

# ITU-T Study Group 5 “Environment, Climate Change and Circular Economy”

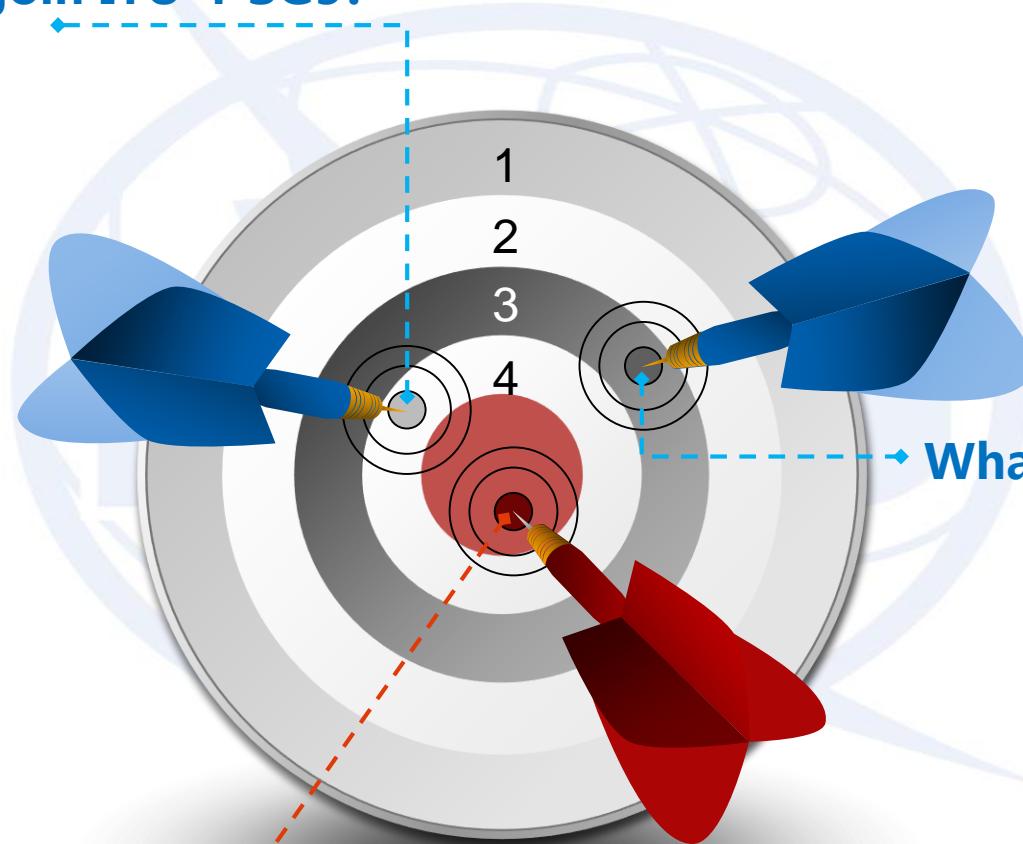
Qi Shuguang  
Vice Chairman  
ITU-T Study Group 5

3 December 2018



# Content

Why should you join ITU-T SG5?



What SG5 focuses on?

What is SG5 developing?

# ITU Resolutions on Environment, Climate Change and Circular Economy

**ITU Resolution 182** – “The role of ICTs on climate change and the protection of the environment” (Busan, 2014)

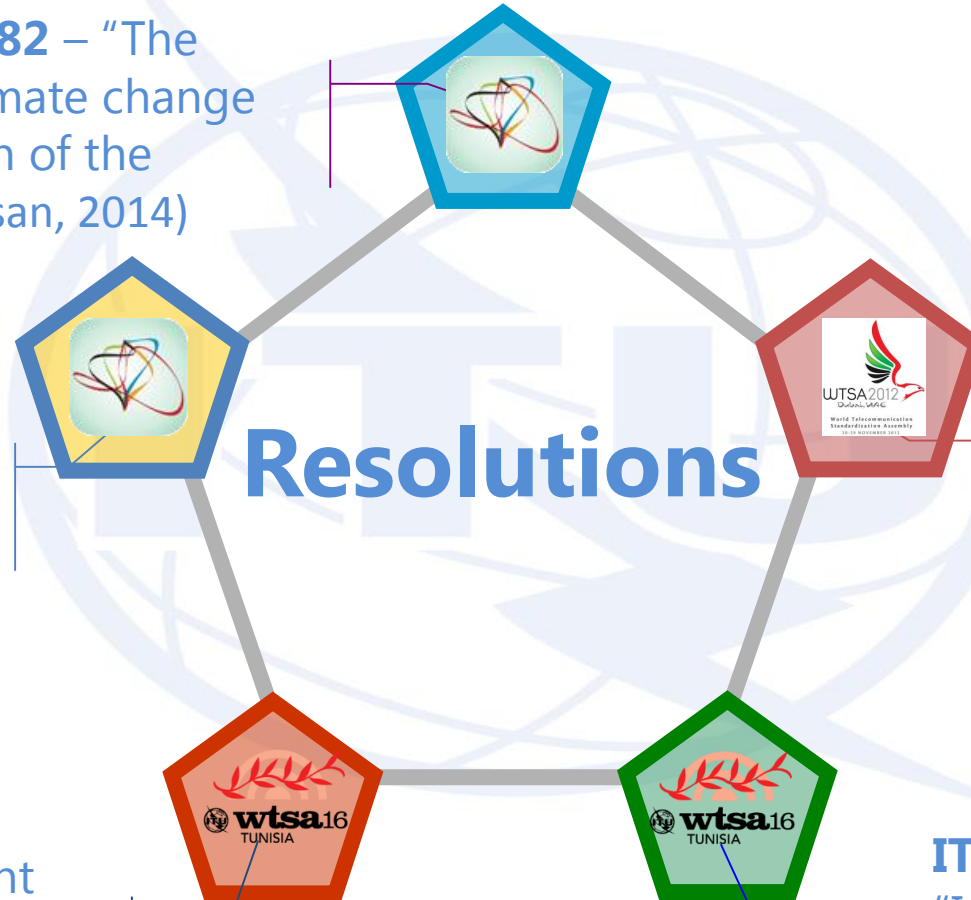
**ITU Resolution 176** – “Human exposure to and measurement of electromagnetic fields” (Rev Dubai, 2018)

**ITU-T Resolution 72** – “Measurement and assessment concerns related to human exposure to electromagnetic fields” (Rev. Hammamet, 2016)

## Resolutions

**ITU-T Resolution 79** - “The role of telecommunications / information and communication technology in handling and controlling e-waste from telecommunication and information technology equipment and methods of treating it” (Dubai, 2012)

**ITU-T Resolution 73** – “Information and communication technologies, environment and climate change” (Rev. Hammamet, 2016)



# ITU Resolutions on Environment, Climate Change and Circular Economy (1)



**ITU Resolution 182** – “The role of ICTs on climate change and the protection of the environment” (Busan, 2014)

instructs the Directors of the three Bureaux:

- to support the development of reports on ICTs, the environment and climate change;
- to organize workshops and seminars to assist developing countries, by raising awareness and identifying their particular needs and challenges.



