ITU Contribution to the Implementation of the WSIS Outcomes: 2023

Draft

Table of Contents

Page

I. Introduction

1. The coordination and implementation of the outcomes of the World Summit on the Information Society (WSIS) continues to be one of the priorities of the Secretary-General of the International Telecommunication Union (ITU). The Vision of the Union, as defined in the ITU Strategic Plans for 2020-2023 and 2024-2027, is "an information society, empowered by the interconnected world, where telecommunication/information and communication technologies enable and accelerate social, economic and environmentally sustainable growth and development for everyone", in line with the WSIS Outcome Documents. The Strategic Goals of the Union (Growth, Inclusiveness, Sustainability, Innovation and Partnership) support ITU's role in facilitating progress towards the implementation of the WSIS Action Lines and the 2030 Agenda for Sustainable Development. Through these goals, the Union seeks to contribute to the development of an environment that is conducive to innovation, where advances in new technologies become a key driver for the implementation of the WSIS Action Lines and the 2030 Agenda for Sustainable Development, while also recognizes the need to contribute to the global partnership to strengthen the role of telecommunication/Information and Communication Technologies (ICTs) as means of implementation of the WSIS Action Lines and the 2030 Agenda for Sustainable Development.

2. Two momentous events took place in the year 2015 that have had a direct impact on strategic and operational activities related to the implementation of the WSIS outcomes, namely the:

   - **UNGA Sustainable Development Summit**, 25 - 27 September 2015, which adopted Resolution A/70/1 "Transforming our world: the 2030 Agenda for Sustainable Development";

   - **UNGA High-level Meeting on the overall review of the implementation of the outcomes of the World Summit on the Information Society**, 14-16 December 2015, which adopted Resolution A/70/125 on "Outcome document of the high-level meeting of the General Assembly on the overall review of the implementation of the outcomes of the WSIS".

3. ITU Plenipotentiary Conference 2022 (PP-22), which took place in Bucharest from 26 September to 14 October 2022 agreed on a number of key resolutions, including revision of the Resolution 140 that highlights ITU's role in implementing the outcomes of the World Summit on the Information Society and in the overall review by United Nations General Assembly of their implementation.

   a) The revised Res. 140 recalls the pledge in UN General Assembly Resolution 75/1 that "we will improve digital cooperation," along with annual General Assembly resolutions on ICTs for sustainable development and UN Economic and Social Commission (ECOSOC) resolutions on progress in implementing WSIS outcomes.
   b) In nearly two decades since the WSIS outcomes were established, ICTs have fundamentally transformed the world. Revised Res. 140 recognizes that infrastructure developed through investment and competition will increase global connectivity and thus help fulfil WSIS Action Lines and Sustainable Development

Goals. Greater connectivity narrows the digital divide for everyone, including vulnerable groups in remote, rural, unserved, and underserved areas.

c) More recently, the COVID-19 pandemic, while highlighting the critical role of ICTs for the continued functioning of societies, has brought to the fore the significant digital divides between and within countries. In this context, ITU should leverage the WSIS Framework to leave no one offline, despite the setbacks brought about by pandemics.

d) The success of the UN's 2030 Agenda for Sustainable Development will depend on increasing ICTs access, connecting the unconnected, and ensuring the inclusion of the marginalised and vulnerable, according to revised Res. 140. While the WSIS process must remain aligned with the 2030 Agenda, the WSIS Forum can provide a platform for reviewing implementation to date.

e) ITU's Member States expressed unanimous support for the WSIS Action Lines to advance the achievement of the Sustainable Development Goals (SDGs). The PP-22 approved updates to Resolution 140 on ITU's role in implementing the outcomes of the WSIS process that emphasize increasing ICTs access, connecting the unconnected, and ensuring the inclusion of the marginalised and vulnerable for the success of the UN's 2030 Agenda for Sustainable Development. While the WSIS process must remain aligned with the 2030 Agenda, the WSIS Forum can provide a platform for reviewing implementation to date.

f) ITU will continue to coordinate with the relevant UN organisations where appropriate, to support the overall review of WSIS Outcomes by UNGA in 2025, and to play an active role in the process according to the ITU's WSIS+20 Roadmap and the review process established by UNGA.

4. During the PP-22 in Bucharest, Romania, H.E. Mr António Guterres, the Secretary-General of the United Nations, reiterated ''the importance of supporting the World Summit on the Information Society'' and highlighted that ''the International Telecommunication Union has a vital role to play in accelerating global connectivity for all by 2030''.

5. In addition, H.E. Prof Isa Ali Ibrahim (Pantami), Minister, Communications and Digital Economy, Nigeria, and Chairman of the WSIS Forum 2022, organised a side event titled WSIS Process: WSIS Beyond 2025 at the ITU PP-22, which highlighted the role of the WSIS Action Lines in accelerating the achievement of the SDGs, raised challenges, and concluded with reflections on the emerging trends and the learning experience towards the digital future.

6. The latest World Telecommunications/ICT Policy Forum (WTPF-21), the Kigali Declaration from this World Telecommunication Development Conference (WTDC-22), and previous ITU Plenipotentiaries have also called for expanding digital infrastructure and making digital transformation relevant for everyone.

7. The United Nations General Assembly in its ten-year review of WSIS, clearly highlighted the cross-cutting contribution of ICTs to the Sustainable Development Goals and poverty eradication, and called for close alignment between the WSIS process and the 2030 Agenda for Sustainable Development, noting that ICTs can accelerate progress towards all 17 SDGs. The resolution A/70/125 provides guidance on the implementation of the WSIS Outcomes till 2025 and requests all stakeholders to integrate ICTs into their approaches to

implementing the Goals, while requesting UN entities facilitating WSIS Action Lines to review their reporting and work plans to support implementation of the 2030 Agenda.

8. Within the ITU, the WSIS implementation and follow up activities of all three Sectors and the General Secretariat are reflected in this annual report titled ITU's Contribution to the Implementation of the WSIS Outcomes. ITU's Contribution to the Implementation of the WSIS Outcomes is a comprehensive report on the ITU activities in context of WSIS carried out by the Union. The Report provides detailed information on the key WSIS related initiatives and activities carried out by the three sectors of the Union (Standardization, Radiocommunication and the Development Sector) and the General Secretariat. The Report provides updates on the tasks carried out by the ITU at the operational and policy level, covering all assigned mandates with reference to the WSIS Process highlighting the linkages between the WSIS Action Lines and SDGs, in particular:

   (a) Lead facilitator (along with UNESCO and UNDP) in coordinating the multistakeholder implementation of the *Geneva Plan of Action*.
   (b) Facilitator of Action Lines C2 (Information and communication infrastructure), C4 (Capacity Building), and C5 (Building confidence and security in the use of ICTs); upon the UNDP's request the ITU accepted to play the role of the Facilitator of Action Line C6 (Enabling environment).
   (c) Co-facilitator of Action Lines C1, C3, C7 and C11; and partner for Action Lines C8 and C9.
   (d) Rotating Chair of the United Nations Group on Information Society (UNGIS).
   (e) Steering committee member of the Partnership on Measuring ICT for Development.
   (f) Facilitator of the WSIS Stocktaking Process.
   (g) Initiator and facilitator of the WSIS Project Prize.
   (h) Implementer of other WSIS outcomes.

9. Within the ITU, the effective coordination of ITU's strategies and activities in relation to WSIS has been ensured by a WSIS&SDG Task Force that is chaired by the Deputy Secretary-General. Taking into account resolves of Resolution 1332, the terms of reference of the WSIS&SDG Task Force have been amended incorporating coordination on the activities of ITU related to SDGs.

10. This document is divided into six sections. Following the introduction, the second section highlights the alignment between the WSIS Action Lines and the 2030 Agenda for Sustainable Development. The third section provides an overview of ITU activities and projects undertaken in 20212 in the context of the implementation of WSIS Outcomes, while the fourth section informs about ITU's Role in the Overall Review of the Implementation of the Outcomes of the World Summit on the Information Society. The fifth section highlights forums, innovative initiatives and informs about the planned future activities to ensure the full implementation of the WSIS outcomes. The final section provides conclusions of the report.

II. WSIS Action Lines and the 2030 Agenda for Sustainable Development

11. In line with Resolution A/70/1 and Resolution A/70/125, the WSIS Process implementation activities have been aligned with the 2020 Agenda for Sustainable Development, thereby highlighting the direct linkages between WSIS Action Lines and SDGs.

(a) High Level Political Forum (HLPF) 2023[1]

12. The **2023 High Level Political Forum (HLPF**), organized by ECOSOC, took place in New York from 10-19 July, focusing on accelerating recovery from COVID-19 and implementing the 2030 Agenda for Sustainable Development. The forum reviewed progress on SDGs 6, 7, 9, 11, and 17. The importance of digital technology in sustainable development was emphasized, with topics such as AI, education, and the digital divide being discussed extensively. ITU's Council contribution highlighted its commitment to global connectivity, digital accessibility, and alignment with SDGs and WSIS. In addition to the ITU Council contribution, there were also submissions from the Broadband Commission, WSIS, UNGIS, and the Partnership on Measuring ICT for Development. ITU actively participated in HLPF 2023 through these submissions, expert group meetings, and various side events discussing digital cooperation and infrastructure development.

(b) WSIS Action Lines and SDG Matrix

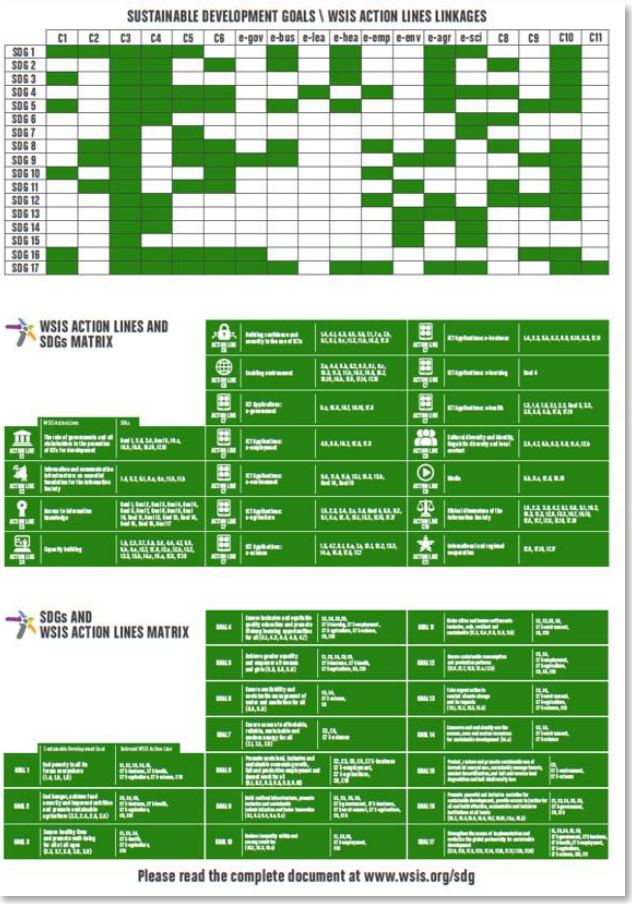
12. At the WSIS Forum 2015, ITU coordinated the **WSIS Action Lines and SDG matrix**, a new tool developed by a number of United Nations agencies to map how ICTs may contribute to the implementation of the new SDGs. The Matrix will serve as an easy reference for stakeholders engaged in shaping the future of both, the SDGs and the WSIS processes beyond 2015 and the 2030 Agenda for Sustainable Development.

[1] The HLPF is the central UN platform for the follow-up and review of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) adopted in 2015.

13. The mapping exercise draws direct linkages of the WSIS Action Lines with the proposed SDGs to continue strengthening the impact of ICTs for sustainable development. Each UN Action Line Facilitator has analyzed the connections and relations of their respective Action Line with the proposed SDGs and their targets. This is a living document and changes can be introduced by Action Line Facilitators, if needed.

14. The goal is to create a clear and direct link and an explicit connection between the key aim of the WSIS, that of harnessing the potential of ICTs to promote and realize the development goals, and the post 2015 development agenda, so as to contribute to the realization of the latter.

15. The WSIS Forum continues to evolve and adapt, by strengthening the synergies between the WSIS Action Lines and SDGs, and taking into account the outcomes of the UNGA Overall Review. In this regard, the annual theme of the WSIS Forum has been aligned with the SDGs process, please read more at www.wsis.org/sdgs.



16. **WSIS Forum Matrix:** The WSIS-SDG Matrix developed by UN WSIS Action Line Facilitators serves as the mechanism to map, analyze and coordinate the implementation of WSIS Action Lines, and more specifically, ICTs as enablers and accelerators of the SDGs. This Matrix builds upon the WSIS-SDG Matrix and provides guidance on the outcomes of the workshops and other sessions held during the Forum, emphasizing linkages between the WSIS Action Lines and SDGs as well as highlighting rational for each linkage that has been established. WSIS stakeholders identified a clear relation and connection between the WSIS Action Lines and SDGs in their respective workshops. Please explore the agenda here.

17. In response to the call by the UN General Assembly within the framework of the ten-year review of the WSIS (Res. A/70/125) calling for a close alignment between the WSIS process and the 2030 Agenda for Sustainable Development, the **WSIS Stocktaking process** highlighted the contribution of 11 WSIS Action Lines to the achievement of 17 SDGs.

18. The **WSIS Prizes 2023** contest aligned its rules to highlight the linkages between the WSIS Action Lines and SDGs, this approach will be strengthened in 2024.

I. Overview of ITU activities and projects undertaken since 2022 in the context of the implementation of WSIS Outcomes, also related to the 2030 agenda for Sustainable Development

(a) Lead facilitator (along with UNESCO and UNDP) in organizing the multistakeholder implementation of the *Geneva Plan of Action*.

19. Since 2006, ITU (along with UNESCO and UNDP) has played a leading facilitating role in the implementation of the Geneva Plan of Action (para 109 of the Tunis Agenda). In 2015, the UNGA resolution A/70/125 recognized the WSIS Forum as a platform for discussion and sharing of best practices in the implementation of the World Summit outcomes by all stakeholders, and stated that it should continue to be held annually.

20. At the regional level the Regional Commissions have played a key role in the implementation of the Geneva Plan of Action and reported at the WSIS Forum globally.

21. ITU has contributed annually to the Commission on Science and Technology for Development (CSTD), which has been mandated by ECOSOC to serve as the focal point in the system-wide follow-up to the outcomes of the WSIS. ITU has submitted its inputs to the two priority themes that were addressed during the CSTD twenty-sixth session held on 27-31 March 2023.

22. ITU has planned, organized, and hosted the WSIS Forum since 2009 in collaboration with the co-organizers, UNESCO, UNCTAD and UNDP. The annual WSIS Forum is a global multistakeholder platform facilitating the implementation of the WSIS Action Lines. The Forum, co-organized by ITU, UNESCO, UNDP and UNCTAD, in close collaboration with all WSIS Action Line co-/facilitators and other UN organizations (FAO, ILO, ITC, UNDESA, UNEP, UNHCR, UNICEF, UNIDO, UNITAR, UNODC, UPU, UN Women, UN Tech Bank for Least Developed Countries (LDCs), UNU, WFP, WHO, WIPO, WMO and UN Regional Commissions), is also an opportunity for information exchange, knowledge creation and sharing of best practices, taking into account the evolving Information and Knowledge Societies. The WSIS Forum provides opportunities for developing multistakeholder and public-private partnerships to advance development goals.

23. The WSIS Forum is a natural evolution of the Cluster of the WSIS related Meetings held every May from 2006 to 2008 organized by the WSIS Action Line facilitations and coordinated by ITU. Since 2009, the WSIS Forum itself has evolved into a unique platform for multistakeholder consensus and discussions on crucial issues concerning the information society. The WSIS Forum results in several documents in particular the WSIS Forum Outcome Document, which c. The agenda, programme and format of the Forum is built in an open multistakeholder consultation process that consists of physical meetings and online consultations. The Forum comprises of a high-level and forum track that include high-level panels, WSIS Action Lines meetings, WSIS Action Line Facilitator's meeting, thematic workshops, and various platforms for networking and initiation of partnerships. More information on the WSIS Action Line Facilitator's meeting here.

24. Please refer to the following for the yearly editions of the WSIS Forum, you can also find the Outcome Documents and the Emerging Trends Document:

    - **Cluster of WSIS Related Events 2006:** http://www.itu.int/net/wsis/implementation/cluster.asp?year=2006&month=0&type='alf'&subtype=0
    - **Cluster of WSIS Related Events 2007:** http://www.itu.int/net/wsis/implementation/cluster.asp?year=2007&month=0&type='alf'&subtype=0
    - **Cluster of WSIS Related Events 2008:** http://www.itu.int/net/wsis/implementation/cluster.asp?year=2008&month=0&type='alf'&subtype=0

    In 2009 the cluster of WSIS related events were rebranded as the WSIS Forum.

    1. **WSIS Forum 2009:** http://www.itu.int/wsis/implementation/2009/forum/geneva/
    2. **WSIS Forum 2010**: http://www.itu.int/wsis/implementation/2010/forum/geneva/
    3. **WSIS Forum 2011**: http://www.itu.int/wsis/implementation/2011/forum/
    4. **WSIS Forum 2012**: http://www.itu.int/wsis/implementation/2012/forum/
    5. **WSIS Forum 2013**: http://www.itu.int/wsis/implementation/2013/forum/
    6. **WSIS Forum 2014**: http://www.itu.int/wsis/implementation/2014/forum/
    7. **WSIS Forum 2015**: http://www.itu.int/wsis/implementation/2015/forum/
    8. **WSIS Forum 2016:** http://www.itu.int/wsis/implementation/2016/forum/
    9. **WSIS Forum 2017:** http://www.itu.int/net4/wsis/forum/2017/
    10. **WSIS Forum 2018:** https://www.itu.int/net4/wsis/forum/2018/
    11. **WSIS Forum 2019:** https://www.itu.int/net4/wsis/forum/2019/
    12. **WSIS Forum 2020:** https://www.itu.int/net4/wsis/forum/2020/
    13. **WSIS Forum 2021:** https://www.itu.int/net4/wsis/forum/2021/
    14. **WSIS Forum 2022:** https://www.itu.int/net4/wsis/forum/2022/
    15. **WSIS Forum 2023:** https://www.itu.int/net4/wsis/forum/2023/

25. At the regional level, each year the regional commissions report on their actions at the annual WSIS-Regional Commissions meeting held at the WSIS Forum. In follow up to the UNGA resolution A/70/125 that invites the regional commissions to continue their work in implementation of the World Summit on the Information Society Action Lines and their contribution to the reviews thereof, including through regional reviews, the regional commissions in collaboration with ITU, UNESCO and UNDP, organizes regional WSIS implementation workshops. The objectives of these workshops are:

    - Building regional capacity on the WSIS Implementation process and its alignment with 2030 Agenda

- Building awareness on the enabling role of ICTs in sustainable development towards programming of future UNDAFs
- Contributing as regional formal submission to the WSIS Forum Open Consultation Process bringing the regional emerging trends, challenges and opportunities to the global dialogue on WSIS implementation
- Regional reporting on projects to the WSIS Stocktaking
- Identification of possible projects for submission to the WSIS Prize competition
- Regional inputs to the WSIS Action Line facilitation process

26. The WSIS Forum 2023 was organised from 13 to 17 March 2023 (*hybrid week*) and continued with virtual workshops from April to May 2023 (*virtual weeks*). This year's Forum hybrid week had several innovative session formats and featured around 250 sessions, including open space talks, thematic workshops, country workshops, WSIS Action Lines Facilitation Meetings, knowledge cafes, WSIS Prizes, high-level track sessions, and many more. The stakeholders appreciated the new innovative formats, which fostered more participatory and collaborative exchanges with engaging dialogues. The Forum hybrid week welcomed over 2,700 participants attending both on-site and remotely, from 150 countries worldwide. The Forum gathered more than 150 high-level representatives of the wider WSIS stakeholder community, including Ministers and Deputies, Ambassadors; and leaders from the private sector, academia and civil society. The virtual weeks brought together a cumulative total of 5,000 participants (*livestreams and session recordings on Zoom and Facebook*). The event featured 50 virtual workshops and showcased the expertise of over 200 speakers. In addition, a total of over 30 exhibitors highlighting innovation and projects from the ground. The Forum also included the announcement of the WSIS Prizes 2023 winners and champions, which represented all seven continents and all WSIS stakeholder groups. In addition, the winning entries of the WSIS Forum Photo Contest 2023 were unveiled, highlighting how ICTs are playing a vital, enabling role on the road to achieve the SDGs.

27. The WSIS Forum 2023 saw a significant milestone, as the first female Chairperson, H.E. Dr. Emilija Stojmenova Duh, Minister of Digital Transformation, Republic of Slovenia, chairing the WSIS Forum 2023. The high-level policy sessions were moderated by 11 High-Level Track Facilitators nominated and identified by the different WSIS stakeholder types.

28. With the constant objective of strengthening the alignment of WSIS and SDG processes, the overall theme for WSIS Forum 2023 was *WSIS Action Lines for building back better and accelerating the achievement of the SDGs*. The concrete outcomes of WSIS Forum 2022 are available online here.

29. The WSIS Forum 2023 also resulted in a very detailed Outcome Document, which is a compilation of all the outcomes of the different sessions (Action Lines Facilitation Meetings, Thematic and Country Workshops, Policy Sessions, Information Sessions, Interactive Sessions). The document is available here.

30. The WSIS Forum 2023 Outcomes linked to WSIS Action Lines SDGs Sustainable Development Goals - Matrix Flyer can be found here.

31. The WSIS Forum 2023 High Level Track Outcomes and Executive Brief can be found here. This document is a compilation of the statements/speeches/briefings delivered at the High-Level

Policy sessions of the High-Level Track by high-ranking officials of the WSIS stakeholders community, representing the Government, Private Sector, Civil Society, Academia and International Organizations.

32. The WSIS Stocktaking Report 2023 can be found here. This document reflects around 966 activities relating to ICTs for development, submitted to the WSIS Stocktaking Platform from 1 September 2021 to 21 January 2022, each one highlighting the efforts deployed by stakeholders involved in the implementation of the SDGs. The Report is based on the multistakeholder approach, including input from stakeholders from all over the world responding to ITU's official call in 2022 for Stocktaking updates and new entries. The inputs from WSIS Action Line facilitators and co-facilitators also contributed to the present Report.

33. The WSIS Stocktaking Success Stories 2023 can be read here. This document contains of ICT success stories to best showcase the possible achievement of SDGs, through the implementation of projects related to the WSIS Action Lines.

34. The WSIS Forum 2023 organised Special Tracks during the Forum, including:

- ICTs and Accessibility for Persons with Disabilities and Specific Needs: the track aims to inform and observe how ICTs can help people living with disabilities whilst focusing on progressing towards the United Nations Sustainable Development Goals.

- ICTs and Youth: WSIS aims to include youth perspectives and engage young people in discussions about how technology can provide opportunities to address some of the world's most pressing issues and provides a platform where youth can offer their insights and understanding of the information society, its challenges and opportunities, and where they can raise questions but also propose solutions to harvesting the power of ICTs towards equally distributed social impact.

- ICTs and Older Persons: the track aims to address the role of technology in achieving healthier ageing but also how technology can help us build smarter cities, combat age-based discrimination at the workplace, ensure financial inclusion of older persons, and support millions of caregivers across the world.

- ICTs and Gender Mainstreaming: the track aims to integrate and mainstream a gender equality perspective through the use of ICTs as well as to strive for 50/50 gender balance participation at the WSIS Forum 2023. This track comprised interactive sessions with different topics covering gender and ICTs issues.

- Cybersecurity: the track comprised sessions that align with the WSIS Action Line C5: Building Confidence and Security in the Use of ICTs. Cybersecurity is crucial to ensuring universal, trustworthy, and equitable access to connectivity.

- ICTs and Emerging Technologies for sustainable development and ICTs for Industry 4.0: emerging technologies are set to have a vital impact in our future. This track explores how frontier technological solutions address sustainable development challenges and help facilitate innovation in a rapidly changing world.

- ICTs and Sports: sport is a one of the most powerful platforms for advancing inclusion and social equality. This special track explores how sport can be harnessed to drive sustainable

development and peace, and the ways innovative technologies can advance the world of sport for development.

Photographs: click here.
All WSIS Forum 2023 outcomes, photos and videos documentation and highlights are available at www.wsis.org/forum.

35. The OCP for the WSIS Forum 2023 was structured in five phases, all information including the invitation letters to contribute to the OCP are available here: www.wsis.org/forum.

36. The **WSIS Forum 2024** is scheduled to be held from 27 to 31 May 2024 in Geneva, Switzerland.

(b) Facilitator of the WSIS Action Lines C2, C5, C6

Action Line C2: Information and Communication Infrastructure

Related to the SDGs: SDG 1 (1.4), SDG 8 (8.2), SDG 9 (9.1, 9.a, 9.c), SDG 11 (11.5, 11.b)

37. Within the framework of the existing resources and given mandate, as well as in line with the Geneva Action Plan, the ITU carries out several activities with regard to the WSIS Action Line C2. ITU plans and activities are taking into consideration the approved Resolution 70/1 (Transforming our world: the 2030 Agenda for Sustainable Development) where it was recognized that high-speed broadband is an essential enabler of sustainable development. Another relevant tool is the WSIS-SDG Matrix developed by UN WSIS Action line Facilitators, serving as a mechanism to map, analyze and coordinate the use of ICTs as catalysts for the implementation of the SDGs.

38. The 18th Action Line C2 Facilitation Meeting was held on Monday, 13 March 2023, 16:45-17:45 CEST as an integral part of the WSIS Forum 2023. The meeting was held jointly with the Action Line C5. The title of the Action Line Facilitation meeting was: “The Next Frontier: Let's talk Digital Resilience - Cyber and Space”. The discussion highlighted the different facets of resilience, with an emphasis on space communications that is playing an increasingly important role due to the provision of critical services such as broadband, GPS, satellite imagery and several others. More details on this session here.

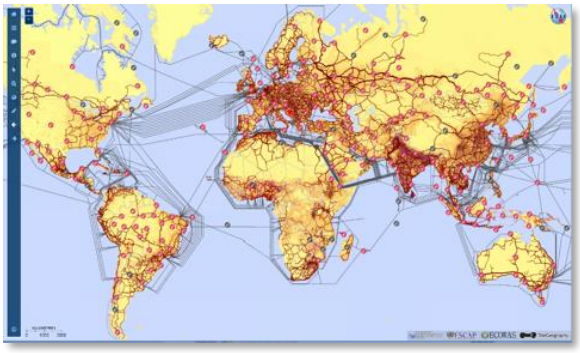
39. The WSIS Prizes 2023 Winner for the Action Line C2 Jalinan Digital Negara Plan, Malaysia. Details of the project are available here.

40. ITU-D worked closely with ITU-R and ITU-T in all regions to develop infrastructure and services. Several countries were assisted in preparing wireless broadband master plans, spectrum management master plans and national broadband policies for their transition from public switched telecommunication networks to next-generation networks.

41. ITU Global Development Initiatives are supporting the implementation of SDGs, such as: the m-Powering Development for a Better Tomorrow that is an innovative and unique ITU initiative. The goal is to extend the benefits of mobile telephony to all strata of society, in

order to build a truly inclusive information society, with special focus on remote rural and underserviced areas; The Smart Sustainable Development Model initiative aims at linking rural telecommunications development for general communications, business, education health and banking to disaster risk reduction and disaster management initiatives, to ensure an optimal use of technology and avoid duplication of efforts and investments.

42. To identify the global perspective of broadband connectivity that allows the ICT community to identify broadband placement, gaps and evidence-based investment opportunities, the ITU Interactive Transmission Map is continuously adding geospatial data of network links from all regions. The maps are a cutting-edge ICT-data mapping platform to take stock of national backbone connectivity (Optical fiber, Microwave links and Satellite Earth Stations) as well as of other key metrics of the ICT sector, which currently covers all regions of the globe.



43. Implementation and updates of the ITU Interactive Terrestrial Transmission Maps (http://itu.int/go/map-publics) is ongoing. The ITU Maps present critical ICT infrastructure on broadband backbone optical fiber, microwave links, satellite earth stations, and submarine cables. The Map interface was renewed to allow new data visualizations and data analytics. The Maps allow for graphical improvements proposals, wireframes for smartphone and tablet applications, and dashboard and statistics. Video and demonstrations for events have been developed ready to be deployed.

44. At the time of this reporting, the Map presented information from 600 operator networks. The research on the transmission links has reached 20 million km of routes. Submarine cables, information on IXPs and satellite earth stations have been updated.

45. In order to enhance the Interactive Terrestrial Transmission Map worldwide, ITU coordinated the data collection and validation process covering infrastructure of more than 190 countries. The geospatial is being used to assess connectivity gaps and is feeding different connectivity models from ITU initiatives (e.g. GIGA, C2R, FIGI) to support investment decisions according to user profile (schools, financial inclusion, health centers, etc.).

46. ITU-D has made available a computer program known as SMS4DC (Spectrum Management System for Developing Countries) to assist administrations of developing countries in performing their spectrum management responsibilities more effectively. ITU has kept updating this program and more than 40 countries have subscribed to the tool. Further developments to the SMS4DC are underway covering administrative and radio communication functions. Technical assistance and training programs were provided in this area to several countries and regions.

47. The capacity of ITU members was enhanced on a range of network issues through numerous activities. Direct assistance was provided to multiple countries from all regions in frequency planning, spectrum management master plans, creation of National Table of Frequency Allocations, the transition from analogue to DTTV broadcasting and other technical issues. Some of the examples of such assistance programs are provided below.

48. Assistance on conformity and interoperability has been provided to developing countries. A C&I Assessment Study follow-up for the Caribbean Region targeting young IoT entrepreneurs and the challenges to reach compliance and market.Regional training events have been organized together with testing laboratory partners for AMS, ASP and AFR.

49. Enhanced knowledge in Conformance & Interoperability for Africa with a training held in Ghana, September 2019 (English) and in November 2019 (French). 30 participants from 15 countries participated in the training in Regulatory framework and practical EMC tests. A Training in ITU Centres Of Excellence Network For Asia Pacific Region: Conformity and Interoperability relating to Smart City, 18-21 September 2019, Guangzhou, P.R. China (https://www.itu.int/en/ITU-D/Technology/Pages/CI_Events.aspx). Conformity and Interoperability virtual/online Training Workshop for Africa Region, November 2020.

50. The ITU/Craig and Susan McCaw Broadband Wireless Network project is under implementation in Africa covering several countries (Burkina Faso, Burundi, Rwanda, Swaziland, etc.). The wireless broadband connectivity and developing ICT applications will provide free or low-cost digital access for schools and hospitals, and for underserved populations in rural and remote areas in those countries.

51. The procurement of ICT equipment is under way in Burkina Faso as part of the Broadband Wireless Network project.

52. Broadband Wireless Network for Djibouti was completed for Phase 2 and the maintenance contract was finalized and signed by Djibouti Telecom.

53. Procurement for the Broadband Wireless Network in Mali is in progress. The international call for Proposals has been done. The technical evaluation is following.

54. Basic National Spectrum Management System is to assist developing countries to establish basic structure of spectrum management system. Projects for Comoros, Bolivia and Kyrgyzstan were finished. The results of the assistance are the workplan for countries for implementing/updating their spectrum management structures and activities.

55. IPv6 and IoT (Internet of Things) Expertise Center: The Project document has been signed with MUST (Malaysia University of Science and Technology) to assist developing countries. Following the cooperation agreement between the ITU and Malaysia University of Science (MUST), procurement is under process for the equipment, software and training material as required for the Implementation of an IPv6 and IoT (Internet of Things) in Penang Malaysia. 3 Trainings have been organized.

56. Project to set up IPv6 and IoT expertise centre in Sudan has been signed.

57. As part of ITU Europe's Technical Assistance on IPv6 for Montenegro, the University of Montenegro is set to open its IPv6 Laboratory on the 27th of September 2023. In 2021, ITU supported Montenegro in constructing a National Workshop dedicated to IPv6 strategies and

also included a training session aimed at equipping over 20 professionals. This was achieved in collaboration with the Mirpur University of Science and Technology (MUST) and the Government of Montenegro, in conjunction with the Agency for Electronic Communications and Postal Services of Montenegro (EKIP).

58. On 29 March 2023, a Roundtable on SDG 9 and 17 was held by the UN Digital Transformation Group for Europe and Central Asia with the lead of ITU Europe Office, as part of the Regional Forum on Sustainable Development for the UNECE Region. This hybrid event was held both online and physically at the WMO Premises in Geneva, Switzerland. The first session of the roundtable addressed Universal access to internet connectivity looking at the critical solutions to developing robust and reliable ICT infrastructure that can provide universal, affordable, and safe connectivity. The session includes representatives from the E-Government Agency of, Moldova, the Ministry of Digital Development, Innovation and Aerospace Industry of Kazakhstan, the Action for Sustainable, UN Women, the Permanent Mission of Poland to the United Nations in Geneva, and UN Women Regional Office for Europe and Central Asia.

59. In accordance with WTDC Resolution 47 (Rev. Buenos Aires, 2017), regional forums, assessment studies and on-the-job training courses on C&I are planned for 2020 with the participation of several countries in the regions.

60. Several modules of Training material for C&I (CITP) have been prepared and others are under preparation.

61. Capacity of ITU members was built and training programs were organized in such areas as telecommunication/ICT network issues, including conformance & interoperability, digital terrestrial television, IPv6, SMS4DC, spectrum management and allocation, frequency planning and coordination, etc.

62. Direct assistance was provided regarding frequency planning, spectrum management structures and activities, the transition from analogue to digital terrestrial television broadcasting, conformance and interoperability, and future Internet exchange.

63. Furthermore, ITU develops a number of the large scale regional projects focusing on regional initiatives facilitating development of the information and communication infrastructure. More information on these projects as well as the other projects can be found ITU-D Projects webpage.

64. In the framework of ITU-D Study Groups, the following questions related to AL-C2 were approved by WTDC-17 with working mandate until 2021:

    1) *Question 1/1: Strategies and policies for the deployment of broadband in developing countries*
    2) *Question 2/1: Strategies, policies, regulations and methods of migration and adoption of digital broadcasting and implementation of new services*
    3) *Question 5/1: Telecommunications/ICTs for rural and remote areas*
    4) *Question 4/2: Assistance to developing countries for implementing conformance and interoperability (C&I) programmes and combating counterfeit ICT equipment and theft of mobile devices*
    5) *Question 7/2: Strategies and policies concerning human exposure to electromagnetic fields*

The Final Reports and Guidelines from the ITU-D Study Groups for the 2014-2017 study period are available for download and viewing in different accessibly formats in the six official languages (link to ITU-D SG1 Reports and link to ITU-D SG2 Reports).

As an input document to Question 1/1 and Question 2/1 in the 2014-2017 cycle, ITU has contributed with a Report on Implementation of Evolving Telecommunication/ICT Infrastructure for Developing Countries: Technical, Economic and Policy Aspects. The report introduces essential telecommunication/ICT infrastructures and their technologies, economic and policy aspects supporting effective adoption of Next-generation Networks, and it is available online. ITU Toolkit on Business Planning for ICT Infrastructure development was prepared and a training based on this toolkit is running in 26 October-11 December 2020.

65. ITU is contributing to bridging the standardization gap between developing and developed countries. Instructed by PP-14 Resolution 123, WTSA-20 Resolution 44, and the new WTDC-14 Recommendation 22 on Bridging the Standardization Gap (BSG), regional workshops and other regional activities are receiving support from ITU Regional Offices to improve awareness, understanding and participation on the development of ICT standards developed by global and regional Standardization Development Organizations (SDOs).

66. In the implementation of Action Line C2, ITU continues to be at the forefront of providing global standards for telecommunication in areas such as broadband access and home networks and infrastructures for ultra-high-speed transport; as well as future networks including 5G and networking innovations in fields such as network slicing, fixed mobile convergence, information centric networking, software-defined networking, machine learning as applied to 5G, cloud computing, data management, and trusted network infrastructure. Since 1 November 2022, ITU-T approved more than 200 texts (as of12 August 2023), including ITU-T Recommendations, Supplements and Technical Reports.

67. ITU continues its activities related to combating counterfeit telecommunication/ICT devices/software and mobile device theft. SG11 started series of webinars on combating counterfeiting and stolen ICT devices. The first Episode "Existing challenges and solutions on combating counterfeiting of ICT devices" run virtually on 15 February 2023. The second Episode is scheduled to be held during next SG11 meeting in Geneva, on 13 October 2023. Among other topics, it will also focus on exploring new opportunities for collaboration with organizations such as WIPO, WTO, WCO and Interpol. More details about all related activities are available on dedicated webpage at: https://itu.int/go/CS-ICT.

68. The ITU Last Mile Connectivity Solutions Guide was developed to help accelerate actions to address last-mile Internet connectivity issues in situations that include a lack of network infrastructure and with a view to encouraging more affordable service delivery. The tools, service interventions and policy solutions reflect how to extend Internet access to areas and users in geographies without Internet while considering their unique characteristics. The Solutions Guide is designed for use during initial consultations on how to address these gaps and includes reference materials, resources and links to other content to support the process, dialogue and decision-making that accompanies intervention design.

69. To complement this Solutions Guide, a range of resources is developed to help Member States address last-mile connectivity challenges, including a database of case studies (LMC Case

Studies Database) and capacity-development courses on last mile connectivity. In addition, interactive last-mile connectivity diagnostic and decision-making tools are being developed that includes methodologies for technology selection and cost estimation for building broadband access networks in localities or connecting schools, hospitals or other specific objects to broadband transport backbones.

70. Emerging technology trends: Artificial intelligence and big data for development 4.0: contains hands-on guidelines for policy-makers and other stakeholders in crafting a national AI and data strategy for development. The report also identifies the main building-blocks of a national AI and data system for development (governance; regulation; ethics; digital and data skills; the digital environment and data infrastructure; the innovation system; AI and data-intensive sectors; and international collaboration).

71. ITU's Emerging Technology for Connectivity 2021 was held from July 5 to July 16 2021 with about 25 sessions and 595 total present participants. It featured about 154 speakers. In addition, capacity development activities were conducted with 5 training courses. The presentations, recordings and reports are available on the event website.

72. New graphical interface of the ITU Interactive Transmission Maps is under development.

73. Results of ITU-T study groups on Action Line C2 are:

- **ITU-T D.285 (revised) "Guiding principles for charging and accounting for intelligent network supported services" (under approval)** outlines general considerations and guiding principles for charging and international accounting for traffic and facilities used to support services that utilize Intelligent Networking (IN) capabilities.
- **ITU-T D.608R "OTT Voice Bypass"**: OTT voice bypass is now widely recognised as a form of traffic bypass and a growing source of losses for international inbound voice revenues. The regional Recommendation for Africa focuses on national and regional collaboration between member states and operators to deal with the OTT voice bypass issue.
- **ITU-T E.118.1 "Allocation, assignment and management global Issuer Identifier Numbers (IIN)"** specifies the criteria by which the ITU-TSB shall allocate and assign global IINs, as well as the specific resources that will be managed.
- **ITU-T E.1120 "Global ITU-T Naming, Numbering, Addressing and Identification assignment processes" (under approval)** details the processes to be used by an applicant, the Telecommunication Standardization Bureau (TSB), and ITU-T Study Group 2, for assignment of: E.164 identification codes (ICs), E.212 shared mobile country codes (MCC) for networks and their respective mobile network codes (MNCs), E.118 shared Issuer Identifier Numbers, and E.218 shared TETRA mobile network codes.
- **ITU-T F.740.3 "Metadata for digital representation of cultural relics/artworks using augmented reality" (under approval):** Augmented reality cultural service system (ARCSS) is a kind of digital interpretation system based on augmented reality (AR), it is able to present a story or history behind the cultural relics/artworks in a dynamic and actual fusion way. This Recommendation describes the information flows of Augmented reality cultural service, including AR content creation information flow and AR content display information flow. Based on the information flows, this Recommendation specifies the metadata for digital representation of cultural relics/artworks using augmented reality.

- **ITU-T F.740.4 "Metadata for image aesthetics assessment with aesthetic attributes in mobile terminal computational photography systems" (under approval):** Image aesthetics assessment (IAA) aims to evaluate whether an image conforms to the aesthetic preferences of a potential audience. This Recommendation defines metadata for image aesthetics assessment with aesthetic attributes in a mobile terminal computational photography system. The metadata is divided into three dimensions according to the key roles: photographer, camera and viewer, and provides non-redundant, fundamental and representative aesthetic attributes of each dimension. The role-based metadata defined in this Recommendation can be used to guide the construction of IAA datasets, and to provide multiple aesthetic attributes evaluation for IAA. Moreover, sample collection requirements and qualifications for annotators are recommended to guide high quality data construction.
- **ITU-T F.740.5 "Data collection and annotation requirements for automatic white balance (AWB) enhancement in mobile terminal for digital culture" (under approval)** provides the collection procedure of data for automatic white balance (AWB) enhancement and describes the requirements for all steps, which includes the requirements for scene selecting, shooting setting, data capturing and illumination uniformity detecting. The requirements of data annotation are also described in this Recommendation, including the illumination colour, illumination indicator and device. The goal of this Recommendation is to improve the user experience during image data transmission, which is the most popular cultural behaviour.
- **ITU-T F.740.6 "Reference framework and requirements for Internet protocol multimedia subsystem early media and extension service systems" (under approval):** The scope of Specifying the technical requirements and extended application scenarios of the Early Media is the primary task of standardization based on which this proposal proposes the application scenarios and requirements of Early Media service.
- **ITU-T F.740.7 "Requirements for edge computing in video surveillance" (under approval)** defines the requirements for edge computing in video surveillance. Edge computing is a distributed computing paradigm aimed at providing various computing services at the edge of the network, and it brings computation and data storage closer to the data source or the location where it is needed, to improve response time and save bandwidth. By using the edge computing technology, the video surveillance system can perform the intelligent video analysis and store data near the network premises units. And the edge computing platform provides the management capabilities of the edge resources and functional components to the video surveillance system. It can improve the video processing efficiency and quality of services, and reduce the infrastructure cost of the video surveillance system. This Recommendation describes the application scenarios and requirements for the edge computing in the video surveillance system.
- **ITU-T F.742.1 "Requirements for smart class based on artificial intelligence"** describes application scenarios and requirements for smart class system based on artificial intelligence, including application scenarios, service requirements, management requirements, and security considerations.
- **ITU-T F.743.19 "Requirements for intelligent surveillance camera in intelligent video surveillance systems"** specifies the intelligent analysis functions classification, intelligent analysis function scenarios, intelligent analysis function and grading requirements for

intelligent surveillance camera. The related intelligent analysis functions include video diagnosis, tampering detection, video enhancement, target detection and feature extraction and object behaviours identification. The basic functions of a camera (see PU defined in [ITU-T H.626]) such as multimedia capturing, multimedia encoding, output alarm signal, parsing PTZ command, etc. are outside the scope of this Recommendation. This Recommendation defines the relevant intelligent analysis function and grading requirements for intelligent surveillance camera in IVS.

- **ITU-T F.743.22 "Requirements and architecture of algorithm training system for intelligent video surveillance"** describes application scenarios and requirements for smart class system based on artificial intelligence, including application scenarios, service requirements, management requirements, and security considerations.
- **ITU-T F.744.5 "Requirements for content delivery networks based on P2P technology" (under approval)** describes the requirement for a peer-to-peer content delivery network (P2P CDN). It specifies the overall functional architecture, domains and functional role relationships, functional blocks and their mutual relationships, service provision requirement, availability requirement, scalability requirement and security considerations. P2P CDN provides a scalable and elastic CDN function pool of shareable terminal devices computing resources, storage resources and uplink bandwidth to save loads of current CDN and improve user experience.
- **ITU-T F.746.14 "Requirements and reference framework for cloud virtual reality systems":** Cloud virtual reality based on cloud capabilities, can effectively shield terminal differences, reduce the difficulty of application development, lower some specific industry entry barriers, and promote the industry business chain cooperation. This recommendation focuses on the overall requirements of cloud virtual reality systems and the related requirements of each layer including content requirements, network requirements, control requirements, resource requirements and terminal requirements, as well as the reference framework for related high-level functions.

- **ITU-T F.746.15 "Requirements for smart broadband network gateway in multimedia content transmission"** specifies requirements for smart broadband network gateway (BNG) in multimedia content transmission, which specifically describes the functional requirements and architecture, security requirements, typical application scenarios and use cases.

- **ITU-T F.746.16 "Technical requirements and evaluation methods of intelligent levels of intelligent customer service systems"** specified the intelligent customer service system which can provide more convenient, efficient, and stable services for users through the application of AI technologies such as speech recognition, text to speech and natural language processing. Improving and evaluating the intelligence levels of the intelligent customer service system are valuable. This Recommendation specifies the requirements and evaluation methods for system intelligence of intelligence customer service system in four aspects, including the basic functions, the core technologies of AI, the maturation of system and the service experience.

- **ITU-T F.746.17 "Requirements for media processing services"** identifies the functional requirements for the media processing services. In particular, the scope of this

Recommendation includes functional requirements and application scenarios. Media processing services utilize a set of techniques including cloud computing, computing resource virtualization, and job queue processing to dynamically control and manage computing resources, which improves scalability, flexibility, and availability. This Recommendation specifies the functional requirements of general requirements, service provision requirements, service management requirements, security considerations, etc.

- **ITU-T F.747.11 "Requirements for intelligent surface-defect detection service in industrial production line":** Intelligent surface-defect detection service in industrial production line refers to accurate positioning of products defects, high-speed classification of defects types, real-time output and transmission of visual and auditory information to ensure the quality of industrial products. Compared with the inspection carried out manually by workers, the ISD service can improve the efficiency and consistency and reduce manual operations in dangerous areas. This work item specifies requirements for intelligent surface-defect detection service in industrial production line, including performance requirements, application requirements and functional requirements. To provide effective surface-defect detection service, it is required to fulfil three important parts. Firstly, it is important to ensure the accuracy of positioning and classification. Secondly, the inference efficiency of the service is also required to satisfy the real-time settings. Last but not the least, the service is required to adapt to the typical application scenarios in industrial production line inspection task. This Recommendation provides related requirements for intelligent surface-defect detection service in industrial production line.
- **ITU-T F.747.12 "Requirements for artificial intelligence based machine vision system in smart logistics warehouse":** With the rapid development of industrial automation and logistics technology in accordance with the market demand for high-tech, machine vision technology has begun to enable the automation transformation of logistics warehouse systems. The application of machine vision technology in the field of logistics warehouse has enabled the rapid evolution of goods sorting, goods palletizing and de-palletizing, goods handling, and shelf inventory from intensive manual work to intelligence and automation, improving the operational efficiency and management capabilities of logistics warehouse. This Recommendation specifies the requirements and framework for artificial intelligence based machine vision system in smart logistics warehouse, and provides use cases. This Recommendation is intended to guide the design and development of machine vision systems in smart logistics warehouse.
- **ITU-T F.747.13 "Requirements and reference framework of cloud-edge collaboration in industrial machine vision systems" (under approval)** specifies requirements and reference framework of cloud-edge collaboration in industrial machine vision systems, and provides use cases. The cloud-edge collaboration is a process (or method) that coordinates cloud computing and edge computing, dynamically allocates required computing, algorithm models, data, or other resources, and jointly completes the same tasks (or objectives) agreed in advance. In industrial machine vision systems, the cloud-edge collaboration includes resource collaboration (computing, network, and storage), service collaboration (data, intelligence, and task), and application collaboration (capability and management). This Recommendation is intended to guide the design and development of industrial machine vision systems.

- **ITU-T F.748.17 "Technical specification for artificial intelligence cloud platform: AI model development"** provides a framework for the cloud-based development of AI models. It covers the terminology, features, and reference design of an AI cloud platform to enable the development of AI models. It establishes the technical specifications of the platform's supporting functional modules, core functional modules, and auxiliary functional modules.
- **ITU-T F.748.18 "Metric and evaluation methods for AI-enabled multimedia application computing power benchmark":** Facing more and more diverse AI computing systems, users hope to have a unified evaluation metric for the system that provides AI computing power. The establishment of relevant real application performance evaluation benchmarks can objectively reflect the current state of the AI computing ability by providing objective metrics and comparison dimensions. This Recommendation provides an AI computing power benchmark framework, evaluation metrics and methods, and a guideline for technical testing for AI clusters.
- **ITU-T F.748.19 "Framework for audio structuralizing based on deep neural network"** presents an overview of the framework for audio structuralizing based on deep neural network. It provides a high-level description of architecture, processing flows, data categories, audio processing tasks and requirements for data management.
- **ITU-T F.748.20 "Technical framework for deep neural network model partition and collaborative execution":** Deep neural network (DNN) model inference process usually requires a large amount of computing resources and memory. Therefore, it is difficult for end devices to perform DNN models independently. It is an effective way to implement end-edge collaborative DNN execution through DNN model partition, which can reduce latency and improve resource utilization at the same time. This recommendation aims to specify the technical framework of DNN model partition and collaborative execution. First, it is necessary to predict the overall inference latency under the current system state according to different DNN partition strategies in advance. Then, choose the appropriate partition locations and collaborative execution strategy based on the equipment computation capabilities, network status and DNN model properties. Finally, implement the model collaborative execution and optimize the resource allocation in the meanwhile.
- **ITU-T F.748.21 "Requirements and framework for feature-based distributed intelligent systems"** introduces the use cases, classification of features and framework for feature-based distributed intelligent systems relevant to intelligent scenarios, specifying the service requirement, functional requirements, and security requirements for feature-based distributed intelligent systems.
- **ITU-T F.747.22 "Functional architecture for feature-based distributed intelligent systems" (under approval)** defines the architecture, the functional entities, and the reference points for feature-based distributed intelligent systems.
- **ITU-T F.747.25 "Requirements for speech interaction of intelligent customer services" (under approval)** describes the scenarios, high-layer level architecture, functional requirements and performance requirements for speech interaction of intelligent customer service. Some detailed use cases and reference process of the creation of the knowledge base are described in the appendix.

- **ITU-T F.749.16 "Requirements for logistics express delivery based on civilian unmanned aerial vehicle"** At present, logistics express delivery based on civilian unmanned aerial vehicle (CUAV) is developing rapidly all over the world. Compared with general water transportation and land transportation, CUAV transportation has the advantages of low cost, flexible scheduling, and can make up for the shortcomings of traditional air transportation. It will change people's consumption mode. This Recommendation provides the requirements for service system and management of CUAV logistics express delivery.
- **ITU-T F.749.6 "Requirements of vehicle information for automated driving in vehicle gateway platforms"** specifies the requirements of vehicle information for automated driving in vehicle gateway platforms. This Recommendation introduces vehicle information for automated driving system (ADS), followed by two different approaches to represent ADS-dedicated vehicle (ADS-DV) by its ownership. Finally, this Recommendation specifies the requirements to support two different approaches to represent ADS-DV.
- **ITU-T F.751.5 "Requirements for distributed ledger technology-based power grid data management"** defines requirements for distributed ledger technology (DLT)-based power grid data management, including framework of DLT-based power grid data management, requirements for infrastructure layer, requirements for service layer, requirements for application layer and requirements for data governance. This Recommendation can be used as a guideline for power grid data management with DLT technologies.
- **ITU-T F.751.6 "Performance assessment methods for distributed ledger technology platforms"** is an extension to the ITU-T F.751.1 and focuses on distributed ledger technology (DLT) performance assessment methods. Based on the performance assessment criteria defined in ITU-T F.751.1, this Recommendation defines specific performance metrics and relevant workflow for the quantitative performance assessment for DLT platform. This Recommendation can be used as a guideline of DLT platform performance assessment for developers, users, third party testers and researchers.
- **ITU-T F.751.7 "Functional assessment methods for distributed ledger technology platforms"** defines functional assessment methods for DLT platforms based on the assessment criteria defined in ITU-T Recommendation F.751.1. For each item of the assessment criteria defined in ITU-T F.751.1, one test case is defined in this Recommendation accordingly. The description of each test case is composed of test purpose, test workflows and expected results.
- **ITU-T F.751.8 "Technical framework for distributed ledger technology (DLT) to cope with regulation"** defines the technical framework for DLT to cope with regulation, including the regulatory challenges and the technical capacities. The design of the technical framework of DLT in this Recommendation is closely related to the DLT properties including decentralization, immutability and openness. This Recommendation can be used as a guidance of DLT system when facing regulation for DLT service providers and DLT system developers.
- **ITU-T F.751.9 "Trusted execution environment based confidential computing on distributed ledger technology systems" (under approval)** specifies a trusted execution environment based confidential computing on distributed ledger technology system:

decomposes user's confidentiality demand into concrete requirements of each step during DLT service utilization; analyses detailed security requirements and technical requirements of trusted execution environment based confidential computing to guarantee the confidentiality in the life cycle of a transaction from end to end; addresses the framework of trusted execution environment based confidential computing, as well as detailed procedures to realize security requirements and technical requirements.

