ITU World Summit on the Information Society

ITU Contribution to the Implementation of the WSIS Outcomes

2024

INTERNATIONAL TELECOMMUNICATION UNION

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2024

DRAFT

(as of 31 October 2024)

International Telecommunication Union (ITU),

Geneva, Switzerland

Table of Contents

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.

    - 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.

- 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.
- 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.
- 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.
- 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.
- 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:

    - Lead facilitator (along with UNESCO and UNDP) in coordinating the multistakeholder implementation of the Geneva Plan of Action.
    - 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).
    - Co-facilitator of Action Lines C1, C3, C7 and C11; and partner for Action Lines C8 and C9.
    - Rotating Chair of the United Nations Group on Information Society (UNGIS).
    - Steering committee member of the Partnership on Measuring ICT for Development.
    - Facilitator of the WSIS Stocktaking Process.
    - Initiator and facilitator of the WSIS Project Prize.
    - 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 organized into eight sections. Following the introduction, Section 2 highlights the alignment between the WSIS Action Lines and the 2030 Agenda for Sustainable Development. Section 3 provides an overview of ITU activities and projects undertaken in 2021 within the context of implementing WSIS Outcomes, while Section 4 covers ITU's role in the Overall Review of the Implementation of the

WSIS Outcomes. Section 5 presents forums, innovative initiatives, and planned future activities to support the full implementation of WSIS outcomes. Section 6 focuses on WSIS+20: Review and WSIS Beyond 2025, and Section 7 covers the Global Digital Compact. 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) 2024

12. The **2024 High Level Political Forum (HLPF**), organized by ECOSOC, took place in New York from 8-17 July, with its theme on ‘’Reinforcing the 2030 Agenda and eradicating poverty in times of multiple crises: the effective delivery of sustainable, resilient and innovative solutions’’. The forum reviewed progress on SDGs 1, 2, 13, 16, 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 2024 through these submissions, expert group meetings, and various side events discussing digital cooperation and infrastructure development.

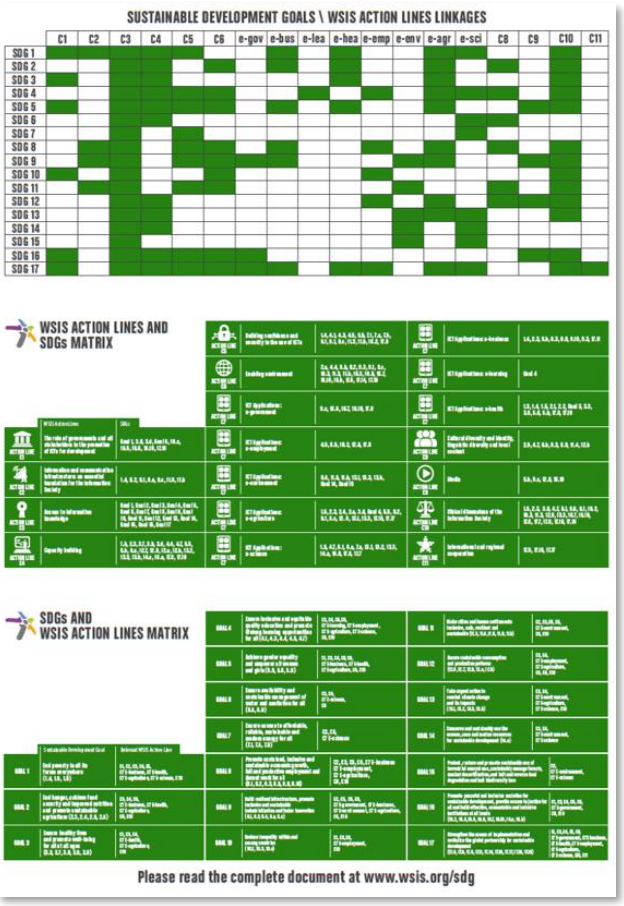
b) WSIS Action Lines and SDG Matrix

13. 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.

14. 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.

15. 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.



16. 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.

17. **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.

18. 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.

19. The **WSIS Prizes 2024** contest aligned its rules to highlight the linkages between the WSIS Action Lines and SDGs, this approach will be strengthened in 2025.

III. Overview of ITU activities and projects undertaken since 2023 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 multi-stakeholder implementation of the Geneva Plan of Action.

20. 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.
21. 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.
22. 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-seventh session held on 15-19 April 2024.
23. 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.

24. 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 captures the summary of all the sessions that took place during the Forum. The agenda, programme and format of the Forum are built through an open multistakeholder consultation process that consists of physical meetings and online consultations. The Forum comprises 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.

25. 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.

- **WSIS Forum 2009:** http://www.itu.int/wsis/implementation/2009/forum/geneva/
- **WSIS Forum 2010**: http://www.itu.int/wsis/implementation/2010/forum/geneva/
- **WSIS Forum 2011**: http://www.itu.int/wsis/implementation/2011/forum/
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- **WSIS Forum 2014**: http://www.itu.int/wsis/implementation/2014/forum/
- **WSIS Forum 2015**: http://www.itu.int/wsis/implementation/2015/forum/
- **WSIS Forum 2016:** http://www.itu.int/wsis/implementation/2016/forum/
- **WSIS Forum 2017:** http://www.itu.int/net4/wsis/forum/2017/
- **WSIS Forum 2018:** https://www.itu.int/net4/wsis/forum/2018/
- **WSIS Forum 2019:** https://www.itu.int/net4/wsis/forum/2019/
- **WSIS Forum 2020:** https://www.itu.int/net4/wsis/forum/2020/

- **WSIS Forum 2021:** https://www.itu.int/net4/wsis/forum/2021/
- **WSIS Forum 2022:** https://www.itu.int/net4/wsis/forum/2022/
- **WSIS Forum 2023:** https://www.itu.int/net4/wsis/forum/2023/
- **WSIS Forum 2024:** https://www.itu.int/net4/wsis/forum/2024/

26. 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
27. The WSIS Forum 2024, rebranded as WSIS+20 Forum High-Level Event 2024 following the ITU-PP Resolution 140 (Rev. Bucharest, 2022) was organised from 27 to 31 May 2024. The Event gathered over 4,000 participants onsite and online, including nearly 80 ministers, deputies, and heads of regulatory authorities. With representation from 160 countries, the Event featured more than 500 high-level participants engaging in 200 sessions with over 100 speakers. The Event was co-hosted by ITU and Swiss Confederation, and co-organised jointly by ITU, UNESCO, UNDP, and UNCTAD. Throughout the five-day event, a diverse array of topics was covered, with particular emphasis on the WSIS process as a robust and inclusive framework for digital governance and cooperation, functioning well through multistakeholder engagement and remaining relevant. During the Ministerial Roundtable, consensus affirmed that the WSIS Principles and Action Lines continue to serve as a foundational reference for global digital discussions. The Ministers reaffirmed that WSIS outcomes are essential pillars for global digital policies and cooperation. Looking ahead to the forthcoming WSIS+20 review, integrating new technologies like Artificial Intelligence (AI) will be essential in ensuring that WSIS continues to evolve and remain relevant in the landscape of global digital governance. In the closing ceremony, the Chair of the WSIS+20 Forum presented the Chair's Summary, encapsulated the discussions from

the Chair's perspective, highlighting key insights and future directions emerging from the Event.

28. The highlights, announcements, and key outcomes of the Event, including publications are available here.

    i. Photographs: click here.

    ii. All WSIS+20 Forum High-Level Event 2024 outcomes, photos and videos documentation and highlights are available at www.wsis.org/forum.

29. The **WSIS Forum 2025,** rebranded as **WSIS+20 High-Level Event 2025** is scheduled to be held from **7 to 11 July 2025** in Geneva, Switzerland.

30. The WSIS Action Lines facilitators have prepared presentations on the WSIS+20 Review Action Lines highlighting the milestones, challenges and emerging trends beyond 2025. Please see here.

b) Facilitator of the WSIS Action Lines C2, C4, C5, C6

Action Line C2: Information and Communication Infrastructure

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

31. 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.

32. The ITU organized several notable events under the WSIS Action Line C2 (Information and communication infrastructure) in both 2023 and 2024. These events emphasized sustainable digital infrastructure, broadband access, and innovations to bridge the connectivity gap, especially in remote and underserved areas.

- WSIS Forum Sessions (2023-2024): Both years featured dedicated sessions exploring innovative solutions for broadband deployment in rural areas. In 2024, specific discussions tackled the digital divide and sustainable digital transformation with a focus on emerging technologies, such as 5G and fiber access, that could address these needs in developing countries.
- Workshops on Digital Public Infrastructure (DPI): In 2024, the DPI workshop highlighted best practices for digital governance and policy. The event encouraged knowledge-sharing around digital infrastructure to enhance inclusivity and accessibility globally, aligned with SDG goals.

33. The 19th Action Line C2 Facilitation Meeting was held on Thursday, 30 May 2024, 14:00-14:45 CEST as an integral part of the WSIS+20 Forum High-Level Event 2024. The title of the Action Line Facilitation meeting was: “Challenges and solutions for broadband infrastructure deployment in developing countries, rural and remote areas”. The discussion presented update on the wireless and fibre access technologies, network topologies as well as innovative solutions to reduce time and cost of deployment with a special focus on the challenges and infrastructure solutions to connect the unconnected in developing countries, rural and remote areas. More details on this session here.

34. The WSIS Prizes 2024 Winner for the Action Line C2: Empowering Disaster Response in Northern Mindanao through the use of Local Radio Networks, Philippines. Details of the project are available here.

35. The ITU has organized several regional workshops during 2023 and 2024, each targeting different aspects of ICT development and connectivity, and catering to a variety of stakeholders, including policymakers, regulators, and industry professionals. Here are a few highlights:

- Regional Workshop on EMF Harmony: Held in Muscat, Oman, in May 2024, this workshop focused on balancing connectivity with safety standards related to electromagnetic fields (EMF). Topics included regulatory requirements, the impact of urban planning on ICT infrastructure, and methods for accurately assessing EMF exposure. It was designed for policymakers, health and safety experts, and regulators in the Arab region.
- Workshop on Universal and Meaningful Connectivity (UMC): This event took place in Doha, Qatar, in October 2024. It aimed to support policymakers and statisticians in promoting and measuring UMC, a concept that emphasizes affordable, equitable internet access. The agenda included discussions on data-driven decision-making and effective strategies for overcoming connectivity challenges, with participants encouraged to take ITU courses on ICT indicators before the event.
- ITU Regional Development Forum for Africa (3-5 October 2023) – Held in Addis Ababa, Ethiopia, this forum brought together stakeholders from across the region to discuss digital development strategies, aiming to drive Africa's digital transformation with inclusive and sustainable practices.
- Workshop on Co-Creating Sustainable Operating Models for Connected Schools (23 March 2023) – Conducted in Nairobi, Kenya, this event addressed sustainable approaches to connecting schools, part of ITU's broader effort to bridge educational divides through digital technology.
- 9th SG13 Regional Workshop for Africa (19-20 September 2023) – Hosted in Abidjan, Côte d'Ivoire, this workshop covered emerging network technologies and future networks. It included sessions on AI, machine learning, and the standardization priorities specific to Africa, catering to representatives from ITU member states and academic institutions (ITU,ITU,ITU)

36. Some of the ITU major projects for 2023 and 2024 focus on global connectivity, cybersecurity, sustainable digital transformation, and advancing technology standards. Key initiatives include:
    - Connect2Recover - Targeted at improving connectivity in underserved regions, this project focuses on building resilient digital infrastructure to bridge gaps in healthcare, education, and economic services through better network coverage and access.
    - Cybersecurity Readiness Programs - ITU continues its work on enhancing cybersecurity, particularly with developing nations, by establishing policies, cybersecurity incident response teams, and a regulatory framework to mitigate risks and secure the digital environment.
    - Green Digital Action - Aligned with COP29 and other environmental goals, ITU's Green Digital Action project supports the development of sustainable ICT practices to combat climate change. This includes initiatives on energy-efficient digital technologies and climate-conscious data management.
    - Transformation for Sustainable Development - Under the ITU Strategic Plan for 2024-2027, this project supports the digital transformation of various sectors, aiming for inclusive digital access and addressing digital gaps, especially for marginalized communities.

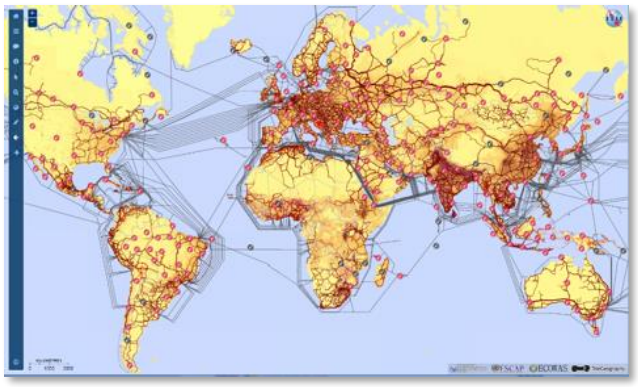
37. During 2023 and 2024, ITU has released several significant publications that address AL C2 and various aspects of telecommunications, digital development, and policy frameworks. Here are some of the major publications:
    - Launch of the ITU's Report on Digital Trends (2024): This report highlighted emerging digital trends and challenges, providing recommendations for policymakers to promote digital inclusion and innovation.
    - ICT Development Index 2023: This report assesses the extent of universal and meaningful connectivity globally, introducing a new methodology for evaluation. It covers 169 economies and is expected to inform stakeholders about connectivity disparities
    - Facts and Figures 2023: This flagship publication tracks global connectivity, highlighting disparities in digital access and the ongoing challenges faced by low-income countries. It includes new indicators for 5G network coverage and internet traffic.
    - Digital Innovation Profiles: Various profiles have been published for countries like Serbia, Georgia, and North Macedonia, offering insights into each country's digital landscape and strategic recommendations for improvement.
    - Connecting Every School in Indonesia: This publication assesses policies related to school connectivity initiatives in Indonesia and identifies gaps in infrastructure and funding.
    - Green Digital Companies 2023: This report examines the intersection of the digital industry and environmental challenges, focusing on monitoring emissions and climate commitments.

38. 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.

39. 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.

40. 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.



41. 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.

42. 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.

43. 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.).

44. 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.

45. 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.

46. 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.

47. 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.

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

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

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

51. 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.

52. 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.

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

54. 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).

55. As part of ITU Europe's Technical Assistance, over the past year, the ITU Office for Europe has been involved in providing technical assistance to various countries in the region, particularly focusing on broadband mapping systems in Albania and Moldova. In Albania, the Office for Europe developed detailed specifications to upgrade the ATLAS platform, improving data collection and analysis to optimize broadband investments. In Moldova, tailored support was provided to create a system that visualizes broadband infrastructure data, helping to identify coverage gaps and guide investments interoperable with the existing register of physical infrastructure (ROITE). Additionally, through the Global Symposium for Regulators (GSR), the Office for Europe shared best practices globally, including supporting the Africa-BB-Maps project to enhance digital infrastructure across the continent. The Africa-BB-Maps project aims to enhance digital infrastructure across the continent by helping African nations adopt broadband mapping systems that improve data transparency and support strategic investments in connectivity.

56. The ITU Office for Europe supported Montenegro in developing its National Broadband Plan 2025-2029, focusing on expanding rural broadband coverage, improving service quality, and aligning with EU digital goals. This guidance ensured the plan adheres to international best practices, contributing to the country's digital transformation.

57. Following the joint declaration signed at the GSR23, the ITU Office for Europe, in partnership with the European Mediterranean Regulators Group (EMERG) and the Eastern Partnership Electronic Communications Regulators Network (EaPeReg), is hosting a series of six workshops on "Strengthening Broadband Infrastructure and Services across the Europe Region and beyond". The fourth workshop was held on 25 July 2024, aimed to advance broadband mapping by showcasing case studies, sharing best practices, and exploring new features of mapping tools, including investment opportunities layers.

58. As part of the ITU's Europe's Technical Assistance, ITU is set to provide support and elaborate detailed technical specifications allowing the Electronic and Postal Communications Authority (AKEP) in upgrading and expanding its spectrum monitoring system in Albania. This enhancement will improve AKEP's capabilities in frequency planning, engineering, licensing, and enforcement, ensuring the new monitoring system adheres to international standards and best practices.

59. Under Resolution 1408 on “Assistance and support to Ukraine for rebuilding their telecommunication sector". ITU Special Task Force on Resolution 1408, established at the level of the General Secretariat and serviced by the ITU Office for Europe, continues to provide the platform for intersectoral response to all issues related to the implementation of this Resolution. ITU is in regular coordination with the Ukrainian Administration on the activities related to the implementation of the Resolution 1408. As a member of the UN Country Team, ITU continues to coordinate all its action with the UN system in the country. ITU continues to use Partner2Connect mechanism to collect pledges dedicated to support Ukraine as well as continues to mobilize funds under the Special Fund in Trust, facilitating the scale up of ITU's operations related to further implementation of Resolution 1408. In line with the implementation of the ITU Council Resolution 1408 ITU, in cooperation with the State Service of Special Communications and Information Protection of Ukraine (SSSCCIP) and the Broadcasting, Radiocommunications and Television Concern, carried out the assessment of the Rehabilitation Costs for 10 Stations of the Broadcasting Network of Ukraine. The reports present 10 initial bankable project proposals for the rehabilitation and reconstruction of the stations with a build-back-better approach.

60. Upon the request presented by the National Commission for the State Regulation of Electronic Communications, Radio Frequency Spectrum and the Provision of Postal Services of Ukraine, the ITU designed an **Executive Training Program on 5G roll-out for Ukrainian officials**. As part of the ITU's capacity-building activities, the ITU Europe Office team organized five sessions from March to July 2024 that served for Ukrainian representatives as the platform for learning and exchanging the experience with three ITU sectors, representatives of Polish, Lithuanian, and Romanian National authorities, representatives from Nokia and Ericsson.

61. 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.

62. 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.

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

64. 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.

65. 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.

66. 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.

67. 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*

68. 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.

69. 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).

70. 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 September 2023, ITU-T

approved more than 200 texts (as of 29 July 2024), including ITU-T Recommendations, Supplements and Technical Reports.

71. 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. Following the first Episode organized in February 2023, ITU organized the second Episode "Global approaches on combating counterfeiting of telecommunication/ICT devices and mobile device theft" during SG11 meeting in Geneva, in October 2023. Among key takeaways was a proposal to strengthen collaboration among ITU, WIPO, WTO, OECD, and other international organizations on addressing these crucial matters. In March 2024, ITU organized a session "Ask the Expert Session – Guardians of Authenticity: Battling Counterfeiting" as a part of ITU webinars on Digital Transformation Dialogues. ITU-T continues developing standards and non-normative documents defining measures to be used for combating counterfeiting and stolen ICT devices. More details about all related activities and standards are available on dedicated webpage at: https://itu.int/go/CS-ICT.

72. 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.

73. 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.

74. 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).

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

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

- ITU-T D.212 (revised) "Charging and Accounting Principles for The Use of Signalling System No. 7" defines charging and accounting principles for the use of Signalling System No. 7.
- **ITU-T D.265 "Principles for Tariff Regulation of Data Services" (under approval)** covers principles of tariff regulation on data services. Members States and NRAs should consider the use of these principles to ensure equitable access to the Internet and transparent pricing practices beneficial to consumers and operators of data services. These guidelines are a starting point for telecommunications /ICTs regulators. Member States and NRAs should take into account their specific national or regional conditions when using this Recommendation.
- ITU-T D.285 (revised) "Guiding principles for charging and accounting for intelligent network supported services" 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.609R "Guidelines for determining the size of fees associated with authorizations/licences" (under approval)**: This Regional Recommendation provides guidelines for determining the size of fees associated with authorizations/licenses.
- ITU-T D.700R "Principles for dealing with OTTs": The scope of this Recommendation are over-the-top (OTT) services that can be regarded as potentially competing with or substituting for traditional telecommunications and audio-visual services such as voice telephony, short message service (SMS), and video calling. This Recommendation seeks to provide guidance to Arab States in relation to the global growth of OTTs in view of ensuring fair competition, consumer protection, dynamic innovation, sustainable investment and infrastructure development, accessibility and affordability of services to the largest part of population.
- ITU-T D.1040 Amd.1 -Appendix I "Method of re-allocating the circuit capacity in the trans-multi-country terrestrial cable in a complex scenario" may face more complicated scenario in the real world, i.e. after the circuit capacity has been allocated and some of the circuits have been used, the length of the TTC is extended because the existing party contributes more cable or a new country joins in. This Appendix explains how to re-allocate the circuit capacity in the above-mentioned case.
- **ITU-T D.1141 "Policy framework and principles for data protection in the context of big data relating to telecommunication/ICT services" (under approval)** proposes a policy framework and a set of principles for the protection of Personally Identifiable Information (PII) in the context of big data relating to international telecommunication/ICT services.
- ITU-T E.164.2 "ITU-T E.164 numbering resources for trials" contains the criteria and procedures for an applicant to be temporarily assigned a three-digit identification code within the shared ITU-T E.164 country code 991 for the purpose of conducting an international non-commercial trial. The purpose of the trial will be to determine the viability of a proposed new international public correspondence service.

- **ITU-T E.190 (revised) "Principles and responsibilities for the allocation, reservation, assignment, reclamation and management of ITU-T international naming, numbering, addressing and identification (NNAI) resources" (under approval)** contains the principles and responsibilities used in the allocation, assignment, reclamation and management of International Naming Numbering Addressing and Identification resources, e.g. Recommendations E.164, E.118.1, E.218 and E.212, under the auspices of the appropriate ITU-T study group.
- ITU-T E.212 (revised) "The international identification plan for public networks and subscriptions" defines a unique international identification plan for public fixed and mobile networks providing users with access to public telecommunication services. The ITU-T E.212 identification plan was originally developed for use in public land mobile networks (PLMNs). The plan is hierarchical and identifies geographic areas, networks and subscriptions. The main body of this Recommendation describes the pure identification plan.
- ITU-T E.218 (revised) "Management of the allocation of terrestrial trunk radio Mobile Country Codes" specifies the structure of the terrestrial trunk radio ITSI, and describes the manner by which the ITU-TSB shall allocate and manage the (T)MCC. The administration of the (T)MNC by a National Administration is a national matter and is therefore outside of the scope of this Recommendation. The 2023 revision of this Recommendation clarifies the conditions for reclamation in the case of non-payment of membership fees as well as amending Clause 2.
- ITU-T E.813 "Mapping and visualization strategies for the assessment of connectivity" defines a high-level framework for mapping and visualization strategies that include guidelines to define first how to identify and measure the level of connectivity and secondly tools and functionalities that are useful in representing the status of this connectivity.
- **ITU-T E.1120 "Assignment processes for ITU-T International resources" (under approval)** specifies processes to be used by an applicant, the Telecommunication Standardization Bureau (TSB), and ITU-T Study Group 2 (SG2), for assignment of: – ITU-T E.164 identification codes (ICs) associated within the shared country codes (CCs) for networks category of ITU-T E.164, whose combination is designated CC + IC. – ITU-T E.212 shared mobile country codes for networks and their respective mobile network codes. – [ITU-T E.118 global issuer identifier numbers (IINs). – ITU-T E.118.1 ITU-T management of the allocation of globally assigned Issuer Identifier Numbers (IINs]– ITU-T E.218 shared terrestrial trunk radio access mobile network codes. The naming, numbering, addressing and identification (NNAI) resources identified in the preceding list can be described as "global".
- ITU-T E.1121 "Mechanisms and processes for audits of assigned ITU-T international naming, numbering, addressing and identification (NNAI) resources": The purpose of this recommendation is to provide the means and mechanism by which audits are performed, by which role, and for what reason. In addition, the recommendation in identifying the process for the audit will identify the result of non-compliance by a global identifier assignee.

- ITU-T F.740.3 "Metadata for digital representation of cultural relics/artworks using augmented reality": 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": 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" 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": 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 "Reference architecture and requirements for mobile terminal computational photography systems" specifies a reference architecture for mobile terminal computational photography system, which includes three functional blocks, namely optical imaging block, image processing block and application block. This recommendation also describes requirements for the mobile terminal computational photography system. This Recommendation can facilitate cooperation between manufactures, and enhance developing efficiency, so as to provide end users better photography experiences. The aim is to define the reference architecture and requirements for the mobile terminal photography system.
- ITU-T F.740.8 "Requirements and architecture for live virtual tour system using panoramic video and augmented reality": The purpose of this Recommendation is to

define a live virtual tour system using panoramic video and augmented reality. By using the panoramic video and augmented reality technologies, the live virtual tour system can enable network users to experience the remote tour by watching the immersive multimedia content and using the related interactive functions. This Recommendation describes the requirements and architecture for the live virtual tour system using panoramic video and augmented reality.

- ITU-T F.742.2 "Functional architecture for distance learning services" specifies the functional architecture for distance learning services.
- ITU-T F.743.23 "Security requirements for video surveillance systems" 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.743.24 "Scenarios and requirements for DLT in video surveillance system interworking" provides the overview of the video surveillance system interworking based on distributed ledger technology, and defines the application scenarios and capability requirements for DLT in video surveillance system interworking, to realize interoperability, high-reliability and high-efficiency of identity authentication and authorization of video surveillance system interworking (VSSI).
- ITU-T F.743.25 "Procedures and requirements for multimedia data asset management" specifies a data asset management framework with its corresponding objects, activities and supports in a high level. In order to manage data assets effectively so that the value of multimedia data assets can be maintained and added, there should be a standard procedure to manage multimedia data assets. The procedures can help different enterprises to identify, recognize, share, exchange, and apply multimedia data assets in a unified and standardized way. This Recommendation contains the procedures for the life cycle management of multimedia data assets. The procedures include multimedia data asset catalogue management, identification, registration, application, inventory check, change, assessment, and disposal. It also provides the detailed requirements for each part of the procedures, and the use cases for how these processes can be applied are also provided in the appendix.
- ITU-T F.743.26 "Technical requirements of cloud gaming platform based on IMT-2020 mobile edge computing" specifies the technical requirements of cloud gaming platform based on IMT-2020 mobile edge computing. It defines the deployment, technical requirements for operations functionality within the cloud gaming platform, technical requirements for service capability functionality within the cloud gaming platform, technical requirements for cloud computing platform and network, and security requirements. The Recommendation aims to utilize the technical advantages of IMT-2020 mobile edge computing to provide a reference for the development and deployment of the cloud gaming platform.
- ITU-T F.744.5 "Requirements for content delivery networks based on P2P technology" 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.746.18 "Requirements for interactive low-latency multimedia transmission system over the Internet" specifies the functional requirements of interactive low-latency multimedia transmission system (ILMTS) over the Internet. It identifies the key functional requirements from the different aspects, such as service level, application level and management level, etc. According to those requirements, this Recommendation also introduces a reference framework of ILMTS. Some use cases are described in the Appendix at the end of this Recommendation. With this Recommendation, the service providers who provide the interactive live content delivery service with low-latency media delivery are able to design a standardized real-time multimedia service system by following the requirements defined in this Recommendation.
- ITU-T F.747.13 "Requirements and reference framework of cloud-edge collaboration in industrial machine vision systems": 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.747.14 "Requirements and capability framework of the multimodal fusion system for vision": With the big data and artificial intelligence explosive development, some new modal data for vision is appeared, like Lidar data, Radar data, and 3D data and so on. Multimodal fusion for vision is one new technology for higher quality human eye presentation or higher performance machine vision tasks. Multimodal fusion system for vision will be popular in the future vision system. Meanwhile the multimodal fusion system focuses on the specific methods of multimodal data fusion. This Recommendation specifies the requirements and capability framework to accommodate the existing and newly developed visual facilities for multimodal fusion for vision applications including autonomous vehicles, autonomous robots' navigation and weather visibility prediction. This Recommendation defines the related requirements, capability framework, and reference use cases for the multimodal fusion system for vision.
- ITU-T F.747.15 "Requirements of event-based vision systems": With the advantages of high time-domain resolution, less data redundancy, low power consumption, and high dynamic range, the event-based vision system (EV-SYS) can be used in power consumption sensitive, high-speed movement and extreme lighting scenarios, such as

high-speed industrial detection, autonomous driving, video surveillance, high-speed imaging and robot vision. Since the EV-SYS has differences in signal acquisition, coding, transmission, analysis, and application compared to traditional camera-based intelligent vision due to the asynchronous output, the traditional vision algorithms cannot be applied. None of the existing machine vision standards has developed based on EV-SYS. The EV-SYS will be used in high-speed motion scenarios beyond the existing standards. This Recommendation provides the related requirements and reference use cases for EV-SYS.

- ITU-T F.748.22 "Functional architecture for feature-based distributed intelligent systems" defines the architecture, the functional entities, and the reference points for feature-based distributed intelligent systems.
- ITU-T F.748.23 "Requirements and framework for intelligent crowdsensing multimedia interaction based on deep learning": Artificial intelligence (AI) techniques can greatly improve the efficiency and effectiveness of crowdsensing tasks execution and enable intelligent multimedia interaction in crowdsensing. Recommendation ITU-T F.748.23 outlines specific scenarios for crowdsensing multimedia interaction that leverage AI techniques, and subsequently defines the corresponding requirements and framework in detail.
- ITU-T F.748.24 "Trusted contribution evaluation framework on federated machine learning services" 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.748.25 "Requirements for speech interaction of intelligent customer services" 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.748.26 "Technical specification for artificial intelligence cloud platforms: Performance evaluation" provides a comprehensive performance evaluation framework for artificial intelligence cloud platform. It covers the overview of the evaluation framework, configuration specification, workloads, metrics, requirements on evaluation results and evaluation suggestions. It can be a unified guideline for developers, users, third-party test agency, and researchers to analyse and access the performance of AI cloud platforms.
- ITU-T F.748.27 "Framework and requirements for the construction of 3D intelligent driven digital human application systems": Multimedia services are becoming increasingly useful for education, video-based marketing, digital museum, E-health, etc., providing an enriched user experience in e-meetings, distance training and product demonstrations. Digital twin realizes the interconnection, intercommunication and interoperability between the physical world and the digital world, constructs the description, diagnosis, prediction and decision-making of the physical world in the virtual world. At present, the digital twin system in different multimedia services has common requirements and functions, and it is necessary to develop a digital twin

platform to realize the services for upper multimedia applications. The digital twin platform provides general services, twin services, interactive services for multimedia applications such as the fields of education, video-based marketing, digital museum, E-health, etc. This Recommendation specifies the requirements and functional architecture of digital twin platform for supporting multimedia services.