**ITU-T Resolution 79** - “The role of telecommunications / information and communication technology in handling and controlling e-waste from telecommunication and information technology equipment and methods of treating it” (Dubai, 2012)

resolves to instruct the Director of the Telecommunication Standardization Bureau, in collaboration with the Director of the Telecommunication Development Bureau

- to pursue and strengthen the development of ITU activities in regard to handling and controlling e-waste;
- to address the handling and controlling of e-waste and to contribute to global efforts designed to deal with the increasing hazards which arise therefrom.



# ITU Resolutions on Environment, Climate Change and Circular Economy (2)



**ITU-T Resolution 73** – “Information and communication technologies, environment and climate change” (Rev. Hammamet, 2016)



resolves,

- to continue and further develop the ITU-T work programme initially launched in December 2007 on ICTs and climate change,

resolves,

to invite ITU T, in particular Study Group 5, to expand and continue its work and support in this domain, including, but not limited to:

- publishing and disseminating its technical reports, as well as developing ITU T Recommendations to address these issues; ;
- developing, promoting and disseminating information and training resources related to this topic through the organization of training programmes, workshops, forums and seminars for regulators, operators and any interested stakeholders from developing countries;
- continuing to cooperate and collaborate with other organizations working on this topic and to leverage their work, in particular with a view to assisting the developing countries in the establishment of standards and in monitoring compliance with these standards, especially on telecommunication installations and terminals;
- cooperating on these issues with ITU R Study Groups 1 and 6, and with Study Group 2 of the ITU Telecommunication Development Sector (ITU D) in the framework of ITU D Question 7/2;
- strengthening coordination and cooperation with WHO in the EMF project so that any publications relating to human exposure to EMF are circulated to Member States as soon as they are issued.



**ITU-T Resolution 72** – “Measurement and assessment concerns related to human exposure to electromagnetic fields” (Rev. Hammamet, 2016)



# ITU Resolutions on Environment, Climate Change and Circular Economy (3)



**ITU Resolution 176** – “Human exposure to and measurement of electromagnetic fields” (Rev Dubai, 2018)



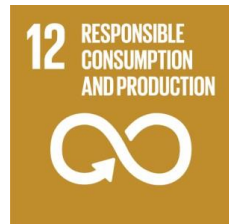
instructs the Directors of the three Bureaux:

- to collect and disseminate information concerning exposure to EMF, including on EMF measurement methodologies, in order to assist national administrations, particularly in developing countries, to develop appropriate national regulations;
- to work closely with all organizations in the implementation of this resolution, as well as Resolution 72 (Rev. Hammamet, 2016), Resolution 62 (Rev. Buenos Aires, 2017), in order to continue and enhance the technical assistance provided to Member States.

# ITU-T programme on Environment, Climate Change & Circular Economy



- **Develop international standards** to protect the environment
- **Assist countries** to develop policies and implement ITU-T standards on climate change adaptation and mitigation
- **Help companies** becoming more sustainable and socially responsible
- **Research and development** on areas which include e-waste, energy efficiency and smart sustainable cities
- Raise **awareness** on role of ICT in tackling environmental challenges



# What can be done?

Information and Communication Technologies (ICTs), such as satellites, mobile phones or the Internet, are capable of playing a key role in **addressing environmental global challenges and sustainable development.**

By raising awareness of ICT's role in tackling environmental challenges including climate change, ITU-T is promoting innovative ICT solutions to environmental questions and is developing green ICT standards to support a sustainable future, in areas such as:



Assessment  
of  
environmental  
impact of  
ICTs



Climate  
change  
adaptation  
and  
mitigation



Energy  
efficiency  
and smart  
energy

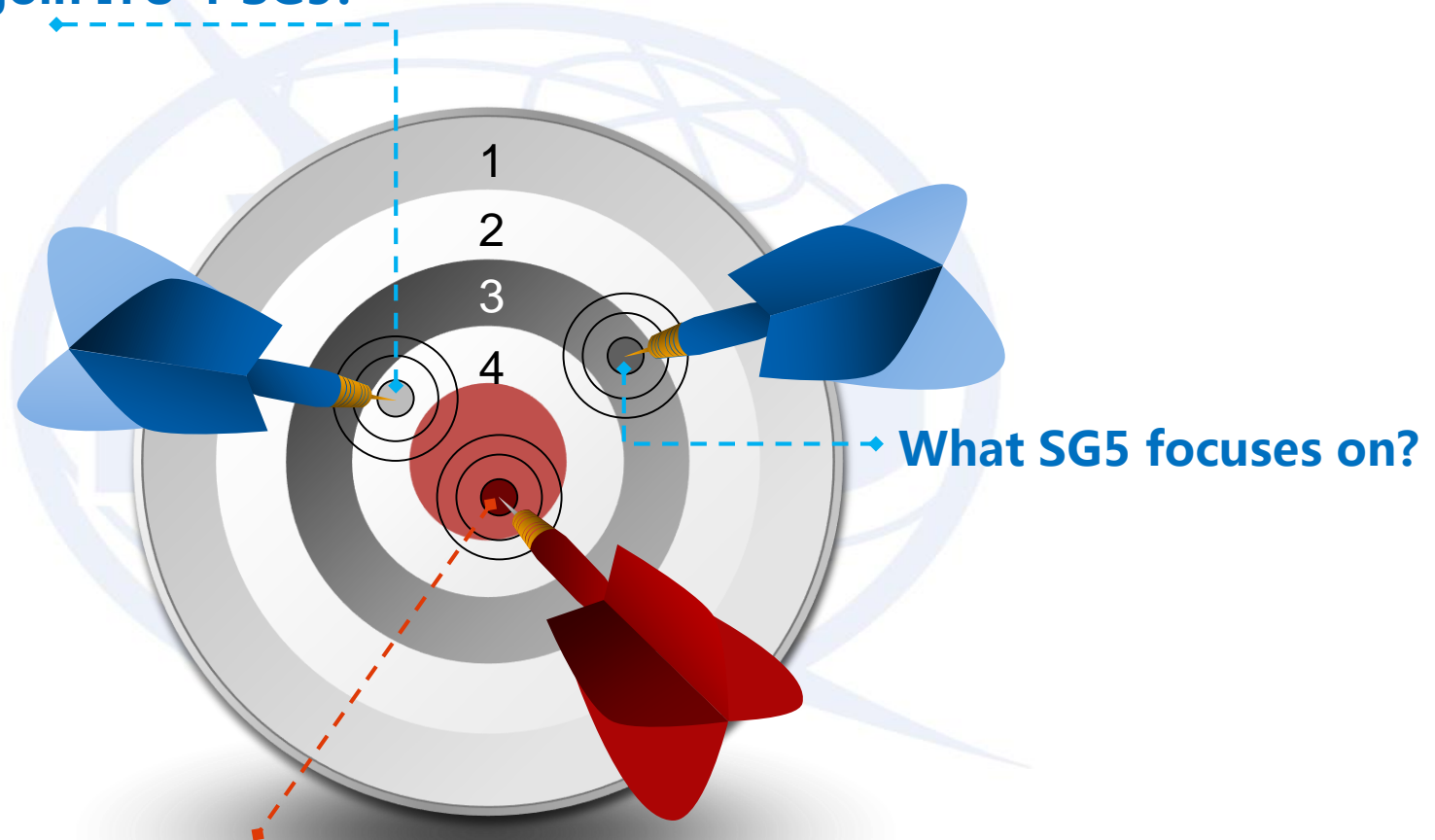


E-waste



# Content

Why should you join ITU-T SG5?



What SG5 focuses on?

What is SG5 developing?

# ITU-T Study Group 5: Environment, climate change and circular economy



## Lead Study Group for

### SG5 is responsible for:

Studying ICT environmental aspects of electromagnetic phenomena and climate change.

Studies on how to use ICTs to help countries and the ICT sector to adapt to the effects of environmental challenges, including climate change, in line with the Sustainable Development Goals (SDGs).

electromagnetic compatibility, lightning protection and electromagnetic effects

ICTs related to the environment, climate change, energy efficiency and clean energy

circular economy, including e-waste



# ITU-T SG5 Overview

Q8

Guides and terminology  
on environment and  
climate change

WP1

Working Party 1:  
EMC, Lightning  
Protection, EMF

WP2

Working Party 2:  
Environment, Energy  
Efficiency and the  
Circular Economy

# ITU-T SG5 last meeting main results

## Geneva, 11-21 September 2018

### Statistics:

**122** Participants

**1** Recommendation approved

- ITU-T L.1450 “Methodologies for the assessment of the environmental impact of the information and communication technology sector”

**12** Draft Recommendations consented

**8** Other texts agreed

**22** New work items



# WP1/5 – EMC, Lightning Protection, EMF



Q1//5 - Protection of information and communication technology (ICT) infrastructure from electromagnetic surges

Q2/5 - Equipment resistibility and protective components

Q3/5 - Human exposure to electromagnetic fields (EMFs) from information and communication technologies (ICTs)

Q4/5 - Electromagnetic compatibility (EMC) issues arising in the telecommunication environment

Q5/5 - Security and reliability of information and communication technology (ICT) systems from electromagnetic and particle radiations