- **ITU-T F.751.10 "Framework and requirements for DLT-based digital collection services" (under approval**): DLT-based digital collection services are provided by DLT system to perform different operations towards digital collections, including issuance, sale, purchase, auction, transaction, transfer etc. This Recommendation specifies framework and requirements for DLT-based digital collection services, and it may be used to guide the DLT-based digital collection services.
- **ITU-T F.751.11 "Performance test suite for distributed ledger technology systems" (under approval)** describes the scenarios, high-layer level architecture, functional requirements and performance requirements for speech interaction of intelligent customer service. Some detailed use cases and reference process of the creation of the knowledge base are described in the appendix.
- **ITU-T F.751.12 "Formal verification framework for smart contract on distributed ledger technology" (under approval)**: Smart contracts can be used to reduce complex business contracts by directly enforcing the contract's payment methods and paybacks, and by automating the process of contract execution and verification into the network, without the intervention and cost of the person checking the contract's performance. However, smart contracts are a series of program codes generated on distributed ledger technology (DLT) and problems may occur in the process of executing the smart contract. As a method to solve problems that occur in the program execution environment, there is a formal verification. This Recommendation specifies formal verification framework for smart contract on distributed ledger technology (DLT), its overview, requirement and architecture in its framework, as well as the main technical direction of its formal method component. This Recommendation can be used as a guideline for smart contract developer to build systems.
- **ITU-T F.751.13 "Framework and requirements for distributed ledger technology-based distributed power trading systems" (under approval)** proposes a distributed power transaction reference architecture based on DLT, so that the distributed power DLT can be built on the framework of common technology, so that it can be developed and expanded in a sustainable manner and reduce the cost of enterprise access. This document divides the roles and activities of participating subjects, clarify the responsibilities and obligations of each participating subject, and avoid unclear rights and responsibilities. This document provides contract templates for different transaction modes, standardize contract objects and data structures, and avoid repeated design and development. This Recommendation specifies the framework and requirements for the distributed power trading (DPT) system based on distributed ledger technology (DLT). The framework includes the infrastructure layer, the interface layer, and the application layer.
- **ITU-T F.760.1 "Requirements and reference framework for emergency rescue systems"** describes the application scenarios, functional requirements, and reference architecture of pre-hospital emergency rescue and applies to the planning and designing emergency

rescue systems in emergency centres, hospitals and other medical institutions. The appendix to this Recommendation includes some use cases of the proposed reference system.

- **ITU-T F.780.1 (revised) "Framework for telemedicine systems using ultra-high definition imaging"** describes requirements for using ultra-high definition (UHD) imaging, such as 4K and 8K video, for telemedicine. The purpose of these requirements is to use UHD systems for medical practices that use endoscopes and/or microscopes. This Recommendation also describes a list of requirements for using a UHD-based "endoscopic video camera" as a medical device. In addition, Annex A describes the requirements on the use of this technology as a medical device. This revision adds the clause for profiles of UHD imaging for medical services, as well as new definitions and abbreviations.
- **ITU-T G.107.2 (revised) "Fullband E-model"** defines accessibility requirements for technical features to be used and implemented by governments, healthcare providers and manufacturers of telehealth platforms to facilitate the access and use of telehealth services by persons with disabilities and specific needs, including older persons with age-related disabilities.
- **ITU-T G.113 Amd.3 "Transmission impairments due to speech processing – Amendment 3: Revised Appendix V - Provisional planning values for the fullband equipment impairment factor, and the fullband packet loss robustness factor and the fullband burstiness robustness factor"** contains an update to Appendix V of G.113, including the burstiness robustness factor to be used with the updated fullband E-model. The text is proposed for agreement at the Working Party and Study Group levels.
- **ITU-T G.191 (revised) "Software tools for speech and audio coding standardization"** provides source code for speech and audio processing modules for narrowband, wideband and super-wideband telephony applications. The set includes codecs, filters, noise generators. This edition introduces changes to Annex A, which describes the ITU-T Software Tools (STL) containing a high-quality, portable C code library for speech processing applications.
- **ITU-T G.698.1 (revised) "Multichannel DWDM applications with single-channel optical interfaces"** provides optical parameter values for physical layer interfaces of dense wavelength division multiplexing (DWDM) systems primarily intended for metro applications. Applications are defined using optical interface parameters at the single-channel connection points between optical transmitters and the optical multiplexer, as well as between optical receivers and the optical demultiplexer in the DWDM system. This Recommendation uses a methodology which fixes the maximum attenuation of the multiplexer/demultiplexer and fibre together and, therefore, does not specify the maximum fibre-link length explicitly. This Recommendation includes unidirectional DWDM applications at 2.5 and 10 Gbit/s with 100 GHz channel frequency spacing, as well as applications at 10 Gbit/s with 50 GHz channel frequency spacing. This latest revision of Recommendation ITU-T G.698.1 includes DWDM applications at 25 Gbit/s with 100 GHz channel frequency spacing.
- **ITU-T G.698.4 (revised) "Multichannel bi-directional DWDM applications with port agnostic single-channel optical interfaces"** provides optical parameter values for physical layer interfaces of dense wavelength division multiplexing (DWDM) systems primarily

intended for metro applications, where the tail-end transmitters have the capability to automatically adapt their DWDM channel frequency to the optical demultiplexer/optical multiplexer (OD/OM) or optical add-drop multiplexer (OADM) port. Applications are defined using optical interface parameters and values for single-channel and multichannel interfaces of multichannel DWDM optical systems in point-to-point applications. This Recommendation uses a system architecture comprising a head-end, connecting to the tail-end equipment (TEE) through a black link. The head end houses a set of transmitters and receivers and an OD/OM. A single bidirectional fibre is used to connect the head-end to the black link OD/OM or OADM. The connection between the OD/OM/OADM and the TEE is also bidirectional. This version of the Recommendation includes DWDM applications at 10 Gbit/s and 25 Gbit/s with minimum channel frequency spacing of 50 GHz and 100 GHz, respectively.

- **ITU-T G.709.1/Y.1331 Amd.3 "Flexible OTN short reach interfaces – Amendment 3**" adds additional payload types and makes a few editorial updates to some figures.
- **ITU-T G.709.3 Amd.1 "Flexible OTN long reach interfaces – Amendment 1"** updates the text in Annex G of G.709.3 to support the FlexO-x-DO TS, PS and MFAS overhead bit values.
- **ITU-T G.709.7/Y.1331.1 Amd.4 "Flexible OTN short-reach interfaces – Amendment 4" (under approval)** adds definitions for FlexO frames using 800 Gb/s physical interfaces, including mapping of Ethernet directly to FlexO (without defining an associated FEC frame), modifications related to 100 Gb/s per lane signalling for FlexO-1 and FlexO-4, (i.e., FOIC1.1, FOIC4.4), editorial clarifications related to renaming Pad overhead as Extended overhead, reorganization of the FlexO frame description to enable potential use of different types of FEC frames for beyond 400G interfaces, and additional overhead to support new FlexO applications.
- **ITU-T G.781 Amd.1 "Synchronization layer functions for frequency synchronization based on the physical layer - Amendment 1"** defines the atomic functions that are part of the two synchronization layers, the synchronization distribution (SD) layer and the network synchronization (NS) layer. It also defines some atomic functions, part of the transport layer, which are related to synchronization. These functions describe the synchronization of SDH, Ethernet, and OTN NEs and how these NEs are involved in network synchronization. The specifications in this Recommendation are the superset of functionality of three regional standards bodies. Care should be taken when selecting from this Recommendation.
- **ITU-T G.781.1 Amd.1 "Synchronization Layer Functions for packet-based networks - Amendment 1"** specifies a functional architecture model and corresponding atomic functions for the transport of time and frequency synchronization via packet-based methods using the precision time protocol (PTP).
- **ITU-T G.798 (revised) "Characteristics of optical transport network hierarchy equipment functional blocks" (under approval)** specifies both the components and the methodology that should be used in order to specify the optical transport network (OTN) functionality of network elements; it does not specify individual optical transport network equipment. Edition 7.0 of this Recommendation includes the text of Amendments 1, 2, 3 and 4, as well as Corrigenda 1 and 2 to Edition 6.0 of this Recommendation, the addition of the

ODUkP to ETH adaptation function using Idle Mapping Procedure (IMP) and a number of editorial enhancements.

- **ITU-T G.806 Amd.1 "Characteristics of transport equipment - Description methodology and generic functionality - Amendment 1**" updates:
  - Clause 6.1 to indicate that TPmode and portmode are applicable only to SDH and PDH and superseded for new development (e.g., OTN).
  - Table 7-1 to remove the columns for TPmode and portmode.

  New Appendix IX to describe the behaviour of TPmode and portmode that are moved from Clause 6.1.
- **ITU-T G.874 Amd.1 "Management aspects of optical transport network elements - Amendment 1"** aligns with the latest editions of ITU-T G.709 and ITU-T G.798, including their amendments.
- **ITU-T G.987.2 (revised) "10-Gigabit-capable passive optical networks (XG-PON): Physical media dependent (PMD) layer specification"** adds a new Annex specifying out of band noise limits on XG-PON ONUs to reduce the impact on other systems coexisting on the same PON.
- **ITU-T G.987.2 Amd.1 "10-Gigabit-capable passive optical networks (XG-PON): Physical media dependent (PMD) layer specification – Amendment 1"** This revision adds a new Annex specifying out of band noise limits on XG-PON ONUs to reduce the impact on other systems coexisting on the same PON.
- **ITU-T G.988 (revised) "ONU management and control interface (OMCI) specification"** specifies the optical network unit (ONU) management and control interface (OMCI) for optical access networks. This Recommendation specifies the managed entities (MEs) of a protocol-independent management information base (MIB) that models the exchange of information between an optical line termination (OLT) and an ONU. In addition, it covers the ONU management and control channel, protocol and detailed messages.
- **ITU-T G.989.2 (2014) Amd.2 "40-Gigabit-capable passive optical networks 2 (NG-PON2): Physical media dependent (PMD) layer specification: Amendment 2" (under approval)** continues the maintenance and evolution of Physical media dependent (PMD) layer specification as defined in Recommendation ITU-T G.989.2 (2014).
- **ITU-T G.989.3 Amd.1 "40-Gigabit-capable passive optical networks (NG-PON2): Transmission convergence layer specification"** incorporates regular maintenance items, supplying new Appendix XI describing the behavior of an NG-PON2 ONU in the Emeregency Stop state, introducing the deactivation reason code reported downstream for offline troubleshooting purposes, and fixing the inconsistency in handling of the Forgotten ONU timer TO6.
- **ITU-T G.993.2 (2015) Amd.4 "**Very high speed digital subscriber line transceivers 2 (VDSL2) – Amendment 4**" (under approval)** addresses the following:
  - Addition of a Band plan and Limit PSD masks for profile 35b for the North American region (Annex A)
  - Addition of operation per the North American region for profile 35b (Annex Q)

- **ITU-T G.1051 "Latency measurement and interactivity scoring under real application data traffic patterns**": An important aspect of data transmission performance of networks are data transfer times and resulting answering delay in real-time, interactive scenarios. Latency and reactivity are becoming even more essential for new interactive and real-time applications as e.g. in Augmented Reality but also in Industry 4.0 or automotive use. Latency and the resulting reactivity must be measured in a scenario that emulates the application and use-case to be evaluated. This requires first a data transfer profile (traffic pattern) that is considered as equivalent to the application so that the relevant latency and reactivity can be measured. Second, the resulting influence of latency to a certain application can be described by an interactivity scoring model. This model is not a general one, rather is individually scaled for each of the use cases like e.g. e-Gaming or real-time drone control and is focused on scoring transport with a simplified, parametrizable model approach, it does not target individual application behaviours.
- **ITU-T G.7703 Amd.1 "Architecture for the automatically switched optical network – Amendment 1"** aligns with G.7701 (2022), which specifies common control aspects for both ASON and software defined networking (SDN) architecture. This amendment refers to G.7701 common clauses.
- **ITU-T G.7710/Y.1701 Amd.1 "Common equipment management function requirements: Amendment 1"** Edition 5.1 of this Recommendation adds specifications for administrative state management in clause 8.15 and Appendix IV. The numbers of the tables and figures are re-sequenced within each clause of the Recommendation.
- **ITU-T G.7716 (revised) "Architecture of management and control operations"** addresses the architecture of management and control operations. Guidance for service providers on the transport network plan, initialization, performing typical operations and maintenance in the network, are described in this Recommendation.
- **ITU-T G.7718 Amd.1 "Framework for the management of management-control components and functions - Amendment 1"** updates management requirements to align with the recent changes to ITU-T Recommendation G.7701, G.7702 and G.7703.
- **ITU-T G.7721 Amd.1 "Management requirement and information model for synchronization – Amendment 1"** updates the Recommendation to align the information model for PTP telecom profile with the data set defined in [IEEE 1588-2019].
- **ITU-T G.8013/Y.1731 (revised) "Operation, administration and maintenance (OAM) functions and mechanisms for Ethernet-based networks"** provides mechanisms for user-plane OAM functionality in Ethernet networks according to the requirements and principles given in Recommendation ITU T Y.1730. This Recommendation is designed specifically to support point-to-point connections and multipoint connectivity in the ETH layer as identified in Recommendation ITU T G.8010/Y.1306. The OAM mechanisms defined in this Recommendation offer capabilities to operate and maintain network and service aspects of the ETH layer.
- **ITU-T G.8051/Y.1345 (2015) Amd.1 "Management aspects of the Ethernet Transport (ET) capable network element"** addresses management aspects of the Ethernet transport network element containing transport functions of one or more of the layer networks of the Ethernet transport network. The management of the Ethernet layer networks is separable from that of its client layer networks so that the same means of management

can be used regardless of the client. The management functions for fault management, configuration management, performance monitoring, and security management are specified. The 2015 Revision of this Recommendation has updated the management information (MI) signals for the ETHx_FT function in clause 8.5, the MI signals for the ETHx/MCC function in clause 8.6, the one-way synthetic loss measurement (1SL) MI signal for the ETHDe_FT_Sk function in clause 8.8, and the on-demand and proactive loss measurement requirements in clause 10.2.The 2018 Revision of this Recommendation has updated the fault cause persistency function at ETH-C function for ring protection, the configuration management for protection switching and connection functions. And, in align with ITU-T G.8021/Y.1341, this revision has removed both fault management functions and the management information (MI) signals that are related to ETYn_TT, ODUkP-X-L/MT_A, and ETYn/ETH_A. This revision has also removed theMI signals to activate processes in Adaptation functions (i.e. MI_Active).

- **ITU-T G.8052.1/Y.1346.1 Amd.1 "Operation, administration, maintenance (OAM) management information and data models for the Ethernet-transport network element - Amendment 1"** updates the UML model to support on-demand measurement and proactive measurement.
- **ITU-T G.8152.1/Y.1375.1 Amd.1 "Operation, administration, maintenance (OAM) management information and data models for the MPLS-TP network element - Amendment 1"** enhances the MPLS-TP OAM information/data model specification to specify the on-demand UML and YANG models. The OAM models, including the version 1.0 specified proactive OAM, are also aligned with the pattern of the Ethernet OAM model defined in ITU-T G.8052.1/Y.1346.1.
- **ITU-T G.8152.2/Y.1375.2 Amd.1 "Resilience information/data models for the MPLS-TP network element - Amendment 1"** updates the UML model and data model for MPLS-TP linear protection.
- **ITU-T G.8251 (revised) "The control of jitter and wander within the optical transport network (OTN)"** specifies the maximum network limits of jitter and wander that shall not be exceeded and the minimum equipment tolerance to jitter and wander that shall be provided at any relevant interfaces which are based on the optical transport network (OTN). The requirements for the jitter and wander characteristics that are specified in this Recommendation must be adhered to in order to ensure interoperability of equipment produced by different manufacturers and a satisfactory network performance.
- **ITU-T G.8260 (revised) "Definitions and terminology for synchronization in packet networks"** provides the definitions, terminology and abbreviations used in ITU-T Recommendations on timing and synchronization in packet networks.
- **ITU-T G.8262.1/Y.1362.1 (revised) "Timing characteristics of enhanced synchronous equipment slave clock"** outlines requirements for timing devices used in synchronizing network equipment that uses the physical layer to deliver frequency synchronization. This Recommendation defines the requirements for clocks, e.g., bandwidth, frequency accuracy, holdover and noise generation.
- **ITU-T G.8265.1 (revised) "Precision time protocol telecom profile for frequency synchronization"** describes the architecture and requirements for packet-based frequency distribution in telecom networks. Examples of packet-based frequency

distribution include the network time protocol (NTP), IEEE-1588-2008 and IEEE 1588-2019 and are briefly described here. Details necessary to utilize IEEE-1588-2008 and IEEE 588-2019 in a manner consistent with the architecture are defined in other Recommendations.

- **ITU-T G.8271.1/Y.1366.1 (revised) "Network limits for time synchronization in packet networks with full timing support from the network"** specifies the maximum network limits of phase and time error that shall not be exceeded. It specifies the minimum equipment tolerance to phase and time error that shall be provided at the boundary of packet networks at phase and time synchronization interfaces. It also outlines the minimum requirements for the synchronization function of network elements. This Recommendation addresses the case of time and phase distribution across a network by a packet-based method with full timing support to the protocol level from the network.
- **ITU-T G.8271.1/Y.1366.1 Amd.1 "Network limits for time synchronization in packet networks with full timing support from the network – Amendment 1"** provides the following updates;
  - Clarifications and improvements in clause XI, Measurement of maximum relative time error limits.
  - Editorial changes replacing the term calibration with compensation that better reflect what is meant throughout this document.
  - Enhanced network limits at reference point C have been added as clause 7.3.3, then for clarity old clause 7.3 text is moved into new clause 7.3.1 and old clause 7.5 is moved to new clause 7.3.2.
  - Change non-inclusive language in line with IEEE1588g.
- **ITU-T G.8271.2/Y.1366.2 Amd.1 "Network limits for time synchronization in packet networks with partial timing support from the network - Amendment 1"** provides the following updates;
- **ITU-T G.8272/Y.1367 Amd.2 "Timing characteristics of primary reference time clocks - Amendment 2"** The changes in this Amendment include Addition of notes regarding the use of T-BC-A and T-BC-P in clauses 7.4.1 and 7.4.2 respectively.
- **ITU-T G.8273/Y.1368 (revised) "Framework of phase and time clocks"** is a framework Recommendation for phase and time clocks for devices used in synchronizing network equipment that operate in the network architecture defined in Recommendations ITU-T G.8271, ITU-T G.8275 and the ITU-T G.8271.x series of Recommendations.
- **ITU-T G.8273.2/Y.1368.2 (revised) "Timing characteristics of telecom boundary clocks and telecom time synchronous clocks for use with full timing support from the network"** specifies minimum requirements for time and phase for telecom boundary clocks and telecom time synchronous clocks used in synchronization network equipment that operates in the network architecture as defined in Recommendations ITU-T G.8271, ITU T G.8271.1, ITU-T G.8275 and ITU-T G.8275.1. It supports time and/or phase synchronization distribution for packet-based networks. This version of the Recommendation only applies to full timing support from the network. These requirements apply under the normal environmental conditions specified for the equipment.

- **ITU-T G.8273.2/Y.1368.2 (2020) Amd.2 "Timing characteristics of telecom boundary clocks and telecom time synchronous clocks for use with full timing support from the network - Amendment 2"** provides the following updates:
    - Clause 7.1.2 – Adds dynamic time error low-pass filtered noise generation (MTIE) for T-BC/T-TSC Class C with variable temperature in Clause
    - Editorial changes in Annex B and Appendix II
    - Updates in Appendix VI
- **ITU-T G.8273.4/Y.1368.4 Amd.2 "Timing Characteristics of Telecom Boundary Clocks and Telecom Time Slave Clocks for Use with Partial Timing Support from the Network - Amendment 2"** specifies minimum requirements for time and phase synchronization equipment used in synchronization networks that operates in the assisted partial timing support (APTS) and partial timing support (PTS) architectures.
- **ITU-T G.8275/Y.1369 (2020) Amd.3 "Architecture and requirements for packet-based time and phase distribution - Amendment 3"** describes the architecture and requirements for packet based time and phase distribution in telecom networks. The architecture described is mainly applicable to the use of IEEE 1588. Details necessary to utilize IEEE 1588 in a manner consistent with the architecture are defined in other Recommendations. Amendment 3 incorporates a new PRTC deployment use case in clause 7.2.1, a new Annex on the use of masterOnly and notMaster and some modifications to align with updates to the profiles.
- **ITU-T G.8275.1/Y.1369.1 (revised) "Precision time protocol telecom profile for phase/time synchronization with full timing support from the network"** contains the ITU-T precision time protocol (PTP) profile for phase and time distribution with full timing support from the network. It provides the necessary details to utilize IEEE 1588 in a manner consistent with the architecture described in Recommendation ITU-T G.8275/Y.1369.
- **ITU-T G.8275.2/Y.1369.2 (revised) "Precision time protocol telecom profile for phase/time synchronization with partial timing support from the network"** contains the ITU-T precision time protocol (PTP) profile for phase/time distribution with partial timing support from the network (unicast mode). It provides the necessary details to utilize IEEE 1588 in a manner consistent with the architecture described in Recommendation ITU-T G. 8275/Y.1369. This Recommendation defines the PTP profile for unicast mode only. Future editions of this Recommendation may contain a separate profile for a mixed unicast/multicast case.
- **ITU-T G.8321 "Characteristics of Metro Transport Network equipment functional blocks"** specifies both the components and methodology that should be used in order to specify the MTN functionality of network elements; it does not specify individual MTN equipment.
- **ITU-T G.8350 "Management and control for metro transport network"** provides the management and control requirements and a protocol-neutral management information model for managing network elements and network of MTN.
- **ITU-T G.9802.1 Amd.1 "Wavelength division multiplexed passive optical networks (WDM PON): General requirements – Amendment 1"** adds requirements on failure protection for CT, ODN or both in Wavelength Routed PONs.

- **ITU-T G.9802.2 (revised) "Wavelength division multiplexed passive optical networks (WDM PON): physical media dependent (PMD) layer and transmission convergence (TC) layer specification"** describes a Wavelength Routed Optical Distribution Network (WR-ODN) based Wavelength Division Multiplexed Passive Optical Network (WDM PON). This Recommendation, as part of the multi-wavelength passive optical network (MW-PON) G.9802 series Recommendation, specifies a PON system utilising a wavelength multiplexer in the Optical Distribution Network (ODN). The specifications of both the physical media dependent (PMD) and transmission convergence (TC) layers of WR-ODN based WDM PON are captured in this Recommendation. The PMD layer specification includes aspects such as the reference logical architecture, wavelength plan, optical path loss, transmitter and receiver specifications, compatible ODN, etc. The TC layer specification includes the details of the Forward Error Correction (FEC) code, implementation methods of the management channel, management functions, a set of processes and messages, etc. to provide similar operation experience as legacy PON systems, e.g., silent start and capability to map a local Physical Layer Operation, Administration and Maintenance (PLOAM) channel.
- **ITU-T G.9804.2 Amd.1 "50-Gigabit-capable passive optical networks (50G-PON): Physical media dependent (PMD) layer specification Amendment 1"** includes the dedicated activation wavelength definition in Clause 3, a description on the processing sequence of the PSBd generation, FEC encoding, and scrambling in Clauses 6 and 10, collision resolution condition update in clause 7, the definition of optional upstream FEC codes and associated messages in clauses 10 and 11 and in Annex B, Burst_Profile PLOAM message modifications in clause 11, Assign_ONU-ID/Collision_Feedback PLOAM message name update in clause 11, golden vectors in Appendix IV, and typo corrections.
- **ITU-T G.9804.3 Amd.1 "Wavelength division multiplexed passive optical networks (WDM PON): General requirements - Amendment 1"** describes a 50-Gigabit-capable passive optical network (50G PON) system in an optical access network for residential, business, mobile backhaul and other applications. This system operates over a point-to-multipoint optical access infrastructure at the nominal line rate of 50 Gbit/s in the downstream direction. In the upstream direction, 12.5 Gbit/s, 25 Gbit/s and 50 Gbit/s nominal line rates are defined. This Recommendation contains the references, the common definitions, acronyms, abbreviations and the specifications of the physical media dependent layer of the 50G-PON system. Amendment 1 defines a third upstream wavelength "option 3" to support triple WDM coexistence with both GPON and XG(S)-PON, optical interface parameters of 50 Gbit/s upstream direction, optical interface parameters for non-MPM use cases, and the ONU out-of-band power spectral density requirements.
- **ITU-T G.9805 Amd.1 "Coexistence of Passive Optical Network Systems -Amendment 1"** includes additional 3-gen PON systems coexistence methods, and Crosstalk analysis between PON systems.
- **ITU-T G.9806 Amd.3 "Higher speed bidirectional, single fibre, point-to-point optical access system (HS-PtP)- Amendment 3" (under approval)** adds support for 100 Gbit/s, Optical Path Loss budget Class S (0-15 dB).

- **ITU-T G.9807.1 (revised) "10-Gigabit-capable symmetric passive optical network (XGS-PON)"** adds an Annex specifying out of band noise limits on XGS-PON ONUs to reduce the impact on other systems coexisting on the same ODN.
- **ITU-T G.9901 Amd.1 "Narrowband orthogonal frequency division multiplexing power line communication transceivers – Power spectral density specification – Amendment 1"** introduces FCC-Low and FCC-High bandplans in Annex B.
- **ITU-T G.9901 Amd.1 "Narrowband orthogonal frequency division multiplexing power line communication transceivers – Power spectral density specification – Amendment 1"** introduces FCC-Low and FCC-High bandplans in Annex B.
- **ITU-T G.9903 Amd.2 "Narrowband orthogonal frequency division multiplexing power line communication transceivers for G3-PLC networks"** covers Cenelec A, Cenelec B, ARIB and FCC bandplans. It adds new mechanisms to improve efficiency of broadcast transmissions (for both data traffic and LOADng RREQ routing messages) and extends the G3-PLC Hybrid PLC & RF Profile with new operating frequency bands, an RF transmit power adaptation mechanism, frequency hopping and a last gasp feature (consisting in an alerting mechanism in case a power outage is experienced by a device in the network).
- **ITU-T G.9940 "High speed fibre-based in-premises transceivers – system architecture" (under approval)** belongs to the family of ITU-T G.9940 Recommendations. Recommendation ITU-T G.9940 specifies the system architecture and requirements for high-speed fibre-based in-premises transceivers.
- **ITU-T G.9960 (revised) "Unified high-speed wireline-based home networking transceivers – System architecture and physical layer specification"** belongs to the family of ITU-T G.996x Recommendations. Recommendation ITU-T G.9960 specifies the system architecture and physical (PHY) layer for wireline-based home networking transceivers which are capable of operating over premises' wiring, including inside telephone wiring, coaxial cable, and power-line wiring. It complements the data link layer (DLL) specification in Recommendation ITU T G.9961, and the power spectral density (PSD) specification in Recommendation ITU-T G.9964. This revision comprises ITU-T G.9960 (2018) plus its Corrigendum 1, Amendment 1, Amendment 2, Corrigendum 2, and Amendment 3, along with the specification of a new PHY frame type for use by ITU-T G.9991.
- **ITU-T G.9961 (revised) "Unified high-speed wireline-based home networking transceivers – Data link layer specification" (under approval)** belongs to the family of ITU-T G.996x Recommendations. Recommendation ITU-T G.9961 specifies the data link layer (DLL) for wireline-based home networking transceivers capable of operating over premises wiring including inside telephone wiring, coaxial cable, and power-line wiring. It complements the system architecture and physical (PHY) layer specification in Recommendation ITU-T G.9960, and the power spectral density (PSD) specification in Recommendation ITU-T G.9964.

  This revision comprises ITU-T G.9961 (2018) plus its Amendments 1, 2 and 3, and Corrigenda 1 and 2, along with a new Annex B on authentication to a domain using external authentication for smart grid applications.
- **ITU-T G.9962 Amd.2 "Unified high-speed wire-line based home networking transceivers – Management Specification"** specifies the physical and data link layer management for

the ITU-T G.996x-series home networking transceiver specifications. It defines common management parameters and protocols for all ITU-T G.996x-series Recommendations for the purpose of device configuration, status and performance management, fault monitoring and diagnostics. It also provides management functionalities to coordinate multiple domains. It includes support for LCMP communication through the L1 and L6 interfaces and some associated data models.

- **ITU-T G.9963 (revised) "Unified high-speed wireline-based home networking transceivers – Multiple input/multiple output specification (2023)"** belongs to the family of ITU-T G.996x Recommendations. Recommendation ITU-T G.9963 specifies the additions and modifications to Recommendations ITU-T G.9960 and ITU-T G.9961 that are needed for a multiple input multiple output (MIMO) home networking transceiver capable of operating over premises power-line wiring. MIMO transceivers are able to transmit and receive over three power-line conductors (phase, neutral and ground). This Recommendation also specifies the means by which transceivers that comply with ITU-T G.9960, ITU-T G.9961 and ITU-T G.9963 interoperate when used on the same wires.
- **ITU-T G.9964 (revised) "Unified high-speed wireline-based home networking transceivers – Power spectral density specification" (under approval)** specifies the control parameters that determine spectral content, power spectral density (PSD) mask requirements, a set of tools to support reduction of the transmit PSD, means to measure this PSD for transmission over telephone wiring, power line wiring and coaxial cable, as well as the allowable total transmit power into a specified termination impedance. It complements the system architecture and physical layer (PHY) specification in Recommendation ITU-T G.9960, and the data link layer (DLL) specification in Recommendation ITU-T G.9961, as well as the modifications and additions to these Recommendations specifying the multiple input/multiple output (MIMO) home networking transceiver in Recommendation ITU-T G.9963. This revision comprises ITU-T G.9964 (2011) plus its Amendments 1, 2 and 3, along with the addition of a narrower subcarrier spacing (12.20703125 kHz) for scenarios where the channel is very narrow (e.g., power line communication for smart grid applications).
- **ITU-T G.9976 "Support UHD video service over G.hn" (under approval)** studies the specificities of transmission of UHD video service over G.hn. This document provides analysis on typical deployment of UHD video types in home network, typical scenarios (including typical topology, medium usage, support endpoints), and network requirements.
- **ITU-T G.Suppl.45 (revised) "Optical access systems power conservation"** consolidates the various optical access systems power-saving proposals in order to facilitate their consideration and comparative analysis from the perspective of the requirements satisfiability, on the one hand, and the overall system impact, on the other hand. This Supplement is formatted as a white paper encompassing the summary of the requirements gathering effort, the specification of the wide spectrum of potential solutions as well as their comparative analysis.
- **ITU-T G.Suppl.58 (revised) "Optical transport network module framer interfaces"** describes several interoperable component-to-component multilane interfaces (across different vendors) to connect an optical module (with or without digital signal processor) to a framer device in a vendor's equipment supporting 25G, 40G, 50G, 100G or beyond

100G optical transport network (OTN) interfaces. Only the structure of the 11G, 28G, 56G, or 112G physical lanes of the different OTN module framer interface examples is provided in this Supplement. Electrical parameters for these interfaces can use specifications provided in the relevant clauses of Optical Internetworking Forum common electrical input/output (OIF-CEI) implementation agreement (IA) specifications. For their electrical characteristics, the OIF-CEI IA specifications can be used. This Supplement relates to Recommendation ITU-T G.709/Y.1331.

- **ITU-T G.Suppl.78 "Use case and Requirements of Fibre-to-The-Room for Small Business Applications (FTTR4B)"** collects the use cases and requirements of Fibre-to-The-Room (FTTR) technology (G.fin) for small business applications. The advantages of the fibre-based technology are also analysed.
- **ITU-T H.222.0 Amd.1 "Information technology - Generic coding of moving pictures and associated audio information: Systems: Carriage of LCEVC and other improvements"** extends the specification by defining how LCEVC (ISO/IEC 23094-2) is carried over MPEG-2 systems. It also defines an additional descriptor signalling the kind of media service and its usage. Further, it includes clarifications for the specification of carriage of JPEG XS. It does this in a compatible way with existing support for other codecs.
- **ITU-T H.430.3 (revised) "Service scenario of immersive live experience (ILE)" (under approval)** identifies service scenarios by analysing several use cases on immersive live experience (ILE) services, in order to classify ILE services and to clarify a reference model of ILE. The new edition of Recommendation H.430.3 appended service scenarios and use cases of interactive immersive services (IIS) as the part of ILE. This Recommendation also summarises several use cases and identifies candidate technologies for implementing ILE, including standards gap analysis related to ILE technologies.
- **ITU-T H.430.6 "Media transport protocols, signalling information of haptic transmission for immersive live experience (ILE) systems" (under approval)**: ILE systems may handle haptic information, such as vibrotactile and kinaesthetic actions, for increasing more immersiveness in addition to audio and video. Haptic information should be transmitted synchronously with audio, video and lighting information. This draft Recommendation identifies media transport protocol and signalling information of haptic transmission for immersive live experience (ILE) systems, in order to transmit haptic information synchronously for provide ILE services.
- **ITU-T H.430.7 "Requirements of interactive immersive services" (under approval)** provides the definition and requirements of interactive immersive services (IIS). Based on the overview of IIS, the requirements which include interactive capabilities, synchronous transmission of concurrent streams, intelligent distribution of massive multimedia data, media processing for immersive interactive information, and network status awareness with QoE scheduling, are specified in this Recommendation.
- **ITU-T H.627.3 "Protocols for intelligent video surveillance systems"** defines protocols for intelligent video surveillance systems, including the functional architecture, functional interface, overall requirements of the protocol, message flows and relevant protocols. This Recommendation is based on Recommendation ITU-T H.626.5, "Architecture for intelligent video surveillance systems".

- **ITU-T H.644.5 "Functional architecture of content request routing service in multimedia content delivery networks"** specifies the functional architecture with the related functional components of CRRS, the Reference points of a CRRS within MCDN. With the consideration of different network environment, content/service types and user/terminal device profile, this Recommendation also presents the potential solutions with the procedurals for CRRS to complete the end-user-to-MCDN node attachment under the case of IPTV service (dedicate network), OTT media service (public/open Internet) and mobile media streaming service (5G network with MEC enabled service). With this Recommendation, a MCDN service provider and manufacturer can deploy their MCDN node, especially the edge node, deeper into network edge. The CRRS provides a comprehensive solution to guide user to find the nearest MCDN node for accessing the request content by ignoring the differentiation of network, service type and terminal device and user's location.
- **ITU-T H.862.6 "Functional requirements for counselling services based on artificial emotional intelligence" (under approval)** proposes service requirements and functional specifications for counselling services based on artificial emotional intelligence technologies. This Recommendation proposes a service model in counselling services using several scenarios. At a time when artificial intelligence (AI) technologies are widely proposed and used, the relevant standards can be an important opportunity to facilitate the development of the technology in the industry.
- **ITU-T H.873 (revised) "Information technology - Digital compression and coding of continuous-tone still images: Reference software" (under approval)** proposes service requirements and functional specifications for counselling services based on artificial emotional intelligence technologies. This Recommendation proposes a service model in counselling services using several scenarios. At a time when artificial intelligence (AI) technologies are widely proposed and used, the relevant standards can be an important opportunity to facilitate the development of the technology in the industry.
- **ITU-T H.876 (revised) "Requirements of interactive immersive services" (under approval)** provides the definition and requirements of interactive immersive services (IIS). Based on the overview of IIS, the requirements which include interactive capabilities, synchronous transmission of concurrent streams, intelligent distribution of massive multimedia data, media processing for immersive interactive information, and network status awareness with QoE scheduling, are specified in this Recommendation.
- **ITU-T J.224 (revised) "Fifth-generation transmission systems for interactive cable television services - IP cable modems"** specifies the fifth generation of high-speed data-over-cable systems. Fifth generation transmission systems introduce a number of new features that build upon what was present in previous ITU-T Recommendations, namely ITU-T J.112, ITU-T J.122, the ITU-T J.222.x-series and the ITU-T J.223.x-series. Recommendation ITU-T J.224 includes key new features for the physical (PHY) layer and establishes a full duplex data-over-cable service interface specification (DOCSIS) mode of operation, including enhancements to media access control (MAC) layer protocols, as well as requirements for those in the upper layer, e.g., the Internet protocol (IP) and dynamic host configuration protocol (DHCP). Fifth generation cable modem specifications fully incorporate those of the fourth generation.

- **ITU-T J.225 (revised) "Fourth-generation transmission systems for interactive cable television services - IP cable modems"** defines the fourth generation of high-speed data-over-cable systems. The fourth-generation transmission systems introduce a number of new features that build upon what was present in previous Recommendations ITU-T J.112, ITU-T J.122, ITU-T J.222.x-series, and ITU T J.223.x-series. This Recommendation includes key new features for the physical (PHY) layer and enhancements to the media access control (MAC) layer protocols as well as requirements for upper layer protocols such as Internet protocol (IP), dynamic host configuration protocol (DHCP), etc. The fourth-generation cable modem specifications are incorporated fully in this Recommendation. Informative Supplement 10 to the ITU-T J-series Recommendations contains the correspondence between the DOCSIS versions and the ITU-T Recommendations revisions and generations.
- **ITU-T J.299 (revised) "Functional requirements for remote management of cable set-top box by auto configuration server"** describes the functional requirements for auto configuration server (ACS) and set-top box (STB) connected to each other for the purpose of remote maintenance. ACS is usually used to remotely set up and maintain customer premises equipment (CPE) such as an STB. The major purpose of the Recommendation is to specify basic requirements for remote maintenance in the cable TV system.
- **ITU-T J.484 "Requirements of multicast adaptive bitrate (M-ABR) IP delivery" (under approval)**: Increase of video traffic on the internet forces cable television operator too invest on additional facilities to accommodate increased IP traffic every year. Most of the video traffic now is unicast which consumes much bandwidth, but is easy to use, and compatible with consumer devices such as smartphones and tablets. Since some of unicast connections carry linear programming such as news and sports, the traffic on the delivery network can be significantly reduced if such linear programs are transmitted as a multicast. This work item defines the requirement of an IP delivery technology which makes use of multicast between headend and subscriber gateway but uses HTTP-based unicast connection between the gateway and consumer devices.
- **ITU-T J.1036 "Factual subscriber-base reporting and protected content delivery in conditional access system – Requirements"**: The objective of this Recommendation is to address two major concerns related to CAS, namely, underreporting of subscriber numbers and content piracy, leading to revenue loss to broadcasters, content providers and the governments. This Recommendation elaborates the various functional requirements of the CAS such as log requirements, reports requirements, database requirements, security requirements, service requirements, and more. Compliance to these requirements in CAS performance will address the concerns mentioned above.
- **ITU-T J.1112 "Functional Requirements for IP-based Digital Video Convergence Service"** aims to define the functional specification of IP-based Digital Video Convergence Service considering the convergence environment.
- **ITU-T J.1305 "Requirements of microservice architecture for audio-visual media in the converged media cloud"** specifies the requirements for the architecture and related components of audio-visual media based on microservice technologies. This Recommendation is applicable to the design, development, construction, operation and maintenance of audio-visual media systems based on microservices. This Recommendation bears the characteristics of microservice technology and audio-visual

media business, combines the requirements of technology and business, and comes up with an audio-visual media microservice architecture (MMA) that meets the needs of rapid iteration and diversified services of the audio-visual media business. MMA follows the tiered architectural methodology as ITU-T J.1302. Mainly from the perspective of cloud platform, ITU-T J.1301 and J.1302 stipulates the system architecture of cloud-based converged media services (CBCMS) to support Internet Protocol (IP) and broadcast cable television (TV) services. From the perspective of microservice, this recommendation specifies the microservice architecture of integrated media based on container, virtual machine, cloud, and other infrastructures to support the audio-visual media business carried out by microservices on a variety of infrastructures.

- **ITU-T J.1306 "Specification of microservice architecture for audio-visual media in the converged media cloud"** specifies the specification for the architecture and related components of audio-visual media based on microservice technologies. This Recommendation fulfills the requirements in [ITU-T J.1305]. This Recommendation is applicable to the design, development, construction, operation and maintenance of audio-visual media systems based on microservices. This Recommendation bears the characteristics of microservice technology and audio-visual media business, combines the requirements of technology and business, and comes up with an audio-visual media microservice architecture (MMA) that meets the needs of rapid iteration and diversified services of the audio-visual media business. MMA follows the layered architectural methodology as ITU-T J.1302. Mainly from the perspective of cloud platform, ITU-T J.1302 stipulates the system architecture of cloud-based converged media services (CBCMS) to support Internet Protocol (IP) and broadcast cable television (TV) services. From the perspective of microservice, this Recommendation specifies the microservice architecture of integrated media based on container, virtual machine, cloud, and other infrastructures to support the audio-visual media business carried out by microservices on a variety of infrastructures. From the perspective of microservice governance, this Recommendation realizes the compatibility of various current mainstream microservice frameworks and stipulates the management capabilities of distributed systems. From the perspective of the media business, it defines the microservice components which support the production, broadcasting, transmission, distribution, interaction, and other audio-visual media business. From the perspective of application integration, it stipulates the service orchestration capabilities and the application assembly means.

- **ITU-T J.Suppl.10 to ITU-T J-Sereies Recommendations "Correspondence between CableLabs DOCSIS Specifications and ITU-T J-series Recommendations"** clarifies the relationship between the multiple generations of CableLabs DOCSIS specifications and the ITU-T J-series of DOCSIS-based Recommendations.

- **ITU-T K.20 (revised) "Resistibility of telecommunication equipment installed in a telecommunication centre to overvoltages and overcurrents"** specifies resistibility requirements and test procedures for telecommunication equipment that is attached to or installed within a telecommunication centre.

  Overvoltages and overcurrents covered by Recommendation ITU-T K.20 include surges due to lightning on or near the line plant, short-term induction from adjacent alternating current (AC) power lines or railway systems, earth potential rise due to power faults, direct contact between telecommunication lines and power lines, and electrostatic

discharges (ESDs). The sources for overvoltages in internal lines, between equipment or racks, are mainly inductive coupling caused by lightning currents being conducted in nearby lightning strikes or lightning currents being conducted in nearby conductors.

- **ITU-T K.34 (revised) "Classification of electromagnetic environmental conditions for telecommunication equipment - Basic EMC Recommendation" (under approval)** defines electromagnetic environmental classes for telecommunication equipment covering all relevant electromagnetic environmental parameters. This Recommendation applies to telecommunication equipment installed in telecommunication centres, outdoor locations and customer premises. This is a basic EMC Recommendation for telecommunications.
- **ITU-T K.35 (revised) "Bonding configurations and earthing at remote electronic sites" (under approval)**: Bonding configurations, earthing, and the type of power distribution for equipment located at remote electronic sites are proposed, which are intended to promote harmony of installation and equipment configurations while providing for personnel safety and electromagnetic compatibility.
- **ITU-T K.45 (revised) "Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents"** specifies resistibility requirements and test procedures for telecommunication equipment installed between telecommunication centres and between a telecommunication centre and the customer's premises.

  Overvoltages or overcurrents covered by this Recommendation include surges due to lightning on or near the line plant, short-term induction from adjacent AC power lines or railway systems, earth potential rise due to power faults, direct contact between telecommunication lines and power lines and electrostatic discharges.
- **ITU-T K.60 (revised) "Emission levels and test methods for wireline telecommunication networks to minimize electromagnetic disturbance of radio services"** proposes a measurement method and target levels to guide administrations in case of interference with radio services. In addition, a methodology for solving the interference is discussed, and under what circumstances the case has to be forwarded to the national responsible body.
- **ITU-T K.78 (revised) "High altitude electromagnetic pulse immunity guide for telecommunication centres" (under approval)** specifies the radiated and conducted immunity requirements against a high altitude electromagnetic pulse (HEMP) for equipment installed in telecommunication centres for functions such as switching, transmission, radiocommunication, and power distribution. The requirements consist of immunity test methods and levels for telecommunication equipment in each installation condition. The telecommunication system can be more robust by applying surge protective devices (SPDs) for surge mitigation and electromagnetic screening to the building and/or equipment enclosures.
- **ITU-T K.80 (revised) "EMC requirements for telecommunication network equipment in the frequency range 1 GHz-40 GHz"** presents electromagnetic compatibility (EMC) requirements for all type of telecommunication equipment in the frequency range between 1 GHz and 40 GHz.
- **ITU-T K.93 (revised) "Immunity of home network devices to electromagnetic disturbances"** aims to ensure normal operation of home networking devices and to

provide a new additional immunity test method for broadband services, especially for devices that are sensitive to broadband interferences.

- **ITU-T K.136 (revised) "Electromagnetic compatibility requirements for radio telecommunication equipment"** specifies the electromagnetic compatibility (EMC) requirements and the test method for radio telecommunication equipment and associated ancillary equipment.
- **ITU-T K.143 (revised) "Immunity of home network devices to electromagnetic equipment"** provides guidance for design of lightning protection and requirements on surge suppressor in equipment from the human safety standpoint. Requirements for SPDs/SPCs in multiservice surge protective devices (MSPDs) external to the equipment and SPDs installed on lines in a building lie outside the scope of this Recommendation.
- **ITU-T K.145 (revised) "Assessment and management of compliance with radio frequency electromagnetic field exposure limits for workers at radiocommunication sites and facilities" (under approval)** includes guidance on the protection of workers against radio frequency electromagnetic fields (RF-EMFs) exposure in their working environments. Radio frequency (RF) workers range from installation engineers and tower climbers to R&D personnel and laboratory testing engineers. All of these RF workers are exposed to stronger RF-EMF fields than the general public. There are also RF informed workers who have been provided with information on RF-EMF safe working practices for a site as well as all other workers who are regarded as members of the public for the purposes of RF-EMF exposure limits. This Recommendation provides minimum general safety guidance for telecommunication RF workers around the world.
- **ITU-T K.147 (revised) "Protection of networked information technology equipment"** covers common one, two and four pair link implementations, their configurations, how surges are coupled into a system and what surge mitigation measures are used. Following this overview, the rationale for different surge and power fault test circuit approaches and when they are specified is given. Networked equipment can be subject to overvoltage and overcurrent transients. Both data and any powering services should be resistant to the expected environmental transients. Where equipment has multiple independent ports, such as central hubs, switches, or repeaters, then testing is required for inter-port resistibility. Resistibility testing needs to identify lightning transients coupled into a network by magnetic induction, earth potential rise, resistive coupling and transient coupling by a voltage-limiting operation of surge protective functions or flashover. Voltage limitation may convert common-mode surges into differential-mode surges in the signal path. It is also possible for alternating current mains power faults to couple into the network, which can necessitate the use of overcurrent protection.
- **ITU-T K.148 "Multiservice surge protective device application guide" (under approval)**: A Multiservice Surge Protective Device (MSPD) protects two or more services e.g. mains and telecommunications, and has a common bonding point for the service surge protective devices (SPDs) contained in the MSPD. This Recommendation application guide on MSPDs explains their uses, required performance parameters and usage consequences.
- **ITU-T K.149 "Passive intermodulation test methods of array antenna systems in mobile communication systems" (under approval)** specifies methods for measuring passive intermodulation level of array antenna systems in mobile communication systems,

including test equipment and test procedures. This Recommendation covers the following frequency ranges, but not limited to the following ranges: LTE 700, APT 700, LTE 800, Cellular 850, E-GSM 900, DCS 1800, PCS 1900, AWS 1700/2100, UMTS 2100 and LTE 2600 operating bands.

- **ITU-T K.150 "Information of semiconductor devices required for design of telecommunication equipment applying soft error mitigation measures" (under approval)** describes characteristic parameters and functions of semiconductor devices that a telecommunication equipment designer needs when implementing soft error mitigation measures. This Recommendation describes kinds of information expected to be supplied from semiconductor device vendors to designers for telecommunication equipment. The definition of expected information and objective to collect it are described firstly. It is described which semiconductor devices are targeted to collect information next. Finally, details of expected information to be collected are described for each target semiconductor devices.
- **ITU-T K.153 "Guidance on Determining the Compliance Boundaries (the exclusion zones) of radio transmitter installations" (under approval)** includes information on how the zones should be determined based on the data concerning operating frequencies and EIRP on each of the operating frequencies. It also includes information on cases in which there is no exclusion zones. For example, those on masts, especially in rural areas, do not need any materialization as the general public does not have any access to this zone and the access for the workers is also limited and existing usually in the front of the transmitting antennas. Furthermore, some other transmitters do not need any compliance boundary as the installed power level is too low.
- **ITU-T K.Suppl.31 to ITU-T K.118 "ITU-T K.118 – Requirements for lightning protection of fibre to the distribution point equipment – Modelling earth potential rise (EPR)"**: Since the publication of ITU-T Recommendation K.118, 2016, Requirements for lightning protection of fibre to the distribution point equipment, the system, often called G.fast (fast access to subscriber terminals) with RPF (reverse power feed), has had extensive deployment. This supplement provides an assessment earth potential rise (EPR) levels at the cabling link ends to the Distribution Point Unit (DPU) and the Customer Premises Equipment (CPE). Electrical lightning stresses on the connected equipment at the link ends are considered to arise from the lightning disturbances on the CPE powering source, differential EPR (earth potential rise) of the link ends and possibly magnetic induction to the link cable. This supplement mainly concerns itself with the link end EPR values.
- **ITU-T K.Suppl.32 "Case Studies of RF-EMF Assessment"**: The RF-EMF exposure levels are varying depending on the environment in which they are taken and type of radio communication systems that are in operation. This Technical Report presents results of case studies of 5G RF-EMF exposure levels taken in different conditions and areas. All results of assessment delivered by ITU-T members and include calculations and measurements of the 5G RF-EMF exposure levels in vicinity of different radio communication systems. The results included in this new Supplement provide information concerning the 5G RF-EMF exposure levels in real situations. The EMF exposure assessments are included in succeeding appendixes.

  This new Supplement is mainly to solve the problem of EMF compliance assessments of 5G base station systems through the typical case studies including computation

evaluation and measurement evaluation, and also provides the case support on implementation of the ITU-T K.Supplement 16 and IEC62232.

- **ITU-T L.109.1 "Type II optical/electrical hybrid cables for access points and other terminal equipment**": The current application scenarios for remote powering and data transmission of access points and other equipment, require a type of a hybrid cable that has a small footprint, is light weight, and is convenient for installation. This Recommendation deals with a type II optical/electrical hybrid cable (OEHC) in which a copper pair is used for power delivery (not for telecommunication) and an optical fibre can support data transmission up to and beyond 1 Gbit/s.
- **ITU-T L.210 "Requirements for passive optical nodes: optical wall outlets and extender boxes"**: refers to passive optical nodes (optical wall outlets and extender boxes) deployed in customer indoor premises. It deals with the node housing, fibre management system and specifies the mechanical and environmental characteristics as well.
- **ITU-T L.340 (revised) "Maintenance of telecommunication underground facilities":** Underground facilities such as tunnels, maintenance holes and handholes are deteriorating continuously as time go by. For example, cracks and water leakages occur and these phenomena degrade the safety and serviceability of the underground facilities. If the deterioration is neglected, large-scale repair and reinforcement measures may be required, which will further increase the cost in the future. Therefore, it is highly recommended that periodic inspection and timely maintenance are performed. Safety management of telecommunication infrastructure facilities is generally described in ITU-T Recommendation L.330, but the detailed technologies and countermeasures for each facility are left for other Recommendations. This Recommendation describes the inspection procedures, technologies and countermeasures for maintenance of underground facilities defined in L.330.
- **ITU-T L.1631 "Reference model of firefighting infrastructure management system for buildings in sustainable cities" (under approval)** provides an overview of a firefighting infrastructure management system (FIMS), defines the reference model of the FIMS, and provides use cases for the FIMS for buildings in sustainable cities.
- **ITU-T M.3020 (revised) "Management interface specification methodology"** describes the management interface specification methodology (MISM). It describes the process to derive interface specifications based on user requirements, analysis and design (RAD). Guidelines are given on RAD using unified modelling language (UML) notation; however, other interface specification techniques are not precluded. The guidelines for using UML are described at a high level in this ITU-T Recommendation.
- **ITU-T M.3366 "Requirements for management of blockchain system"** introduces requirements for management of blockchain system, includes configuration management, performance management, fault management and log management related to blockchain node, blockchain ledger, smart contract, consensus, account, etc., in blockchain system. This Recommendation proposes management requirements for private chains or permissioned chains.
- **ITU-T M.3367 "Requirements for robot-based on-site smart patrol of telecommunication network"** introduces requirements for IMR-based on-site smart patrol of telecommunication network, includes the network elements to be patrolled,

requirements for management function of IMR-based patrol and related management interface.