- ITU-T F.748.29 "Framework and requirements of computer audition based machinery fault diagnosis systems": Building intelligent machinery fault diagnosis systems is essential for preventing unexpected breakdowns of machinery, thus enhancing production efficiency and ensuring safety during operations. The integration of computer audition into machinery fault diagnosis systems can detect subtle faults imperceptible to vision through non-destructive ways. This Recommendation specifies the basic concept of computer audition, and identifies the framework and requirements of computer audition based machinery fault diagnosis systems.
- ITU-T F.748.30 "Requirements of communication services for digital humans": Digital human technology is developing rapidly and is being used in various fields. This document defines the communication services for digital humans and the requirements for developing and utilizing digital humans. This document defines entities and their roles in communication services for digital humans, interaction and communication types between entities, and describes human and digital human communication service types. It also defines the concept model for communication services for digital humans. Emotions and memories are needed for perfect communication, and digital human communication also requires emotions and memories. This document also define requirements of communication services of digital human using emotions and memory.
- ITU-T F.748.34 "Requirements for the construction of multimedia knowledge graph database structure based on artificial intelligence" specifies the requirements for effectively constructing a knowledge graph database capable of processing multimedia data using artificial intelligence technology. It specifies the framework and requirements for the construction of the multimedia knowledge graph database.
- ITU-T F.748.35 "Requirement and framework of trustworthy federated machine learning based service": Federated machine learning (FML) is an emerging distributed machine learning paradigm that enables collaborative model training, learning, utilizing and construction from a large number of distributed datasets on the basis of ensuring data security and legal compliance. It performs where the computing is where the data, and data available is not visible and so is data computing. There are some challenges for FML-based services in aspects of trust for they work in distributed or decentralized environments. All the challenges are often brought about by a lack of trust in the multiple participants of FML-based services, usually in the progresses of model training and utilizing, such as data indexing, data computing, parameter exchanging, etc. Specific functional components are needed to enhance the trustworthiness of FML-based services, such as to enhance dataset indexing, data computing, parameter exchanging, and model utilization. Distributed ledger technology (DLT) system can be as one type of trustworthy shared data system to store the data of FML-based service as well. Convergence between FML and those components can make benefits for FML-based service, especially for helping for addressing the challenges for FML-based services in aspects of trust. This Recommendation provides a trustworthy FML-based service, and

specifies its concept, general characteristics and requirements and reference framework.

- ITU-T F.748.36 "Requirements and framework of multi-algorithm scheduling systems" specifies the requirements and framework of the multi-algorithm scheduling (MAS) systems for artificial intelligence (AI)-based multimedia applications. The MAS systems consist of the scheduling unit, the algorithm warehouse unit, and the computing power resource management unit. The MAS systems schedule multiple algorithms (multi-type, multi-version, or from multiple providers) across heterogeneous computing power resources based on specific tasks on-demand. This Recommendation is intended to guide the design, development, application and implementation of the MAS systems for AI-based multimedia applications.
- ITU-T F.748.37 "Requirements and functional framework of joint semantic query system of unstructured data across clusters" specified the requirements and framework for joint semantic query system of unstructured data across clusters, enabling efficient and rapid query of unstructured data without change the physical location of the data.
- ITU-T F.748.38 "Technical specification for artificial intelligence cloud platform: General architecture" provides technical specifications and capability requirements for artificial intelligence cloud platform. This recommendation specifies the capabilities of artificial intelligence cloud platforms from service providers in the following six aspects: resource management, model development, model deployment, high availability, performance, and platform security.
- ITU-T F.749.8 "In-vehicle multimedia applets: Framework and functional requirements" describes the VMMA concept, the VMMA framework, the functional requirements, the functional APIs and the reference parameters. Some detailed use cases and reference APIs are described in the appendix.
- ITU-T F.749.18 "Framework and requirements for emergency services using civilian unmanned aerial vehicles": When emergency occurs, there are always two critical things to consider: to find the survivors and to reduce the loss, but it's dangerous and difficult for human beings to observe or enter the scene in time. With CUAVs which carry base stations or observation equipment (such as cameras, sensors), administrators can easily analyse the situation and make decisions. This Recommendation provides the framework and requirements for emergency services using civilian unmanned aerial vehicle, which meets the need of emergency use cases.
- ITU-T F.751.9 "Trusted execution environment based confidential computing on distributed ledger technology systems" 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”: 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” provides a performance test suite for DLT system based on assessment criteria proposed in ITU-T F.751.1 and ITU-T F.751.6. This Recommendation specifies the basic principles and main dimensions of the performance testing for DLT system, and provides a suit of test cases, which can help users quantitatively and objectively analyses the performance of DLT system with different test environment comprehensively, and find the most suitable path to improve the performance.
- ITU-T F.751.13 “Framework and requirements for distributed ledger technology-based distributed power trading systems” 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.751.14 “Reference architecture for information tracing of renewable energy consumption based on distributed ledger technology” defines the relevant participants, tracing process and reference architecture for the renewable energy consumption information traceability (RECT) system based on distributed ledger technology (DLT). It provides guidance for users and demanders, who choose DLT for renewable energy consumption information traceability.
- ITU-T F.751.15 “Assessment methods for distributed ledger technology (DLT) management service platforms"” provides the assessment methods for DLT-MSP and the assessment criteria cover DLT layer, management layer, business layer.The description of each test case is composed of test purpose, test workflows and expected results.
- ITU-T F.751.16 “Reference framework for distributed ledger technology (DLT) management service platforms” specifies the reference framework for distributed ledger technology management service platforms (DLT-MSP). The framework includes resource layer, DLT layer, management layer, business layer, application layer, and security layer. Additionally in the framework, it provides functionalities for DLT layer, management layer and business layer. This Recommendation can be used as a guideline for DLT-MSP development and assessment.

- ITU-T F.751.18 "Framework for DLT-based energy metering data sharing": In order to provide better support for energy applications such as carbon emission and green certificate based on trustworthy energy metering data, this Recommendation specifies a framework for distributed ledger technology (DLT) -based energy metering data sharing and it provides functional modules of the DLT-based energy metering data sharing platform.
- ITU-T F.751.19 "Framework and requirements for distributed ledger technology based on sharding technique": Sharding technique helps to improve the scalability of DLT system, including the transaction processing throughput and ledger storage capacity, without compromising the decentralization and security. This Recommendation specifies the framework and technical requirements for distributed ledger technology based on sharding technique, and it can be used as a guideline to perform DLT system scalability.
- ITU-T F.751.20 "Reference architecture for DLT-based multimedia data delivery management systems" specifies the reference architecture for DLT-based multimedia data delivery management systems including three subsystems and the related high level requirements to solve the problems of quality assurance and trusted sharing of multimedia data, support the construction of a traceable value and revenue distribution system and the corresponding multimedia data applications and services.
- ITU-T F.751.21 "Technical Requirements on inter-chain interoperability for permissioned distributed ledger technologies": In order for data exchanging and sharing in different DLTs systems, this Recommendation specifies general flows of the inter-chain interoperability between the different DLT systems, functional requirements of the inter-chain interoperability and general requirements of the inter-chain interoperability for the DLT systems. This Recommendation may be used for guiding the design and implementation inter-chain interoperability for DLT system.
- ITU-T F.751.22 "Financial distributed ledger technology application guideline" specifies the application guideline of financial distributed ledger technology (DLT). It provides: - General principles from five aspects; - Reference architecture from both the participant and conceptual architecture views; - Technical requirements, including functionality, performance, security, governance, maintenance, auditability and interoperability; - Use cases in trade finance and supply chain finance to illustrate how DLT can be used more reasonably and effectively for financial applications according to this guideline.
- ITU-T F.760.2 "Guidelines for user interface of first responders in emergency response support systems" provides requirements for the user interface for first responders in emergency response support systems, which facilitates the use of information and devices supporting the activities of first responders at the scene of an emergency. This Recommendation identifies the human factors in emergency response services and the user interface requirement in emergency response support systems based on the characteristics of first response activities. These user interface requirements are specified to support the functional modules and usability of emergency response support systems for first responders. By meeting these requirements, developers can create user interfaces that are optimized to support the

needs and tasks of first responders, resulting in more effective and efficient use of the system.

- 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.650.1 (revised) "Definitions and test methods for linear, deterministic attributes of single-mode fibre and cable" contains definitions of the linear, deterministic parameters of single-mode optical fibres and cables. It also contains both reference test methods and alternative test methods for characterizing these parameters. These test methods are suitable mainly for factory measurements of the linear, deterministic attributes of single-mode fibres and cables. Some of the test methods may also be used to characterize discrete optical components.
- **ITU-T G.652 (revised) "Characteristics of a single-mode optical fibre and cable" (under approval)** describes the geometrical, mechanical and transmission attributes of a single-mode optical fibre and cable which has zero-dispersion wavelength around 1310 nm. The ITU-T G.652 fibre was originally optimized for use in the 1310 nm wavelength region, but can also be used in the 1550 nm region. This is the latest revision of a Recommendation that was first created in 1984 and deals with some relatively minor modifications. In this revision, example guideline for the statistical chromatic dispersion coefficient in a link with a number of concatenated cable pieces of M equals 1 to 16 is provided in the clause I.6 of Appendix I.
- **ITU-T G.654 (revised) "Characteristics of a cut-off shifted single-mode optical fibre and cable" (under approval)** describes the geometrical, mechanical and transmission attributes of a single-mode optical fibre and cable which has the zero-dispersion wavelength around 1 300 nm wavelength, and which is loss-minimized and cut-off wavelength shifted at around the 1 550 nm wavelength region.
- **ITU-T G.657 (revised) "Characteristics of a bending-loss insensitive single-mode optical fibre and cable" (under approval)**: It is the aim of Recommendation ITU-T G.657 to support this optimization by recommending strongly improved bending performance compared with the existing [ITU-T G.652] single-mode fibre and cables. This is done by means of two categories of single-mode fibres, one of which, category A, is fully compliant with the [ITU-T G.652] single-mode fibres and can be deployed throughout the general transport and datacenter networks as well as the access network. The other, category B, is not necessarily compliant with Recommendation [ITU-T G.652], but is capable of low values of macrobending losses at very low bend radii and is intended for application in the access network inside buildings or near buildings (e.g., outside building riser cabling). These category B fibres are system compatible with ITU-T G.657.A (and [ITU-T G.652.D]) fibres in access networks. This fifth edition of Recommendation ITU-T G.657, amongst other things, extends the application space for G.657 fibre and merges category B2 into category A2.

- ITU-T G.698.5 "Multichannel DWDM applications with single-channel optical interfaces in the O-band" provides optical parameter values for physical layer interfaces of dense wavelength division multiplexing (DWDM) systems primarily intended for mobile fronthaul and metro applications in the O-band, optimized for 10-km and 20-km transmission distances. Applications are defined using optical interface parameters and values for single-channel interfaces of multichannel wavelength division multiplexing (WDM) optical systems in point-to-point applications.
- ITU-T G.698.6 "Multichannel WDM applications with single-channel optical interfaces in the O-band" provides optical parameter values for physical layer interfaces of wavelength division multiplexing (WDM) systems primarily intended for mobile fronthaul and metro applications in the O-band, optimized for 5-km transmission distances. Applications are defined using optical interface parameters and values for single-channel interfaces of multichannel WDM optical systems in point-to-point applications.
- ITU-T G.781 (revised) "Synchronization layer functions for frequency synchronization based on the physical layer" 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.
- ITU-T G.872 (revised) "Architecture of the optical transport network" describes the functional architecture of the optical transport network (OTN) using the modelling methodology described in Recommendations ITU-T G.800, ITU-T G.805 and ITU-T G.807. The OTN functionality is described from a network level viewpoint, taking into account, the characteristic information of clients of OTN, client/server layer associations, networking topology, layer network functionality and optical media network structure, which provide multiplexing, routing and supervision of digital clients.
- ITU-T G.709/Y.1331 (2020) Amd.3 "Interfaces for the optical transport network - Amendment 3" defines the requirements for the optical transport network (OTN) interface signals of the optical transport network, in terms of: – OTN hierarchy – functionality of the overhead in support of multi-wavelength optical networks – frame structures – bit rates – formats for mapping client signals. Edition 6.5 (Amendment 3) of this Recommendation adds mapping of 800GBASE-R clients, clarifications to the description of GMP, and a new fine-grained path layer and tributary slot structure.
- ITU-T G.709.1/Y.1331.1 (2018) Amd.4 "Flexible OTN short-reach interfaces - Amendment 4" 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.709.1 (revised) "Flexible OTN common elements" specifies common elements and signal structures used by various types of FlexO interfaces. Edition 3.0 removes short-reach interfaces which are moved to [ITU-T G.709.5]. This Recommendation is renamed and focuses on common FlexO elements.
- **ITU-T G.709.1 (2024) Amd.1 "Flexible OTN common elements - Amendment 1" (under approval)** specifies common elements and signal structures used by various types of flexible optical transport network (FlexO) interfaces. Edition 3.0 removes short-reach interfaces which are moved to Recommendation ITU-T G.709.5. This Recommendation is renamed and focuses on common FlexO elements. Amendment 1 to G.709.1 adds FlexO level deskewing functionality.
- ITU-T G.709.3 (revised) "Flexible OTN B100G long-reach interfaces" specifies 100G, 200G and 400G FlexO Beyond 100G (B100G) long-reach interfaces. The Recommendation specifies the structure using forward error correction codes with a higher coding gain suitable for longer reach applications, and references common elements from [ITU-T G.709.1] and FEC structures from [ITU-T G.709.2]. Edition 3 contains the following extensions to Edition 2.1: – Removal of FlexO-1-SC and FOIC1.k-SC interface – Move of OTUCn GMP mapping procedure to G.709.1.
- ITU-T G.709.5 "Flexible OTN short-reach interfaces" specifies 100G, 200G, 400G and 800G FlexO short-reach interfaces. The Recommendation specifies the structure using forward error correction code with a coding gain suitable for short-reach applications, and references common elements from [ITU-T G.709.1].
- **ITU-T G.709.5 (2024) Amd.1 "Flexible OTN short-reach interfaces - Amendment 1" (under approval)** specifies 100G, 200G, 400G and 800G flexible optical transport network (FlexO) short-reach interfaces. This Recommendation specifies the structure using forward error correction (FEC) code with a coding gain suitable for short-reach applications, and references common elements from Recommendation ITU-T G.709.1. Amendment 1 to G.709.5 adds a new FOIC1.2-RS optical short reach interface.
- ITU-T G.709.6 "Flexible OTN B400G long-reach interfaces" specifies 400G and 800G FlexO Beyond 400G (B400G) long-reach interfaces. The Recommendation specifies the structure using forward error correction codes with a higher coding gain suitable for longer reach applications, and references common elements from [ITU?T G.709.1] and FEC structures from [ITU-T G.709.3].
- ITU-T G.709.20 "Overview of fine grain OTN" provides an overview of functions provided by the fine grain OTN (fgOTN) layer network and identifies Recommendations where the functions are defined.
- **ITU-T G.781 (2024) Amd.1 "Synchronization layer functions for frequency synchronization based on the physical layer - Amendment 1" (under approval)** 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 synchronous digital hierarchy (SDH), Ethernet, and optical transport network (OTN) network elements (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.

- ITU-T G.798 (revised) "Characteristics of optical transport network hierarchy equipment functional blocks" 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.
- ITU-T G.798 (2023) Amd.1 "Characteristics of optical transport network hierarchy equipment functional blocks - Amendment 1" 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.
- **ITU-T G.798 (2023) Amd.2 "Characteristics of optical transport network hierarchy equipment functional blocks - Amendment 2" (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. Amendment 2 to Recommendation ITU-T G.798 (2023) adds FlexOxR and FlexOnM layer atomic functions to support FlexO regenerator applications, adds ODUflexP to ETC800GR adaptation function, adds fgOTN layer atomic functions to support fine-grained OTN applications, makes some editorial changes.
- **ITU-T G.807 (revised) "Generic functional architecture of the optical media layer" (under approval)** describes the generic functional architecture of the optical media layer that supports the propagation of signals in the context of a transport network. This description is independent of the client characteristic information (CI) that is being carried by a signal in the media network. Amendment 1 removes the dependence on the ITU-T G.694.1 grid, names the reference point between the digital layer and the modulator/demodulator and uses M-AI/Client CI to replace digital-lane/digital-client. Revision 2 changes the name of modulator/demodulator to transmitter/receiver, includes the subcarrier and point-to-multipoint cases.
- **ITU-T G.808.4 "Linear protection for fine grain Metro Transport Network (fgMTN) and fine grain Optical Transport Network (fgOTN)" (under approval)** defines the operation of linear protection switching schemes for both fine grain Metro Transport Network (fgMTN) layer network and fine grain Optical Transport Network (fgOTN) layer network, including the automatic protection switching (APS) protocol.
- ITU-T G.874 (2020) Amd.2 "Management aspects of optical transport network elements - Amendment 2" addresses management aspects of optical transport network (OTN) elements containing transport functions of one or more of the layer networks of the OTN. The management of optical 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 (CM) and performance monitoring are specified.
- ITU-T G.876 (2021) Amd.1 "Management Requirements and Information Model for the optical media network - Amendment 1" Amendment 1 to G.876 specifies the management architecture, the management of OTN optical media layer and the management of Ethernet media layer.

- **ITU-T G.876 (2021) Amd.2 "Management requirements and information model for the optical media network - Amendment 2" (under approval)** describes the management requirements and the information model for network elements (NEs) that contain optical media layer functions defined by ITU-T equipment Recommendations based on the ITU-T G.807 architecture, e.g., Recommendation ITU-T G.798. The management requirements are based on Recommendation ITU-T G.7710, and the information model is based on ITU-T G.7711 object classes.
- ITU-T G.959.1 (revised) "Optical transport network physical layer interfaces" provides physical layer inter-domain interface (IrDI) specifications for optical networks which may employ wavelength division multiplexing (WDM). The IrDIs within the optical transport network (OTN) are provided by unidirectional, point-to-point, single and multichannel line systems. Their primary purpose is to enable transversely compatible interfaces to span the boundary between two administrative domains.
- **ITU-T G.959.1 (2024) Amd.1 "Optical transport network physical layer interfaces - Amendment 1" (under approval)** provides physical layer inter-domain interface (IrDI) specifications for optical networks which may employ wavelength division multiplexing (WDM). The IrDIs within the optical transport network (OTN) are provided by unidirectional, point-to-point, single and multichannel line systems. Their primary purpose is to enable transversely compatible interfaces to span the boundary between two administrative domains. The IrDI specifications include intra-office, short-haul and long-haul applications, without line amplifiers. This version of this Recommendation includes single-channel interfaces suitable for FOIC1.1-RS with PAM4 100G. Amendment 1 to Recommendation ITU-T G.959.1 (2024) includes an updated definition of OTSi and defines new terms T-OTSi, R-OTSi and OTScSi.
- **ITU-T G.971 (revised) "General features of optical fibre submarine cable systems" (under approval)** applies to optical fibre submarine cable systems. The purpose of this Recommendation is to identify the main features of optical fibre submarine cable systems, and to provide generic information on relevant Recommendations in the field of optical fibre submarine cable systems. A common implementation relevant to all the optical fibre submarine cable systems is described in Annex A. Specific information relevant to each optical fibre submarine cable system is included in annexes of other Recommendations. The updated data on cable ships and submersible equipment of various countries are also described in Appendix I.
- **ITU-T G.972 (revised) "Definition of terms relevant to optical fibre submarine cable systems" (under approval)** applies to optical fibre submarine cable systems. The purpose of this Recommendation is to provide definitions of terms relevant to optical fibre submarine cable systems, including terms relevant to system configuration, system aspects, terminal equipment, optical submarine repeaters and branching units, optical fibre submarine cable, manufacturing and installation, and the maintenance of the submarine portion. Appendix I is the alphabetical list of terms defined in this Recommendation. In this latest version, terms and definitions introduced by new Recommendations G.9730.1 and G.9730.2 are added. All the terms that the definitions were for further study have been added as well.
- ITU-T G.988 (2022) Amd.1 "ONU management and control interface (OMCI) specification - Amendment 1" specifies the optical network unit (ONU) management

and control interface (OMCI) for optical access networks. Recommendation ITU-T G.988 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.1051 Amd.1 "Latency measurement and interactivity scoring under real application data traffic patterns - Amendment 1" describes latency measurement and interactivity scoring under real application data traffic patterns.
- ITU-T G.1052 "Testbed framework for mobile application QoS and QoE evaluation" proposes a testbed setup and a methodology to evaluate the QoE of the multiple 5G and beyond mobile use cases. A testbed, its calibration, and a testing methodology are described, able to provide consistent and repeatable results in an automated fashion. A key focus of the setup is the use of commercial devices and applications, aiming at making results more valuable by mimicking the setup of a real user. This document focuses on cellular 3GPP networks. A similar setup could be thought of using other technologies, e.g., Wi-Fi, also interoperating to emulate inter-RAT handovers, although it will not be covered here.
- ITU-T G.1092 "Taxonomy of telemeetings from a QoE perspective" provides a taxonomy on the different possible types of telemeetings, focussing on aspects that are crucial for Quality of Experience (QoE) assessment. The purpose is to facilitate the selection of appropriate quality assessment methods as well as an appropriate reporting and interpretation of results.
- **ITU-T G.7701 (2022) Amd.1 "Common control aspects - Amendment 1" (under approval)** describes the concepts and the aspects of management control components that are common to the use of either software defined networking (SDN) and automatically switched optical network (ASON) approaches to the management of a transport network. It also describes the common aspects of the interaction between the management-control functions and the transport network resources. Amendment 1 adds a clause on interaction between SDN and ASON MC systems, and transport resources and other MC systems. Clause 14 on topology and discovery was moved from G.7703 and made common to all MC systems.
- **ITU-T G.7702 (2022) Amd.1 "Architecture for SDN control of transport networks - Amendment 1" (under approval)** describes the reference architecture for software defined networking (SDN) control of transport networks applicable to both connection-oriented circuit and/or packet transport networks. This architecture is described in terms of abstract components and interfaces that represent logical functions (abstract entities versus physical implementations). Amendment 1 describes the name space, resource and component distribution within one SDN controller, and aligns with the clause structure in G.7701.
- **ITU-T G.7703 (2021) Amd.2 "Architecture for the automatically switched optical network -Amendment 2" (under approval)** describes the reference architecture and requirements for the automatically switched optical network (ASON) as applicable to connection-oriented circuit or packet transport networks. This reference architecture is described in terms of the key functional components and the interactions between

them. Amendment 2 aligns with Recommendation ITU-T G.7701, which specifies common control aspects for both ASON and software defined networking (SDN) architecture. This amendment refers to Recommendation ITU-T G.7701 common clauses.

- **ITU-T G.7718 (2020) Amd.2 "Framework for the management of management-control components and functions - Amendment 2" (under approval)** contains the framework for ASON management. It places automatically switched optical network (ASON) management within the TMN context and specifies how the TMN principles may be applied. A management view of the ASON control plane is developed. This view provides the bases for the ASON management requirements specified in this Recommendation. Identifier spaces needed in ASON management are specified. Examples of management system structures and ASON related management applications are contained in the appendices.
- ITU-T G.8021/Y.1341 Amd.1 "Characteristics of Ethernet transport network equipment functional blocks - Amendment 1" specifies both the functional components and the methodology that should be used in order to specify the Ethernet transport network functionality of network elements; it does not specify individual Ethernet transport network equipment.
- ITU-T G.8023 Amd.2 "Characteristics of equipment functional blocks supporting Ethernet physical layer and Flex Ethernet interfaces - Amendment 2" specifies both the functional components and the methodology that should be used in order to specify the Ethernet physical layer and Flex Ethernet interfaces.
- **ITU-T G.8051 (revised) "Management aspects of the Ethernet transport (ET) capable network element" (under approval)** addresses management aspects of the Ethernet transport (ET) capable 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.
- ITU-T G.8052 (revised) "Protocol-neutral management information model for the Ethernet transport capable network element" 8052 contains the protocol neutral UML information model for Ethernet transport network (NE) management. The model is based on the Ethernet equipment functions specified in Recommendation ITU-T G.8021, generic management requirements in Recommendation ITU-T G.7710, and Ethernet specific management requirements in Recommendation ITU-T G.8051.
- ITU-T G.8052.1/Y.1346.1 (2021) Amd.2 "Operation, administration, maintenance (OAM) management information and data models for the Ethernet-transport network element - Amendment 2" specifies the management information model and data models for Ethernet transport network element (NE) to support specific interface protocols and specific management control (MC) functions. The information model is interface protocol neutral and specified using the unified modelling language (UML). The information model of this Recommendation is derived through pruning and refactoring from Recommendation ITU-T G.7711/Y.1702 core information model and

Recommendation ITU-T G.8052/Y.1346 foundation Ethernet transport NE information model.

- ITU-T G.8121/Y.1381 Amd.1 "Characteristics of MPLS-TP equipment functional blocks - Amendment 1" specifies both the functional components and the methodology that should be used in order to specify multi-protocol label switching – transport profile (MPLS-TP) layer network functionality of network elements; it does not specify individual MPLS-TP network equipment as such. Amendment 1: Provides new Annex A "Mapping MPLS-TP packets to OTN using IMP" Replaces Maintenance Communication Channel (MCC) by Management Communication Channel (MCC) Makes editorial corrections in Figure 11-37 to Figure 11-40 (replacing ETH_FP by ETH_AP) and Table 11-17 Updates the publication dates in References.
- **ITU-T G.8151 (revised) "Management aspects of the MPLS-TP network element" (under approval)** addresses management aspects of the multi-protocol label switching (MPLS) transport profile (MPLS-TP) capable network element containing transport functions of one or more of the layer networks of the MPLS-TP network. The management of the MPLS-TP 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.
- ITU-T G.8151/Y.1374 (2020) Amd.1 "Management aspects of the MPLS-TP network element - Amendment 1" addresses management aspects of the multi-protocol label switching (MPLS) transport profile (MPLS-TP) capable network element containing transport functions of one or more of the layer networks of the MPLS-TP network.
- ITU-T G.8152 (revised) "Protocol-neutral management information model for the MPLS-TP network element" contains the protocol neutral unified modelling language (UML) model for multi-protocol label switching – transport profile (MPLS-TP) network element (NE) management. This Recommendation provides a representation of the MPLS-TP technology using the methodologies that have been used for other transport technologies (e.g., SDH, OTN and Ethernet).
- **ITU-T G.8152.1/Y.1375.1 (2021) Amd.2 "Operation, administration, maintenance (OAM) management information and data models for the MPLS-TP network element - Amendment 2" (under approval)** specifies the operation, administration, maintenance (OAM) information model and data models for multi-protocol label switching – transport profile (MPLS-TP) transport network element (NE) to support specific interface protocols and specific management and control functions. The information model is interface protocol neutral and derived from the ITU-T G.8152/Y.1375 foundation MPLS-TP NE information model. The data models are interface protocol specific and translated from the information model with the assistance of an automated translation tool.
- **ITU-T G.8152.2/Y.1375.2 (2021) Amd.2 "Resilience information/data models for the MPLS-TP network element - Amendment 2" (under approval)** specifies resilience management information and data models for a multi-protocol label switching-transport profile (MPLS-TP) network element (NE) as specified in

Recommendations ITU-T G.8131 and ITU-T G.8132. The information model is interface protocol neutral and specified using the unified modelling language (UML).

- **ITU-T G.8251 (2022) Amd.1 "The control of jitter and wander within the optical transport network (OTN) - Amendment 1" (under approval)** 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. Amendment 1 to Recommendation ITU-T G.8251 includes the following change: – Add fgOTN timing specification. – Replace the OCh term with OTSi and OTSiG. – Remove non-inclusive terms.
- ITU-T G.8260 (2022) Amd.1 "Definitions and terminology for synchronization in packet networks - Amendment 1" provides the definitions, terminology and abbreviations used in ITU-T Recommendations on timing and synchronization in packet networks. Amendment 1 to ITU-T G.8260 (11/2022) provides the following updates: - Updated definitions with consideration given to the use of this terminology in metrology - New Appendix II "Time scales" added - New Appendix III "Clarifications on the term traceability" added - New references added to Bibliography - Revised terminology based on inclusive language.
- **ITU-T G.8262 (revised) "Timing characteristics of synchronous equipment clock" (under approval)** 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.8264/Y.1364 (2017) Amd.2 "Distribution of timing information through packet networks - Amendment 2" outlines aspects of distribution of timing information through packet networks and initially focuses on Ethernet networks. A number of methods may be used to transfer frequency which may be physical-layer based or protocol-layer based. This Recommendation provides information on architectural aspects of timing flows in Ethernet networks which will form the basis for future work related to time and phase transfer. This Recommendation specifies the synchronization status message (SSM) protocol and formats for use with synchronous Ethernet.
- **ITU-T G.8265.1/Y.1365.1 (2022) Amd.1 "Precision time protocol telecom profile for frequency synchronization - Amendment 1" (under approval)** contains the ITU-T precision time protocol (PTP) profile for frequency distribution without 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.8265/Y.1365.
- **ITU-T G.8271 (2020) Amd.1 "Time and phase synchronization aspects of telecommunication networks - Amendment 1" (under approval)** defines time and phase synchronization aspects in packet networks. It specifies the suitable methods

to distribute the reference timing signals that can be used to recover the phase synchronization and/or time synchronization according to the required quality. The requirements for the synchronization 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.8271.1/Y.1366.1 (2022) Amd.2 "Network limits for time synchronization in packet networks with full timing support from the network - Amendment 2" 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.8272.1 (revised) "Timing characteristics of enhanced primary reference time clocks" specifies the requirements for enhanced primary reference time clocks (ePRTCs) suitable for time and phase synchronization in packet networks. It defines the error allowed at the time output of the ePRTC. These requirements apply under the normal environmental conditions specified for the equipment.
- ITU-T G.8272.2 "Timing characteristics of coherent network primary reference time clocks" specifies the requirements for coherent network primary reference time clocks (cnPRTCs) suitable for time, phase and frequency synchronization in networks. These requirements apply under the normal environmental conditions specified for the equipment.
- **ITU-T G.8273.2 (2023) Amd.1 "Timing characteristics of telecom boundary clocks and telecom time synchronous clocks for use with full timing support from the network - Amendment 1" (under approval)** 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.8273.3 (2020) Amd.1 "Timing characteristics of telecom transparent clocks for use with full timing support from the network - Amendment 1" (under approval)** defines the minimum requirements for telecom transparent clocks (T-TCs). These requirements apply under normal environmental conditions specified for the equipment. This Recommendation includes: clock accuracy, noise generation, noise tolerance, noise transfer, and transient response for T-TCs.
- **ITU-T G.8273.4 "Timing characteristics of telecom boundary clocks and telecom time synchronous clocks for use with partial timing support from the network" (under approval)** 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 (revised) "Architecture and requirements for packet-based time and phase distribution" 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.
- **ITU-T G.8275 (2024) Amd.1 "Architecture and requirements for packet-based time and phase distribution - Amendment 1" (under approval)** 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.
- ITU-T G.8275.1/Y.1369.1 (2022) Amd.1 "Precision time protocol telecom profile for phase/time synchronization with full timing support from the network - Amendment 1" 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].
- **ITU-T G.8275.1/Y.1369.1 (2022) Amd.2 "Precision time protocol telecom profile for phase/time synchronization with full timing support from the network Amendment 2" (under approval)** 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].
- ITU-T G.8275.2/Y.1369.2 (2022) Amd.1 "Precision time protocol telecom profile for phase/time synchronization with partial timing support from the network - Amendment 1" specifies a profile for telecommunication applications based on [IEEE 1588] precision time protocol (PTP). The profile specifies the IEEE 1588 functions that are necessary to ensure network element interoperability for the delivery of accurate phase/time (and frequency) synchronization. The profile is based on the use of partial timing support (PTS) or assisted partial timing support (APTS) from the network architecture as described in [ITU-T G.8275] and definitions described in [ITU-T G.8260].
- **ITU-T G.8275.2/Y.1369.2 (2022) Amd.2 "Precision time protocol telecom profile for phase/time synchronization with partial timing support from the network - Amendment 2" (under approval)** specifies a profile for telecommunication applications based on [IEEE 1588] precision time protocol (PTP). The profile specifies the IEEE 1588 functions that are necessary to ensure network element interoperability for the delivery of accurate phase/time (and frequency) synchronization. The profile is based on the use of partial timing support (PTS) or assisted partial timing support (APTS) from the network architecture as described in [ITU-T G.8275] and definitions described in [ITU-T G.8260].
- ITU-T G.8310 (2020) Amd.1 "Architecture of the metro transport network - Amendment 1" describes the functional architecture of the metro transport network

(MTN) using the modelling methodology described in Recommendations ITU-T G.800 and ITU-T G.805. MTN is primarily intended to support transport of distributed radio access network (D-RAN) and cloud radio access network (C-RAN) traffic. The MTN functionality is described from a network level viewpoint, taking into account the client characteristic information, client/server layer associations, networking topology, and layer network functionality that provide multiplexing, routing and supervision of the digital clients.