# ITU-T Activities on Human Exposure to Electromagnetic Fields (EMF)

Development and implementation of Standards

**Q3/5** - Human exposure to electromagnetic fields (EMFs) from information and communication technologies (ICTs)

Monitoring of EMF Levels

**Recommendation ITU-T K.83**

EMF estimator Software

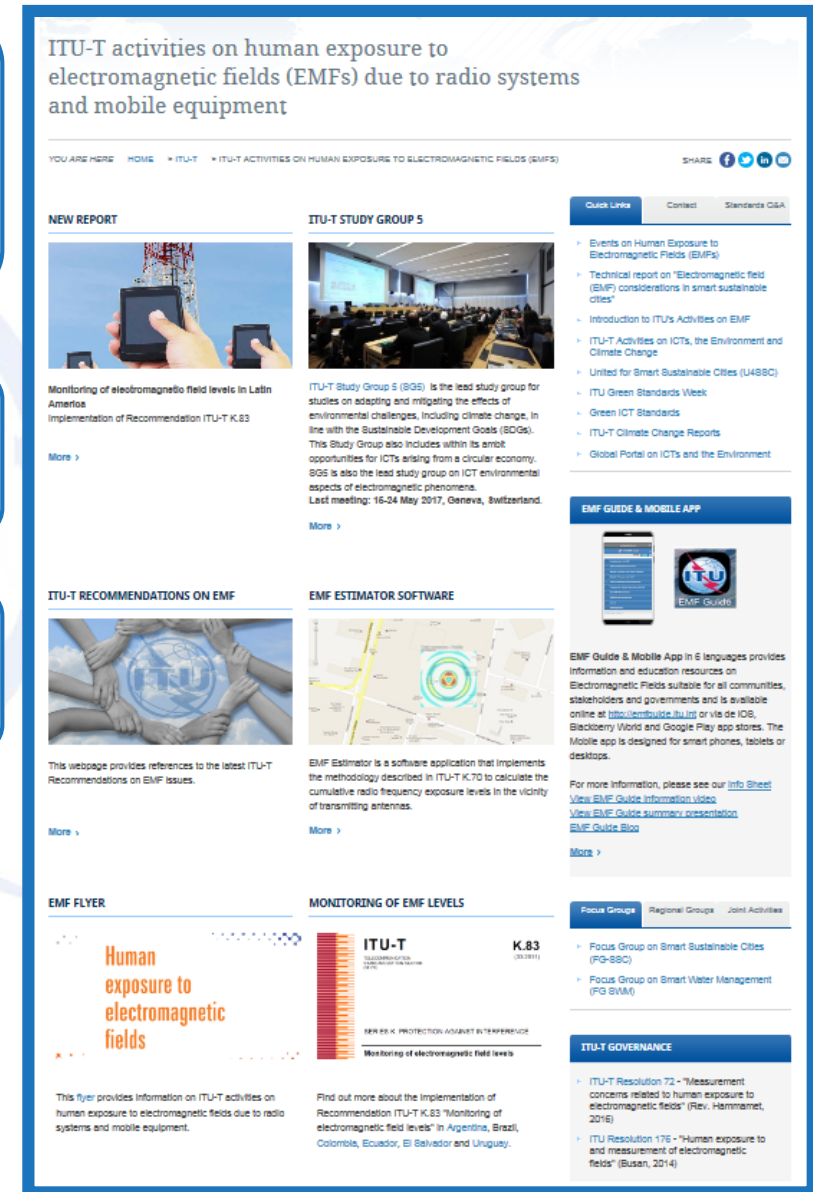
**Recommendation ITU-T K.70**

EMF mobile application

**EMF GUIDE & MOBILE APP**



EMF Publications



ITU-T activities on human exposure to electromagnetic fields (EMFs) due to radio systems and mobile equipment

YOU ARE HERE HOME ITU-T ITU-T ACTIVITIES ON HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS (EMFs) SHARE

**NEW REPORT**

**Monitoring of electromagnetic field levels in Latin America**  
Implementation of Recommendation ITU-T K.83  
More >

**ITU-T STUDY GROUP 5**

ITU-T Study Group 5 (SG5) is the lead study group for studies on adapting and mitigating the effects of environmental challenges, including climate change, in line with the Sustainable Development Goals (SDGs). This Study Group also includes within its ambit opportunities for ICTs arising from a circular economy. SG5 is also the lead study group on ICT environmental aspects of electromagnetic phenomena.  
Last meeting: 16-24 May 2017, Geneva, Switzerland.  
More >

**ITU-T RECOMMENDATIONS ON EMF**

This webpage provides references to the latest ITU-T Recommendations on EMF issues.  
More >

**EMF ESTIMATOR SOFTWARE**

EMF Estimator is a software application that implements the methodology described in ITU-T K.70 to calculate the cumulative radio frequency exposure levels in the vicinity of transmitting antennas.  
More >

**EMF GUIDE & MOBILE APP**

EMF Guide & Mobile App in 6 languages provides information and education resources on Electromagnetic Fields suitable for all communities, stakeholders and governments and is available online at <http://emfguide.itu.int> or via de iOS, Blackberry World and Google Play app stores. The Mobile app is designed for smart phones, tablets or desktops.  
For more information, please see our [Info Sheet](#)  
[View EMF Guide information video](#)  
[View EMF Guide summary presentation](#)  
[EMF Guide Blog](#)  
More >

**EMF FLYER**

Human exposure to electromagnetic fields  
This flyer provides information on ITU-T activities on human exposure to electromagnetic fields due to radio systems and mobile equipment.

**MONITORING OF EMF LEVELS**

**ITU-T K.83**  
(2013)  
RECOMMENDATION  
Monitoring of electromagnetic field levels  
Find out more about the Implementation of Recommendation ITU-T K.83 "Monitoring of electromagnetic field levels" in Argentina, Brazil, Colombia, Ecuador, El Salvador and Uruguay.

**Focus Groups** Regional Groups Joint Activities

- Focus Group on Smart Sustainable Cities (FG-SSC)
- Focus Group on Smart Water Management (FG-SWM)

**ITU-T GOVERNANCE**

- ITU-T Resolution 72 - "Measurement concerns related to human exposure to electromagnetic fields" (Rev. Hammanet, 2016)
- ITU Resolution 175 - "Human exposure to and measurement of electromagnetic fields" (Busan, 2014)

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



Q6/5 - Achieving energy efficiency and smart energy

Q7/5 - Circular economy including e-waste

Q9/5 - Climate change and assessment of information and communication technology (ICT) in the framework of the Sustainable Development Goals (SDGs)



## Q6/5 - Achieving energy efficiency and smart energy

Q6/5 is focused on the studies and development of energy efficiency metrics, KPIs, measurement methods, technical requirements related to ICT infrastructures, guidelines to reduce environmental impacts, in addition to best practices for low cost and reduced environmental impact solutions.

### Green Data Centers



### ICT Equipment and Energy Efficiency

For example, applying best practices to cooling could reduce the energy consumption of a typical data centre by more than **50%**.

ITU-T L.1300  
ITU-T L.1301  
ITU-T L.1302  
Draft ITU-T L.1303

ITU-T L.1310,  
ITU-T L.1315,  
ITU-T L.1320,  
ITU-T L.1321,

ITU-T L.1325,  
ITU-T L.1330,  
ITU-T L.1331,  
ITU-T L.1332,

ITU-T L.1340,  
ITU-T L.1350,  
ITU-T L.1351,  
ITU-T L.1360



# Q7/5 - Circular economy including e-waste

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Promoting circular design combined with responsible e-waste management will not only reduce e-waste but will also help curb the other negative impacts related to the use of ICTs worldwide.

**Power supply series**



**Recycling of rare metals in ICT products**

**Target 12.5: By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.**



Sustainable management of waste electrical and electronic equipment in Latin America



ITU-T L.1000 ITU-T L.1005  
ITU-T L.1001 ITU-T L.1006  
ITU-T L.1002

ITU-T Suppl. 27  
ITU-T Suppl.28

ITU-T L.1100  
ITU-T L.1101  
ITU-T L.1020  
ITU-T L.1021  
ITU-T L.1030  
ITU-T L.1031



# Q9/5 - Climate change and assessment of information and communication technology (ICT) in the framework of the Sustainable Development Goals (SDGs)

Q9/5 aims to develop assessment methodologies that allow objective, transparent and practical assessments of the sustainability impacts of information and communication technologies (ICTs).