- **ITU-T M.3383 "Requirements for log Analysis in telecom management with AI"** introduces requirements for log analysis in telecom management with AI, includes functional framework, functional requirements, and typical scenarios of log analysis in telecom management with AI. This Recommendation gives examples of some log types and characteristics. This Recommendation also describes use cases of log analysis in telecom management with AI.
- **ITU-T M.3384 "Intelligence Levels of AI enhanced Telecom Operation and Management (IL-AITOM)"** provides definitions, classifications, object selection and automatic evaluating mechanism, for evaluating the intelligence levels of systems which follow the framework of artificial intelligence enhanced telecom operation and management (AITOM) defined in [ITU-T M.3080].
- **ITU-T M.3385 "Intelligence Levels Evaluation Framework of AI enhanced Telecom Operation and Management"** provides detailed evaluation framework, evaluation rating method and automatic evaluating process for intelligence levels of systems which follow the framework of artificial intelligence enhanced telecom operation and management (AITOM).
- **ITU-T P.58 (revised) "Head and torso simulator for telephonometry"** specifies the electroacoustic characteristics of the head and torso simulator (HATS) to be used for telephonometric measurements. Both the sound generation and sound pick-up characteristics of this device are specified. The artificial ears described in this Recommendation support narrowband, wideband, super-wideband, as well as full-band applications. The artificial mouth described in this Recommendation supports narrowband, wideband and super-wideband applications. However, it should be noted that the directionality of the artificial mouth is limited in its ability to simulate the human mouth in the super-wideband frequency range.
- **ITU-T P.381 (revised) "Technical requirements and test methods for analogue wired headsets/headphones and corresponding universal interface of terminals"** specifies critical physical and electrical-acoustical characteristics for the universal headset interface and provides corresponding test methods. Both 3.5 mm and 2.5 mm diameter headset/headphone interfaces have been widely used in digital mobile terminals in recent years. Nowadays, the consumer is free to choose either the headset/headphone originally provided by the terminal manufacturer or others that are offered separately. However, the quality of service (QoS)/quality of experience (QoE) perceived by users is influenced by both the electrical performance of the interface and the compatibility between the terminal and the connected headset/headphone.
- **ITU-T P.382 (revised) "Technical requirements and test methods for analogue wired multi-microphone headsets/headphones and corresponding universal interface of terminals"** specifies critical physical and electroacoustical characteristics for a universal headset interface with more than four terminals and provides corresponding test methods. Headset or headphone (HP) interfaces of diameter 3.5 mm and 2.5 mm have been widely used in digital mobile terminals during recent years. Nowadays, the consumer is free to choose either the headset or HP originally provided by the terminal

manufacturer or others that are offered separately. However, the quality of service/quality of experience (QoS/QoE) perceived by users is influenced by both the electrical performance of the interface and the compatibility between the terminal and the connected headset or HP.

- **ITU-T P.383 (revised) "Technical requirements and test methods for digital headsets/headphones and corresponding interfaces of terminals"** specifies requirements and provides corresponding test methods for headsets and headphones as well as terminals when tested separately. Headsets and headphones equipped with wired or wireless digital interfaces have been widely used in digital mobile terminals in recent years. The consumer is free to choose either the headset or the headphone originally provided with the terminal or other headsets or headphones that are offered separately. However, the quality of service and quality of experience (QoS/QoE) perceived by users is influenced by both the electrical performance of the interface and the compatibility between the terminal and the headset or headphone.
- **ITU-T P.810 (revised) "Modulated Noise Reference Unit (MNRU)"** describes the Modulated Noise Reference Unit (MNRU), a standalone unit for introducing controlled degradations to speech signals. The MNRU has been used extensively in subjective performance evaluations of digital processes as reference conditions. Historically MNRU was implemented in analogue hardware. The Recommendation was subsequently complemented with the description of digital implementations of the MNRU for narrowband and wideband signals.

  This revision provides the extension of digital MNRU to fullband signals, which shapes the flat gaussian noise used in the narrowband and wideband version with an average speech power spectrum. The introduction of the shaped noise provides a more representative degradation for super-wideband and fullband speech as it reduces the energy of the noise towards high frequencies. A reference implementation of the algorithms is provided in the Software Tool Library (STL), ITU-T Rec. G.191.
- **ITU-T P.836 "Simulating Conversations for the Prediction of Speech Quality"** provides a conversation simulation model which is able to simulate realistic conversational behavior to produce conversations on the semantic level, as well as on the speech signal level. The simulation is able to replicate conversations with different interactivity patterns and the resulting simulated conversations will reflect changes of this conversation behavior due to delayed transmission and packet loss. The simulated conversations may be used to predict conversational quality in combination with signal-based or parametric quality prediction models, such as the E-model, e.g., in drive-test scenarios.
- **ITU-T P.1503 "Extended methodology for cross-country and inter-operator Digital Financial Services testing"** is based on ITU-T Rec. G.1033, where a conceptual framework for Quality of service and quality of experience aspects of digital financial services is standardized, and on ITU-T Rec. P.1502 which standardizes a methodology for QoE testing of digital financial services for the basic person-to-person (P2P) money transfers between two devices using the same network and DFS operator.
- **ITU-T Y.1540 Amd.2 "Internet protocol data communication service - IP packet transfer and availability performance parameters - Amendment 2: Revised Annex B: Additional search algorithms for IP-based capacity parameters and methods of measurement"**

revises Annex B, which provides a second, more capable search algorithm for the IP capacity method of measurement defined in Annex A.

- **ITU-T P.Sup.29 "ITU-T P.800 use cases"** describes ITU-T P.800 use case examples that include NB, WB, SWB and FB audio bandwidth, speech, music and mixed speech and music content, stereo and spatial quality evaluations. Guidance for using subjective listening methodology in ITU-T Rec. P.800 for stereo and spatial speech and general audio content is described next in this Supplement. Anchor conditions, level normalization for stereo and multichannel signals, listener screening methods are presented.

- **ITU-T Q.3060 "Signalling architecture of the fast deployment emergency telecommunication network to be used in a natural disaster" (under approval)**: Currently, the emergency systems, which are used in a natural disaster case, are based on the existing technologies such as space-based networks (e.g. Iridium, etc.). However, in forthcoming 5G and IoT era, there are some technologies which may play an important role in helping to provide wide number of ICT services from simple voice/video communication up to telemetry exchange, to name a few. All these services which are rapidly deployed in harmed country may sufficiently change the situation and help to save life of victims of natural hazard events. The goal of this Recommendation is to describe the functional elements, services and signaling architecture of emergency telecommunication network which can be rapidly deployed in a country affected by a natural disaster.

- **ITU-T Q.3406 "Signalling requirements for telemetry of virtual broadband network services"** specifies the signalling requirements for telemetry of virtual broadband network services, by architecturally adding the dedicated functional component and the corresponding interfaces in NFV framework.

- **ITU-T Q.3721 "Procedures for Programming Protocol-Independent Packet Processors (p4) Switch-based vBNG"** specifies the architecture, interfaces, and procedures for Programming Protocol-Independent Packet Processors (p4) Switch-based vBNG.

- **ITU-T Q.4070 "Test suite for interoperability testing of virtualized broadband network gateway"** specifies the interoperability testing of virtualized broadband network gateway (vBNG), including overview of test suite and test cases for interoperability testing of vBNG.

- **ITU-T Q.4140 "Signalling requirements for service deployment in computing power network"** provides the signalling procedures and signalling requirements for service deployment in computing power network (CPN) based on Recommendation ITU-T Y.2501. The signalling requirements for service deployment include centralized mode and distributed mode.

- **ITU-T Q.5006 "Signalling requirements for hierarchical network slicing service"** specifies the signalling requirements for hierarchical network slicing services. This signalling is used for hierarchically and automatically slicing the network for the customers and its applications.

- **ITU-T T.801 (revised) "Information technology - JPEG 2000 image coding system: Extensions" (under approval)** Rec. ITU-T T.801| ISO/IEC 15444-2 extends the capabilities of Rec. ITU-T T.800 | ISO/IEC 15444-1 ("JPEG 2000"). The 1st edition of this Recommendation | International Standard dates to 2004. It has since then been supplemented by amendments and corrigenda, several of its normative references have

been obsoleted, and industry practices have evolved. The 2nd edition has addressed these shortcomings without modifying its scope. This 3rd edition introduces an additional entry into the SGcod and Ppoc parameters for supporting a new progression order. In comparison with the second edition of this Recommendation | International Standard, this edition introduces the following changes: – Support for progression order extensions This third edition cancels and replaces the second edition (ITU-T T.801 (2021) | ISO/IEC 15444-2:2021), which has been technically revised. This Recommendation was developed jointly with ISO/IEC JTC 1/SC 29/WG 1 (JPEG), and is common text with ISO/IEC 15444-2.

- **ITU-T T.807 (revised) "Information technology – JPEG 2000 image coding system: Secure JPEG 2000"** extends security capabilities of Rec. ITU-T T.800 | ISO/IEC 15444-1 ("JPEG 2000"). The 1st edition of this Recommendation | International Standard dates to 2007, and it has since then been supplemented by one amendment that include file format-based security. This 2nd edition addresses this amendment without modifying its scope. This Recommendation was developed jointly with ISO/IEC JTC 1/SC 29/WG 1 (JPEG), and is common text with ISO/IEC 15444-8. This second edition cancels and replaces the first edition, which has been technically revised.
- **ITU-T T.808 (revised) "Information technology – JPEG 2000 image coding system: Interactivity tools, APIs and protocols"** This second edition cancels and replaces the first edition, which has been technically revised.
- **ITU-T T.816 "Information technology - JPEG 2000 image coding system: Extensions for coding of discontinuous media"** provides extensions of the scalable image coding tools described in Rec. ITU-T T.800 | ISO/IEC 15444-1 and Rec. ITU-T T.801 | ISO/IEC 15444-2, of two types. First, new wavelet-like image transforms known as "breakpoint-dependent" transforms are defined, whose underlying basis functions can be discontinuous at defined locations within the image component to which they are applied. Second, new scalable coding tools are described for a new type of image component known as a "breakpoint component," which provides a successively refinable and hierarchical description of the breakpoint locations used by the breakpoint-dependent transforms. Any non-initial component or components within a codestream conforming to this Recommendation | International Standard can be breakpoint components and any or components in the codestream other than breakpoint components can use a breakpoint-dependent transform that depends upon one of the breakpoint components in the same codestream. These new tools together allow for the scalable coding of imagery that naturally exhibits strong discontinuities in the spatial domain. An important example of such imagery is depth maps. This Recommendation was developed jointly with ISO/IEC JTC 1/SC 29/WG 1 (JPEG) and is common text with ISO/IEC 15444-17.
- **ITU-T T.Suppl.20 "Practice for intelligent traffic sensing device deployment in the roadside":** The detection and analysis of traffic elements based on roadside sensing devices is an important foundation for intelligent transportation. Sensing devices used in roadside to build an intelligent transport system generally include cameras, lidars, millimetre wave radars, etc. The requirements for sensing devices, such as the deployment and the function characteristics will affect the quality of data for intelligent transportation system. In order to support ITS to obtain comprehensive and effective perception data, this supplement gives the practice references for roadside sensing

devices' deployment in ITS. This Supplement applies to ITU-T H.550-H.599 series: Vehicular gateways and intelligent transportation systems (ITS).

- **ITU-T Y.4222 "Framework of smart evacuation in a disaster and/or an emergency in smart cities and communities" (under approval):** Smart evacuation facilitates effective and efficient solutions for people inside the disaster and/or emergency zone and for people who approach the disaster and/or emergency zone. IoT and smart cities and communities provide possibilities to use their functionalities to provide smart evacuation during the incidence of a disaster and/or an emergency. This Recommendation describes concepts and features of smart evacuation control in disaster and/or emergency situations. It identifies high-level requirements and ICT infrastructure for smart evacuation along with use cases of disaster and/or emergency situations.
- **ITU-T Y.4461 "Framework of open data in smart cities"** defines a framework of open ata in smart cities. It clarifies the concept of open data in smart cities, analyses the benefits of open data in smart cities, identifies the key phases, key roles and activities of open data in smart cities and describes the framework and general requirements of open data in smart cities. The use cases are also provided in an informative appendix.
- **ITU-T Y.4487 "A functional architecture of roadside multi-sensor data fusion systems for autonomous vehicles" (under approval):** With the development of autonomous driving, methods by relying solely on the vehicle's own sensors or by traditional roadside sensing systems lacking collaboration between devices are no longer sufficient to support higher-level autonomous driving applications, and a higher requirement of roadside perception capabilities is proposed. The roadside multi-sensor data fusion system can provide new functionalities which will contribute to enhancing the roadside perception capabilities by combining different types of roadside sensing devices such as cameras, lidars, millimeter wave radars, etc. according to their characteristics, and perform unified management and coordination, so as to achieve accurate perception of road information, and support autonomous driving applications. This Recommendation defines a reference functional architecture of roadside multi-sensor data fusion systems. It clarifies the concept and components of the systems, and specifies the key functional entities of the systems and the reference points between the functional entities. Use cases based on roadside multi-sensor data fusion systems are also provided in the appendix.
- **ITU-T Y.4600 "Requirements and capabilities of a digital twin system for smart cities":** A digital twin is a digital representation of an object of interest and may require different capabilities according to the specific domain of application, such as synchronization between a physical thing and its digital representation, and real-time support. A smart city digital twin can be defined as a digital twin for a smart city that can be used to develop strategies to achieve specific goals for a smart city, by conducting simulations and to increase visibility of human-infrastructure-strategy interactions. A smart city digital twin allows the simulation of plans before implementing them, exposing problems before they become a reality. In other word, it is possible to conduct simulations on a digital replica of the city (virtual cities) before actually implementing the strategy on the real city. In this way, it is also possible to find the best strategies to achieve a specific goal or strategies that have similar effects while minimizing budget and resource usage. Therefore, a smart city digital twin is a tool for improving urban operations, efficiencies and resilience of a city.

- **ITU-T Y.2247 "Framework and Requirements of Network-oriented Data Integrity Verification Service based on Blockchain in Future Network"** specifies the network-oriented data integrity verification service based on blockchain in future networks. It provides the service requirements, framework and service scenarios of the network-oriented data integrity verification service based on blockchain and specifies the network capability requirements accordingly in the context of future networks including IMT-2020 network and beyond. Detailed descriptions of the use cases are listed in the appendix.
- **ITU-T Y.2248 "Service model for Entry-level Smart Farm":** Entry-level smart farms can provide convenience of use and increased economic profits to agricultural producers that have not been familiar with high-level ICT technologies. This Recommendation describes the service model for Entry-level smart farm. The scope of this Recommendation covers reference architecture, service requirements and service scenarios for the Entry-level smart farm.
- **ITU-T Y.2344 "Scenarios and requirements of Intent-Based Network for network evolution" (under approval)** aims to provide the scenarios and requirements of Intent-Based Network for network evolution. The scope of this Recommendation includes Scenarios and workflow of Intent-Based Network for network evolution, Capability requirements of Intent-Based Network for network evolution, and General framework of Intent-Based Network for network evolution.
- **ITU-T Y.2345 "Scenarios and requirements of network resource sharing based on distributed ledger technology"** aims to provide the overview and general framework of the network resource sharing based on distributed ledger technology and specifies scenarios and capability requirements which are derived from use cases.
- **ITU-T Y.3079 "Information-Centric Networking in networks beyond IMT-2020: Framework of locally enhanced name mapping and resolution"** specifies the framework of locally enhanced name mapping and resolution to achieve high performance of deterministic latency and scalability for a massive number of named objects for information centric networking (ICN)in networks beyond IMT-2020.
- **ITU-T Y.3080 "Information-Centric Networking in networks beyond IMT-2020: Requirements and Mechanisms of Transport Layer"** describes the requirements and mechanisms of transport layer for information-centric networking (ICN) in networks beyond IMT-2020. (1) It provides an introduction to transport layer in networks beyond IMT-2020. (2) It describes service and functional requirements of transport layer. (3) Based on the requirements, it specifies the mechanisms of transport layer for information-centric networking (ICN) in networks beyond IMT-2020.
- **ITU-T Y.3081 "Self-Controlled Identity based on Blockchain: Requirements and Framework"** presents the motivations and principles for self-controlled identity based on blockchain in future networks including networks beyond IMT-2020. It provides the high-level framework and requirements of self-controlled identity based on blockchain. It specifies the capability requirements of the self-controlled identity based on blockchain accordingly in the context of future networks including networks beyond IMT-2020. Detailed descriptions of the use cases and business models are listed in the appendix.
- **ITU-T Y.3082 "Mobile network sharing based on distributed ledger technology for networks beyond IMT-2020: Requirements and Framework"** specifies the requirements

and framework of distributed ledger technology used in mobile network sharing for networks beyond IMT-2020. The detailed requirements of distributed ledger technology based mobile network sharing are put forward. The high-level framework, service procedures and security considerations are presented. The detailed use cases are described in the appendix.

- **ITU-T Y.3184 "Mechanism for intelligent awareness of network status"** specifies mechanism for intelligent awareness of network status. The scope of this Recommendation includes: introduction of intelligent awareness of network status; overview of mechanism for intelligent awareness of network status; mechanism for intelligent awareness of network fault; mechanism for intelligent awareness of network performance; mechanism for intelligent awareness of network resource; mechanism for intelligent awareness of network load; mechanism for intelligent awareness of other aspects of network status and security consideration.
- **ITU-T Y.3325 "Framework for high-level AI-based management communicating with external management systems":** After the IMT-2020 technology and network virtualization technology spread, the appearance of emerging services such as multimedia services (high resolution, AR, VR, etc.) and IoT will be expected. Since huge amount of traffic of these new coming services will be incurred to the network, the importance of the network flexibility and stability will increase. Network operators intend to improve network operations such as provisioning, resource control, failure detection and recovery, etc. Automatic network management supported by recent AI technologies, called AI-based network, will play an essential role for such era. On the other hand, service provider needs to manage service dynamically based on service and network status for better quality of service (QoS). In order for service providers to use the information managed by AI-based network effectively, common interface between system of service providers over AI-based network and AI-based network is required. This Recommendation describes requirements for reference model of such interactions including interface and metadata.
- **ITU-T Y.3540 "Edge computing - Overview and highlevel requirements" (under approval)** provides overview and high-level requirements of edge computing. This Recommendation defines terms related to the edge computing, describes overview of edge computing including concept, common characteristics, ecosystem with operations by edge computing main roles. Also, this Recommendation provides orchestration aspects for edge computing and relationship with other technologies. This Recommendation provides high-level requirements through various use cases.
- **ITU-T Y.Suppl.72 to Y.3000-series of Recommendation (revised) "Artificial Intelligence Standardization Roadmap"** provides the standardization roadmap for artificial intelligence (AI) in the information and communication technologies area. This AI standardization roadmap has been developed to assist in the development of AI related standards in the ICT fields by providing information about existing and under developing standards in key standards development organizations (SDOs). In addition, it provides the overviews of AI and AI related technical areas from standards perspective, AI related activities in standards development organizations (SDOs), and gap analysis.
- **ITU-T Y.Suppl.73 "Concept and use cases of a digital twin in smart sustainable cities"** A digital twin is regarded as a virtual representation that serves as the real-time digital

counterpart of a physical object or process. This Supplement defines the concept and describes use cases of digital twins in smart sustainable cities. It also identifies challenges and opportunities for digital twins in smart sustainable cities.

- **ITU-T Z.161 (revised) "Testing and Test Control Notation version 3: TTCN-3 core language"** defines Testing and Test Control Notation 3 (TTCN-3) intended for specification of test suites that are independent of platforms, test methods, protocol layers and protocols. TTCN-3 can be used for specification of all types of reactive system tests over a variety of communication ports. Typical areas of application are protocol testing (including mobile and Internet protocols), service testing (including supplementary services), module testing, testing of Common Object Request Broker Architecture (CORBA) based platforms and application programming interfaces (APIs). The specification of test suites for physical layer protocols is outside the scope of this Recommendation. This revision of the Recommendation contains amendments, clarifications, corrigenda and editorial corrections.
- **ITU-T Z.161.1 (revised) "Testing and Test Control Notation version 3: TTCN-3 language extensions: Support of interfaces with continuous signals"** defines the "continuous signal support" package of TTCN 3. TTCN 3 can be used for the specification of all types of reactive system tests over a variety of communication ports. Typical areas of application are protocol testing (including mobile and Internet protocols), service testing (including supplementary services), module testing, testing of Common Object Request Broker Architecture (CORBA) based platforms, testing of application programming interfaces (APIs), etc. TTCN 3 is not restricted to conformance testing and can be used for many other kinds of testing including interoperability, robustness, regression, system and integration testing. The specification of test suites for physical layer protocols is outside the scope of this Recommendation.
- **ITU-T Z.161.2 (revised) "Testing and Test Control Notation version 3: TTCN-3 language extensions: Configuration and deployment support"** defines the configuration and deployment support package of TTCN-3. TTCN-3 can be used for the specification of all types of reactive system tests over a variety of communication ports. Typical areas of application are protocol testing (including mobile and Internet protocols), service testing (including supplementary services), module testing, testing of Common Object Request Broker Architecture (CORBA) based platforms, application programming interfaces (APIs), etc. TTCN-3 is not restricted to conformance testing and can be used for many other kinds of testing including interoperability, robustness, regression, system and integration testing. The specification of test suites for physical layer protocols is outside the scope of this Recommendation.
- **ITU-T Z.161.3 (revised) "Testing and Test Control Notation version 3: TTCN-3 language extensions: Advanced parameterization"** defines the advanced parameterization package of TTCN-3. TTCN 3 can be used for the specification of all types of reactive system tests over a variety of communication ports. Typical areas of application are protocol testing (including mobile and Internet protocols), service testing (including supplementary services), module testing, testing of Common Object Request Broker Architecture (CORBA) based platforms, application programming interfaces (APIs), etc. TTCN-3 is not restricted to conformance testing and can be used for many other kinds of testing including interoperability, robustness, regression, system and integration testing.

The specification of test suites for physical layer protocols is outside the scope of this Recommendation.

- **ITU-T Z.161.4 (revised) "Testing and Test Control Notation version 3: TTCN-3 language extensions: Behaviour types"** defines the behaviour types package of TTCN 3. TTCN 3 can be used for the specification of all types of reactive system tests over a variety of communication ports. Typical areas of application are protocol testing (including mobile and Internet protocols), service testing (including supplementary services), module testing, testing of Common Object Request Broker Architecture (CORBA) based platforms, application programming interfaces (APIs), etc. TTCN 3 is not restricted to conformance testing and can be used for many other kinds of testing including interoperability, robustness, regression, system and integration testing. The specification of test suites for physical layer protocols is outside the scope of this Recommendation.
- **ITU-T Z.161.5 (revised) "Testing and Test Control Notation version 3: TTCN-3 language extensions: Performance and real time testing"** defines the real-time and performance testing support package of TTCN-3. TTCN-3 can be used for the specification of all types of reactive system tests over a variety of communication ports. Typical areas of application are protocol testing (including mobile and Internet protocols), service testing (including supplementary services), module testing, testing of OMG CORBA based platforms, APIs, etc. TTCN-3 is not restricted to conformance testing and can be used for many other kinds of testing including interoperability, robustness, regression, system and integration testing. The specification of test suites for physical layer protocols is outside the scope of this Recommendation.
- **ITU-T Z.161.6 (revised) "Testing and Test Control Notation version 3: TTCN-3 language extensions: Advanced Matching"** defines the support of advance matching of TTCN-3. TTCN-3 can be used for the specification of all types of reactive system tests over a variety of communication ports. Typical areas of application are protocol testing (including mobile and Internet protocols), service testing (including supplementary services), module testing, testing of OMG CORBA based platforms, APIs, etc. TTCN-3 is not restricted to conformance testing and can be used for many other kinds of testing including interoperability, robustness, regression, system and integration testing. The specification of test suites for physical layer protocols is outside the scope of the present document.
- **ITU-T Z.161.7 (revised) "Testing and Test Control Notation version 3: TTCN-3 Language Extensions: Object-Oriented Features"** defines the support for object-oriented features in TTCN-3. TTCN-3 can be used for the specification of all types of reactive system tests over a variety of communication ports. Typical areas of application are protocol testing (including mobile and Internet protocols), service testing (including supplementary services), module testing, testing of OMG CORBA based platforms, APIs, etc. TTCN-3 is not restricted to conformance testing and can be used for many other kinds of testing including interoperability, robustness, regression, system and integration testing. The specification of test suites for physical layer protocols is outside the scope of the present document.
- **ITU-T Z.165 (revised) "Testing and Test Control Notation version 3: TTCN-3 runtime interface (TRI)"** provides the specification of the runtime interface for TTCN-3 (Testing and Test Control Notation 3) test system implementations. The TTCN-3 Runtime Interface (TRI) provides the recommended adaptation for timing and communication of a test

system to a particular processing platform and the system under test, respectively. This Recommendation defines the interface as a set of operations independent of target language.

- **ITU-T Z.165.1 (revised) "Testing and Test Control Notation version 3: TTCN-3 extension package: Extended TRI"** defines the extended TRI package of TTCN 3. TTCN 3 can be used for the specification of all types of reactive system tests over a variety of communication ports. Typical areas of application are protocol testing (including mobile and Internet protocols), service testing (including supplementary services), module testing, testing of CORBA based platforms, APIs, etc. TTCN 3 is not restricted to conformance testing and can be used for many other kinds of testing including interoperability, robustness, regression, system and integration testing. The specification of test suites for physical layer protocols is outside the scope of this Recommendation.
- **ITU-T Z.166 (revised) "Testing and Test Control Notation version 3: TTCN-3 control interface (TCI)"** specifies the control interfaces for Testing and Test Control Notation 3 (TTCN-3) test system implementations. The TTCN-3 control interfaces (TCIs) provide a standardized adaptation for management, test component handling and encoding/decoding of a test system to a particular test platform. This Recommendation defines the interfaces as a set of operations independent of a target language. The interfaces are defined to be compatible with the TTCN-3 standards (see clause 2 of ETSI ES 201 873-6 V4.12.1). The interface definition uses the Common Object Request Broker Architecture (CORBA) Interface Definition Language (IDL) to specify the TCI completely. Clauses 8, 9 and 9.7 of ETSI ES 201 873-6 V4.12.1 present language mappings for this abstract specification to the target languages Java and ANSI C. This revision of the Recommendation contains amendments, clarifications, corrigenda and editorial corrections.
- **ITU-T Z.167 (revised) "Testing and Test Control Notation version 3: Using ASN.1 with TTCN-3"** defines a normative way of using ASN.1 as defined in Recommendations ITU-T X.680, ITU-T X.681, ITU-T X.682 and ITU-T X.683 with TTCN-3. The harmonization of other languages with TTCN-3 is not covered by this Recommendation. This revision of the Recommendation contains amendments, clarifications, corrigenda and editorial corrections.
- **ITU-T Implementer's Guide G.Imp8013 "Operations, administration and maintenance (OAM) functions and mechanisms for Ethernet-based networks - Implementer's Guide"** is an Implementer's Guide for Recommendation ITU-T G.8013/Y.1731 (2015). This revision contains all updates submitted up to and including those at Study Group 15 meeting in September 2022. This document was approved by ITU-T Study Group 15 on 30 September 2022.
- **ITU-T Implementer's Guide G.Imp8021 "Characteristics of Ethernet transport network equipment functional blocks - Implementer's Guide"** is an Implementer's Guide for Recommendation ITU-T G.8021/Y.1341 (2022). This revision contains all updates submitted up to and including those at Study Group 15 meeting in September 2022. This document was approved by ITU-T Study Group 15 on 30 September 2022.
- **ITU-T Implementer's Guide G.Imp8121 "Characteristics of MPLS-TP equipment functional blocks - Implementer's Guide"** is an Implementer's Guide for

Recommendation ITU-T G.8121/Y.1381 (2018). This edition contains all updates submitted up to and including those at Study Group 15 meeting in September 2022. This document was approved by ITU-T Study Group 15 on 30 September 2022.

- **ITU-T Technical Paper FSTP.ACC-WebVRI "Guideline on web-based remote sign language interpretation or video remote interpretation (VRI) system"** describes a web-based VRI, based on Web real time communication (RTC), and describes how it can be used in a scenario where community sign language interpreters can participate, as well as ways in which other remote services, online medical treatment and distance education, can harmonize with the Web-based VRI system.
- **ITU-T Technical Paper FSTP-CONF-F780.1 "Conformance testing specification for F.780.1 "Framework for telemedicine systems using ultra-high definition imaging""** defines the testing specification for F.780.1 "Framework for telemedicine systems using ultra-high definition imaging".
- **ITU-T Technical Paper FSTP-VS-SDCA "Application of software-defined camera in surveillance industy"** introduces several use cases of software-defined camera in multiple surveillance scenarios, analyses the possible requirements and pain points that customers may put forward, providing guidance for the further development of software-defined camera technology in the future. This technical paper also specifies the entire software-defined camera system ecosystem mechanism and security implementations. This technical paper aims to provide a comprehensive guidance for SDC technology usage in surveillance industry.
- **ITU-T Technical Paper LSTP-GLSR (revised) "Guide on the use of ITU-T L-series Recommendations related to optical technologies for outside plant"** provides information on the background, development and uses of L-series Recommendations prepared by Working Party 2 of ITU-T Study Group 15. These Recommendations are related to the design, construction, maintenance and operation of the optical fibre outside plant.
- **ITU-T Technical Report TR.ibc-cd "Guidelines for identity based cryptosystems used for cross-domain secure communications"**: Secure communications take place not only within an operator's network but also across operators' networks. Public key cryptosystem has become the foundation for the secure communications since it has been invented. Identity-based public key cryptography (ID-PKC) system has the advantage over the PKI-based public key cryptography (PKI-PKC) system as ID-PKC remove the need for the certificate management. However, current bootstrap schemes for ID-PKC rely on the availability of the PKI. Multi-CA trust issue in the PKI-PKC system is transmitted to the ID-PKC system. In this technical report, the secure bootstrap of an ID-PKC without relying on PKI is studied. The weaknesses of current IBC system for cross-domain secure communications are identified. Potential solutions to overcome the weaknesses are introduced. Further, the evaluation of these solutions and way forward to standardization are given.
- **ITU-T Technical Report DSTR-IoT-DLT-Accounting "Accounting and billing aspects in Internet of Things (IoT) ecosystem and integrated approach using Distributed Ledger Technology (DLT)"** studies the various accounting, billing and related challenges in the IoT ecosystem and to analyse the usage of Distributed Ledger Technology (DLT) to provide an integrated approach to the management of IoT. In addition, it presents various principles

and models on this subject and records the best practices followed by Member States. This technical report discusses the various challenges faced in the accounting, billing and related areas in the Internet of Things (IoT) ecosystem. The exponential growth of digital interactions and the increasing use of IoT devices to collect and transmit data has created the need for modern billing systems that are well-integrated with businesses and capable of accommodating complex business models and pricing structures.

- **ITU-T Technical Report DSTR-IoTM2M-Roaming "Roaming aspects of IoT and M2M including any related development and tariff principles"** addresses roaming aspects of the Internet of Things (IoT) and machine-to-machine (M2M) communications. Following an overview of IoT/M2M communications, it discusses business models and policy challenges. The report also includes illustrative case studies from the European Union (EU), Republic of Korea, and India. This report encourages policymakers to support clear, harmonized light-touch regulatory frameworks that enable investments by the private sector. By using the information in this report, Member States may consider various roaming business models in order to adopt an approach that suits them best and supports innovation and technology development in their respective jurisdictions.
- **ITU-T Technical Report TR.FSR "Factual subscriber-base reporting and protected content delivery in conditional access system (CAS)"**: Access system (CAS) is prepared to specify the terminology definition, service scenario, and use cases related to the Recommendation J.1036 highlighting the characteristics of related technologies and network architecture. The goal of the technical report is to develop secured network and ecosystem to ensure authorised access to the content utilising the standard conditional access system (CAS) in Digital Addressable Systems (DAS) for television broadcasting. The objective of the technical report is also to supplement the under-development Recommendation J.1036 that addresses two major concerns related to CAS, namely, underreporting of subscriber numbers and content piracy, leading to revenue loss to broadcasters, content providers, and governments. The Recommendation J.1036 elaborates on the various functional requirements of the CAS such as log requirements, reports requirements, database requirements, security requirements, service requirements, and more. Compliance with these requirements in CAS performance will address the twin concerns mentioned above.
- **ITU-T Technical Report JSTR-OPTR "Optimizing bitrates and transmission resolution by considering display characteristics and available bandwidth"** provides subjective test results that can be used for optimal video transmission methods in terms of bitrates and resolution, which use the minimum bandwidth while providing equivalent perceptual video quality by considering content characteristics and display size/resolution.
- **ITU-T Technical Report TR-NCDP "Session-layer network coding protocol for multicast data transmission**": One of the purposes of the emerging network protocols is to reduce the network traffic volume without reducing the number of network services or their functionality. Among the other technologies, network coding can solve this problem with Bitwise XOR (eXclusive OR) addition and decrease the number of packets transmitted through the network.
- **ITU-T Technical Report GSTP-OPHN "Operation of G.hn technology over access and in-premises phone line medium"** describes typical network architectures, parameters, and implementation issues regarding broadband applications that use ITU-T G.9960/G.9961

transceivers (called here “G.996x transceivers”). G.996x devices are designed to be capable of operating over different types of physical media, using different frequency ranges, and different sets of PHY and MAC parameters. Each of these applications has specific characteristics that may require optimized settings (configuration options) to be used. Additionally, implementations themselves need to consider various aspects of the applications, which are described in detail in this document. This document is not an ITU-T Recommendation, but rather a tutorial that provides guidance for the user and describes how to configure ITU-T G.996x home networking systems to operate in the context of applications that require operating over various phone lines with potentially high level of crosstalk, such as phone line cables within private apartment buildings, connecting GAM equipment in the basement with GNT equipment in the individual apartments.

- **ITU-T Technical Report GSTR-SDM “Optical Fibre, Cable, and Components for Space Division Multiplexing Transmission”** is established for analysing the current state of SDM technical maturity, clarifying the technical and commercial aspects of this technology, and highlighting the characteristics of related technologies and network configuration/installation/operations. The goal is to develop a cost-effective network and ecosystem utilizing SDM optical fibre and cable technologies. The classification and definition of existing SDM optical fibre and cable technologies are described from the viewpoint of the geometrical, mechanical, and optical properties of various SDM optical fibres. Potential application areas are investigated to examine the relationship between various SDM optical fibre and cable technologies. Furthermore, aspects of how to use SDM optical fibres in anticipated applications are addressed, including considerations on connectorisation, splicing, breakout technologies, and how to imbed this technology in current optical systems. The purpose of this technical report is to establish a clear and agreed upon roadmap for SDM optical fibre and cable technologies including related technologies such as test methods, connectivity, maintenance, and restoration.

- **ITU-T Technical Report YSTR.BP-DTw “Best Practices for Graphical Digital Twins of Smart Cities”:** This example-based report focuses on how emerging technology solutions can best address environmental issues within cities. The data used is based on information gained from the United Nations ''United for Smart Sustainable Cities” reports [b-U4SSC 2020]. Industrial Internet of Things (IoT) and smart cities gather a lot of data in data lakes and present the insights generated by machine learning or artificial intelligence in custom proprietary dashboards or in open APIs. It is a tedious task for stakeholders with low data literacy to apprehend so much information and in so many data formats in a way that helps them bend their decisions and adapt their behaviours towards a more sustainable future. In light of the United Nations’ 2030 Agenda for Sustainable Development and the European Commission’s Fit-for-55 programmes, there is a critical need for a visualisation tool which can help visualise and compare, in a consistent manner, the sustainability of smart cities in such a way that priorities can be identified and anchored at all decision-making levels and best practices can be scaled-up and replicated to other cities. The purpose of the document is thus to identify the emerging technologies which allow a prompt comparison between different cities and help detect low hanging fruits and areas of high priorities. In the sake of convenience and reproducibility, attention is drawn to potential universal data formats.

74. The Financial Inclusion Global Initiative (FIGI) is a three-year programme of collective action led by ITU, the World Bank Group and the Committee on Payments and Market Infrastructures, with support from the Bill & Melinda Gates Foundation. FIGI is designed to advance research in digital finance and accelerate digital financial inclusion in developing countries concluded at the end of 2021. The ITU DFS Security Lab was set up as part of FIGI activities and developed a standard methodology based on the OWASP Mobile Top 10 Security Risks for conducting security tests for mobile payment apps based on USSD, STK, and Android.

75. The activities of the DFS security lab include a) organization of ITU DFS Security Clinics to offer guidance to regulators and DFS providers on adoption of the DFS security recomendations developed under FIGI, b) providing assistance to regulators through the knowledge transfer programme in establishing their own security labs and to implement the security methodology to conduct security audits of mobile payment applications based on USSD, iOS, and Android and c) conduct security audits on mobile payment apps at the request of DFS regulators and DFS providers.

76. The DFS Security Lab conducted some 22 security clinics, welcoming over 500 participants, in 2022 and 2023 in Africa, Asia Pacific and Latin America regions. Under the knowledge transfer programme ITU has provided technical assistance to telecom regulators from Tanzania, Peru, The Gambia and Uganda Telco to set up the DFS Security Lab and guidance to the staff of the regulatory bodies on how to conduct the security audits of mobile payment apps used in their countries.

77. The United for Smart Sustainable Cities (U4SSC) initiative, supported by 19 UN bodies, advocates for public policy to ensure that ICTs – and ICT standards in particular – play a definitive role in the transition to smart cities.

    More than 150 cities worldwide are evaluating their progress towards the SDGs with "Key Performance Indicators for Smart Sustainable Cities" based on ITU standards, indicators promoted by U4SSC. New U4SSC reports include "Reference framework for integrated management of an SSC", "Procurement guidelines for smart sustainable cities", "Compendium of practices on innovative financing for smart sustainable cities projects", "Smart tourism: A path to more secure and resilient destinations", "Redefining smart city platforms: Setting the stage for Minimal Interoperability Mechanisms", "Smart public health emergency management and ICT implementations", "Compendium of survey results on integrated digital solutions for city platforms around the world" and "Digital solutions for integrated city management and use cases", as well as a range of city snapshots, factsheets and verification reports sharing the results of the latest KPI evaluations.

    The first United for Smart Sustainable Cities (U4SSC) Austrian U4SSC Country Hub will be hosted by the Austrian Economics Center in Vienna, Austria. The city of Kyebi, Ghana, has also set up a U4SSC Country Hub in Ghana. The main objective of this country hub is to promote the work of U4SSC.

    U4SSC is working on the following Thematic Groups:

    - City Platforms;
    - Lessons Learned from Building Urban Economic Resilience at City Level During and After COVID-19;
    - Artificial intelligence in cities;

- Procurement for Smart Sustainable Cities;
- Enabling People-Centred Cities through Digital Transformation; and
- Digital Wellbeing

78. The AI for Road Safety initiative was launched on 6 October 2021 by ITU together with UN Secretary-General's Special Envoy for Road Safety and the UN Envoy on Technology. Since its establishment the AI for Road Safety initiative has been functioning in line with the UN General Assembly Resolution on Improving global Road Safety, and the UN Secretary General's roadmap on digital cooperation. The activities of this initiative are oriented towards the United Nations Sustainable Development Goals, especially Target 3.6 to halve by 2030 the number of global deaths and injuries from road traffic accidents, and the SDG Goal 11.2 to provide access to safe, affordable, accessible and sustainable transport systems for all by 2030. In accordance with its scope, this initiative will continue to organize Webinars, challenges and explore the AI for Road Safety readiness landscape.

79. The ITU/WMO/UNESCO-IOC Joint Task Force on SMART [2] Cable Systems is leading an ambitious project to equip submarine communications cables with climate and hazard-monitoring sensors to create a global observation network capable of providing earthquake and tsunami warnings as well as data on ocean climate change and circulation.

    The information from SMART cables can be used for:
    - Climate change monitoring including ocean circulation, heat content and sea level rise;
    - Tsunami and earthquake early warning for disaster risk reduction;
    - Seismic monitoring for earth structure and related hazards;
    - Quantifying risk to inform sustainable development of coastal and offshore infrastructure, and
    - Warning of external hazards to cables, and improved routing of cable systems

    Several recent events have contributed to positive developments:

    - SMART Cables project was endorsed by UN Decade of Ocean Science for Sustainable Development 2021-2030. Details are at https://oceandecade.org/actions/smart-cables-for-observing-the-global-ocean/ .
    - The Portuguese Government, with guidance from its telecom regulatory agency ANACOM, directed that the new CAM ring (Continent-Azores-Madeira) "… enhance the use of submarine cables such as seismic detection, environmental monitoring Oceanography, Geophysics and Environment ….". An RFP for this project was issued in December 2022. The new CAM ring is expected to be in operation in 2025 and likely be the first SMART cable system.
    - ITU-T Study Group 15 (SG15) is progressing a work item on SMART cables under Question 8/15 (Characteristics of optical fibre submarine cable systems).
    - The 9th workshop on "Joint Task Force on SMART Cables" was held on 19 and 20 January 2023 in Honolulu, United States. Details are at https://www.itu.int/en/ITU-T/Workshops-and-Seminars/2023/0119/Pages/default.aspx .

[2] Science Monitoring and Reliable Telecommunications

- A workshop “SMART Cables, Science and Society” was held on 22 and 23 May 2023 in Aveiro, Portugal. Details are at https://www.ua.pt/pt/smartcss .

- ITU-T Study Group 5 has started a new work item on Impact assessment framework for evaluating how ICT-based subsea infrastructure could support climate, environmental and biodiversity monitoring in the oceans. This Recommendation will help countries in becoming more resilient for climate change as it will help in creating metrics to assess how SMART Cables are helping to monitor in real time key climate indicators, such as (but not limited to): temperature of the bottom of the sea, level of sea rising, salinity and even biodiversity. It will also develop a metric related to the impact of SMART Cables on Climate change resilience in a given region or area.

80. ITU is carrying out various activities to encourage and facilitate the participation of academia in the work of the Sector, as well as to benefit from their technical and intellectual expertise.

❖ ITU Journal

The ITU Journal on Future and Evolving Technologies (ITU J-FET) is an international journal providing complete coverage of all communications and networking paradigms, free of charge for both readers and authors. Free and for all, this publication addresses fundamental and applied research sharing new techniques, concepts, analyses, and tutorials while discussing implications of the latest research on policy, regulations, legal frameworks, the economy and society. The ITU Journal welcomes submissions at any time, on any topic within its scope and publishes papers quarterly. In less than three years, over 160 papers have been published - authored by over 700 researchers (72% of which come from academia), exploring areas of high relevance to the whole ITU, spanning from telecommunication and radiocommunication standardization to policy and regulatory issues. This year, Volume 4 will feature regular papers and seven special issues papers. The following issues are still calling for papers:

- AI for accessibility
- Metaverse: Communications, networking and computing
- Intelligent technologies for future networking and distributed systems
- Satellite constellations and connectivity from space
- Next generation computer communications and networks

All published papers are available to download free of charge from the ITU Digital library.

The joint ITU and Tsinghua University Press journal , Intelligent and Converged Networks (ICN), is a quarterly publication and published 84 papers since its establishment in June 2020. All publications are available for free download on the IEEE *Xplore* Digital Library.

❖ ITU Kaleidoscope Academic conference

The ITU Kaleidoscope series of peer-reviewed academic conferences – technically co-sponsored by the IEEE and IEEE Communications Society (IEEE ComSoc) – calls for original research on ICT innovation and related demands on international standardization.

Innovation to match the world’s growing metaverse ambitions was in focus at Kaleidoscope 2022: *Extended reality – How to boost quality of experience and interoperability*. This 14th edition of the ITU Kaleidoscope conferences provided a forward-

looking perspective on the future development and widespread adoption of extended realities. Kaleidoscope 2022, hosted by the Ministry of Communications and Digitalisation and the Ghana-India Kofi Annan Centre of Excellence in ICT, took place in Accra, from 7 to 9 December at the National Communications Authority of Ghana, with options also available for remote, online participation. The conference programme featured four keynote sessions, an invited paper, an invited talk, three paper sessions, one video demo, and a students' exhibit. Full papers are reproduced in the Conference Proceedings and are also available on the IEEE *Xplore* Digital Library. The best papers are being evaluated for potential publication in the IEEE Communications Standards Magazine and other international journals. An evaluation of all Kaleidoscope 2022 papers with respect to relevance in ITU activities was presented at TSAG, 12-16 December 2022, and submitted to RAG and TDAG.

The next edition of the conference is under preparation and will be held in 2024.

81. Resolution 177 on Conformance and Interoperability (Rev. Bucharest, 2022) endorsed the objectives of both Resolution 76 (Rev. Geneva, 2020) and Resolution 47 (Rev. Kigali, 2022) on conformity and interoperability of ICT equipment. The goal of Resolution 76 (Rev. Geneva, 2020) on Conformance and Interoperability testing is to help in increasing probability of interoperability and to ensure all the countries to benefit of ICTs. WTDC-22 reviewed Resolution 47 on enhancement of knowledge and effective application of ITU Recommendations in developing countries, including Conformance and Interoperability (C&I) testing of systems manufactured on the basis of ITU Recommendations. C&I issues are in the Dubai Declaration and are part of Regional Initiatives for AFR and ARB.

ITU-T CASC (Conformity Assessment Steering Committee) was established by ITU-T SG11 in 2015 to elaborate the recognition procedure of Testing Laboratories (TLs) which have competence for testing against ITU-T Recommendations. CASC developed ITU-T Guideline "Testing Laboratories Recognition Procedure" (2015), which was further revised in July 2022.

In 2017 and further in 2019, SG11 agreed a Guideline "ITU-T CASC procedure to appoint ITU-T technical experts". Those experts could be included in the assessment team of ILAC in order to evaluate TL which have competence on particular ITU-T Recommendations. In 2019, SG11 appointed several ITU technical experts on different ITU-T Recommendations.

This activity goes in close collaboration with the International Laboratory Accreditation Cooperation (ILAC, https://ilac.org/). The Memorandum of Understanding among ITU-T, the International Laboratory Accreditation Cooperation (ILAC) and the International Accreditation Forum (IAF) was updated and signed in August 2022.

In March 2021, SG11 decided that ITU recognizes the Testing Laboratories (TLs) which are accredited by an Accreditation Body that is a signatory to the ILAC MRA for testing, which scope of accreditation contains ITU-T Recommendation(s). The TL recognition procedure was announced in January 2022 (TSB Circular 368).

As of April 2023, there are 11 registered TLs which were listed in the ITU Testing Laboratories Database (https://itu.int/go/tldb) and highlighted in the ITU Operational Bulletins.

In May 2023, SG11 updated its C&I Action plan which allows TSB to maintain reference table of standards are used for C&I assessment. This reference table provides guidance when populating the ITU Product Conformity Database.

The C&I Portal is responsible to gather all information about the work done in Pillars 1 (conformance assessment) and 2 (interoperability); as Pillars 3 (capacity building) and 4 (assistance in the establishment of test centres and C&I programmes in developing countries).

The following ITU guidelines have been published on C&I: *i)* Guidelines for the development, implementation and management of mutual recognition arrangements/agreements (MRAs) on conformity assessment; *ii)* a Feasibility Study for the establishment of a Conformance Testing Center; *iii)* Guidelines on Establishing Conformity and Interoperability Regimes – Basic and Complete Guidelines.; *iv)* Guidelines for Developing Countries on establishing conformity assessment test labs in different regionsITU has organized C&I training events and workshops in the regions. During these events, key issues were discussed highlighting the relevance of accreditation and certification, including mutual recognition agreements and arrangements to increase confidence in conformity assessment and decreasing the need of repeated testing. Trainings on EMC, mobile terminals, and C&I regimes for experts from Americas, Africa, Arab, CIS, and Asia-Pacific regions has been organized in the premises of partners' laboratories in the regions. Guidelines for building Test Labs for C&I of equipment and systems in developing countries were distributed, during the forums and the training courses.

ITU is preparing assessment studies in the regions to determine C&I areas of commonalities and differences in the concerned countries, allowing to assessing the present situation in each beneficiary country and proposing a common C&I regimes for the participant countries. While promoting regional integration on ICT, the result of the studies can include either building new labs and/or establishing MRAs, as appropriate. Until 2016, assessment studies on C&I for SADC, Maghreb, EAC, COMTELCA the Caribbean Regions were finalized. Follow-up for each of the regions are taking place.

The ITU is providing assistance to developing countries on conformity and interoperability tailored to their needs. The ITU assisted Sri-Lanka, Zambia, Tanzania, Paraguay, and Ghana in building national Human capacity for C&I and to Government of Mongolia in setting up Type Approval systems in the country.

The "ICT Product Conformity Database" provides industry with a means to publicize the conformance of ICT products and services with ITU-T's international standards. Currently, the C&I database lists e-health devices, mobile phones, Ethernet services, IPTV, GPON and Mobile Number Portability systems (MNP).

82. ITU has developed an 'EMF Guide mobile app' providing an up-to-date reference of the EMF information provided by the World Health Organization and ITU. The 'EMF Guide mobile app' is available in 6 languages and includes relevant information related to 5G.

83. ITU and its partners, sharing a common community of interest, have recognized the relationship between IMT — International Mobile Telecommunication system — and "5G" and are working towards realizing the future vision of mobile broadband communications. Development of the radio-interface specifications for IMT-2020 has proceeded on schedule towards the timely delivery of the fifth generation (5G) of mobile broadband services. Specifications for UHDTV television with High Dynamic Range (HDR) were also approved in 2017.

84. ITU-R hosted its major events, RA-19 and WRC-19. These were well attended and forged pathways in key areas such as mobile and fixed broadband communications, radiocommunications for transportation systems, satellite services as well as global identifications for International Mobile Telecommunications (IMT).

85. Additional details of the ITU-R objectives (Objective R.1, Objective R.2, Objective R.3) are available online on ITU website.

86. In response to Resolution ITU-R 61-2 "ITU-R's contribution in implementing the outcomes of the World Summit on the Information Society and the 2030 Agenda for Sustainable Development", the Radiocommunication Bureau continues to work on WSIS implementation and follow-up activities within its mandate as well as in achieving the Sustainable Development Goals (SDGs). The document lists of the ITU-R publications related to the SDGs are available here: https://www.itu.int/en/ITU-R/study-groups/Pages/Sustainable-dev-goals.aspx

Action Line C5: Building Confidence and Security in the use of ICTs

Related to SDGs: SDG 1 (1.4), SDG 4 (4.1, 4.3, 4.5), SDGs 5 (5.b), SDGs 7 (7.1, 7.a, 7.b), SDG 8 (8.1), SDGs 9 (9.1, 9.c), 11.3, 11.b, 16.2, 17.8

87. A fundamental role of the ITU, following the WSIS Summit and the 2006 ITU Plenipotentiary Conference is to build confidence and security in the use of ICTs.

88. The 18th Action Line C5 Facilitator Meeting was held on Monday, 13 March 2023, 16:45-17:45 CEST, jointly organised with the Action Line C2 meeting. The theme of this year was **"The Next Frontier: Let's talk Digital Resilience - Cyber and Space.** More details about the meeting are available here.

89. The WSIS Prizes 2023 Winner for the Action Line C5 is **Cybersecurity Education in the Philippines in the Face of New Normal Adversities**, The Philippines. Details of the project are available here.

90. **Cybersecurity and Countering Spam Activities**

- The Global Cybersecurity Agenda (GCA) provides a framework for international cooperation aimed at enhancing confidence and security in the information society. Resolution 130 (Rev. Dubai, 2018) clearly endorses the GCA as the ITU-wide strategy on cybersecurity.

- The GCA is built upon five strategic pillars or work areas around which its work is organized: (i) Legal Measures, (ii) Technical and Procedural Measures, (iii) Organizational Structures, (iv) Capacity Building and (v) International Cooperation. Within ITU, the activities below, organized along the five pillars of the GCA, shows the complementary nature of existing ITU work programmes and facilitates the implementation of Telecommunication Development Bureau (BDT), Telecommunication Standardization Bureau (TSB) and Radiocommunication Bureau (BR) activities in this domain.

(i) Legal Measures (SDG 7 (7.1, 7.a, 7.b), SDG 9 (9.1, 9.c), SDG 11 (11.3, 11.b), SDG 16 (16.2), SDG 17 (17.8))

91. As part of Objective 2/Output 2.2 of the Buenos Aires Action Plan, and taking into account ITU-D Q 3/2 (former Q22/1), ITU is assisting Member States in understanding the legal aspects of cybersecurity through its ITU Cybercrime Legislation Resources in order to help harmonize their legal frameworks. In the area of legal measures, ITU collaborates closely with partners such as UNODC and others.

(ii) Technical and Procedural Measures (SDG 1 (1.4), SDG 7 (7.1, 7.a, 7.b), SDG 9 (9.1, 9.c), SDG 11 (11.3, 11.b), SDG 17 (17.8))

92. In order to identify cyberthreats and countermeasures to mitigate risks, ITU-T has developed Recommendations of security requirements, guidelines and specifications for ICT and IP-based systems. ITU-T also provides an international platform for the development of the protocols, systems and services that protect current and future networks. ITU-T's work on secure communication services, reviews enhancements to security specifications for mobile end-to-end data communications and considers security requirements for web services and application protocols.

93. ITU-T Study Group 17 (SG17) is responsible for building confidence and security in the use of information and communication technologies ICTs. Providing security by ICTs and ensuring security for ICTs are both major study areas for Study Group 17. This includes studies relating to cybersecurity, managed security services, endpoint detection and response, security management, countering spam and identity management. It also includes security architecture and framework, quantum-based security, distributed ledger technology (DLT) security, intelligent transport system (ITS) security, security aspects related to artificial intelligence (AI), and security of networks, applications and services such as Internet of things (IoT) and smart cities, various kinds of networks including IMT-2020/5G and beyond, smart grid, industrial control systems (ICS), supply chain, smartphone, software-defined networking (SDN), network function virtualization (NFV), Internet Protocol television (IPTV), web services, over-the-top (OTT), social network, cloud computing, big data analytics, digital financial system (DFS) and telebiometrics. Building confidence and security in the use of ICTs also includes protecting personally identifiable information (PII), such as technical and operational aspects of data protection with respect to ensuring confidentiality, integrity and availability of PII. Study Group 17 is also responsible for the application of open system communications, including directory and

object identifiers, and for technical languages, the method for their usage and other issues related to the software aspects of telecommunication systems, and for test specification languages in support of conformance testing to improve the quality of Recommendations. SG17 held two meetings in February/March and August/September 2023 where SG17 approved 17 new or revised Recommendations and established 50+ new standardization work items on ICT security.

