. The second meeting was held on 29-30 August 2019 in Abuja, Nigeria, during the [1st Digital African Week](https://www.itu.int/en/ITU-T/climatechange/Pages/1st-Digital-African-Week.aspx).
* [SG5 Regional Group for the Arab Region](https://www.itu.int/en/ITU-T/studygroups/2017-2020/05/sg5rgarb/Pages/default.aspx) (SG5RG-ARB) held its first meeting in Zanzibar, Tanzania on 10 April 2018. The second meeting was held on 18 December 2018 in Kuwait city, Kuwait.
* [SG5 Regional Group for Latin America](https://www.itu.int/en/ITU-T/studygroups/2017-2020/05/sg5rglatam/Pages/default.aspx) (SG5RG-LATAM) held its first meeting in Cartagena de Indias, Colombia on 19 April 2018. The second meeting was held on 24 October 2018 in Bogotá, Colombia.
* [SG5 Regional Group for Asia and the Pacific](https://www.itu.int/en/ITU-T/studygroups/2017-2020/05/sg5rgap/Pages/default.aspx) (SG5RG-AP) will hold its first virtual meeting on 29 and 30 September 2020.

**6 Focus Group on "Environmental Efficiency for Artificial Intelligence and other Emerging Technologies" (FG-AI4EE)**

**The first meeting of the FG-AI4EE took place on 12 December 2019 in Vienna, Austria** at the kind invitation of the Federal Ministry of Transport, Innovation and Technology of Austria. The FG-AI4EE meeting was preceded by the [Forum on “Environmental Efficiency for Artificial Intelligence and other Emerging Technologies”](https://www.itu.int/en/ITU-T/climatechange/Pages/20191014-forum.aspx). Additionally, the [1st Meeting of the Thematic Group on the United for Smart Sustainable City Index](https://www.itu.int/en/ITU-T/climatechange/Pages/20191014-meeting.aspx) took place on 13 December 2019 in Vienna, Austria.

The FG-AI4EE has the following structure and will work on over 20 deliverables:

* **Working Group 1** - Requirements of AI and other Emerging Technologies to Ensure Environmental Efficiency.
* **Working Group 2** - Assessment and Measurement of the Environmental Efficiency of AI and Emerging Technologies.
* **Working Group 3** – Implementation Guidelines of AI and Emerging Technologies for Environmental Efficiency.

The FG-AI4EE website is available [here](https://www.itu.int/en/ITU-T/focusgroups/ai4ee/Pages/default.aspx).

**7 Other activities**

Since February 2020, the following events on Environment, Climate Change and Circular Economy have been organized:

* Webinar on E-waste Challenge MOOC live event: [Using international standards to tackle the e-waste challenge](http://www.brsmeas.org/Default.aspx?tabid=3574&meetId=DD2CA984-A16E-EA11-BFF8-005056857856&lang=en), 1 and 2 April 2020.
* Webinar on E-waste Challenge MOOC live event: [Explore a circular vision for the ICT sector](http://www.brsmeas.org/Default.aspx?tabid=3574&meetId=46965D8E-C675-EA11-BFFE-005056857856), 14 and 16 April 2020.

**7.1 Reports on Climate Change**

* TSB together with UN Environment, BRS, UNECE, UNESCO, UNFCCC, UN Global Compact, UN Habitat, UNIDO and UN-Women developed a report on “Frontier Technologies to Protect the Environment & Tackle Climate Change", which was launched on 22 April 2020 to commemorate the Earth Day. This Report begins by exploring what is changing in our planet, why these changes are taking place, and who is the most at risk as a result. It shows that catastrophic global climate change is already clearly underway, and that urgent action is needed to help monitor, mitigate and adapt to its effects. Frontier technologies – new, innovative, and disruptive technologies – offer tremendous potential for tackling climate change and meeting the goals of United Nations sustainable development goal (SDG) 13 (Climate Action).