Adapting information and communication technology infrastructure to the effects of climate change



Methodologies to assess the environmental impact of ICT

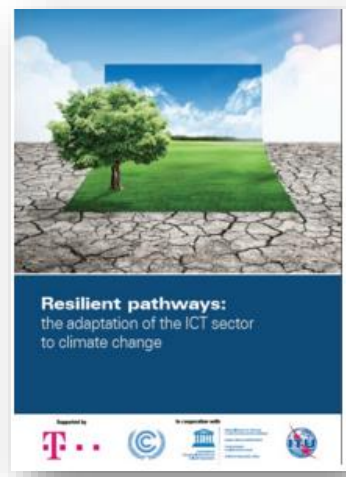
195 countries

Keep warming "well below 2°C".

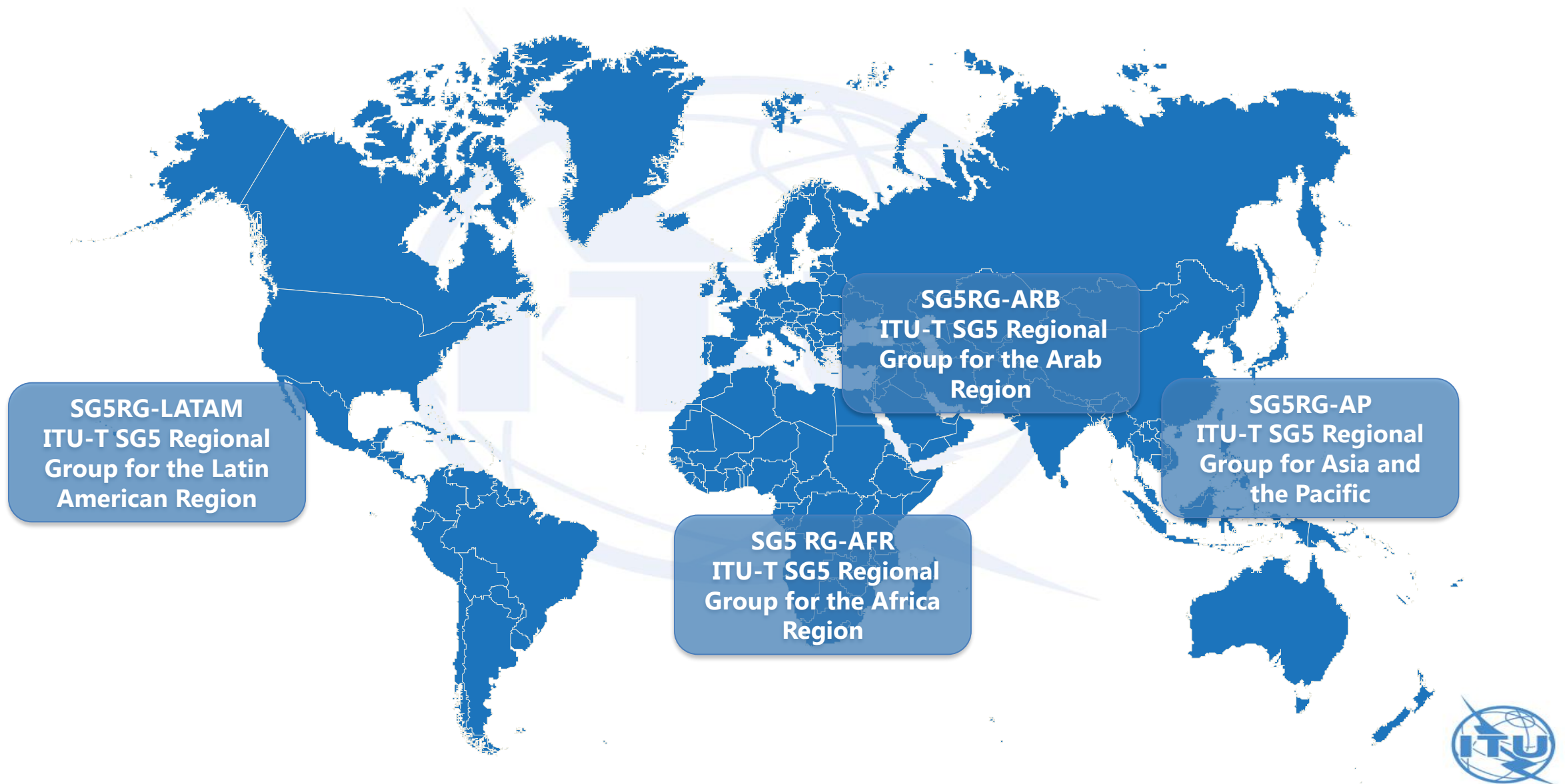
ITU-T L.1500, ITU-T L.1503,  
ITU-T L.1501, ITU-T L.1504  
ITU-T L.1502,

ITU-T L.1400, ITU-T L.1430  
ITU-T L.1410, ITU-T L.1440,  
ITU-T L.1420, ITU-T L.1450

L.MAAP



# ITU-T SG5 Regional Groups



**SG5RG-LATAM**  
ITU-T SG5 Regional  
Group for the Latin  
American Region

**SG5 RG-AFR**  
ITU-T SG5 Regional  
Group for the Africa  
Region

**SG5RG-ARB**  
ITU-T SG5 Regional  
Group for the Arab  
Region

**SG5RG-AP**  
ITU-T SG5 Regional  
Group for Asia and  
the Pacific



# ITU-T SG5 Regional Group for Asia and the Pacific



- AI and emerging technology Working Group;
- EMC & EMF, protection and safety aspects Working Group;
- Energy efficiency and circular economy Working Group.

# ITU-T SG5 Regional Group for Asia and the Pacific

- **Contributions to SG5**

Asia Pacific Regional Group ( AP-RG ) will discuss on the region priorities and develop Contributions on which there are common topics from this Region such as on the following aspects, and will contribute to SG5 as regional group contributions.