94. SG11 continues its studies on implementation of security measures on signalling level in order to cope with different types of attacks on existing ICT infrastructure and services (e.g. OTP intercept, calls intercept, spoofing numbers, robocalls, etc.). Among the solutions to be used against such attacks is the use of digital signature (digital certificates) in the signalling exchange which may guarantee the trustworthiness of the sender. In 2020 and further in 2022, ITU-T SG11 developed three key standards which define the way on how digital certificate can be inserted into signalling exchange (ITU-T Q.3057, Q.3062 and Q.3063). Also, SG11 developed Technical Report ITU-T QSTR-USSD "Low resource requirement, quantum resistant, encryption of USSD messages for use in financial services" which goal is to examine new technologies for encryption of USSD in an end-to-end manner and estimate its applicability for integration into existing USSD technology, suggesting new recommendation and signalling requirements for the integration of such technology into the existing reference architecture. SG11 organized series of Webinars and Workshops to provide overview of existing signalling protocols and their security, as well as the way forward. More information is available on dedicated webpage at: https://itu.int/go/SIG-SECURITY.

95. ITU-T Recommendations and other texts on security and trust:

- **ITU-T T.807 (second edition) "Information technology – JPEG 2000 image coding system: Secure JPEG 2000"**: Rec. ITU-T T.807 | ISO/IEC 15444-8 provides a syntax that allows security services to be applied to JPEG 2000 coded image data. Security services include confidentiality, integrity verification, source authentication, conditional access, secure scalable streaming and secure transcoding. The syntax allows these security services to be applied to coded and uncoded image data in part or in its entirety. This maintains the inherent features of JPEG 2000 such as scalability and access to various spatial areas, resolution levels, colour components, and quality layers, while providing security services on these elements.

- **ITU-T F.743.23 "Security requirements for video surveillance systems"** (under approval) defines premises unit (PU) device security classification, functional requirements, typical use case and scenario for video surveillance systems. The Recommendation specifies the functional requirements, including PU access security requirements, transmission security requirements, platform security requirements, application security requirements, network security and security management centre in video surveillance systems.

- **ITU-T F.748.24 "Trusted contribution evaluation framework on federated machine learning services"** (under approval) introduces a trusted contribution evaluation service on federated machine learning service which converges and takes advantage the technologies of FML and DLT, and provides relevant concept, characteristics, and

requirements and use cases, and specifies relevant reference framework and common capabilities.

- **ITU-T F.751.9 "Trusted execution environment based confidential computing on distributed ledger technology systems"** (under approval) specifies a trusted execution environment based confidential computing on distributed ledger technology system: decomposes user's confidentiality demand into concrete requirements of each step during DLT service utilization; analyses detailed security requirements and technical requirements of trusted execution environment based confidential computing to guarantee the confidentiality in the life cycle of a transaction from end to end; addresses the framework of trusted execution environment based confidential computing, as well as detailed procedures to realize security requirements and technical requirements.

- **ITU-T Q.3057 "Signalling requirements and architecture for interconnection between trustable network entities"**. It specifies the interfaces and signalling requirements between the functional entities and signalling procedures to be applied.

- **ITU-T Q.3062 "Signalling procedures and protocols for enabling interconnection between trustable network entities in support of existing and emerging networks"**: The goal of this Recommendation is to define the signalling requirements for authentication of signalling messages, in order for operators to be able to verify the authenticity of signalling exchange based on an accepted.

- **ITU-T Q.3063 "Signalling procedures of calling line identification authentication"**: SS7 was originally designed for operator management on the assumption that anyone connected to the SS7 network was trustable. In the current network environment, however, there appear more and more untrusted devices (including the PABX, call centre and VoIP access system) that interconnect to PLMN/PSTN. As a result, calling line identification spoofing is particularly effective at defeating call blockers, thus leading to a variety of scams by avoiding identification. The goal of this document is to identify the signalling requirements of calling line identification authentication including codes and signalling procedure base on the mechanism defined in the ITU-T Q.3057.

- **ITU-T X.590 "JSON Signature Scheme (JSS)"** (under approval) defines a method called JSON Signature Scheme (JSS) which enables JSON objects to be signed and/or countersigned while leaving the original JSON objects themselves in JSON format. This process enables a consistent data format that simplifies the use, documentation, debugging, and logging of the JSON data while still allowing it to be digitally signed. Further, with this method, signed JSON objects can be used and processed just like standard JSON objects which simplifies their use for application developers and systems.

- **ITU-T X.1051 (revised) "Information security, cybersecurity and privacy protection - Information security controls based on ISO/IEC 27002 for telecommunications organizations"** establishes guidelines and general principles for initiating, implementing, maintaining and improving information security controls in telecommunications organizations based on ISO/IEC 27002. Also, this Recommendation provides an implementation baseline of information security controls within telecommunications organizations to ensure the confidentiality, integrity and availability of telecommunications facilities, services and information handled, processed or stored by the facilities and services.

- **ITU-T X.1095 ”Entity authentication service for pet animals using telebiometrics”** (under approval) defines an entity authentication infrastructure for pet animals using telebiometrics. It specifies multimodal telebiometrics which uses nose patterns and faces of pet animals.
- **ITU-T X.1150” Security assurance framework for digital financial services”** (under approval) describes a DFS security assurance framework which provides a systematic security risk management process for assessing threats and vulnerabilities and identifies appropriate security controls to be implemented by the DFS stakeholders.

  The DFS security assurance framework consists of the following components:
  a) A security risk management process based on [b-ISO/IEC 27005].
  b) Assessment of threats and vulnerabilities to the underlying infrastructure of the mobile network operator and DFS provider, DFS applications, services, network operations and third-party providers involved in the ecosystem for DFS delivery.
  c) Mitigation strategies based on the outcome of (b) above. The mitigation measures identify 119 security controls for the security threats which are outlined in clause 13 of this Recommendation.
- **ITU-T X.1219 “Functional requirements for a secured process to evaluate technical vulnerabilities”** The vulnerabilities evaluation by crowdsourcing is a good manner for famous online systems to find their technical vulnerabilities, but on the other hand, there are still many problems or challenges such as the shell script uploaded by members of a security team was not deleted after evaluation, resulting in a backdoor in the system. The functional requirements for a secured process to evaluate technical vulnerabilities are recommended in this recommendation. And the functional requirements with corresponded mechanisms would be mainly used to solve the lack of trust in the crowdsourcing manner. It is meaningful to make sure that the vulnerabilities evaluation operated by security teams be reliable, auditable, traceable, and controllable.
- **ITU-T X.1220 “Security framework for storage protection against malware attacks on hosts**” (under approval) provides a framework for the protection of storage against malware attacks on hosts, which bypass network protection and endpoint protection. The framework also considers attacks caused by human errors or social engineering. The framework consists of a host and a storage protection server. The storage protection server works separately from the host, stores data in the storage, and provides a network drive to the host.
- **ITU-T X.1221 “Structured threat information expression”** (under approval) defines Structured Threat Information Expression (STIX), a language used to express data objects and exchange cyber threat intelligence, along with a JSON serialization format. STIX does not rely on any specific transport mechanism. This Recommendation is technically equivalent and compatible with the OASIS STIX 2.1 standard.
- **ITU-T X.1222 “Trusted automated exchange of intelligence information”** (under approval) defines a trusted automated exchange of intelligence information (TAXII), an application layer protocol for the communication of cyber threat information in a simple and scalable manner. This specification defines the TAXII REST API and its resources along with the requirements for TAXII Client and Server implementations. This

Recommendation is technically equivalent and compatible with the OASIS TAXII 2.1 standard.

- **ITU-T X.1236 "Security requirements and countermeasures for targeted email attacks"** (under approval) specifies the requirements for security features to block inbound and outbound email attacks in the form of multilevel management that includes countermeasures against targeted email attacks. This approach is necessary to integrate or deploy a new framework to improve internet users' defence against such attacks. This Recommendation will form a reference on the direction and objectives of designing an email security diagnostic framework or developing email security solutions with those security functional requirements for IT security managers, especially in those countries beginning to be actively engaged in IT development and implementation.

- **ITU-T X.1282 "Security measures for Countering Password Related Online Attacks"** (under approval) provides security risks analysis and security considerations that will help mitigate password related security risks into each phase of the service life cycle, thus advancing the business application and security requirements together to ensure a balanced approach during the life cycle of service systems. It provides a baseline to all service systems that provide password login mechanisms, and additional filters for critical applications.

- **ITU-T X.1277.2 "Universal authentication framework (UAF) protocol specification"** The goal of the universal authentication framework is to provide a unified and extensible authentication mechanism that supplants passwords while avoiding the shortcomings of current alternative authentication approaches. This approach is designed to allow the relying party to choose the best available authentication mechanism for a particular end user or interaction, while preserving the option to leverage emerging device security capabilities in the future without requiring additional integration effort. This Recommendation describes the architecture in detail, it defines the flow and content of all UAF protocol messages and presents the rationale behind the design choices.

  NOTE: This technically equivalent protocol is based on the work in FIDO Alliance Client to Authenticator Protocol (CTAP).

- **ITU-T X.1278.2 "Client to authenticator protocol version 2.1"** describes an application layer protocol for communication between a roaming authenticator and another client/platform, as well as bindings of this application protocol to a variety of transport protocols using different physical media. The application layer protocol defines requirements for such transport protocols. Each transport binding defines the details of how such transport layer connections should be set up, in a manner that meets the requirements of the application layer protocol.

  Note: This Recommendation is technically equivalent to [b-CTAP] Client to Authenticator Protocol (CTAP)].

- **ITU-T X.1352 "Security Requirements for Internet of things (IoT) device and gateway"** establishes detailed requirements for five security dimensions applicable to Internet of things (IoT) device and gateway: authentication, cryptography, data security, device platform security, and physical security, based on the IoT reference model specified in [ITU-T Y.4100] and the IoT security framework in [ITU-T X.1361].

The authentication dimension includes user authentication, secure use of authentication credentials and device authentication. The cryptography dimension includes the use of secure cryptography, secure key management and secure random number generation. The data security dimension includes secure transmission and storage, information flow control, secure session management and personally identifiable information (PII) management. The device platform security dimension includes five elements: software security; secure update; security management; logging; and timestamp. Likewise, the physical security dimension includes a secure physical interface and tamper-proofing.

- **ITU-T X.1373 (revised) "Secure software update capability for intelligent transportation system communication devices"** provides secure software update procedures between a software update server and vehicles with appropriate security controls including in-vehicle communication messages. This Recommendation can be utilized by car manufacturers and ITS-related industries as a set of standard capabilities for best practice.
- **ITU-T X.1377 "Guidelines for an intrusion prevention system for connected vehicles"** establishes guidelines for an intrusion prevention system (IPS) for connected vehicles. This Recommendation mainly focuses on aspects of active response capability for intrusion and includes the implementation guidance and use cases of IPS for connected vehicles. Prior in-vehicle intrusion detection systems (IDSs) have limitations, e.g., requiring too many computing resources that a vehicle cannot provide and being unable to mitigate intrusions due to characteristics of protocol and bus topology. To address these limitations of conventional in-vehicle IDSs, this Recommendation provides methodologies for intrusion detection and intrusion prevention. The proposed IPS consists of the intrusion detection plane – an external component that calculates intrusion detection algorithms – and the data plane – in-vehicle networks (IVNs) where traffic monitoring and active response happen. This Recommendation aims to protect (automotive) Ethernet-based IVNs.
- **ITU-T X.1380 "Security guidelines for cloud-based data recorders in automotive environments":** The purpose of this Recommendation is to standardize security guidelines for cloud-based data recorders in automotive environments. This Recommendation describes threats, vulnerabilities, security requirements, and use cases for cloud-based data recorders in automotive environments.
- **ITU-T X.1381 "Security guidelines for Ethernet-based In-Vehicle networks"** provides security guidelines for Ethernet-based in-vehicle networks (IVNs). The current trend in electrical and electronic (E/E) architecture is to integrate the Ethernet with legacy IVNs such as the controller area network (CAN), local interconnect network (LIN), media-oriented systems transport (MOST) and FlexRay. In the past, the Ethernet was considered only as a connection between vehicles with external environments. Standard protocols that enable Internet protocol-based connections over the Ethernet (e.g., diagnostic communication over Internet protocol or universal measurement and calibration protocol) have been used to enable communications between the external environment and vehicles. These use cases generally do not need to meet stringent real-time constraints. However, in-vehicle applications using Ethernet communication require characteristics that include high time sensitivity and reliability.

- **ITU-T X.1382 "Guidelines for sharing security threat information on connected vehicles"** is a guide on the principles, rules, methodology and procedures of sharing security information for connected vehicles. This Recommendation also provides a brief description of the different scopes, roles and effectiveness of the various organizations while they engage in the life cycle of security threat information sharing. This Recommendation is intended to help organizations stay in touch with the existing shared community. Furthermore, this Recommendation helps organizations contribute to the threat information of a connected vehicles sharing community, which would support the practices of connected vehicles safety protection. Overall, this Recommendation aims to enhance security threat information sharing; and mitigate the potential impact of cyber security attacks on connected vehicles.
- **ITU-T X.1383 "Security requirements for categorized data in vehicle-to-everything (V2X) communication":** Data security is one of the most important works for vehicle-to-everything (V2X) communication. However, in a resource constrained environment such as in-vehicle communication, a lot of resources are consumed protecting data as cryptographic functions are required. This Recommendation categorizes the data used in V2X communication into several types such as object attribute data, vehicle status data, environmental perception data, vehicle control data, application service data and user personal data, and assigns three security levels for categorized data types. Based on these categorized data types and assigned data security levels, this Recommendation provides security requirements for categorized data in V2X communication.
- **ITU-T X.1410 "Security architecture for data-sharing management based on the distributed ledger technology"** specifies a security architecture of data-sharing management based on distributed ledger technologies (DLTs). Based on the architecture, this Recommendation specifies the interfaces between the functional entities and the procedures of data-sharing management based on DLT. Distributed ledger technology is transforming the industries with innovative solutions and changing the way governments, institutions, and businesses operate. It provides a solution for securely replicating, sharing, and synchronizing data across a distributed computer network, considering its decentralization and tamper-proof features. Current approaches for sharing business data and personally identifiable information (PII) data with companies and digital platforms have led to privacy vulnerabilities from hacks or poor data management. Adopting DLT or blockchain in data-sharing management allows individuals or companies to maintain more direct control over their own confidential information. In the DLT-based solution, only non-PII data, e.g., hashed data values, are stored in the on-chain. PII data about a data owner are stored in the off-chain. A DLT-based solution provides a way that improves the traceability, verifiability and changeability of status of data.
- **ITU-T X.1411 "Guidelines on blockchain as a service (BaaS) security"** provides generic guidelines for blockchain as a service (BaaS). The security threat and vulnerabilities of blockchain as a service (BaaS) are analysed, followed by the security measures of blockchain as a service (BaaS). The Recommendation addresses the security requirements and provides guidelines for all the activities in the construction, operation and use of BaaS.

- **ITU-T X.1412 "Security Requirements for Smart Contract Management based on the distributed ledger technology"** Smart contract is widely used in the distributed ledger technology (DLT) system, and it is faced with a lot of security threats and challenges. This Recommendation analyses the security threats and challenges, and provides security requirements for smart contract management in DLT systems. This Recommendation can be used by smart contracts designers, developers, and managers to manage smart contracts, including design and development, compilation and deployment, invocation and execution, maintenance and management in DLT systems. This Recommendation does not deal with the security issues of wallets or distributed applications related to smart contracts.
- **ITU-T X.1454 "Security measures for location enabled smart office service" (under publication**) In order to ensure the security of location enabled smart office services, security threats and relevant security requirements, specific to location enabled services need to be analyzed and the overall security measures established. This draft Recommendation aims to analyse the typical application scenarios of location enabled smart office services, specifies the security threats and requirements that are specific to the location enabled services and thereby establishing security measures for the operator and key stakeholders in a smart office to safeguard location enabled services.
- **ITU-T X.1471 "Reference monitor for online analytics services" (under approval**) describes a reference monitor for big data analytics and operations to detect an un-authorized data use. The Recommendation analyses security threats and challenges in the big data analytics, and describes security considerations that could mitigate these threats and address security challenges with access control mechanisms. A reference monitor methodology based on access control is provided for determining which of these security capabilities are required for mitigating security threats and addressing security challenges for big data analytics.
- **ITU-T X.1644 "Security guidelines for distributed cloud"** analyses security threats and challenges on distributed cloud and propose security guidelines against threats for distributed cloud, which includes the security guidelines for core cloud, regional cloud and edge cloud.
- **ITU-T X.1645 "Requirements for data de-identification assurance" (under publication**) will first introduce the concept and development of network security situational awareness, analyze the advantages of NSSA coping with the security challenges of cloud computing, then aim to document the requirements for network security situational awareness platform for cloud computing.
- **ITU-T X.Suppl.38 "Supplement to ITU-T X.1152: Use cases for contact tracing applications to prevent spread of infectious diseases"** describes various use cases for contact tracing technologies. It also provides data processing models including their procedures, data processing flow and security considerations. In addition, practical use cases are described in Appendix I.
- **ITU-T X.Suppl.39 "Supplement to ITU-T X.1148: Requirements for data de-identification assurance " (under publication**) defines data de-identification assurance. It also provides a set of requirements for managing data de-identification assurance,

including data risk assessment, risk assessment of the data use environment, and using and managing de-identified data.

- **ITU-T X.1815 "Guidelines and requirements for classifying security capabilities in IMT-2020 network slice":** The definition of basic network slicing technology functions and processes has laid a solid foundation for the first wave of IMT-2020 deployment and commercial use of network slicing services. As an end-to-end logical network that is customized on demand, slicing can provide differentiation security capabilities: First, the IMT-2020 network slicing provides the supporting security measures for the differentiated network implementation. Second, the IMT-2020 network supports some optional security measures at the slice level. Some security measures can also provide multiple security options and operators may own different security resources. These may bring different degrees of security guarantee or non-security performance. Slice customers also have specific security requirements and may request customized network slices with different security protection levels from slice operators. There exist some challenges for the slice customers or the slice operators choosing the security capabilities of their slices such as management cost and definition inconsistency, etc. The objective of this Recommendation is to provide a description of differentiated IMT-2020 network slice security capabilities and guideline for classifying the IMT-2020 network slice security capabilities and IMT-2020 network slice security to help the ecosystem more clearly understand and choose the slicing security capabilities.
- **ITU-T X.1816 "Security guidelines for distributed cloud"** analyses security threats and challenges on distributed cloud and propose security guidelines against threats for distributed cloud, which includes the security guidelines for core cloud, regional cloud and edge cloud.
- **ITU-T X.1817 "Security requirements for IMT-2020/5G message service" (under publication**) provides the security requirements for IMT-2020/5G messaging service, including use security requirements, management security requirements and control security requirements for 5G messaging service.
- **ITU-T X.1818 "Security controls for operation and maintenance of IMT-2020 network systems"** (under approval) provides comprehensive guidance on securing the IMT-2020 (aka, 5G) System during operation and maintenance phases in practice. The described security threats and recommended security controls are the result of a threat analysis.

  The focus of this Recommendation is the 5G Standalone (5G SA) system as well as the virtual infrastructure and associated management systems that are expected to form the foundation for 5G deployments. Furthermore, consideration has been given not only to technology, but also people and process aspects affecting the security of 5G services. Recommended security controls are described at a high-level and reference established standards and best practices where relevant.

- **ITU-T Y.2073 "Framework of trusted electricity brokerage for distributed energy resources" (under approval)**: Due to the rapid spread of distributed energy resources, the demand for intermediary trading (i.e., brokerage) of surplus electricity for energy prosumers in electricity markets is significantly increasing. To support transparency of brokerage transactions in the trading process, various technologies such as blockchain can be applied to applications that require mutual trust between users in a trustless

environment. Thus, this Recommendation provides a framework of trusted electricity brokerage for distributed energy resources taking into account the blockchain technology for trust provisioning in electricity markets. After introducing key characteristics, core technologies and service scenarios for trusted electricity brokerage with the necessity of the blockchain technology to ensure trust, this draft Recommendation mainly presents requirements, architecture overview specifying related interfaces and functional blocks for the blockchain enabled trusted electricity brokerage.

- **ITU-T Y.2086 "Framework and Requirements of Decentralized Trustworthy Network Infrastructure" (under approval**) specifies the framework and requirements of Decentralized Network Infrastructure. The Decentralized Network Infrastructure is expected to enhance the trustworthiness of the network infrastructure via a universal basic framework for different kinds of high-level network services. This Recommendation includes the framework, requirements, and use cases of the Decentralized Network Infrastructure.
- **ITU-T Y.3802 "Quantum key distribution networks – Functional architecture" (under approval**) defines a functional architecture model of quantum key distribution (QKD) networks. In order to realize this model, it specifies detailed functional elements and reference points, architectural configurations and basic operational procedures of QKD networks (QKDN).
- **ITU-T Y.3803 "Quantum key distribution networks – Key management" (under approval**): The objective of this Recommendation is to provide the help for design, deployment, and operation of key management of QKDN. Overall structure and basic functions of QKDN are first reviewed along with Recommendation ITU-T Y.3800, requirements of QKDN are second reviewed along with Recommendation ITU-T Y.3801, and then functional elements and procedures of key management are described in this Recommendation.
- **ITU-T Y.3810 "Quantum key distribution network interworking – framework"**: For quantum key distribution networks (QKDN), Recommendation ITU-T Y.3810 specifies framework of QKDN interworking (QKDNi). This Recommendation describes the overview of interworking QKDNs, the reference models, and the functional models of gateway functions (GWFs) and interworking functions (IWFs). The configurations for QKDNi are specified. Appendix I includes QKDNi with different key relay schemes.
- **ITU-T Y.3811 "Quantum key distribution networks - Functional architecture for quality of service assurance"** specifies a functional architecture of QoS assurance for the quantum key distribution networks (QKDN). This recommendation first provides an overview of the functional architecture of QoS assurance for the QKDN. It then describes the functional architecture of QoS assurance which includes functional entities such as QoS data collection, data processing, data storage, data analytics, QoS anomaly detection and prediction, QoS policy decision making, and enforcement and reporting. Based on the functional entities described in the functional architecture, this Recommendation specifies a basic operational procedure of QoS assurance for the QKDN.

- **ITU-T Y.3812 "Quantum key distribution networks - Requirements for machine learning based quality of service assurance"** specifies high-level and functional requirements of machine learning (ML) based QoS assurance for the quantum key distribution networks (QKDN). This recommendation first provides an overview of requirements of ML based QoS assurance for the QKDN. It describes a functional model of ML based QoS assurance and followed by associated high level and functional requirements of ML based QoS assurance. And some use cases are described.
- **ITU-T Y.3813 "Quantum key distribution networks interworking – functional requirements"**: For quantum key distribution networks (QKDN), Recommendation ITU-T Y.QKDN_iwrq specifies functional requirements for QKDN interworking (QKDNi). This Recommendation describes the functional requirements for key management layer, QKDN control layer, and QKDN management layer, for interworking using gateway nodes (GWNs) and/or interworking nodes (IWNs).
- **ITU-T Y.3814 "Quantum key distribution networks - functional requirements and architecture for machine learning enablement"**: QKDN is expected to maintain stable operations and meet the requirements of various cryptographic applications efficiently. Due to the advantages of machine learning (ML) related to autonomous learning, ML can help to overcome the challenges of QKDN in terms of quantum layer performances, key management layer performances and QKDN control and management efficiency. Based on the functional requirements and architecture of QKDN in [ITU-T Y.3801] and [ITU-T Y.3802], this recommendation is to specify one possible set of functional requirements and a possible architecture for ML-enabled QKDN (QKDNml), including the overview, the functional requirements, architecture and operational procedures of QKDNml.
- **ITU-T Y.Suppl.74 to ITU-T Y.3800-series Recommendations "Standardization roadmap on Quantum Key Distribution Networks"** provides the standardization roadmap on quantum key distribution networks. It describes the landscape with related technical areas of trust technologies from an ITU-T perspective and list up related standards and publications developed in standards development organizations (SDOs).
- **ITU-T Y.Suppl.75 to ITU-T Y.3000-series Recommendations "Standardization roadmap on Quantum Key Distribution Networks"** describes ITU-T's Views for Quantum-Enabled Future Networks (QEFN) for the future networks study to act as a document to help SG13 to study the future network evolution towards Quantum era.
- **ITU-T Technical Report TR.ba-iot "Broadcast authentication schemes for IoT system"** (under publication) provides a conceptual model of the target broadcast authentication system and clarifies the security characteristics and requirements required therein. In addition, this specifies a MAC-based broadcast authentication scheme and a digital signature-based broadcast authentication scheme as methods to achieve the security requirements and show the convenience and usage of each method.
- **ITU-T Technical Report TR.cpn-col-sec** "**Security considerations of collaboration of multiple computing power networks**" (under publication) analyses concept, business roles, use cases and security risks of collaboration of multiple computing power networks, as well as relevant general security characteristics and requirements, and security reference framework and capabilities.

- **ITU-T Technical Report TR.qs-dlt "Guidelines for quantum-safe DLT system"** (under publication) assesses the security threats to DLT systems when large-scale quantum computers are available. The methods to construct a quantum-safe DLT system are presented. Moreover, the measures to transit from the current DLT system to the quantum-safe one are suggested.
- **ITU-T Technical Report TR.sgfdm "FHE-based data collaboration in machine learning"** (under publication) provides a guideline for secure data aggregation in machine learning while protecting input data. It focuses on how Fully Homomorphic Encryption (FHE) works on data aggregations in machine learning (ML). This technical report first describes a general workflow on secure aggregation in machine learning, and explains how FHE-based data aggregation in ML could satisfy a certain requirement. A general workflow is then given on FHE-based ML supporting data aggregation between more than two parties.
- **ITU-T Technical Report TR.x509ac4sc "A use case of X.509 Attribute Certificate for Supply Chain"** (under publication) puts forth an Information Sharing Platform Architecture using X.509 attribute certificate. This report covers:
    - Concepts of the information sharing platform and how it functions.
    - Breakdown of the information sharing platform architecture and the relationships between X.509 parts.

96. Use Cases driven by the information sharing platform.Several ITU-T Focus Groups are exploring the trust aspect of various emerging technologies as part of their work. These include (1) ITU-T Focus Group on "Artificial Intelligence for Health" (FG-AI4H) (2) ITU-T Focus Group on Autonomous Networks (FG-AN) (3) ITU-T Focus Group on AI for Natural Disaster Management (FG-AI4NDM) (4) ITU-T Focus Group on "Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture" (FG-AI4A) (5) ITU-T Focus Group on Testbeds Federations for IMT-2020 and beyond (FG-TBFxG) (6) ITU-T Focus Group on metaverse (FG-MV), and (7) ITU-T Focus Group on cost models for affordable data services (FG-CD).

97. ITU-R's work in radiocommunication standardization continues, matching the constant evolution in modern telecommunication networks. ITU-R established clear security principles for IMT (3G, 4G and 5G) networks (Rec. ITU-R M.1078, M.1223, M.1457, M.1645, M.2012 and M.2083). It has also issued Recommendations on security issues in network management architecture for digital satellite systems (Rec. ITU-R S.1250) and performance enhancements of transmission control protocol over satellite networks (Rec. ITU-R S.1711). Information related to Futuristic mobile technologies foresee "IMT for 2020 and beyond" can be found on the website.

(iii) Organizational Structures (SDG 1 (1.4), SDG 7 (7.1, 7.a, 7.b), SDG 9 (9.1, 9.c), SDG 11 (11.3, 11.b), SDG 17 (17.8))

98. BDT collaborates with Member States, partners, and global organizations to strengthen cybersecurity by creating national and regional CIRTs. Additionally, BDT conducts CIRT Maturity Assessments to further enhance their capabilities. So far, 84 countries have been assisted in evaluating their cybersecurity readiness, leading to the establishment or

improvement of National CIRTs. ITU has implemented 21 CIRT-related projects and is currently working on three more.

99. ITU actively collaborates with the FIRST community to enhance the CSIRT Service Framework and revise training materials for capacity-building in managing national CIRT operations.

100. To ensure that the national CIRTs apply good practices to respond to cybersecurity incidents and foster technical cooperation among national CIRTs, CyberDrills are organized at a regional and intra-regional level. In recent years, BDT has conducted over 40 international, regional or national exercises involving more than 120 countries from all the six ITU regions, this includes six (6) CyberDrills conducted in 2022 and recent Regional CyberDrill for Africa (08-12 May 2023 – over 300 participants, more than 180 local and 120 international participants) that took place in Malawi in collaboration with recently established National CIRT. Other 2023 CyberDrills schedule will be visible on the link during this year.

101. Through cybersecurity exercises the ITU Member States build capacity that promotes readiness, protection, and better incident response. The ITU CyberDrills serve a dual purpose: provide a platform for cooperation, information sharing, discussions on current cybersecurity issues, and be a platform for capacity building thought hands-on exercises and focused training workshops for the national Computer Incident Response Teams.

(iv) Capacity Building (SDG 1 (1.4), SDG 7 (7.1, 7.a, 7.b), SDG 9 (9.1, 9.c), SDG 11 (11.3, 11.b), SDG 17 (17.8))

102. BDT continues to organize regional cybersecurity forums for all ITU regions, using them as a capacity-building vehicle for different BDT programmes and activities as well as an operational platform for cooperation at the regional and international level.

103. The BDTs work on NCS focuses on supporting countries in developing and/or improving their cybersecurity strategies through direct assistance, in-country activities, including providing expertise, training, and capacity-building resources. The second edition of the National Cybersecurity Strategy (NCS) Guide remains an enhanced resource for Member States, aiding in the development and execution of comprehensive cybersecurity strategies. The NCS Guide serves as a methodical approach to achieve this objective used by BDT and other implementing agencies or organizations. In 2023, BDT has re-launched online self-paced training on NCS in English, French, Spanish and Russian that covers best practices for developing and implementing National Cybersecurity Strategies which are delivered on ITU Academy Platform. We believe that this self-paced training in 2022, proved to be useful course to a significant number of professionals from various countries that have successfully completed the training. (Trainings were utilized by about 750 professionals in 139 countries). We also piloted NCS tabletop exercises (TTX[3]) on the development and

[3] TTX Session Country Communication: https://www.dgssi.gov.ma/fr/content/exercice-d-elaboration-d-une-strategie-nationale-de-cybersecurite.html

implementation of NCS in two countries and run similarly consultation workshops[4] on national level to validate drafted NCS objectives of the respective countries. In each country, there were between 35 to 45 participants from different national stakeholder groups representing various organizations, and they actively engaged in these TTX sessions and consultation workshops. BDT in partnership with the United Kingdom team worked to deliver a Joint Integrated Cybersecurity Assessment Project (JICAP) aimed to facilitate and support national efforts for two (2) countries in developing/reviewing their NCS and NCS Action Plans. In addition, BDT has assisted other five (5) countries in the assessment of their current cybersecurity strategies and provided suggestions to improve since last study group meeting.

104. The fifth edition of the Global Cybersecurity Index began data collection in April 2023, with a planned publication in early 2024. The GCI builds on the fourth edition of the ITU Global Cybersecurity Index (GCI) Report, which was seen released on June 29th 2021. The edition of the index covers 193 Member States and the State of Palestine. The fifth edition features revisions to the Questionnaire by the 140+ member Expert Group, and a shift from ranks to tiers in presentation of the scores. Currently, almost 170 Member States are participating in the process.

105. To promote the involvement of young people in the field of cybersecurity and to raise awareness on the field's worldwide workforce shortage, ITU is planning activities and collaborations for and by youth under the umbrella of the Generation Connect Initiative.

106. The ITU, FIRST and EQUALS, the global partnership for gender equality in the digital age of which ITU is a co-founder, jointly organize the Women in Cyber Mentorship Programme for empowering women in the cybersecurity sector. The programme engages role models and leaders in this field and connects them with talented women worldwide. The Women in Cyber Mentorship Programme builds on and benefits from the ongoing efforts of ITU-BDT to close the digital gender divide, by mainstreaming gender-focused activities within our different thematic priorities. Since 2021, through two (2) Programme editions around three hundred women have been trained and mentored across seventy-three countries in the Arab, Africa, and Asia-Pacific regions, through collaborations with 106 mentors from across the world. Several mentees have reported being able to find jobs in cybersecurity because of their participation in the programme (98% of alumni would recommend the programme to their peers), with some alumni becoming changemakers themselves in their national contexts, learning from their Women in Cyber Mentorship Programme experience and leading new local capacity building efforts for women and marginalized communities. The 3rd edition of the Women in Cyber Mentorship Programme started in May 2023, with the financial and in-kind support of Microsoft.

107. The Her CyberTracks initiative is a three-part project incorporating online and on-site technical trainings in cybersecurity policy and diplomacy, soft skills trainings, guided monthly mentorship circles, inspirational keynotes, as well as regional networking events – all made available as a complementary and one-stop holistic curriculum under the Policy

[4] Consultation Workshop Country Communication: https://www.dgssi.gov.ma/fr/content/ateliers-debats-autour-des-nouveaux-objectifs-strategiques-nationaux-en-matiere-de-cybersecurite.html

& Diplomacy Track. The Her CyberTracks Project aims to promote the equal, full, and meaningful representation of women in cybersecurity for a more resilient cyberspace for all. The project builds on ITU's ongoing efforts to bridge the gender digital divide and integrates the established Women in Cyber Mentorship Programme. The objective of the Project is to promote the representation and participation of women seeking to improve their contribution to national and international cybersecurity policy processes. Application to participate (as a mentor or a mentee) started in May 2023. This project is financially supported by the German Federal Foreign Office and is co-implemented with GIZ Germany.

108. The Cyber for Good project aims to narrow the cyber capacity gap by promoting the inclusion of women and youth, and enhancing cybersecurity within and between nations, focusing on LDCs and developing countries. Since its start in 2022, ITU's work with LDCs has reached 18 countries. Collaborating with ITU-D Sector Members, particularly cybersecurity providers and experts, the BDT strives to offer free tools, advice, and training to LDCs, ensuring low barriers for engagement. Currently, four ITU-D Sector Members have pledged in-kind contributions to partner with BDT, benefiting several LDCs.

(v) International Cooperation (SDG 1 (1.4), SDG 7 (7.1, 7.a, 7.b), SDG 9 (9.1, 9.c), SDG 11 (11.3, 11.b), SDG 17 (17.8))

109. ITU is developing relationships and partnerships with various regional/international organizations and initiatives, including Commonwealth Cybercrime Initiative, ENISA, INTERPOL, ECOWAS, the World Bank, FIRST, and regional CSIRT/CERT associations, such as AP CERT, AFRICA CERT, and OIC CERT.

110. The 2022 session of Council approved the guidelines developed for utilization of the GCA by the ITU for transmission to 2022 ITU Plenipotentiary Conference.

111. In collaboration with the Organization of American States (OAS) Cybersecurity Program, the BDT Cybersecurity Division is actively engaged in the creation of capacity development instruments designed to assist nations in adopting a systems-based approach to cybersecurity education. This collaboration will capitalize on OAS' and ITU's prior research in the field, incorporating country-level workshops and expert consultations for the development of a comprehensive toolkit for national use. OAS expects to implement these tools in select pilot countries by 2024. Building upon the lessons learned, ITU intends to make these resources accessible in additional regions while simultaneously exploring potential synergies with other regional organizations for the deployment of the tools within their respective territories.

(vi) The Child Online Protection (COP) Global Initiative (SDG 4 (4.1, 4.5) and SDG 16 (16.2))

112. Within the framework of the GCA, the Child Online Protection (COP) Initiative was established by ITU as an international collaborative network for action to promote the online protection of children worldwide.

113. ITU has been raising awareness on COP issues and building capacity through organizing workshops, strategic dialogues and regional forums, holding several workshops at different international conferences and leading or participating in different projects.

114. ITU has signed a collaboration agreement with the SCORT Foundation on COP. ITU has contributed to many discussions such as the Safer Internet Day 2021 and the 15th and 18th European Football for Development Conference as well as in a round table discussion with European Football Clubs. ITU, SCORT and partners have released recommendations for sports clubs and associations on how to include online safety measures into safeguarding efforts for children in sports.

115. The Kingdom of Saudi Arabia and ITU signed an agreement to implement a three-year global programme on 'Creating a safe and empowering cyber environment for children', which focuses both on policy assistance for governments and development of digital skills and literacy with end-users. The implementation of the program started in 2021 with the signature of an ITU internal project document. ITU has started implementing the project focusing on capacity building through the development of online self-paced trainings for all relevant stakeholders and other interactive solutions like a game and an app for children and young people to become responsible digital citizens.

116. All ITU regions started implementing activities of the Global programme on 'Creating a safe and empowering cyber environment for children'. The first implementing country was Albania, followed by Armenia, Kazakhstan, Malawi, and Morocco.

117. Together with the Office of the UN Special Representative of the Secretary General on Violence Against Children, and selected partners, ITU started an initiative on *Protection through online participation* (POP), aiming at providing recommendations to all relevant stakeholder groups based on a global mapping of the current ways that children and young people use the digital environment to access protection services, support each other, and stay safer, both online and offline, and to better understand the effectiveness of these systems.

118. In June 2023, upon the request of the Malta Foundation for the Wellbeing of Society (MFWS), and within the framework of its "P.O.P-up: Promote Online Protection" project, the ITU delivered the Child Online Protection Training of Trainers (ToT) module for staff of the education system to circa. 80 staffs of psychosocial teams from schools across the country. This build upon a pilot project rolled out in 2022 that trained 35 trainers.

119. In Albania, a national child online protection project is being rolled out and implemented since September 2021 until October 2023 within the scope of the ITU Global Project: "Creating a Safe and Prosperous Cyberspace for Children" in collaboration with National Authority on Electronic Certification and Cybersecurity (NAECCS). By the May 2023, 185 industry stakeholders, 370 government representatives, 460 parents, educators and caregivers and 190 children took part of training and capacity building exercises on on child online protection based on the ITU COP Guidelines. In addition two reports are being developed "The implementation of National Policies for Child Online Protection" and an "Assessment and prioritization report "that will inform NAECCS strategy on Cybersecurity.

120. ITU delivered an interactive learning session at the ITU's Global Youth Summit held in Kigali, Rwanda in 2022.

121. ITU celebrated Safer Internet day 2021 with various communications, including a blog post on the application of the COP Mascot in a national drawing competition in Hungary. The

COP Mascot furthermore moderated different virtual events, such as among others the Online Safety Moment at the Girls in ICTs Day Celebration and the Session 4: Safe Digital Inclusion - Child Online Protection at GSR2021.

122. The COP Mascot furthermore announced a collaborative project with Eni and Deloitte Italia to raise awareness and build capacity on online safety with children and educators. In five video episodes, the Online Safety Course with Sango provided practical advice to children up to 9 years old on risks that they can face online.

123. Through the ITU Academy, ITU provided an instructor led training session for regulators on the Arab Region on child online protection.

Action Line C6: Enabling Environment

Related to the SDGs: SDG 2 (2.a), SDG 4 (4.4), SDG 5 (5.b), SDG 8 (8.2, 8.3), SDG 9 (9.1, 9.c), SDG 10 (10.3), SDG 11 (11.3, 11.b), SDG 16 (16.3, 16.6, 16.7, 16.10, 16.b), SDG 17 (17.6, 17.14, 17.16)

124. Recognizing the strong commitment of ITU's work towards bridging the digital divide in the area of the enabling an ICT policy and regulatory environment, ITU is leading the facilitation role on WSIS Action Line C6 Enabling Environment as the sole facilitator building upon its regular work carried out within the framework of the ITU-D Objective 3: Enabling environment: Foster an enabling policy and regulatory environment conducive to sustainable telecommunication/ICT development.

125. The 18th Action Line C6 Facilitation Meeting was held as an integral component of the WSIS Forum 2023, on Thursday, 16 March 2023.. The theme of this year was: "Next generation regulation for sustainable digital transformation"During this session, the main outputs from the new Global Digital Regulatory Outlook 2023: Policy and regulation to spur digital transformation were presented and served as a discussion framework.This edition benchmarks regulatory progress across 193 countries worldwide, building on the successful track record of the first three editions. The 2023 Outlook introduces the latest of ITU's suite of highly specialized tools: a unified framework for assessing the state of readiness of national policy, legal and governance frameworks for digital transformation. The unified framework is based on the tried-and-tested ICT Regulatory Tracker and the G5 Benchmark. This new analysis is the go-to reference for regulators and policymakers seeking to understand a fast-moving landscape – and shape regulatory change that will benefit all in the quest for digital transformation.

126. The WSIS Prizes 2023 Winner for the Action Line C6 is **Community Networks in the strategy of connecting rural and remote areas as licensees in Argentina**, Argentina. Details of the project are available here.

127. ITU has undertaken numerous activities that foster the development of an enabling environment worldwide including High Level Exchange Platforms on ICT Policy and Regulation for Digital transformation, ICT Policy and Regulation Data and Knowledge Platforms for evidence-based decision making, and support for the development and

strengthening of ICT Policy and Regulatory Frameworks and Capacity Development. The main purpose is to provide the platforms and tools for effective policy, legal and regulatory frameworks to support regulators and policymakers in driving inclusive and cross-sectoral collaboration so that all stakeholders have their voices heard and create a virtuous dynamic for the digital transformation.

128. ITU-D provides knowledge exchange tools and platforms to enable inclusive dialogue and enhanced cooperation to help countries leap forward and achieve a more inclusive digital society and to raise national and regional awareness about the importance of an enabling environment for digital transformation.

129. ITU-D continues providing direct assistance to countries and regions on an enabling environment for digital transformation.

130. ITU-D provides knowledge exchange tools and platforms such as the Global Symposium for Regulators (GSR), to enable inclusive dialogue and enhanced cooperation to help countries achieve a more inclusive digital society and to raise national and regional awareness about the importance of an enabling environment.

    - The annual Global Symposium for Regulators (GSR) provides a neutral platform for ITU members to share their views on major issues facing the ICT sector and concludes with the adoption by regulators of a set of regulatory GSR Best Practice Guidelines.

    - Over the years, the GSR Best Practice Guidelines have shaped a regulatory evolution towards an open, collaborative and innovative approach. For example, since the 2004 guidelines on broadband, the number of countries with a National Broadband Plan quadrupled, from a dozen in 2007 to 168 in 2019. Other precursing guidelines include VoIP in 2007, infrastructure sharing in 2009 or regulatory openness mentioned in 11 editions of the guidelines.

131. The 22nd edition of the Global Symposium for Regulators (GSR-23) was held in Sharm El-Sheikh, Egypt, from 5 to 8 June 2023, and attracted over 750 participants including Government Ministers, Heads of Regulatory Authorities and C-level industry executives from over 100 countries. GSR-23 was chaired by Eng. Hossam El-Gamal, Executive President of Egypt's National Telecommunications Regulatory Authority (NTRA), under the theme "Regulation for a sustainable digital future".

132. A series of pre-events took place on 5 June, including the Regional Regulatory Associations' Meeting (RA), which saw the launch of ITU's new Digital Regulation Network (DRN): The Collaborative Network of Networks initiative, the Industry Advisory Group on Development Issues and the Private Sector Chief Regulatory Officers (IAGDI-CRO) Meeting, the Heads of Regulators' Executive Roundtable, and further included two signing ceremonies between ITU and partners. On 7 June, a roundtable of the Network of Women (NoW) in the ITU Development Sector (ITU-D) was held providing women delegates with the opportunity to exchange views on how to develop gender-mainstreamed policies. A technology exhibition was held showcasing the latest digital innovative technologies and applications from international and local ICT companies.

133. Throughout the GSR programme, discussions focused on novel regulatory approaches for digital transformation, trustworthy and resilient digital infrastructure, spectrum for tomorrow, online child and youth safety, digital accessibility, affordability of the devices, emergency public early warning systems, going green with the digital transformation, and harnessing the opportunities of the metaverse. In sharing experiences, regulators and industry players explored innovative approaches to collaborative regulation for meaningful universal connectivity to accelerate the achievement of the 2030 Agenda for Sustainable Development (SDGs).

134. Regulators from around the world identified and endorsed the GSR-23 Best Practice Guidelines on regulatory and economic incentives for an inclusive sustainable digital future. The Guidelines address and identify incentives that can be used to expand connectivity, and support access, adoption, and use. The Guidelines also identify novel, innovative, ground-breaking, evidence-based cross-sector digital policy and regulatory principles to support a sustainable digital future for all people everywhere. The guidelines are included in annex to this report and can also be found on the GSR-23 website at: www.itu.int/gsr23. ITU-D has its "eye" on ICTs and is recognized around the globe as the leading provider of timely and comprehensive telecommunication/ICT indicators as well as regulatory and tariff policies statistics, profiles and trends. ITU data, research and analysis and tools support stakeholders in defining, elaborating, implementing and reviewing transparent, coherent and forward-looking strategies, policy, legal and regulatory frameworks as well as in moving towards evidence-based decision-making.

- The ICT Regulatory Tracker is a composite metric based on a total of 50 indicators grouped into four clusters: 1. Regulatory authority (focusing on the functioning of the separate regulator), 2. Regulatory mandates (who regulates what), 3. Regulatory regime (what regulation exists in major areas) and 4. Competition framework for the ICT sector (level of competition in the main market segments). The Tracker covers between 190 and 193 countries and economies over the period 2007 – 2022. To help analyse the evolution of ICT regulation worldwide, identify progress areas as well as gaps and measure those, the countries included in the Tracker are split into score thresholds that relate to generations of regulation, for any given year. Generation 1 (G1) to Generation 4 (G4) presents the evolution in telecommunication and ICT regulation, starting from the command-and-control regime typically associated with state-owned monopolies, through privatization and liberalization, the need to encourage investment, and the shift to meeting socio-economic objectives.

- The 2021 G5 Benchmark covers 193 countries and calibrates data on 70 indicators against four pillars: 1. National Collaborative Governance; 2. Policy Design Principles; 3. Digital Development and 4. Digital Economic Policy Agenda. While a sizable group of countries have reached leading and advanced G5 Benchmark scores (67 countries or 34 per cent of the sample), most countries still need to fulfil the conditions required for those levels of readiness for digital transformation.

135. ITU-D provides Membership with innovative tools and assistance to help countries leap forward.

- The G5 accelerator provides high-value tools and resources offering practical step-by-step support for countries already embarked or planning to embark on their digital transformation journey, and the ICT Policy Impact Lab explores the impact of policies and regulations on ICT investment.

- ITU has led the research and analysis on collaborative regulation while at the same time building a global community around it – it is a community-owned programme of work. A series of country reviews articulate the benefits of G5 regulation at country level, and anchors these benefits in experience and evidence. Each of the collaborative regulation case studies offers a high-value, authoritative analysis of the country regulatory landscape and a clear-eyed view of the path ahead towards G5 regulation.

- ITU and the World Bank have been collaborating since 2000 to support countries with these rapid changes and have launched the Digital Regulation Handbook and Platform to provide the latest information on developments of regulation strategies, best practices, and case studies. The thematic sections, regularly updated, tackle new regulatory aspects and tools to consider when making regulatory decisions to harness the benefits of the digital economy and society.

- The Global ICT Regulatory Outlook (GIRO) series lays out a broad canvas of how regulation and digital markets are interacting – and advocates for collaborative regulatory reform in delivering meaningful connectivity and inclusive digital markets. This series explores the evolution of ICT regulatory trends and first set out the ITU concept of five 'generations', sharing unique, focused research and offer both evidence and practical advice to support regulators embarked on their journey to fifth generation collaborative regulation.

- In February, with the support of Government of the United Kingdom Foreign, Commonwealth & Development Office (FCDO) Digital Access Programme (DAP), the **Efficiency toolkit** was launched **as a practical guide for countries looking to achieve impactful and sustainable universal access and service implementation.** This toolkit helps to navigate the multitude of business models that need financial support in order to have a local, municipal and national impact, as well as to meet SDGs and related targets. The online self-paced course developed to better understand how to use the toolkit is available through the ITU Academy. The main objective is for participants to understand and apply the analytical tools, examples and templates provided in the toolkit to navigate common questions and challenges faced when using public funds to design, implement and finance programmes and projects that facilitate access to digital technologies and communication infrastructure. Face-to-face facilitated training to national stakeholders on the toolkit modules have also been delivered in Kenya in November 2022 and in Sierra Leone in May 2023.

- With the REG4COVID platform, ITU led research efforts into the telecommunication/ICT sector response to COVID-19, bringing together more than 500 measures taken by the regulatory community, private sector and civil society, and showing how we can come together as a community and how collaboration can help countries in challenging situations. With this research, the confirmation of the economic contribution of ICTs throughout 2020 and the assessment of the value of broadband in mitigating economic disruption caused by the pandemic provide support for the measures taken so far by policy makers and regulators to accommodate the resulting changes in sector dynamics.

- A series of expert reports quantified the positive economic impact of broadband, digital transformation and the interplay of ICT regulation both at regional and global levels. The main outcomes from the econometric modelling by region suggest that an increase of 10 per cent in mobile broadband penetration would yield an increase in 2.46 per cent in GDP per capita in the Africa region, while the increase in GDP per capita would be of 1.73 per cent in the Americas region, 1.82 per cent in the Arab States region, 0.51 per cent in the Asia-Pacific region, 1.25 per cent in CIS region. In the Europe region, countries would enjoy an increase of 2.1 per cent. The new *2020 Report on How broadband, digitization and ICT regulation impact the global economy* sets out six powerful and concrete steps which will maximize the economic impact of strategic ICT investment decisions, as well as concrete recommendations designed to boost economic impact.

- A 2021 Report on The impact of policies, regulation, and institutions on ICT sector performance uses econometric modelling to pinpoint the impact of the regulatory and institutional frameworks on the performance of the ICT sector and its contribution to national economies. The modelling has allowed to capture fresh insights backed by authoritative data on the evolution of ICT regulation since 2007, the ICT Regulatory Tracker, and a global dataset on ICT markets economics.

136. ITU web portals bring together in one place information on International Mobile Roaming (IMR) Resources , Quality of Service, the Digital Ecosystem, Infrastructure and Connectivity Development Frameworks. In addition, the Regional Regulatory Associations Portal is continually updated to bring together regulatory resources and ITU activities on such issues as well as activities and initiatives by Regulatory Associations, regional and international organizations and other stakeholders. These portals also highlight key findings from ITU publications, studies, research, ITU Study Groups, and data and analysis from the ITU ICT Eye.

137. ITU-D provides training and capacity development for regulators and other stakeholders to address digital policy, regulation as well as economic and market developments and collaborative regulatory approaches for digital transformation.

    - ITU is developing training materials for regulators jointly with the World Bank as part of the Digital Regulation Handbook and platform. These training resources consist of a series of self-paced e-learning modules on regulatory governance, spectrum management, access for all, competition and economics, and consumer affairs.. An online training programme on digital regulation was developed with CITC Saudi Arabia for delivery in two phases. Phase 1 focusing on regulatory

governance and collaborative regulation, and took place on 29 and 30 March 2021, phase 2 took place in December 2021. An online self-paced course based on the digital regulation platform provides an introduction to regulatory governance and evidence-based decision-making, competition and economics, consumer affairs, access for all and spectrum management. The course was developed with the kind support of the Communications, Space and Technology Commission (CST) as part of the collaboration between Saudi Arabia and the International Telecommunication Union (ITU) on assistance in Telecommunication/ICTs to ITU Member States and runs from 5 February to 31 December 2023 on the ITU Academy platform.

- ICT infrastructure is the basis of today's digital economy and offers enormous potential to advance progress towards the UN Sustainable Development Goals (SDG) and improve people's lives in fundamental ways. Deploying broadband in big towns and cities happens almost naturally. But deploying these networks to rural and remote areas is markedly more challenging. ITU launched the ICT Infrastructure Business Planning toolkit and training to support regulators in designing optimal broadband network that can respond and adapt to a wide range of infrastructure deployment projects.

138. **ITU-D Study Groups** examine specific task-oriented telecommunication/ICT questions of priority to developing countries, to support them in achieving their development goals and SDG targets. The mandate of ITU-D Study Group 1, relevant to Action Line C6 covers questions on "Enabling environment for meaningful connectivity", including : National policy and regulatory aspects of broadband telecommunication/ICT development, Economic aspects in the field of national telecommunications/ICTs, including facilitating the implementation of the digital economy and the provision of telecommunication/ICT services, including for rural and remote areas, National approaches for providing access to telecommunications/ICTs in rural and remote areas, with special focus on developing countries, including least developed countries, small island developing states, landlocked developing countries and countries with economies in transition, Access to telecommunication/ICT services to enable inclusive communications, especially for persons with disabilities and persons with specific needs, Migration and adoption of digital technologies for broadcasting for different environments, Use of telecommunications/ICTs for disaster risk reduction and management, particularly in developing countries, and Consumer information, protection and rights for telecommunication/ICT services, especially for vulnerable groups.