- ITU-T G.8312 (2020) Amd. 2 "Interfaces for metro transport networks - Amendment 2" describes a transport technology for metro networks (MTNs), including transport of distributed radio access network (D-RAN) and centralized radio access network (C-RAN) traffic. This technology leverages existing and emerging pluggable Ethernet modules and reuses flex Ethernet (FlexE) implementation logic.
- **ITU-T G.8312 (2020) Amd.3 "Interfaces for metro transport networks - Amendment 3" (under approval)** describes a transport technology for metro networks (MTNs), including transport of distributed radio access network (D-RAN) and centralized radio access network (C-RAN) traffic. This technology leverages existing and emerging pluggable Ethernet modules and reuses flex Ethernet (FlexE) implementation logic. Amendment one adds several clarifications and also provides test vectors. Amendment two adds an annex to describe the fine grain MTN path and the associate elements. Amendment three adds a new annex A subclause and appendix V to describe the method of mapping CBR clients into fgMTNP and a new annex B to describe the fine grain MTN path hitless resizing mechanism.
- ITU-T G.8312.20 "Overview of fine-grain MTN" provides an overview of the functions provided by the fine-grain MTN (fgMTN) layer network and identifies the Recommendations where the functions are defined.
- **ITU-T G.8312.20 (2024) Amd.1 "Overview of fine grain MTN - Amendment 1" (under approval)** provides an overview of the functions provided by the fine grain MTN (fgMTN) layer network and identifies the Recommendations where the functions are defined. Amendment 1 to Recommendation G.8312.20 updates the overview of fgMTN recommendation series to include the fgMTN protection and equipment recommendations.
- **ITU-T G.8321 (2022) Amd.1 "Characteristics of metro transport network equipment functional blocks - Amendment 1" (under approval)** specifies both the components and methodology that should be used in order to specify the metro transport network (MTN) functionality of network elements; it does not specify individual MTN equipment. Amendment 1 to Recommendation ITU-T G.8321 (2022) adds Annex A that specifies new atomic functions to align with Amendment 2 to Recommendation ITU-T G.8312, including a new path layer fgMTNP.
- ITU-T G.8350 (2022) Amd.1 "Management and Control of metro transport networks - Amendment 1" specifies management and control requirements and a protocol-neutral management information model for managing metro transport networks and their elements.
- **ITU-T G.9730.1 "Dedicated scientific sensing submarine cable system" (under approval)**: Submarine scientific sensing activities including the measurement of

temperature, pressure, vibration, acceleration, salinity, etc, are important for climate monitoring and disaster risk reduction. Dedicated submarine cable sensing systems have been constructed around the world. Recommendation ITU-T G.9730.1 is concerned with the dedicated submarine cable system for scientific sensing applications. It covers the aspects related to submarine cable system architecture, functional blocks, interfaces between various set of sensors and optical fibre submarine cable.

- **ITU-T G.9730.2 "Scientific monitoring and reliable telecommunications submarine cable systems" (under approval)** Recommendation identifies the capabilities and features of fibre optical submarine telecommunication cable systems equipped with scientific monitoring sensors along the length of the undersea optical cables (i.e., SMART cables). It describes at a high-level characteristics and requirements of a SMART cable system (e.g., no interference between telecommunications and sensing functions, reliability of each function, operations and maintenance, general attributes of a power and communication interface).
- **ITU-T G.9802 (2015) Amd.2 "Multiple-wavelength passive optical networks (MW-PONs) - Amendment 2" (under approval)** continues the maintenance and evolution of the specification of multiple wavelength passive optical network (MW-PON) systems.
- ITU-T G.9804.1 Amd.2 "Higher Speed Passive Optical Networks: Requirements - Amendment 2" serves as a guide for the development of higher speed passive optical network (PON) systems, by identifying sets of applications that can be addressed by a particular system and defining the requirements for each of those systems. It is anticipated that they may have several distinct systems, such as higher speed single channel (TDMA PON), higher speed multi-channel (TWDM PON), and higher speed point to point overlay PONs. Amendment 2 to Recommendation ITU-T G.9804.1 includes additional requirements for higher speed PON, including complementary for co-existence scenario of three generation PON systems.
- **ITU-T G.9804.2 (2021) Amd.2 "Higher speed passive optical networks - Common transmission convergence layer specification - Amendment 2" (under approval)** specifies the common transmission convergence (ComTC) layer of Higher Speed passive optical network (HSP) systems providing optical access for residential, business, mobile backhaul and other applications. This specification defines operation of HSP systems in a manner agnostic of transmission rates, number of operating wavelength channels, and signal modulation.
- ITU-T G.9804.3 Amd.2 "50-Gigabit-capable passive optical networks (50G-PON): Physical media dependent (PMD) layer specification - Amendment 2" 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. Amendment 2 defines

the optical interface parameters of 50 Gbit/s upstream direction on further power budget classes besides N1 class.

- ITU-T G.9806 Amd.3 "Higher-speed bidirectional, single fibre, point-to-point optical access system (HS-PtP) - Amendment 3" describes a higher speed bidirectional single fibre point-to-point optical access system than the data rate in existing ITU-T point-to-point access systems. It supports 10 Gbit/s for the optical access services including the optical distribution network (ODN) specification, the physical layer specification, services requirements and the operation, administration and maintenance (OAM) specification. Amendment 1 added support for 25 Gbit/s. Amendment 2 added support for 50 Gbit/s. Amendment 3 adds support for 100 Gbit/s, Optical Path Loss budget Classes SL (0-10 dB), SU (5-15 dB) and BL (10-20 dB).
- ITU-T G.9930 "Point to point fibre-in-the-premises" belongs to the family of ITU-T Recommendations addressing Fibre-in-the-Premises. This Recommendation specifically addresses the network topology consisting of multiple point-to-point fibres between a Residential Gateway (RG) and Customer Premises Equipment (CPE), e.g., Wireless Access Points (WAP). This Recommendation G.p2pf specifies the system architecture and requirements for high-speed point-to-point-fibre-based in-premises transceivers.
- ITU-T G.9940 "High speed fibre-based in-premises transceivers - system architecture" belongs to the family of ITU-T G.fin Recommendations. Recommendation G.fin-SA specifies the system architecture and requirements for high speed fibre-based in-premises transceivers.
- ITU-T G.9941 "High speed fibre-based in-premises transceivers - physical layer specification" belongs to the family of ITU-T G.fin Recommendations. Recommendation G.fin-PHY specifies the physical layer of high speed fibre-based in-premises (G.fin) transceivers for applications in home and SME.
- ITU-T G.9942 "High speed fibre-based in-premises transceivers - data link layer" belongs to the family of ITU-T G.fin Recommendations. Recommendation G.9942 specifies the data link layer for high-speed fibre-based in-premises transceivers.
- ITU-T G.9960 Amd.1 "Unified high-speed wireline-based home networking transceivers - System architecture and physical layer specification - Amendment 1" 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. Amendment 1 to G.9960 (2023) adds the new feature HBMSG/HBACK.
- **ITU-T G.9960 (2023) Amd.2 "Unified high-speed wireline-based home networking transceivers - System architecture and physical layer specification - Amendment 2" (under approval)** 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.

- ITU-T G.9961 (revised) "Unified high-speed wireline-based home networking transceivers - Data link layer specification" 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.
- ITU-T G.9961 Amd.1 "Unified high-speed wireline-based home networking transceivers - Data link layer specification - Amendment 1" 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.
- ITU-T G.9964 (revised) "Unified high-speed wireline-based home networking transceivers - Power spectral density specification" 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.
- ITU-T G.Suppl.40 (revised) "Optical fibre and cable Recommendations and standards guideline" provides information on the background and specifications used in the development of optical fibre and cable ITU-T Recommendations such as Recommendations ITU-T G.651.1 G.652, G.653, G.654, G.655, G.656 G.657 and L-series Recommendations. It also contains information used in the development of test method Recommendations such as Recommendations ITU-T G.650.1, G.650.2 and G.650.3. Moreover, this Supplement maps ITU-T documents to optical fibre and cable standards developed under IEC. Fifth edition covers new technical report on "Optical fibre, cable, and components for space division multiplexing" and L-series Recommendations for optical fibre cable.
- ITU-T G.Suppl.41 (revised) "Design guidelines for optical fibre submarine cable systems" describes design considerations for repeatered, repeaterless and optically amplified systems supporting synchronous digital hierarchy (SDH) and optical transport network (OTN) signals in optical submarine cable systems.
- ITU-T G.Suppl.55 (revised) "Radio-over-fibre (RoF) technologies and their applications" includes new important fundamental technologies, which are unique and useful techniques for radio-over-fibre (RoF) systems.
- ITU-T G.Suppl.58 (revised) "Optical transport network module framer interfaces" describes several interoperable component-to-component 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.68 (revised) "Synchronization OAM requirements" provides an overview of synchronization operations, administration and maintenance (OAM) and includes fault management, performance monitoring, alarms and events.
- ITU-T G.Suppl.71 (revised) "Optical line termination capabilities for supporting cooperative dynamic bandwidth assignment" describes the passive optical network optical line termination or PON OLT capabilities needed for applying cooperative dynamic bandwidth assignment (CO DBA) both in a generic sense and for specific use cases. It explains the interactions of the optical line termination (OLT) with the external entity sending information for CO DBA, the way to interpret such information, and the needs for coordination on choosing values for configurable parameters.
- ITU-T G.Suppl.79 "Latency control and deterministic capability over a PON system" describes the latency control and deterministic capability of PON systems. It reviews feasible technologies of latency control and optimization technologies over a PON, and discusses possible future expansion on PON system including use case and requirements, technologies for latency control and deterministic improvement, and possible extensions in future.
- ITU-T G.Suppl.80 "Use case & Requirements of Fibre-based In-premises networking for Home Application (FIP4H)" describes the use cases, requirements, and corresponding advantages of fibre-based in-premises networking technology (G.fin) for the home application.
- ITU-T G.Suppl.81 "Practical aspects of PON security" gives an overview of PON security, collects the use cases on PON security with associated expectations, and reviews security aspects and methods applicable to PON systems, including the general PON Threat Model, Unicast data encryption key exchange, Duplicate-ONU-SN, Security Enhancement Recommendations in OMCI-based authentication, which may be considered in future PON recommendations to support security enhancement features.
- ITU-T G.Suppl.82 "Enhanced optical line termination with IT functions" describes the enhanced Optical Line Terminals (eOLT) with IT capabilities such as computation and storage. It describes the application scenarios and use cases, together with the eOLT architectures. Requirements for capabilities, services and system of the eOLT are also illustrated in this supplement.
- ITU-T G.Suppl.83 "Supplement on the use of options in PTP profile with full timing Support from the network" provides clarifications and guidelines on the use of options in PTP profile with full timing support from the network.

- ITU-T H.273 (V4) (revised) "Coding-independent code points for video signal type identification" defines various code points and fields that establish properties of a video (or still image) representation and are independent of the compression encoding and bit rate. These properties may describe the appropriate interpretation of decoded data or may, similarly, describe the characteristics of such a signal before the signals are compressed by an encoder that is suitable for compressing such an input signal. This edition of ITU-T H.273 removes an informative reference that had been included in the not-yet-published third edition of Rec. ITU-T H.273, due to a publication delay of the referenced document (a video format specification under development in SMPTE). It also includes some minor corrections and clarifications. The text was developed as a twin text Recommendation corresponding to the video code points in ISO/IEC 23091-2 (formerly ISO/IEC 23001-8) in collaboration with ISO/IEC JTC 1/SC 29. It is published as a technically aligned twin text by both organizations (ITU-T and ISO/IEC).
- ITU-T H.274 (V3) (revised) "Versatile supplemental enhancement information messages for coded video bitstreams" specifies the syntax and semantics of video usability information (VUI) parameters and supplemental enhancement information (SEI) messages for use with coded video bitstreams. The VUI parameters and SEI messages defined in this Recommendation may be conveyed within coded video bitstreams in a manner specified in a video coding specification or may be conveyed by other means as determined by the specifications for systems that make use of such coded video bitstreams. This Recommendation is particularly intended for use with coded video bitstreams as specified by Rec. ITU-T H.266 | ISO/IEC 23090-3, although it is drafted in a manner intended to be sufficiently versatile and generic that it may also be used with other types of coded video bitstreams.
- ITU-T H.430.3 (V2) (revised) "Service scenario of immersive live experience (ILE)" 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": 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" 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.430.8 "Functional architecture of interactive immersive services (IIS) systems" identifies the high-level architecture, functions, and reference points of interactive immersive services (IIS) system.
- ITU-T H.431.1 "Functional architecture for cloud virtual reality systems" is as the subsequent Recommendation of ITU-T F.746.14, specifies the functional architecture of cloud virtual reality systems. It describes the overall functional architecture including control layer, resource layer, network layer, terminal layer, OA&M and security. This Recommendation also describes the basic functions of each layer, such as by unified scheduling/technology integration/content distribution of the control layer, cloud-based operation on the resource layer and high-quality transmission by the network layer, the cloud VR content can be run concurrently based on the cloud and is distributed to the terminal for presentation.
- ITU-T H.626.6 "Architecture for big data application in video surveillance systems": As the amount of video data is growing in the video surveillance systems, the suitable architecture is needed to support the requirements for big data application in video surveillance systems to deal with the structured and unstructured data, and to enhance the efficiency for the huge data retrieval and the data mining across time and space range. This Recommendation is to define an architecture for big data application in video surveillance systems, including the functional architecture and reference points. This Recommendation is based on Recommendation ITU-T F.743.7 "Requirements for big data-enhanced visual surveillance services".
- ITU-T H.644.6 "Architecture for video distribution systems" 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" 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 H.644.8 "Requirements and architecture on audio and video processing of media processing services": With the requirements of recently developed video services, media contents are required to be processed before transmission through CDN. For example, media contents are required to be transcoded adaptively according to quality of network. Some UGC contents are required to not include specific contents. Some image and text contents are required to detected, located and identified to provide personalized service for consumers. Media processing service is based on the concept of cloud computing technology. Media processing service provides a cost-effective, easy-to-use, elastic, on-demand and highly scalable method to process audio and video in various services related with video. This Recommendation identifies requirements and architecture on audio and video processing via management platform for the media processing service.
- ITU-T H.552 "Implementation of vehicular multimedia systems" specifies essential requirements for the implementation of vehicular multimedia systems (VMSs), addressing four of their main aspects: connectivity, providing essential standard references and specific performance requirements for the vehicular environment, human machine interface, dealing with voice assistant (VA) and auditory interaction requirements, media format and control, providing standard references for different types of media for VMSs, smartphone infotainment assistant, with requirements related to the interface architecture between smartphones and VMSs, as well as performance requirements to provide a fair level of user experience. Two appendices provide VMS implementation guidance: radio frequency performance criteria for wireless local area network (WLAN) and user performance testing scenarios for WLAN and wireless personal area network connectivity, implementation of a diagnostic interface for tuning the VA functionalities.
- ITU-T H.862.6 "Functional requirements for counselling services based on artificial emotional intelligence" 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 J.1 (revised) "Terms, definitions and acronyms for television and sound transmission and integrated broadband cable networks" compiles all the definitions related to television and sound transmission, and integrated broadband cable networks, and which are in force in J-series and N-series Recommendations developed under the responsibility of SG9. The Recommendation is regularly updated to reflect newly-approved terms and definitions.
- ITU-T J.153 "System architecture for cable television services to use IMT-2020 radio system": In this Recommendation, four functional components of adaptive MBS are described and the system architecture is defined to meet the four system requirements specified in ITU-T Recommendation ITU-T J.152, namely Efficiency, Reliability, Robustness, and Latency.

- ITU-T J.198.2 "Physical layer specification for third-generation HiNoC" aims to define the physical (PHY) layer specification of third generation high performance network over coax (HiNoC 3.0) which provides 10 Gbit/s data transmission over coaxial networks in the cable industry. The HiNoC network consists of a HiNoC bridge (HB) and HiNoC modems (HMs). The HiNoC protocol stack includes Media Access Control (MAC) layer and Physical (PHY) layer. This Recommendation contains descriptions for the signal transmission mechanism of the HiNoC 3.0 PHY layer, including frame structure, channel coding and modulation techniques. The HiNoC 3.0 protocol supports channel bonding which refers to the scheduling of the MAC layer frames over multiple PHY layer channels.
- ITU-T J.198.3 "MAC layer specification for third-generation HiNoC" aims to define the MAC layer specification of third generation high performance network over coax (HiNoC 3.0) which provides 10 Gbit/s data transmission over coaxial networks in the cable industry. HiNoC consists of HiNoC Bridge (HB) and HiNoC Modem (HM) in terms of architectural functional entity and is layered as Media Access Control (MAC) layer and Physical (PHY) layer.
- ITU-T J.298 (revised) "Requirements and technical specifications of a cable TV hybrid set-top box compatible with terrestrial and satellite TV transport" describes the requirements and technical specifications of a cable TV hybrid set-top box compatible with terrestrial and satellite TV transport. The main purpose of the Recommendation is to specify minimum and basic requirements for a hybrid set-top box (STB), which meets the requirements of all countries and regions.
- ITU-T J.484 "Requirements of multicast adaptive bitrate (M-ABR) IP delivery" defines the requirements of an IP delivery technology which makes use of multicast to reduce audio-visual traffic in the cable delivery network but uses HTTP based unicast inside the home network, thereby making it compatible with consumer devices such as smartphones.
- ITU-T J.1291 "Requirements and functional specification of Audio and Video interface on cable set-top box" specifies requirements and function of audio and video interface on cable set-top box.
- ITU-T J.1311 "Technical Requirements for Cloud Gaming Service Platforms" describes the cloud gaming service platform basic components and functional elements requirements including resource layer, capability layer, business layer and client access layer. This Recommendation is intended to provide a reference for game service developers and operators to build and operate a cloud gaming service.
- ITU-T J.1630 "End to End network characteristics requirement for video services over integrated broadband cable network" describes the scope of key performance indicators (KPIs) for network performance and key quality indicators (KQIs) for user experience with traditional and advanced video services. This Recommendation also defines the measurement and monitoring methods. Such key performance indicators (KPI) as well as their monitoring and management can be used for multi-QoS optimization thus enabling AI functions over integrated broadband cable network. This Recommendation belongs to the series of Artificial Intelligence (AI)

assisted cable network Recommendations intended to provide more flexible and effective usage of network resource by applying intellectual functions.

- ITU-T J.Suppl.12 "Comparison between third-generation HiNoC and second-generation HiNoC" indicated the main differences between the third-generation HiNoC (HiNoC 3.0) and the second-generation HiNoC (HiNoC 2.0). This supplement is helpful for operators to choose the proper HiNoC for deployment.
- ITU-T J.Suppl.13 "Factual subscriber-base reporting and protected content delivery in Conditional Access System - Test Methods": The purpose of this supplement is to frame the testing methodology against the various technical requirement of CAS. In addition to develop a framework for standardization (i.e. Technical Requirements), some countries have issued the provisions for assuring broadcasters and content providers that each CAS system has to conform to certain technical features and get tested from certified lab before deployment so that piracy and other malpractices can be minimised. The draft new supplement will provide the clause-by-clause test procedures and expected results for each clause of the draft new ITU-T Recommendation J.1036 such as log requirements, reports requirements, database requirements, security requirements, and more.
- ITU-T L.100 (revised) "Optical fibre cables for duct and tunnel application " describes characteristics, construction, test methods and performance criteria of optical fibre cables installed by pulling method for duct and tunnel application.
- **ITU-T L.101 (revised) "Optical fibre cables for directly buried application" (under approval)** describes characteristics, construction and test methods of optical fibre cables for buried application. Note that Recommendation ITU-T L.43, Ed 2.0, was redesignated as ITU-T L.101, Ed 2.0, in February 2016. First, in order to demonstrate sufficient performance of an optical fibre cable, the characteristics that a cable should possess are described in this recommendation. Then, the methods of examining if whether a cable has the required characteristics are described in this recommendation. Therein, detailed performance criteria for a cable are recommended. Recommended technical requirements are detailed by reference to IEC 60794-3-11 on outdoor optical fibre cables for duct, directly buried, and lashed aerial applications. Changes and additions to these requirements suitable to the directly buried cable application are recommended herein. Required conditions may differ from the installation environment. Therefore, instances where agreement on detailed conditions should be determined between customer and manufacturer are stated.
- **ITU-T L.103 (revised) "Optical fibre cables for indoor applications" (under approval)** describes characteristics, construction and test methods for optical fibre cables for indoor applications. In order for an optical fibre to perform appropriately, characteristics that a cable should have are described. Also, the method of determining whether the cable has the required characteristics is described. Required conditions may differ according to the installation environment; detailed test conditions need to be agreed upon between the user and manufacturer for the environment where a cable is to be used. Recommendation ITU-T L.103 describes characteristics, construction and test

methods for optical fibre cables for indoor applications. In order for an optical fibre to perform appropriately, characteristics that a cable should have are described.

- ITU-T L.109 (revised) "Construction of optical/metallic hybrid cables " describes cable construction and provides guidance for the use of optical/metallic hybrid cable, which contains both optical fibres and metallic wires for telecommunication and/or power feeding. Technical requirements may differ according to the installation environment.
- ITU-T L.250 (revised) "Topologies for optical access network" describes the optical access network to be used in the design and construction of fibre to the x (FTTx), centralized- radio access networks (C-RAN) for mobile communications, and other network services. It deals mainly with access network architectures and the upgrading or new deployment of optical fibre to optical access networks.
- ITU-T L.312 (revised) "Optical fibre cable maintenance support, monitoring and testing system for optical fibre cable networks carrying high total optical power " describes the functional requirements for optical fibre cable maintenance systems for optical fibre cable carrying a high total optical power. It also considers safety procedures and guidelines for the maintenance of outside optical fibre plant carrying a high total optical power.
- ITU-T L.Suppl.58 "National experiences for FTTx network architectures" provides the national experiences on FTTx network architectures which could be used as references during the construction of FTTx networks.
- **ITU-T M.3164.1 "Interface for on-site generic telecommunication smart maintenance - Protocol neutral requirements" (under approval)** provides the requirements phase of the interface specification for on-site generic telecommunication smart maintenance at a protocol-neutral level. It describes the position of the relevant interface and specifies the high level requirements for interface interaction, as well as the specification level use cases for each requirement.
- **ITU-T M.3164.2 "Interface for on-site generic telecommunication smart maintenance - Protocol neutral analysis" (under approval)** provides the analysis specification of the interface for on-site generic telecommunication smart maintenance (TSM). It defines the interface operation interactions for on-site TSM, including the managed entities and their relationships for the TSM interface, the interactive control information exchanged through this interface, and detailed parameter definitions of each interface operation.
- ITU-T M.3173.1 "Interface for synergy management of cloud and SDN-based networks - Protocol neutral requirements" provides the interface requirements for the synergy management of cloud and SDN-based networks. It describes the interface position for the synergy management system, and the synergy management scenarios of cloud and SDN-based networks. It also specifies the management interface requirements and the related use cases for the synergy management interface at a technology-independent level (protocol-neutral).

- **ITU-T M.3186 "Shared information and data model (SID) for network operation cost management" (under approval)** provides the "Shared information and data model (SID) for network operation cost management". It covers the following aspects: The overall framework of the SID for network operation cost management. The specific definition of information object classes and their attributes in the SID for network operation cost management. Definition and description of related properties and relationships between information object classes.
- **ITU-T M.3351 "Framework of knowledge management for telecom operation and management" (under approval)**: The contents of this Recommendation include the following: Background and overview of knowledge management Knowledge classification in telecom operation and management Framework of knowledge management for telecom operation and management.
- **ITU-T M.3368 "Requirements for Optical Distribution Frame (ODF) on-site smart maintenance" (under approval)** specifies the optical distribution frame (ODF) on-site smart maintenance architecture and functional requirements of ODF smart maintenance, including the functional requirements of smart handover unit (SHU), ODF smart maintenance system (OSMS) and the interface between SHU and OSMS. It reduces the ODF on-site maintenance workload of manual operation and maintenance mode and saves a lot of maintenance economic and time cost. The quickly and accurately changing optical fiber connections and then flexibly changing the network connection and data relationship according to the business requirements can be achieved. Consequently, the capability of smart maintenance and smart service for optical communication network and data center can be improved.
- **ITU-T M.3369 "Cost-effectiveness evaluation framework for network operation" (under approval)** establishes the cost-effectiveness evaluation framework for network operation based on the classification of network operation cost which is defined in Recommendation ITU-T M.3386. It specifies cost-effectiveness evaluation indicators, methods, and processes for network operation cost evaluation within the framework.
- ITU-T M.3386 "Requirements for the management of network operation cost within AI enhanced Telecom Operation and Management (AITOM) in telecommunication operational aspects" focuses on network operation cost management within AITOM in telecommunication operational aspects. This Recommendation provides the classification standard, functional requirements of network operation cost management.
- ITU-T M.3387 "Management requirements for federated machine learning systems": Data privacy and information security pose significant challenges to the big data and artificial intelligence (AI) community as these communities are increasingly under pressure to adhere to regulatory requirements. Many routine operations in big data systems and applications, such as merging user data from various sources to build a machine learning model, are considered to be illegal under current regulatory frameworks.

- **ITU-T M.3388 "Effectiveness indicators of intelligence level for AI enhanced telecom operation and management" (under approval)**: The effectiveness indicators for AI enhanced telecom operation and management aim to evaluate intelligence level with quantitative methods and focus on showing effects and benefits of applying AI in terms of operation optimization, cost reduction, service fulfillment, customer experience upgrade, etc. Recommendation ITU-T M.3388 provides the principle, classification, definition and method of effectiveness indicators to evaluate intelligence level of AI enhanced telecom operation and management.
- ITU-T P.10/G.100 (2017) Amd.2 "Vocabulary for performance, quality of service and quality of experience. Amendment 2 New definitions for inclusion in Recommendation ITU-T P.10/G.100" contains terms and definitions associated with network performance, quality of service and quality of experience. Amendment 2 introduces new definitions and a bibliographic reference.
- ITU-T Q.763 (1999) Amd.7 "Signalling System No. 7 - ISDN User Part formats and codes. Amendment 7. Extensions for the support for the calling line identification authentication" was produced to meet the need for the implementation of calling line identification authentication (CIDA) as specified in ITU-T Q.3063 (2022). This amendment contains the modifications to Recommendation ITU-T Q.763 (1999) in order to accommodate these needs. This amendment should be read in connection with the related amendments to Recommendations ITU-T Q.761 and ITU-T Q.762.
- ITU-T P.812 "Principles of subjective test methods for interactive virtual reality (VR) applications" provides methods and procedures for conducting subjective evaluation experiments for interactive virtual reality (VR) applications. Such interactive VR applications enable the user to interact with generated videos, images, sounds, and other sensations that aim at but are not limited to, the simulation of a user's physical presence in this virtual environment with the use of specialized VR equipment.
- ITU-T P.833.2 "Methodology for the derivation of equipment impairment factors from subjective listening only tests for fullband speech codecs" describes an extension of the methodology for deriving equipment impairment factors from subjective listening-only tests. It is intended that it primarily be applied to determining fullband equipment impairment factors Ie,FB, capturing the degradation introduced by fullband speech codecs.
- ITU-T P.863.2 (revised) "Extension of ITU-T P.863 for multi-dimensional assessment of degradations in telephony speech signals up to fullband" describes a set of models for predicting perceptual dimensions of degradations linked to the overall speech quality from narrowband (300 to 3 400 Hz) to fullband (20 to 20 000 Hz) telecommunication scenarios. The predictions target user judgements on four perceptual dimensions, as obtained in a subjective test described in an annex.
- ITU-T P.910 (revised) "Subjective video quality assessment methods for multimedia applications" describes non-interactive subjective assessment methods for evaluating the one-way overall video quality, audio quality and

audiovisual quality for applications such as multimedia and distribution quality television. These methods can be used for several different purposes including, but not limited to, comparing the quality of multiple devices, comparing the performance of a device in multiple environments, and for subjective assessment where the quality impact of the device and the audiovisual material is confounded.