Lightening Protection



Green Energy



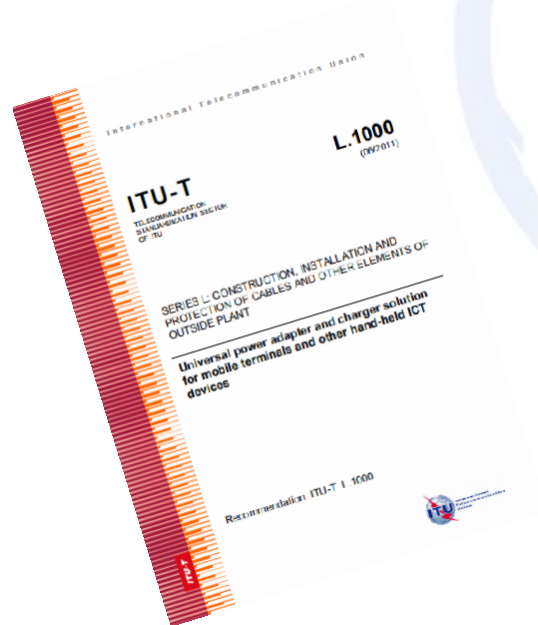
Energy Efficiency



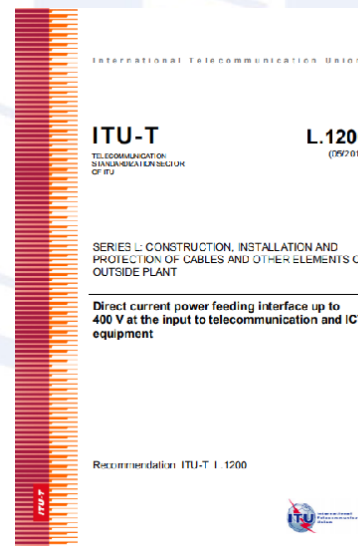
# ITU-T SG5 Regional Group for Asia and the Pacific

- **Discussion on P&C (Performance test and Conformity test) program**

In order to implement the existing ITU standards, the P&C program (performance test and standard conformity test) will be done according to the Recommendations already published.