139. Outputs agreed on in the ITU-D Study Groups, and related reference material, are used as input for the implementation of policies, strategies, projects and special initiatives in Member States. These activities also serve to strengthen the shared knowledge base of the membership. (http://www.itu.int/ITU-D/study-groups).

140. Additional details about other activities implemented by BDT in all ITU regions can be found in BDT's quarterly and annual performance reports: <https://www.itu.int/en/ITU-D/Pages/OperationalPlansPerformanceReports.aspx>.

141. International mobile roaming remains an important area of work for ITU-T SG3.

142. ITU also provides support, assistance and training to developing countries with the aim of bridging the standardization gap (BSG) on ICT technologies. ITU-T has 23 Regional Groups to stimulate effective participation in ITU-T Study Groups and increase the number of quality Contributions from the various regions - eight in Africa, four in the Americas, five in the Arab region, two in the APT region and four in the Eastern Europe, Central Asia and Transcaucasia. ITU-T also continues to offer a mentoring programme for new delegates to ITU-T Study Groups. Remote participation is offered during all study group meetings and closing plenaries benefit from full interpretation.

143. ITU organizes annual Regional ICT Standardization Forums as part of activities under WTSA Resolution 44 on bridging the standardization gap. The Forums discuss current standardization topical issues in ITU-T study groups and focus groups to engage more developing countries in the standardization work and could also feature capacity building on ITU-T Recommendations. Regular BSG trainings are also organized in collocation with Study Group meeting in order to equip delegates from developing countries with right skills to contribute to the standards development process at the ITU.

144. ITU-T study groups developed the following Recommendations and other texts on the network aspects of IMT-2020:

- **ITU-T F.743.18 "Requirements for IMT-2020 ultra-high definition surveillance camera"** defines typical use cases, functional requirements, performance requirements and security requirements for IMT-2020 UHD surveillance cameras, in order to solve UHD video reliably transmission in IMT-2020. This Recommendation also defines the classification of IMT-2020 UHD surveillance service, SLA rank of IMT-2020 UHD surveillance service, the network requirements for IMT-2020 UHD video surveillance service which are very relevant to IMT-2020 surveillance scenarios, so as to meet the actual user's UHD video captured and transmission requirements.

- **ITU-T J.152 "Requirements for cable television services to use 5G radio system"** IMT-2020 radio system, a.k.a. 5G, is expected to replace the wiring inside apartment buildings in cities, or to extend cable television systems in rural areas. However, to use the available bandwidth of 5G radio, cable television signals have to meet certain requirements to carry cable television service signals over 5G radio system. This Recommendation defines the requirements for cable television systems that use 5G radio system.

- **ITU-T K.Suppl.16 to ITU-T K-series Recommendations (revised) "Electromagnetic field compliance assessments for 5G wireless networks"** provides guidance on the radio frequency-electromagnetic field (RF-EMF) compliance assessment considerations for IMT-2020 wireless networks also known as 5G. Given that the 5G technical standards have just been finalised and commercial 5G networks are now lunched in many countries.

- **ITU-T L.1326 "Requirements and use cases of liquid cooling solutions and high energy efficiency solutions for 5G BBU in Centralized-RAN mode"** identifies the requirements for liquid cooling and high energy efficiency solutions for 5G BBU in Centralized-RAN mode, including requirements of immersion and spray liquid cooling technology, key indicators of immersion and spray liquid, safety requirements of immersion and spray

liquid cooling system, management procedure and energy efficiency measurement method, and use cases of liquid cooling solutions. In this Recommendation a complete infrastructure solution practiced in 5G BBU is proposed that can provide safe and efficient liquid cooling technical support, which can assist in the design of full liquid cooling facilities as well as the successful introduction of liquid cooling solutions into the existing air cooling telecommunication rooms and data centres.

- **ITU-T Q.5004 "Signalling architecture of Lite IMS for IMT-2020 network and beyond"**: In the context of signalling architecture of LiteIMS for IMS-2020 network and beyond, the signalling architecture is designed for IMS domain with high efficiency, extensibility, intelligence and high value-added characteristics.

- **ITU-T Q.5005 "Requirement, framework and protocols for signalling network analysis and optimization in IMT-2020"** specifies the framework, interfaces and protocols, and service procedures for signalling network analysis and optimization in IMT-2020, in which the signalling network refers to the network functions and the signalling exchange which are related to telecommunications services. It covers the aspects including an overview of a signalling network, requirements for signalling collection, requirements for signalling network analysis, requirements for signalling network optimization, framework, interfaces and protocols, service procedures, AI-assisted functions and general security considerations of signalling network analysis and optimization in IMT-2020.

- **ITU-T Q.5025 "Protocol for managing User Plane function in IMT-2020 network"** specifies protocol for managing user plane function (UPF) in IMT-2020 network. It describes the communication mechanism inside UPF. It also describes API management, procedure, signalling flow and message format between UPF and other core network functions or third-party applications.

- **ITU-T Q.5026 "Signalling Requirements and Protocol for Providing Network-oriented Data Integrity Verification Service based on Blockchain in IMT-2020 network"** specifies signalling requirements and protocol for providing network-oriented data integrity verification service (DIVS) based on blockchain in IMT-2020 network. It includes signalling requirements, protocol procedures and message format between DIVS function with the UEs, the service users, the CEF and other DIVS functions.

- **ITU-T Q.5027 "Protocol for IMT-2020 network integration with Time Sensitive Network"** specifies protocol for IMT-2020 network integration with Time Sensitive Network(TSN), and introduces the communication mechanism between IMT-2020 network and TSN system. It also describes parameters, procedures, signalling flow and message format between core network function of IMT-2020 network and TSN Translator.

- ITU-T SG17 developed Recommendations **X.1815, X.1816, X.1817** and **X.1818** on IMT-2020/5G security, see Para. 95 above.

- **ITU-T Y.3079 "Information-Centric Networking in networks beyond IMT-2020: Framework of locally enhanced name mapping and resolution"** specifies the framework of locally enhanced name mapping and resolution to achieve high

performance of deterministic latency and scalability for a massive number of named objects for information centric networking (ICN)in networks beyond IMT-2020.

- **ITU-T Y.3080 "Information-Centric Networking in networks beyond IMT-2020: Requirements and Mechanisms of Transport Layer"** describes the requirements and mechanisms of transport layer for information-centric networking (ICN) in networks beyond IMT-2020. (1) It provides an introduction to transport layer in networks beyond IMT-2020. (2) It describes service and functional requirements of transport layer. (3) Based on the requirements, it specifies the mechanisms of transport layer for information-centric networking (ICN) in networks beyond IMT-2020.

- **ITU-T Y.3081 "Self-Controlled Identity based on Blockchain: Requirements and Framework"** presents the motivations and principles for self-controlled identity based on blockchain in future networks including networks beyond IMT-2020. It provides the high-level framework and requirements of self-controlled identity based on blockchain. It specifies the capability requirements of the self-controlled identity based on blockchain accordingly in the context of future networks including networks beyond IMT-2020. Detailed descriptions of the use cases and business models are listed in the appendix.

- **ITU-T Y.3082 "Mobile network sharing based on distributed ledger technology for networks beyond IMT-2020: Requirements and Framework"** specifies the requirements and framework of distributed ledger technology used in mobile network sharing for networks beyond IMT-2020. The detailed requirements of distributed ledger technology based mobile network sharing are put forward. The high-level framework, service procedures and security considerations are presented. The detailed use cases are described in the appendix.

- **ITU-T Y.3117 "Quality of service assurance-related requirements and framework for smart education supported by IMT-2020 and beyond"** specifies the quality of service (QoS) assurance-related requirements and framework for smart education supported by the international mobile telecommunications 2020 (IMT-2020) and beyond. Recommendation ITU-T Y.3117 (Y.IMT2020-qos-req-se) first provides an overview of smart education supported by IMT2020 and beyond. It then specifies the QoS assurance-related requirements and a framework. Finally, the QoS consideration for smart education services are described in Appendix I.

- **ITU-T Y.3118 "Requirements and framework for jitter guarantee in large scale networks including IMT-2020 and beyond"** specifies the requirements and framework for an effective and efficient solution of jitter guarantee for dynamic traffic with arbitrary input patterns in large-scale networks including IMT-2020 and beyond. The framework in this Recommendation is composed of the time-stamping and the buffering functions at the network boundary. It is scalable and does not rely on time synchronization or slot scheduling.

- **ITU-T Y.3119 "Future networks including IMT-2020: capability classification framework for dedicated networks"**: In the context of future networks including IMT-2020, dedicated networks are networks designed for application domains with common requirements. The capabilities of dedicated networks include, but are not limited to,

core network, transport network, access network, service support, management, infrastructure, and artificial intelligence (AI)/machine learning (ML) enabling capabilities. To evaluate the capabilities of dedicated networks in a standardized way, there exists the need to introduce capability classification for dedicated networks. With the understanding that the capability level is the level of availability of capabilities in a network, the capability classification is based on the evaluation of the capability level of the network. This Recommendation specifies the methods and framework of capability classification for dedicated networks.

- **ITU-T Y.3120 "Functional Architecture for latency guarantee in large scale networks including IMT-2020 and beyond"** specifies the functional architecture, functional entities, reference points, and operational procedures, for the requirements and framework defined in Y.3113, based on the architecture defined in Y.2111. Meanwhile, Y.3113 specifies the use of flow aggregate (FA)-based scheduling and regulators at aggregation domain (AD) boundaries. Y.2111 specifies the resource and admission control functions (RACF) in support of end-to-end quality of service (QoS) and necessary transport functions in next generation networks (NGNs).

- **ITU-T Y.3121 "QoS requirements and framework for supporting deterministic communication services in local area network for IMT-2020"** specifies QoS requirements and framework for supporting deterministic communication services in a local area network (LAN). First, it presents the concept and benefits of deterministic communication services in a LAN consisting of heterogeneous network technologies. Then it specifies a high-level model and associated QoS requirements for inter-technology domain deterministic communication services in LAN. Based on the identified QoS requirements, it identifies a framework and an example operational procedure. Finally, it provides three scenarios and associated use cases as informal material in appendixes.

- **ITU-T Y.3122 "Quality of service assurance requirements and framework for smart grid supported by IMT-2020 and beyond"** specifies the quality of service (QoS) assurance aspects for the smart grid supported by the international mobile telecommunications 2020 (IMT-2020) and beyond. It first provides an overview of the smart grid supported by IMT2020 and beyond. It then identifies a number of QoS considerations. The QoS assurance requirements and framework based on the QoS considerations are specified. Finally, smart grid application scenarios with detailed QoS requirements supported by IMT2020 and beyond are described in appendix I.

- **ITU-T Y.3123 "Framework of edge computing capability exposure for IMT-2020"** There are various edge computing capabilities that can be exposed to applications. With the exposure of such capabilities, the applications, including edge computing applications and non-edge computing applications, are able to obtain augmented information from which these applications can benefit, especially, but not limited to, in terms of performance. This Recommendation specifies the framework of edge computing capability exposure for IMT-2020 networks and beyond.

- **ITU-T Y.3137 "Technical requirements for supporting application addressing in edge computing for future networks including IMT-2020":** Application addressing is the process to discover the IP address of the server which the application running on when

UE intends to access the application. This Recommendation specifies the technical requirements for supporting application addressing in edge computing for future networks including IMT-2020, and also proposes new requirements towards fixed mobile convergence (FMC) architecture for future networks including IMT-2020.

- **ITU-T Y.3138 "Unified multi-access edge computing for supporting fixed mobile convergence in IMT-2020 networks"** A unified and cloud-based edge computing platform allows operators to flexibly deploy network functions and support infrastructure for fixed mobile convergence (FMC), to provide unified multi-access edge computing capabilities for all the access network technologies in IMT-2020 networks. This Recommendation specifies the requirements, architecture and functions of unified multi-access edge computing for supporting FMC network.

- **ITU-T Y.3139 "Fixed mobile convergence enhancements to support IMT-2020 based software-defined wide area networking service"**: IMT-2020 based fixed mobile convergence (FMC) is one of the main trends in the future development of telecommunication. The main purpose of FMC is to combine all access technologies, including fixed and mobile access method, to access the network without network constraints. By adopting IMT-2020 technologies, SD-WAN service is required to support IMT-2020 access as one of the multiple connection types. By having the enhancements of FMC, IMT-2020 based SD-WAN service could have some features such as end to end isolated connections and duel link transmission. This Recommendation provides specification about fixed mobile convergence enhancements to support IMT-2020 based software-defined wide area networking service.

- **ITU-T Y.3140 "Service brokering network framework for Trusted Reality"** describes service brokering network framework for Trusted Reality featuring application-aware brokering capabilities in terms of context, data and computation. The service brokering network framework for Trusted Reality aims to deliver customized immersive application service experience with real-time communication and recognition of knowledge and information in a safe and convenient way for anyone throughout the automated connection of real and cyber world.

- **ITU-T Y.3158 "Local shunting for multi-access edge computing in IMT-2020 networks"** points out the relationship between IMT-2020 networks and MEC system, and specifies an architecture for transmitting traffic flows at the edge of IMT-2020 networks. The objective of this Recommendation is to specify the requirements, architecture, functional entities, reference points and information flows for multi-access edge computing in IMT-2020 networks.

- **ITU-T Y.3159 "Framework for classifying network slice level in future networks including IMT-2020" (under approval)**: The objective of this Recommendation is to specify a framework for classifying network slice level in future networks including IMT-2020. This framework guides the network slice deployment and management. A method for classifying network slice level of future networks including IMT-2020 is introduced.

- **ITU-T Y.3160 "Architectural framework of end-to-end service level objective guarantee for future networks"** describes the architectural framework of end-to-end

service level objective guarantee for future networks including IMT-2020, which considers the issues of Overview of SLO guarantee, A mechanism for SLO guarantee, and the SLO design and acceptance method.

- **ITU-T Y.3181 "Architectural framework for Machine Learning Sandbox in future networks including IMT-2020"** provides an architectural framework for machine learning (ML) sandbox in future networks including IMT-2020. More precisely, it describes requirements and high-level architecture for ML sandbox in future networks including IMT-2020.

- **ITU-T Y.3182 "Machine learning based end-to-end multi-domain network slice management and orchestration"** describes an intelligent cost-effective network management and orchestration framework that can cope with the challenges of multi-domain network slicing, while minimizing human intervention towards full automation of slice lifecycle management and runtime operation.

- **ITU-T Y.3183 "Framework for network slicing management assisted by machine learning leveraging QoE feedback from verticals"** provides a framework for machine learning assisted network slicing management, leveraging vertical end users' feedback on QoE, which can help achieve run-time optimisation of user perceived performance. The overall architecture, components, workflow and related APIs of this framework are specified with respect to the high-level requirements identified. A use case is provided in appendix to show an application example of this framework. Example implementations of the key APIs are also provided.

- **ITU-T Y.3201 "Fixed, mobile and satellite convergence – Framework for IMT-2020 networks and beyond":** Fixed, mobile and satellite convergence (FMSC) is the capability that provides services and applications to end users regardless of the fixed, mobile or satellite access technologies. This Recommendation specifies the design considerations, framework, enabling technologies, network function enhancements, procedures, and security considerations of FMSC, in the context of IMT-2020 networks and beyond.

- **ITU-T Y.3202 "Fixed, mobile and satellite convergence - Mobility management for IMT-2020 networks and beyond"**: Fixed, mobile and satellite convergence (FMSC) is the capability that provides services and applications to end users regardless of the fixed, mobile, or satellite access technologies. This Recommendation specifies the mobility management requirements, architecture, procedures, and security considerations for FMSC in IMT-2020 networks and beyond.

- **ITU-T Y.3203 "Fixed, mobile and satellite convergence - Connection management for IMT-2020 networks and beyond"** specifies the framework and functions of connection management for fixed, mobile and satellite convergence (FMSC) in IMT-2020 networks and beyond. The Recommendation specifies connection status management, control plane functions and user plane functions maintenance in connection scenarios involving FMSC network.

- **ITU-T Y.Suppl.59 to ITU-T Y.3100 of Recommendations "IMT-2020 standardization roadmap"** provides the standardization roadmap for IMT-2020 area in the telecommunication sector.

145. Cloud computing, big data and data management work in ITU-T is reported as follows:

- **ITU-T F.746.14 "Requirements and reference framework for cloud virtual reality systems"** focuses on the overall requirements of cloud virtual reality systems and the related requirements of each layer including content requirements, network requirements, control requirements, resource requirements and terminal requirements, as well as the reference framework for related high-level functions.

- **ITU-T F.747.13 "Requirements and reference framework of cloud-edge collaboration in industrial machine vision systems"** (under approval) specifies requirements and reference framework of cloud-edge collaboration in industrial machine vision systems, and provides use cases. The cloud-edge collaboration is a process (or method) that coordinates cloud computing and edge computing, dynamically allocates required computing, algorithm models, data, or other resources, and jointly completes the same tasks (or objectives) agreed in advance. In industrial machine vision systems, the cloud-edge collaboration includes resource collaboration (computing, network, and storage), service collaboration (data, intelligence, and task), and application collaboration (capability and management). This Recommendation is intended to guide the design and development of industrial machine vision systems.

- **ITU-T F.748.17 "Technical specification for artificial intelligence cloud platform: AI model development"** provides a framework for the cloud-based development of AI models. It covers the terminology, features, and reference design of an AI cloud platform to enable the development of AI models. It establishes the technical specifications of the platform's supporting functional modules, core functional modules, and auxiliary functional modules.

- ITU-T SG17 developed Recommendations **X.1380, X.1644** and **X.1645** on cloud security, see Para 95 above.

- **ITU-T Y.3532 "Cloud computing - Functional requirements of Platform as a Service for cloud native applications"** provides overview and functional requirements of Platform as a Service (PaaS) for cloud native applications. To introduce cloud native PaaS, this Recommendation also provides an overview of cloud native and cloud native applications. This Recommendation also addresses functional requirements of PaaS for cloud native applications through various use cases.

- **ITU-T Y.3537 "Cloud computing – Functional requirements of cloud service partner for multi-cloud"** provides the overview of multi-cloud and the functional requirements of cloud service partner for supporting multi-cloud by identifying various use cases related with multi-cloud in terms of cloud service customer, cloud service provider and cloud service partner. It also provides cloud computing activities to support multi-cloud as sub-role of cloud service partner by identifying interactions between cloud service customer, cloud service provider and cloud service partner.

- **ITU-T Y.3538 "Cloud computing - Global management framework of distributed cloud"** introduces the framework and functional requirements of the global management of distributed cloud. The global management framework includes resource management,

data management, platform service management, application service management, operation and maintenance management, and risk management.

- **ITU-T Y.3539 "Cloud computing - Framework of risk management"** provides framework of risk management in cloud computing environment, including risk assessment, risk treatment, risk acceptance, risk communication and consultation, and risk monitoring and review. It also provides a complete set of management processes and effective measures to reduce risks in cloud computing environments.

- **ITU-T Y.3602 (revised) "Big data – Functional requirements for data provenance"** describes a model and operations for big data provenance. Also, this Recommendation provides the functional requirements for big data service provider (BDSP) to manage big data provenance. The reliability of data is an important factor in determining the reliability of the analysis result. Data provenance aims to ensure the reliability of data by providing transparency of the historical path of the data. In a big data environment, complex data processing and migration due to the big data lifecycle and data distribution cause various difficulties in managing data provenance.

- **ITU-T Y.3603 "Big data - Requirements and conceptual model of metadata for data catalogue"** describes the general concept of metadata and its utilization in a big data ecosystem. Also, this Recommendation provides requirements and a conceptual model of metadata for the data catalogue as well as the extensible markup language (XML) schema of metadata as an example. This metadata supports finding data easier and is used for the exchange, preservation, integration and provenance of data in a big data ecosystem.

- **ITU-T Y.3607 "**Big data – Functional architecture for data provenance**"** describes the general concept of metadata and its utilization in a big data ecosystem. Also, this Recommendation provides requirements and a conceptual model of metadata for the data catalogue as well as the extensible markup language (XML) schema of metadata as an example. This metadata supports finding data easier and is used for the exchange, preservation, integration and provenance of data in a big data ecosystem.

- **ITU-T Y.3356 "Big data driven networking-mechanism of network service provisioning"** describes a functional architecture for big data provenance. To provide the functional architecture for big data provenance, the big data provenance functions are defined based on the functional requirements and logical components identified in [ITU-T Y.3602]. This Recommendation also provides the relationship between the functional architecture of big data provenance and the big data reference architecture in [ITU-T Y.3605].

- **ITU-T Y.3527 "Cloud computing - End-to-end fault and performance management framework of network services in inter-cloud" (under approval)** provides framework and functional requirements of end-to-end(E2E) fault and performance management of network services (NSs) in inter-cloud. The functional requirements are derived from the corresponding typical use cases. In particular, a predictive model for fault and performance issues detection and localisation is presented.

- **ITU-T Y.3655 "Big data driven networking - management and control mechanisms"** specifies the management and control mechanisms of big data driven networking. The Recommendation studies general mechanisms related to management and control aspects of big data driven networking, and management mechanisms, control mechanisms, orchestration mechanisms of big data driven networking, and other consideration related to management and control mechanisms of big data driven networking.

- **ITU-T Y.3656 "Big data driven networking-mechanism of network service provisioning"**: The bDDN can provide a better integration and more intelligent capabilities, such as the capability of self-optimization, self-configuration, and intelligent fault management, based on big data plane and its machine learning capabilities. It can provide significantly enhancement to the network service provisioning by using big data intelligence. This recommendation specifies the network service provisioning mechanism in bDDN.

146. ITU-T study groups developed Recommendations and other texts in the context of Action Line C6:

- **ITU-T H.644.6 "Architecture for video distribution systems" (under approval)** specifies the architecture for video distribution systems. The video distribution system described in this Recommendation is an over-the-top video application system, which has the capabilities of video access, distribution, transcoding, processing, management, and presentation, and can provide the live video streaming service, video on demand service, and other related value-added services to users on the Internet. Users can directly use the video distribution functions through the system without complex system development, deployment and maintenance processes.

- **ITU-T H.644.7 "Functional architecture for media processing services" (under approval)** specifies the functional architecture for the media processing services. In particular, the scope of this Recommendation includes domains and functional roles relationship, functional architecture and reference points. Media processing services utilize a set of techniques including cloud computing, computing resource virtualization, and job queue processing to dynamically control and manage all kinds of computing resources, which improves scalability, flexibility, and availability.

- **ITU-T F.744.5 "Requirements for content delivery networks based on P2P technology"** (under approval) describes the requirement for a peer-to-peer content delivery network (P2P CDN). It specifies the overall functional architecture, domains and functional role relationships, functional blocks and their mutual relationships, service provision requirement, availability requirement, scalability requirement and security considerations. P2P CDN provides a scalable and elastic CDN function pool of shareable terminal devices computing resources, storage resources and uplink bandwidth to save loads of current CDN and improve user experience.

- **ITU-T H.705.1 "Layered specification for the IPTV service platform functional architecture based on open service capabilities" (under approval)** describes a layered architecture of IPTV service platform intended to provide open service capabilities for diversified IPTV services. In comparison with the high-level IPTV functional architecture

defined in Recommendation ITU-T Y.1910, the layered architecture decouples service logic from data resource and decompose the functions of IPTV service platform into more granular modules. This recommendation specifies the fine-grained functional modules and reference points, by considering the aspects of service offering and operational management. It also defines typical procedural flows on content preparation, service presentation and content consumption in appendices. This recommendation provides reference for IPTV service providers to construct the open platform of IPTV services and enables automatic deployment and fast iteration of multimedia applications in the platform. It's of benefit to promote service capability of IPTV and further enhance user experience on using diversified IPTV services.

- **ITU-T H.705.2 "Requirements for live streaming systems based on QUIC" (under approval)** specifies the requirements of a live streaming system to utilize QUIC transport protocol to improve its delivery performance and security. It also describes the procedures and framework for QUIC-based live streaming system to provide unicast or multicast service encapsulating in QUIC protocol. With this Recommendation, a live streaming service provider can gain understanding of how to utilize QUIC protocol to provide unicast or multicast live streaming media service. With QUIC transport protocol, the services will have lower connection establishment and delivery delay, enhanced delivery performance, and security insurance.

- **ITU-T J.1611 (revised) "Functional requirements for Smart Home Gateway"**: In a smart home solution, a smart home gateway is incorporated to connect various smart home appliances. In addition, an IoT-based connection management platform is required to enable various applications. These applicable solutions include home health, entertainment, security, and home automation, which promotes a safer, happier, and more comfortable and convenient lifestyle. This Recommendation aims to define the functional requirements for a smart home gateway from both hardware and software point of view to ensure secure interoperability among consumers, businesses and industries by delivering a standardized communications platform and allowing devices to communicate cross operating system, service provider, transport technology or ecosystem.

- **ITU-T J.1612 (revised) "The Architecture for Smart Home Gateway"**: Smart home is a kind of home automation system in which a wide range of IoT devices in a home cooperate to provide intelligent controlling and monitoring functions for home users. Smart home gateway connects various smart home devices, provides hardware interfaces of various smart home communication protocols, runs communication protocols, performs protocol conversion and bridging, realizes the interaction between user control terminal and Cloud server. Recommendation ITU-T J.1612 aims to define the architecture for a smart home gateway (SHGW) which addresses the functional requirements found in Recommendation ITU-T J.1611. The Recommendation consists of concepts of a virtual device model, dynamic device profile and other important software modules. With the introduction of these important modules, the architecture can dynamically support existing smart home devices and the devices in the future.

- **ITU-T Q.3647 "Signalling requirements for emergency service in IMS roaming environment"** addresses the signalling requirements for emergency service in IMS

roaming environment. It defines the signalling architecture, interfaces and functional description, signalling requirements, signalling procedures and security consideration of emergency service in home routing architecture of IP Multimedia Subsystem (IMS) roaming over Long Term Evolution (LTE) and LTE-Advanced.

- **ITU-T Q.4069 "Testing requirements and procedures for Internet of Things based green data centres"** specifies testing requirements and procedures for Internet of Things based green data centres. This Recommendation introduces testing requirements including interoperability testing requirements between platform, systems and IoT devices, functional testing requirements(e.g. testing requirement of analysis of IoT devices status) and self-optimization testing requirements (e.g. testing requirement of data quality audit), and testing procedures including interoperability testing procedure, functional testing procedure, and self-optimization testing procedure for IoT based green data centres.
- **ITU-T Y.4910 "Maturity model of digital supply chain for smart sustainable Cities":** With the rapid development of advanced information technologies such as the Internet of Things, big data and cloud computing, the traditional supply chain has been transformed into a digital supply chain. Digital supply chains may help to maintain high growth by reducing the operation cost and improving the efficiency of supply chain management with the help of digital methods. As a result, digital supply chains can assist with the construction and management of SSC. This Recommendation provides a maturity model of digital supply chain for SSC referring to the key performance indicators (KPIs) for SSC in [ITU-T Y.4900] and the maturity model for SSC in [ITU-T Y.4904]. Both of these Recommendations support the maturity model for digital supply chains. Its use has specific benefits for socioeconomic indicators, like: environmental sustainability, productivity, innovation, and trade. This maturity model helps identify the goals, levels, dimensions and assessment methods of digital supply chain for SSC. It is designed as a practical tool for city managers and all related stakeholders to study the performance and benefits of digital supply chain from economic, social and environmental perspectives. Thus, it gives general guidance for accurately assessing the maturity of digital supply chain and helping achieve sustainable development goals for SSC.

ITU-T Study Group 20 adopted the IoT specifications from OneM2M and published them as Recommendations. Recommendation ITU-T Y.4500.3 "oneM2M - Security Solutions" was approved.

147. A Digital Transformation Resource Hub has been created in February 2023. The Digital Transformation Resource Hub provides a wide range of quality publications on digital transformation topics, including smart sustainable cities, cities' actions to tackle COVID-19, artificial intelligence, Internet of things, blockchain, digital twin, metaverse and digital transformation trends.

148. An ITU-T Global Portal on Environment and Sustainable Digital Transformation highlights the latest external resources related to three distinct topics, including: energy efficient ICTs; e-waste management and circular economy; and climate change. This Global Portal also provides link to ITU's IoT and SC&C Standards Roadmap.

149. A Toolkit on Digital Transformation for People-Oriented Cities and Communities has been developed to support cities and communities. The resources contained in this Toolkit include international standards and guidance, the latest research and projections, and cutting-edge reports on a variety of timely topics relevant to the digital transformation of cities and communities.

150. An ITU-T Global Portal is maintained with special focus on activities in the Africa, Asia Pacific, Arab, and Americas regions.

151. ITU-T's work on accessibility has started early 1990s with ITU-T V.18 text telephone. Since then, ITU-T SG16 has developed a number of ITU-T standards on accessibility, within Question 26/16 on accessibility and Question 24/16 on human factors, **cooperating with advocacy organizations** (such as the G3ict, WFD) in addition to other technical groups, and **with participation of persons with disabilities**. Accessibility and Standardization shows examples of ITU-T work.

    In addition, as accessibility is a cross-cutting subject through various ICT technologies, **multiple ITU-T Study Groups**, including, ITU-T SG2 (Operational aspects), SG9 (Broadband cable and TV) and SG20 (IoT, smart cities & communities) have Work Items related to accessibility.
    In addition to Study Groups, the following groups also work on accessibility:
    - ITU-T Joint Coordination Activity on Accessibility and Human Factors (JCA-AHF): **coordination** group on activities concerning accessibility;
    - ITU Intersector Rapporteur Group Audiovisual Media Accessibility (IRG-AVA): **joint group** of ITU-R SG6, ITU-T SG9 and SG16 working on standardization on accessibility of audiovisual media considering a number of delivery systems.
    - Joint technical specification development with ISO/IEC JTC1/SC35 "User interfaces" for accessibility of ICT systems and services.

- **ITU-T Technical Paper FSTP-ACC-Rural "Use cases of accessibility to multimedia systems in rural and out-of-home environments"** describes the use cases of Interactive Mobile Digital Unit in rural and out of home environments, especially in developing countries. The purpose of this Technical Paper is to describe the architecture and use cases of such a unit, which is to be used for overcoming the barriers that are a common denominator in developing countries, such as lack of infrastructures, connectivity and electricity. Such a unit is expected to provide inclusion of persons with disabilities, with auditory processing disorder and visual impairment, while promoting faster comprehension of the content delivered.

- **ITU-T Y.4219 "Accessibility requirements for user interface of smart applications supporting IoT"**: The use of IoT may increase the quality of life among persons with disabilities, persons with age-related disabilities and those with specific needs when properly designed. There are many possible IoT services in various environments that provide accessibility services as well. The IoT also can be used to create tools for persons with many types of disabilities and specific needs, including physical, visual, hearing and cognitive disabilities. IoT services interact with a user through the user interface. To ensure an IoT service is accessible, the user interface must be accessible. An accessible user interface must take into account a user's physical, audio and visual capabilities and

consider compatibility with any assistive technology used by the user. This Recommendation outlines essential requirements that a user interface must consider in order to secure the accessibility of smart applications.

152. Additional details about other activities implemented by BDT in all ITU regions can be found in BDT's quarterly and annual performance reports: <https://www.itu.int/en/ITU-D/Pages/OperationalPlansPerformanceReports.aspx>.

(c) Co-facilitator of Action Lines C1, C3, C4, C7, C11 and Partners for C8 and C9.

Action Line C1: The Role of Public Governance Authorities and all Stakeholders in the Promotion of ICTs for Development

Related to SDGs: SDG 1, SDG 3 (3.8, 3.d), SDG 5, SDG 10 (10.c), SDG 16 (16.5, 16.6, 16.10), SDG 17 (17.18)

153. In accordance with its mandate, the ITU continues to foster international and regional cooperation on a broad range of activities. ITU conducted several meetings, conferences and symposiums to provide a platform to broaden international dialogue on innovative means in harnessing ICTs for advancing development. In 2023, ITU organized a number of events. Series of regional meetings on private-public partnerships as a solution to address the needs of regions for digital technology deployment were organized. At the occasion of the WSIS 2023, several meetings were organized for various Action Lines offering platforms for discussion, networking and collaboration for stakeholders on projects and initiatives to promote of ICTs for Development.

154. The 18th Action Line Facilitation Meeting of C1, C7: E-Government and C11 was held on Thursday, 16 March 2023 on the topic of "Future of e-government assessment in the era of AI: Opportunities and Challenges". Issues raised around the methodology of the United Nations E-Government Survey by stakeholders included how to capture e-government services that are jointly developed by public and private sector, how we measure inefficiencies in government i.e. they invest so much on digitalization but these services are not used, how to measure Artificial Intelligence based services, how we can measure incorrect data governments may have, how to measure privacy efforts, how to include immersive technologies. Some participants also raised that mobile broadband is more relevant for them than the traditional board. It is also added that the more important thing than the ranking is what to do to improve the e-government development in that country. There were also concerns about capturing AI development in a country by just assessing the portal as unit of study.

155. The WSIS Prizes 2023 Winner for the Action Line C1 is Banda Ancha para Todos, Dominican Republic. Details of the project are available here.

156. Advisory **Groups for each Sector: Advisory Groups for each Sector meet every year and** review priorities, strategies, operations and financial matters of the Sector. Please see the Advisory Groups for the sectors below:

- The Telecommunication Development Advisory Group (TDAG) for the ITU-D. In 2023, TDAG was held from 19 to 23 June. Please see https://www.itu.int/en/ITU-D/Conferences/TDAG/Pages/default.aspx.

- Telecommunication Standardization Advisory Group (TSAG) for the ITU-T. The second meeting of the TSAG was held from 30 May to 2 June 2023 at the ITU headquarters, Geneva. TSAG entered the 2022-2024 study period with a strong mandate to prepare restructuring of ITU-T study groups. The leaders of ITU's standardization expert groups (ITU T study groups) are invited to play a central role in this work, highlighting the basis of the future ITU-T study group strategy.

- Radiocommunication Advisory Group (RAG) for the ITU-R. The 30th RAG meeting was held from 1 to 3 May 2023. Please see https://www.itu.int/en/ITU-R/conferences/rag/Pages/default.aspx.

157. Study Groups for each sector:

- Standardization work is carried out by the technical Study Groups (SGs) in which representatives of the ITU-T membership develop Recommendations (standards) for the various fields of international telecommunications.

- ITU-D Study Groups provide an opportunity for all Member States and Sector Members (including Associates and Academia) to share experiences, present ideas, exchange views, and achieve consensus on strategies to address ICT priorities. ITU-D Study Groups are responsible for developing **Reports**, **Guidelines**, **Best Practices** and **Recommendations** based on input received from the membership. Information is gathered through contributions, case studies and surveys and is made available for easy access by the membership using content management and web publication tools. The Study Groups examine specific task-oriented telecommunication/ICT questions of priority to countries, especially developing countries, to support them in achieving their development goals and SDG targets.

- Outputs agreed on in the ITU-D Study Groups, and related reference material, are used as guidance for the implementation of policies, strategies, projects, and specific telecommunication/ICT initiatives in membership. These activities also serve to strengthen the **shared knowledge base** of the membership. Sharing of topics of common interest is carried out through face-to-face meetings, multilingual remote participation and online collaborative sites, in an atmosphere that encourages **open debate** and **exchange of information** and for receiving input from experts on the topics under study.

- ITU-D Study Group 1 scope focuses on "Enabling environment for the development of telecommunications/ICTs" while the work of ITU–D Study Group 2 relates to "ICT services and applications for the promotion of sustainable development".

- 9 webinars were also organized by the ITU-D Study Groups from 27 May to 29 July 2020, which shared analyses of the response to the global COVID-19 pandemic from the perspective of specific ITU-D Study Group Questions. The areas covered by the webinars were related to several WSIS Action Lines. The detailed programmes can be

found in the following link: www.itu.int/go/COVID19-dialogues. A full list of workshops and events held by ITU-D Study Groups during the 2018-2021 study period can be found in the following link.

- The ITU-R Study Groups develop the technical bases for decisions taken at World Radiocommunication Conferences and develop global standards (Recommendations), Reports and Handbooks on radiocommunication matters. More than 5 000 specialists, from administrations, the telecommunications industry as a whole and academic organizations throughout the world, participate in the work of the Study Groups on topics such as efficient management and use of the spectrum/orbit resource, radio systems characteristics and performance, spectrum monitoring and emergency radiocommunications for public protection and disaster relief (please see https://www.itu.int/en/ITU-R/study-groups/Pages/default.aspx).

158. **World Telecommunication Development Conferences**

- The World Telecommunication Development Conference (WTDC) is an international event organized every 4 years by the ITU. WTDC sets the agenda and guidelines for the ITU-D Sector for the following four-year cycle, while Regional Conferences review "work-in-progress" towards the overall objectives and ensure that goals are met. The Telecommunication Development Conferences serve as forums for the discussion of the digital divide, telecommunications and development by all stakeholders involved in and concerned with ITU-D's work. In addition, they review the numerous programmes and projects of the Sector and Telecommunication Development Bureau. Results are reported and new projects are launched. Each Regional Preparatory Meeting brings together the countries in its region to explore and discuss their needs and the present and future projects of the Sector.
- **ITU-D Study Groups** provide an opportunity for the membership to share experiences, present ideas, exchange views, and achieve consensus on appropriate strategies to address telecommunication/ICT priorities. The Study Groups examine specific topics of importance to developing countries to support them achieving the SDG targets and their specific development priorities. **ITU-D Study Groups 1 and 2: Questions Under Study and their linkages with SDGs and WSIS Action Lines.**

Action Line C3: Access to Information and Knowledge

Related to SDGs: SDG 1, SDG 2, SDG 3, SDG 4, SDG 5, SDG 6, SDG 7, SDG 8, SDG 9, SDG 10, SDG 11, SDG 12, SDG 13, SDG 14, SDG 15, SDG 16, SDG 17

159. In 2023, ITU held numerous webinars, conferences, events, to promote digital inclusion. See details here: https://www.itu.int/en/ITU-D/Digital-Inclusion/Pages/Digital-Inclusion-Events.aspx.

160. UNESCO organised the WSIS Action Line Facilitation Meeting C3, which took place on Monday, 13 March 2023, during the WSIS Forum 2023. The meeting focused on the topic of "UNESCO Policy Guidelines for the Development and Promotion of Governmental Public Domain Information 2022 ". The workshop discussed the scope of the new version of the Policy Guidelines for the Development and Promotion of Governmental Public Domain Information. For more details on the sessions and the outcomes, please see here.

161. ITU continues to ensuring inclusive, equal access and use of ICTs for all by supporting: (i) Member States, sector members and academia in the formulation and implementation of policies and strategies on digital inclusion, as well as awareness raising and advocacy, sharing good practices and knowledge, building capacity and the development products/services; and (ii) specific local communities (children, youth, older persons, women, persons with disabilities and indigenous people) through multi-stakeholder partnerships, collaborations and initiatives, to implement scalable roadmaps, actions, activities, and projects, to reduce the digital divide and towards more inclusive, equal access and use of ICTs for all.

162. ITU activities and resources on ICT Accessibility aim to contribute to ITU members' efforts to accelerate the implementation of digital accessibility as a means to enable digital inclusion and ensures inclusive communication for all people – regardless of their gender, age, ability or location.

163. These resources and tools include policy guidelines, toolkits, trainings (on-line/ face to face) ICT accessibility (in country) educational programmes, video tutorials; and in-country and regional assessments. Specific resources on COVID19 response and recovery were also developed. These resources were designed, developed, and made available in several UN languages to support ITU members in the regional and global implementation of ICT accessibility. Online trainings are delivered through the ITU Academy free of charge and self-paced, with localized content and the possibility of certification.

164. All ITU-D resources on ICT accessibility are delivered in accessible formats to ensure that persons with disabilities can also benefit. Examples of these resources are:

- The ITU toolkit "Towards building inclusive digital communities," and interactive self-assessment for ICT accessibility implementation (2021);
- Self-Paced online training courses such as: ICT Accessibility: the key to inclusive communication (currently available in: Arabic, English, French, Russian and Spanish), and Web Accessibility - the Cornerstone of an Inclusive Digital Society (currently available in: Arabic, English, French, Russian and Spanish). These training courses are available through ITU Academy, free of charge and provided in digitally accessible format (they can also be followed by persons with disabilities). If the knowledge acquired is successfully validated, the training courses offer ITU certification;
- ITU video-tutorial on the development of an in-country self-assessment (ITU toolkit, 2021);
- Video-tutorial on: ICT Accessibility: the key to achieving a digitally inclusive world (2021);
- ITU Report on the Information and Communication Technology (ICT) Accessibility Policy Review of the Republic of Serbia (2021);

- ITU regional assessment on ICT accessibility for the Africa Region (2021);
- ICT accessibility assessment report for the Europe region (2021);
- ITU guidelines on how to ensure that digital information, services and products are accessible by all people, including persons with disabilities during COVID-19 (2020, in Arabic, Chinese, English, French, Spanish, Russian). These guidelines were selected and translated by the UN COVID-19 emergency group into the 22 most spoken languages in the world;
- ITU regional assessment on ICT Accessibility for the Asia-Pacific region (2020);
- On-line self-paced training on: How to ensure inclusive digital communication during crises and emergency situations (2020, in English, French, Spanish);
- Video- tutorial on: How to ensure inclusive digital communication during crisis and emergency situation (2020, in English, French, Spanish);
- Updated and localized On-line self-paced training on ICT Accessibility: The key to inclusive communication (2020, in Arabic, English, French, Russian and Spanish);

165. For more information on the work and resources on ICT Accessibility see here: https://www.itu.int/en/ITU-D/Digital-Inclusion/Pages/ICT-digital-accessibility/default.aspx.

166. ITU Europe is hosting a Regional Forum for Europe on ": Accessible Europe: ICT 4 All Forum (itu.int)] on the 13-14 December 2023. Accessible Europe is held within the framework of the Regional Initiative for Europe 3 on "*Digital inclusion and skills development*" adopted by the World Telecommunication Development Conference 2021. The Forum mark the International Day of Persons with Disabilities, celebrated annually on the 3rd of December. The Forum is organized by the International Telecommunication Union (ITU) and the European Commission (EC), and co-organized by the AccessibleEU Resource Centre. It is hosted by Fundación ONCE, supported by the Government of Spain. This year edition will have a special focus on universal design, AI, emerging technologies, and Metaverse. It will also include a pitching session where stakeholders across the region will be invited to present their innovative solutions submitted to the call for good practices preceding Accessible Europe Forum. Attendees will have the opportunity to participate in a public vote to recognize the most impactful solutions presented.

167. The WSIS Prizes 2023 Winner for the Action Line C3 is **Community Network for Education**, Ecuador. Details of the project are available here.

168. ITU developed and is maintaining a database for following the transition from analogue to digital terrestrial television broadcasting: http://www.itu.int/en/ITU-D/Spectrum-Broadcasting/Pages/DSO/Default.aspx.

169. The **World Radiocommunication Conferences (WRC)** are held every three to four years. It is the job of WRC to review, and, if necessary, revise the Radio Regulations, the international treaty governing the use of the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits. Revisions are made on the

basis of an agenda determined by the ITU Council, which takes into account recommendations made by previous world Radiocommunication conferences. The Radio Regulations edition following the decisions of the WRC-15 and its Final Acts came into force on 1 January 2017. Further details about WRC are available here: https://www.itu.int/en/ITU-R/conferences/wrc/Pages/default.aspx.

170. The WRC 2023 (WRC-23) will be held from 20 November to 15 December 2023, hosted by the UAE. More details are available here.

171. The new releases of regulatory publications are available here: https://www.itu.int/en/publications/Pages/Newreleases.aspx. Further details about regulatory publications can be read here.

172. The ITU organizes World Radiocommunication Seminars (WRS) on a biennial basis, in complement to the cycle of Regional Radiocommunication Seminars (RRS). WRS deal with the use of the radio-frequency spectrum and the satellite orbits, and, in particular, with the application of the provisions of the ITU Radio Regulations. More information please visit: https://www.itu.int/wrs-22/.

Action Line C4: Capacity-Building

Related to SDGs: SDG 1 (1.b), SDG 2, SDG 3 (3.7, 3.b, 3.d), SDG 4 (4.4, 4.7), SDG 5 (5.5, 5.b), SDG 6 (6.a), SDG 12 (12.7, 12.8, 12.a, 12.b), SDG 13 (13.2, 13.3, 13.b), SDG 14 (14.a), SDG (16.a), SDG 17 (17.9, 17.18)

173. Within the framework of its mandate as facilitator for Action Line C4, the ITU, together with ITC-ILO, organized the facilitation meeting of Action Line C4 on *Understanding AI powered learning: Implications for developing countries*. The meeting was held virtually as part of the WSIS Forum 2023 virtual weeks. This session discussed how AI is changing learning practices, behaviours, and policies as well as the implications for developing countries.

174. Several issues were discussed during the meeting, including:

- Artificial Intelligence (AI) has the potential to bring about transformational change, especially in the education sector. AI-enabled technologies are reshuffling the education paradigm and can reshape the future of skills development.
- New digital learning and collaboration solutions, such as Augmented Reality (AR) and Virtual Reality (VR), are expanding the outreach and impact of learning programs. They also provide new resources for learning specialists, curriculum designers, and trainers.
- Connectivity and digital inclusion remain persistent challenges as AI-enabled tools are likely to widen the existing digital skills gap.

- Limited AI-related research and development, along with the lack of common understanding of AI concepts among the public (referred to as "conceptual confusion"), represent significant barriers.

- The gradual integration of Artificial Intelligence into the education ecosystem may come at the expense of the social dimension of learning and lead to a lack of human interaction. Additionally, the reliability of learning content may be compromised.

- There is a growing importance of green skills and jobs and the interconnectedness between AI and sustainability.

- The International Community has a critical role in mitigating some of the challenges posed by AI by providing technical assistance to member states in developing AI-related policies and regulations and strengthening data governance frameworks.

  Data-driven evidence-based decision making is essential and requires a long-term structural approach.

175. Please find the complete details on session and the outcomes here.

176. The Action Line 4 thematic is linked to many SDGs.

    - SDG 1: development of domestic policies to ensure that ICTs are fully integrated in education and training at all levels. Creation of policy frameworks requires stakeholder engagement, analysis and interpretation of data for targeted policy interventions which can be achieved through skills development programs.

    - SDG 2: With the emergence of e-agriculture and the growing need for the knowledge in the use of ICT's, capacity building interventions focused at development and promotion of programmes to eradicate illiteracy using ICTs at national, regional and international levels, will contribute to knowledge growth and inclusion. It also focuses on building the capacity to use ICT tools to increase crop production, adopt modern farming methods, predict weather patterns, and in the process work towards eliminating hunger and creating food security.

    - SDG 3: To support research and strengthen capacity of developing countries for early warning, risk reduction and management of national global health risks, activities include design of specific training programmes in the use of ICTs in order to meet the educational needs of information professionals, such as archivists, librarians, museum professionals, scientists, teachers, journalists, postal workers and other relevant professional groups which focuses not only on new methods and techniques for the development and provision of information and communication services, but also on relevant management skills to ensure the best use of technologies.

    - SDG 4: Action Line C4 focuses on development and promotion of programmes to eradicate illiteracy using ICTs at national, regional and international levels, with the aim of increasing the number of people with relevant ICT skills and to facilitate employment and entrepreneurship in the ICT sector.

- SDG 5: Work on removing the gender barriers to ICT education and training and promoting equal training opportunities in ICT-related fields for women and girls, is part of the action line, with early intervention programmes in science and technology targeting young girls with the aim of increasing the number of women in ICT careers as well as promotion the exchange of best practices on the integration of gender perspectives in ICT education.

- SDG 6: Development of distance learning, training and other forms of education and training as part of capacity building programs, is part of the capacity building initiatives that supports countries interventions giving special attention to developing countries and especially LDCs in different levels of human resources development.

- SDG 12: Raising awareness on sustainable consumption and production in today's era requires the use of technology. The action line therefore impacts on this SDG by enhancing technological capacity of countries through training and development initiatives that target ICT's and related areas, as well as building a more inclusive information society.

- SDG 13: WSIS Action Line C4 promotes creation by governments, in cooperation with other stakeholders, of programs for capacity building with an emphasis on building a critical mass of qualified and skilled ICT professionals and experts.

- SDG 14: Empowering communities in ICT use and promoting the production of useful and socially meaningful content is a capacity building intervention that can increase scientific knowledge and promote innovation and research.

- SDG 16: WSIS Action Line C4 focuses on promotion of international and regional cooperation in the field of capacity building, including country programmes developed by the United Nations and its specialized agencies.

- SDG 17: Capacity building initiatives contributes to the SDG through the design and implementation of regional and international cooperation activities to enhance the capacity, notably, of leaders and operational staff in developing countries and LDCs, to apply ICTs effectively in the whole range of educational activities. Also, through the launch of pilot projects to design new forms of ICT-based networking, linking education, training, and research institutions between and among developed and developing countries and countries with economies in transition.

177. The WSIS Prizes 2023 Winner for the Action Line C4 is **Mobile Connectivity for Teachers in Poor and Remote Areas Project**, Mexico. Details of the project are available here.

178. The ITU continues to support its **Centres of Excellence (CoEs)**. The Centres of Excellence (CoE) programme was launched by ITU at the turn of the millennium, with the aim to support capacity development in the field of information and communication technologies (ICTs) by offering continuous education to ICT professionals and executives in the public and private spheres through face-to-face, online or blended learning. The CoE initiative evolved over the years to become one of the ITU's key training delivery mechanisms. With

the support from multilateral and regional organizations, CoE networks have been established in a number of regions including Africa, the Americas, Arab States, Asia-Pacific, Commonwealth of Independent States (CIS) and Europe. Under the umbrella of the ITU Academy, these regional networks are brought together into a single global network sharing expertise, resources and capacity-building know-how in telecommunications and ICT training/education.

179. Following the adoption of the priority areas for the next four years by the World Telecommunication Development Conference (WTDC 2022), one of ITU's key training delivery mechanisms, the Centres of Excellence programme was replaced by the ITU Academy Training Centres (ATCs) programme. A total of 14 centres were selected initially to begin working in 2023. More details please visit: https://academy.itu.int/itu-d/projects-activities/itu-academy-training-centres.

180. As the main ITU umbrella for training activities, the ITU Academy offers several courses under the ITU Spectrum Management Training Programme (SMTP). The SMTP comprises a set of high-level training materials in all areas of spectrum management, which were developed by experts drawn from within and outside ITU.

181. ITU launched the Digital Transformation Centres (DTC) initiative. The initiative seeks to create a global network of centres, whose main purpose is to develop digital skills mainly at basic and intermediate level for citizens. More information is available here: https://academy.itu.int/itu-d/projects-activities/digital-transformation-centres-initiative.

182. The ITU Academy website has been redeveloped and redesigned to provide users with a user-friendly interface, easier navigation, and modern feel and look. The innovative design and features transform the new ITU Academy into the main online gateway to all ITU's capacity development activities. The primary objective of the new website is to harmonize and integrate all ITU capacity development products and services. A steep user growth was experienced in 2020, which has also continued into 2021, largely due to COVID-19 pandemic. ITU Academy has also expanded its course offerings and now has over 150 courses promoted in the first 3 quarters of the year.

183. Close contact has continued with the BDT on work of mutual interest to ITU R and ITU D. The BR has participated in relevant meetings of ITU D Study Groups, Rapporteur Groups and TDAG, where liaison activities have involved topics such as spectrum management, digital broadcasting and migration from analogue systems, transition towards and implementation of IMT, and broadband wireless access technologies. These topics are in addition to the collaboration undertaken through ITU D Question 9-3/2 that calls for the identification of study topics in ITU R (and ITU T) considered of particular interest to developing countries.

184. During 2023, as part of the ITU-R capacity building programme, two Regional Radiocommunication Seminars have been conducted: RRS-23-Americas (8 – 12 May 2023) and RRS-23-Africa (20-23 June 2023), in order to foster knowledge on spectrum management, the Master International Frequency Register (MIFR), the ITU Radio Regulations, the World Radiocommunication Conference, the Radiocommunication Assembly and agenda of WRC-23. These seminars also included training on ICT tools for frequency notifications as well as information on BR and BDT spectrum management

activities as well as tutorials on the use of these tools for notification procedures of terrestrial stations and space stations. Moreover, each Seminar was culminated with a Forum on topics of interest for each region.

185. ITU Europe is conducting a digital skills assessment for the elderly, following a request issued at the Regional Development Forum (RDF) for Europe, by the Ministry of Infrastructure and Energy of Albania. The objective of this assessment is to determine the digital skills needs of the elderly population in Albania. The project will develop a strategy for an intergenerational approach to capacity building. This will be accompanied by a detailed roll-out action plan specifying the activities to be implemented.