The report spotlights eight key emerging technologies, each with the potential to be instrumental in tackling climate change: artificial intelligence (AI), Internet of Things (IoT), 5G, clean energy technology, digital twin, robotics, Space 2.0 technologies, as well as digitalization and Big Data.

**Annex 1**

**Achievements of ITU-T Study Group 5 on electromagnetic compatibility, lightning protection and electromagnetic effects; ICTs related to the environment, climate change, energy efficiency and clean energy and circular economy, including e‑waste
(status from February 2020 until August 2020)**

* 1. **WP1/5 - EMC, lightning protection, EMF**

**1.1.1 Recommendations approved**

| **SG** | **No** | **Title** |
| --- | --- | --- |
| 5 | K.50 Amd.1 | Amendment 1 to Recommendation ITU-T K.50: Safe limits for operating voltages and currents of telecommunication systems powered over the network |
| 5 | K.64 (rev.) | Safe working practices for outside equipment installed in particular environments |
| 5 | K.98 Corr.2 | Corrigendum 2 to Recommendation ITU-T K.98: Overvoltage protection guide for telecommunication equipment installed in customer premises |
| 5 | K.21 Amd.1 | Amendment 1 to Recommendation ITU-T K.21: Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents |
| 5 | K.45 Amd.1 | Amendment 1 to Recommendation ITU-T K.45: Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents |
| 5 | K.83 (rev.) | Monitoring of electromagnetic field levels |
| 5 | K.91 (rev.) | Guidance for assessment, evaluation and monitoring of the human exposure to RF EMF |
| 5 | K.146 | Management of interferences on telecommunication transmissions on copper other than speech |
| 5 | K.147 | Ethernet port resistibility testing for overvoltages and overcurrents |

**1.1.2 Informative texts agreed**

| **SG** | **No** | **Title** |
| --- | --- | --- |
| 5 | K.Suppl.1 | Guide on electromagnetic fields and health |
| 5 | K.Suppl.20 | RF Exposure evaluation around base station installed underground |

**1.1.3 Deleted Recommendations**

|  |  |  |
| --- | --- | --- |
| SG | No. | Title |
| None |  |  |

**1.1.4 Discontinued Supplement**

|  |  |  |
| --- | --- | --- |
| SG | No. | Title |
| None |  |  |

**1.1.5 Recommendations consented (in AAP Last Call)**

| **SG** | **No** | **Title** |
| --- | --- | --- |
| 5 | K.56 (rev.) | Protection of radio base stations against lightning discharges |
| 5 | K.112 (rev.) | Lightning protection, earthing and bonding: Practical procedures for radio base stations |

**1.2 WP2/5 - Environment, Energy Efficiency and the Circular Economy**

**1.2.1 Recommendations approved**

| **SG** | **No** | **Title** |
| --- | --- | --- |
| 5 | L.1381 | Smart energy solution for data centre |
| 5 | L.1382 | Smart energy solution for telecommunication rooms |
| 5 | L.1371 | A methodology for assessing and scoring the sustainability performance of office buildings |

**1.2.2 Informative texts agreed**

| **SG** | **No** | **Title** |
| --- | --- | --- |
| 5 | L.Suppl.37 | Guidance to operators of mobile networks, fixed networks and data centres on setting 1.5°C aligned targets compliant with Recommendation ITU-T L.1470 |

**1.2.3 Deleted Recommendations**

|  |  |  |
| --- | --- | --- |
| Q | No. | Title |
| None |  |  |

**1.2.4 Recommendations consented (in AAP Last Call)**

| **SG** | **No** | **Title** |
| --- | --- | --- |
| 5 | L.1310 (rev.) | Energy efficiency metrics and measurement methods for telecommunication equipment |
| 5 | L.1331 (rev.) | Assessment of mobile network energy efficiency |
| 5 | L.1023 (ex.L.CE-2) | Assessment method for circular scoring |

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