- ITU-T P.1204 (revised) "Video quality assessment of streaming services over reliable transport for resolutions up to 4K" is the introductory document for a set of documents that describe model algorithms for monitoring the video quality for streaming using reliable transport (e.g., adaptive streaming based on the hypertext transfer protocol (HTTP) over the transmission control protocol (TCP), quick user datagram protocol internet connections (QUIC)). mobile streaming on handheld devices such as smartphones; –presentation on tablet-type devices.
- ITU-T P.1204.5 (revised) "Video quality assessment of streaming services over reliable transport for resolutions up to 4K with access to transport and received pixel information" describes the hybrid no-reference video quality estimation model for monitoring the video quality for streaming using reliable transport (e.g., hypertext transfer protocol- (HTTP-)based adaptive streaming (HAS) over the transmission control protocol (TCP), quick user datagram protocol internet connections (QUIC)).
- ITU-T P.1211 "Derivation procedure of contribution values for quality degradation of adaptive audiovisual streaming services" provides the derivation procedure of contribution values that provides information about a relationship between quality-influencing factors (e.g., media quality levels and stalling) and the final media session quality score of adaptive audiovisual streaming services.
- ITU-T P.Suppl.30 "Considerations on the automation of Digital Financial Services testing" provides examples of automation which are suitable for DFS testing. It is meant to be a starting point and basis for industry vendors and other stakeholders in the DFS Ecosystem to develop robust environments for automated testing. In all cases, it is assumed that automation is technology neutral and technology agnostic.
- ITU-T Q.931 (1998) Amd.2 "ISDN user-network interface layer 3 specification for basic call control. Amendment 2. Extensions for the support for the calling line identification authentication" was produced to meet the need for the implementation of calling line identification authentication (CIDA) as specified in Q.3063 (2022). This amendment contains the modifications to Recommendation ITU-T Q. 931 (1998) in order to accommodate these needs.
- ITU-T Q.1902.3 (2001) Amd.6 "Bearer Independent Call Control protocol (Capability Set 2) and Signalling System No. 7 ISDN user part: Formats and codes. Amendment 6. Extensions for the support for the calling line identification authentication" was produced to meet the need for the implementation of calling line identification authentication (CIDA) as specified in Q.3063 (2022). This amendment contains the modifications to Recommendation ITU-T Q.1902.3 (2001) in order to accommodate these needs. This amendment should be read in

connection with the related amendments to Recommendations ITU-T Q.1902.1 and ITU-T Q.1902.2.

- ITU-T Q.3064 "Signalling architecture of NICE (Network intelligence capability enhancement) in support of awareness capabilities" provides the signalling architecture of NICE in support of awareness capabilities based on Recommendation ITU-T Y.2301, ITU-T Y.2302 and ITU-T Y.2303. Based on the functional architecture and the awareness functions of NICE, this recommendation specifies the mapping of reference points to interfaces in the signalling architecture of NICE especially in support of awareness capabilities. And it also provides the signalling requirements and protocols used for interfaces and the signalling procedures of NICE in support of awareness capabilities.
- ITU-T Q.3648 "Signalling architecture of data channel enhanced IMS network": In the context of signalling architecture of Recommendation ITU-T Q.3648, the data channel enhanced IMS network framework, signalling architecture, interfaces are standardized to enable the data channel capability and realize the IMS network interactive services.
- ITU-T Q.3742 "Signalling requirements and data models for SD-DCI service": As the enterprises use more and more geographically distributed cloud services, the demand for interconnection among different data centers is increasing. Network operators develop Software-Defined Data Center Interconnection (SD-DCI) services to meet customized demands for interconnection among multiple data centers. The Recommendation ITU-T Q.3742 specifies the signalling requirements and data models for SD-DCI service.
- ITU-T Q.3962 "Requirements and Reference Model for optimized traceroute of joint Internet Protocol/Multi-Protocol Label Switching" aims to solve the problems of wrong failure location and performance information which brought by the traditional isolated traceroute tools in joint Internet Protocol /Multi-Protocol Label Switching (IP/MPLS) scenario. This Recommendation describes the requirements and reference model for optimized traceroute for joint IP/MPLS.
- ITU-T Q.4045 "Framework of network function virtualization automated testing" provides overview and framework requirements of Network Function Virtualization (NFV) automated testing. To introduce NFV automated testing framework, this Recommendation also provides an overview of NFV automated testing and design consideration of it. Then, framework and requirements for NFV automated testing are derived based on the use cases.
- ITU-T Q.4046 "Interoperability testing requirements of blockchain as a service" aims to provide blockchain as a service (BaaS) interoperability testing overview and specifies BaaS interoperability testing requirements which are derived from use cases.
- ITU-T Q.4047 "Interoperability testing between software-defined networking (SDN) and hypervisor based computing virtualization" specifies the interoperability testing between software-defined networking (SDN) and hypervisor based computing virtualization. Firstly, this Recommendation introduces the framework for interoperability between SDN and hypervisor based computing virtualization,

which includes the target areas, components and interoperability in different scenarios. The corresponding requirements and the data model framework which should be considered during the interoperability testing between SDN and hypervisor based computing virtualization are presented in the next. And test cases of interoperability testing between SDN and hypervisor based computing virtualization are provided as appendix, which describe the involved test procedures.

- ITU-T Q.4071 "The testing of 3D ultra high density IoT networks": High density and ultra-high density communication networks are currently being introduced based on the density requirements for IoT devices. For 3D Ultra-high density networks, the density of IoT devices is 100 devices per cubic meter. Such networks have certain design peculiarities and different fractal figures can be used for their planning. Therefore, it is required to develop models and test methods for high density and ultra-high density networks. New models and test methods for three-dimensional ultra-high density IoT networks will be developed and the structure of a model network for testing will be presented in the proposed Recommendation.
- ITU-T Q.4072 "Monitoring Parameters for Intelligent Speech in Future Networks": Intelligent speech technologies can greatly improve the efficiency of network operation and maintenance when it is applied to the future network. Meanwhile, it is required to be monitored periodically. This Recommendation aims to specify monitoring parameters of intelligent speech applied in future networks. The monitoring parameters are classified into speech recognition parameters, speech generation parameters, natural language processing parameters, system parameters, and performance parameters.
- ITU-T Q.4073 "Framework for interconnection testing of Voice, Video over 5G" specifies the high-level framework for the interconnection of Voice over New Radio (VoNR) based networks to achieve worldwide interoperability with legacy and IMS/MMTel networks.
- ITU-T Q.4074 "Testing of robotics based on a model network": Currently, the services of remote control of robotics over the network are becoming increasingly widespread. One of the important tasks in the implementation of such services is comprehensive testing. This Recommendation presents the architecture and characteristics of a model network for testing a remote robotics control service over the network. The control of operations is carried out using a camera.
- ITU-T Q.4075 "Test specifications for remote testing of Internet of Things using the probes": The Internet of things (IoT) is one of the global infrastructures for the information society, delivering advanced services by interconnecting things based on, existing and evolving, interoperable information and communication technologies. Currently, methods of remote testing of network equipment are actively used. During testing, special attention is paid to the quality of service parameters (delays, losses, jitter, bandwidth and etc.), however, in relation to the specifics of the IoT devices, it is most appropriate to control the parameters for the optimum functioning of end devices. IoT devices, as a example, have battery power and monitoring of their operation parameters will allow timely adjustments to the algorithms of their functioning in order to extend the battery life. The use of probes

will allow addressing important parameters of the IoT devices and conduct remote testing of various parameters of the Internet of Things devices, such as: power consumption, memory and processor operation, open interfaces, etc. The description of the test specifications for remote testing using probes will allow us to develop a unified approach for conducting appropriate testing of IoT devices.

- ITU-T Q.4102 (2022) Amd. 1 "Hybrid peer-to-peer communications: Peer protocol" enhances the peer protocol to support various services over hybrid peer-to-peer networks. The updates include a new message format, revised message configurations, and a new feature for establishing vertical candidate paths.
- ITU-T Q.4103 (2022) Amd. 1 "Hybrid peer-to-peer communications: Overlay management protocol" enhances overlay management protocol to support various services over hybrid peer-to-peer networks. The updates include revised resource elements, and revised message configuration.
- ITU-T Q.4104 "Hybrid peer-to-peer (P2P) communications: Signalling requirements for data streaming service" describes the signalling requirements for data streaming service over hybrid peer-to-peer network. The hybrid overlay network may have multiple data sources which send the different types of data. Thus, source peers and peers conduct the several specific operations for data streaming over the hybrid peer-to-peer communications, and those operations define the requirements for the relevant protocols such as overlay management protocol and peer protocol. This Recommendation includes service architecture for data streaming services over hybrid peer-to-peer network, high-level procedures and signalling requirements for the relevant protocol.
- ITU-T Q.4105 "Hybrid peer-to-peer (P2P) communications: Signalling requirements for feature-based video services" specifies the signalling requirements for the feature-based video services that exchange feature about the video scene rather than transmitting fully encoded video data, through the hybrid overlay network specified in [ITU-T Q.4100]. The feature is used for reconstruct the video in the end point using artificial intelligence, such as generative AI. This Recommendation specifies signalling requirements for developing further protocol specifications for feature-based video services over hybrid overlay networks, such as video streaming, virtual conference, metaverse, etc.
- ITU-T Q.4141 "Requirements and signalling of intelligence control for the border network gateway in computing power network" provides a network solution to dynamically and flexibly schedule computing tasks at the border network gateway based on real-time computing resource performance, network performance, cost and other multi-dimensional factors based on business needs, thereby improving resource utilization, network utilization efficiency, and improving business user experience. This Recommendation aims to study the requirements and signalling of intelligence control for the border network gateway in computing power network.
- ITU-T Q.4142 "Signalling architecture for service orchestration in computing power network" provides the signalling architecture for service orchestration in computing power network (CPN) based on Recommendation ITU-T Y.2501, ITU-T Y.2502 and ITU-T Q.4140. This Recommendation provides overall signalling

architecture, functional entities and interfaces for service orchestration, and signalling procedures of computing resource collection, service orchestration within one operator, sharable service publishing among multiple operators, and cross-operator service orchestration.

- ITU-T Q.4143 "Signalling requirements for cloud-based control plane and pooled user plane of vBNG (virtualized Broadband Network Gateway)" aims to specify the signalling requirements for cloud-based control plane and pooled user plane of vBNG (virtualized Broadband Network Gateway). Firstly, as a basic background, this Recommendation introduces the centralized deployment requirements and architecture of CCP (cloud-based control plane) and PUP (pooled user plane) of vBNG. Based on the service procedure of vBNG, the signalling requirements for CCP and PUP of vBNG will be introduced.
- ITU-T Q.4160 "Quantum key distribution networks - Protocol framework" specifies a framework for signalling and protocols for quantum key distribution network (QKDN).
- ITU-T Q.4161 "Protocols for Ak interface for quantum key distribution network" specifies protocols for Ak interface in quantum key distribution network (QKDN).
- ITU-T Q.4162 "Protocols for Kq-1 interface for quantum key distribution network" specifies protocols for Kq-1 interface in quantum key distribution network (QKDN).
- ITU-T Q.4163 "Protocols for Kx interface for quantum key distribution network" specifies protocols for Kx interface in quantum key distribution network (QKDN).
- ITU-T Q.4164 "Protocols for Ck interface for quantum key distribution network" specifies protocols for Ck interface in quantum key distribution network (QKDN).
- ITU-T Q.5007 "Signalling architecture for microservices based intelligent edge computing" specifies the signalling architecture, protocol interfaces, and protocol procedures for microservices based intelligent edge computing.
- ITU-T Q.5008 "Signalling requirements and architecture to support AI based vertical services in future network, IMT2020 and beyond" provides the signalling requirements and architecture to support AI based vertical services in future network, IMT2020 and beyond. These requirements include the signalling information over each reference points and service procedures for high-level AI Platform.
- ITU-T Q.5009 "Signalling Requirements and Protocol procedures for two-way QoS mechanism between access networks and core networks in IMT-2020 network and beyond" specifies the signalling requirements, signalling flows and message format for enhanced quality assured connections in IMT-2020 network and beyond.
- **ITU-T Q.5010 "Signalling requirements and architecture for urban air mobility service environment" (under approval)**: An increasing number of companies, countries, and institutions are building consortiums or partnerships to create alliances and drives efforts to successfully commercialize UAM service. From the service providers' perspective, an architecture and signalling points that can interconnect UAM service infrastructure and mobile communication network, are

needed to be categorized into four different functional blocks to create connectivity between UAM aircraft and the commercial network.

- ITU-T Q.5011 "Signalling requirements and interfaces of edge-aided energy management agent at intelligent edge computing" defines the signalling requirements and interfaces of edge-aided energy management agent at intelligent edge computing. This Recommendation focuses on the signalling functionality of the edge-aided energy management agent (EEMA) and interfaces among EEMAs.
- ITU-T Q.5012 "Signalling architecture of WLAN access network for interworking with 5G network" describes the signalling architecture and signalling protocol procedures for WLAN access network to interwork with 5G network, focusing on the interworking procedures between Layer 2 and Layer 3 for providing enhanced end-to-end user experience.
- ITU-T Q.5013 "Signalling Requirements and Protocol procedures for two-way QoS mechanism between access networks and core networks in IMT-2020 network and beyond" specifies signalling requirements and protocol procedures for two-way QoS mechanism between access networks (AN) and core networks (CN) in IMT-2020 network and beyond. It includes signalling requirements, protocol procedures and message format for enhanced QoS negotiation mechanism between AN and CN.
- ITU-T Q.5028 "Data management interfaces for intelligent edge computing-based smart agriculture service" defines data management interfaces for intelligent edge computing-based smart agriculture service. The data management interface includes data resources and interfaces for data processing. Data resource can be used to decide what data are for. There are a lot of data needed to check environment and crop-growing status. The interfaces for data Agriculture, data management, edge. Processing defines web-based application programming interface (API) including data creation, retrieving, update and deletion.
- ITU-T Q.5029 "Data management interfaces in digital twin smart aquaculture system with intelligent edge computing" defines signalling messages for network functions and intelligent data processing. However, in addition to the defined signalling messages, it is needed to support an API such as Web API in order to accommodate legacy devices which only support Web-based communications. In addition, service-specific API will be helpful to support service-specific functions. This draft Recommendation defines data management interfaces for intelligent edge computing-based digital twin smart aquaculture service.
- ITU-T Q.5030 "Data management interfaces for intelligent edge computing-based flowing-water smart aquaculture system" defines signalling messages for network functions and intelligent data processing. However, in addition to the defined signalling messages, it is needed to support an API such as Web API in order to accommodate legacy devices which only support Web-based communications. In addition, service-specific API will be helpful to support service-specific functions.
- ITU-T Q.5031 "Protocol for traffic flow coordination of multi-modality communication" specifies protocols, signalling flow and message format for multi-

modality communication. It specifies traffic coordination between two or more traffic flows of one terminal, two or more traffic flows of two more terminals.

- ITU-T Q.5032 "Network coding protocol for network repeaters" considers networks with repeaters. A repeater is usually a device designed to receive a signal from a remote transmitter and then retransmit this signal to a remote receiver that unable to receive a signal from the original transmitter without retransmission due to certain conditions, for example, due to too large a distance, transmission medium, low power of the source signal, or other reasons. Implementation of network coding at repeater with a two-way relay channel allows to reduce the network load and, consequently, data transmission delays in such networks. This Recommendation includes: - Description of a network architecture where the protocol could be implemented. - Coding and decoding procedures. - Packet types and formats. - Signaling procedures and diagrams.
- **ITU-T Q.5054 "Consumer centric framework for combating counterfeit and stolen ICT mobile devices" (under approval)**: The purpose of this recommendation is to provide a consumer centric framework through unified platform combining all scenarios for combating counterfeit and stolen devices as covered in Q.5050 Recommendation Series. Consequently, it aims to define possible channels for consumer interfaces, North Bound and South Bound interfaces, query and response format, implementation scenarios, key features of platform, including approach for consumer education and awareness. Further, the technical challenges inter-alia related to vendor agnostic interfaces, mobile equipment bulk registration, dealing with cloned IMEI, reporting of stolen/lost or restored equipment will also be addressed.
- **ITU-T Q.5055 "Technical requirement, interfaces and generic functions of CEIR" (under approval)** provides detailed technical description of the CEIR system, its requirements, interfaces and basic functions that should be provided by the system and also some optional features – which may be used considering the client specific requirements. It also describes the different stakeholders of the CEIR system and their indented/expected roles and responsibilities.
- ITU-T Q.Suppl.76 "Common approaches and interfaces for data exchange between CEIR and EIR": As defined on the ITU-T Q.5050 series, CEIR can be used to combat counterfeit ICT devices, to combat the use of stolen ICT devices and for other purposes. However, implementing a CEIR is a complex project that involves and impacts multiple stakeholders, and may require different processes in each country. Therefore, to assist ITU members on implementation, this supplement aims to identify current industry approach on the data exchange between CEIR and EIR and propose common approaches and interfaces on this topic.
- ITU-T Q.Suppl.77 "Signalling requirements for parallel SFC packet processing" describes the signaling requirements of parallel SFC packet processing. This supplement focuses on the signallings among the controller, classifier and service function forwarders.
- ITU-T T.86 (V2) (revised) "Information technology - Digital compression and coding of continuous-tone still images: APPn Markers" provides definitions for JPEG

application specific markers (APPn) found in Rec. ITU-T T.81 | ISO/IEC 10918-1 and Rec. ITU-T T.84 | ISO/IEC 10918-3. This 2nd edition integrates the provisions of Amendment 1 of ITU-T T.86 (2012) | ISO/IEC 10918-4 (2013) and cancels the provisions concerning the registration authority processes originally defined in the 1st edition. ITU-T T.86 is a common text with ISO/IEC 10918-4.

- ITU-T T.800 (V4) (revised) "Information technology - JPEG 2000 image coding system: Core coding system" defines a set of lossless (bit-preserving) and lossy compression methods for coding bi-level, continuous-tone grey-scale, palletized colour, or continuous-tone colour digital still images. This Recommendation | International Standard: – specifies decoding processes for converting compressed image data to reconstructed image data; – specifies a codestream syntax containing information for interpreting the compressed image data; – specifies a file format; – provides guidance on encoding processes for converting source image data to compressed image data; – provides guidance on how to implement these processes in practice.
- ITU-T T.803 (V3) (revised) "Information technology - JPEG 2000 image coding system: Conformance testing" contains a normative electronic attachment with the codestreams used in the application of the procedures described herein that is available from ITU at https://www.itu.int/net/itu-t/sigdb/speimage/ImageForm-s.aspx?val=10100803† or from ISO at https://standards.iso.org/iso-iec/15444/-4/ed-4/en.
- 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.
- ITU-T T.873 (V3) (revised) "Information technology - Digital compression and coding of continuous-tone still images: Reference software" was developed jointly with ISO/IEC JTC 1/SC 29/WG 1 (JPEG), and corresponds as common text with ISO/IEC 10918-7. This third edition cancels and replaces the second edition, which has been technically revised. The main changes compared to the previous edition are as follows: This second edition updates Reference Software A to release 1.65, and Reference Software B to release 3.0.0. This version of Reference Software A corrects implementation errors and improves the overall stability of the software.
- ITU-T Y.1567 "Latency Under Load metrics and methods of measurement" specifies metrics of latency under simultaneous traffic load, and defines methods of measurement to increase the specificity and repeatability of metric assessment.
- ITU-T Y.2249 "Service model for human-centric touring guide with augmented reality" specifies a service model for a human-centric touring guide with augmented reality (AR), including the concept, reference architecture, service requirements, and specific application scenarios of the service model. This Recommendation can be used to guide AR-based cultural tourism service providers to develop a service model for human-centric touring guide with AR.
- ITU-T Y.2250 "Requirements and Framework of Human-oriented Message Service for Smart Learning in Future Network" specifies the requirements of human-oriented

message service in context of interaction between service user and smart learning devices. Based on these requirements, a framework of the human-oriented message service for smart learning is developed. The requirements and framework provide convenient and simple implementation for the message interaction between service user and the smart learning devices.

- **ITU-T Y.2256 "Overview of Unmanned Smart Farm based on networks" (under approval)** provides an overview of Unmanned Smart Farms based on networks. The scope of this Recommendation includes a Reference Architecture and identifies services required to support Unmanned Smart Farms.
- ITU-T Y.2325 "Architectural evolution for Next Generation Network control plane by applying Software-Defined Networking technology" aims to standardize an evolved NGN control plane architecture which is scalable, simplified and flexible by decoupling the end-user signalling handling functionality and the user plane control functionality and also treating the signalling as a user service (data) leading to uniform handling of services. This recommendation includes the description of information flow for services such as network attachment, session establishment and registration etc. for the recommended architecture.
- ITU-T Y.2344 "Scenarios and requirements of Intent-Based Network for network evolution" specifies metrics of latency under simultaneous traffic load, and defines methods of measurement to increase the specificity and repeatability of metric assessment. 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. General framework of Intent-Based Network for network evolution.
- ITU-T Y.2346 "Requirements and framework of Service Function Orchestration based on service function chaining" provides the scenarios, requirements and framework of service function orchestration based on service function chaining. Based on user requirement, service function orchestration can realize function services deployment and dynamically adjustment on demand, and based on resource situation, it can realize the resource optimization and load balance of service functions.
- **ITU-T Y.2502 "Computing power network - Authentication and orchestration architecture" (under approval)** provides the architecture of resource authentication and orchestration in computing power network (CPN) such as resource discovery, resource registration, resource identification, resource orchestration in order to agilely organize and utilize the computing, storage, and network resources in the computing power network to provide services to computing power network consumers.
- ITU-T Y.2776 "Deep packet inspection - intelligent management and maintenance of policy information base" specifies intelligent management and maintenance aspects for policy information base of DPI. The scope of this Recommendation includes the following aspects: Problems analysis for policy information base of DPI; functional architecture of intelligent management and maintenance of policy information base (PIB-IMM), implementation methods for the PIB-IMM, functional requirements for PIB-IMM, performance aspects for PIB-IMM, consideration for control plane of PIB-IMM,

consideration for management and application of PIB-IMM, and security consideration etc.

- ITU-T Y.3073 (2019) Amd.1 "Framework for service chaining in information-centric networking" was produced to support the non-linear structures of service function chaining in information centric networking (ICN). It adds the requirements in message content and naming scheme in applying to non-linear structures of service function chaining.
- ITU-T Y.3083 "Information-centric networking in networks beyond IMT-2020: Reference model of on-site, elastic, and autonomous network" describes the elastic and autonomous information-centric networking (ICN), which can meet all the requirements of look-up-based forwarding in ICN described in [ITU-T Y.3075], and its capabilities of on-site forwarding and processing, elastic managing, and autonomous name mapping and resolving to support instant re-addressing and routing efficiently. It describes the reference model, interaction mechanism of different components, and the deployment considerations.
- ITU-T Y.3091 "Digital twin network - Capability levels and evaluation methods": Digital twin network is a virtual representation of the physical network. It is useful for analyzing, diagnosing, simulating and controlling the physical network, and can help the physical network achieve intelligent decision-making and predictive maintenance. This Recommendation specifies the capability levels and evaluation methods of DTN system to help the telecommunication industry reach a consensus on indicating DTN's capability levels, as well as DTN's technical maturity levels.
- ITU-T Y.3185 "Functional architecture for intelligent awareness of network requirements" specifies the functional architecture of intelligent awareness of network requirements. The scope of this Recommendation includes the following aspects related to intelligent awareness of network requirement: introduction of intelligent awareness of network requirement; general functional architecture; network service data based functional architecture; crowd sourcing based functional architecture; functional architecture of requirement descriptor; functional architecture of requirement broker; functional architecture of requirement evaluator.
- ITU-T Z.161 (revised) "Testing and Test Control Notation version 3: TTCN-3 core language" describes the VMMA concept, the VMMA framework, the functional requirements, the functional APIs and the reference parameters. Some detailed use cases and reference APIs are described in the appendix.
- 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.
- ITU-T Z.171 (revised) "Testing and Test Control Notation version 3: Using JSON with TTCN-3" specifies the rules to define schemas for JSON data structures in TTCN 3, to enable testing of JSON-based systems, interfaces and protocols, and the conversion

rules between TTCN-3 and JSON to enable exchanging TTCN 3 data in JSON format between different systems.

- ITU-T Technical Report HSTP-CONF-H870 (V2) (revised) "Testing of personal audio systems for compliance with ITU-T H.870" describes the testing of the compliance of various personal audio systems/devices to the essential/mandatory and optional features of [ITU-T H.870V2].
- ITU-T Technical Report HSTP-DLT-CG "Construction guidelines for city-level distributed ledger technology (DLT) infrastructure" provides the city-level distributed ledger technology (DLT) infrastructure application model including relevant parties, construction principles and key processes. Relevant parties are divided into governance parties, business parties, user parties, technology providers and third-party support parties. Construction principles include compliance principles, security principles, hierarchical authorization principles, high availability principles, and traceability principles. The key process is divided into design system reference architecture, construction of standard specification system and construction of security assurance system.
- ITU-T Technical Report "The Potential of Distributed Ledger Technology to Improve Management of Universal Service Funds" explores the use of Distributed Ledger Technology (DLT) for the management of funds in the Universal Service Financing projects to enhance transparency and efficiency. The purpose of this technical report to identify ways to reduce process inefficiency in centralized systems, facilitating the prudent and transparent use of funds and providing a clear and automatic definition of the roles and responsibilities of all stakeholders in the new distributed framework. At the same time, this report also highlights the challenges that comes with new DLT ecosystem such as standardization of DLT frameworks, interoperability and regulatory mechanisms.
- ITU-T Technical Report on "Dispute Resolution Processes (previously "Dispute Resolution Related to Charging and Invoicing")" is meant to help ITU members to understand the origin, nature and dynamics of the conflicts between traditional telecommunication services providers and over-the-top (OTT) providers in order to get information that allows Member States design regulatory framework and principles leading to establish agile and transparent procedures for the dispute resolutions in the context of the mentioned relationship. This task is not simple, bearing in mind the changing scenario in the telecommunication/ICT market, therefore, this document promotes flexible, transparent and collaborative frameworks and principles to conduct the conflict resolutions.
- ITU-T Technical Report on "5G related policy considering MVNOs" seeks to study the various economic and policy aspects related to IMT2020 technologies taking into consideration MVNOs. In addition, it presents an overview of 5G deployment and MVNOs, a detailed review of MVNO conceptual models as well as drivers and barriers to MVNO rollout. The report also presents various case studies from Member States in order to inform best practices.
- ITU-T Technical Report on "OTT Bypass": Although OTT Bypass may broadly affect other services, the focus of this Technical Report is restricted to the bypass of standard

international voice calls. This Technical Report describes OTT bypass and provides economic and policy background on its nature and implications, and discusses impacts to stakeholders including regulators and consumers, policy challenges, protection of users amongst other issues. It also provides a working definition of OTT bypass and a country case study.

- ITU-T Technical Report on "Operation Requirements for Federated Machine Learning based Applications" provides operation requirements for federated machine learning based applications, specifies operation functional framework and description on operation functional components.
- ITU-T Technical Report on "Operation Requirements for Federated Machine Learning based Applications" addresses aspects related to delivering free to view television and other audiovisual signals to smartphones and other portable devices using the wireless local area network/ Wi-Fi constituting the last mile of secondary distribution TV network. In other words, the scope of the draft Technical Report is intended to cover the last mile connection via the wireless local area network/ Wi-Fi interconnected with the conventional TV transmission modes of satellite, cable, or terrestrial.
- ITU-T Technical Report on "Operation Requirements for Federated Machine Learning based Applications": A Common User Profile (CUP) format used to personalize audiovisual media is intended to assist users who have different ranges of abilities to make audiovisual content more accessible. The CUP is targeted at broadband, digital TV, computer and smart phone software and web-based audiovisual systems. The CUP is independent of the device or application being used and is intended through a software agent stored in the user's device or devices, to personalize the media experience by adapting the devices interface parameters such as the displayed captions font size, colour and contrast, the audio dialogue balance, volume and equalisation, the size and position of on-screen elements etc. The CUP application can also be used to create synthetic profiles which can be used to simulate the effect of parameter adjustment on different devices allowing developers to assess features on different persons with different ranges of abilities.
- ITU-T Technical Report on "Use Cases on the combat of Multimedia Content Misappropriation" aims to collect use cases from ITU Members that reflects challenges, opportunities, and results on the combat of multimedia content misappropriation and, with this information compendium, assist ITU members in engaging this problem. To facilitate this information collection, this document proposed a template to be used when including information from new sources, that can either be members state engaging the problem or solution providers.
- ITU-T Technical Report on "RF level based single-number indicator for mobile network usefulness for a given range of applications" describes a framework and methodology for a spatially resolved single-number indicator expressing mobile network usefulness for a given range of purposes.
- ITU-T Technical Report on "Optical fibres, cables and systems" The ITU-T has published a complete set of Recommendations dealing with these topics: Recommendations and Supplements of the ITU-T G-series on optical fibres and systems

and Recommendations and Supplements of the ITU-T L-series on construction, installation, jointing and termination of the optical cables.This report was prepared by the Rapporteurs and editors of WP2/15 responsible for developing those Recommendations and is meant to provide an introduction to them, but can also act as an introductory overview to the rapidly developing world of fibre optic communications.

- ITU-T Technical Report on "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. The items covered are related to the following areas: – optical fibre cable characteristics, evaluation and installation techniques; – construction of optical infrastructure; – network design; – network maintenance and operation, including disaster management; – passive optical components.

76. 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.

77. 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.

78. 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.

79. 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 sustainable cities.

80. More than 200 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 "Guiding principles for artificial intelligence in cities", "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.

81. The first United for Smart Sustainable Cities (U4SSC) Austrian U4SSC Country Hub is 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;
- Enabling People-Centred Cities through Digital Transformation; and
- Digital Wellbeing

82. 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.

83. The ITU/WMO/UNESCO-IOC Joint Task Force on SMART[1] 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;

[1] Science Monitoring and Reliable Telecommunications

- 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, is deploying the new CAM ring (Continent (Lisbon)-Azores-Madeira) The new CAM ring is expected to be in operation in 2025/2026 and likely be the first SMART cable system.
- ITU-T Study Group 15 (SG15) has approved Recommendation ITU-T G.9730.2 on SMART cables together with Recommendation ITU-T G.9730.1 on dedicated scientific sensing submarine cable system under Question 8/15 (Characteristics of optical fibre submarine cable systems).
- The 10th workshop on JTF on SMART cables was held on 20 January 2024 in Honolulu, United States.
- 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.