Action Line C7: ICT Applications

Action Line C7: E-Government

Related to the SDGs: SGD 9 (9.c), SDG 16 (16.6, 16.7, 16.10), SDG 17 (17.8)

186. The Action Line C7: E-Government Facilitation Meeting was held on Thursday, 16 March 2023 together with the Action Lines C1 and C11. The title of this session was "Future of e-government assessment in the era of AI: Opportunities and Challenges ". Concerning the E-Government issues, the session discussed new tools and models to better measure digital government and utilize e-government to accelerate the 2030 Agenda. Find more details on this session here.

187. The WSIS Prizes 2023 Winner for the Action Line C7 on e-Government is **AuditOnline: Facilitating Audit in Government**, India. Details of the project are available here.

188. ITU-Estonia-GIZ-DIAL Digital Government project: the GovStack initiative

ITU in collaboration with Estonia, GIZ/Germany and the Digital Impact Alliance have jointly launched the GovStack initiative [5], which is an effort to accelerate governments digitalization and Transformation towards the attainment of SDG.

The initiative is an expert community-driven multistakeholder effort aimed at assisting countries to build a shared "Digital Government Services Infrastructure" or a "Government Technology Stack" that is constituted of a set of reusable common foundational digital capabilities and services – called also Building Blocks – such as Digital ID, Information Exchange, Payments Gateway, Registrations, Security, etc. that can be used by the whole-of-government through any government agency or department to build new government digital services without having to design, test and operate the underlying systems and infrastructure themselves. This "digital public services infrastructure" effectively sits 'on top' of the internet, is ubiquitous, available for all (i.e., as a utility) and provides the basic requirements to accelerate a sustainable digital economy. It is therefore the engine or the

[5] www.govstack.global

heart of green digital transformation. It will reduce the time and effort needed to introduce new truly green and sustainable digital services that could be scaled up and upgraded in a more agile, accelerated, and cost-effective manner.

189. The WSIS Digital Service Design Prize 2023 was initially announced at the 2022 WSIS Forum by Ambassador-at-large for Digital Affairs Nele Leosk of Estonia and the Head of the Digital Development Programme and GIZ Björn Richter. The Prize specifically spotlights innovative and impactful government service designs that are based on a building block approach. The Prize will highlight digital service designs that address citizen/resident need(s) through improving, innovating, or developing government processes, and are designed for scalability, extensibility, and adaptability to a variety of generic workflows. The Prize supported by GovStack founding partners: ITU, the Digital Impact Alliance, GIZ, and Republic of Estonia. **The e-Governance Agency of Moldova's submission of Front-Office Digitization (FOD) won the 2023 WSIS Digital Service Design Special Prize.** Read more about their submission here.

190. ITU is launching a "Spotlight Series on Human-Centric Digital Transformation" which builds upon the ITU Regional Development Forum for Europe (RDF-EUR) submission from the Republic of Poland and the Czech Republic on such a topic. This initiative is therefore rolled out in collaboration with both countries and in cooperation with all Countries of the Europe Region. This initiative is held in line with ITU Regional Initiatives for Europe 2 on "Digital Transformation for Resilience," as well as 3 on "Digital Skills and Inclusion" and 4 on "Trust and Security in the use of ICTs". It will consist of a series of workshops that will aim to deepen the understanding of 'human-by-design' digital features, by showcasing concrete examples of human-centric digital transformation projects in Europe within government services, education, and health, pinpointing challenges, opportunities, and emerging trends in the field. Case studies as well as insights and policy recommendations on good practices will be collated in a Compendium, aimed to inform future human-centered digital (services) development strategies both within Europe and globally.

191. Smart Villages Niger

The Smart Villages project in Niger aims to transform 20 rural villages into smart villages during its first phase. It will deploy a range of ICT-enabled solutions to the villages selected by the Government of Niger based on the successful proof of concept that has been conducted earlier in two villages in Niger. It will bring about a positive change in the quality of life by providing connectivity and new ICT-enabled services to the local communities while also promoting interoperability, cooperation, and holistic demand-driven response to the SDG-related needs.

192. Smart Islands[6]

A Joint Programme (JP) was developed related to "Accelerating SDG achievement through digital transformation to strengthen community resilience in Micronesia" to be funded by the Joint SDG Fund. The programme adopts an SDG-based approach to digital transformation across Micronesian countries. Digital technologies, as experienced

[6] Smart Islands (itu.int)

worldwide during the pandemic, serve as a powerful tool to facilitate the much needed social and economic transformation towards the achievement of the SDGs as Pacific Islands Countries continue to embark on the digital transformation journey. The traditional supply-side, siloed approaches to providing public goods and services do not address the problem in a holistic and sustainable manner. An SDG based integrated planning approach (policy, legislation, strategy and delivery of digital services) customized to local needs and priorities can address multiple high priority challenges experienced by the citizens through digital devices and service.

Fundamentally, two outcomes are targeted: Outcome 1: Promoting enabling policy and legislative framework that benefit communities and vulnerable groups that accelerate achieving SDGs and digital transformation (including internet development). Outcome 2: Access to resilient broadband connectivity facilitated through pilots in at least 5 remote islands and villages, one each in the 5 countries, to accelerate their digital transformation to smart islands / digital villages with access to a range of digitally enabled services that meaningfully improve: livelihoods; healthcare; the enjoyment of human rights; skills in harnessing the digitally enabled services; education and job opportunities, food availability and nutrition; digital finance and information; response to natural disasters; maritime security.

193. The project addresses the need of interventions that would help African countries to transform into digital economies and to adopt e-applications geared to sustainable development in various aspects of African economies. The project provides a model for assistance in the development of digital inclusive services and interventions specifically targeted at achieving social and economic development and inclusion through improving digital literacy and access. The project seeks to establish a model in Niger that could be replicated in other countries in the region by learning from experiences and lessons.

Action Line C7: E-Health

Related to the SDGs: e-health: SDG 1 (1.3, 1.4, 1.5), SDG 2 (2.1,2.2), SDG 3 (3.3, 3.8), SDG 5 (5.6, 5.b), SDG 17 (17.8, 17.19)

194. ITU/WHO organised WSIS Action Line Facilitation Meeting C7: E-Health on Friday, 17 March 2023. The theme of the meeting was "The role of the Global Strategy on Digital Health 2020-2025 in strengthening country's autonomy in fast tracking UHC and the health related SDGs". More details on this session here.

195. The WSIS Prizes 2023 Winner for Action Line C7 on E-Health is **Bone Health New Zealand**, New Zealand. Details of the project are available here.

196. The WHO-ITU have initiated a project (2017-2021) to establish an mHealth Knowledge and Innovation Hub through financial support the European Commission (EC) Horizon2020 Programme. This will enable both the development of national mHealth interventions in selected EU member states to champion the uptake of mHealth and the foundation and maintenance of a centralised 'Knowledge and Innovations Hub for mHealth' to monitor and enable mHealth adoption and innovation.

197. ITU developed content for the specialized multimedia courses focusing on the use of ICTs in healthcare, including telemedicine and courses for IT specialists on the maintenance of medical information systems (jointly with Odessa National Academy of Telecommunications, Ukraine).

198. In the 2017-2021 study period this topic is addressed by ITU-D Study Group 2 *Question 2/2: Telecommunications/ICTs for e-health.* The final report from the 2014-2017 study period on "Information and telecommunications/ICTs for e-health" is available at the following link.

199. ITU-T study groups developed the following Recommendations and other texts:

- **ITU-T F.780.2 (revised) "Accessibility of telehealth services"** gives the algorithm for the fullband (FB) version of the E-model as the common ITU-T transmission rating model for planning speech services that provide FB speech transmission (20-20000 Hz). This computational model can be useful to transmission planners, to help ensure that users will be satisfied with end-to-end transmission performance. The primary output of the model is a scalar rating of transmission quality. A major feature of this model is the use of transmission impairment factors that reflect the effects of different types of degradations occurring on the entire transmission path, mouth-to-ear. This FB-E-model is an adapted version of the narrowband (NB) (300-3400 Hz) and wideband (WB) (50-7000 Hz) E-models, which are described in Recommendations ITU-T G.107 (NB) and ITU-T G.107.1 (WB). It does not replace the NB or the WB E-model. Instead, it describes a separate FB version of the model that uses, within limits, similar concepts and input parameters as the NB and WB E-models.
- **ITU-T F.780.3 "Use cases and requirements for ultra-high-definition teleconsulting system"** It recommends the framework, functional requirements, and performance requirements of UHD teleconsulting system which are the necessary hardware and software foundations for teleconsultation. Finally, the Recommendation gives two application cases of UHD teleconsulting system in Appendix I, including the roles of different participants, as well as the teleconsultation process. The Recommendation is suitable for the development, construction and evaluation of UHD teleconsulting system in different countries and regions.
- **ITU-T F.780.4 "Reference framework, requirements and scenarios for telemedicine systems" (under approval)** describes the reference framework, requirements and scenarios of telemedicine system. Telemedicine system is an important application of ICT in medical field, under the background of unbalanced medical resources, which can realize the optimal allocation of medical resources and benefit people in areas with less developed medical resources. It recommends the framework, functional requirements, and scenarios of telemedicine system which are the necessary hardware and software foundations for telemedicine. The Recommendation is suitable for the development, construction and evaluation of telemedicine system in different countries and regions.
- **ITU-T H.845.10 "Conformance of ITU-T H.810 personal health system: Personal Health Devices interface Part 5J: Insulin pump**" This edition includes the

corrections approved in ITU-T H.845.10 (2017) Corrigendum 1 (11/2017), and the maintenance contents from ISO/IEEE 11073-20601:2022 and ISO/IEEE 11073-10419:2019 (Insulin Pump) versions.

200. Jointly with WHO, experts started work on a new ITU-T H.SL-ES addressing safe listening in video gaming and esports and work progressed the WHO-ITU Technical Paper HSTP-SLD-Venue "Guideline on safe listening at venues and events". One new Recommendation was completed for ITU-T F.780.4 "Reference framework, requirements and scenarios for telemedicine systems" that describes the reference framework, requirements and scenarios of telemedicine system. Telemedicine system is an important application of ICT in medical field, under the background of unbalanced medical resources, which can realize the optimal allocation of medical resources and benefit people in areas with less developed medical resources. It recommends the framework, functional requirements, and scenarios of telemedicine system which are the necessary hardware and software foundations for telemedicine. The Recommendation is suitable for the development, construction and evaluation of telemedicine system in different countries and regions.

201. The Radio Regulations defines, under RR No. 1.15, the *industrial, scientific and medical (ISM) applications* (of radio frequency energy) as: *"*Operation of equipment or appliances designed to generate and use locally radio frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of *telecommunications*." Frequencies for the use of ISM applications are identified in the Radio Regulations.

202. ITU-R Study Group 1 identified some frequency ranges for Short Range Devices (SRDs) that are used in some health applications (e.g. Assistive Listening Systems).

203. ITU-R Study Group 5 developed Recommendation ITU-R M.1076 on impaired hearing solutions.

204. In February 2021, Recommendation ITU-R M.2150-0 on "Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT-2020)" (developed under the responsibility of ITU-R Study Group 5) was approved. Similar to previous mobile generation technologies, this work is the basis for the development of 5G systems that provides great improvements and benefits to several ICT applications, including e-health, e-agriculture, e-manufacturing, intelligent transport systems, smart cities and traffic control, etc., to facilitate the development of the digital economy.

205. On March 13 at WSIS, a session titled "GovTech 4 Impact: Executive experience sharing on digital public service development in Europe" focused on digital public service developments in Europe. It emphasized the potential of GovTech to promote sustainable growth, enhance public services, and increase citizen engagement and explored how ICTs enable governments to tackle global challenges while fostering transparency and accountability. The discussion underscored how digital transformation improves service accessibility, reduces disparities, and amplifies citizen involvement in decisions. It also highlighted the importance of multi-stakeholder partnerships and capacity-building in using ICTs to achieve sustainable goals.

206. The engagement in the GovStack activities of the Government of Ukraine advanced significantly and were focused on the Ukrainian Platform of Registries, covering the Fit-

Gap analysis as well as exploring the possible future steps in relation to the platform prototype development and its integration into the GovStack Sandbox. These efforts informed the development of the GovStack compliance methodology, paving the way for other countries to join and confirm compliance with GovStack specifications. Also, the Regional Office is continuously supporting the country in positioning itself as a frontrunner in eGovernment.

Action Line C7: E-Agriculture

Related to the SDGs: e-agriculture: SDG 1 (1.5) , SDG 2 (2.3,2.4,2.a) , SDG 3(3.d), SDG 4, SDG 5 (5.5), SDG 8 (8.2) , SDG 9 (9.1, 9.c) , SDG 12 (12.8), SDG 13

207. The Action Line C7 E-Agriculture Facilitation meeting entitled "Digital in Action - Agrifood Systems Transformation for SDGs Achievement" was organised by Food and Agriculture Organization (FAO) on Thursday, 16 March 2023. The FAO Strategic Framework 2022-31 recognizes that digitalization across agrifood systems is key to achieve the SDGs. Digitalization, as a cross-cutting accelerator for development, remains a priority for FAO. To achieve the SDGs and fulfill FAO's international commitments at the broadest level, it is crucial to fully embrace and capitalize on the transformative capabilities and opportunities offered by digital technologies. This entails integrating digital as a key component in collective efforts and policies for agrifood systems. By serving as an enabling tool, digitalization can help bridge the gap and ensure inclusive development, leaving no one behind. The session highlighted concrete solutions and examples of digital capabilities as accelerators to achieve the Sustainable Development Goals, including FAO Digital Village Initiative, the Hand-in-Hand Initiative and its enabling tool, the Geospatial Platform. It aims at creating synergies enabling environment (e.g. policies, regulations, infrastructure, organizations, and socio-cultural changes) conducive to an inclusive and sustainable digitalization in agrifood systems and build back better in the wake of the COVID-19 pandemic. More information about the session is available here.

208. The WSIS Prizes 2023 Winner in category C7: e-Agriculture is **Digital AgroInsurance**, Kazakhstan. Details of the project are available here.

209. The series of most recent publications documenting success stories and promising practices in e-Agriculture are available here: https://www.itu.int/en/ITU-D/ICT-Applications/Pages/e-agriculture-in-action.aspx.

210. In the 2017-2021 study period this topic is addressed by ITU-D Study Group 2 Question 1/2: Creating smart cities and society: Employing information and communication technologies for sustainable social and economic development. The final report from the 2014-2017 study period on "Creating the smart society: Social and economic development through ICT applications" available at the following link.

211. Established by ITU-T Study Group 20 on "Internet of things (IoT) and smart cities and communities (SC&C), Focus Group on Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture (FG-AI4A), explores the potential of AI and IoT in supporting the

adoption of innovative practices for agricultural production, while examining the barriers related to their use, and best practices for their optimal deployment. In this context, FG-AI4A will focus on three key aspects including how to leverage AI and IoT and other emerging technologies for (i) data acquisition and management, (ii) conducting modelling, and (iii) facilitating effective communication for timely interventions, based on data derived related to agricultural production processes. The activities of FG-AI4A are being carried out in close collaboration with FAO. The Focus Group approved its first deliverable on Technical Report – Glossary – Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture.

212. ITU, in collaboration with FAO, developed Module 12 on Digital Agriculture as part of the Toolkit on Digital Transformation for People-Oriented Cities and Communities.

213. ITU and FAO have been collaborating to guide the European Union's pre-accession countries to meet the EU Digital Agriculture requirements, to support them in their journey to become equal members of the single EU market and implement their agricultural policies under the umbrella of European Common agricultural policy. To do so, ITU and FAO developed the "ITU-FAO Guidelines for pre-accession countries: Meeting the expectations of the EU in terms of digital agriculture" that went through a series of consultations.

Action Line C7: E-Environment

Related to SDGs: SGD 9 (9.4), SDG 11 (11.6, 11.b), SDG 13 (13.1, 13.3, 13.b), SDG 14, SDG 15

214. The Action Line C7: E-Environment Facilitation Meeting on *Harmonization of E-waste Data and Statistic* was held virtually on Tuesday, 2 May 2023 as part of the WSIS Forum 2023. It was co-organized by ITU and UNEP. The session brought attention to the importance of monitoring and measuring e-waste, including the internationally harmonized approach used by the Global E-waste Statistics Partnership (GESP). Panelists shared lessons learned from projects and experiences when measuring e-waste at the global, regional and national levels. More details on this session here.

215. This session was mainly linked to the following SDGs: 11,12, 13, and 17.

216. The WSIS Prizes 2023 Winner for the Action Line C7 on E-Environment is **Early Warning Epidemics System**, Saudi Arabia. Details of the project are available here.

217. The Development sector of the ITU has undertaken several activities falling under the Action Line c7 E-environment, in particular Emergency Telecommunications and e-waste. On the e-waste side the following activities have taken place:

1) **E-waste:**

1.1. Global E-waste Statistics Partnership

EACO Regional WEEE Data Harmonization:

ITU and the UNITAR-SCYCLE Programme, founding members of the Global E-waste Statistics Partnership (GESP), are working with the EACO secretariat on the *EACO Regional E-waste Data Harmonization* initiative to provide technical assistance to EACO member states. The project will support the relevant strategic actions of the Regional E-waste Management Strategy, including tracking progress and achievements, and harmonizing regional e-waste data collection. This will eventually result in a central database on e-waste within the EACO secretariat. The project's duration is from March 2021 to December 2022.

In order to assist the East African Communications Organization in tracking progress toward meeting a regional e-waste management strategy, and harmonizing the collection of e-waste data regionally, the GESP developed regional baseline surveys to collect e-waste data for households and businesses in Tanzania, Rwanda, Uganda, Burundi, Kenya, and South Sudan. The surveys were piloted by collecting e-waste data from 504 households and 300 businesses in Kenya, and 407 households and 100 businesses in Burundi.

Regional E-waste Monitors (Latin America, Western Balkans, CIS+ and Arab States):
Based on the success of the Global E-waste Monitors, a number of regional e-waste monitors have been produced through various projects. Regional E-waste Monitors include Latin America (2022), CIS+ Georgia (2021), and the Arab States (2021). A monitor is currently in development under an ITU-UNEP project for the Western Balkans.

In the Europe Region, the joint ITU-UNEP-UNITAR E-Waste Project for the Western Balkans is being rolled out in Albania, Bosnia and Herzegovina, Serbia, Montenegro and North Macedonia since 2022. The project trained 20+ national focal points across the countries and across entities (Ministries of ICTs, Ministries of Environment, and National Statistical Offices) on how to collect and analyze e-waste related data. This is along the development of a Regional E-Waste Monitor Report to analyse trends in the transboundary movement of e-waste, inform policymakers, industries, and businesses about regional e-waste data, and support the development of national and regional counter-measures through policies, regulations, awareness-raising, and industrial response. Such a Report will be launched in the end of 2023.

ITU is also working on securing funds for the 2023 Global E-waste Monitor which will present cutting-edge research into key areas such as the circular economy, green data centres, and the status of e-waste legislation globally.

Global E-waste Statistics Partnership website:
The GESP has achieved a series of milestones in its aim to provide access to detailed and reliable open data about e-waste within publications and via the GESP website. The website publicly visualizes e-waste indicators on e-waste generated and e-waste formally collected. The map feature also allows to explore country specific data and legislation system. A new and relevant *about us* video was created for the site.

E-waste Statistics Technical Assistance:
Regional capacity-building workshops have been conducted so far in East Africa, Latin America, Eastern Europe, and the Arab States. National capacity building has been provided in Botswana, Namibia, and Malawi, where national e-waste monitors are being finalised for publication, with the national statistics offices taking a lead in the quantification of e-waste generation, flows and importation of electronics. More than 360 people from 60 countries have been trained on the internationally adapted methodology. Where possible, the GESP involves South-South training and collaboration in workshops.

E-waste Statistics Blended E-learning:
An e-learning course was developed in order to transpose in-person e-waste statistics capacity building into a self-paced online course, through the ITU Academy. The course will allow for blended instruction between online and in-person delivery. Prior to attending in-person seminars, participants will have opportunity to collect the necessary data and get acclimated to the e-waste statistics tools by taking the online training, which will be by invitation only and offered over a 2 to 4-month period.

On 29 March 2023, a Roundtable on SDG 9 and 17 was held as part of the Regional Forum on Sustainable Development for the UNECE Region, organized by the UN Digitasl Transformation Group for Europe and Central with the lead of ITU Europe Office. The hybrid event was held both online and physically at the WMO Premises in Geneva, Switzerland. The second session of the roundtable was on green and digital and sustainable digital transformation and digital transformation for sustainability. The session discussed the effective policies or actions can governments implement to manage e-waste and make ICT and digital solutions and devices circular and sustainable and how can innovative ICT-based solutions and emerging technologies be leveraged to support governments in mitigating environmental risks and challenges. It included speakers from the European Commission (DG CNECT), the French Regulatory Authority for Electronic Communications, Posts and Press Distribution (ARCEP), ECMWF, PortugalSpace, and the StartUp Waste Ukraine Analytics.

1.2. E-waste management awareness raising

Fifth edition of International E-waste Day in collaboration with WEEE Forum:
BDT/EET collaborated with the WEEE Forum in promoting the fifth edition of International E-waste Day, which took place on 14 October 2021. Some of the areas of collaboration included a joint publication of a thought paper. The thought paper, *Global and Complementary Actions for Electronics Extended Producer Responsibility* presents complementary solutions and concepts to propel e-waste collection rates in line with EPR-based regulation, whilst also delving into the perceived need for an international regime around EPR to assist with harmonization efforts.

Industry collaboration on shaping a circular economy for the electronics industry:
ITU (both BDT and TSB) joined the Circular Electronics Partnership (CEP) as a partner. The CEP includes almost 50 companies who have come together to develop an industry vision

and roadmap until 2030 for the electronics sector. ITU took part in the panel discussion of the new CEP publication *Circular Electronics System Map: An Industry Blueprint for Action* this year at the multi-stakeholder dialogue hosted by CEP. The blueprint provides a common understanding of what circularity means for the electronics sector and guides companies and other stakeholders in creating a circular electronics system.

1.3. Development of national e-waste management strategies, policies and regulations

Implementing the EPR concept in policies and regulations for the sound management of e-waste

ITU has provided technical assistance to 9 Member States to support the development and implementation of national e-waste management strategies, policies, and regulations. Support was also given to the nations of Botswana, the Dominican Republic, Namibia, Rwanda, The Gambia, and Uzbekistan. The work, part of a larger project between UNEP and ITU on EPR concept application for sustainable e-waste management, implements UNEP and ITU tools for e-waste management in the context of policy and regulatory development. More than 133 stakeholders from the public sector and 145 from the private sector have been involved.

In Burundi, Botswana, Malawi and Namibia, ITU supported the development and validation of a draft national policy on the management of e-waste. In Dominican Republic, a national e-waste management regulation is being finalized and reviewed by the Minister of Environment.

An e-waste awareness raising campaign was launched at national level in Rwanda with the aim of increasing collection of e-waste at dedicated drop-off points, and sensitize the population on the issue of e-waste.

Through this programme of work and phase two of the project, ITU will continue to push on the global agenda of circular economy, in line with WTDC Resolution 66 (Rev. Kigali, 2022). This position will be stronger with UNEP as a key project partner.

A deep dive into EPR policy

ITU is creating an e-learning that will be offered on the ITU Academy without cost. Anyone in the public will be able to use the online training. It will primarily be utilized by ITU for public sector players to have a better grasp of how an EPR system can operate as they work on their national e-waste systems. The work is part of ITU's technical assistance to countries in the development of national e-waste management strategies, policies and regulations.

2) **Climate Change:**

2.1. Early warning systems

ITU is supporting the UN initiative *Early Warning Systems for all*. This climate change adaptation measure, announced by the UN Secretary General in March 2022, stipulates that

by 2027 every person in the world should be protected by an early warning system. To achieve this goal, ITU will highlight the opportunities brought by the growth in digital services to effectively reach and deliver alerts to people at risk; especially over mobile cellular networks, which reach a very large percentage of the population. ITU will work closely with WMO and other partners in supporting the UN Global Early Warning Initiative by engaging mobile network operators and regulators, as well as identifying and sharing best practices and expertise. WMO – which has been designated to lead on this initiative – will present an 'action plan' on the initiative during COP27, in Egypt in November 2022.

2.2. Graduate Institute research project

Through the Generation Connect Research Agenda with Academia initiative, ITU collaborated with a group of four postgraduate students from the Graduate Institute of International and Development Studies in Geneva on a capstone research project on *ICTs for Climate Change Action*. The goal of the initiative was to provide university students with an opportunity to engage in key areas of ITU's work.

The project aimed to understand how emerging digital technologies can be leveraged to mitigate and adapt to the impacts of climate change in the agricultural and energy sectors in Sub Saharan Africa. Through country focused case studies, the research explored how knowledge and technology transfer strategies can advance climate action in Mauritius, Ethiopia, Angola and Madagascar.

2.3. Masterclass at the Generation Connect Youth Summit

ITU developed a masterclass for the Generation Connect Global Youth Summit on *Applying the power of digital technologies for climate action*. The masterclass explored the importance of digital, geospatial and sensing technologies, and presented case-studies demonstrating how digital technologies can provide insights and effective solutions for climate action, and offered ideas for young people globally to get involved in citizen science projects to directly address climate and development challenges. In addition, the Opening Ceremony connected live with youth attending UNEP's Stockholm+50 to explore how young people can enhance sustainability to support a greener and circular economy.

2.4. Digital Public Goods Alliance Climate Change Adaption Call for Action and Report

The Digital Public Goods Alliance (DPGA), International Telecommunication Union (ITU), and the World Meteorological Organization (WMO) are issuing a call for weather, climate & hydrological information datasets to be made open and freely available as digital public goods. This was driven by the efforts of the DPGA's Climate Change Adaptation Community of Practice that focused on DPGs with the potential to impact climate and weather services. Read the report here.

2.5. Collecting data on ICT Industry GHG emissions

To support a green digital transition, ITU collects data from the ICT industry on their Greenhouse Gas (GHG) emissions. A collaborative report on Greening digital companies: Monitoring emissions and climate pledges was released in 2022 by the ITU and the World Benchmarking Alliance (WBA). It documents the emissions and energy use of 150 of the world's leading tech companies. In 2020, the analised enterprises' operating GHG emissions increased to 239 million tonnes, or 0.8% of global emissions. The availability and depth of climate data were found to have certain gaps, and these gaps need to be filled, which can be facilitated by increased country-level reporting of emissions. Therefore, ITU also aims to extend the focus of its tracking of ICT sector emissions by monitoring GHG emissions from country-specific ICT sectors. Building on and expanding the existing data set is important to shed light on the industry's green transition and to guarantee a more holistic approach to emissions reduction and acceleration of low-carbon or carbon-free operations.

2.6. Generation Connect Iconathon

The E-waste Iconathon was an icon design contest that aimed to raise awareness about the global e-waste issue, and leverage the participation of youth globally. Young people ages 18 to 29 were invited to take part and create a universal icon that represents the collection and take-back of e-waste for recycling. The contest was in line with the Generation Connect mission to engage youth and encourage their participation as equal partners alongside the leaders of today's digital change, empowering young people with the skills and opportunities to advance their vision of a connected future. The top 3 finalists attended the Youth Summit in Kigali, Rwanda, and the winner was selected by vote in the closing ceremony.

218. The Standardization sector of the ITU has undertaken several activities falling under the WSIS Action Line C7 e-Environment. The following Recommendations were developed:

- **ITU-T L.1023 (revised) "Assessment method for circular scoring"** outlines an assessment method for circularity scoring of information and communication technology (ICT) goods. The assessment method consists of three steps: 1) Setting the relevance and applicability (R) of each circularity indicator for the ICT goods at hand, 2) Assess the margin of improvement (MI) of each circularity indicator, 3) Calculate the circularity score (score) from 0 to 100% for the ICT good at hand for all three circularity aspects. This includes: – Using a predefined value matrix to identify the % score from 0 to 100 for each combination of R×MI. – Average the included circularity indicators for the ICT good at hand separately for all three circularity aspects: product durability, ability to recycle, repair, reuse, and upgrade from equipment and manufacturer level.
- **ITU-T L.1027 "Assessment of material efficiency of ICT network infrastructure goods (circular economy) part 5- server and data storage product disassembly and disassembly instruction"** utilises information compiled from stakeholders which can provide good insights into the specified content.

- **ITU-T L.1031 (revised) "Guideline for achieving the e-waste targets of the Connect 2030 Agenda" (under approval)** describes a three-step approach to achieve the e-waste targets set in the Connect 2030 Agenda. These steps consist of guidance on developing an e-waste inventory, approaches to design e-waste prevention and reduction programmes and the supportive measures required for successfully implementing the Connect 2030 e-waste targets. This Recommendation is intended to be utilized by relevant stakeholders to take their first step in addressing Target 3.2 of the Connect 2030 Agenda that is to increase the global e-waste recycling rate to 30% and Target 3.3 that is to raise the percentage of countries with e-waste legislation to 50%.
- **ITU-T L.1061 "Circular public procurement of information and communication technologies":** Green procurement policies, which focus on purchasing durable information and communication technology (ICT) equipment and recycling e-waste, can help reduce emissions and resource extractions and influence the market by increasing demand and stimulating research and product development. This Recommendation provides technical guidance to public sector organizations on improving their procurement practices to purchase more circular ICT goods and services. The Recommendation covers the purchase of ICT equipment such as personal computers, terminals, network equipment and servers, and imaging equipment, and recommends specific requirements in procurement to (1) minimise the generation of e-waste and its adverse effects, (2) maximise the use of energy efficient equipment, (3) maximize the useful life of equipment, and (4) maximize recyclability. It also covers design for e-waste prevention and procurement recommendations which are relevant for the management choices of the e-waste hierarchy, as well as specific requirements and guidance on procurement to enhance the energy efficiency, reduce Green House Gas (GHG) emissions to mitigate climate change and reduce the emissions of hazardous substances in e-waste.
- **ITU-T L.1070 "Global digital sustainable product passport opportunities to achieve a circular economy" (under approval)** provides an overview of global and common opportunities to represent sustainability, mainly environmental-related, details about digital technology products, either collective ICT product models, batches or individual ICT product items. These product details are intended to be represented in digital format instead of paper-based. The details can represent design-related information, products at the time of manufacturing, including relevant information for product transparency and a potential for a circular lifecycle, such as details related to the origin of materials composition, design, manufacturing, energy consumption, maintenance, repair, preparation for reuse, final recycling, and may include links to related documentation. Product details can include or relate to details that change over the lifespan of a product as a result of reconfiguration events, including repair, upgrade, usage, sale, and final recycling. The details should exclude any personal or business-sensitive information. The goal of the recommendation is to provide an overview of sustainability opportunities, environmental related, about product-related digital information common to all ICT products, with global scope for harmonisation, i.e. relevant to any region, that can support the development of the circular economy of ICT products. The product-

related digital information can be represented under digital technology, such as product identifiers, data formats, linked data, and system architectures. It relates to and can complement regional and global standards.

- **ITU-T L.1241 "Methodologies for evaluating the functionality and performance of power supply unit configured for servers" (under approval)** provides comprehensive evaluation methods of power supply unit configured for servers to evaluate the electrical performances, functionalities and safety aspect.
- **ITU-T L.1304 "Procurement Criteria for Sustainable Data Centres" (under approval)** provides comprehensive evaluation methods of power supply unit configured for servers to evaluate the electrical performances, functionalities and safety aspect.
- **ITU-T L.1306 "Specification of edge data center infrastructure"** makes systematic requirements on infrastructure including ICT equipment, power feedingsystem, cooling system, monitoring system, etc. to get green, safe, reliable, smart, energy-saving for edge data center.
- **ITU-T L.1333 "Carbon data intensity for network energy performance monitoring"**: To meet the targets of the Paris agreement, telecom operators, as other industries, need to set targets on their emission reduction to arrive at a net zero situation as reported in Recommendation [b-ITU-T L.1470]. In a moment in which the network traffic will increase, this Recommendation defines a KPI useful to evaluate network emission and give an indication on how a network reduce its emission due to the energy usage. This Recommendation defines a KPI called Network Carbon Intensity energy NCIe; also, it defines how to apply the Recommendation: which part of the network is covered and finally how to calculate the metric and continuously in network evolution. This Recommendation also defines correlation between the carbon intensity indicator and energy efficiency metric. The carbon KPI defined in this Recommendation refers to the energy efficiency metric defined in [ITU-T L.1331].
- **ITU-T L.1400 (revised) "Overview and general principles of methodologies for assessing the environmental impact of Information and Communication Terchnologies"** presents the general principles on assessing the environmental impact of information and communication technologies (ICT) and outlines the different methodologies that have been developed in the L.14xx-series. The Recommendation describes the intended usage of each Recommendation and the connections between them.
- **ITU-T L.1471 (revised) "Guidance and criteria for information and communication technology organizations on setting Net Zero targets and strategies"** seeks to guide information and communication technology (ICT) organizations in clarifying the meaning of Net Zero in the context of the ICT sector and setting Net Zero targets and strategies. It also identifies actions that would lead the sector towards Net Zero according to the trajectories described in Recommendation ITU-T L.1470.
- **ITU-T L.1480 "Enabling the Net Zero transition: Assessing how the use of ICT solutions impacts GHG emissions of other sectors"** provides methodology for assessing how the use of ICT solutions impacts GHG emissions of other sectors.

More specifically, the methodology provides guidance on the assessment of the use of ICT solutions covering the net second order effect (i.e. the resulting second order effect after accounting for the emissions due to the first order effects of the ICT solution), and the higher order effects such as rebound. By providing a structured methodological approach, it aims to improve consistency, transparency and comprehensiveness of assessments of how the use of ICT solutions impact GHG emissions over time.

- **ITU-T L.1481 "Guidance on how to address Connect2030 targets on net abatement"** provides guidelines on how to address the Connect 2030 greenhouse gas on net telecommunication/ICT-enabled Greenhouse Gas abatement. It is intended to be utilized by relevant stakeholders of the Connect 2030 ambitions, while considering the sustainable development goal (SDG) 13 and the objectives of the Paris Agreement and the Glasgow Climate Pact. It also presents examples of ICT solutions associated with a potential reduction of GHG emissions in other sectors.
- **ITU-T L.1630 "Framework of building infrastructure management system for sustainable city"**: One of the sustainable development goals of sustainable city is to build resilient and safe city assets. Building is one of the key city assets and closely related with circular and sustainable city. Typically, energy and firefighting equipment are key equipment within the building infrastructure, which may affect the safety of people. Currently, many energy and firefighting equipment are separately deployed and managed, so there exist gaps between energy equipment management and firefighting equipment management. This draft Recommendation defines the framework of building infrastructure management system which improves the sustainability of city, particularly building as a city asset. The framework provides a holistic management of building infrastructure. It also presents a service use cases composed of functional elements.
- **ITU-T L.Suppl.30 "ITU-T L.1700 – Setting up a low-cost sustainable telecommunication network for rural communications in developing countries using cellular network with capacity transfer"** provides guidance on the radio frequency-electromagnetic field (RF-EMF) compliance assessment considerations for IMT-2020 wireless networks also known as 5G. Given that the 5G technical standards have just been finalised and commercial 5G networks are now lunched in many countries.
- **ITU-T L.Suppl.30 "ITU-T L.1700 – Setting up a low-cost sustainable telecommunication network for rural communications in developing countries using cellular network with capacity transfer"** provides guidance on the radio frequency-electromagnetic field (RF-EMF) compliance assessment considerations for IMT-2020 wireless networks also known as 5G. Given that the 5G technical standards have just been finalised and commercial 5G networks are now lunched in many countries.
- **ITU-T L.Suppl.52 "Guidelines on the Implementation of environmental efficiency Criteria for AI and Other Emerging Technologies"** provides guidelines to policymakers, technologists, innovators, environmentalists, and other stakeholders from the technology industry, environmental sciences, and policy

arena, on the topic of environmental efficiency criteria to assess the environmental impacts of artificial intelligence and other emerging technologies. These guidelines aim to serve as common factors, rather than a comprehensive list, for the above-mentioned stakeholders to consider while developing, deploying, and promoting any piece of technology into the market and society.

- **ITU-T L.Suppl.53 "Computer processing, data management and energy perspective"** proposes a set of good practices to improve the energy efficiency of cyber-physical applications – making use of IoT, AI, and Digital Twins. First, the Supplement introduces the cyber-physical paradigm, engineering reference framework, and a couple of system deployments models. Secondly, it defines three end-to-end use case typologies to be addressed (i.e. monitoring application using smart IoT systems and AI software; smart application using Edge computing and Cloud data center; and simulation applications using Digital Twin pattern). Energy efficiency practices are discussed adopting a circular value-chain model that consists of three main steps: Data Storage; Data Transfer/Move; and Data Processing/Analytics. Finally, this Supplement offers a set of recommended practices relating to each component of the three end-to-end use case typologies.

- **ITU-T L.Suppl.54 "Guidance for assessing the GHG emissions consequences of the financial effects generated by ICT"** describes a guidance for assessing the GHG emissions consequences of a financial effects (gains or losses) generated by ICT, separately considering the user and the vendor financial benefits or losses from the solution. It thus assesses the GHG impact of this common case of rebound effect due to changes in behaviour.

- **ITU-T L.Suppl.55 "Environmental efficiency and impacts on United Nations Sustainable Development Goals of data centre and cloud computing"**: As the role of data centre and cloud computing keeps increasing, so are the concerns over their energy use and energy cost, and the associated impacts on climate change and environment. In recent years, the data centre and cloud industry has made great progress in enhancing energy efficiency and adopting renewable energy sources. However, a sole focus on energy efficiency may cause burden shifting and overlook other relevant environmental impacts stemming from other parts of the data centres' life cycle and cloud computing value chain.

  Therefore, to support the development of sustainable data centres and cloud computing services, this Supplement aims to explore the environmental sustainability of data centres during their entire life cycle, factoring in a broad spectrum of energy and environmental aspects that needs to be addressed to achieve the relevant United Nations Sustainable Development Goals (SDGs). An integrated approach addressing both technical and implementation challenges will be applied to yield actionable insights to policy makers and industry experts

- **ITU-T L.Suppl.56 "Guidelines for connecting cities and communities with the Sustainable Development Goal"** is based on the U4SSC report on "Connecting cities and communities with the Sustainable Development Goals" and provides an overview of how cities can use information and communication technologies (ICTs) to achieve the SDGs. It also maps the case studies to the various international agreements as well as the SDGs.

219. The ITU/WMO/UNEP Focus Group on Artificial Intelligence for Natural Disaster Management (FG-AI4NDM) was established in December 2020 to help lay the groundwork for best practices in the use of AI for: assisting with data collection and handling, improving modelling across spatiotemporal scales, and providing effective communication.

220. In particular Smart Sustainable Cities and Climate Change, Internet of Things, Energy Efficiency and E-waste, E-waste and EMF, and have developed important standards and recommendations in the area, please see the activities in detail below.

221. **Smart Sustainable Cities and Climate Change (Past Events)**

Events and Webinars on IoT, Smart Sustainable Cities, Data Management and Digital Transformation

- Episode #29: Decade of Healthy Aging: Role of Digital Technologies
  Virtual, 22 August 2023
- Episode #28: Digital transformation and Ethical use of technology for animals
  Virtual, 26 July 2023
- Episode #27: Digital transformation of testing: federated testbeds as a service
  Virtual, 21 June 2023
- ITU and UNIGE: A better future for all with international standards
  ITU headquarters, Geneva, 19 June 2023,
- Episode #26: Digital transformation of mobility: Paving the way for road safety
  Virtual, 14 June 2023
- Episode #25: STI Forum Side event on Leveraging the metaverse in cities to achieve the SDGs
  Virtual, 4 May 2023
- Episode #24: STI Forum Side event on Building back smarter and more sustainable cities through the United for Smart Sustainable Cities Initiative
  Virtual, 3 May 2023
- DT Episode #22: Digital water in smart sustainable cities
  Virtual, 14 March 2023
- DT4CC Episode #21: Digital Agriculture: Driving Digital Transformation for Food Security
  Virtual, 17 February 2023
- DT4CC Episode #20: A one-of-a-kind platform for digital transformation: the U4SSC Austrian Country Hub
  Virtual, 7 December 2022
- DT4CC Episode #19: Tourism in smart cities: Reimagining the road to digital tourism
  Virtual, 7 December 2022
- AI for Good webinar: Digital transformation for people-oriented cities and communities
  Virtual, 29 November 2022
- DT4CC Episode #18: Cities in the age of artificial intelligence: How to leverage technology for digital transformation
  Virtual, 23 November 2022
- DT4CC Episode #17: Emergency responses in smart cities: Driving resilience in the post-pandemic era
  Virtual, 22 November 2022

- ITU@COP27 Climate classroom - “Digital Transformation for People-oriented Cities and Communities”
  Virtual, 10 November 2022
- RECI Roundtable on “Sustainable and smart cities towards digital transformation”
  Palma de Mallorca, 10 October 2022
- RECI Special Session on U4SSC
  Palma de Mallorca, 11 October 2022
- Workshop on “Digital Agriculture at Scale: Sustainable Food Systems with IoT and AI”
  Seongnam, Korea, 24 August 2022
- DT4CC Episode 16: Procurement for Smart and Sustainable Cities: Innovative mechanisms for Digital Transformation
  Virtual, 9 September 2022
- Forum on Strengthening digital transformation in Latin America
  Guatemala, 7-8 July 2022
- Information Session on Toolkit on Digital Transformation for People-oriented Cities and Communities
  Virtual, 21 June 2022
- WSIS 2022 - Beyond smart cities = “Smart for all”
  Virtual, 10 May 2022
- STI Forum 2022 - Side Event on Building People-Oriented Cities Through Digital Transformation
  Virtual, 6 May 2022
- DT4CC Episode #15: Smart city platforms for an integrated management in smart sustainable cities
  Virtual, 28 April 2022
- DTC4CC Episode #14: Accelerating agricultural digital transformation through AI and IoT
  Virtual, 29 March 2022
- WSIS Forum 2022 workshop on "Towards People-Oriented Cities"
  Virtual, 29 March 2022
- AI for Good webinar: Towards digital agriculture: Expanding on the AI and IoT paradigm
  Virtual, 14 February 2022
- DTC4CC Episode #13: Architecting the Web of Things
  Virtual, 3 February 2022

Events and Webinars on ICTs, the Environment and Climate Change, EMFs (Past and Upcoming events)

- 14th Symposium on ICT, Environment and Climate Change (planned), Rome, Italy, 25 October 2022
- Workshop on Global Digital ICT Product Passport to achieve a Circular Economy, Virtual, 1 June 2022

- A Global Portal on Environment and Smart Sustainable Cities is being maintained and highlights the latest external resources related to six distinct topics, including; smart sustainable cities; cities’ actions to tackle Covid-19; energy efficient ICTs; climate change; e-waste management and circular economy; and frontier technologies (e.g. AI, IoT, blockchain). This Global Portal also provides link to ITU's IoT and SC&C Standards Roadmap.

222. **International Standards**

- ITU-T Study Group 5 on Environment, EMF and Circular Economy is responsible for the development of standards on the environmental aspects of ICT and digital technologies and protection of the environment, including electromagnetic phenomena and climate change. Study Group 5 will study how the digital transformation can be shaped to ensure it supports transitions towards more sustainable societies.
- Study Group 5 studies issues related to resistibility, human exposure to electromagnetic fields (EMF), circular economy, energy efficiency and climate change adaptation and mitigation. It develops international standards, guidelines, technical papers and assessment frameworks that support the sustainable use and deployment of ICTs and digital technologies, and evaluate the environmental performance, including biodiversity, of digital technologies such as, but not limited to, 5G, artificial intelligence (AI), smart manufacturing, automation, etc. Study Group 5 is also responsible for studying design methodologies and frameworks to reduce the volume and adverse environmental effects of e-waste and to support the transition towards a circular economy.
- ITU-T SG5 is the lead study group on electromagnetic compatibility, resistibility, lightning protection; soft error caused by particle radiations; human exposure to electromagnetic fields; circular economy and e-waste management and ICTs related to the environment, energy efficiency, clean energy and sustainable digitalization for climate actions.
- ITU's 'green ICT' standards are contributing to the reduction of the ICT sector's environmental footprint as well as those of other industry sectors.
- ITU's 'green ICT' standards are contributing to the reduction of the ICT sector's environmental footprint as well as those of other industry sectors.
- Taking into consideration the development of 5G systems, ITU-T SG5 is developing a series of international standards (ITU-T Recommendations, Supplements and Technical Reports) that will study the following environmental aspects of 5G: electromagnetic compatibility (EMC); electromagnetic fields (EMF); energy feeding and efficiency; and resistibility. The following Recommendations and Supplements have been approved or agreed:
    - **ITU-T K.20 (revised) "Resistibility of telecommunication equipment installed in a telecommunication centre to overvoltages and overcurrents"** specifies resistibility requirements and test procedures for telecommunication equipment that is attached to or installed within a telecommunication centre.

      Overvoltages and overcurrents covered by Recommendation ITU-T K.20 include surges due to lightning on or near the line plant, short-term induction from adjacent alternating current (AC) power lines or railway systems, earth potential rise due to power faults, direct contact between telecommunication lines and power lines, and electrostatic discharges (ESDs). The sources for overvoltages in internal lines, between equipment or racks, are mainly inductive coupling caused by lightning currents being conducted in nearby lightning strikes or lightning currents being conducted in nearby conductors.

- **ITU-T K.34 (revised) "Classification of electromagnetic environmental conditions for telecommunication equipment - Basic EMC Recommendation" (under approval)** defines electromagnetic environmental classes for telecommunication equipment covering all relevant electromagnetic environmental parameters. This Recommendation applies to telecommunication equipment installed in telecommunication centres, outdoor locations and customer premises. This is a basic EMC Recommendation for telecommunications.
- **ITU-T K.35 (revised) "Bonding configurations and earthing at remote electronic sites" (under approval)**: Bonding configurations, earthing, and the type of power distribution for equipment located at remote electronic sites are proposed, which are intended to promote harmony of installation and equipment configurations while providing for personnel safety and electromagnetic compatibility.
- **ITU-T K.45 (revised) "Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents"** specifies resistibility requirements and test procedures for telecommunication equipment installed between telecommunication centres and between a telecommunication centre and the customer's premises.

  Overvoltages or overcurrents covered by this Recommendation include surges due to lightning on or near the line plant, short-term induction from adjacent AC power lines or railway systems, earth potential rise due to power faults, direct contact between telecommunication lines and power lines and electrostatic discharges.
- **ITU-T K.60 (revised) "Emission levels and test methods for wireline telecommunication networks to minimize electromagnetic disturbance of radio services"** proposes a measurement method and target levels to guide administrations in case of interference with radio services. In addition, a methodology for solving the interference is discussed, and under what circumstances the case has to be forwarded to the national responsible body.
- **ITU-T K.78 (revised) "High altitude electromagnetic pulse immunity guide for telecommunication centres" (under approval)** specifies the radiated and conducted immunity requirements against a high altitude electromagnetic pulse (HEMP) for equipment installed in telecommunication centres for functions such as switching, transmission, radiocommunication, and power distribution. The requirements consist of immunity test methods and levels for telecommunication equipment in each installation condition. The telecommunication system can be more robust by applying surge protective devices (SPDs) for surge mitigation and electromagnetic screening to the building and/or equipment enclosures.
- **ITU-T K.80 (revised) "EMC requirements for telecommunication network equipment in the frequency range 1 GHz-40 GHz"** presents electromagnetic compatibility (EMC) requirements for all type of telecommunication equipment in the frequency range between 1 GHz and 40 GHz.
- **ITU-T K.93 (revised) "Immunity of home network devices to electromagnetic disturbances"** aims to ensure normal operation of home networking devices and

to provide a new additional immunity test method for broadband services, especially for devices that are sensitive to broadband interferences.

- **ITU-T K.136 (revised) "Electromagnetic compatibility requirements for radio telecommunication equipment"** specifies the electromagnetic compatibility (EMC) requirements and the test method for radio telecommunication equipment and associated ancillary equipment.
- **ITU-T K.143 (revised) "Immunity of home network devices to electromagnetic equipment"** provides guidance for design of lightning protection and requirements on surge suppressor in equipment from the human safety standpoint. Requirements for SPDs/SPCs in multiservice surge protective devices (MSPDs) external to the equipment and SPDs installed on lines in a building lie outside the scope of this Recommendation.
- **ITU-T K.145 (revised) "Assessment and management of compliance with radio frequency electromagnetic field exposure limits for workers at radiocommunication sites and facilities" (under approval)** includes guidance on the protection of workers against radio frequency electromagnetic fields (RF-EMFs) exposure in their working environments. Radio frequency (RF) workers range from installation engineers and tower climbers to R&D personnel and laboratory testing engineers. All of these RF workers are exposed to stronger RF-EMF fields than the general public. There are also RF informed workers who have been provided with information on RF-EMF safe working practices for a site as well as all other workers who are regarded as members of the public for the purposes of RF-EMF exposure limits. This Recommendation provides minimum general safety guidance for telecommunication RF workers around the world.
- **ITU-T K.147 (revised) "Protection of networked information technology equipment"** covers common one, two and four pair link implementations, their configurations, how surges are coupled into a system and what surge mitigation measures are used. Following this overview, the rationale for different surge and power fault test circuit approaches and when they are specified is given. Networked equipment can be subject to overvoltage and overcurrent transients. Both data and any powering services should be resistant to the expected environmental transients. Where equipment has multiple independent ports, such as central hubs, switches, or repeaters, then testing is required for inter-port resistibility. Resistibility testing needs to identify lightning transients coupled into a network by magnetic induction, earth potential rise, resistive coupling and transient coupling by a voltage-limiting operation of surge protective functions or flashover. Voltage limitation may convert common-mode surges into differential-mode surges in the signal path. It is also possible for alternating current mains power faults to couple into the network, which can necessitate the use of overcurrent protection.
- **ITU-T K.148 "Multiservice surge protective device application guide" (under approval)**: A Multiservice Surge Protective Device (MSPD) protects two or more services e.g. mains and telecommunications, and has a common bonding point for the service surge protective devices (SPDs) contained in the MSPD. This

Recommendation application guide on MSPDs explains their uses, required performance parameters and usage consequences.

- **ITU-T K.149 "Passive intermodulation test methods of array antenna systems in mobile communication systems" (under approval)** specifies methods for measuring passive intermodulation level of array antenna systems in mobile communication systems, including test equipment and test procedures. This Recommendation covers the following frequency ranges, but not limited to the following ranges: LTE 700, APT 700, LTE 800, Cellular 850, E-GSM 900, DCS 1800, PCS 1900, AWS 1700/2100, UMTS 2100 and LTE 2600 operating bands.
- **ITU-T K.150 "Information of semiconductor devices required for design of telecommunication equipment applying soft error mitigation measures" (under approval)** describes characteristic parameters and functions of semiconductor devices that a telecommunication equipment designer needs when implementing soft error mitigation measures. This Recommendation describes kinds of information expected to be supplied from semiconductor device vendors to designers for telecommunication equipment. The definition of expected information and objective to collect it are described firstly. It is described which semiconductor devices are targeted to collect information next. Finally, details of expected information to be collected are described for each target semiconductor devices.
- **ITU-T K.153 "Guidance on Determining the Compliance Boundaries (the exclusion zones) of radio transmitter installations" (under approval)** includes information on how the zones should be determined based on the data concerning operating frequencies and EIRP on each of the operating frequencies. It also includes information on cases in which there is no exclusion zones. For example, those on masts, especially in rural areas, do not need any materialization as the general public does not have any access to this zone and the access for the workers is also limited and existing usually in the front of the transmitting antennas. Furthermore, some other transmitters do not need any compliance boundary as the installed power level is too low.
- **ITU-T K.Suppl.31 to ITU-T K.118 "ITU-T K.118 – Requirements for lightning protection of fibre to the distribution point equipment – Modelling earth potential rise (EPR)"**: Since the publication of ITU-T Recommendation K.118, 2016, Requirements for lightning protection of fibre to the distribution point equipment, the system, often called G.fast (fast access to subscriber terminals) with RPF (reverse power feed), has had extensive deployment. This supplement provides an assessment earth potential rise (EPR) levels at the cabling link ends to the Distribution Point Unit (DPU) and the Customer Premises Equipment (CPE). Electrical lightning stresses on the connected equipment at the link ends are considered to arise from the lightning disturbances on the CPE powering source, differential EPR (earth potential rise) of the link ends and possibly magnetic induction to the link cable. This supplement mainly concerns itself with the link end EPR values.
- **ITU-T K.Suppl.32 "Case Studies of RF-EMF Assessment":** The RF-EMF exposure levels are varying depending on the environment in which they are taken and type

of radio communication systems that are in operation. This Technical Report presents results of case studies of 5G RF-EMF exposure levels taken in different conditions and areas. All results of assessment delivered by ITU-T members and include calculations and measurements of the 5G RF-EMF exposure levels in vicinity of different radio communication systems. The results included in this new Supplement provide information concerning the 5G RF-EMF exposure levels in real situations. The EMF exposure assessments are included in succeeding appendixes.

This new Supplement is mainly to solve the problem of EMF compliance assessments of 5G base station systems through the typical case studies including computation evaluation and measurement evaluation, and also provides the case support on implementation of the ITU-T K.Supplement 16 and IEC62232.

