Activities of ITU-T Study Group 5 (Environment, Climate Change and Circular Economy) and Discussion Results

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Abstract

The NTT Group participates in the development of international standards by the International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) with a view to protecting telecommunication equipment from electromagnetic interference and lightning surges, assessing the impact of information and communication technology on climate change, promoting a circular economy conducive to sustainable development, enhancing the reliability of telecommunication services, and reducing the environmental load of the Group's business activities. This article reports on the main discussion results of the ITU-T Study Group 5 meeting held in September 2018.

Keywords: ITU-T SG5, climate change, circular economy

1. Introduction

The International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) Study Group 5 (SG5) is responsible for studying issues related to the environment, climate change, and the circular economy and consists of two working parties (WPs) as shown in **Fig. 1** [1]. WP1 studies five Questions relating to protection of information and communication technology (ICT) infrastructure against electromagnetic surges, electromagnetic compatibility (EMC), and human exposure to electromagnetic fields (EMFs). WP2 tackles three Questions relating to energy efficiency, the circular economy, and assessment of the environmental impact of ICT. In this article, we report on the main results of discussions in the SG5 meeting held in Geneva, Switzerland, September 11–21, 2018. An executive summary of this meeting is posted on the ITU-T website [2].

2. WP1 discussion results

WP1 addresses Questions 1 through 5. The contents of each question are explained in this section.

2.1 Question 1

Question 1 concerns lightning strikes, earthing (grounding), and protection of communication systems against electromagnetic surges caused by power systems. A proposal was made at this meeting to expand the scope of a new Recommendation on protection of small-size telecommunication installations with poor earthing conditions to include systems without earthing ports or high-voltage direct current systems. The meeting discussion included the idea of applying an isolation transformer (with limitations on the length of the cable in the secondary winding and a requirement to indicate the danger of electric shock) to a system without earthing ports. Consent was reached on a draft as Recommendation (K.134).

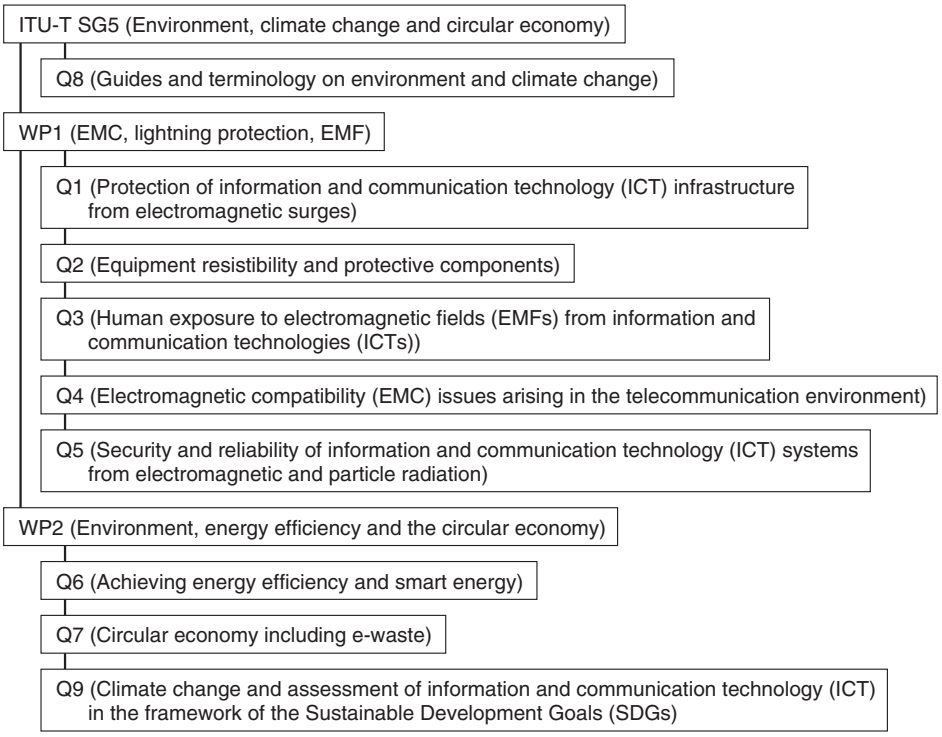

Fig. 1. Questions and organization of ITU-T SG5.