84. 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.

85. 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, 2022) 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.

86. According to Resolution 76 (WTSA-20), the Conformity Assessment Steering Committee (ITU-T CASC), which works under auspices of SG11, studies and defines

an ITU procedure to recognize testing laboratories that are competent to test according to ITU-T Recommendations, in collaboration with existing accreditation bodies.

87. ITU continues its collaboration with ILAC and IAF on TL recognition procedures. In August 2022, all three entities signed the updated MoU which among other activities includes a new TL recognition procedure (see here). In addition, ILAC developed its own assessment procedure to explain the operation of the set-up (see here). The detailed information on ILAC-ITU partnership is available here.

88. Following the TSB Circular 368, TSB received several requests from TLs seeking ITU recognition. As of June 2024, there are 14 Testing Laboratories registered in the ITU Testing Laboratories database (https://itu.int/go/tldb). The announcements about recognized TLs were also issued via ITU Operational Bulletins (OB.1253, OB.1256, OB.1263, OB.1266, OB.1283, OB.1286 and OB.1293). Testing Laboratories keep TSB updated on any changes in their scope of accreditation and its validity.

89. CASC updated the list of ITU-T technical experts based on the inputs received from ITU-T SGs and according to the criteria and procedures defined in cl.9.1 of ITU-T Guideline "ITU-T CASC procedure to appoint ITU-T technical experts" (2019). The updated list of ITU-T Technical experts is available on the CASC webpage at: https://itu.int/go/casc.

90. In response to requests from ITU members, ITU organized a Tutorial on Testing Laboratories recognition procedure. This tutorial aimed to guide all stakeholders on the Testing Laboratories recognition procedure established by ITU, its benefits, and all the logistical details needed for submitting applications.

91. 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. As a result, the GPON ONT end-device, which was tested by recognized TL, was registered in the ITU Product Conformity Database (https://itu.int/go/tcdb) under a new ICT product category “optical fiber equipment”.

92. A helpful video guideline about ITU Testing Laboratories and the ITU Product Conformity Databases is available at the ITU C&I Portal (https://itu.int/go/citest).

93. 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, Optical fiber equipment and Mobile Number Portability systems (MNP).

94. 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).

    Under the pillars 3 and 4 of the C&I programme, the following activities have been conducted:

    i) ITU guidelines have been published on C&I:

ii) Guidelines for the development, implementation and management of mutual recognition arrangements/agreements (MRAs) on conformity assessment;

iii) Feasibility Study for the establishment of a Conformance Testing Center;

iv) Guidelines on Establishing Conformity and Interoperability Regimes – Basic and Complete Guidelines;

v) Guidelines for Developing Countries on establishing conformity assessment test labs in different regions;

95. ITU 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 technical collaboration and different C&I testing domains.

96. ITU assessment studies in the regions helped 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.

97. ITU-D Study Group 4 Question 2 (Q4/2), revised by WTDC-202, has its current Study Period ongoing (2022-2025), under the title: Telecommunication/ICT equipment: Conformance and interoperability, combating counterfeiting and theft of mobile devices - website. Outcomes from previous Study Period: Q4/2 Report (2021): Assistance to developing countries for implementing conformance and interoperability programmes and combating counterfeit information and communication technology equipment and theft of mobile devices; and promotional video.

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100. 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.

101. 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.

102. ITU-R hosted its major events, the Radiocommunication Assembly 2023 (RA-23) and the World Radiocommunication Conference 2023 (WRC-23). These were well attended and forged pathways in key areas such as mobile and fixed broadband communications, including the identification of additional spectrum for International Mobile Telecommunications (IMT) as well as the identification of new radio frequency bands to support the use of high-altitude platform stations (HAPS) as base stations for IMT (HIBS). WRC-23 also adopted a new agenda item on future lunar communications and recognized the importance of space weather observation. Moreover, regulatory actions were taken to modernize the Global Maritime Distress and Safety System (GMDSS) and to prevent and mitigate harmful interference to the radionavigation-satellite service. Finally, WRC-23 agreed on specific tolerances regarding the orbital characteristics of non-GSO space stations in the fixed-satellite, mobile-satellite and broadcasting-satellite services that operate within 15 000 km of the Earth's surface.

103. In response to Resolution ITU-R 61-3 "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 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)

104. Within the framework of its mandate as facilitator for Action Line C4, the ITU organized the facilitation meeting of Action Line C4 on *Capacity development in emergency telecommunications: Building resilience through digital skills*. This session discussed insights and best practices on building resilient ICT infrastructure and communities capable of effectively responding to emergencies in an increasingly digital world. Session details are available here.

105. 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.

106. The WSIS Prizes 2024 Winner for the Action Line C4 is: JaWAra Internet Sehat (Cyberwise Champion), Indonesia. Details of the project are available here.

107. The ITU Academy portal continues to be the main gateway to ITU's capacity development and training activities. It offers ICT professionals and policymakers access to capacity development opportunities using various methodologies and tailored to different learning styles, such as online self-paced or instructor-led courses. Its comprehensive training catalogue covers a large array of topics relevant to the ITU membership, such as cybersecurity, digital inclusion, artificial intelligence, spectrum management, policy and regulation, and network infrastructure. The platform plays a central role in promoting digital capacity development which is key to ensuring inclusive and secure telecommunications / ICTs for sustainable development – one of the core priorities for the ITU-D as outlined in the Kigali Action Plan. Between November 2023 and July 2024, the ITU Academy welcomed over 8,500 additional users, bringing the total of the platform's learners to over 49,700 users, from all Member States. During this period, 101 courses were delivered via the ITU Academy to over 13,600 registered participants.

108. 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. Between November 2023 and July 2024, the ATCs delivered 33 courses attracting around 2,600 registrations. In the first quarter of 2024, BDT organized several training sessions on how to conduct engaging online training, aimed at the instructors of the ATCs. The goal of the initiative was to impact the quality of the training courses, by improving facilitation, virtual delivery skills and by allowing for exchanges of best practices among the participating institutions. During the first global annual meeting of the ATCs, representatives from all ATCs convened to share methodologies and promote best practices for delivering an optimal learning experience, empowering ICT professionals worldwide. More details please visit: https://academy.itu.int/itu-d/projects-activities/itu-academy-training-centres.

109. ITU launched the Digital Transformation Centres (DTC) Initiative in partnership with Cisco in 2019. The Initiative seeks to strengthen the digital capacities of citizens, particularly in rural and underserved communities through a global network of local institutions, the Digital Transformation Centres (DTCs). Five years since the inception of the Initiative, the Digital Transformation Centres (DTC) community has grown from an initial group of 9 centres to a network of 14 centres located across four regions. To date, the DTCs have provided basic and intermediate digital skills training to more than 364,000 course participants (of which 54 per cent are female). The DTC Project "Boosting Digital Skills through the Digital Transformation Centres" was launched as a partnership between ITU and the Norwegian Agency for Development Cooperation (Norad). This project supports the activities implemented under the DTC Initiative, particularly those aimed at scaling the delivery of digital skills training – and hence digital literacy - in local communities and among marginalised groups. The Initiative continues to expand through the engagement of various partner organisations that are supporting the DTCs to further scale the impact of their capacity development interventions on the ground. More information is available here: https://academy.itu.int/itu-d/projects-activities/digital-transformation-centres-initiative.

110. Funded by the European Union in the context of the Global Gateway, the 4-year "Capacity Development for Digital Transformation" project addresses the development needs of policymakers and government officials through targeted training on key topics linked to digital transformation. The project aims to enhance the knowledge and skills required to make informed decisions and policies in the digital era and to support a human-centric digital transformation globally. Through face-to-face and online training courses organized by ITU under the umbrella of the ITU Academy, in collaboration with ITU Academy Training Centres, UNDP and other selected United Nations agencies, the project aims to train at least 5,000 professionals, the majority of whom are from developing countries.

111. The Digital Skills Forum, previously the Capacity Building Symposium (held in 2016 and 2018), will resume in September 2024 and is expected to be held every two years. The Forum aims to provide a continuous platform for the ITU membership and other stakeholders to discuss the most pressing needs that have to be addressed to close the digital skills gap.

112. ITU continues to lead the Digital Skills Campaign, which was launched in 2016 as one of eight thematic priorities under the ILO Global Initiative on Decent Jobs for Youth. The campaign seeks to equip young women and men with the skills needed for the digital jobs of today and tomorrow. In 2021, the target was revised from commitments to train 5 million young people to training 25 million by the end of 2030. As of March 2024, the campaign had received commitments to train more than 23 million young people with job-ready, transferable digital skills by 2030. The 19 partners who have made commitments under this initiative come from a range of sectors including government, development banks, NGOs, UN Agencies and the private sector.

113. 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.

114. 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.

115. 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 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

116. 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.

117. The 19th Action Line C5 Facilitator Meeting was held on Tuesday, 28 May 2024, 10:00-10:45 CEST. The theme of this year was "Beneath the Waves: Safeguarding Global Connectivity through Secure Submarine Networks''. More details about the meeting are available here.

118. The WSIS Prizes 2024 Winner for the Action Line C5 is: NationalConnect: Empowering Governance, Education, and Sustainability through Secure Government Video Conferencing, Bangladesh. Details of the project are available here.

119. 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. Bucharest, 2022) 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.

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))

120. As part of ITU-D Priority 5 of the Kigali Action Plan, and taking into account ITU-D Q 3/2, ITU has assisted Member States in understanding the legal aspects of cybersecurity through its ITU Cybercrime Legislation Resources. ITU collaborates closely with partners such as the United Nations Office on Drugs and Crime (UNODC).

121. ITU works to enhance the capacity of Member States to address cybersecurity through the Policy & Diplomacy track under HerCyberTracks, which supports the skills, knowledge, and abilities of women in target countries to engage on cybersecurity.

(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))

122. 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.

123. ITU-T Study Group 17 (SG17) is responsible for developing international standards to enhance confidence, security and trust in the use of Telecommunication/ICTs, in the context of an ever-growing attack surface and confronted with an unbalanced threat landscape. Providing security by ICTs and ensuring security for ICTs are both major study areas for Study Group 17.

124. This comprehensive and transformative endeavour, which considers the increase of compliance requirements, and ongoing coordination within ITU-T and other SDOs, encompasses the following areas:

- Security Model, Framework, Architecture and Lifecycle: This includes studies of cybersecurity, wholistic security approaches spanning development, deployment, and operation phases, managed security services, and security automation. In particular, it delves into both security models like zero trust for network infrastructure and at the same time supply chain security, especially concerning software.

- Cybersecurity and Service: This includes adapting to the evolving threat landscape (targeted attacks and ransomware), understanding the characteristics of emerging malware types, addressing and managing cybersecurity incidents, identifying security requirements, core cybersecurity solutions, exchanging threat intelligence, combating spam, endpoint detection and response and developing new simulation and prediction capabilities. It also includes services and their organizations such as the development of cyber security centres, incident response teams (IRTs) and managed security services.

- Security Management: This includes information security management, identity solutions and management, authentication mechanisms and telebiometrics, all stimulated by new and emerging security technologies.

- End-device, Edge, Network, Cloud, and Application Security: This addresses security in the context of end-devices, edge, networks, cloud, applications, and services, which is of paramount importance. It includes endpoint security, smart devices and Internet of things (IoT) devices, networks ranging from IMT-2020/5G and beyond and IMT-2030/6G, intelligent transport system (ITS) security, which extends to vehicle-to-vehicle (V2X) communication and autonomous driving. Additionally, it covers multifaceted approaches of security for smart cities and communities, smart entities including smart grid, smart factory and e-health, industrial control systems (ICS), terrestrial-satellite and satellite-satellite network convergence, radio navigation satellite service (RNSS), automatic identification system (AIS), software-defined networking (SDN), network function virtualization (NFV), Internet Protocol television (IPTV), web services, over-the-top (OTT) platforms, metaverse, digital twin technology, cloud computing, in-network computing, big data analytics, and digital financial system (DFS).

125. SG17 held one meeting in February/March 2024 - where SG17 approved 14 new or revised Recommendations and established 54 new standardization work items on ICT security.

126. 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 implemented against such attacks is the use of digital public-key certificates (ITU-T X.509) for signing sensitive information in the signalling exchange which may guarantee the trustworthiness of the information and the caller/sender identity. In 2020 and further in 2022, ITU-T SG11 developed three key standards which define the way on how public-key certificates can be inserted into signalling exchange (ITU-T Q.3057,

Q.3062 and Q.3063). Afterwards, SG11 developed several amendments to existing Recommendations which define extensions in SS7 and BICC signalling to support the calling line identification authentication in line with the approach defined in ITU-T Q.3063 (Amendment 2 to ITU-T Q.931, Amendment 6 to ITU-T Q.1902.3, Amendment 7 to ITU-T Q.763). Currently, SG11 is working on the draft Recommendation ITU-T Q.TSCA "Requirements for issuing End-Entity and Certification Authority certificates for enabling trustable signalling interconnection between network entities" which specifies the requirements for the verification of information elements in certificate signing requests. It becomes a fourth part of the ITU-T SG11 standards related to signalling security (ITU-T Q.3057, ITU-T Q.3062 and ITU-T Q.3063). SG11 continues collaboration with SG2 and SG17 on this subject matter. 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.

127. Among ITU-T SGs approved Recommendations and other texts in this reporting period, 37 texts are about security (https://www.itu.int/ITU-T/workprog/wp_search.aspx?isn_sp=8265&isn_status=-1,8,1,3,7,2&adf=2023-11-01&adt=2024-08-19&sum=security&details=0&field=acdefghijo) and 12 texts are about trust (https://www.itu.int/ITU-T/workprog/wp_search.aspx?isn_sp=8265&isn_status=-1,8,1,3,7,2&adf=2023-11-01&adt=2024-08-19&sum=trust&details=0&field=acdefghijo).

128. https://www.itu.int/ITU-T/recommendations/rec.aspx?id=14968Use Cases driven by the information sharing platform. Several ITU-T focus groups, referenced on this page, are also exploring the trust aspect of various emerging technologies as part of their work. For example, the Focus Group on metaverse (FG-MV) has approved 4 Technical Reports on issues such as Cyber risks, threats, and harms in the metaverse, and Embedding safety standards and user control of Personally Identifiable Information (PII) in the development of the metaverse.

129. 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. In addition, RA-23 approved the revisions of Resolution ITU-R 56, confirming the name for the next generation of IMT (also known as "6G") to be "IMT-2030" and Resolution ITU-R 65, which describes the principles of the IMT-process. Along these revisions, RA-23 also approved new Recommendation ITU-R M.2160 on the "IMT-2030 Framework". Together with the already existing Report on "Future Technology Trends" ITU-R M.2516, this marks the achievement of the initial phase, setting the basis for the development of IMT-2030. The next phase (2024-2027) will be the definition of relevant requirements and evaluation criteria for potential radio interface technologies (RIT) for IMT-2030. At its first meeting in 2024, ITU-R SG 5 approved a

new Report ITU-R M.2542 about the "Technical feasibility of IMT in bands above 100 GHz", which includes information on propagation mechanisms and channel models, as well as newly developed technology enablers such as active and passive components, antenna techniques, deployment architectures, and the results of simulations and performance tests. As such, it complements Report ITU-R M.2376 containing studies for the frequency ranges 6-100 GHz. Further information on "IMT towards 2030 and beyond" can be found here.

130. 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.

131. 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.

132. 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 42 international, regional or national exercises involving more than 140 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. Over 200 stakeholders from 40 countries from Europe and the Asia-Pacific benefited from the ITU Interregional CyberDrill held from 28 November to 1 December 2023 in Cyprus. Other 2023 CyberDrills schedule will be visible on the link during this year.

133. 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.

(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))

134. 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. ITU has built on the Second edition of The Guide to Developing a National Cybersecurity Strategy (NCS), published in 2021 in collaboration with over 20 international partners, and is working with several countries and territories to advance their cybersecurity strategies through in-person table top exercises and Action Plan assessments in collaboration with the United Kingdom. ITU, in

conjunction with stakeholders, plans to begin the process of updating The Guide to Developing a National Cybersecurity Strategy in 2025. 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[2]) on the development and implementation of NCS in two countries and run similarly consultation workshops[3] 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.

135. Under the Cyber for Good initiative, ITU-D Sector Member Axon Consulting has worked with LDCs to review their NCS.

(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))

136. 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.

137. The fifth edition of the ITU Global Cybersecurity Index (GCI) Questionnaire has worked with 172 countries to gather data. The GCI Expert Group recommended weightages and how to move to a tier-based reporting model, as requested in PP Resolution 130 (Rev. Bucharest, 2022), and WTDC Resolution 46 (Rev. Kigali, 2022). 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.

138. 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

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

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

collaborations for and by youth under the umbrella of the Generation Connect Initiative.

139. 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. ITU has successfully completed three editions of the Women in Cyber Mentorship Programme. The third cohort has been launched in April 2023, with target groups in the Africa, Arab and Asia-Pacific regions.

140. 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 & 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. "Her CyberTracks", supported by GIZ and Microsoft, successfully targeted at women policy-makers and diplomats in 2023, and is expanding to tackle specific needs in incident response and cybercrime (in cooperation with UNODC). This project is financially supported by the German Federal Foreign Office and is co-implemented with GIZ Germany.

141. 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 23 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, five 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))

142. 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.

143. Pursuant to Decision 630 (Council 2023), ITU is developing an informational resource to help Member States build their cybersecurity and cyber resilience capacity, and has invited Member States and other stakeholders to contribute best practices, resources and related information for this purpose.

144. ITU has continued to engage with stakeholders in Open-ended Working Group on security of and in the use of ICTs (OEWG), providing inputs into its capacity development mapping exercise, understanding current cybersecurity needs based on the Global Cybersecurity Index, and showcasing the impact of the HerCyberTracks initiative.

145. ITU continues to participate as an observer in the work of the Ad Hoc Committee to Elaborate a Comprehensive International Convention on Countering the Use of ICTs for Criminal Purposes. UNODC serves as Secretariat for the Ad Hoc Committee.

146. 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.

147. ITU collaborated with the Kingdom of Sweden, Microsoft, and Global Forum for Cybersecurity Expertise (GFCE) on developing a Compendium on Mainstreaming Cybersecurity in Development.

148. ITU is collaborating with Member States to deliver its work, notably the Czech Republic, Germany, the Kingdom of Saudi Arabia, and the United Kingdom.

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

149. 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.

150. 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.

151. 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.

152. 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.

153. 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.

154. 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.

155. 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. Within the Joint Declaration signed in October 2023 between ITU and Malta Foundation for the Wellbeing of Society (MFWS) and following the successful roll-out of the Train of Trainer initiative for psycho-social teams of all Maltese colleges nationally in June 2023, the ITU Europe Office continue to scale up and support Malta on Child Online Protection activities.

156. In Albania, a national child online protection project has been 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 were developed "The implementation of National Policies for Child Online Protection" and an "Assessment and prioritization report "that will inform NAECCS strategy on Cybersecurity.

157. ITU Office for Europe supported the National Contact Centre for Children Safety in the roll-out of the Child Online Protection Guidelines in the country. On the 6th of February 2024, the National event dedicated to child online protection was held in the country where the translated Materials were presented. The roll-out of the materials included the translation of the Guidelines into the national language as well as the support of carrying out by the National Contact Centre of the dissemination campaign of the COP materials that reached out to 957 children and 60 teachers, pedagogues, and psychologists.

158. 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.

159. 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

160. 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 continuous leading the facilitation role on WSIS Action Line C6 Enabling Environment as the sole facilitator building upon its work carried out within the framework of the ITU-D Priority 3: Enabling Policy and Regulatory Environment Promoting an enabling policy and regulatory environment conducive to sustainable telecommunication/ICT.

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

161. The 19th Action Line C6 Facilitation Meeting was held as an integral component of the WSIS+20 Forum High-Level Event 2024, on Tuesday, 28 May 2024. The theme of this year was: "Collaborative Regulation Interactive workshop" with the active participation of Regional Regulatory Associations (RAs). Session details are available here.

162. The WSIS Prizes 2024 Winner for the Action Line C6 is: Interactive Tool of Policies, Terms and Conditions Applicable in the use of Digital Platforms, Mexico. Details of the project are available here.

163. 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.

164. 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.

165. In the frame of knowledge exchange tools and platforms 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.

166. The 23nd edition of the Global Symposium for Regulators (GSR-24) was held in Kampala, Uganda, from 1 to 4 June 2024, and attracted 600 participants including Government Ministers and Deputy Ministers (10), Heads of Regulatory Authorities and C-level industry executives (50+) from over 77 countries. GSR-24 was chaired by Mr William Nyombi Thembo, Executive Director, Uganda Communications Commission (UCC), under the theme “Regulation for impact”.

167. Throughout the GSR programme, discussions focused on maximizing digital opportunities, the space economy, universal connectivity, digital transformation, Artificial Intelligence (AI) and robotics for positive impact, safe and inclusive digital financial services, agile regulation, and digital for climate action. The GSR-24 Chairman's report is available at: www.itu.int/gsr24.

168. A series of special events took place on 1 July, including the Regional Regulatory Associations (RA) and Digital Regulation Network (DRN) meeting and the Heads of Regulators' Executive Roundtable. The Industry Advisory Group on Development Issues and Private Sector Chief Regulatory Officers (IAGDI-CRO) convened on 2 July. A session of Network of Women (NoW) in ITU's Telecommunication Development Sector on 3 July explored mechanisms for greater participation of women in ICT-related fields and addressed the leadership gender gap in the ICT sector. A technology exhibition was held from 1-4 July showcasing the latest digital innovative technologies and applications from international and local ICT companies. Regulators from around the world identified and endorsed the GSR-24 Best Practice Guidelines on "Helping chart the course of transformative technologies for impact". These Guidelines can help ICT regulators shape a regulatory environment that enables the rollout of cutting-edge infrastructure to support digital societies and digital economies of the future. The Guidelines also identify measures to minimize risk and maximize inclusive social and economic benefits of transformative technologies. The guidelines can be found on the GSR-24 website at: www.itu.int/gsr24.

169. The Digital Regulation Network (DRN), a new BDT initiative launched at GSR-23, identifies common approaches to collaborative digital policy, regulation, and governance across economic sectors and across borders. The Network is enabled by Regulatory Associations (RAs) at the regional and global level by leveraging South-South, North-South and triangular cooperation. Over the past year, DRN facilitated the active participation of RAs in capacity building workshops, shared digital regulation materials, and called for twinning opportunities to learn from other Regional Regulatory Associations (RAs). Future activities will continue to focus on capacity building, collaborative regulation, twinning, and participation in ITU-D Study Group activities.

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

- 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 collaborative digital regulation country reviews (Brazil, Colombia, Egypt, Nigeria, and Kenya) articulate the benefits of G5 regulation at country level, and anchors these benefits in experience and evidence.
- The 2023 edition of the G5 Benchmark provided an assessment of the state of readiness of national policy, legal and governance frameworks for digital transformation. The new visualization tools on the G5 Accelerator platform allow for a customized analysis and deep dive into the data on 54 indicators by region or country.
- The analytical companion of the 2023 G5 Benchmark dataset, the technical paper 'Benchmark for fifth generation collaborative digital regulation 2023: global and regional trends', highlights trends in the evolution of national legal, policy and governance frameworks for digital transformation across regions and groups of vulnerable countries (LDCs, LLDCs and SIDS).
- Econometric research and analysis include studies and recommendations on affordability for ICT adoption across the globe. 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.

171. The ITU World Bank Digital regulation platform provides 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 latest articles include the following: National digital transformation strategy – mapping the digital journey; Guiding principles for ICT regulators to enhance cyber resilience; Transformative technologies (AI) challenges and principles of regulation; and Regulation of NGSO Satellite Constellations.

172. In February, with the support of Government of the United Kingdom Foreign, Commonwealth & Development Office (FCDO) Digital Access Programme (DAP), the Efficiency toolkit was developed by ITU 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, and being translated in other languages. Face-to-face facilitated training to national stakeholders on the toolkit modules have also been delivered in Indonesia by end of 2023 and to CRASA members in 2024.

173. 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.

174. ITU is developing training materials for regulators as part of the Digital Regulation platform and providing training with partners, such as EaPeReg, EMERG. Globally, two ITU global digital regulation training courses were delivered (with financial support from CST Saudi Arabia) on effective policy, legal, and regulatory frameworks for 910 participants from 134 countries, among which 310 received a certificate.

175. The IMDA Executive Training, held in Singapore from 19 to 25 September 2023, highlighted the commitment to digital transformation in small States, aligning with the Partner2Connect Digital Coalition (P2C) initiative and benefiting members globally. The training built the capacity of policy-makers and regulators from small states in digital regulation and included 19 participants.

176. 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 developed the ICT Infrastructure Business Planning toolkit, training series and self-paced training to support regulators in designing optimal broadband network that can respond and adapt to a wide range of infrastructure deployment projects for 5G technologies and satellite.

177. **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: a) Strategies and policies for the deployment of broadband in developing countries, b) Economic aspects of national telecommunications/ICTs, c) Telecommunications/ICTs for 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, d) Telecommunication/ICT accessibility to enable inclusive communication, especially for persons with disabilities, e) Strategies, policies, regulations and methods of migration to and adoption of digital technologies for broadcasting, including to provide new services for various environments, f) Use of telecommunications/ICTs for disaster risk reduction and management, particularly in developing countries, and g) Consumer information, protection and rights for telecommunication/ICT services, especially for vulnerable groups.

178. 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. (www.itu.int/itu-d/sites/studygroups/).

179. Additional details about other activities implemented by BDT can be found at the ITU-D Policy and Regulation website: www.itu.int/itu-d/sites/regulatory-market/.

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

181. 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.

182. 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.

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

- ITU-T Y.3061 "Autonomous Networks - Architecture framework" provides requirements, architecture, components and related sequence diagrams which together comprise an architecture framework for autonomous networks. The scope of this Recommendation includes: Requirements for the architecture; Description of the architecture and its components; Sequence diagrams explaining the interactions between the architecture components.

- **ITU-T Y.3062 "Trustworthiness Evaluation for IMT-2020 and Beyond with Autonomous Network Functions" (under approval**) specifies trustworthiness evaluation for IMT-2020 and beyond which are equipped with autonomous network (AN) functions. It includes the overview of trustworthiness, evaluation process for trustworthiness, evaluation metrics and related sub-metrics for trustworthiness, quantitative ways for trustworthiness in trust in AN (TiAN).

- **ITU-T Y.3084 "Information-centric networking in networks beyond IMT-2020: Requirements and functional framework to support immersive live experience services" (under approval**) specifies the requirements, functions,

scenarios and security considerations of information-centric networking (ICN) to support immersive live experience services in networks beyond IMT-2020.

- **ITU-T Y.3085 "Information-centric networking in networks beyond IMT-2020: Requirements and functional framework enhancement to support deterministic communication services" (under approval**) specifies the requirements and functional framework for enhanced information-centric networking (ICN) to support deterministic communication services in networks beyond IMT-2020.

- **ITU-T Y.3086 "Information-centric networking in networks beyond IMT-2020: Requirements and functional framework enhancement to support machine learning" (under approval**) specifies the requirements, functions, and scenarios of information-centric networking (ICN) to support machine learning services in networks beyond IMT-2020.

- **ITU-T Y.3092 "Digital twin for management and orchestration in IMT-2020 networks and beyond" (under approval)** describes how digital twins facilitate management and orchestration in IMT-2020 networks and beyond. It specifies the requirements, framework, and interfaces of network digital twins, as well as the considerations for data collection. It also outlines the necessities and values of IMT-2020 networks and beyond.

- ITU-T Y.3124 "Quality of service monitoring requirements and framework for IMT-2020 and beyond" specifies the quality of service (QoS) monitoring requirements and framework for IMT-2020 and beyond. It first provides an introduction of QoS monitoring for IMT-2020 and beyond. The QoS monitoring requirements and framework are specified accordingly.

- ITU-T Y.3125 "QoS assurance requirements and framework for cloud gaming supported by IMT-2020 network" specifies the QoS assurance aspects for cloud gaming supported by the international mobile telecommunications 2020 (IMT-2020) network. It first provides an overview of the cloud gaming supported by IMT-2020 network. It then specifies the high level requirements, functional requirements, and framework for cloud gaming supported by IMT-2020 network.

- ITU-T Y.3126 "QoS requirements and framework of interworking capability for supporting deterministic communication services in local area network for IMT-2020 and beyond": Interworking capability is an essential function to support QoS-guaranteed data transmission across heterogeneous networks. The data transmission of deterministic communication service in local network usually involves in multiple technology domains. In order to provide efficient QoS guarantee for deterministic communication services in heterogeneous technology domains, this Recommendation defines three types of interworking capability and specifies QoS assurance requirements, framework instances and operational procedures of interworking capabilities, based on the models defined in [ITU-T Y.3121].

- ITU-T Y.3127 "Future networks including IMT-2020 - Requirements and framework for self-organizing core network": The self-organizing core network is a core network constituted by a group of self-organized network entities cooperating to provide core network functions based on the available network capabilities and resources. It may reduce the Capital Expenditure and Operating Expense of core network by efficiently utilizing available network capabilities and resources. This Recommendation specifies overview, requirements, framework and general procedures of self-organizing core network, in the context of future networks including IMT-2020.

- ITU-T Y.3128 "QoS assurance requirements and framework for cloud gaming supported by IMT-2020 network" specifies requirements for network function communication between public networks (PNs) and public network integrated non-public networks (NPNs) in IMT-2020. These requirements build on the analysis of relevant use cases and related network problems. There are two types of NPN: public network integrated non-public network; and stand-alone non-public network. The requirements specified in this Recommendation concern the first type.

- ITU-T Y.3129 "Requirements and framework for stateless fair queuing in large scale networks including IMT-2020 and beyond" specifies the requirements and framework for deterministic networking with a set of work conserving packet schedulers that guarantees end-to-end (E2E) latency bounds to flows. The schedulers in core nodes do not need to maintain flow states. Instead, the entrance node of a flow marks an ideal service completion time according to a fluid model, called Finish Time (FT), of a packet in the packet header.

- ITU-T Y.3141 "Energy efficiency management of virtual resources in IMT-2020 networks and beyond" covers the following aspects: Functional requirements of energy efficiency management of virtual resources in IMT-2020 networks and beyond; Architectural model of energy efficiency management of virtual resources in IMT-2020 networks and beyond; Reference points of energy efficiency management of virtual resources in IMT-2020 networks and beyond; Procedures of energy efficiency management of virtual resources in IMT-2020 networks and beyond.