- ITU-T Study Group 5 completed the Focus Group on "Environmental Efficiency for Artificial Intelligence and other Emerging Technologies" (FG-AI4EE). The FG-AI4EE identifies the standardization gaps related to the environmental performance of AI and other emerging technologies including automation, augmented reality, virtual reality, extended reality, smart manufacturing, industry 5.0, cloud/edge computing, nanotechnology, 5G, among others. The focus group develops technical reports and technical specifications to address the environmental efficiency, as well as water and energy consumption of emerging technologies. The FG-AI4EE has already approved twelve technical reports or specification as follows:
    - Technical specification on Key performance indicators for small and medium enterprises to assess the achievement of the sustainable development goals.
    - Technical report on A method for intuitive human interaction with data model (Machine Learning & AI etc.).
    - Technical report on Requirements on energy efficiency measurement models and the role of AI and big data.
    - Technical specification on Guidelines on energy efficient blockchain systems.
    - Technical report on Smart energy saving of 5G base station: Based on AI and other emerging technologies to forecast and optimize the management of 5G wireless network energy consumption.
    - Technical report on Guidelines on the environmental efficiency of machine learning processes in supply chain management.
    - Technical Report on Guidelines on the use of digital twin of cities and communities for better climate change mitigation solutions
    - Technical Report on Best practices for graphical digital twins of smart cities
    - Technical Report on Computer processing, data management and energy perspective
    - Technical Report on Assessing environmentally efficient data centre and cloud computing in the framework of the UN sustainable development goals

- Technical Report on Guidelines on the implementation of eco-friendly criteria for AI and other emerging technologies
- Technical Report on Data center energy saving: Application of AI technology in improving energy efficiency of telecom equipment rooms and internet data center infrastructure

A Global Portal on Environment and smart sustainable cities highlights the latest external resources related to six distinct topics, including; smart sustainable cities; cities' actions to tackle Covid-19; energy efficient ICTs; climate change; e-waste management and circular economy; and frontier technologies (e.g. AI, IoT, blockchain).

Action Line C7: E-Science

Related to the SDGs: SDG 1 (1.5) , SDG 4 (4.7) , SDG 6 (6.1, 6.a) , SDG 7 (7.a), SDG 13 (13.1, 13.2, 13.3), SDG 14 (14.a), SDG 15 (15.9) , SDG 17 (17.6, 17.7)

223. UNESCO organised the WSIS Action Line Facilitation Meeting C7: E-Science on 17 March 2023 under the topic of "Post truth on Open Data, Disinformation and Climate Change: Can Technology help?". More details of the session here.

224. The WSIS Prizes 2023 Winner for the Action Line C7 on E-Science is Women In Tech Maldives, Maldives. Details of the project are available here.

225. ITU is one of the co-facilitators together with UNESCO, UNDESA and Regional Commissions, ILO, ITC, FAO, UPU, UNEP, WMO, UNCTAD, WHO, etc. for the eight areas of ICT applications that are covered by WSIS Action Line C7. ITU is running the ITU Academy for trainings on ICT related issues. (https://academy.itu.int/).

Action Line C7: E-Learning

Related to the SDG: SDG 4

226. As the co-facilitator of Action Line C7 on E-Learning, UNESCO organised a WSIS Action Line Facilitation Meeting entitled "Implementation of the UNESCO Recommendation on Open Educational Resources (OER)'' at the WSIS Forum 2023. Details of the session is available here.

227. During this session, UNESCO emphasized the importance of leveraging the UNESCO Recommendation on OER 2019 to guide governments through the crucial digital ecosystems needed for the establishment and maintenance of free, high quality open educational resources and platforms.

228. The WSIS Prizes 2023 Winner for the Action Line C7 on **E-Learning is BIPES (Individualized Personnel Training System**, Turkiye. Details of the project are available here.

229. As the lead agent for all ITU capacity building activities, the ITU Academy continues to produce publications as part of its main deliverables. Some activities on curriculum development are available on the following link: https://academy.itu.int/index.php/main-activities/curriculum-development.

Action Line C7: E-Employment

Related to the SDGs: SDG 4 and SDG 8

230. The Action Line C7: E-Employment Facilitation Meeting, co-organized by the ILO, was held on Monday, 13 March 2023. The topic of the meeting was "Towards decent work in the digital economy for forcibly displaced youth". Details of the session are available here.

231. The WSIS Prizes 2023 Winner in category c7: e-Employment is **Advance IT & Entrepreneurship Training and Incubation for young women**, The United Republic of Tanzania. Details of the project are available here.

Action Line C7: E-Business

Related to the SDGs: SDG 1 (1.4), SDG 2 (2.3), SDG 5 (5.b), SDG 8 (8.3, 8.9, 8.10), SDG 9 (9.3), SDG 17 (17.11)

232. The WSIS Action Line C7 E-Business Facilitation Meeting was held on Monday, 13 March 2023 as an integral component of the WSIS Forum 2023. The topic of the meeting was "Enabling women in eBusiness". It was held in cooperation with the UNCTAD (United Nations Conference on Trade and Development), the ITC (International Trade Centre) and the Universal Postal Union (UPU). This session discussed the value of role modelling, peer support, business mentorship, supporting institutions and strategic networking to catalyse digital female entrepreneurship, create e-business opportunities, and facilitate sustainable and inclusive trade. For more details on this meeting please see here.

233. The WSIS Prizes 2023 Winner for the Action Line C7 on E-Business is **Material Supermarket Revitalization Solution for Enterprises and Institutions**, China. Details of the project are available here.

Action Line C8: Cultural diversity and identity, linguistic diversity and local content

Related to SDGs: SDG 2, SDG 4 (4.7), SDG 6 (6.b), SDG 8 (8.3, 8.9), SDG 11 (11.4), SDG 12 (12.b)

234. The WSIS Action Line C8 Facilitation Meeting was held on Thursday, 16 March 2023 as an integral component of the WSIS Forum 2023 on the topic of "Cultural and Linguistic Diversity, and Local Content Promotion". It was organised by UNESCO as the lead facilitator of this Action Line. For more details on this meeting please see here.

235. The WSIS Prizes 2023 Winner for the Action Line C8 is **Africa Teen Geeks**, South Africa. Details of the project are available here.

236. Since 2005, the ITU-D Digital Inclusion group has developed a capacity building programme for indigenous communities. Developed in collaboration with El Fondo para el Desarrollo de los Pueblos Indígenas de América Latina y El Caribe (FILAC), the objective is to empower indigenous people and communities through technology and thus support their educational, social, and economic development, and to contribute to the self-sustainability of indigenous communities and their cultural legacy. Several training programmes have been organised, which benefited more than thousands of indigenous leaders from Latin America and the Caribbean. Many communities have benefited from trainings on innovative communication tools for strengthening ICT knowledge of indigenous communities - with a special focus on how to develop, manage and operate an indigenous community radio network, and other blended trainings such as the Training Programme for Technical Promoters in Indigenous Communities for the Generation, Development and Maintenance of Communication and Broadcasting Network Technologies. More information is available here: https://www.itu.int/en/ITU-D/Digital-Inclusion/Indigenous-Peoples/Pages/default.aspx.

Action Line C9: Media

Related to the SDGs: SDG 5 (5.b), SDG 9 (9.c), SDG 12 (12.8), SDG 16 (16.10)

237. The WSIS Action Line C9: Media meeting was held on Friday, 17 March 2023 organised by UNESCO. The topic of the meeting was “Digital platform regulation”. The main take aways of the session are the following:

    - When pursuing regulation for digital platforms there is a need to be clear about what is that we want to achieve and how is that we will achieve it. Once the objective is well set, there is a need to identify with clarity who would be the stakeholders / companies in the scope.

- Setting a standard base on human rights principles requires reminding everyone those principles and include them as a preamble so every stakeholder involve abides to them.
- There is an increase necessity to bring to the table the different companies and to find ways where they can engage with the different stakeholders in the different countries they operate.
- When it comes to regulating digital platforms, It is very important to find a correct balance between been to detailed (this can happen related to transparency considerations) or leave some flexibility for the operation (for instance in the case of content moderation).
- Regulating digital platforms requires a look at the advertising market.

More information of the session is available here.

238. The WSIS Prizes 2023 Winner for the Action Line C9 is **Strategic Communication to Counter Security Threats in the Disinformation Era**, Spain. Details of the project are available here.

239. A number of recommendations relevant to providing access to ICTs through terrestrial and satellite radiocommunication and broadcasting infrastructures have been established, and are under study currently, broadcasting infrastructures are particularly relevant in developing countries and/or underserved areas such as remote and sparsely populated areas.

240. Moreover, ITU-T carried out various studies for Internet Protocol TV (IPTV) that will enable enhanced, media rich delivery of content to users around the world, as well as Next Generation Networks (NGN) to reduce international imbalances affecting the media, particularly as regards infrastructure and technical resources. ITU is also working to enhance accessibility features of audiovisual media delivered by a number of delivery systems through the IRG-AVA.

241. ITU-T Study Group 16 approved the following standards:

- **ITU-T H.265 (revised) "High efficiency video coding" (under approval)** represents an evolution of the existing video coding Recommendations (ITU-T H.261, ITU-T H.262, ITU-T H.263 and ITU-T H.264) and was developed in response to the growing need for higher compression of moving pictures for various applications such as Internet streaming, communication, videoconferencing, digital storage media and television broadcasting. It is also designed to enable the use of the coded video representation in a flexible manner for a wide variety of network environments. The use of this Recommendation | International Standard allows motion video to be manipulated as a form of computer data and to be stored on various storage media, transmitted and received over existing and future networks and distributed on existing and future broadcasting channels. This revision adds the specification of additional levels (levels 6.3, 7, 7.1, and 7.2), the specification of level 8.5 for the video profiles, and also includes corrections to various minor defects in the prior content of the Specification. This Recommendation | International Standard was developed jointly with ISO/IEC JTC 1/SC 29 and corresponds in a technically aligned manner to ISO/IEC 23008-2.

- **ITU-T H.266.1 (revised) "Conformance specification for ITU-T H.266 versatile video coding" (under approval)** specifies tests for (non-exhaustive) testing to verify whether bitstreams and decoders meet the normative requirements specified in ITU-T H.266 | ISO/IEC 23090-3 versatile video coding (VVC). The bitstreams provided with this document correspond to the 04/2022 (V2) edition of Rec. ITU-T H.266. Relative to the previous edition, this version adds bitstreams for the 12-bit and 16-bit profiles that were added in the second edition of Rec. ITU-T H.266. This draft new Recommendation was developed collaboratively with ISO/IEC JTC 1/SC 29, and corresponds with ISO/IEC 23090-15 as technically aligned twin text. The conformance bitstreams needed for this Recommendation are available at the following link: https://www.itu.int/wftp3/av-arch/jvet-site/bitstream_exchange/VVC2ndEd/FDIS.zip

242. During WTDC-14 Digital broadcasting has been identified as one of the regional initiatives in several regions, and ITU members have recognized the importance of managing the transition smoothly. ITU, in cooperation with Korea, Japan, and Australia, has provided assistance on Digital Broadcasting Transition with updating Guidelines for roadmap development for world-wide, and developed roadmaps for Afghanistan, Fiji, Indonesia, Lao PDR, Solomon Islands, Vietnam, Vanuatu, Guyana, Gabon, Democratic Republic of the Congo, Equatorial Guinea, Bangladesh, Pakistan, Micronesia, Samoa, Myanmar, Timor-Leste, Kiribati, Tonga, Bhutan and Nauru.

243. Also, in cooperation with the Latin-American Development Bank (CAF), ITU provided support to 8 countries (Bolivia, Dominican Republic, Venezuela, Costa Rica, Panama, Colombia, Paraguay and Jamaica) in the Americas Region and translated the guidelines into Spanish.

244. In addition, 5 other countries in Latin-America were assisted within the BDT Operational Plan.

245. Within the framework of the ITU-Latin-American Development Bank (CAF), a summary report on the digital broadcasting roadmaps, which includes 12 countries, has been prepared.

246. Case studies on the experiences in digital terrestrial television broadcasting transition for Thailand, Japan and Australia have been prepared. Also a report was prepared on the Interactive Multimedia Services and Pay TV in ASP.

247. Several workshops were delivered on the subject together the BDT and the BR all around the world. On 17 June 2015, on the date of the analogue switch-off in UHF bands in Region 1, ITU organized a Symposium on the Digital Broadcasting Transition.

248. ITU participated in the EBU (2016 June) and ABU (2015 October) Technical Assembly meetings.

249. ITU-ABU organized Pacific Media Partnership Conference 2015: Partnering for Broadcasting, Apia Samoa, 25-27 August 2015, Apia, Samoa (50 participants from 20 countries)

250. Regional Seminar for Europe and CIS on "Spectrum Management and Broadcasting was held with around 70 participants" in Rome on 29-31 May 2017. In 9 sessions, 45

presentations were delivered on, among others, the Future of digital terrestrial television broadcasting, Digital dividend utilisation, IMT 2020 (5G), Spectrum needs of IoT, etc.

251. ITU developed and is maintaining a database for following the transition from analogue to digital terrestrial television broadcasting:

http://www.itu.int/en/ITU-D/Spectrum-Broadcasting/Pages/DSO/Default.aspx

252. ITU Membership outreach:

253. ITU-R Outreach activities include the information and assistance to membership, the publication of ITU-R outputs and their dissemination, the organization of, and the participation in, seminars and workshops, and the development and maintenance of communication and promotion tools. The purpose of these activities is to ensure that the outputs produced by the ITU-R Sector (regulations, recommendations, reports and handbooks) are disseminated worldwide and familiar to the ITU membership and to stakeholders of spectrum, and that they form the basis for the formulation of spectrum management policies and decisions and for the use of radiocommunications in general. To carry out these activities, the BR relies on close cooperation with the other Bureaus and Sectors, the ITU regional and area offices and the relevant international organisations and national authorities. Recently approved ITU-R outputs are available here: https://www.itu.int/dms_pub/itu-r/oth/0a/0e/R0A0E0000E80001PDFE.pdf

254. Member States of ITU and Sector Members participate actively in the work of the Radiocommunication Sector. Since its opening to the private sector, the ITU membership represents a cross-section of the industry, from the world's largest manufacturers, carriers, operators and system integrators to small, innovative players of the new information and communication technology field.

    Current members include:

    - 193 ITU Member States, which constitute the Union, set its mandate and contribute to the work of ITU as a whole;
    - Around 900 ITU Sector Members, Regional and International Organisations, and Academia (which participate in the work of a defined Sector (R, T or D)) and ITU Associates (which work within the framework of a specific Study Group). These include operating agencies, scientific or industrial organizations, financial and developmental institutions, other entities dealing with telecommunication matters, regional and other international telecommunication, standardization, financial or developmental organizations;

255. In its efforts to ensure the widest participation in the enhancement of worldwide communications and that the interests of all stakeholders are taken into consideration, ITU encourages new entities and organizations to join the Union as Sector Members or Associates. In addition, ITU seeks to further develop intellectual cooperation with educational institutions and universities.

Action Line C10: Ethical dimensions of the Information Society

Related to the SDGs: SDG 1, SDG 2, SDG 3, SDG 4, SDG 5, SDG 8, SDG 9, SDG 10, SDG 11, SDG 12, SDG 13, SDG 16, SDG 17.

256. UNESCO organised a WSIS Action Line C10 session on "The UNESCO Recommendation on the Ethics of Artificial Intelligence: Putting ethics at the heart of AI systems" on Thursday, 16 March 2023 at the WSIS Forum 2023. The session focused on the need to embed ethics at every stage of the AI system lifecycle and use UNESCO's Recommendation on the Ethics of AI in order to ensure a responsible and human-rights-based approach to ethical AI governance encompassing design, development, deployment, and procurement in a mutually supportive, inclusive, and holistic manner. Details of the session are available here.

257. The WSIS Prizes 2023 Winner for the Action Line C10 is **UAE Cyber Pulse**, United Arab Emirates. Details of the project are available here.

Action Line C11: International and Regional Cooperation

258. The Action Line C11 Facilitation Meeting was held on Thursday, 16 March 2023 together with the Action Lines C1 and C7:E-Government. The title of this session was "Future of e-government assessment in the era of AI: Opportunities and Challenges".

259. The WSIS Prizes 2023 Winner for the Action Line 11 International and Regional Cooperation is Enhance VR, Portugal. Details of the project are available here.

260. Healthy liaison has continued between ITU R Study Groups and other organizations, with due reference to Resolution ITU R 9, where required. The Bureau continued to maintain close cooperation with international and regional organizations with the following objectives:

    1) promote dialogue amongst bodies having common interests;

    2) improve coordination leading to more effective preparation for events such as WRCs; and

    3) keep ITU R abreast of relevant activities in other organizations for a more strategic planning of work programmes.

261. The Bureau continues its close collaboration with:

- international and regional organizations dealing with the use of spectrum, including the Regional Telecommunication Organizations recognized by the ITU for regional coordination (APT, ASMG, ATU, CEPT, CITEL and RCC); broadcasting organizations (ABU, ASBU, EBU and HFCC); and those focused on the use of specific radiocommunication systems and services (e.g., ITSO, ESOA, GSMA).

- 3GPP and IEEE, as well as several regional standardization organizations, given their importance and relevance to the work of ITU-R Study Group 5. Other notable areas of liaison with Study Groups activities include those with the World Meteorological

Organization (WMO), the World Health Organization (WHO), ISO and IEC (including CISPR).

- the International Maritime Organization (IMO), the International Mobile Satellite Organization (IMSO), Bureau International des Poids et Mesures (BIPM), the International Telecommunications Satellite Organization (ITSO), COSPAS-SARSAT, the International Committee of the Red Cross (CICR), the International Civil Aviation Organization (ICAO) with regard to the application of ITU treaty texts. BR experts also participated in various meetings of these organizations.

(d) WSIS Implementation at the Regional Level

262. In the outcomes of the UN General Assembly overall review on the implementation of the World Summit on the Information Society (WSIS) (GA Resolution A/70/125), regional commissions are invited to coordinate the implementation of the WSIS at the regional level.

263. UN Regional Commissions are working towards Regional WSIS Implementation and Review at the Regional Level. ESCAP is the chair (2023-2024) for the WSIS-UN Regional Commissions.

264. ESCAP adopted its resolution 72/10, mandating the ESCAP secretariat to support the member States and relevant stakeholders in the implementation of the WSIS action lines, and in particular, to hold a regional review of the implementation of the Summit action lines as part of the session of the Committee on Information and Communications Technology, Science, Technology and Innovation; and coordinate United Nations agencies and partners in the regional review and follow-up towards harmonized approaches in the implementation of the Summit.

265. ESCAP will organise its Seventh Session of the Asia-Pacific Information Superhighway (APIS) Steering Committee & Regional Review of the WSIS on 8-9 November in Yerevan, Armenia with remote participation.

(e) United Nations Group on the Information Society (UNGIS)

266. UNGIS was endorsed by the CEB in April 2006 and it serves as an interagency mechanism to coordinate substantive policy issues facing the United Nations system's implementation of the Geneva Plan of Action and Tunis Agenda for the Information Society adopted by the World Summit on the Information Society, thereby contributing to improving policy coherence in the UN system, as requested by the 2005 World Summit.

267. ITU and UNDP took over the Chairmanship of UNGIS for period 2023-2024. The Vice-Chairs are UNESCO, UNCTAD, and UN ESCAP.

268. ITU continues to provide secretariat support to UNGIS and maintains the official UNGIS webpage www.ungis.org.

269. UNGIS events/contributions to global processes:

a) WSIS/UNGIS Side Event at the ECOSOC Partnership Forum 2023 on WSIS Cooperation for Accelerating Progress on the SDGs

b) WSIS/UNGIS Side Event at 5th United Nations Conference on the Least Developed Countries (LDC5) on WSIS Action Lines and ICTs for building back better and accelerating the achievement of the SDGs in LDCs

c) UNGIS' contribution to the Global Digital Compact (GDC)

d) UNGIS input to HLPF 2023

e) WSIS/UNGIS Side Event at the HLPF 2023 on *Harnessing the Power of Digital Innovation for a Sustainable World Post-COVID-19 - WSIS Action Lines for Advancing the Achievement of SDGs*

f) UNGIS meeting at the IGF 2023

(f) Measuring the Information Society (Para113-119 of TAIS)

270. In 2022-2023, more than 180 statistical indicators from over 200 economies worldwide were collected through five annual questionnaires. The data were disseminated through the ITU website, ITU DataHub (an online portal), Digital development dashboard, printed publications such as the Global Connectivity Report, the Measuring Digital Development: Facts and Figures, and electronic download and USB-key of the 27th (July 2023) edition of the World Telecommunication/ICT Indicators database (WTID), available for both Windows and Mac users.

271. ITU is an active member of the Partnership on Measuring ICT for Development[7] and one of the three members of its Steering Committee, together with UNCTAD and UN DESA. The Partnership has been very active in tracking the progress of the WSIS Targets, has made a concerted effort to highlight the role that ICTs will play in achieving the SDGs and has taken a lead role in increasing awareness about the importance of ICT for development and in international ICT monitoring. The Partnership has developed a core list of ICT indicators as well as associated statistical standards and methodologies, in close consultation with experts from National Statistical Systems. The core list, which has been

[7] The Partnership on Measuring ICT for Development is an international, multi-stakeholder initiative that was launched in 2004 to improve the availability and quality of ICT data and indicators, particularly in developing countries. The Partnership has guided policy makers in producing ICT statistics that are crucial to informed decision-making, including through the identification of a core list of ICT indicators and methodologies to collect these indicators. The Partnership helps developing countries collect ICT statistics, particularly through capacity-building and hands-on training for national statistical offices, and collects and disseminates information society statistics. Its membership has grown from originally 11, to today 14 regional and international organisations: ITU, UNCTAD, UNDESA, UNESCO Institute for Statistics (UIS), ILO, UNEP-SBC, UNU-ViE SCYCLE, World Bank, UNECA, UNECLAC, UNESCAP, UNESCWA, EUROSTAT and OECD.

endorsed by the United Nations Statistical Commission, provides the basis for the production of ICT statistics in countries all over the world.

272. The Partnership is actively engaged in monitoring the Sustainable Development Goals. The 2030 Agenda for Sustainable Development recognizes that "the spread of information and communications technology and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide and to develop knowledge societies". Several SDG targets refer to ICTs and technology, highlighting the need to include specific ICT indicators in the monitoring framework. Nevertheless, in the global SDG indicator framework, which helps to monitor progress, identify challenges, and guide policy makers, out of 231 only 7 ICT indicators are included, covering 6 targets under Goals 4, 5, 9, and 17. Five of the seven indicators are collected and disseminated by the ITU.

273. The Partnership has also developed a thematic list of ICT indicators that could be used to measure ICT availability and use in sectors relevant to the SDGs that are not covered in the global SDG indicators framework. This list was presented during the 2019 WSIS Forum, and finalized after the WSIS Forum 2019, upon receiving feedback from stakeholders. The list was endorsed by the UN Statistical Commission in its 51st session.

274. During the WSIS Forum 2023, the Partnership organised a session on "ICT Indicators for monitoring international goals and targets", that was held on 16 March 2023. This session highlighted activities of Partners, including future plans to improve the quality and availability of data needed for monitoring the achievement of international goals and targets, such as those of the 2030 Agenda for Sustainable Development, the implementation of WSIS Action Lines, and the assessment of the Global Digital Compact. The session also discussed the current core list of ICT indicators defined by the Partnership and endorsed by the UN Statistical Commission in 2022, and their methodologies to collect the indicators, are sufficient to answer current and future policy making needs. The session addressed capacity building needs of countries and other challenges faced to produce official ICT statistics.

275. The 14th Meeting of the Expert Group on Telecommunication/ICT Indicators (EGTI) and the 11th Meeting of the Expert Group on ICT Household Indicators (EGH) took place back-to-back in a hybrid format, from 18 to 21 September 2023. More than 200 participants from national statistical offices, ministries, regulators, international and regional organizations, and the private sector attended these meetings. The topics that were discussed during the EGH meeting included a report of the subgroup on e-waste indicators in household surveys, a report of the subgroup on the development of indicators measuring OTT services (jointly with EGTI), a report of the subgroup on skills to aggregate the skills categories and a review of the household long questionnaire. The topics that were discussed during the EGTI meeting included a report of the subgroup on the development of indicators measuring OTT services (jointly with EGH), a report of the subgroup on measuring fixed broadband penetration, the outcomes of a pilot data collection of recently introduced indicators on mobile money, as well as presentations on measuring ICT prices, mobile money services and measuring satellite services.

276. The 18th World Telecommunication/ICT Indicators Symposium (WTIS-23) was held from 3 to 4 July 2023 in Geneva. It brought together government ministers, business leaders, regulators, national statisticians, academics, data producers, analysts, and partners to

discuss the latest trends in digital development and the related data aspects. Under the theme "Advancing the measurement agenda to achieve universal and meaningful connectivity", the Symposium highlighted the importance of adequately measuring the enablers of connectivity and showcase promising approaches.

277. The 2022 edition of **Measuring Digital Development: Facts and Figures** is available here. The publication offered a snapshot of the most important ICT indicators, including estimates for the current year. The 2023 estimate of the number of people connected was released on 12 September 2023 and is available here.

278. The M*ethodological guide on the use of mobile phone data: Measuring the Information Society (SDG ICT indicators)*, prepared in collaboration with experts from the Task Team on Mobile Phone Data under the UN Committee of Experts on Big Data and Data Science for Official Statistics (UN-CEBD) was released in November 2022. The Task Team is currently composed of more than 50 members and chaired by ITU. ITU has been active in exploring the use of mobile phone data for information society measurements and has implemented pilots in selected countries and organized sessions in global events including a side event to the 54th Session of the United Nations Statistical Commission and in the 7th International Conference on Big Data and Data Science for Official Statistics held in November 2022 in Yogyakarta, Indonesia.

279. As part of the implementation of the UN Secretary-General's Roadmap for Digital Cooperation, the ITU, the Office of the UN SG's Envoy on Technology and their partners, have established a set of aspirational targets for 2030 to help prioritize interventions, monitor progress, evaluate policy effectiveness, and galvanize efforts around achieving universal and meaningful connectivity by the end of the decade. Building on this groundwork, ITU and the European Commission (EC) have jointly designed the project "Promoting and measuring universal and meaningful digital connectivity". The project started in May 2023 and will run until 2026, with a budget of 3 million euros. Through three workstreams -- advocacy, measurement, and research – the project pursues four objectives: increasing awareness of universal and meaningful connectivity (UMC) as a policy imperative; improving the measurement and dissemination of UMC data; enhancing statistical capacity of national actors in measuring UM; and identifying better policies for achieving UMC.

(g) Maintaining the WSIS Stocktaking Database (Para 120, Tunis Agenda) and a portal for best practices and success stories (Para 28, Geneva Plan of Action).

280. The WSIS Stocktaking process has been maintained by ITU since 2004 as requested by the WSIS Outcomes (TAIS, Para 120). This **publicly accessible WSIS Stocktaking database**

(www.wsis.org/stocktaking), currently with more than 14,000 entries and a growing community of 450.000 stakeholders, is a unique global tool for collecting information and regular reporting on information and communication technology related initiatives and projects, carried out by governments, international organizations, the private sector, civil society, academia and other entities, in the context of 11 WSIS Action Lines.

281. In 2015, the UN General Assembly within the framework of the ten-year review of the WSIS (Res. A/70/125) called for a close alignment between the WSIS process and the 2030 Agenda for Sustainable Development (Res. A/70/1). The WSIS Stocktaking process responded by highlighting the contribution of 11 WSIS Action Lines to the achievement of 17 Sustainable Development Goals.

282. The United Nations Economic and Social Council ECOSOC Resolution 2020/12 on "Assessment of the progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society" reiterates the importance of sharing best practices at the global level, and, while recognizing excellence in the implementation of the projects and initiatives that further the WSIS goals, encourages all stakeholders to submit ICT-related projects and initiatives to the WSIS Stocktaking platform.

283. ITU is pleased to invite you to update and submit new entries online at www.wsis.org/stocktaking. Submitted activities were reflected in the **WSIS Stocktaking Report 2023**, that was released at the WSIS Forum 2023.

(h)Emergency Telecommunications (Para 91 of TAIS)

BDT events

284. BDT and the United States Telecommunication Training Institute (USTTI) jointly organized a public webinar on *"Building Disaster Resilience through Emergency Telecommunications"*. This webinar which took place on 15 and 16 December 2020, from 9h00 to 12h00 EST (15h00-18h00 CET), highlighted the role of emergency telecommunications for disaster risk reduction and management, and discussed best practices for increasing ICT resilience and capacity for saving lives and limiting the impact of natural and manmade hazards, including pandemics. This event was attended by over 100 participants from all over the world on both days.

285. During a virtual event that took place the 20th of January 2021, the Emergency Telecommunications Division launched three new online training modules to allow ITU to build capacity and increase knowledge on the topic of emergency telecommunications and to continue to build disaster resilience, even in times of the current pandemic. These modules cover the development of NETPs (based on the ITU Guidelines on NETPs), guidelines on organizing tabletop simulation exercises (based on the guide jointly developed with ETC) and information on the Tampere Convention and its benefits. The online event was attended by 162 participants from all over the world. **By 04 Oct. 2021, the number of participants that have taken the courses were the following: TTX = 143; 23 have earned the badge. Tampere = 147; 49 have earned the badge. NETPs = 293; 84 have earned the badge.**

286. BDT organized an online event to highlight the key findings indicated in the report *Women, ICT and Emergency Telecommunications: Opportunities and Constrains*. This event took

place on the 8th of March 2021 and brought together different experts who discussed how closing the digital gender divide can help to save more lives when disasters or emergencies strike.

287. As part of the WSIS Forum 2023, ITU jointly with UNEP organized a WSIS Action Line C7 on e-environment session on "Harmonization of E-waste Data and Statistics'', which was held virtually on 2 May 2023.

288. During the World Summit on the Information Society 2021, ITU in partnership with UNDRR, WMO and WBU, organized a High-Level Dialogue on "Disaster Risk Reduction Media Hub", a toolkit for news media professionals reporting on disasters and resilience, which took place on the 26 April 2021. The session emphasized the role and capacity of TV and radio technologies as the most trusted sources of information, and highlighted the crucial role that broadcast media organizations play in the early warning chain to deliver accurate and timely early warning messages to end-users before disasters strike. Panel discussions examined the importance of having access to safety information early enough and prior to a disaster, and the critical role that ICTS play in delivering early warnings and alerts. Panelists highlighted that collaborative efforts made by different agencies and stakeholders can accelerate action for saving lives and livelihoods.

289. On the 29th April 2021, during the Humanitarian Networks and Partnerships Week, ITU together with IFRC and WMO announced the Call to Action on Emergency Alerting. The goal is that all countries, by 2025, are able to enhance their emergency alerting by leveraging the Common Alerting Protocol (CAP). CAP is the international (ITU) standard format for exchanging all-hazard emergency alerts and warnings over all kinds of networks, including digital media. With increased risks of extreme weather and disasters, the public needs to have an even greater awareness of the risks they face. Information shared at the right time, in an understandable format, by trusted sources, can be the most effective life-saving tool in the event of an emergency. Early warning systems have improved over the years, but people continue to perish and suffer from hazard threats because, too often, early warning messages arrive too late, are not understandable enough, or do not provide clear guidance. The adoption of CAP is an important step for better disaster management.

290. On July 6th, EET partnered with ITU-TSB's Focus Group on AI for Natural Disaster Management (FG-AI4NDM) to host a 60-minute session during the Emerging Technology for Connectivity week (5 to 9 July 2021). Speakers included senior representatives from ITU-BDT, ITU-TSB, WMO, WFP, and the University of Oregon. This session, attended by over 140 participants, discussed new applications of emerging technology, or novel use of existing technology, in the context of ICTs for disaster management. The event presented a number of initiatives that use emerging technologies to advance disaster forecasting and response, including AI and ML, drones, satellites, big data, and 3D printing, with particular focus on LDCs, landlocked developing countries (LLDCs), and small island developing states (SIDS). The session also introduced the concept of a new repository of case studies and subject matter experts that ITU would like to build to connect relevant stakeholders from industry, the public sector, and academia.

291. The ITU Arab Regional Office in collaboration with the Telecommunications Regulatory Authority (TRA) of the Sultanate of Oman organized a training workshop on the Common Alerting Protocol (CAP) that took place on the 7th of July, 2021. The workshop highlighted

the benefits of using the Common Alerting Protocol (CAP) as an ITU standard for exchanging all-hazard emergency alerts and public warnings over all kinds of ICT networks and enable national authorities to deliver early warnings and alerts to all people and communities at risk in a timely manner. The workshop was attended by over 110 participants from Oman's ICTs sectors, national disaster committee, national NGOs, meteorological organizations, public and private sector involved in disaster management in Oman, including academia. Once again, the number of participants that were able to join the virtual workshop from different parts of Oman, shows the benefits of moving to virtual meetings. Virtual gives the opportunity for more people to benefit from this type of trainings as no travel needs to take place.

292. The ITU America's Regional Office, in collaboration with EET Division, organized a Regional Workshop on the use of ICTs for disaster management and risk reduction, which took place from 14 to 16 September 2021. This event presented and discussed how ICT solutions and digital technologies can be used for disaster management and risk reduction in the region, the importance of National Emergency Telecommunication Plans, the value of the Tampere Convention, the benefits of emerging technologies for risk reduction, as well as early warning for early action, the role of simulation exercises and the importance of gender inclusion on the use of ICTs for disaster management. During the workshop, participants and speakers had an opportunity to exchange experiences, views and best practices on the use of modern technologies for humanitarian purposes. The regional event was provided in Spanish & English and had 68 participants from the region.

293. The ITU Europe Office has been working on the National Emergency Telecommunications Plans for Moldova and Georgia. The aim is to review and update the Global Guidelines on National Emergency Telecommunication Plans, emphasizing the inclusion of early warnings for all initiative components, especially the Cell Broadcast (CB) and Location Based SMS (LB-SMS). This effort will equip Moldova and Georgia with guidance on the development of their National Emergency Telecommunication Plans, ensuring communications availability throughout the four phases of the disaster management cycle: Mitigation, Preparedness, Response, and Recovery.

ITU's support to develop NETPs

294. BDT continues aiding the following countries to develop their NETPs: Afghanistan, Saint Lucia, Somalia, Sudan, Solomon Islands, Ecuador, Peru and Dominica and Grenada. Countries that have requested assistance on the development of the plans are Fiji, Kiribati, and Tonga. NETPs that have been concluded are Guatemala, Bolivia, Vanuatu, Samoa, and Papua New Guinea. Several online meetings have been organized with national stakeholders in order to ensure that the plans are developed through a multi-stakeholder approach involving different organizations working on disaster management, such as the national disaster management authorities, meteorological and hydrological organizations, humanitarian entities, ICT government and private sector, academia, civil society and customs authorities. This will guarantee that the plans are developed based on each countries' real needs.

295. To further support countries in developing NETPs, ITU started to undertake baseline assessments, which will help to identify the availability of national laws, regulations and policies governing emergency telecommunications within the Arab, Pacific Islands and Americas Member States. The ongoing assessments will also help to track ITU's Strategic Goals and in particular the Target 3.5, which reads: By 2023, all countries should have a National Emergency Telecommunication Plan as part of their national and local disaster risk reduction strategies; assess the levels of maturity and preparedness for each country in terms of the resilience of the telecommunication sector and the way it can support the countries' disaster risk reduction and management efforts. So far, two assessments have been concluded, Bahrain and Perú. These assessments are based on a template that was developed for this task.

ITU's Disaster Response

296. ITU provided support to the Government of Haiti after the devastation caused by a 7.2 magnitude earthquake that struck the county on 14 August 2021, by providing 20 satellite phones and 10 Broadband Global Area Network (BGANs) terminals. This equipment is currently being used by national humanitarian first responders to help communities that were severely impacted with recovery and reconstruction efforts. During this emergency, ITU and the Emergency Telecommunications Cluster (ETC) also used the Disaster Connectivity Map (DCM) to assist planning for the response efforts and determine connectivity gaps in the impacted areas. DCM is a mapping platform to help first responders determine the status of telecommunications network infrastructure, coverage, and performance before and after a disaster. Since the earthquake, the DCM mapped over 12,000 connectivity data measurements and compared them to baseline measurements to find gaps that can be filled with emergency telecommunications, saving lives and connecting the people affected by this deadly event.

Disaster connectivity map

297. The Disaster Connectivity Map (DCM) was built in 2020. The DCM is a joint initiative between ITU and Emergency Telecommunications Cluster (ETC) and input from GSMA, which consists of a live map that can provide information on the type, level, and quality of connectivity available on the ground during times of disasters. In December 2020, the DCM prototype was implemented and hosted onto an upgraded ITU web server with defined access control restrictions on third party DCM content based on different data licensing, rights and permissions. ITU and ETC have tested the DCM twice in the last six months, once in Fiji and once in the Caribbean. The first test was in response to cyclone Yasa, which flattened entire villages as it tore through Fiji in mid-December 2020. In this case, the DCM was used to compare baseline data and ICT infrastructure data to actual connectivity measurements during the event to estimate which cell sites and other ICT infrastructure were online and which might be offline while power was restored, and which areas may be offline longer term. Based on this, and in conjunction with broader coordination efforts, ETC worked with partners in the region to supplement communications gaps with additional satellite equipment in the short term, and for work on temporary cell sites to fill gaps while longer term recovery was in progress. The second test was in response to the La Soufriere volcano, situated on the main island of St. Vincent and the Grenadines. On April 9th 2021, an explosive eruption occurred, forming a plume of volcanic ash that

affected St. Vincent as well as neighboring islands including Barbados. Based on requests to confirm internet outages, we started a connectivity measurement campaign from April 15th through April 22nd, where we collected over 32,000 connectivity measurement datapoints and updated the DCM at hourly intervals. When analyzing these measurements compared to baseline connectivity data, we observed short-term geographic outages during the event that were restored by the end of the campaign.

Emergency Telecommunications Roster

298. To respond to the increasing demand for support in delivering emergency telecommunication equipment and services when disasters strike, the ITU has established an internal emergency telecommunication roster. Suitable ITU staff has been selected and are being trained on the deployment process and use of the current (and future) ITU telecommunication equipment. So far, the roster staff has received trainings on travel safety and personal security, social media in crisis situations and how to write impact stories. This team is also being trained to support the Emergency Telecommunications Cluster work on the ground, by liaising with national authorities and stakeholders on importation and licensing requirements of telecommunication equipment.

Collaboration with other UN entities

299. ITU contributed to a training project on Early Warning Systems for broadcasters. This project is a special collaboration between UNDRR, WMO, IOC-UNESCO and EBU, and focuses on using public service broadcasting technologies, such as TV and radio, to deliver early warning alerts to communities at risk. The purpose of this project is to train broadcasters on disaster management and on reducing risks by sending the correct message for impending hazards to end users. This project is already ongoing, and from December 2020 to April 2022, there are 36 training sessions that have been schedule in 29 countries, involving 46 organisations and more than 675 media professionals. Training sessions taking place: 10 in Africa, 16 in Asia Pacific, 10 in Caribbean. So far, trainings have been delivered in Caribbean and Asia Pacific.

300. ITU is working very closely with WMO and IFRC to participate in the Expert Team on the Global Multi-hazard Alert System Framework (ET-GMAS). GMAS is a framework for substantially increasing and enhancing the availability of authoritative warnings and information related to extreme and/or potentially high-impact weather, water and climate events – regionally and globally. Several meetings have been organized and a concept note to include the component of early warning systems is in the process of being finalized.

301. On 29 April 2021, ITU along with the International Federation of Red Cross and Red Crescent Societies (IFRC) and the World Meteorological Organization (WMO) endorsed the "Call to Action on Emergency Alerting", which states that by “2025 all countries have the capability for effective, authoritative emergency alerting that leverages the Common Alerting Protocol" . So far, 12 other organizations have also endorsed the call to action.

302. As a follow up activity to the Call to Action on Emergency Alerting, ITU along with the International Federation of Red Cross and Red Crescent Societies (IFCR), is supporting the World Meteorological Organization (WMO) to establish a CAP HelpDesk, which aims at supporting country level implementation of CAP through information, methods, and tools to inspire coordination and build a community of support to scale CAP implementation

worldwide. Moreover, it will serve as an important contribution to WMO's ongoing Global Multi-hazard Alert System (GMAS) development, where ITU is also part of.

303. On 16 March, the ITU hosted a WSIS interactive session in a hybrid format. The hybrid session assessed the current state of digital development in Europe and Central Asia and the envisioned goals to each the 2030 Agenda for Sustainable Development. The session provided insights into UN Agencies' support at the national level, offering examples to promote SDG-centric digital economies and societies comprehensively. The outcomes include the long-standing alignment between the WSIS process and the SDG processes, emphasizing the importance of communication across multiple levels including content, strategy, political, and European levels.

304. On 29 March 2023 a Roundtable on SDG 9 and 17 was held as part of the Regional Forum on Sustainable Development for the UNECE Region, organized by the UN Digital Transformation Group for Europe and Central Asia with the lead of ITU Europe Office. The hybrid event is accessible both online and physically at the WMO Premises in Geneva, Switzerland. The third session focused on innovative partnerships toward inclusive and sustainable digital development. The session discusses the partnerships and the effective mechanisms that can be leveraged. The panel featured regional and national actors to reflect jointly on the partnerships and mechanisms needed to foster inclusive and sustainable digital development.

305. The ITU Regional Office for Europe has been partnering with various UN agencies and participating in UNCT meetings and tasks supporting ICTs for SDG In addition, the Office contributes to CCAs, UNSDCF, and EU reporting processes. The Office has engaged with Member State Administrations and stakeholders in Albania, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia and Ukraine. In 2022, the ITU Office for Europe was signatory of 5 UN Sustainable Development Cooperation Framework in the Europe Region and is member of all 9 UNCTs.

306. The ITU Office for Europe is co-chairing two regional working groups of the UN on digital development. The UN Digital Transformation Group for Europe and Central Asia, co-chaired with UNECE, engage representatives of FAO, ILO, IOM, UNDP, UNEP, UNESCO, UNFPA, UN Habitat, UNICEF, UNIDO, UNWTO, UN Women, WHO, WIPO, WMO, and IFAD. It facilitates improved cooperation between UN agencies and their partners. ITU has likewise joined the UN Brussels Team (UNBT) to strengthen cooperation with the EU structures and collaboration on the ICT projects advancing the achievement of SDGs. ITU co-chairs the “UN Brussels Task Force on Digitalization for the SDGs” together with UNESCO Office in Brussels.

(i) International Internet Connectivity (Para27c.ii and 50d of TAIS)

307. ITU-T Study Group 3 continues to study this subject through its current work items. BDT is providing assistance to East African Community (EAC) and South African Development Community (SADC) countries on the creation of national Internet Exchange Points (IXPs) and achieving efficient and cost effective Regional Internet connectivity.

308. ITU-D Study Group 1 Question 1/1 within its work items for the 2014-2017 study period studied some of the existing resources available, including case studies received, related to the deployment of Internet Exchange Points (IXPs) with an aim to prepare best practice guidelines that may be useful for the Member States. As an example, an empirical study of Kenya and Nigeria assessing the impact of IXPs in these two Sub-Saharan countries has been considered. The Group examined how IXPs can be used to improve connectivity, how they can improve the quality of Internet services provided and potentially save operators money in connectivity fees. Other contributions to the work of the Group looked at the critical cost and performance benefits of IXPs in countries in the Americas (Argentina, Brazil, Colombia and Ecuador), and how they have been able to advance Internet growth in this region.

(j) World Telecommunication and Information Society Day

309. World Telecommunication Day has been celebrated annually on 17 May since 1969, marking the date of the founding of ITU and the signing of the first International Telegraph Convention in 1865. It was formally instituted by the Plenipotentiary Conference in Malaga-Torremolinos in 1973. In recognition of ITU as the lead United Nations agency for ICTs, the World Summit on the Information Society in Tunis, November 2005, called on the General Assembly of the United Nations to proclaim 17 May as World Information Society Day (see paragraph 121 of the Tunis Agenda).

310. On 27 March 2006, the General Assembly adopted Resolution 60/252, proclaiming 17 May as World Information Society Day to focus global attention on the enormous benefits that the digital revolution in ICTs can bring to the world. That same year, the Plenipotentiary Conference (Antalya, 2006) welcomed the General Assembly's decision and amended Resolution 68 to invite the ITU Council to adopt a specific theme for each World Telecommunication and Information Society Day (WTISD).

311. The theme for WTISD-2023, "Empowering the least developed countries through information and communication technologies", aimed to increase awareness of the importance of ICTs to support these countries in addressing their development challenges; presenting key ongoing efforts in ITU's Telecommunication Development Sector to support least developed countries (LDCs) through digital technologies, as well as to call on the public and private sectors to make pledges for universal connectivity and sustainable digital transformation in these countries through its Partner2Connect Digital Coalition. At the event marking ITU's anniversary in Geneva, ITU Secretary-General Doreen Bogdan-Martin announced the SDG Digital Day, scheduled for 17 September in New York in advance of the UN SDG Summit to review the 17 Sustainable Development Goals. The SDG Digital Day, powered by ITU on behalf of the UN system, will showcase high-impact, sustainable, digitally based solutions that have a game-changing potential to accelerate progress on the SDGs. More details are available here: https://www.itu.int/wtisd.

(k) Bridging the standardization gap (BSG)

312. The BSG Programme is centred around five pillars in line with governing texts, such as PP Resolution 123 (Dubai, 2018) and Resolution 44 (Rev. Geneva, 2022). The five pillars of the BSG programme are as follows: Engagement, Know-how, Community, Awareness, and Partnering. The objective of the BSG programme is to empower participation and informed dialogue in standards-making from all corners of the world. Empowered participation raises the international acceptance and quality of ITU-T standards and ensures their wide implementation.

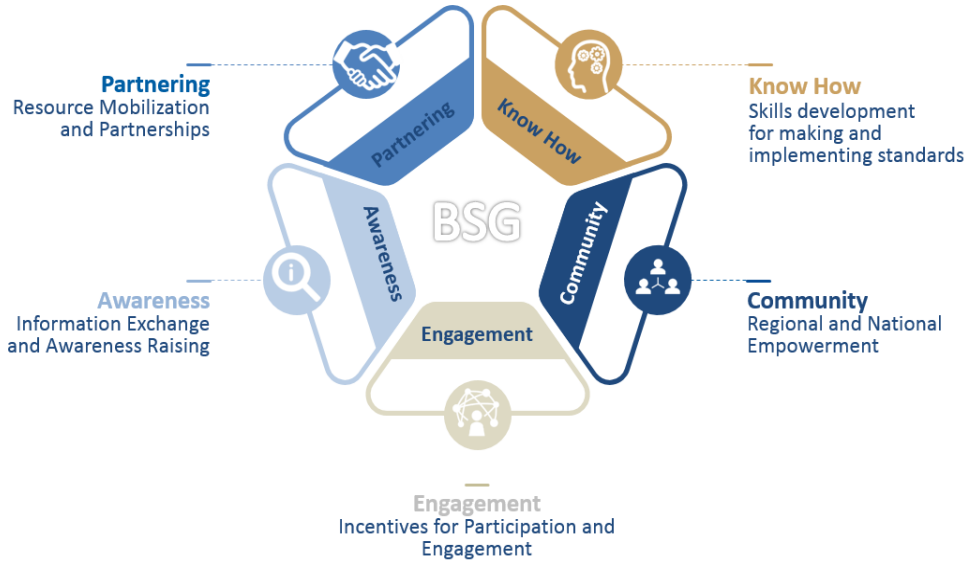


Figure 1: Pillars of the BSG programme

313. ***BSG Engagement*** is directed towards facilitating participation from developing countries in the standards development process. This includes fellowships, mentorship programmes and tools for remote participation.

314. ITU-T Study Group Mentors are very important when it comes to helping newcomers settle in and leave no questions unanswered. The 11 ITU-T Study Groups have already some 20 mentors.

315. Remote participation efforts continue to be enhanced and fellowships are provided to support participation in the work of ITU-T Study Groups and their regional groups.

316. BSG Know-how covers the development of skills and capabilities for standards-making. This includes standards-making effectiveness sessions (BSG hands-on sessions), video primers and e-learning courses.

317. The successful hands-on capacity-building training conducted by ITU T SG3 since early 2014 has been extended to other study groups and their regional groups. These BSG Hands-On sessions are geared towards assisting developing countries in acquiring the right skills and capabilities for international standards-making and to draft contributions for meetings. The sessions focus on the development of practical skills to maximize the effectiveness of developing countries' participation in the ITU-T standardization process, covering topics including strategies for participation in Study Groups, drafting Contributions, presenting

proposals, collaborative working methods and means of gaining support and building consensus.

318. These BSG training sessions have welcomed 104 delegates in first quarter of 2021. Considering the shift to fully virtual ITU-T meetings in response to COVID-19, 12 virtual BSG training sessions have been organized since May 2020 and additional trainings are being planned for the remaining quarter of 2021.

319. ***BSG Community*** is dedicated to empowerment for standardization, both at the regional and national level. A key example under ***BSG Community*** are the regional groups of ITU-T study groups, which ensure that standards-making is inclusive of the needs of all regions. Celebrations of the 50th anniversary of ITU-T regional groups were held in February 2018 during the SG3RG-AFR meeting. SG3RG-AFR is among the first ITU-T regional groups to be created back in 1968, together with three other regional groups of SG3.

320. Activities under the pillar BSG Awareness aim to promote information sharing and exchange, through for instance, ITU-T publications on a wide range of topics and Regional and Inter-regional Standardization Forums.

321. Since 2016, a new strategy was adopted for Standardization Forums. These are now fully in line with the priorities of ITU-T study groups, and are mainly held in coordination with ITU-T regional groups. Raising awareness of standards activities is also made possible through the participation of key decision makers (including prime Ministers, Ministers, Head of Regulators etc.) and good media coverage. The following events were held since November 2020:

    - Eighth SG13 Regional Workshop for Africa "Standardization and Future Networks: Opportunities for Africa beyond 2020", virtual, 1 June 2021.

        - ITU-T SG13 developed: **ITU-T Technical Report TR-BSG "Use of ITU-T Recommendations by Developing Countries"**: A standard is defined as a document established by consensus and approved by a recognized body. In the UN, the ITU-T is the recognized body for Telecommunication Standardization whose output Standards are known as ITU-T Recommendations. Countries use standards to maximize compatibility, interoperability, safety, repeatability, and quality among others. The ITU-T standardization process involves its members in the development of the standards, which they later utilize. The development of any standard is motivated by a present need to solve a problem or a future need to solve future problems. The expectation is that all countries on either side of development, to actively participate in both the production and utilization of the standards. There is however a perception that there is less utilization of the ITU-T standards by Developing Countries. This document presents the analysis and interpretation of the results of the questionnaire on use of ITU-T Recommendations in Developing Countries.

322. **Free on-line access to ITU-R Publications for bridging the standardization gap**

The ITU free online access policy continues to provide a very large dissemination of ITU standards to a broader public, especially in developing countries with financial and technical constraints. This wide outreach via free online access is helping to build the visibility of ITU's mission and mandate and reinforce ITU as a global telecommunication authority.

By Decision 12 (Guadalajara, 2010), PP-10 adopted a free online access policy to include, inter alia, ITU-R Recommendations and Reports. This policy was expanded by Council 2012 Decision 571, revised by Council 2013 and 2014 , and confirmed by PP-14 revised Decision 12, which provides free online access for the general public, on a permanent basis, to ITU-R, ITU-T and ITU-D Recommendations and Reports; ITU-R handbooks on radio-frequency spectrum management[8]; ITU publications concerning the use of telecommunications/ICTs for ensuring disaster preparedness, early warning, rescue, mitigation, relief and response; the International Telecommunication Regulations (ITRs); the Radio Regulations; the Rules of Procedure; the basic texts of the Union (Constitution, Convention, General Rules of conferences, assemblies and meetings of the Union, decisions, resolutions and Recommendations); the final acts of plenipotentiary conferences; the final reports of WTDCs; the ITU Council resolutions and decisions; the final acts of world and regional radiocommunication conferences; and the final acts of world conferences on international telecommunications.

ITU-R Recommendations

The ITU-R Recommendations constitute a set of international technical standards developed by the Radiocommunication Sector (formerly CCIR) of the ITU. More details are available online: https://www.itu.int/pub/R-REC

ITU-R Reports

Free online access to all current ITU-R Recommendations & Reports is available at: https://www.itu.int/pub/R-REP

Navigation and analysis tools for ITU-R electronic publications:

Radio Regulations tools: the Radiocommunication Bureau developed software tools to facilitate the use and analysis of the Radio Regulations which is available for subscription and download since the first quarter of 2016 - www.itu.int/pub/R-REG-RRX

ITU-R documents database search tool

The ITU-R documents database search facility was developed to make ITU-R documents (ITU-R Recommendations, ITU-R Questions, ITU-R Reports, ITU-R Resolutions and ITU-R Handbooks) more accessible. It helps to search ITU-R documents by providing search functions and filtering criteria such as document number, radio category, radio service, frequency range and approval year - https://extranet.itu.int/brdocsearch

(l) Internet Governance Forum (IGF)

323. The 18th annual meeting of the IGF was hosted by the Government of Japan in Kyoto from 8 to 12 October 2023, under the overarching theme: The Internet We Want - Empowering

[8] These include the ITU-R Handbooks on National Spectrum Management; Computer Aided Techniques for Spectrum Management; and Spectrum Monitoring.