L.1000 series on universal power adapter



L.1200 series on Up to 400V system

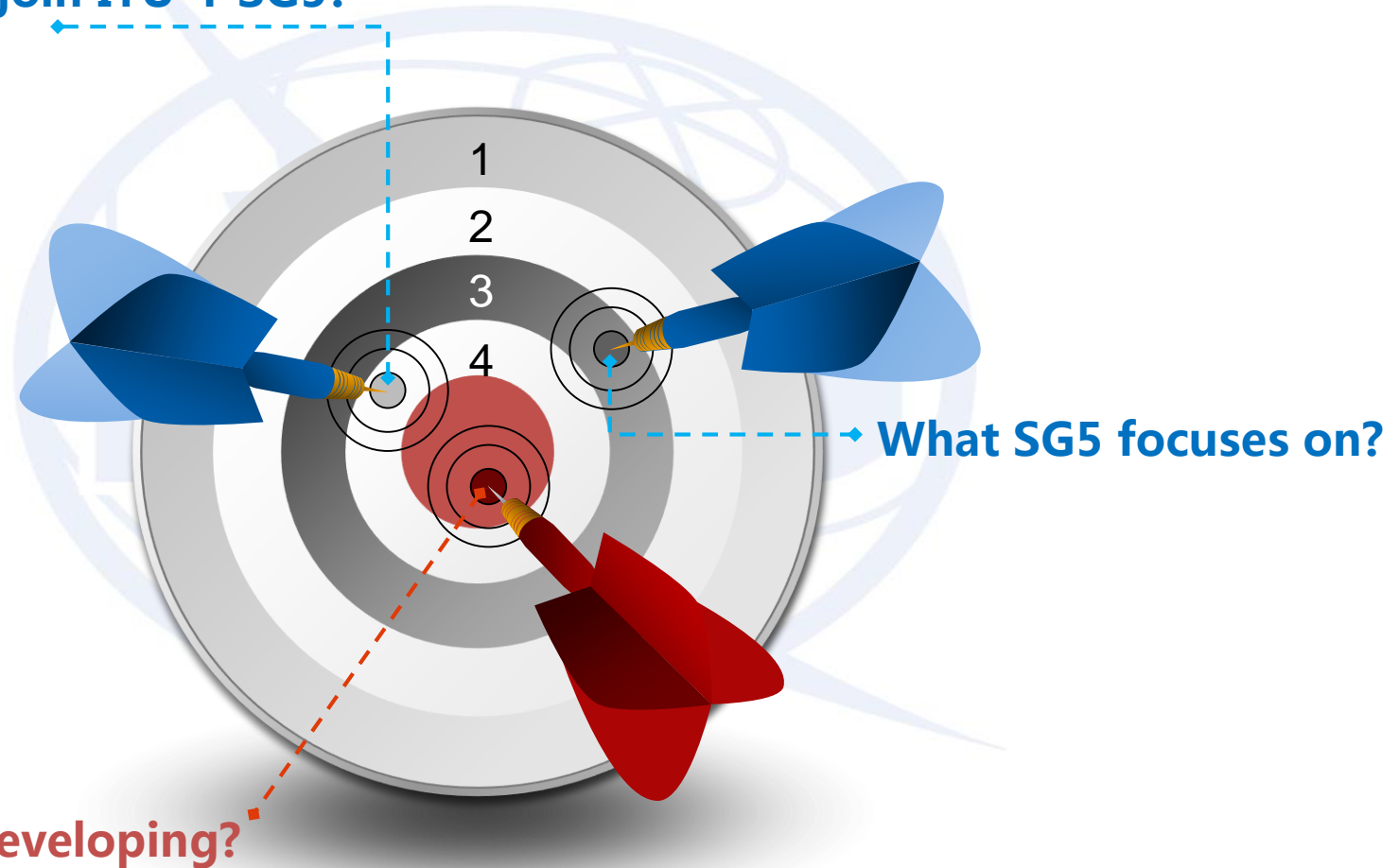


L.1300 series on Energy Efficiency measurement



# Content

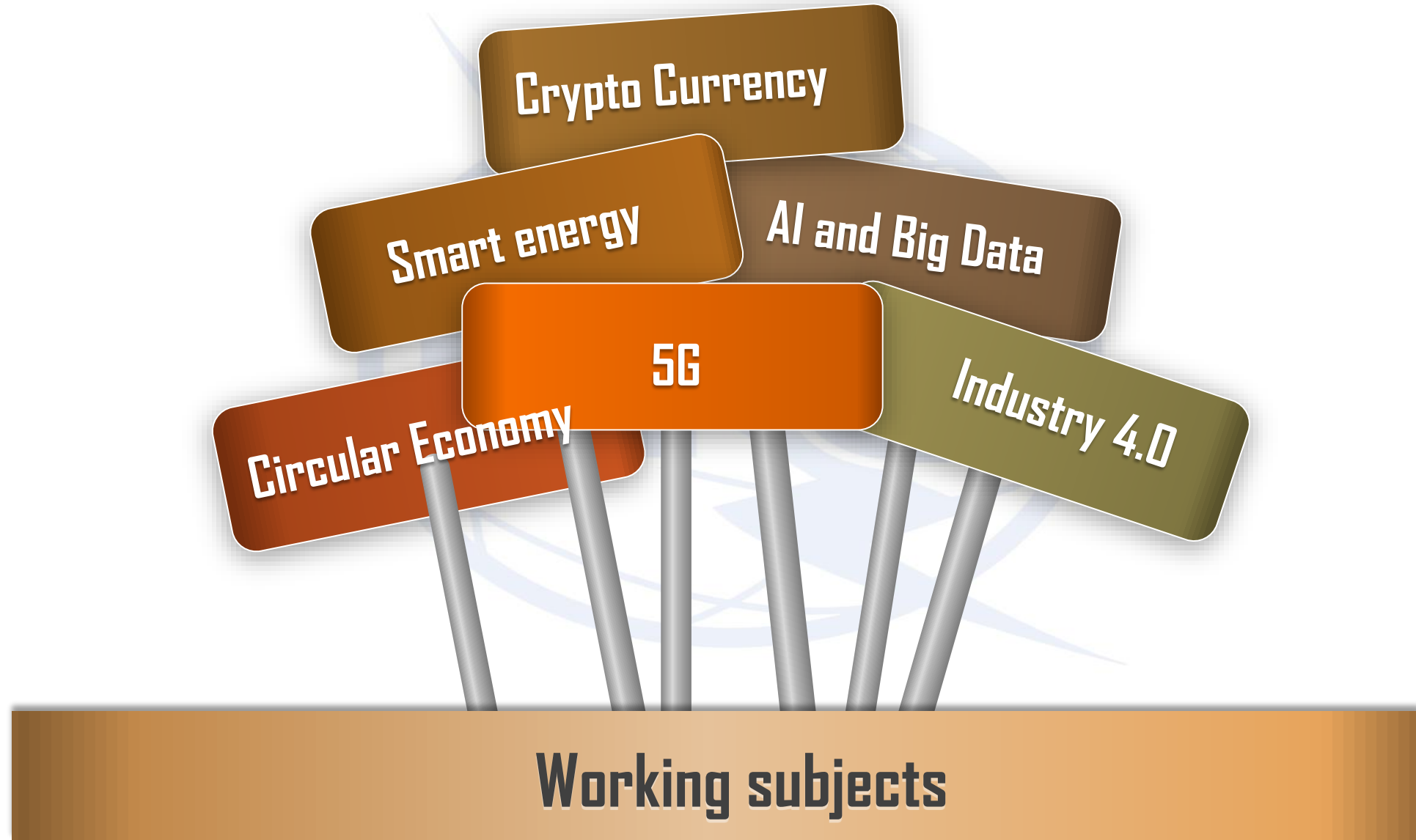
Why should you join ITU-T SG5?



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# Ongoing standardization work on emerging technology





# Setting Environmental Requirements for 5G

International Standards

Supplements

Technical Reports

ITU-T  
SG5

Electromagnetic  
compatibility  
(EMC)

ITU-T K.Suppl.10

Electromagnetic  
fields (EMF)

ITU-T K.Suppl.9  
ITU-T K.Suppl.14  
ITU-T K.Suppl.16

Energy & efficiency

ITU-T L. 1220  
ITU-T L.1221  
ITU-T L.1222  
ITU-T L. Suppl.36

Resistibility

ITU-T K.Suppl.8





## ITU-T K. Suppl. 10

### Analysis of EMC aspects and definition of requirements for 5G systems

This Supplement provides guidance on the EMC compliance assessment considerations for 5G systems. Given the 5G Radio Access Network (RAN) technical standards are still being finalised, the first version of this Supplement focuses on possible emission and immunity requirements for 5G systems.

## ITU-T K. Suppl. 8

### Resistibility analysis of 5G systems

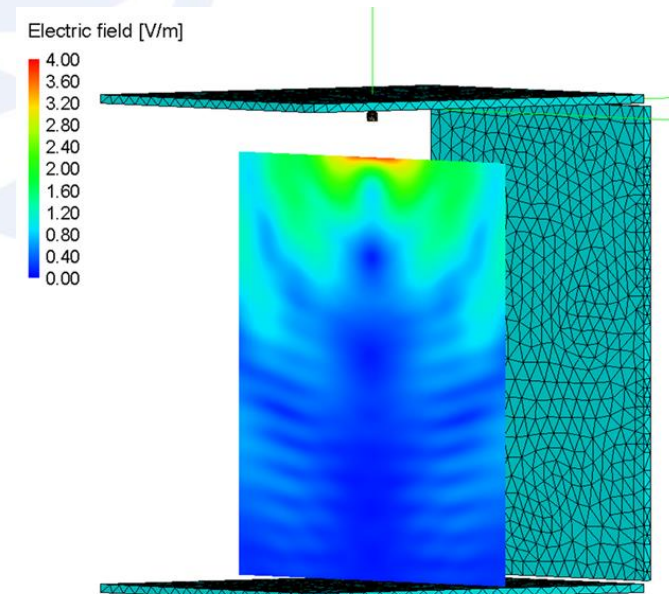
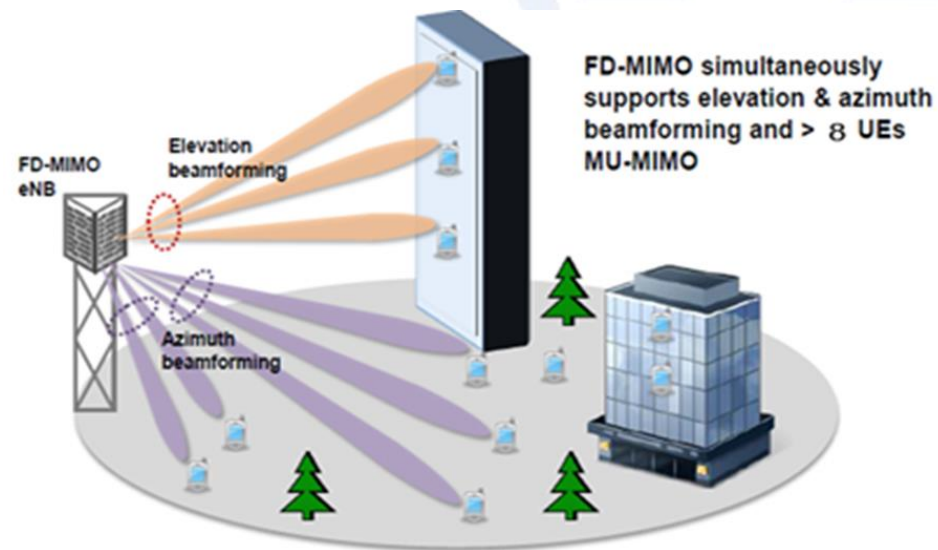
This Supplement analyses 5G system resistibility requirements for lightning and power fault events. The electrical threats posed by lightning and power fault events are discussed and the appropriate resistibility tests identified. Installation practice can have a big influence on the reliability of service and the equipment. Earthing, location and craftsmanship are discussed.