- ITU-T Y.3142 "Requirements and framework for AI/ML-based network design optimization in future networks including IMT-2020" focuses on using AI/ML to improve network design mechanisms, which deals with how to integrate AI/ML in order to optimize the design of network capacity, network topology, and routing for satisfying all the demands' SLAs in a cost-effective way, instead of only guaranteeing the SLAs without taking into account the overall cost.

- **ITU-T Y.3143 "Quality of service assurance requirements and framework for smart healthcare supported by IMT-2020 and beyond" (under approval)** specifies the quality of service (QoS) assurance requirements and framework for the smart healthcare supported by the international mobile telecommunications 2020 (IMT-2020) and beyond. It first provides an overview

of smart healthcare supported by IMT2020 and beyond. The QoS considerations for smart healthcare supported by IMT2020 and beyond are described. The specification of the QoS assurance requirements and a framework to reflect the identified QoS considerations is followed. Finally, the smart healthcare application scenarios with QoS metrics extended from the requirements are described in Appendix I.

- **ITU-T Y.3144 "Future networks including IMT-2020 - Requirements and functional architecture of distributed core network" (under approval)**: The distributed core network is a core network which builds on network functional units collaborating in a distributed manner to provide the network functions of control plane, user plane, and data plane. This Recommendation specifies the enabling features, requirements, functional architecture, network function enhancements and procedures of distributed core network, in the context of future networks including IMT-2020.

- ITU-T Y.3159 "Framework for classifying network slice level in future networks including IMT-2020": 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.3161 "Intent-based network management and orchestration for network slicing in IMT-2020 networks and beyond": The objective of this Recommendation is to specify a intent-based network management and orchestration for network slicing in IMT-2020 networks and beyond. This architecture guides the network slice deployment and management based on intent-based network.

- ITU-T Y.3162 "Evaluating intelligence capability for network slice management and orchestration in IMT-2020 network and beyond": As a novel technology of IMT-2020 network and beyond, network slicing allows the creation of multiple virtual networks on top of a shared physical infrastructure and meets diverse needs of users and applications. Meanwhile, Artificial Intelligence (AI) makes it intelligent especially by empowering network slice management and orchestration. This Recommendation aims to evaluate the intelligence level for network slice management and orchestration in IMT-2020 network and beyond and mainly covers the following aspects: overview, intelligence level definition, evaluation methods, framework and procedures of intelligent network slice management and orchestration.

- **ITU-T Y.3163 "Network accelerating for edge computing in IMT-2020 networks and beyond" (under approval)** clarifies the requirements, architecture, reference points and information flows for network accelerating for edge computing in IMT-2020 networks and beyond.

- **ITU-T Y.3164 "Requirement of joint development and operation for IMT-2020 and beyond" (under approval)**: Network softwarization brings forward

the requirements of fast update, fast iteration and fast delivery for networks. By establishing a general joint development and operation pipeline tailored for communication operations management between network operators and network software providers, continuous delivery, continuous integration, continuous testing, and continuous deployment of related software systems can be achieved. This Recommendation specifies requirements of joint development and operation for IMT-2020 networks and beyond.

- ITU-T Y.3186 "Requirements and framework for distributed joint learning to enable machine learning in future networks including IMT-2020" specifies scenarios, requirements, framework and flow diagram for distributed joint learning to enable machine learning in future networks including IMT-2020. The Recommendation can help to realize a highly automated, intelligent, and multi-party collaborative network.

- **ITU-T Y.3187 "Architectural Framework for Machine learning function orchestrator in future networks including IMT-2020" (under approval)** provides an architectural framework for Machine Learning Function Orchestrator (MLFO) in future networks including IMT-2020. More precisely, it describes high-level requirements and high-level architecture of MLFO in future networks including IMT-2020.

- ITU-T Y.3204 "Fixed, mobile and satellite convergence - Service continuity for IMT-2020 networks and beyond": The service continuity is the ability for a moving object to maintain ongoing service over including current states, such as user's network environment and session for a service. 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 scenarios, requirements, enablers, network function enhancements, procedures and security considerations of service continuity for FMSC, in the context of IMT-2020 networks and beyond.

- ITU-T Y.3205 "Fixed, mobile and satellite convergence - Requirements of integrated user-centric service units": An integrated user-centric service unit (IUSU) supports end users to define network and service capability profiles according to their own necessities. Fixed, mobile and satellite convergence (FMSC) is the capability of IUSU in supporting multiple access technologies used by various devices. This Recommendation specifies the scenarios, general characteristics, requirements, framework and security considerations of IUSU for FMSC, in the context of IMT-2020 networks and beyond.

- ITU-T Y.3206 "Fixed, mobile and satellite convergence - Capability exposure for IMT-2020 networks and beyond": The capability exposure provides functionalities for network functions to expose their capabilities to third parties (e.g. users or other operators). 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 scenarios, requirements, reference points, network function enhancements, procedures and security considerations of capability exposure for FMSC, in the context of IMT-2020 networks and beyond.

- ITU-T Y.3207 "Fixed, mobile and satellite convergence - Integrated network control architecture framework for IMT-2020 networks and beyond" specifies the integrated network control architecture framework for fixed, mobile and satellite convergence (FMSC) in the control plane for IMT-2020 networks and beyond. It describes the scenarios and architecture frameworks of integrated network control system and individual network domain control system. It describes the procedures for the design and orchestration of end-to-end network services, and the performance monitoring and resource control in a unified manner of both terrestrial and non-terrestrial network domains.

- **ITU-T Y.3208 "Fixed, mobile and satellite convergence - Session management with satellite backhaul for IMT-2020 networks and beyond" (under approval**): 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 session management requirements, framework, procedures, and security considerations for the FMSC with satellite backhaul in the IMT-2020 networks and beyond.

- **ITU-T Y.3209 "Fixed, mobile and satellite convergence - Traffic scheduling for IMT-2020 networks and beyond" (under approval**) aims to describe the traffic scheduling for FMSC in IMT-2020 networks and beyond, including the scenarios, requirements, framework, network function enhancements and procedures.

- **ITU-T Y.3212 "Fixed, mobile and satellite convergence - Requirements of supporting High Altitude Platform for IMT-2020 networks and beyond" (under approval**) specifies the requirements of supporting HAP for FMSC for IMT-2020 networks and beyond, focusing on scenarios, requirements, and security considerations.

- **ITU-T Y.3213 "Fixed, mobile and satellite convergence - Policy control for IMT-2020 and beyond" (under approval**) specifies the policy control in FMSC network for IMT-2020 and beyond, focusing on scenarios, requirements, network function enhancements, reference points, procedures and security considerations.

- **ITU-T Y.3214 "Fixed, mobile and satellite convergence - Service function chain (SFC) for IMT-2020 networks and beyond" (under approval**): In SFC an ordered set of abstract service functions are defined with ordering constraints that must be applied to packets and/or frames and/or flows selected as a result of classification and/or policy, [ITU-T X.1045]. This Recommendation aims to describe the service function chain (SFC) in fixed, mobile and satellite convergence (FMSC) in IMT-2020 networks and beyond. It covers overview on

SFC, requirements of SFC, SFC modification, network function enhancements for SFC, and security considerations in FMSC.

- **ITU-T Y.3215 "Fixed, mobile and satellite convergence - Requirement of network sharing for IMT-2020 networks and beyond" (under approval**) specifies high-level requirement and functional requirement of network sharing for fixed, mobile and satellite convergence networks.

- **ITU-T Y.3216 "Fixed, mobile and satellite convergence - Distributed core network for IMT-2020 networks and beyond" (under approval**) specifies the general considerations, requirements, network function enhancements, procedures and security considerations of distributed core network in FMSC network, in the context of IMT-2020 and beyond.

- ITU-T Y.3400 "Coordination of networking and computing in IMT-2020 networks and beyond - Requirements": The emergence of new services puts forward the need for the support of critical service requirements on computing, networking and storage resources at the same time. The coordination among resources of the same or different types (computing, networking and storage resource types) is necessary. By the application of the coordination of utilization, control and management of computing, storage, and networking resources for the purpose of provisioning and optimization, satisfaction of requirements of resources' users and improvement of resource utilization may be achieved. This Recommendation specifies the requirements for coordination of networking and computing in IMT-2020 networks and beyond (CNC).

- **ITU-T Y.3401 "Coordination of networking and computing in IMT-2020 networks and beyond - Capability framework" (under approval)**: The emergence of new services puts forward the need for the support of critical service requirements on computing, networking and storage resources at the same time. The coordination among resources of the same or different types (computing, networking and storage resource types) enabled by new capabilities is necessary. By the coordination of utilization, control and management of computing, storage, and networking resources for the purpose of provisioning and optimization, satisfaction of requirements of resources' users and improvement of resource utilization may be achieved. This Recommendation provides a capability framework for the coordination of utilization, control and management of computing, storage, and networking resources in IMT-2020 networks and beyond, including the interactions among the capabilities of the CNC (Coordination of Networking and Computing in IMT-2020 networks and beyond) capability framework.

- ITU-T Y.Suppl.40 to Y.3600 series "IMT-2020 standardization roadmap" provides the standardization roadmap for IMT-2020 and beyond in the information and communication technologies area. This revised Supplement 59 to ITU-T Y.3100-series Recommendations IMT-2020 and beyond standardization roadmap has been developed to assist in the development of IMT-2020 and beyond related standards in the ICT fields by providing

information about existing and under developing standards in key standards development organizations (SDOs).

- ITU-T Y.Suppl.81 to Y.3200 series "Use cases of satellite communications in Developing Countries": Satellite communications is the type of communications using satellite-borne equipment(s) as part of or all of the communications network. In Developing Countries, considering the limitation on capabilities and capacity of land-based networks, use of satellite communications is important. This Supplement specifies some use cases and the corresponding requirements of satellite communications networks in Developing Countries, in the context of non-radio aspects of IMT-2020 networks and beyond.

- ITU-T Technical Report TR.Reqts-SAN "Requirements of semantic-aware networking for future networks": Semantic-aware network (SAN) adopts machine and human-shared semantic terms and syntax to represent, annotate, analyse, and interpret network and user generated data, and is a promising candidate to support automatic data analysing, processing, and learning for future networks including IMT-2020. This Technical Report identifies potential requirements of SAN for future networks.

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

- **ITU-T F.748.39 "Functional requirements and reference architecture of artificial intelligence cloud platform for smart grid operation and maintenance" (under approval)** describes functional requirements and reference architecture of artificial intelligence cloud platform for smart grid operation and maintenance.

- ITU-T H.626.7 "Functional architecture for machine vision systems in smart manufacturing" specifies the architecture of machine vision systems for supporting the communication between endpoint, application and machine vision systems in smart manufacturing, so as to help ender users and providers to specify the machine vision tasks and the solutions, enhance confidence in machine vision ecosystem and open new applications for machine vision systems.

- ITU-T H.715.12 "Formal verification framework for smart contract on distributed ledger technology": 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 H.751.17 "Smart contract lifecycle management requirements for distributed ledger technology systems" specifies the requirements for the smart contract lifecycle, including design, development, compliance, deployment, triggering, execution, maintenance and management. By addressing these areas, distributed ledger technology (DLT) systems can efficiently realize and support programmable and intelligent functions.

- ITU-T H.862.7 "Interoperability framework for sleep management services": Sleep occupies a third of our lives and helps to relieve the physical and mental fatigue of daily life and lead a smooth daily life. Therefore, it is possible to obtain an improvement effect that can enhance the quality of life based on the understanding of sleep time and quality through sleep monitoring. With the growth of the sleep market, various sleep monitoring products combined with ICT technology are being launched, and these products are mainly composed of dedicated apps and sensors. The use of products composed of such dedicated software for each sensor is a major limitation in service operation because it is difficult to integrate with existing service data and difficult to share data with other services when changing the product or using it with other services. This Recommendation introduces a way to provide an open, interoperable API for smart sleep management devices and sleep services. In order to provide an individual with optimal sleep, data collection, analysis, and customized services on individual sleep are required. For this, interoperability between IoT-based sleep management devices and services must be secured. Interoperability of services covered by this Recommendation includes interoperability of data and interoperability at the API level.

- ITU-T J.1206 "The application programming interface of smart TV operating system" specifies the application programming interface of a smart TV operating system over integrated broadcast and broadband cable networks. A smart TV operating system is intended to be installed in an integrated broadcast and broadband (IBB)-capable cable set-top box (STB) and TV and to enable broadcasting and IP-based interactive services provided by cable television operators and third-party providers.

185. Internet of Things (IoT) and Smart Cities & Communities standardization progressed and numerous ITU-T Recommendations and other texts were developed.

- ITU-T Y.4221 "Requirements of IoT-based electric power infrastructure monitoring system" specifies the requirements for an IoT-based electric power infrastructure monitoring system for the purposes of maintaining electric power infrastructure.

- **ITU-T Y.4222 "Framework of smart evacuation in a disaster or emergency in smart cities and communities" (under approval)** describes concepts and

features of smart evacuation control in disaster and emergency situations. It identifies high-level requirements and ICT infrastructure for smart evacuation along with use cases in disaster and emergency situations. The introduction of a smart evacuation service will allow the maintenance of the level of comfort for the population achieved in a smart city even in the event of an emergency. This is fundamental to justify the enormous material costs for the rapid development of smart cities around the world against the background of emergencies that have become more frequent throughout the world.

- ITU-T Y.4223 "Common requirements and capabilities of smart cities and communities from IoT and ICT perspectives": Based on the fundamental characteristics of smart cities and communities, this Recommendation specifies common requirements and capabilities of SC&C from IoT and ICT perspectives. The specified common requirements and capabilities are intended to be generally applicable in SC&C.

- ITU-T Y.4224 "Requirements for digital twin federation in smart cities and communities" defines the requirements for digital twin federation.

- ITU-T Y.4225 "Requirements and capability framework of digital twin for intelligent transport system" specifies the requirements and capability framework of digital twin for intelligent transport system.

- **ITU-T Y.4226 "Functional framework and requirements for disaster monitoring system" (under approval)** provides an overview of a disaster monitoring system (DMS) for Smart Sustainable Cities (SSC) and identifies requirements and functional framework of the DMS.

- **ITU-T Y.4227 "IoT requirements and capabilities for support of blockchain" (under approval)**: Blockchain can help IoT and smart city and community related services and applications to establish trust, accountability and transparency while streamlining business processes. In order to promote the integration of blockchain with the IoT infrastructure, as well as enable richer flexible service scenarios for different IoT and smart cities and community verticals, this Recommendation, from the IoT point of view, identifies the functionalities of the blockchain, specifies the requirements of blockchain enabled IoT, and describes the specific IoT capabilities that are necessary to support blockchain.

- **ITU-T Y.4228 "Requirements and framework of Industrial IoT (IIoT) infrastructure for smart manufacturing" (under approval)**: Industrial Internet of things (IIoT) infrastructure for smart manufacturing refers to common facilities based on IoT that support smart manufacturing in industries or sectors. It is independent from the products and production process in specific enterprises. This Recommendation provides requirements and reference framework of the IIoT infrastructure capabilities for smart manufacturing to help service providers implementing their system according to the needs of smart manufacturing, and merge existing and newly developed

IIoT infrastructure, in order to give the stakeholders of smart manufacturing guidance for their applications.

- **ITU-T Y.4229 "Requirements and reference functional model of IoT-based smart forest firefighting system" (under approval)** introduces the smart forest firefighting system based on IoT and specifies the reference functional model and requirements. This Recommendation is intended to guide the design, development and implementation of the IoT-based smart forest firefighting system.

- **ITU-T Y.4230 "Requirements and capability framework of public smart charging service for electric vehicles" (under approval)** specifies requirements and capability framework of public smart charging service for EVs, to optimize the EV charging service process and improve the EV charging service experience of EV users.

- **ITU-T Y.4231 "Requirements and capability framework of the internet of things for vision" (under approval)** provides requirements and capability framework of the IoT for vision, a typical IoT for vision application workflow as well as some relevant IoT for vision use cases.

- **ITU-T Y.4232 "Requirements, capabilities and use cases of Internet of Things infrastructures in roadside traffic perception system" (under approval)**: RTPS, which refers to roadside traffic perception system, is a system composed of Internet of Things (IoT) infrastructures, including sensing devices, cloud facilities, intelligent traffic lights and smart traffic signs. By utilizing IoT technologies, roadside traffic perception system (RTPS) can enhance traffic safety and efficiency with capabilities of its components. To enhance traffic safety and efficiency, IoT infrastructures in RTPS need to collaborate with each other using IoT technologies. Therefore, common and specific requirements and capabilities for IoT infrastructures are described in this recommendation. Use cases of RTPS are also given in the appendix.

- **ITU-T Y.4233 "Framework for smart public health emergency management in smart and sustainable cities" (under approval)** specifies the framework of smart public health management in Smart and Sustainable Cities (SSC). SSCs are capable of fostering data driven smart applications to manage limited resources and implement them to thwart the advent of future pandemics of the same magnitude.

- **ITU-T Y.4234 "Requirements, capabilities and deployment models for e-learning in remote classrooms" (under approval)** includes a concept of e-learning in Remote Classrooms, i.e., places where ICT infrastructure and e-learning facilities, such as digital connectivity, computers, computer applications, virtual collaboration, online and digital educational catalogues, are made available for willing learners to educate themselves by using the said educational facilities. It develops requirements, capabilities and deployment models to enable high quality e-learning in Remote Classrooms in rural and

remote areas, that otherwise lack the connectivity and ICT infrastructure to impart education.

- **ITU-T Y.4463 "Framework of delegation service for Internet of things devices" (under approval)** is a framework of the delegation service for transferring ownership (i.e., access rights to the Internet of things (IoT) devices) among authorized IoT devices. This Recommendation gives an overview and types of delegation service in IoT environment. It also describes the requirements and architectural models of delegation service.

- ITU-T Y.4487 "A functional architecture of roadside multi-sensor data fusion systems for autonomous vehicles" 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.4488 "Requirements and functional architecture of data services provided via IoT-based technologies for the safety of manufacturing-related working environments" specifies the requirements and functional architecture of data services provided via IOT-based technologies to ensure the safety of three typical manufacturing-related working environments, namely working environments with high temperature, high dust concentrations or harmful gases. By deploying data services provided via IoT-based technologies, workplaces with these kinds of working environments can make use of IoT technologies to collect information remotely, identify risky behaviour, control items of equipment remotely, and so on.

- ITU-T Y.4489 "Reference architecture of digital twin federation in smart cities and communities" defines the functionalities of each entity and the interfaces among the entities. In addition, this Recommendation also addresses operational flows of digital twin federation in different scenarios.

- ITU-T Y.4490 "Framework of monitoring of water system for smart fire protection" addresses the monitoring of water system (MWS) for smart fire protection. It specifies the reference model of MWS, as well as requirements and framework of MWS.

- ITU-T Y.4491 "Framework of blockchain-based self-organization networking in IoT environments" describes a framework for the support of SON in IoT environment using blockchain.

- ITU-T Y.4492 "Decentralized IoT communication architecture based on information centric networking and blockchain" introduces the overview of the decentralized IoT communication, and the decentralized IoT communication requirements. It also includes the functional architecture of the decentralized IoT communication based on ICN and blockchain and the implementation view

of the decentralized IoT communication architecture based on ICN and blockchain.

- ITU-T Y.4493 "Autonomic operations support protocols in the Internet of things" provides a description of the autonomic operations support protocols in the Internet of things (IoT) based on the architecture of the IoT specified in Recommendation ITU-T Y.4416, in order to support provisioning of autonomic operation capabilities specified in Recommendation ITU-T Y.4401. It describes architecture of autonomic operations support protocols in the IoT, autonomic event management support protocol, autonomic control support protocol, and autonomic policy management support protocol in the IoT. Possible deployment and relevant use cases of these autonomic operations support protocols in the IoT are described.

- ITU-T Y.4494 "Reference architecture of collaborative decentralized machine learning for intelligent IoT services" introduces collaborative decentralized machine learning (CDML) for intelligent IoT services, and provides the characteristics and reference architecture of CDML for intelligent IoT services.

- ITU-T Y.4495 "Requirements and a reference model of data for smart greenhouse service": For data interoperability, this Recommendation defines requirements and a reference model of data for smart greenhouse service.

- **ITU-T Y.4496 "Requirements and reference architecture of smart service for public health emergency" (under approval)** is intended to provide the requirements and architecture for a smart service for public health emergency system that can be implemented to address current and future potential public health risks.

- ITU-T Y.4497 "Requirements and functional architecture of smart sharing bicycle service" describes the requirements and functional architecture of the smart sharing bicycle (SSB) service intended to meet people's daily travel needs, provide a positive user experience, and create significant market opportunities. This Recommendation includes the service requirements and the functional architecture of the smart sharing bicycle service.

- ITU-T Y.4498 "Framework of city-level energy data sharing and analytics among buildings" specifies requirements and architectural models for city-level energy management that facilitates data exchange, sharing and analytics among buildings in smart cities. Recommendation ITU-T Y.4498 also provides use cases to support energy planning, management and energy data sharing through city energy services for smart sustainable cities. As the sector accounts for a significant portion of total energy consumption, efforts are being made to increase energy efficiency in the built environment through smart solutions in homes, office and commercial premises, and factories.

- **ITU-T Y.4499 "Framework of urban infrastructure monitoring based on crowdsourcing" (under approval)** specifies a framework for urban infrastructure monitoring based on crowdsourcing, including requirements,

functional architecture, common procedures, as well as security and privacy considerations. Urban infrastructure includes the physical facilities and systems that a city must have for its operation and development.

- **ITU-T Y.4501 "Functional architecture for smart door lock service framework" (under approval)** describes the functional architecture for the smart door lock (SDL) service framework. With the development of mobile communication technology and smart hardware, various technologies are introduced into the door lock to form the smart door lock. Multiple unlocking methods can be realized, and abnormal alarm reporting and flexible door lock management can be performed.

- **ITU-T Y.4502 "Requirements and functional architecture of IoT sensing quality management service" (under approval)**: Emerging technologies, such as artificial intelligence, crowdsourcing, etc, are enhancing the sensing capabilities of IoT systems in recent years. IoT sensing quality management has become more complex. Consequently, sensing quality management service needs to be compatible with these emerging technologies in order to help in improving service quality of IoT systems. This Recommendation specifies the functions architecture of IoT sensing quality management service.

- **ITU-T Y.4503 "Framework of common rule enablement for intelligent IoT services in heterogeneous IoT platform environments" (under approval)**: Based on the agent, the heterogeneous IoT platforms operate the common rule scenario although heterogeneous rules are delivered to the environment. This Recommendation specifies a framework of common rule enablement for intelligent IoT services in heterogeneous IoT platform environments.

- **ITU-T Y.4504 "Service framework of prediction for intelligent IoT" (under approval)** introduces the concept of service framework of prediction for intelligent IoT and the requirements. And this draft Recommendations describes a functional architecture of service framework of prediction for intelligent IoT.

- **ITU-T Y.4505 "Minimal Interoperability Mechanisms for smart and sustainable cities and communities" (under approval)** defines the concept, purpose, and structure of Minimal Interoperability Mechanisms (MIMs) that provide the requirements for implementing minimal but sufficient capabilities needed to achieve interoperability based on a minimal common ground. The value of this approach is becoming widely recognised and several organisations and national and regional agencies are showing interest in the development of MIMs covering a range of different topics.

- **ITU-T Y.4506 "Reference architecture for the interworking of autonomous urban delivery robots" (under approval)** is to define the reference architecture for autonomous delivery robots based on the ITU-T Y.4607 that interwork with delivery robot service provider, user devices, and urban infrastructure to facilitate the delivery of goods without human intervention.

- **ITU-T Y.4507 "A functional architecture of power supply facilities warning system" (under approval)** provides the functional architecture of power supply facilities warning system, use cases and data flows also are provided in this recommendation.

- **ITU-T Y.4508 "Functional requirements and architecture of blockchain-based activity logs management for IoT data processing and management" (under approval)** presents a blockchain-based activity logs management for IoT data processing and management, and specifies its characteristics, functional requirements and architecture.

- ITU-T Y.4604 "Metadata for camera sensing information of autonomous mobile IoT devices" defines metadata for camera sensing information (MCSI) and describes characteristics and features of individual MCSI working on autonomous mobile IoT devices (AMIDs).

- ITU-T Y.4605 "Information exchange model for digital twin federation in smart cities and communities" addresses information exchange model for digital twin federation in smart cities and communities.

- ITU-T Y.4606 "Requirements and functional model of data management system for smart greenhouse service" defines requirements and functional model of data management system in the perspective of smart greenhouse service. The general requirements and functional model of the data management system are not under scope of this Recommendation.

- ITU-T Y.4607 "Requirements for the interworking of autonomous urban delivery robots" specifies the requirements for autonomous delivery robots that interwork with delivery robot service providers, user devices and urban infrastructure to facilitate the delivery of goods without human intervention.

- ITU-T Y.4703 "Internet of things service management application programming interface Representational State Transfer specification" specifies the Representational State Transfer (REST) Internet of things (IoT) service management applications programming interface (API) user guide. It includes the model definition as well as all available operations.

- ITU-T Y.4704 "Internet of things device management application programming interface Representational State Transfer specification" specifies the Representational State Transfer (REST) application programming interface (API) for the management of any Internet of Things (IoT) Device. It includes the model definition as well as all available operations.

- **ITU-T Y.4705 "Metadata model of sensing capability for disaster monitoring system" (under approval)** provides a Sensing Capability Metadata Model (SCMM) for Disaster Monitoring System (DMS). It clarifies the basic metadata categories of sensing capability for DMS, and describes the structure and contents of sensing capability metadata elements of SCMM for DMS.

- **ITU-T Y.4706 "Data exchange model for IoT devices in power transmission and transformation equipment" (under approval):** The Internet of things (IoT) devices in the power transmission and transformation equipment can meet the demand for comprehensive and accurate data acquisition of power transmission and transformation equipment. It is necessary to develop a data exchange model for enable applications, sharing, coordination when constructing the system for power transmission and transformation equipment based on IoT. This Recommendation provides the requirements and model of IoT data exchange in power transmission and transformation equipment.

- ITU-T Y.Suppl.76 "ITU-T Y.4000-series - Use cases of IoT based smart agriculture" surveys use cases related to smart agriculture in the perspective of, but not limited to: 1) smart greenhouse, 2) smart open field, 3) smart hydroponics, 4) smart livestock barn, and 5) smart agriculture data service.

- ITU-T Y.Suppl.77 "Digital transformation for people-centred smart cities and communities: an analysis of definitions" aims to comprehend the multiple dimensional definitions of digital transformation for people-centred smart cities and communities from open literature. It used keywords and attributes analytical methodology to developing a new definition.

- ITU-T Y.Suppl.78 "Use Cases on implemented or evaluated SSC solutions based on ITU-T Y.4900 Recommendation Series" aims to collect use cases from ITU Members that have implemented or evaluated Smart Sustainable Cities (SSC) based on the ITU-T Y.4900 Recommendation series. The expected result is to provide information, identify challenges and opportunities on the implementation and evaluation of SSC solutions, based on the Y.4900 Recommendation series, across a wide spectrum of realities (such as varied infrastructure maturity, city size, financial conditions, among others).

- ITU-T Y.Suppl.82 "Standardization gaps and roadmap for AI and IoT in digital agriculture" analyses and identifies standardization gaps related to AI and IoT in digital agriculture and develop a future standardization roadmap, taking into consideration the activities currently undertaken by other ITU groups, various standards developing organizations (SDOs) and forums.

- ITU-T Y.Suppl.83 "Optimizing Digital Agriculture with Best Practices for Integrating AI and IoT" provides a detailed analysis of how AI and IoT technologies are revolutionizing digital agriculture. It includes numerous use cases demonstrating successful implementations, highlighting their objectives, innovations, data collection methods, and AI/ML algorithms used. The report assesses accuracy, performance, deployment status, and the benefits of these technologies. It also evaluates environmental impacts, offering recommendations for enhancing productivity, sustainability, and efficiency in agriculture.

- ITU-T Technical Report YSTP.AIoT on "Challenges of and Guidelines to Standardization on Artificial Intelligence of Things" describes concepts,

characteristics, technical features and approaches of AIoT. Then, it presents challenges and guidelines for standardization on AIoT. It aims to provide technical insight and a clear direction for AIoT standardization from an ITU-T SG20 perspective.

- ITU-T Technical Report YSTR.DataModelling-Agri on "Data processing, management and analytics with AI for digital agriculture" describes Data Modeling for digital agriculture delves into the integration of data technologies and AI modeling for optimizing farming practices. It explores diverse data sources, techniques, pre-processing methods, and modeling algorithms used in digital agriculture. It illuminates how digital agriculture is revolutionizing crop management, resource utilization, and sustainability practices, ultimately paving the way for a more efficient and resilient agricultural sector.

- ITU-T Technical Report YSTR.P2P-CC on "Current state of P2P crowd charging platforms and corresponding market needs": A P2P crowd charging system is a distributed system comprising ICT infrastructure provided by the general public (e.g., smartphones). The distributed resources of a P2P crowd charging system operate in a collaborative manner driven to perform energy sharing tasks by using their built-in power transfer modules. This work item will conduct a review of and provide an analysis of the current state of P2P crowd charging systems in terms of currently available technological solutions, ongoing research, and recent and ongoing standardisation activities in this area. The aim of the analysis will be to identify existing gaps and market needs in the area of P2P crowd charging systems.

- ITU-T Technical Report YSTR-IADIoT on "Intelligent Anomaly Detection System for IoT" presents an Intelligent Anomaly Detection System for IoT which is based on the use of new technologies to detect anomalous behaviour in IoT-based systems. It is a hybrid system that responds to proven filtering security rules for known attacks. Then, through a machine learning module, new anomalous traffic can be detected, and the rules reconfigured according to the analysis and discovery made. The main objective of this Technical Report is to demonstrate the feasibility of implementing certain controls and security aspects as close as possible to IoT devices.

- ITU-T Technical Report YSTR.HTSA-overview on "Overview of ICT based highway traffic safety assessment": A lot of information and communication technologies have been widely used in the traffic field, especially in the highway industry, and have made remarkable achievements. There is no scientific and effective index system for evaluating ICT-based highway traffic safety. In other words, there is a lack of uniform capability methodologies for ICT based highway traffic safety assessment. This Technical report presents an overview and covers the process of ICT based highway traffic safety assessment.