All People. WSIS organised its WSIS+20 Forum High-Level Event Open Consultation Process during the IGF 2023.

(m) Follow up on the UN Secretary-General's Roadmap for Digital Cooperation

324. In June 2020, the UN Secretary-General released the new Roadmap for Digital Cooperation (A/74/821), which includes a set of recommended actions for the international community to help ensure all people are connected, respected, and protected in the digital era. It builds on recommendations made by the Secretary-General's High-level Panel on Digital Cooperation, and input, received through the eight Roundtable groups convened by the office of the UN Secretary-General, from Member States, the private sector, civil society, and the technical communities and other stakeholder groups.

325. ITU is collaborating with the office of the UN Secretary General, specifically the office of the UN Secretary-General's Special Envoy on Technology in the implementation of the Roadmap on Digital Cooperation. ITU is co-leading two Roundtable groups, namely on Global Connectivity and Capacity Building, together with UNICEF and UNDP, respectively, and participating other Roundtable groups, for rest the subjects, such as Digital Inclusion, Digital Public Goods, Trust and Security, Artificial Intelligence and Digital Cooperation Architecture, to implement and support key actions outlined in the Roadmap.

(IV) Overall Review of the Implementation of the Outcomes of the World Summit on the Information Society

(a) UNGA Overall Review of the Implementation of the WSIS Outcomes

326. The General Assembly through its Resolution 70/125 on *Outcome document of the high-level meeting of the General Assembly on the overall review of the implementation of the outcomes of the World Summit on the Information Society* was requested to hold a high-level meeting on the overall review of the implementation of the outcomes of the World Summit on the Information Society in 2025, involving the input and participation of all stakeholders, including in the preparatory process, to take stock of progress on the outcomes of the World Summit and identify both areas of continued focus and challenges.

(V) Forums, innovative initiatives and future actions

(a) Forums

WSIS Forum 2023 Event and its outcomes:

327. The WSIS Forum builds upon the outcomes of the UN General Assembly Overall Review of the Implementation of the WSIS Outcomes (UNGA Resolution A/70/125) that recognized the necessity of holding this Forum on an annual basis and called for a close alignment between WSIS and the 2030 Agenda for Sustainable Development. In this context, the WSIS Forum leverages on the WSIS-SDG Matrix and serves as a key forum for discussing the role of ICTs as a means of implementation of SDGs, with due regard to the global mechanism for follow up and review of the implementation of the 2030 Agenda (UNGA Resolution A/70/1). The WSIS Forum is coordinated by ITU and has been co-organized since 2006 by ITU, UNESCO, UNDP and UNCTAD with the engagement of other United Nations Agencies, including FAO, ILO, ITC, UNDESA, UNEP, UNHCR, UNICEF, UNIDO, UNITAR, UNODC, UPU,

UN Women, UN Tech Bank for LDCs, UNU, WFP, WHO, WIPO, WMO and UN Regional Commissions.

328. The WSIS Forum 2023 hybrid week was held from 13 to 17 March in Geneva, Switzerland, and brought together experts, policymakers, and diverse stakeholders from around the world to discuss ICTs for sustainable development. This year's Forum theme is WSIS Action Lines for building back better and accelerating The Forum hybrid week welcomed over 2,700 participants attending both on-site and remotely, from 150 countries worldwide. The Forum gathered more than 150 high-level representatives of the wider WSIS stakeholder community, including Ministers and Deputies, Ambassadors; and leaders from the private sector, academia and civil society.

329. This year's Forum hybrid week had several innovative session formats and featured around 250 sessions, including open space talks, thematic workshops, country workshops, WSIS Action Lines Facilitation Meetings, knowledge cafes, WSIS Prizes, high-level track sessions, and many more. The stakeholders appreciated the new innovative formats, which fostered more participatory and collaborative exchanges with engaging dialogues.

330. The WSIS Forum 2023 continued with virtual workshops from April to May 2023. These workshops brought together a cumulative total of 5,000 participants (livestreams and session recordings on Zoom and Facebook). The event featured 50 virtual workshops and showcased the expertise of over 200 speakers.

331. The Chairperson of the WSIS Forum 2023 was H.E. Dr. Emilija Stojmenova Duh, Minister of Digital Transformation, Republic of Slovenia. Policy Statements were delivered during the High-Level Policy Sessions (14-15 May 2023) of the WSIS Forum 2023 by high-ranking officials of the WSIS stakeholders community, representing the Government, Private Sector, Civil Society, Academia and International Organizations. The High-Level Track consisted of the opening segment, interactive policy dialogues, and a ministerial round table.

332. The High-Level Policy sessions were moderated by 11 High-Level Track Facilitators and grouped around different themes identified as important by the WSIS Stakeholders during the open consultation process. Please find more details on the High-Level track here.

333. With the objective of strengthening the alignment of WSIS and SDG processes, the overall theme for WSIS Forum 2023 was "WSIS Action Lines for building back better and accelerating the achievement of the SDGs".

334. WSIS Forum 2023 resulted in several concrete outcomes that will enable stakeholders to strengthen implementation of WSIS Action Lines and the alignment of the WSIS and SDG processes. The full list of the WSIS Forum 2023 highlights and outcomes is available here.

(b) WSIS Action Lines and SDGs Matrix

335. The vital role of ICTs as a catalyst for development is specifically recognized in the new development framework Transforming Our World: The 2030 Agenda for Sustainable Development, which acknowledges that "the spread of information and communication technology and global interconnectedness has great potential to accelerate human progress and to develop knowledge societies, to bridge the digital divide and to develop

knowledge societies, as does scientific and technological innovation across areas as diverse as medicine and energy".

336. Four targets of the SDGs explicitly recognize the role of ICTs. This applies to the targets on Education and scholarships (4.b) on Gender empowerment (5.b) on Infrastructure for Universal and Affordable access to ICTs and the Internet in the Least Developed Countries (9.c) and more broadly, Goal 17 on Strengthen the means of implementation and revitalizing the global partnership for sustainable development, which calls to enhance the use of enabling technology, in particular ICTs. There are also several references to technology in general throughout the SDGs in which ICTs play an important direct or indirect role.

337. ICTs already empower billions of individuals around the world with wide ranging applications cutting across sectoral boundaries in agricultural productivity; population, health and education; transportation; industry, trade and finance; climate change and protection of our environment; as well as for the prevention and management of disasters, among many others.

338. Internet, mobile technologies and relevant ICT applications and services unquestionably help strengthen governance; empower people, in particular women and youth; enable wider exercise of human rights including freedom of expression; foster social inclusion of marginalized groups; open up employment opportunities; promote cultural diversity; expand access to learning and scientific knowledge; and create efficiencies in basic services including energy and water, to name here just a few.

339. However, we do need to acknowledge that, although access to advanced technologies has grown at a fast pace, the impressive gains observed during the MDG era are still hampered by existing gaps in access to ICTs— inequalities still persist among and within countries, between urban and rural sectors and among men and women. A major digital divide is still in place, with more people offline than online and particularly poor access in LDCs.

340. ITU's latest data reveal that while access to the Internet is approaching saturation levels in the developed world, the Net is only accessible to 35% of people in developing countries. The situation in the 48 UN-designated LDCs is particularly critical, with over 90% of people without any kind of Internet connectivity.

341. With the newly adopted 2030 Development Agenda, the WSIS Forum is evolving and continuing to strengthen the linkages between the WSIS Action Lines and the Sustainable Development Goals. This evolution is in line with the outcomes of the UN General Assembly Overall Review of the Implementation of WSIS Outcomes.

(c) WSIS TalkX

342. The WSIS TalkX is a platform, both virtual and physical, dedicated to sharing experiences and inspirational stories about ICTs for development (implementation of the WSIS Action Lines for Development) by stakeholders all over the world. The WSIS TalkX was initiated during the WSIS Forum 2019 and is continued to be organised in a virtual format since April 2020 at the request of stakeholders. More than 50 sessions (*physical and virtual*) have been conducted, and some sessions have been adapted to podcasts and are available to listen and download at WSIS TalkX Podcast here.

343. In 2022, the WSIS TalkX was rebranded as the WSIS&SDG TalkX with a series of sessions organised to celebrate the UN international days, including UN International Day of Women and Girls in Science, World Radio Day, International Mother Language Day, to name a few. More information of the WSIS & SDG TalkX sessions is available here.

(d) WSIS Prizes

344. Each year, during the WSIS Forum, 18 WSIS stakeholders are awarded the WSIS Prizes, representing global recognition for their excellence in the implementation of WSIS outcomes. The WSIS Prizes honor outstanding projects that leverage the power of ICT to accelerate socio-economic development around the globe. To this end, 18 projects are selected as the most successful stories worldwide, under each category, to serve as best-practice models to be replicated by other stakeholders interested in ICTs for development. These projects vividly demonstrate how established SDGs can be achieved through concrete actions, inspiring other stakeholders all over the world to replicate their success. Besides recognizing the WSIS Prizes Winners, this year we have continued to implement the WSIS Prize Champions category for the WSIS Prizes 2023 contest.

345. The WSIS Prizes is a unique international contest developed in response to requests from the WSIS stakeholders to create an effective mechanism to evaluate and recognize individuals, governments, civil society, local, regional and international agencies, research institutions and private-sector companies for outstanding success in implementing development-oriented strategies that leverage the power of ICTs as an enabler of the development. The WSIS Prizes contest is an integral part of the WSIS Stocktaking process set up in 2004 to assist WSIS implementation and follow-up. The contest was held for the first time in 2012, and rapidly gained attention and popularity within the ICT for Development (ICT4D) community, including ICT for SDG community since 2016.

346. Building upon the outcomes of the United Nations General Assembly Overall Review on WSIS as well as the 2030 Agenda for Sustainable Development, the WSIS Prizes 2023 reflected close linkages with achieving the SDGs. The WSIS Prizes contest serves as the platform for identifying and showcasing the success stories across the WSIS Action Lines defined in the Geneva Plan of Action and SDGs. It also provides us with models that can be replicated in the interests of empowering the community at the local level, providing everyone with an opportunity to participate in the contest and, most importantly,

recognizing the efforts made by stakeholders to contribute to the development of society and their commitment to achievement of both the WSIS goals and SDGs.

347. Facilitated by ITU in coordination with all WSIS stakeholders, the WSIS Prizes 2023 contest provided a platform to identify and showcase success stories across the WSIS Action Lines defined in the Geneva Plan of Action and Sustainable Development Goals. For the ninth year in a row, WSIS recognized outstanding success stories from around the world for their part in building an inclusive information society.

348. The 12th edition of the WSIS Prizes has received another record number of submissions, with 966 ICT projects submitted. Following the results of the online voting with close to million votes cast, 90 WSIS Prizes Champions have been announced online, while 18 WSIS Prizes Winners were awarded on 14 March 2023 in Geneva.

349. The prizes are awarded across 18 categories, each directly linked to the 11 WSIS Action Lines defined in the Geneva Plan of Action.

350. The WSIS Prizes 2023 Winners featured a wide range of impact-driven projects that leverage ICTs to improve lives, bridge digital divides, reduce inequalities and more.

Below is the **full list** of the 18 winners, in order of the WSIS Action Lines:

Category	Project Title	Entity Name	Entity Country
C1. The role of governments and all stakeholders in the promotion of ICTs for development	Banda Ancha para Todos	Instituto Dominicano de las Telecomunicaciones	Dominican Republic
C2. Information and communication infrastructure: an essential foundation for the Information Society	Jalinan Digital Negara Plan	Malaysian Communications and Multimedia Commission	Malaysia
C3. Access to information and Knowledge	Community Network for Education	UMAYUX	Ecuador
C4. Capacity Building	Mobile Connectivity for Teachers in Poor and Remote Areas Project	National Council for Educational Promotion	Mexico
C5. Building Confidence and Security in the Use of ICTs	Cybersecurity Education in the Philippines in the Face of New Normal Adversities	Department of Information and Communications Technology	Philippines

C6. Enabling Environment	Community Networks in the strategy of connecting rural and remote areas as licensees in Argentina	ENTE NACIONAL DE COMUNICACIONES	Argentina
C7. ICT Applications: e-Government	AuditOnline : Facilitating Audit in Government	National Informatics Center	India
C7. ICT Applications: e-Business	Material Supermarket Revitalization Solution for Enterprises and Institutions	China Mobile Procurement Shared Center	China
C7. ICT Applications: e-Learning	BIPES (Individualized Personnel Training System)	Directorate General for Information Technologies, Ministry of Justice	Turkey
C7. ICT Applications: e-Health	Bone Health New Zealand	Osteoporosis New Zealand (ONZ)	New Zealand
C7. ICT Applications: e-Employment	Advance IT & Entrepreneurship Training and Incubation for young women	Computer Applications for Girls Foundation	United Republic of Tanzania
C7. ICT Applications: e-Environment	Early Warning Epidemics System	Ministry of Environment Water and Agriculture	Saudi Arabia
C7. ICT Applications: e-Agriculture	Digital AgroInsurance	AGROINSURANCE LLC.	Kazakhstan
C7. ICT Applications: e-Science	Women In Tech Maldives	Women In Tech Maldives	Maldives
C8. Cultural diversity and identity, linguistic diversity and local content	Africa Teen Geeks	Apodytes	South Africa
C9. Media	Strategic Communication to Counter Security Threats in the Disinformation Era	University Rey Juan Carlos - Research Group Ciberimaginario	Spain

C10. Ethical dimensions of the Information Society	UAE Cyber Pulse	UAE Cyber Security Council	United Arab Emirates
C11. International and regional cooperation	Enhance VR	Virtuleap Lda	Portugal

351. Detailed descriptions of all WSIS Prizes 2023 winning projects are available here. It is critical to highlight the importance of the multistakeholder and bottom-up approach that is the essential philosophy of the WSIS Forum. Stakeholders highly appreciated the multistakeholder approach of the contest and highlighted the importance of the continuation of this contest to serve as a mechanism to recognize stakeholders for their efforts on the implementation of WSIS outcomes.

352. The principal role of the WSIS Stocktaking exercise is to collect information, share knowledge and experiences and leverage the activities of stakeholders working on the implementation of WSIS outcomes. In this context, WSIS Stocktaking process provides a portal of best practices for stakeholders seeking updated information on the progress of implementation of WSIS outcomes. All stakeholders benefit from the sharing of interesting case studies, as this undoubtedly facilitates the transfer of knowledge, experiences and models for project implementation. The WSIS platform helps to create partnerships and to provide greater visibility and add value to ICT projects all around the world.

353. All stakeholders are urged to encourage their networks to join the WSIS Prizes process, including the multistakeholder open consultation process for the WSIS+20 Forum High-Level Event in 2024, in order to ensure that all features correspond to the real needs of the WSIS implementation process towards 2025.

354. ICTs are enablers for sustainable development, and reporting on ICT success stories to best showcase the possible achievement of SDGs is the major objective of WSIS Stocktaking process, including WSIS Prizes, as already recognized and anticipated by the WSIS stakeholders community. The contest thus comprises 18 categories which are linked to the 11 WSIS Action Lines outlined in the Geneva Plan of Action and SDGs. Submitted projects are to be recognized solely for the 18 categories covering the 11 WSIS Action Lines.

WSIS Prizes 2024:

355. ITU is pleased to announce that the WSIS Prizes 2024 call, 13th edition of this major global exercise in recognizing best ICT practices that are implementing the WSIS Action Lines and advancing the Sustainable Development Goals will soon be launched.

(d) WSIS Stocktaking Portal

356. WSIS Stocktaking has been maintained by ITU since 2004. It is a unique global platform for collecting information and annual reporting on information and communication technology related initiatives and projects, carried out by governments, international organizations, the business sector, civil society, academia, and other entities. This global repository, currently comprising over 14,000 entries, reflects the implementation of the WSIS Action Lines on the ground.

357. In 2015, the UN General Assembly, during the ten-year review of the WSIS (Res. A/70/125), called for a strong alignment between the WSIS process and the 2030 Agenda for Sustainable Development (Res. A/70/1). In response, the WSIS Stocktaking process highlighted the role of 11 WSIS Action Lines in contributing to the achievement of the 17 Sustainable Development Goals (SDGs). ECOSOC Resolution 2023/3 reaffirms the significance of sharing best practices globally and encourages all stakeholders to submit ICT-related projects and initiatives to the WSIS Stocktaking platform, recognizing outstanding efforts in implementing projects that advance the WSIS goals.

358. As in 2015, the UN General Assembly within the framework of the ten-year review of the WSIS (Res.A/70/125) called for a close alignment between the WSIS process and the 2030 Agenda for Sustainable Development (Res.A/70/1). The WSIS Stocktaking process responded by highlighting the contribution of 11 WSIS Action Lines to the achievement of 17 Sustainable Development Goals.

359. WSIS Stocktaking continues to diversify its database by introducing new repositories, including the WSIS Photo Contest (since 2016), WSIS Healthy Ageing Innovation Prize (since 2021), WSIS Women in Technology (since 2022), and the recently proposed repositories of WSIS x Generation Connect Youth Prize (since 2023) and WSIS Digital Service Design Prize (since 2023). New repositories are in line with the WSIS Forum special tracks on ICTs and Older Persons, Gender Mainstreaming, Youth, and WSIS Action Line e-Government. The new calls for submissions will be launched in September 2023.

360. The new call for update and new entries 2024 is inviting stakeholders to submit entries online at www.wsis.org/stocktaking. All WSIS stakeholders are invited to continue submitting updates and new entries online at www.wsis.org/stocktaking. Submitted activities will be reflected in the Global WSIS Stocktaking Report 2024, while the 6 regional reports will be published as part of the 5th series of regional reporting and will be released during the final week of the WSIS Forum 2024, branded as the WSIS+20 Forum High-Level Event.

(e) WSIS Stocktaking Publications

361. In 2023, the WSIS Stocktaking Global Report publication contains more than 1,000 submissions, including those submitted to the WSIS Prizes and special prizes.

362. WSIS-related publications, including the WSIS Stocktaking reports are available to download at the ITU Bookshop.

363. Following the outcomes of the United Nations General Assembly Overall Review on WSIS (Res. A/70/125) that called for a close alignment between the WSIS Process and the 2030

Agenda for Sustainable Development (Res. A/70/1), the WSIS Prizes is the unique global platform to identify and showcase success stories in the implementation of the WSIS Action Lines and SDGs.

364. The ECOSOC Resolution 2020/12 on Assessment of the progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society reiterates the importance of sharing best practices at the global level, and, encourages all stakeholders to nominate their projects for the annual WSIS Prizes as an integral part of the WSIS Stocktaking process (www.wsis.org/stocktaking). The same Resolution also reiterates the importance of recognizing excellence in the implementation of the projects and initiatives that further the goals of the World Summit on the Information Society process, and encourages all stakeholders to nominate their ICT-related projects for the annual WSIS Prizes contest as an integral part of the WSIS Stocktaking process. With the year-round ongoing call for updates and new entries, all stakeholders are invited to continue sharing best practices on the WSIS Stocktaking Platform and emphasize how ICT-related initiatives and projects are enabling SDGs.

(f) WSIS Forum Photo Contest 2023

365. The three winning entries in the WSIS photo contest were unveiled during the WSIS Forum 2023:

1) Klik Dengan Bijak - Be Informed, Be Protective

The Internet is a virtual world with limitless resources and boundaries, but without sufficient knowledge and precaution, it could pose threats to us in real life. The photo shown a community at rural area in Terengganu, Malaysia attended the online safety and awareness program called Klik Dengan Bijak and participated in MyCybergenius, an advocacy assessment and monitoring system which has multiple functions including customization of online assessment and comprehensive data collection - *Terengganu — Malaysia*.

2) #TeachAChildHowToCode #1BillionProject

The #1BillionProject is dedicated to making a positive impact on the lives of one billion people around the world. Our mission is to identify and address pressing social, economic, and Technical challenges facing Startups, Students, Creatives and Local Communities across the globe - *Mediahooch Space, Zaria Kaduna State — Nigeria (Federal Republic of)*.

3) New Discovery

A farmer holds a drone that just took aerial images of his farm. The farmer's surprise was in full display as he couldn't believe his eyes so he had to hold the flying device otherwise known as a drone - *Ringim, Jigawa — Nigeria (Federal Republic of)*.

(g) Exhibition

366. The WSIS Forum 2023 gathered many exhibitors from Civil Society, Academia, International Organizations, Private Sector, and Governments. The exhibition allowed a wide array of stakeholders to showcase their projects and the technology behind it. It provided an opportunity to share their initiatives and solutions that harness the power of ICT-enabled development to advance the achievement of the SDGs and expand our Information Society.

367. More than 30+ exhibitions spaces showcased ICTs for sustainable development. The exhibitors displayed a wide range of technologies and innovative solutions addressing global development issues. The WSIS Forum 2023 partners also exhibited their projects and initiatives. The exhibition spaces also featured virtual reality tools that provided participants with different immersive experiences, such as to explore the reality of the indigenous people of the Amazon, to explore the enigmatic world of M.K.Čiurlionis paintings from Lithuania, and to explore the XR Olympics. The exhibitors came from governments, civil society, private sectors, technical community, academia, youth, and the international organisations. The WSIS Forum 2023 photo contests winners and finalists photos enriched the exhibition space and the venue.

368. The exhibition inauguration took place on 13 May 2023 at 10:45 am CEST with the presence of ITU Secretary-General, Ms. Doreen Bogdan-Martin, the WSIS Forum 2023 Chairperson, H.E. Dr Emilija Stojmenova Duh, and the WSIS Forum 2023 partners who were also exhibitors.

(h) Hackathon

369. The WSIS Forum 2023 Hackathon on Advancing the Digital Economy by Leveraging Emerging Technologies (Digital GovHack) was jointly organised by ITU, WSIS, and Digital Government Authority (DGA) of Kingdom of Saudi Arabia. The Hackathon aimed to contribute to building the GovTech of tomorrow and help ensure a better future for us, all in line with the WSIS Action Lines and the UN Sustainable Development Goals.

370. The virtual hackathon addressed four challenge areas, namely (i) immersive public services; (ii) empowering young talent; (iii) productivity in the public workspace; and (iv) financial sustainability. The winning team of each challenge was announced and awarded during the LEAP event in Riyadh, Saudi Arabia on 7 February 2023, with the presence of DGA Governor H.E. Eng. Ahmed Alsuwaiyan and ITU Deputy Secretary-General, Mr. Tomas Lamanauskas. More information of WSIS Forum 2023 Hackathon here.

(i) WSIS Special Initiatives

371. **ICTs and Gender Mainstreaming**

As part of the Gender Mainstreaming initiatives, the WSIS Gender Trendsetters contributed to the 67th Commission on the Status of Women by organising a side-event on *WSIS Gender Trendsetters: ICTs for Gender Inclusion*, which took place on 16 March 2023 in New York. Details of the event are available here.

372. **ICTs and Older Persons:**

The third edition of the WSIS Forum 2023 Healthy Ageing Innovation Prize was organised as part of the WSIS Forum 2023. The call for submissions was launched in October 2022. 13 finalists were selected for their outstanding projects in supporting healthy ageing for older persons. The winner of the Prize was FibriCheck that offers a fully certified application capable of detecting and managing cardiac arrhythmias (including Atrial Fibrillation) using an app on a smartphone or smartwatch. For more information, please read here.

373. **ICTs and Youth:**

The WSIS x Generation Connect Youth Prize was organised for the WSIS Forum 2023. The Prize is about collecting visual representations of challenges, new ways of understanding the global and local digital ecosystems and challenges for the meaningful inclusion of youth. Submissions were submitted in a form of a short video, series of images, posters, and any other graphic representation of the digital inclusion of youth projects and initiatives.

(j) WSIS+20: Review and WSIS Beyond 2025

374. In 2015, the UN General Assembly Overall Review resolved to hold the WSIS Forum on the annual basis till 2025. WSIS+20 will provide opportunity to reflect and discuss on the evolution of the WSIS implementation process.

375. *Report by the Director General on implementation of the World Summit on the Information Society (WSIS) outcomes*, elaborates UNESCO's roadmap towards the WSIS+20 review.

376. *World Summit on the Information Society (WSIS)+20: WSIS Beyond 2025: WSIS+20 Roadmap*; elaborates the ITU Secretary-General's roadmap on the role of ITU in the WSIS+20 Review process and its preparations.

377. At the WSIS Forum 2023, several multistakeholder dialogues and discussions were held to discuss on the preliminary steps towards the WSIS+20 review process, including:

- WSIS+20 Multistakeholder Consultation Process: WSIS+20 Visioning Challenge, 13 March, 12:30-13:45
- High-Level Strategic Dialogue: WSIS+20 and the future of WSIS beyond 2025, 14 March, 11:15-12:15

378. The WSIS Forum 2024 will be branded as the WSIS+20 Forum High-level Event celebrating the achievements of the WSIS Process and identifying the opportunities and challenges in implementing the WSIS Action Lines. The Forum is scheduled to be held from 27 to 31 May 2024 in Geneva, Switzerland.

(k) The Global Cyber Security Agenda (GCA)

379. In May 2007, ITU launched the GCA: a framework for international cooperation in cyber security. The GCA has seven main strategic goals and is built around the following five work areas or pillars: (1) Legal Measures; (2) Technical and Procedural Measures; (3) Organizational Structures; (4) Capacity Building; and (5) International Cooperation. It acts on existing national and regional initiatives to avoid duplication of work and encourage collaboration amongst all relevant partners. Within the overall framework of the cyber security agenda (GCA), ITU along with its partners, are deploying joint services. These services harmonize, at the international level, different national approaches to better prepare countries to face cyber threats and solve cyber-attacks. This is achieved through information sharing, awareness raising and trainings programs. The momentum generated by the GCA and the broad nature of this ITU initiative have resulted in interest from other stakeholders and opportunities for collaboration and cooperation. More on activities under the GCA can be found in the Section on Action Line C5: Building Confidence and Security in the use of ICTs.

380. Second Open Consultation on the draft Guidelines for utilization of the GCA was held during the WSIS Forum 2021 on 1 March 2021.

(l) Connect 2030 Agenda for global telecommunication/ICT development

1. Background

381. At PP-22, ITU Member States adopted revision to Resolution 200 (Rev. Bucharest, 2022): "Connect 2030 Agenda for global telecommunication/information and communication technology, including broadband, for sustainable development", establishing a set of global targets to be achieved by the whole Union by 2023 in the areas of growth, inclusiveness, sustainability, innovation and partnerships in the telecommunication/ICT sector.

382. Resolution 200 invites ITU Member States to participate actively in the implementation of the Connect 2030 Agenda; to contribute with national, regional, and international initiatives; to provide data and statistics, as appropriate, to monitor progress towards the achievement of the Connect 2030 goals and targets; and to engage all stakeholders through the promotion of partnerships around the Connect 2030 Agenda.

383. At PP-22, ITU Member States also adopted Resolution 71 (Rev. Bucharest, 2022): "Strategic plan for the Union for 2024-2027", which incorporates the Connect 2030 goals and targets into the framework of ITU's strategic plan for this period.

2. Progress for the reporting period

Measurement, monitoring and reporting

384. An annual report on the progress and implementation of ITU Strategic Plan and the Connect 2030 Agenda is presented each year to ITU Council. The latest report for the period 2019-2020 was presented in June 2021 and is available online (ITU Annual Report 2019-2020).

385. A dedicated microsite for the Connect 2030 Agenda was also created to track the progress of the Connect 2030 Agenda targets on an annual basis starting from 2020. The microsite provides a dashboard for both the goals and targets, as well as relevant links to publications, data and other resources, so that ITU and its members can progress together towards connecting the world.

386. The Connect 2030 Agenda has 24 targets designed to provide an indication of progress towards the achievement of the 5 goals up to 2023:

Goal 1 – Growth: Enable and foster access to and increased use of telecommunications/ICT in support of the digital economy and society.

Recognizing the role of telecommunications/ICTs as a key enabler for social, economic and environmentally sustainable development, ITU will work to enable and foster access to, and increase the use of, telecommunications/ICTs, foster the development of telecommunications/ICTs in the support of the digital economy and help developing countries make their transition to the digital economy. Growth in the use of telecommunications/ICTs has a positive impact on short- and long-term socio-economic development as well as on the growth of the digital economy towards building an inclusive information society. The Union is committed to working together and collaborating with all stakeholders in the telecommunication/ICT environment in order to achieve this goal.

- Target 1.1: By 2023, 65% of households worldwide with access to the Internet
- Target 1.2: By 2023, 70% of individuals worldwide will be using the Internet
- Target 1.3: By 2023, Internet access should be 25% more affordable (baseline year 2017)
- Target 1.4: By 2023, all countries adopt a digital agenda/strategy
- Target 1.5: By 2023, increase the number of broadband subscriptions by 50%
- Target 1.6: By 2023, 40% of countries to have more than half of broadband subscriptions more than 10 Mbit/s
- Target 1.7: By 2023, 40% of the population should be interacting with government services online

Goal 2 – Inclusiveness: Bridge the digital divide and provide broadband access for all.

Being committed to ensuring that everyone without exception benefits from telecommunications/ICTs, ITU will work to bridge the digital divide for an inclusive information society and enable the provision of broadband access for all, leaving no one offline. Bridging the digital divide focuses on global telecommunication/ICT inclusiveness, fostering telecommunication/ICT access, accessibility, affordability and use in all countries and regions and for all peoples, including women and girls, youth and marginal and vulnerable populations, people from lower socio-economic groups, indigenous peoples, older persons and persons with disabilities.

- Target 2.1: By 2023, in the developing world, 60% of households should have access to the Internet
- Target 2.2: By 2023, in the least developed countries, 30% of households should have access to the Internet
- Target 2.3: By 2023, in the developing world, 60% of individuals will be using the Internet

- Target 2.4: By 2023, in the least developed countries, 30% of individuals will be using the Internet
- Target 2.5: By 2023, the affordability gap between developed and developing countries should be reduced by 25% (baseline year 2017)
- Target 2.6: By 2023, broadband services should cost no more than 3% of average monthly income in developing countries
- Target 2.7: By 2023, 96% of the world population covered by broadband services
- Target 2.8: by 2023, gender equality in Internet usage and mobile phone ownership should be achieved
- Target 2.9: By 2023, enabling environments ensuring accessible telecommunications/ICTs for persons with disabilities should be established in all countries
- Target 2.10: By 2023, improve by 40% the proportion of youth/adults with telecommunication/ICT skills

Goal 3 – Sustainability: Manage emerging risks, challenges and opportunities resulting from the rapid growth of telecommunications/ICT.

To promote the beneficial use of telecommunications/ICTs, ITU recognizes the need to manage emerging risks, challenges and opportunities from the rapid growth of telecommunications/ICTs. The Union focuses on enhancing the quality, reliability, sustainability and resilience of networks and systems as well as building confidence and security in the use of telecommunications/ICTs. Accordingly, the Union will work to make it possible to seize of opportunities presented by telecommunications/ICTs while working towards minimizing the negative impact of undesired collaterals.

- Target 3.1: By 2023, improve cybersecurity preparedness of countries, with key capabilities: presence of strategy, national computer incident/emergency response teams and legislation
- Target 3.2: By 2023, increase the global e-waste recycling rate to 30%
- Target 3.3: By 2023, raise the percentage of countries with an e-waste legislation to 50%
- Target 3.4: By 2023, net telecommunication/ICT-enabled Greenhouse Gas abatement should have increased by 30% compared to the 2015 baseline
- Target 3.5: By 2023, all countries should have a National Emergency Telecommunication Plan as part of their national and local disaster risk reduction strategies

Goal 4 – Innovation: Enable innovation in telecommunications/ICT in support of the digital transformation of society.

The Union recognizes the crucial role of telecommunications/ICTs in the digital transformation of society. The Union seeks to contribute to the development of an environment that is conducive to innovation, where advances in new technologies become a key driver for the implementation of the WSIS Action Lines and the 2030 Agenda for Sustainable Development.

- Target 4.1: By 2023, all countries should have policies/strategies fostering telecommunication/ICT-centric innovation

Goal 5 – Partnership: Strengthen cooperation among the ITU membership and all other stakeholders in support of all ITU strategic goals.

In order to facilitate the achievement of the above strategic goals, the Union recognizes the need to foster engagement and cooperation among governments, the private sector, civil society, intergovernmental and international organizations, and the academic and technical communities. The Union also recognizes the need to contribute to the global partnership to strengthen the role of telecommunication/ICTs as means of implementation of the WSIS Action Lines and the 2030 Agenda for Sustainable Development.

- Target 5.1: By 2023, increased effective partnerships with stakeholders and cooperation with other organization and entities in the telecommunication/ICT environment. `

387. Each year, the World Telecommunication and Information Society Day (WTISD) theme is also linked to the Connect 2030 Agenda goals and targets, the SDG's and the WSIS Action Lines so as to continue to promote and raise awareness about the possibilities that the use of the Internet and other ICTs can bring to societies and economies, as well as of ways to bridge the digital divide.

Operationalization of the ITU Strategic Plan 2024-2027

388. The ITU secretariat contributed to the progress towards the Connect 2030 Agenda through the implementation of the operational plans of the three Sectors and the General Secretariat.

Contribution of the Connect 2030 Agenda to the Sustainable Development Goals

389. In order for ITU to respond to the needs of its constituents with regards to the 2030 Agenda for Sustainable Development, the secretariat developed the 'ITU SDG mapping tool', aiming to provide a comprehensive visual overview of how the ITU strategic framework and Connect 2030 Agenda contribute to the SDGs. The tool visualizes the mapping and the linkage of the ITU strategic framework, Connect 2030 Agenda, WSIS Action Lines and the SDGs and Targets. It is also now linked to the WSIS Stocktaking DB and allows for third parties to publish success stories.

Example: Three map of SDG mapping to ITU activities:

Example: Three map of SDG mapping to activities on the WSIS Stocktaking DB:

Roadmap for 2030

390. ITU will further advance the implementation of Connect 2030 by:

a) *Measurement, monitoring and reporting*: Effective measurement and data analysis is key in meeting the needs of policy-makers and practitioners. Further work required in specific cases to define measurement methodologies will be continued.

b) *Coordinated implementation of the ITU strategic and operational plans contributing to the Connect 2030 Agenda: Ensuring inter-sector coordination on the cross-sectoral*

thematic areas covered by the Connect 2030 Agenda goals and targets will ensure maximizing the impact of ITU's work.

(m) Broadband Commission for Sustainable Development

391. The Broadband Commission for Sustainable Development was established May 2010 by ITU and UNESCO in response to calls by the UN Secretary-General Mr. Ban Ki-moon to step up efforts by the UN to accelerate progress towards the MDGs. The Commission is grounded in the belief that universal connectivity is key to achieve the Sustainable Development Goals (SDGs). Acting as the UN advocacy engine for implementation of the UNSG's Roadmap for Digital Cooperation and leveraging the strength of its membership and collective expertise, the Commission's work advocates for meaningful, safe, secure, affordable and sustainable broadband communications services that are reflective of human and children's rights.

392. The Broadband Commission for Sustainable is led by President Paul Kagame of Rwanda and Carlos Slim Helù of Mexico and is co-chaired by ITU's Secretary-General Doreen Bogdan-Martin and UNESCO Director-General Audrey Azoulay. It is comprised of over 50 Commissioners representing a cross-cutting group of top CEOs and industry leaders, senior policymakers and government representatives, and experts from international agencies, academia and organizations concerned with development. Its mission is to catalyze the expansion of broadband connectivity globally to enhance quality of life, power sustainable development, and accelerate the achievement of the of the United Nations' SDGs by 2030.

393. The Broadband Commission believes that high-speed, high-capacity broadband connectivity to the Internet is essential in modern society, with wide economic and social benefits. It aims to promote the adoption of broadband-friendly practices and policies, so the entire world can take advantage of the benefits. It defines strategies for accelerating broadband roll-out worldwide and examines applications that could see broadband networks improve ICT delivery in healthcare, education, environmental management, safety and across society.

394. Every year, the ITU/UNESCO Broadband Commission for Sustainable Development publishes its flagship annual 'State of Broadband' report in September providing a unique, global snapshot of global progress on reaching universal connectivity. Written through a consensus-driven framework and drawing on the insights of the Commission's high-level, multistakeholder membership, the report provides input on the most pertinent issues facing broadband development; updates on the 2025 Broadband Advocacy Targets; and insights and impact stories from Commissioners. In 2023, the Commission continued to see progress towards universal and meaningful online activity. It is heartening to note that the global offline population continues to steadily decline to 2.6 billion people in 2023, a reduction from the estimated 2.7 billion people offline in 2022. This year's State of Broadband 2023 reviews also the progress of the seven Advocacy Targets and notes the wins that can be seen as we move towards broadband being universally available, equitable, and affordable. Yet despite the gains, market trends for consumption and supply are shifting, and may not be strong enough to guarantee that the objective of universal and meaningful connectivity will be met by 2030. The report offers five considerations for how future efforts on connectivity for digital transformation should be financed and funded: defining measurable goals; addressing barriers to Internet use where coverage is available;

broadening the contributor base and implementing creative funding approaches; aligning and incentivizing funding contributors; building sustainable network infrastructure policies. The work of the Broadband Commission in 2023has responded to these challenges through addressing the most pertinent issues affecting broadband affordability, access and use. The Broadband Commission for Sustainable Development welcomes stakeholders and partners to work on achieving universal and meaningful connectivity by 2030, to ensure not just connectivity but also that those who are connected have the skills and knowledge to use it.

395. Over the course of 2022 and 2023, the Broadband Commission pursued a range of topics through its Working Groups on: Data for Learning, chaired by UNESCO, and one on Connectivity for MSMEs, chaired by ITC and the GSMA, presented findings and recommendations of their final reports during the Annual Meeting in September 2023. Both Working Group have developed a relevant frameworks and set core recommendations for all relevant stakeholders.. The Commission Working Groups for the next year will be focused on digital policies to support digital transformation research, among others.

396. By issuing these reports, the ITU/UNESCO Broadband Commission for Sustainable Development has developed thought leadership and made worthy contributions to the debate about how best to expand broadband access and services and achieve digital inclusion for all through innovative financing mechanisms. The Commission will continue working with many different stakeholders to fulfil its Universal Connectivity Manifesto dedicated to connecting the unconnected and realizing the forthcoming SDGs and the 2030 Agenda. In addition, in 2023, The Commission contributed to the Global Digital Compact (GDC) calling for the GDC to be anchored in the vision of a connected, inclusive and sustainable world, where no one is left behind from benefitting from digital transformation, where the potential of ICTs is harnessed to realize the 2030 Agenda and to secure a sustainable and inclusive digital future for all. With more than 170 Members of the Commission since 2010, including 50 current Members, representing all players from the digital ecosystem and a community of more than 500 top External Experts in the field of ICT for development, this multistakeholder leadership platform, has established a solid foundation and strong case to continue its role as a pre-eminent thought-leader on digital and can play an important advisory role for the GDC, especially in the consultation period before its adoption by UN Member States at The Summit of the Future.. .

397. In addition to these reports, the Commission maintains an online inventory, housing a wealth of digital resources, country case studies, best practices and regulatory recommendations, in addition to releasing its publicly available newsletter.

398. In addition to its Working Group activities, the Broadband Commission, hosts two regular face-to-face meetings each year, in some cases virtual, to solicit feedback from regional constituents, including ministers and regulators, as well as members of the private sector and UN high level representatives. At these bi-annual meetings, Broadband Commissioners debate key issues to advance the work of the Commission, present findings and recommendations from their work throughout the year, offer expertise and guidance to high-profile guests and launch global calls to action like the 2020 Universal Connectivity Manifesto.

399. On 16 September 2023, the Commission held its Annual Fall Session held in person in the UNHQ in New York. In the backdrop of the 78th Session of the General Assembly and the UN SDG Summit, the Broadband Commission's Fall Meeting 2023 titled: *Digital Connectivity: a transformative opportunity,* discussed broadband as a foundational element to achieving the 2030 Agenda. The meeting explored new investments models to meet targets of universal meaningful connectivity. The Commissioners and Special Guests debated new financing instruments needed to encourage investment in broadband networks. The meeting also addressed the key regulatory and policy considerations to ensure Universal Meaningful Connectivity is achieved, and adoption and usefulness are extended. The meeting also served as a platform for Commissioners to share progress through the flagship State of Broadband Report, Working Groups publications.

400. This meeting reaffirmed the Commission's call for digital cooperation, and collaborative effort that must ensure that people around the world are not only connected, but that they also have the skills and knowledge to use that connectivity. The Commission called for innovative investment models to bring together private and public stakeholders to deliver meaningful access and content to those most in need, highlighting investments and policies to bring digital benefits to all by 2030.

(n) AI for Good Global Summit

Introduction

401. The AI for Good Global Summit series identifies practical applications of AI with the potential to accelerate progress towards the SDGs. Close to 40 UN organizations are partners of the AI for Good Global Summit. Now in its fourth edition, this year's AI for Good Global Summit is being held online all year, and will continue to connect AI innovators with public and private-sector decision-makers in the interests of stimulating the discovery and delivery of "AI for Good" solutions for all. The AI for Good series has been arranged into three streams (Build, Learn, Experience) with the following service offerings:

Build:
- AI for Good Breakthroughs
- AI for Good Innovation Factory
- AI for Good Machine Learning 5G Challenge
- AI for Good Repository

Learn:
- AI for Good Keynotes
- AI for Good Webinars
- AI for Good Perspectives
- AI for Good On the Go!

Experience:
- AI for Good Artistic Intelligence
- AI for Good Demos

402. Following TSAG discussions on the matter in September 2019 (see TSAG-R8), a roundtable was convened at ITU headquarters on 30-31 January 2020 to discuss the mission and

composition of a Global Initiative to support the implementation of beneficial AI-based solutions to accelerate progress towards the SDGs.

Attended by around 100 participants (including AI specialists, data owners, and infrastructure providers from the private sector, academia, governments, UN agencies and standards bodies), the roundtable highlighted the need for the Global Initiative to maximize collaboration in order to:

- Match problem owners with providers of solutions using AI and data
- Scale and sustain AI-based projects
- Make available and accessible capabilities, resources, datasets, know-how, guidelines, frameworks and standards as a common good

At the roundtable, two working groups (on repositories and on marketplaces) were established and one project was identified (Global AI services platform, initially introduced at an AI for Good Global Summit) to progress toward achieving the mission of the Global Initiative, summarized here.

403. On 16 July 2020, as part of the AI for Good webinar series, the Global Initiative launched the Global Data Pledge project to help identify, support and make available data as a common global resource.

(o) Girls in ICT Day

404. On 28 April, ITU celebrated International Girls in ICT Day, observed annually during the last week of April, with a focus on 'Access and Safety' as key elements to engage the next generation with information and communication technology (ICT). The global celebration and associated worldwide Girls in ICT Day events underline ITU's commitment to encourage girls and young women everywhere to consider pursuing STEM career paths. An interactive global dialogue hosted on 28 April on ICT access and safety for girls took place as part of the 2022 World Summit on the Information Society (WSIS) Forum. ITU regional offices held Girls in ICT Day events to encourage girls and young women everywhere to learn about technology and find STEM career paths.

405. During regional virtual and hybrid events in the Arab States, Africa, the Americas, CIS and Europe on 28 April, women regulators and ministers within the Network of Women for the World Telecommunication Development Conference (WTDC) connected with young women to share their experiences and inspire them to continue or start a career in tech.

406. In Africa, the ITU Regional Office for Africa participated in the Girls in ICT Day celebrations in collaboration with the African Telecommunication Union (ATU) and the UNICEF Liaison Office to the African Union Commission, held on 25 and 27 April respectively. Discussions focused on the challenges of access and safety online for girls and young women, and how to promote their active participation in ICTs. On 28 April, the Africa Regional Girls in ICT Day was organized in coordination with youth envoys from the Generation Connect and the Africa Network of Women, together with a national physical event in Addis Ababa with close to 100 young girls in attendance, during which the challenges and opportunities in safely accessing the internet were discussed in line with the theme of the day.

407. In Asia, Thailand's National Broadcasting and Telecommunication Commission and the Ministry of Digital Economy and Society worked with the ITU Asia and the Pacific Regional

Office to organize celebrations on 28 April, as well as events and training programmes throughout June.

408. In the Arab States, the Girls in ICT Day 2022 celebration powered by Network of Women for WTDC for the Arab region was held on 28 April with a special focus on encouraging girls and young women to meaningfully utilize ICTs.

409. In the CIS Region, a hybrid Fireside Discussion was held to celebrate Girls in ICT Day on 28 April, supported by the Network of Women for WTDC. The event was part of a wider Girls in ICT Day celebration in Uzbekistan, where a digital learning centre for women and youth was opened, organized by the Regional Office for CIS in partnership with Uzbekistan.

410. In the Americas, Generation Connect and the Network of Women for WTDC collaborated to celebrate Girls in ICT Day.

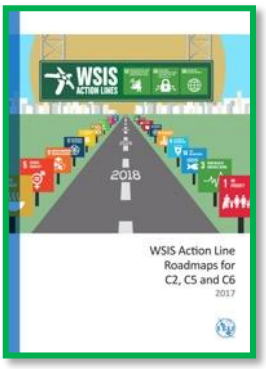
411. The European Celebration of Girls in ICTs: "Digital Skills for Life" was held virtually on the 27th of April, 2023. There was participation and also inputs from UN agencies, private companies, governmental entities, and the Generation Connect Europe Youth. The celebration and webinar addressed issues such as "Why do digital skills for life matter?", "How are countries connecting girls to digital skills opportunities?", "What is the way forward for Europe on digital skills?", "What do young people need and want to create their digital futures?", and "How can the private sector grow digital success for girls and young women?"

(p) Equals in Tech Awards -2023

412. The EQUALS in Tech Awards, hosted by the EQUALS Global Partnership, recognize innovative solutions aimed at closing the digital gender gap. In 2022, 15 finalists were selected among 150+ nominations representing work in 50+ countries. On December 8, 2022, winners were announced at the annual EQUALS in Tech Award ceremony.

(q) Roadmaps for WSIS Action Lines C2, C4, C5, C6

413. In line with its mandate and the WSIS outcome documents, the ITU continues to play a key role in the WSIS implementation and follow-up process, in particular, as the WSIS Action Lines Sole Facilitator for AL C2 (Information and Communication Infrastructure), AL C5 (Building Confidence and Security in the Use of ICTs), and AL C6 (Enabling Environment). ITU has also been performing the role of the lead WSIS Action Line facilitator and implementer of WSIS Action Line C4 (Capacity Building).



414. With the aim of strengthening the implementation mechanism, ITU Council 2009 agreed on the framework for roadmaps of ITU's activities in its role as the sole facilitator for the above mentioned WSIS Action Lines in the implementation of WSIS up to 2015. Highlighting the important role of ITU in implementing the WSIS Action Lines until 2025, revised resolution 140 in para 8 under resolves instructs ITU to do the following with regard to the roadmap:

i) updating its roadmaps for WSIS Action Lines C2, C4, C5 and C6 to take into account activities under way to also implement the 2030 Agenda for Sustainable Development;

ii) providing input, as appropriate, into the roadmaps/work plans for WSIS Action Lines C1, C3, C7, C8, C9 and C11, also related to the 2030 Agenda for Sustainable Development

415. Roadmaps are detailed plans to guide progress towards achieving WSIS goals, also related to the 2030 Agenda for Sustainable Development. They provide broad vision and detailed overview of the activities planned within the mandate of the Union. Direct links between the activities and the strategic goals and relevant resolutions, programmes and initiatives of the ITU are highlighted. The roadmaps include timeframes, expected results, impact on ITU's human and financial resources as well as list of relevant partners.

416. Elaborated framework may serve as a template for the other WSIS Action Line moderators/facilitators to strengthen the implementation mechanism of WSIS process. It has been widely disseminated amongst the WSIS Action Line Facilitators, members of the United Group on the Information Society as well as WSIS stakeholders. The Roadmaps can be accessed at www.itu.int/itu-wsis.

417. At its 38th ITU Council Working Group (CWG) on WSIS&SDG in January 2022, the Secretariat was requested to prepare the ITU Roadmaps in accordance with the template approved during the 36th CWG-WSIS&SDG meeting in January 2021, and in alignment with the Strategic Plan of the Union for 2024-2027, including the outcomes of WTSA-20 and WTDC-21.

(r) Communication and Outreach

418. WSIS Flash: is a monthly newsletter on WSIS Related news, projects and activities. https://www.itu.int/net4/wsis/stocktaking/Flash/Newsletter

419. imeetyouatWSISForum provides all registered onsite participants of the WSIS Forum with an online social networking community experience. This component of the WSIS Forum has been specially designed for the WSIS Forum onsite participants.

420. WSIS Process on Facebook: The WSIS Facebook page gives opportunity for stakeholders to get informed and actively contribute to the page: https://www.facebook.com/WSISprocess

421. @WSISprocess on Twitter: The WSIS Twitter page gives opportunity for stakeholders to get informed and actively participate at the page https://twitter.com/WSISprocess

422. WSIS Process on YouTube: WSIS Forum highlights, interviews and all the important WSIS Related Videos are available on the WSIS Forum You Tube site: http://www.youtube.com/wsisprocess.

423. WSIS Process on LinkedIn: WSIS Process has a LinkedIn group: https://www.linkedin.com/groups/WSIS-Process-World-Summit-on-2599279?gid=2599279&trk=hb_side_g .

424. WSIS in ITU News: The ITU News is a media partner of the WSIS Process and regularly publishes WSIS Process related articles in several issues https://itunews.itu.int/en/

425. WSIS is also on Instagram: the WSIS Process Instagram account allows to share pictures and videos and give the opportunity for the followers to comment and share them https://www.instagram.com/wsis_process/

(s) WSIS Fund in Trust

426. The WSIS Trust Fund was established in 2011 with the adoption of Plenipotentiary Conference Resolution 140. Council Resolution 1332 as modified by ITU Council in May 2016 takes into account the outcomes of the United Nations General Assembly Overall Review of the Implementation of WSIS Outcomes and the 2030 Agenda for Sustainable Development, and resolves to maintain the fund to support ITU activities to facilitate the implementation of WSIS outcomes, calls for partnerships and strategic alliances, and invites the ITU Membership to make voluntary contributions to the fund.

427. Since its creation, information on the WSIS Trust Fund and stakeholder contributions has been reflected at the dedicated website: https://www.itu.int/en/itu-wsis/Pages/WSIS-Fund-in-Trust.aspx. This provides an opportunity to thank all those who have contributed towards the Trust Fund to date for their dedication and commitment towards WSIS Implementation, in particular the WSIS Forum. Moving towards 2025, and following the multistakeholder approach, the WSIS Forum will build upon the outcomes of the WSIS+10 Review and the 2030 Agenda for Sustainable Development.

428. The ITU would like to thank all WSIS stakeholders who have generously contributed to the WSIS Fund in Trust, the names of all contributors are reflected in the dedicated site of the WSIS Fund in Trust http://www.itu.int/en/itu-wsis/Pages/WSIS-Fund-in-Trust.aspx

429. We thank the United Arab Emirates, Saudi Arabia, Japan, Huawei, IEEE, Bahrain, Rwanda, Switzerland, United Kingdom, ICANN, Internet Society, Belgium - The General Delegation of Wallonia-Brussels, Global Coalition on Aging, IFIP, and Organisation Internationale de la Francophonie (OIF) for their contributions to the WSIS Fund in Trust in 2023 to accelerate the implementation of the WSIS related activities undertaken by ITU.

(t) Future Actions

430. The WSIS+20 Forum High-Level Event is scheduled to be held from 27 to 31 May 2023 in Geneva, Switzerland. Please find out more on the WSIS&SDG activities and events on our website: www.wsis.org/forum.

(VI) Final conclusions

431. The ITU is committed to connecting the world in its role as one of the lead facilitating organizations for the WSIS Process. In 2023, ITU initiated, facilitated and implemented a number of activities and projects related to the implementation of the WSIS outcomes showcasing direct linkages with the SDGs. The three ITU sectors, Radiocommunication (ITU-R), Standardisation (ITU–T), Development (ITU-D), and the General Secretariat were active

in this process in their respective areas of expertise, and worked to create an environment and opportunities for multistakeholder cooperation in line with the goals of WSIS.

432. For the last 20 years, WSIS Process and its components, especially the Forum has proven to be an efficient global multi-stakeholder platform that is open and inclusive for all to exchange knowledge and information, enhance collaborative networks, and to share best practices in the ICTs sector. The WSIS Action Lines have served a valuable role in identifying and addressing emerging trends, opportunities and challenges in the digital world. All stakeholders, including governments, the private sector, civil society, and international organizations, have a role to play in implementing the WSIS Action Lines and ensuring that the benefits of ICTs are accessible to all.

433. Building upon the outcomes of the UN Summit on Sustainable Development and the UNGA Overall Review on the Implementation of the WSIS Outcomes, both held in 2015, the alignment of these processes is ongoing and with strengthened efforts by all stakeholders at all levels – national, regional and global – in order to ensure that the enabling power of ICT is leveraged for achieving the SDGs by 2030.