# ITU-T K. Suppl. 9

## 5G technology and human exposure to RF EMF

Contains an analysis of the impact of the implementation of 5G mobile systems with respect to exposure level of EMF around radiocommunication infrastructure

- **Higher frequencies and higher throughput**
- **Smart antennas:** will be more efficient which will result in minimized RF-EMF exposure
- **Small cells:** are well suited for coverage extent as well as capacity issues. Better quality and reduced power to and from mobile phones.
- **Internet of things (IoT):** EMF exposure will usually be much lower than from other devices and systems



## ITU-T K.Suppl.14

# The impact of RF-EMF exposure limits stricter than the ICNIRP or IEEE guidelines on 4G and 5G mobile network deployment



- Provides an overview of some of the challenges faced by countries, regions and cities which are about to deploy 4G or 5G infrastructures.
- Includes a case study on Poland
- Based on inputs and contributions from, inter alia, Poland, India, Ericsson, Nokia, China Telecom, Huawei, Uganda, Cisco, GSMA and Vodafone, Telstra, Korea, Belgium, etc.

## **Recommendation ITU-T L.1220**

### **Innovative energy storage technology for stationary use - Part 1: Overview of energy storage**

This Recommendation introduces an open series of documents for different families of technologies (battery systems, super-capacitor systems, etc.) that will be enriched progressively as new technologies emerge that may have a possible significant impact in the field of energy storage.



## **Draft Recommendation ITU-T L.1221**

### **Innovative energy storage technology for stationary use - Part 2: Battery**

This Recommendation introduces technologies and methods for evaluating, selecting and testing battery systems for defined applications.

## **Recommendation ITU-T L.1222**

### **Innovative energy storage technology for stationary use - Part 3: Supercapacitor technology**

This Recommendation contains selection criteria for telecommunication application based on main performance parameters and the methods for proper use.





# ITU-T L. Suppl.36

## Study on methods and metrics to evaluate energy efficiency for future 5G systems

This Supplement analyses the energy efficiency issues for future 5G systems. The focus of this Supplement is on methods and metrics to measure energy efficiency in 5G systems, with consideration of the degree of stability of the systems known so far and the experience of the legacy systems as well as related measurement procedures for evaluating future standardization evolutions.



International Telecommunication Union

**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**Series L**

**Supplement 36**  
(11/2017)

SERIES L: ENVIRONMENT AND ICTS, CLIMATE  
CHANGE, E-WASTE, ENERGY EFFICIENCY;  
CONSTRUCTION, INSTALLATION AND PROTECTION  
OF CABLES AND OTHER ELEMENTS OF OUTSIDE  
PLANT

**ITU-T L.1310 – Study on methods and metrics to  
evaluate energy efficiency for future 5G systems**

ITU-T L-series Recommendations – Supplement 36



# Some work items under study on 5G



- Draft Recommendation ITU-T L.5G\_powering on **“Sustainable power feeding solutions for 5G network”**.
- Draft Recommendation ITU-T L.EE\_5G on **“Energy efficiency Metrics and measurement methodology for 5G solutions”**.
- Draft Recommendation ITU-T L.methodology\_arch on **“Methodology to assess the environmental impact of the different proposed architectures”**.
- Draft Recommendation ITU-T L.ENV-KPI-5G-ARCH on **“Environmental KPIs/metrics for 5G architectures”**.
- Draft Recommendation ITU-T L.EE\_sclicing on **“Energy efficiency and slicing of IMT2020/5G”**.
- Draft Recommendation ITU-T L.ARCH\_EOL\_CE on **“Environmental Impact of architecture solutions with regards to End of Life and Circular Economy (CE)”**.

# Some work items under study on Smart Energy

- Draft Recommendation ITU-T L.SM\_BS on “Smart energy solution for telecom base stations”
- Draft Recommendation ITU-T L.SM\_DC on “Smart energy solution for data centres and telecom centres ”
- Draft Recommendation ITU-T L.SM\_EN on “Smart energy for cities and home applications ”





# Some work items under study on AI and Big data

- Draft Recommendation ITU-T L.DCIM on “Technical specifications of **data centre infrastructure management (DCIM) system based on Big Data and AI technology**”
- Draft Recommendation ITU-T L.AI-Env\_effects on “**AI environmental effect on Networks goods and services**”



# Some work items under study on other emerging technology

- Draft Recommendation ITU-T L.Energy\_Crypto\_currency “Energy consumption of crypto currency”
- Draft Recommendation ITU-T L.CE Industry 4.0 on “Circular Economy and Industry 4.0”
- Draft Recommendation ITU-T L. ICT\_CE on “ICT response to circular economy”



# Upcoming meetings



- **ITU-T Study Group 5 “Environment, Climate Change and Circular Economy” meeting**  
13-22 May 2019, Geneva, Switzerland  
(planned)



**Thank you!**

**For more information please contact: [tsbsg5@itu.int](mailto:tsbsg5@itu.int)**