186. 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.

187. 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.

188. 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.

189. ITU has been organizing the Digital Transformation Dialogues (DTD). DTD offers a dynamic platform to facilitate a deeper understanding of emerging technologies to reshape traditional processes, improve operational efficiency and unlock new possibilities for innovation and standardization. The Digital Transformation Dialogues seeks to address evolving themes associated with digital transformation, foster cooperation among city stakeholders, and examine the role of standardization within this domain. The Digital Transformation Dialogues serve as a unique platform for highlighting the latest work and outcomes of the ITU-T Focus Groups, Initiatives and ITU-T Study Groups. DTD covers webinars, fireside chats and ask the expert sessions.

190. Throughout 2024, the ITU has consistently published the Digital Transformation and Cities Digest, with editions being released in January, March, May and July. Copies of the Digest are available for access on the Digital Transformation and Cities Digest webpage.

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

192. 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.

193. 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.

194. 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.

195. ITU-T Technical Report FSTP-ACC-MV-SUST "Accessibility in a sustainable metaverse" promotes and instructs on the adaptation of an integrated approach to accessibility and sustainability in the metaverse. It explores the integration of accessibility products and services in the metaverse and their associated social benefit and environmental impact. Emphasising the need for the early integration of accessibility and sustainability, this document presents information and guidance on how to incorporate sustainable accessibility products and services in the metaverse from the outset. Questions related to sustainability and accessibility in the metaverse need to consider the following: – Social benefit of sustainable accessibility products and services in the metaverse. – Challenges and opportunities of an accessible and sustainable metaverse.

196. 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>.

197. In December 2023, the International Telecommunication Union (ITU) published the framework for the development of standards and radio interface technologies for the sixth generation of mobile systems, popularly referred to as 6G. The details of the 6G framework are contained in Recommendation ITU-R M.2160 on the "IMT-2030 Framework" approved by the ITU Radiocommunication Assembly (RA-23) at its recent meeting in Dubai, United Arab Emirates. ITU's Radiocommunication Sector (ITU-R) will now focus on defining technical requirements, the submission process, and the evaluation criteria for potential 6G radio interface technologies.

198. The ITU-R Recommendation represents significant progress in the development and implementation of globally accepted standards for mobile systems using 6G. All the previous mobile telecommunication generations - analogue cellular (1G), digital cellular (2G), IMT 2000 (3G), IMT Advanced (4G), and IMT 2020 (5G) - were also standardized through ITU.

199. For the next phase of 6G development, companies and industry associations will submit proposals for the IMT-2030 Radio Interface Technology (RIT) for ITU-R consideration in early 2027. These submissions will then be evaluated against the agreed minimum requirements prepared by ITU's expert group on IMT systems (ITU-R Working Party 5D), with the prospect of getting a final set of 6G technology standards approved by 2030.

200. In October 2023, the ITU won the Engineering, Science & Technology Emmy Award for the development of a radiocommunication standard for High Dynamic Range Television (HDR-TV). The award, given by the Television Academy, recognizes the groundbreaking work done by engineers and other experts within ITU

Radiocommunication Study Group 6 to develop a global HDR-TV standard that provides viewers with an enhanced visual experience. This is the third Emmy Award received by ITU Radiocommunication Study Groups.

201. Recommendation ITU-R BT.2100 was released in 2016. The standard centres around image parameter values for high dynamic range television for use in production and international program exchange.

202. The standard enables the reproduction of a wider and more accurate range of colours resulting in more vibrant and true-to-life colours and video images. The application of the standard specifications significantly enhances viewer experience by making bright parts of the image much brighter and more detailed. It also improves the visibility of details in darker areas of the image. The HDR-TV standard ensures that content creators, broadcasters, and manufacturers follow specific guidelines to deliver a consistent and improved viewing experience to consumers.

203. In its announcement, the Television Academy stated that the influence of the HDR-TV standard extends across the television industry, “from cameras, post-production (especially in colour processing), delivery though traditional broadcasting, OTT (over-the-top) streaming services, and both professional and consumer display/television products."

204. The Television Academy further recognised the pivotal role the radiocommunication standard played in facilitating the widespread accessibility and consumer appreciation of HDR-TV.

205. Two previous awards received by ITU's Radiocommunication Bureau include the Technology and Engineering Emmy Award for standardizing Loudness Metering in Broadcast Audio in 2012. In 1983, the CCIR (now ITU-R) received the Emmy Award for establishing a common world standard for digital television studios.

206. The 2023 Engineering, Science & Technology Emmy Award brings to six the total number of Emmy Awards received by ITU.

207. The ITU Radiocommunication Assembly 2023 (RA-23) charted future directions in radiocommunication systems. The Assembly adopted a resolution that will guide the development of standards and radio interface technologies for the 6th generation of mobile systems. Among other outcomes, Discussion highlights during the Radiocommunication Assembly (RA-23) included:

- agreement on "IMT-2030" as the technical reference for the 6th generation of mobile systems;
- revision of ITU-R Resolution 65, paving the way for studies on the compatibility of current regulations with potential 6th generation mobile system radio interface technologies for 2030 and beyond;
- adoption of the new Recommendation ITU-R M. 2160 on the "IMT-2030 Framework," setting the basis for the development of IMT-2030. The next phase will be the definition of relevant requirements and evaluation criteria for potential radio interface technologies (RIT);

- adoption of a new resolution on the use of IMT technologies for fixed wireless broadband;
- in accordance with Resolution 219 (Bucharest, 2022), adoption of a new resolution on space sustainability to facilitate the long-term sustainable use of radio-frequency spectrum and associated satellite orbit resources used by space services. This will be supportive of further cooperation with other United Nations organizations and beneficial to the satellite industry;
- conclusion of a new ITU-R Recommendation on the protection of the radio navigation-satellite service and amateur satellite services;
- revision of ITU-R Resolution 65, paving the way for studies on the compatibility of current regulations with potential 6th generation mobile system radio interface technologies for 2030 and beyond.

c) Co-facilitator of Action Lines C1, C3, 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)

208. 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 2024, 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+20 Forum High-Level Event 2024, 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.

209. The 19th Action Line Facilitation Meeting of C1 and C11 was held on Thursday, 30 May 2024 on the topic of "Journey to "Building Our Multistakeholder Digital Future". The session provided an overview and preparation of the 19th Internet Governance Forum (IGF), scheduled to be held from 15 to 19 December 2024 in Riyadh, Saudi Arabia. Details of the session are available here.

210. The WSIS Prizes 2024 Winner for the Action Line C1 is: The National Data Bank (NDB) and Estishraf, Saudi Arabia. Details of the project are available here.

211. 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.

212. Radiocommunication Advisory Group (RAG) for the ITU-R. The 31st RAG meeting was held from 25 to 27 March 2024. Please see: https://www.itu.int/rag/.

213. 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).

214. **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

215. In 2024, 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.

216. UNESCO organised the WSIS Action Line Facilitation Meeting C3, which took place on Wednesday, 29 May 2024, during the WSIS+20 Forum High-Levent 2024. The meeting focused on the topic of "Guaranteeing the online space for all". For more details on the sessions and the outcomes, please see here.

217. The WSIS Prizes 2024 Winner for the Action Line C3 is Tanzania Digital Inclusion Project, Tanzania. Details of the project are available here.

218. 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.

219. 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.

220. 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.

221. 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);

222. 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.

223. 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.

224. 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.

225. 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 2024 Radio Regulations edition following the decisions of the WRC-23 and its Final Acts will entry into force on 1 January 2025. Further details about WRC are available here: https://www.itu.int/en/ITU-R/conferences/wrc/Pages/default.aspx. The next WRC will be held in 2027. Further details will become available in due course.

226. 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.

227. 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. For more information please visit: https://www.itu.int/wrs-24/.

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)

228. The Action Line C7: E-Government Facilitation Meeting was held on Tuesday, 28 May 2024. The title of this session was “Exploring the Vital Role of E-Government in Advancing Sustainable Development Goals”. The session discussed the E-Government Survey 2024 and best practices on e-government. Find more details on this session here.

229. The WSIS Prizes 2024 Winner for the Action Line C7 on e-Government is: MyGov, Azerbaijan. Details of the project are available here.

230. 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[4], 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 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.

231. 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. WSIS Digital Service Design Prize 2024** winner is **National Information Technology Authority (NITA), Uganda** and their project to UGPass,

232. In October 2023, ITU launched a "Spotlight Series on Human-Centric Digital Transformation" which buildt 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 was therefore rolled out in collaboration with both countries and in cooperation with all Countries of the Europe Region. This initiative was 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 consisted of a series of workshops that aimed to deepen the understanding of 'human-by-design' digital features, by showcasing concrete examples of human-centric digital transformation projects in Europe within

[4] www.govstack.global

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 were collated in a Compendium, aimed to inform future human-centered digital (services) development strategies both within Europe and globally.

233. The Human Centric Approach to Digital Transformation, organised as a side event to the Regional Forum on Sustainable Development for the UNECE region, was held online, on 11 March 2024. The event was organised by the UN Digital Transformation Group for Europe and Central Asia, in coordination with Republic of Poland, the Czech Republic, UNECE and ITU. This session provided an opportunity for presenting the outcomes of several initiatives in this field carried out by diverse UN agencies and stakeholders. This included the outcomes of the ITU initiative implemented in 2023, in cooperation with Poland and Czech Republic, i.e. Human-Centric Digital Transformation Compendium. A series of 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 were presented and discussed, facilitating engagement with the audience to explore the topics further.

234. Insights and recommendations on good practices, will aim to inform future digital development strategies both within the UNECE region and globally, and help advance the various SDGs, particularly related to SDGs 1 (No Poverty), 2 (Zero Hunger), 13 (Climate Action), 16 (Peace, Justice and Strong Institutions) & 17 (Partnerships for the Goals).

235. 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.

236. Smart Islands[5]. 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 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

[5] Smart Islands (itu.int)

address multiple high priority challenges experienced by the citizens through digital devices and service.

237. 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.

238. 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)

239. ITU/WHO organised WSIS Action Line Facilitation Meeting C7: E-Health on Friday, 31 May 2024. The theme of the meeting was “Strengthening country stewardship in National Digital Health Transformation through Robust Foundations and Collaboration”. More details on this session here.

240. The WSIS Prizes 2024 Winner for Action Line C7 on E-Health is: Check Me, Cameroon. Details of the project are available here.

241. 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.

242. 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).

243. 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.

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

- ITU-T F.748.28 "Requirements and functional architecture of digital twin platform for supporting multimedia services": Multimedia services are becoming increasingly useful for education, video-based marketing, digital museum, E-health, etc., providing an enriched user experience in e-meetings, distance training and product demonstrations. Digital twin realizes the interconnection, intercommunication and interoperability between the physical world and the digital world, constructs the description, diagnosis, prediction and decision-making of the physical world in the virtual world. At present, the digital twin system in different multimedia services has common requirements and functions, and it is necessary to develop a digital twin platform to realize the services for upper multimedia applications. The digital twin platform provides general services, twin services, interactive services for multimedia applications such as the fields of education, video-based marketing, digital museum, E-health, etc. This Recommendation specifies the requirements and functional architecture of digital twin platform for supporting multimedia services.
- ITU-T F.780.4 "Reference framework, requirements and scenarios for telemedicine systems" 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 F.780.5 "Requirements, reference framework and use cases for telemonitoring systems in rapid deployment hospitals" describes the application scenarios, functional requirements, and reference architecture of telemonitoring systems in RDHs and applies them into their planning and designing in RDHs. The appendix to this Recommendation includes some use cases of the proposed reference system.
- ITU-T F.781.1 "General framework of quality control of medical images for machine learning applications": The object of the Recommendation is to set up the initial framework for quality control on medical imaging for machine learning applications, including specifying the workflow of data quality control for machine learning application, the requirements of medical input image, medical image integration, medical image annotation and criteria on data quality for machine learning application.

- ITU-T F.781.2 "Quality assessment requirements for artificial intelligence/machine learning-based software as a medical device": With the advent of artificial intelligence/machine learning (AI/ML) and its strength in faster and more accurate disease detection and diagnosis, it is inspiring that more timely and widespread adoption of decision-making assistant (DMA) software as a medical device (DMA-SaMD) would benefit improving health for human beings. However, that does not mean the AI/ML-based DMA-SaMD for decision making is ready for the clinic, AI/ML technology can only be used with complete confidence if it has been quality controlled through a rigorous evaluation in a standardized way. The performance and usability shall be assessed under a reliable and rigorous evaluation with a robust method to substantiate AI/ML-based DMA-SaMD quality. This Recommendation provides a requirement framework for the quality assessment with a perspective of lifecycle management for AI/ML-based DMA-SaMD. It describes the quality assessment principles and process in the life cycle of AI/ML-based DMA-SaMD, including requirement analysis, data collection, algorithm design, verification and validation, change control and other stages when using AI/ML technology to assist medical staff in making clinical decisions by providing suggestions on diagnostic and treatment activities.
- ITU-T H.861.0 (V2) (revised) "Requirements on communication platform for multimedia brain information" describes a conceptual ecosystem intended to exchange brain data based on communication platform requirements and definitions. Starting from a background of brain data exchange in the context of e-health, a functional framework model for a multimedia brain information platform (MBI-PF) is outlined. This model is then developed into a set of communication platforms which enable not only experts but also non-experts to utilize brain data for monitoring and maintaining health status of the brain.
- ITU-T Technical Report on "Guideline on safe listening at venues and events" is aimed at reducing the risk hearing loss among audience members at venues and events that play amplified music/sounds. It forms part of ITU-T recommendations on safe listening for hearing protection. The World Health Organization (WHO) estimates that over one billion young people globally are at risk of hearing loss due to sound exposure in recreational settings. The risk of permanent hearing injury due to unsafe listening is both avoidable, and costly. "Unsafe listening" refers to the common practices of listening to music or other audio content at high levels or for prolonged time periods. In the face of this growing threat, governments, public-health agencies, those involved in the creation, distribution and amplification of music, the private sector, civil society, and other stakeholders, all have a duty of care in understanding the sound levels to which audiences and consumers are being exposed, and creating environments that facilitate safe listening behaviours.
- ITU-T Technical Report on "Conformance testing specification for ITU-T F.780.2" describes the testing of the compliance of accessible telehealth platforms to the mandatory and recommended features of [ITU-T F.780.2].
- ITU-T Technical Report on "Outline and elements of basic telehealth services" describes basic elements of telehealth/telemedicine, and outlines the fundamental services telehealth/telemedicine should provide. This Technical Paper gives a

general outline of the roles involved in telehealth/telemedicine service, service classification, and function of the telehealth/telemedicine platform.

245. 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.

1. 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.

246. 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).

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

248. 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. The current version of this publication is Recommendation ITU-R M.2150-2.

249. In November 2023, Recommendation ITU-R M.2160-0 on "Framework and overall objectives of the future development of IMT for 2030 and beyond" was approved. IMT-2030 is expected to further contribute to improving digital-health and well-being delivery services.

250. 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.

251. 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. In addition, the knowledge and best practice exchange in the field of digital services were facilitated between the Governments of Ukraine and North Macedonia.

252. To advance digital transformation in the European region and ensure the rollout of GovStack in the Western Balkans, three projects were co-developed with various UN agencies. Work has commenced on two projects financed by the Digital Window of the Joint SDG Fund in Albania and Serbia, and one project to be financed by the Joint Acceleration Fund in Montenegro. The project in Albania focuses on Digital Agriculture and Rural Transformation, the project in Serbia is titled "Digital Service Design Hub - Clicking Together with Citizens," and the project in Montenegro aims at the Digital Transformation of Local Self-Governments early.

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 (13.1, 13.3), SDG 17 (17.16,

253. The Action Line C7 E-Agriculture Facilitation meeting entitled “The Future of Digital Agriculture: Process for Progress” was organised by Food and Agriculture Organization (FAO) on Thursday, 30 May 2024. Since its beginning, FAO has recognized WSIS crucial role in promoting global digital cooperation and collective action towards harnessing the transformative potential of ICTs for the achievement of the SDGs and the broader agenda of inclusive and sustainable development. Since then, the Organization has been gearing its efforts towards making significant contributions to WSIS, particularly in the realm of utilizing ICTs for agricultural development and food security. More information about the session is available here.

254. The WSIS Prizes 2024 Winner in category C7: e-Agriculture is: GeoTanaman, Malaysia. Details of the project are available here.

255. 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.

256. 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.

257. 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), explored 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 focused 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 were being carried out in close collaboration with FAO. The Focus Group concluded its work in June 2024 and approved 5 deliverables, as follows:

- FG-AI4A Deliverable: Glossary – Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture
- FG-AI4A Deliverable: Technical Report on "Ethical Legal, and regulatory Considerations relating to the use of AI for agriculture": A European Perspective
- FG-AI4A Deliverable: Technical Report on "Data Modelling for digital agriculture
- FG-AI4A Deliverable: Technical Report - Use Cases for AI and IoT for Digital Agriculture
- FG-AI4A Deliverable: Standardization gaps and roadmap for AI and IoT in digital agriculture

258. 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.

259. 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 "Meeting the EU's Digital Agriculture Requirements. A Compendium for Pre-accession Countries".

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

260. The Action Line C7: E-Environment Facilitation Meeting on *Milestones, challenges and future* was held on Thursday, 30 May 2024 as part of the WSIS+20 Forum High-Level Event 2024. It was co-organized by ITU, WMO and UNEP. The session offered an update on the key milestones that have been achieved towards the achievement of Action Line C7 goals and offered a perspective on key challenges and future directions. The session also offered an opportunity for an interactive exchange with stakeholders on key priorities for 2025 and beyond. More details on this session here.

261. The WSIS Prizes 2024 Winner for the Action Line C7 on E-Environment is: AIS E-Waste+ Application, Thailand. Details of the project are available here.

262. 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:

263. **E-waste:**

E-waste Data

(i) **Global E-waste Monitor 2024:** The **GLOBAL E-WASTE MONITOR 2024** was launched 20 March 2024 and is the fourth edition of the Monitor. It is an indispensable reference tool for both policymakers and industry that shows the position of the world in terms of the global e-waste challenge. It highlighted that in 2022, a record 62 billion kg of e-waste was generated globally (equivalent to an average of 7.8 kg per capita per year); 22.3 per cent of this e-waste mass was documented as formally collected and recycled in an environmentally sound manner. Of the 81 countries covered by a national e-waste policy, legislation, or regulation, 67 applied the Extended Producer Responsibility (EPR) principle, 46 had enshrined national e-waste collection targets in their regulations, and 36 had done so for e-waste recycling targets at the national level. The Global E-waste Monitor 2024 was funded, and prepared in partnership, by the UNITAR SCYCLE Programme, ITU and Fondation Carmignac.

(ii) **National E-waste Monitors 2024 for Botswana and Namibia:** Through a joint project with UNITAR, ITU provided technical assistance to the Governments of Botswana and Namibia to effectively monitor e-waste. The technical assistance resulted in the publication of the National E-waste Monitor Botswana 2024 and of the National E-waste Monitor Namibia 2024. The two reports outline the current status of e-waste management and highlight challenges faced in both countries. The reports are based on international frameworks to measure e-waste statistics and identify best policy practices to the maintenance of internationally comparable e-waste statistics and the achievement of SDG targets relevant to e-waste management.

(iii) **E-waste Policy and Regulation**

- **Creating a Circular Economy for Electronics:** Through its e-waste policy support programme, ITU provided technical assistance to Member States in their

development and implementation of national e-waste management regulatory frameworks.

- **Paraguay:** ITU coordinated and participated in the first e-waste management consultation in Paraguay, which brought together government representatives from all concerned departments.
- **Rwanda:** ITU participated in a meeting on the alignment of RURA and RICA E-waste regulations, held from 26 to 28 February 2024. ITU facilitated the discussion of the meeting on the harmonization and alignment of key terms, definitions, articles and obligations between RURA and RICA regulations, contributed to discussions around the proposed architecture for the digital service that will become the registration system for electronics producers within the EPR system and facilitated the discussion between RURA and PSF with regards to the legal obligations on reporting and licensing.
- **Thailand:** ITU coordinated and participated in the first e-waste management consultation in Thailand, which brought together government representatives from all concerned departments.
- **Zambia:** ITU coordinated and participated in a two-day Zambia Government Stakeholder Consultation Workshop and in a two-day Zambia Private Sector Stakeholder Consultation Workshop and in Bilateral Meetings in Lusaka between 27th October and 1st November 2023 and between 25th and 29th of March 2024. The workshops were the first event of contact between the project team and national stakeholders in Zambia. Attended by 100 participants, the workshops allowed government and industry players in Zambia to learn about circular economy, the EPR principle and e-waste management. Discussions were fruitful to gather inputs from public and private sectors for coherent update to EPR regulations in Zambia as well as effective implementation of EPR on EEE. ITU convened a brainstorming session with the legal teams of relevant government departments of Zambia on 24 June 2024 in Lusaka. The session consisted of a set of presentations by ITU followed by detailed plenary discussions to get consensus among key government stakeholders on revised EPR regulations in Zambia. ITU organized and participated in a high-level breakfast meeting, held on 25 June 2024 in Lusaka, Zambia, whose objective was to inform and get the buy-in of senior management in key government agencies on the recommended approach and implementation steps for a legally transparent, digitally supported and appropriately financed EPR system for the sound management of e-waste in Zambia. ITU participated in an Industry Engagement Session on E-waste Management Financing and Extended Producer Responsibility, held on 26 June 2024 in Lusaka, Zambia. The engagement session was instrumental in providing valuable insights into EPR and its financial aspects, fostering a collaborative environment for designing effective EPR strategies together with the industry in Zambia.

(iv) **International Partnerships and Events:** ITU became a strategic partner in the SWITCH-2-CE in ESA, an upcoming programme approved by the European Commission in November 2023. The SWITCH-2-CE in ESA programme will be led, tentatively, by GIZ as a Team Europe initiative

potentially with France, Belgium, Netherlands and Finland, with ITU serving as a strategic partner.

During the World Circular Economy Forum 2024, held in Brussels on 15 and 16 April 2024, ITU participation included a speaking role at the Measuring Circularity Across the Electronics Value Chain session, as well as involvement in a Circular Electronics Partnership community event, a World Business Council for Sustainable Development networking event, a GIZ session on Accelerating Extended Producer Responsibility Worldwide and European Commission sessions on the EU in the Global Circular Economy Transition and on Driving the Circular Economy Transition with Private Sector Initiatives.

ITU participated in the Workshop on Secondary Raw Materials and Inclusive Recycling in Africa, organized by AfricaMaVal and the World Resources Forum, held on 28 May 2024, online. The workshop focused on African recycling country profiles as well as the opportunities for improving secondary raw materials value chains. ITU introduced the status of national e-waste/recycling policies and legislation in Africa with a focus on EPR-based take-back systems. The workshop was well-attended by experts from AfriMaVal participating countries.

ITU participated in the Lenovo 360 Circle Summit in Brussels, upon invitation by Lenovo's Global Sustainability Director of International Markets and the Global Channel group. ITU was the only UN agency and non-private sector organization present and participated through three key engagement over two days (19 and 20 June 2024): a speaking role during the plenary session entitled ''Driving Urgent Action: The Global Landscape of Sustainability, Opportunities and Risks, with a Focus on the Role of the ICT Industry'', two Firestarter presentations during working group sessions on '"Economically Viable Electronic Waste Regulation in Low-, Middle- and Upper-Middle-Income Economies'' and ''Repair and Electronic Waste Regulation in Low-Middle- and Upper-Middle-Income Economies''.

264. **Climate Change:**

The Telecommunication Development Sector (BDT) of the ITU has undertaken the following activities:

(i) **Early warning systems:** ITU is leading Pillar 3 "Warning dissemination and communication" of the UN initiative *Early Warnings for All initiative.* 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 is working closely with WMO, UNDRR, IFRC 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.

The EW4All initiative has started to roll out in 30 particularly at-risk countries identified, including Small Island Developing States and Least Developed Countries. The Early Warnings for All Dashboard tracks progress for informing decision-making and measuring success of the initiative.

(ii) **Monitoring industry emissions, energy use and climate commitments from tech companies:** ITU and the World Benchmarking Alliance have been working on the 3rd edition of the Greening Digital Companies 2024 report. The report analyses GHG emissions and energy usage of 200 digital companies globally. It not only assesses their climate data and targets but also serves as a valuable resource for companies to learn from best practices and enhance their emissions reduction performance. The report sheds light on the operational emissions and electricity consumption of the ICT sector, with particular focus on reporting across all 15 Scope 3 emissions and the growing carbon footprint from artificial intelligence (AI). A press presentation is being prepared and two virtual launch events for September 2024. Throughout 2023 and 2024, ITU coordinated and launched the Green Digital Action at COP28. This included setting up an ICT Sector GHG Emissions Pillar 2 Working Group where BDT was actively co-leading activities. The following calls for action were launched at COP28 as an outcome of the working group:

- Companies commit to setting (or already have set) 1.5 degree aligned science-based targets, to be validated (or already validated) by SBTi, for emissions reduction and commit to reduce accordingly scope 1, 2 and 3 emissions, as well as to create and publish transition plans outlining how decarbonization trajectories and net-zero targets will be achieved.
- Companies commit to report data on all GHG emission scopes and categories yearly, publicly and submit results to a public ITU database. When a company reports to CDP, this can be done through the CDP disclosure, making sure the submission is publicly available. When a company does not report to CDP, this can be done by reporting directly to the ITU.
- Companies express interest in contributing to an ICT sector database creation, on products and services' Emission Factors and join a working group to support implementation.

(iii) **Supporting countries to monitor and track ICT sector GHG emissions and energy use:** ITU and the World Bank began working to collect emissions and energy data from ICT companies globally to enable countries to monitor and track their ICT sector GHG emissions and energy use. The results of this research were showcased in the Measuring the Emissions and Energy Footprint of the ICT Sector: Implications for Climate Action report launched in March 2024. This joint ITU and World Bank report collates GHG emissions and electricity consumption from the ICT sector in the thirty highest emitting countries. The report also presents case studies from several countries which report on ICT emissions and energy use, in order to delve into regulatory approaches and policy implications inferred from the data.

Between January and March 2024, ITU surveyed World Telecommunication/ICT Indicator (WTI) focal points to assess priorities and needs in undertaking ICT sector emissions monitoring. Responses were received from 77 countries, and key results showed that regulator mandates do not fully capture emerging environmental sustainability goals and priorities, there was strong interest in joining an ITU working group dedicated to improving ICT sector GHG emission data monitoring and collection, respondents are unfamiliar with but eager to learn about GHG reporting standards and methods. The results are being used to guide ITU-D's work on monitoring ICT sector emissions and energy use and to support with the evaluation of priorities and needs in the regulatory community in undertaking ICT sector GHG emissions monitoring.

BDT supported the General Secretariat to advance the Green Digital Action agenda at Council 2024 through technical inputs, which resulted in the adoption of a new Council Resolution on ITU's role in facilitating ICTs contribution to sustainability and climate action.

ITU, the World Bank and the French regulatory (ARCEP) are working on a publication 'Measuring ICT Sector GHG Emissions: A step-by-step guide for Regulators'. The publication explores the regulatory mandate of measuring ICT sector GHG emissions and energy use, the data collection, data analysis and reporting standards being used by ARCEP, and explores how the collected GHG emissions and energy use data is being disseminated to inform policy making and regulatory decisions. The publication will be launched at a side event during COP29 taking place in Baku, Azerbaijan in November.

ITU are working on a OneITU proposal for advancing green digital actions towards a net-zero sector, which includes resource mobilisation and project development. Under this, ITU are working to create a standardized methodology and global database on digital sector GHG emissions and energy. BDT has contributed to the development of an ITU-T Recommendation which will guide the development of the database. Database 1.0 will be launched at COP29 which has been guided and will feature data from 2024 BDT reports.

(iv) **Supporting countries in developing green ICT strategies and policies, including through the provision of tools, resources and training:** ITU, the World Bank, Federal Ministry for Economic Cooperation and Development (BMZ), and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) collaborated on the Green Data Centers: towards a sustainable digital transformation - A practitioner's guide and an e-learning course on Greening Data Centers which is hosted on ITU Academy . The Green Data Center Guide outlines six key areas for practitioners to strengthen to support the greening of data centers: climate-resilient data centers; sustainable design and buildings; sustainable ICT; sustainable energy; sustainable cooling; and e-waste management. Sustainable digital transformation requires efforts to green digital infrastructure, manage climate risks, and minimize environmental impacts from digital infrastructure.

ITU launched the Green and Digital Entrepreneurship for Women e-learning course on ITU Academy. The course was made possible with the support of the Women's Entrepreneurship Accelerator (WEA) and Mary Kay. The training course empowers start-up and scale-up women entrepreneurs by developing green digital entrepreneurship knowledge and skills in order to increase their economic empowerment. The course is designed to guide participants through the concepts and benefits of green business, green and circular economy and sustainability concepts. It also explores digital green concepts, how to green supply chains and green finance.

Contributed to the ITU Global ICT Regulatory Outlook 2023 report which explores nine issues that should be on every regulator's radar, including how regulation can support the twin green and digital transitions. The contribution highlights that higher regulatory pressure is needed to report climate data and support harmonizing methodologies and standards.

A StoryMap has been developed to highlight EET's climate change programme of work on Advancing Green Digital Actin Towards a Net-Zero Sector, which also features key messages from 2024 reports. The StoryMap will be released at COP29 in November 2024.

(v) **International events, including the UN Climate Change Conference (COP29):** BDT participated in COY18 and COP28 in Dubai, UAE in November and December 2023. ITU promoted digital technology-driven climate action by uniting the ICT community, mobilizing commitments for green and digital transitions, and fostering partnerships with existing initiatives. The goal was to position the ICT sector at the forefront of climate action and set an example for other industries while acknowledging both its crucial role in climate-related efforts and its environmental challenges, such as increased energy consumption and e-waste generation. BDT were involved in co-organizing the following events which were used to promote the Sector's work, identify new partners and funds, and increase the visibility of BDT's programme on the environment.