2.2 Question 2

Question 2 concerns test methods and requirements for overvoltage protection devices such as varistors and lightning arrestors. A comment on grounding of direct current (DC) power lines was submitted. This comment was related to existing Recommendation revisions that had been discussed and given consent at the previous meeting. They include K.20 and K.21, which respectively specify overvoltage-related requirements for systems installed in telecommunication buildings and those for systems installed in customer premises, and K.44, which specifies basic requirements regarding overvoltages and overcurrents in telecommunication equipment. The meeting participants agreed to issue a document on internal DC powering interface surge testing factors as a supplement to K.20, K.21, and K.44.

NTT has been leading the development of K.spd-safe, which serves as guidance on safety relating to the use of surge protective devices and surge protective components in customer buildings and access networks. The meeting participants agreed to add to this draft Recommendation information about safety for cases where high voltage occurs suddenly on telecommunication lines when the power system malfunctions, and for cases where an overvoltage occurs on internal line ports. This draft Recommendation will be consented to when International Electrotechnical Commission (IEC) Technical Committee 108 arrives at a basic understanding of it.

The participants also discussed K.135, a new Recommendation on technical parameters for residual-current-operated protective devices with an automatic reclosing feature for telecom applications, and they reached consent on it with some editorial changes.

2.3 Question 3

Question 3 concerns management, measurement, and guidelines regarding human exposure to EMFs from telecommunication equipment such as wireless access systems. NTT DOCOMO and the National Institute of Information and Communications Technology, both based in Japan, submitted evaluation data on human exposure to EMFs in the vicinity of a maintenance hole (manhole)-installed base station. It was found at the meeting that such data had not

previously existed and that the data were very useful for member countries. The data were added to K.91 (Guidance for assessment and monitoring of human exposure to radio frequency EMFs), an existing Recommendation, as Appendix VIII. Four version-one draft Recommendations were also discussed and agreed to, including K.workers, which concerns the assessment and management of restrictions regarding exposure of wireless equipment workers to EMFs.

2.4 Question 4

Question 4 pertains to EMC-related requirements for new telecommunication equipment, telecommunication services, and wireless systems. The meeting members discussed two new Recommendations (K.136 and K.137) related to EMC-related requirements for wireless and wireline equipment, specified their scopes of application, reviewed the compatibility of these Recommendations with existing standards, and consented to their final drafts. NTT proposed adding specifications on acceptable values for conducted interference waves below 150 kHz to K.123, an existing Recommendation on EMC-related requirements for electrical equipment within a telecommunication building. This proposal was based on NTT technical requirements [3], which NTT revised in fiscal year 2018. Consensus was reached on that proposal. The final draft was discussed and consented at the next meeting, which was held in May 2019.

2.5 Question 5

Question 5 concerns soft errors in telecommunication equipment caused by particle radiation, and electromagnetic security. Japan proposed the fourth version of a new draft Recommendation on methods for estimating quality from soft error test results, and guidelines for application of these methods. The meeting members discussed definitions of terms and specification grounds and consented to the final draft for K.138. Similarly, consent was reached on the final draft for a new Recommendation (K.139) on reliability requirements for telecommunication equipment to counter soft errors, which Japan was proposing to study, after minor revisions.

In the coming years, WP1 will develop new Recommendations on requirements for measures against soft errors in semiconductor devices used in telecommunication equipment, and will revise K.78, an existing Recommendation on protection of telecommunication equipment from high-altitude electromagnetic pulses, which has recently been the subject of considerable discussion, by incorporating the latest IEC standards and study results.

3. WP2 discussion results

WP2 deals with Questions 6, 7, and 9, the topics of which are explained here.

3.1 Question 6

Question 6 pertains to the energy efficiency of telecommunication equipment and datacenters. It was proposed to include main battery technologies and characteristics, a selection of battery technologies suitable for individual applications, and battery evaluation and test methods in L.1220, an existing Recommendation on energy storage technology, as Part 2. Part 2 will be based on Part 1 of L.1220, which describes general methods for selecting and evaluating storage system technology. The meeting members consented to the final draft (L.1221). They also discussed the criteria and methods for measuring energy efficiency of functional components such as virtual network functions and network functions virtualization (NFV) infrastructure in an NFV environment in connection with L.mmNFV, a new Recommendation on the measurement method for measuring the energy efficiency of NFV. The members consented to the final draft (L.1361).

3.2 Question 7

Question 7 concerns the circular economy including e-waste (electrical and electronic devices that have been disposed of). The Connect 2020 Agenda* is aimed at achieving a 50% reduction in e-waste by 2020. It was proposed to create a guidance document that specifies three steps: (1) creation of a comprehensive e-waste inventory; (2) development of a sustainable e-waste management system; and (3) introduction of support measures to promote the use of said management system. The meeting members consented to the final draft (L.1031). They also studied L.CEM, a new Recommendation on criteria for evaluating the environmental impact of mobile phones. Criteria for this assessment, which takes into consideration the entire life cycle of a product, from design through production and use to end of life, and is based on the contents of L.Suppl.32 (supplementary document) and UL Standards (electric product safety standards in the US), such as UL110. The meeting members consented to the final draft (L.1015).

* Connect 2020 Agenda defines ITU's policies on ICT-related activities up to 2020.

3.3 Question 9

Question 9 pertains to methods for assessing the sustainability impacts of ICT in order to promote the United Nations Sustainable Development Goals. Both the assessment procedure part and the future forecast part of L.MAE, a new Recommendation on methodology for assessing the environmental impact of the ICT sector, were revised at the meeting in order to incorporate received comments, and agreement was reached on the final draft (L.1450).

A proposal was made and accepted to create, as a supplementary document to this Recommendation, greenhouse gas (GHG) emissions trajectories for the ICT sector compatible with the United Nations Framework Convention on Climate Change Paris Agreement. This supplementary document will be developed in collaboration with the Global e-Sustainability Initiative. The collaboration will be extended to include the Science Based Targets Initiative.

Discussions on L.MAAP, a new Recommendation on methods for assessing the positive impact of ICT on sector level, have been ongoing since 2017. The currently proposed method is a bottom-up method. It aggregates GHG emissions from each component to be assessed. At this meeting, NTT proposed a top-down method to assess the impact of ICT use on the environment and economy based on an Input-output Table, which represents nation-level inter-industry trade. The meeting members agreed to include NTT's proposal in the draft Recommendation.

4. Conclusion

We have introduced the latest standardization activities of ITU-T SG5. Communication technology is advancing on a daily basis, as is manifested by the emergence of 5G (fifth-generation mobile communications), the Internet of Things, and virtualization. We will promote timely standardization in order to enable rapid response to changes in the environment surrounding telecommunication facilities and to contribute to enhancing the quality and reliability of telecommunication services while reducing their environmental load.

References

[1] ITU-T SG5 Study Group Structure, https://www.itu.int/net4/ITU-T/lists/sgstructure.aspx?Group=5&Period=16

[2] Executive Summary of the ITU-T Study Group 5 Meeting "Environment, Climate Change and Circular Economy" (Geneva, 11–21 September 2018). https://www.itu.int/en/ITU-T/studygroups/2017-2020/05/Pages/exec-sum-201809.aspx

[3] Website of NTT, Technical Requirements, http://www.ntt.co.jp/ontime/e/policy/tr/

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