- ITU Generation Connect: Youth for Green Digital Action, 18th UN Climate Change Conference of Youth (COY18), 27 November 2023, Dubai, UAE
- Greening Data Centers Climate Classroom at COP28, UN CC:Learn, 11 December 2023, online
- Digital Solutions for Climate Action Climate Classroom at COP28 , UN CC: Learn, 6 December 2023, online
- Digital Transformation on a Liveable Planet, World Bank, IMF and Financial Times Pavilion, UN Climate Change Conference (COP28), 5 December 2023, Dubai, UAE
- Reducing ICT Sector GHG Emissions, Finland Pavilion in partnership with Nokia, UN Climate Change Conference (COP28), 3 December 2023, Dubai, UAE

- Climate Connections Mixer, China-UAE Economy & Trade Exchange Center, UN Climate Change Conference (COP28), 3 December 2023, Dubai, UAE
- Creating a Circular Economy for Electronics, Kingdom of Saudi Arabia Pavilion, 5 December 2023, Dubai, UAE
- Unleashing collaborative power f or a sustainable digital tech industry, High-level opening session of Green Digital Action, UN Climate Change Conference (COP28), 2 December 2023, Dubai, UAE

During 2024, BDT has participated in the following events:

- The 15th Symposium on ICT, Environment, Climate Change and Circular Economy on 9th May 2024 and delivered a presentation on 'Harnessing Data for Sustainable Digital Transformation'.
- The ITU Green Digital Action webinar on 3rd June 2024 'From Data to Action: Standardized methodologies for measuring ICT sector progress'.
- Supported preparations for the 'Harnessing digital for climate action' event at the ITU Global Symposium for Regulators 2024 on 4th July in Kampala, Uganda.
- BDT are preparing for participation in COP29 which will occur in Baku, Azerbaijan in November 2024 as part of the Green Digital Action initiative, key events being planned include:
  - Side event on ICT Sector GHG Pillar working group outcomes where we will present the calls for action and showcasing Database 1.0 which is based on data collected from two EET reports.
  - Side event with the World Bank to launch an upcoming publication.
  - UNFCCC side event with WMO, OHRLLS and partners, including ITU/BDT on scaling-up climate finance for ambitious action on early warning systems for adaption.
  - Side event on AI side with partners on AI for UN EW4All showcasing AI applications, including ITU's Disaster Connectivity Map.
  - 'Climate Classrooms' event with UN: CCLearn to introduce climate change topics related to greening digital transformation and AI applications in EW4All.

2. 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.1017 "Environmental performance scoring of smartphones" (under approval)**: ETSI EE Working Group M-ICT "Environmental matters associated with Mobile ICT Devices" is dedicated exactly to the intended scope and purpose of these kinds of scoring methods. European and international markets are in need of a standardized scoring method for the environmental performance of smartphones which goes beyond just reparability criteria and can provide a more robust foundation for non-LCA based Green Claims. Features of such a method include: • Additional indicators to differentiate best performing products that reach beyond regulatory requirements. • Definition of weightings to combine all indicators into a single score.
- 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.1028 "Indicator for global-warming-potential impact as a function of ICT-equipment operating-lifetime extension" (under approval)** defines the ratio UER10 as an indicator for impact of ICT-equipment operating-lifetime extension on the resulting GWP. UER10 can help the practitioner to get an idea of the relative significance of use stage GHG emissions vs embodied emissions of a product over its lifetime.
- ITU-T L.1031 (revised) "Guideline for the development of an e-waste management system and achieving the e-waste targets of the Connect 2030 Agenda" 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, for example: national authorities in charge of ICTs and communications, e-waste and waste management authorities, ministries of the environment, local authorities and entities involved in e-waste management, 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.1070 "Global digital sustainable product passport opportunities to achieve a circular economy" 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.
- **ITU-T L.1071 "A model for digital product passport information on sustainability and circularity" (under approval)** aims to define an information model to describe environmental sustainability and circularity information details about ICT goods (products) in a digital form to be part of a digital product passport as environmental information, that can be compared with information requirements in relevant environmental sustainability and circularity standards, specifically ETSI standards and ITU-T recommendations. The information details can represent products at any time of their circular lifespan: design, manufacturing, use, hardware changes, and final recycling as e-waste. Several product-related standards can be expressed as a list of environmental information templates. The matching of product information to standards information for checking the alignment of products with different standards when relevant.
- ITU-T L.1241 "Methodologies for evaluating the functionality and performance of power supply unit configured for servers" presents the necessary conditions for implementing near-real-time greenhouse gas monitoring in cities, with updates provided shortly after data collection rather than instantly (real-time) [b-Zhu2022], to support the sustainable development strategy and planning of the city. Compared to existing research or standards, near-real-time greenhouse gas data in cities can present high temporal resolution characteristics of urban emissions (hourly or daily), enabling better identification of spatial and temporal hotspots. This can help city managers formulate more effective emission reduction policies.
- **ITU-T L.1260 "Reference Model of a Factory Energy Management System" (under approval)** presents a reference model for a factory energy management system that is operated to efficiently manage energy consumed in the factory. A factory energy management system should provide functions such as data collection and control, data processing and analysis, energy services, system management, and security.
- ITU-T L.1307 "Energy Efficiency in Micro Data Centre for Edge Computing": With the advent of the Artificial Intelligence era, the demands for edge computing to provide ultra-low latency for various services that require high computation power continue to grow. The demand for micro data centres, an essential equipment for delivering edge computing services near users, is also growing. This Recommendation presents considerations on micro data centres for edge computing services in energy efficiency aspects. In addition, it presents the management information needed to manage micro data centres'

energy efficiently and provides a metric for evaluating the energy performance of micro data centres. Finally, it presents the energy efficiency issues in the operation of edge computing services and methods to solve them.

- **ITU-T L.1310 (revised) "Energy efficiency metrics and measurement methods for telecommunication equipment" (under approval)** contains the definition of energy efficiency metrics test procedures, methodologies and measurement profiles required to assess the energy efficiency of telecommunication equipment. Energy efficiency metrics and measurement methods are defined for telecommunication network equipment and small networking equipment.
- ITU-T L.1326 "Requirements and use cases of liquid cooling solutions and high energy efficiency solutions for 5G BBU in Centralized-RAN mode": 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 L.1327 "Guidelines on the selection of cooling technologies for data centres in multiple scenarios" (under approval)** describes a universal data centre-cooling technology selection method at its current industry development stage by matching detailed analysis of such technology and typical application scenarios.
- ITU-T L.1362 (revised) "Power management capabilities of the future energy telecommunication network nodes. Enhanced interface for power management in Network Function Virtualization (NFV) environments" specifies a data model for energy discrete states within virtualized networks, and operations to interact on this model. In virtualized networks, establishing a mapping between the energy discrete states of logical entities (e.g., virtualized network functions) and the energy consumption of the hardware hosting the virtual machines that execute these logical entities is a challenging task. Recommendation ITU-T L.1362 adapts the green abstraction layer specification (GALv1) to virtualized networks.
- **ITU-T L.1384 "Implementation of a virtual micro power station at base station sites" (under approval)** provides technical specification on how to utilize energy storage system installed in base stations sites to realize a coordination optimization to participate in power grid dispatching as a virtual power plant. This solution helps site owner to build a virtual micro power station with telecommunication base station energy storage system, in this way, site owners can significantly reduce the construction and operation cost of power feeding system for the base station sites, contribute to reduce the carbon emissions of energy sector improving the integration of renewable sources in grid, and achieve optimal energy scheduling.
- ITU-T L.1391 "Specification of 5G network sharing and co-construction adapting to climate change mitigation" identifies the specification of 5G

network sharing and co-construction and the contribution of 5G network sharing and co-construction to climate change mitigation, provides the key technologies of 5G network sharing and co-construction and explain how to make assessment of these technologies to adapt to the climate change. It also addresses the cost-benefit analysis and best practice of 5G network sharing and co-construction.

- **ITU-T L.1410 "Methodology for environmental life cycle assessments of information and communication technology goods, networks and services" (under approval)** deals with environmental life cycle assessments (LCAs) of information and communication technology (ICT) goods, networks and services. It is organized in two parts: • Part I: ICT life cycle assessment: framework and guidance • Part II: "Comparative analysis between ICT and reference product system (Baseline scenario); framework and guidance". Part I deals with the life cycle assessment (LCA) methodology applied to ICT goods, networks and services. Part II deals with comparative analysis based on LCA results of an ICT goods, networks and services product system, and a reference product system.
- ITU-T L.1471 (revised) "Guidance and criteria for information and communication technology organizations on setting Net Zero targets and strategies": Currently, the definitions of Net Zero and related concepts such as carbon neutrality and climate neutrality for organizations are still under development. Several initiatives, including, inter alia, the Science Based Target Initiative, the United Nations Framework Convention on Climate Change (UNFCCC) Race to Zero, the UN High-level Expert Group on Credibility and Accountability of Net-Zero Emissions Commitments of Non-State Entities (HLEG), ISO IWA42, ISO TC 207, and the Net Zero Initiative are working on defining or aligning the different views of these concepts to avoid confusion and reduce risks for green washing. Recommendation ITU-T L.1471 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.1472 "Requirements for the creation of an ITU database on energy consumption and GHG emissions of the ICT sector" (under approval)** provides the requirements to support the creation of an ITU database on GHG emissions of the Global ICT sector at worldwide level and at a national level. The guidance is intended to support ITU in establishing such a database.
- **ITU-T L.1490 "Framework and Functional Requirements of Greenhouse Gas Emissions Management System using Digital Technology for Public Sector" (under approval)** proposes a GHG emissions management using ICT for public sector, and specifies the requirements for system construction principles, framework and functional requirements.
- ITU-T L.1508 "Framework for climate change adaptation in coastal cities using ICT and digital technologies": Coastal cities and areas are particularly

vulnerable to the impacts of climate change, including flooding, rising sea level, storm surge, precipitation, and more. The frequency and intensity of these impacts continue to deepen, as a result of climate change. It is, therefore, imperative that coastal cities and areas are proactively taking climate adaptation actions to minimize these impacts. Information and Communication Technologies, as well as digital transformation, are providing innovative solutions for accelerating climate adaptation. The objective of this Recommendation is to support coastal cities and areas to adopt these technologies and enhance climate resilience.

- ITU-T L.1631 "Reference model of firefighting infrastructure management system for buildings in sustainable cities" 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 L.1632 "Identification method for building infrastructure equipment in a sustainable city" (under approval)** defines the identification method for equipment at the building infrastructure which improves the manageability and interworking among facilities at the building. The identification method includes the identifier structure and identifier management procedure which are easily recognizable, understandable mapping between identifier and device, consistency in the equipment category.
- ITU-T L.1640 "Methodology for dynamic monitoring and analysis of greenhouse gas emissions in city" presents the necessary conditions for implementing near-real-time greenhouse gas monitoring in cities, with updates provided shortly after data collection rather than instantly (real-time) [b-Zhu2022], to support the sustainable development strategy and planning of the city. Compared to existing research or standards, near-real-time greenhouse gas data in cities can present high temporal resolution characteristics of urban emissions (hourly or daily), enabling better identification of spatial and temporal hotspots. This can help city managers formulate more effective emission reduction policies.
- ITU-T K.Suppl.32 (revised) "Case studies of radio frequency-electromagnetic field (RF-EMF) assessment": Supplement 32 to ITU-T K-series Recommendations presents results of case studies of radio frequency-electromagnetic field (RF-EMF) exposure levels, including fifth generation (5G) systems, taken in different conditions and areas.
- ITU-T K.Suppl.44 (revised) "Guidelines on best practices and environment friendly policies for effective information and communication technology deployment methods": Supplement 44 to ITU-T L-series Recommendations identifies best practices and opportunities for new applications using information and communication technologies (ICTs) to foster environmental sustainability, identify appropriate actions and promote best practices towards implementing environmental friendly policies and practices. Supplement 44 to ITU-T L-series Recommendation also includes a questionnaire that has been developed to gather relative information from stakeholders for use cases and key success factors, including exemplary

collection of green best practices to ultimately formulate guidelines on best practices and environment friendly policies for effective ICT deployment methods.

- ITU-T K.Suppl.59 to ITU-T L.1700 "Low-cost sustainable telecommunication solution in rural and remote areas using WLAN/Wi-Fi for conventional telecom services like voice calling using SIP" provides a solution on a low-cost sustainable solution in rural and remote areas using WLAN/Wi-Fi for conventional telecom services like voice calling using Session Initiation Protocol (SIP). Access to communication and ICT infrastructure in rural areas of most developing countries is still a challenge. The inadequacy of crucial infrastructure like electricity in rural and remote areas present a significant problem.

- ITU-T K.Suppl.60 to ITU-T L.1410 "Example of an LCA of a mobile phone fully compliant with Recommendation ITU-T L.1410" shows how an LCA of an ICT good, a mobile phone, is performed by an ICT manufacturer, based on Recommendation ITU-T L.1410. For compliance with ITU-T L.1410 all body text and annexes need to be considered when performing an LCA, i.e., this example is fully compliant with Recommendation ITU-T L.1410 as described in clause 5.2 except for a few deviations listed in the 'Reporting' clause 5.12 below.

- ITU-T K.44 Implementation "Guide on the use of the overvoltage resistibility for Recommendations ITU-T K.20, K.21 and K.45": The Resistibility Guide assists test laboratories in implementing the correct tests for ITU-T K.20, K.21, and K.45 compliance testing. It will have four definitive sections: 1) introduction with general comments 2) definition of terms 3) general test plan flow charts 4) test circuit schematics This guide will assist the lab engineers and technicians in developing the correct test plans for equipment being submitted for ITU-T K.20, K.21 or K.45 compliance testing. It provides the sequence of testing to be conducted, shows specific test sequence for single pair ports and multiple pair ports with and without primary protection in both internal and external environments: 1) symmetric pair(s) ports including single pair, multiple pairs, and including Ethernet, 2) coaxial ports, 3) power ports and 4) ac mains ports This Guide also provides a practical example as Appendix, using a Home Gateway application that is subject to Recommendation ITU-T K.21. This application example contains ADSL port types, mains power port types, FXO and FXS port types, Ethernet port types, and USB port types.

265. 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.

266. 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.

267. **Smart Sustainable Cities and Climate Change (Past Events)International Standards:**

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

- Episode #30: ChatGPT: risks and rewards of generative AI in cities (Virtual, 4 September 2023)
- Episode #31: Digital tourism: bridging the gap between communities and destinations (Virtual, 27 September 2023)
- Episode #32: "Fashioning" the metaverse to accelerate digital transformation: what has gone out of style (Virtual, 2 October 2023)
- Episode #33: Disaster risk reduction in the digital transformation age: Leveraging emerging technologies (Virtual, 13 October 2023)
- Episode #34: What is a citiverse? And how can it contribute to sustainable city development? (Virtual, 24 October 2023)
- Episode #35: How to successfully develop People-Centred citiverse? (Virtual, 30 October 2023)
- Episode #36: World cities day: digital transformation for a better urban life (Virtual, 31 October 2023)
- Episode #37: Digital transformation in the pharma Industry (Virtual, 14 November 2023)
- Episode #38: Localizing the Sustainable Development Goals: Invest NYC SDG Initiative (Virtual, 16 November 2023)
- Episode #39: The Interplay Between Human Rights and Technology (Virtual, 8 December 2023)
- Fireside Chat: Prospects for Surgical Advances (Virtual, 18 January 2024)
- Ask the Expert Session: Digital twin for smart cities (Virtual, 30 January 2024)
- Webinar: Future of real-love in the virtual world: The Perfect Date (Virtual, 14 February 2024)
- Ask the Expert Session: Urban Intelligence Unveiled: AI Principles for Smart Cities (Virtual, 21 February 2024)
- 4th ITU Forum on Shaping the CitiVerse: People centred cities & virtual worlds (Queretaro, Mexico, 4 March 2024)
- Fireside Chat: Beyond Boundaries: Revolutionizing Banking through Digital Transformation (Virtual, 14 March 2024)
- Webinar: Unleashing the Power of Digital Water Solutions: Exploring the flow of emerging technologies (Virtual, 22 March 2024)
- Ask the Expert Session: Guardians of Authenticity: Battling Counterfeiting (Virtual, 28 March 2024)
- Webinar: Immersive Inclusivity: Enhancing Virtual Worlds with Accessibility (Virtual, 2 April 2024)
- Fireside Chat: Ethical Horizons: Navigating Responsible AI in the Digital Landscape (Virtual, 16 April 2024)
- Webinar: Metaverso 360°: Explorando la Accesibilidad, la Inclusión y los Derechos Humanos en Dominicana Innova (Virtual, 22 April 2024)

- Ask the Expert Session: Breaking barriers in the metaverse: Improving accessibility (Virtual, 25 April 2024)
- UN 2.0 Week Side event on Harnessing the metaverse and virtual worlds for global Impact (Virtual, 26 April 2024)
- Ask the Expert Session: Assessing the circularity of ICT goods (Virtual, 22 May 2024)
- Webinar: Connected Communities: Harnessing the Power of Digital Public Infrastructure (Virtual, 21 May 2024)
- WSIS Side event: CitiVerse: Envisioning Inclusive, Sustainable, and People-Centered Cities (Hybrid, 28 May 2024)
- Webinar: Greening the Future: Navigating Digital Transformation for Land Restoration (Virtual, 5 June 2024)
- 5th Forum on Integrating virtual and physical worlds in the metaverse with digital twin (Geneva, 13 June 2024)
- 1st UN Virtual Worlds Day (Geneva, 14 June 2024)
- Ask the Expert Session: Rester connecté: Explorer l'itinérance mobile internationale (Virtual, 27 June 2024)
- Ask the Expert Session: Exploring DLT Beyond Cryptocurrency: Applications and Opportunities (Virtual, 23 July 2024)

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.

268. **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.

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- 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.12 (revised) "Characteristics of gas discharge tubes for the protection of telecommunications installations" (under approval)** defines the basic characteristics to be met by gas discharge tubes for the protection of exchange and outdoor equipment, subscriber or customer equipment and telecommunication lines from surges. It is intended to be used for the harmonization of existing or future specifications issued by gas discharge tube manufacturers, telecommunication equipment manufacturers, administrations or network operators.
    - ITU-T K.37 (revised) "Low and high frequency EMC mitigation techniques for telecommunication installations and systems - Basic EMC Recommendation" defines mitigation techniques which the telecommunication operators may use to avoid disturbances, interference and damages caused by power and electrified railway plants, radio transmitters, both intentional and unintentional, and electrostatic discharges. This Recommendation contains guidance for the telecommunications system normal operation: – use of telecommunications equipment fulfilling relevant EMC requirements; – proper installation practices such as well-controlled earthing and bonding networks and a.c. power distribution networks in buildings, avoidance of disturbing equipment close to telecommunications equipment, environmental control and well-designed cabling; – proper working practices such as avoiding use of hand-held radios close to telecommunications equipment and applying special precautions when handling electrostatic discharge sensitive devices; – proper working practices in areas subject to high levels of low-frequency induction.

- ITU-T K.38 (revised) "Radiated emission test procedure for physically large systems" specifies the technical requirements for the radiated emission measurement procedure for physically large systems used within the public telecommunication network. A minimum representative system is defined, which is used for compliance testing of physically large telecommunication systems.
- **ITU-T K.42 (revised) "General Principle for the definition of emission and immunity requirements for Telecommunications/ICTs Equipment" (under approval)** explains the basic principles on which EMC standardization is based in ITU-T taking into account EMC standards published by IEC and CISPR. It describes procedures which are followed in the preparation of ITU-T Recommendations on Electromagnetic Compatibility (EMC) requirements which apply to telecommunications/ICTs equipment. Recommendations concerning resistibility requirements for equipment as well as EMC characteristics of telecommunications/ICTs networks, mitigation methods, bonding and earthing, etc. are outside the scope of this Recommendation.
- **ITU-T K.52 (revised) "Guidance on complying with limits for human exposure to electromagnetic fields" (under approval)** aims to help with compliance of telecommunication installations and mobile handsets, or other radiating devices used against the head with safety limits for human exposure to electromagnetic fields (EMFs). It presents general guidance, a calculation method and an installation assessment procedure.
- **ITU-T K.81 (revised) "High-power electromagnetic immunity guide for telecommunication systems" (under approval)** provides information on the vulnerability of equipment. The example of vulnerability is provided in ITU-T K-Supplement 5. The equipment is assumed to meet the immunity requirements presented in Recommendation ITU-T K.48 and relevant resistibility requirements, such as those described in Recommendations ITU-T K.20, ITU-T K.21 and ITU-T K.45.
- ITU-T K.83 (revised) "Monitoring of electromagnetic field levels" gives guidance on how to make long-term measurements for the monitoring of electromagnetic fields (EMF) in the selected areas that are under public concern, in order to show that EMFs are under control and under the limits. The purpose of this Recommendation is to provide the general public, clear and easily available data concerning.
- **ITU-T K.87 (revised) "Guide for the application of electromagnetic security requirements - Overview" (under approval)** provides general guidelines of information security management for telecommunications organizations are presented in Recommendation ITU-T X.1051, which is based on ISO/IEC 27002.
- ITU-T K.91 (revised) "Guidance for assessment, evaluation and monitoring of human exposure to radio frequency electromagnetic fields": There are many possible methods of exposure assessment and each of them has its own

advantages and disadvantages. Recommendation ITU-T K.91 gives guidance on how to assess and monitor human exposure to radio frequency (RF) electromagnetic fields (EMFs) in areas with surrounding radiocommunication installations based on existing exposure and compliance standards in the 8.3 kHz to 300 GHz range. This includes procedures for evaluating exposure and how to show compliance with exposure limits with reference to existing standards. Recommendation ITU-T K.91 is oriented to the examination of the area accessible to people in the real environment of currently operated services with many different sources of RF EMF, but also gives references to standards and Recommendations related to EMF compliance of products. Recommendation ITU-T K.91 includes an electronic attachment containing an uncertainty calculator and the Watt guard modules.

- **ITU-T K.100 (revised) "Measurement of radio frequency electromagnetic fields to determine compliance with human exposure limits when a base station is put into operation" (under approval)** provides information on measurement techniques and procedures for assessing compliance with the general public electromagnetic field (EMF) exposure limits when a new base station (BS) is put into operation, taking into account effects of the environment and other relevant radio frequency sources present in its surroundings.
- ITU-T K.153 "Guidance on Determining the Compliance Boundaries (the exclusion zones) of radio transmitter installations": Exclusion zones are described by the compliance boundaries around radio base station and transmitting stations in which the electromagnetic fields may exceed the RF-EMF exposure limits. The general public shall not have access to those areas. The exclusion zones are also defined for occupational exposure. Those areas are generally positioned on rooftops in urban or suburban locations. Their shape and dimension may be different depending on the regulations. This Recommendation 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.154 "Operating telecommunication facilities using lightning strikes data obtained from Lightning Location Systems" mainly includes how to use data of Lightning Location System (LLS), which commonly uses to determine the cause of the malfunctions, damages in maintenance stage of telecommunication facilities, and is meaningful to promote the research and formulation of guidance for operating telecommunication facilities using data related to lightning strikes. Lightning strikes data obtained by other systems (typically refer to Lightning Monitoring System in

telecommunication facilities (LMS)) are also introduced in Appendix IV. The data usage strategy can also refer to this Recommendation.

- **ITU-T K.155 "Performance Requirements and Test Methods for Surge Protective Modules Used in AC power port of Telecommunication Equipment" (under approval):** The purpose of this Recommendation is to address terms, classifications, electrical / mechanical / environmental and material requirements and test methods for surge protective modules (SPMs) used in AC power port of telecommunication equipment with voltages up to AC 1000 V, to mitigate overvoltage surges. This Recommendation gives the special technical requirements and test methods considering the characteristics of SPMs.
- **ITU-T K.156 "Time and spatial averaging in RF-EMF exposure assessment" (under approval)**: In this Recommendation EMF levels variation in time and space are not considered because of different weather and radiowave propagation conditions.
- **ITU-T K.157 "Electromagnetic compatibility requirements and test methods for satellite communication terminal equipment" (under approval)** establishes the essential electromagnetic compatibility (EMC) requirements for satellite communication terminal equipment and ancillary accessories. This Recommendation specifies the emission and immunity requirements for satellite communication terminal equipment and ancillary equipment. It also describes test conditions for emission and immunity testing. Performance assessment and criteria for immunity tests are also specified.

- 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)

269. UNESCO organised the WSIS Action Line Facilitation Meeting C7: E-Science on 30 May 2024 under the topic of "Assessment of progress made over the last 20 years". More details of the session here.

270. The WSIS Prizes 2024 Winner for the Action Line C7 on E-Science is: Large-Capacity Wide-Area Data Express for Scientific Computing Breakthroughs, China. Details of the project are available here.

271. 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 SDGs: SDG 4

272. As the co-facilitator of Action Line C7 on E-Learning, UNESCO organised a WSIS Action Line Facilitation Meeting entitled "Empowering Educators and learners: Enhancing Teacher Training and e-Learning for Digital Inclusion'' at the WSIS+20 Forum High-Level Event 2024. Details of the session is available here.

273. The WSIS Prizes 2024 Winner for the Action Line C7 on E-Learning is: YoungArcHers project, Spain. Details of the project are available here.

274. 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

275. The Action Line C7: E-Employment Facilitation Meeting, co-organized by the ILO, was held on Thursday, 30 May 2024. The topic of the meeting was "The Impact of Digitalisation and AI on Employment Quality - Challenges and Opportunities". Details of the session are available here.

276. The WSIS Prizes 2024 Winner in category C7: e-Employment is: Smart Employee, United Arab Emirates. 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)

277. The WSIS Action Line C7 E-Business Facilitation Meeting was held on Tuesday, 28 May 2024 as an integral component of the WSIS+20 Forum High-Level Event 2024. The topic of the meeting was "E-business and the Global Digital Compact". It was organised by UNCTAD (United Nations Conference on Trade and Development), the ITC (International Trade Centre) and the Universal Postal Union (UPU). This session discussed the intersection of the WSIS e-business action line with the issues

articulated in the current draft of the Global Digital Compact. For more details on this meeting please see here.

278. The WSIS Prizes 2024 Winner for the Action Line C7 on E-Business is Analytical Portal (Bayanat), Oman. 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)

279. The WSIS Action Line C8 Facilitation Meeting was held on Friday, 31 May 2024 on the topic of "Key messages in preparation for the UNESCO MONDIACULT Conference in 2025". It was organised by UNESCO as the lead facilitator of this Action Line. For more details on this meeting please see here.

280. The WSIS Prizes 2024 Winner for the Action Line C8 is: Center for Digitization and Documentation of Heritage and Arts Setif, Algeria. Details of the project are available here.

281. 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)

282. The WSIS Action Line C9: Media meeting was held on Wednesday, 29 May 2024 organised by UNESCO. The topic of the meeting was "Milestones, Challenges and Emerging Trends in Freedom of Expression and Media Development". More information of the session is available here.

283. The WSIS Prizes 2024 Winner for the Action Line C9 is: Upview - One-stop AI Solution for content creators to go viral – consistently!, United States of America. Details of the project are available here.

284. 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.

285. 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.

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

- **ITU-T H.264 (v15) (revised) "Advanced video coding for generic audiovisual services" (under approval)** specifies additional SEI messages for the neural-network post-filter characteristics, neural-network post-filter activation, and phase indication (through referencing to Rec. ITU-T H.274 | ISO/IEC 23002?7), additional colour type identifiers, and miscellaneous minor corrections and clarifications.
- ITU-T H.265 (v9) (revised) "High efficiency video coding" 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.265 (V10) "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.
- ITU-T H.266 (V3) (revised) "Versatile video coding" specifies a video coding technology known as Versatile Video Coding and it has been designed with two primary goals. The first of these is to specify a video coding technology with a compression capability that is substantially beyond that of the prior generations of such standards, and the second is for this technology to be highly versatile for effective use in a broadened range of applications than that addressed by prior standards. Some key application areas for the use of this standard particularly include ultra-high-definition video (e.g., with 3840×2160 or 7620×4320 picture resolution and bit depth of 10 bits as specified in Rec. ITU-R BT.2100), video with a high dynamic range and wide colour gamut (e.g., with the perceptual quantization or hybrid log-gamma transfer characteristics specified in Rec. ITU-R BT.2100), and video for immersive media applications such as 360° omnidirectional video projected using a common projection format such as the equirectangular or cubemap projection formats, in addition to the applications that have commonly been addressed by prior video coding standards.
- ITU-T H.266.1 (V2) (revised) "Conformance specification for ITU-T H.266 versatile video coding" 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.
- ITU-T H.266 (V2) (revised) "Reference software for ITU-T H.266 versatile video coding" provides reference software for Rec. ITU-T H.266 | ISO/IEC 23090-3 "Versatile video coding" and corresponds to the 3rd edition of Rec. ITU-T H.266. The reference software includes both encoder and decoder functionality. Reference software is useful in aiding users of a video coding standard to establish and test conformance and interoperability, and to educate users and demonstrate the capabilities of the standard. For these purposes, the accompanying software is provided as an aid for the study and implementation

of Rec. ITU-T H.266 "Versatile video coding". This Recommendation was developed collaboratively with ISO/IEC JTC 1, Information technology, Subcommittee SC 29, Coding of audio, picture, multimedia and hypermedia information, and corresponds with ISO/IEC 23090-16 as technically aligned twin text.

- ITU-T H.705.1 “Layered specification for the IPTV service platform functional architecture based on open service capabilities” 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” 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 H.705.3 “Requirements and architecture for open IPTV multicast service” specifies the requirements and the referenced architecture of the open IPTV multicast service. In this Recommendation, two solutions are introduced for different scenarios: a dedicated open IPTV multicast service system solution and an interface solution for exposing IPTV multicast network capability. The related functional components, requirements and the reference points are also defined accordingly. With this Recommendation, IPTV service providers are able to expose their dedicated multicast network capability to the third parties so that the OTT live broadcast service deployed on the public Internet could improve its QoE by taking advantage of the dedicated multicast network. Furthermore, new "live +" service may be developed based on the open multicast service defined in this Recommendation.
- ITU-T H.725 “IPTV Terminal Device: Virtualized model” specifies the functionalities of virtualized IPTV terminal device (IPTV TD). Virtualized IPTV TD

divides the IPTV terminal function (ITF) into 3 parts: physical terminal (PT), function platform (FP) and logic subscriber link (LSL). It identifies key features, functional components, service procedures of virtualized IPTV TD. Functionality partition of physical terminal (PT), function platform (FP) and logic subscriber link (LSL) is also included in this Recommendation. With this Recommendation, IPTV service providers are able to deploy new IPTV services with lower costs of IPTV terminals and in a more flexible way by following the architecture of virtualized IPTV TD defined in this Recommendation.

- ITU-T H.741.5 "Application event handling: Overall aspects of personalized IPTV services": A personalized IPTV service is an example of application event handling. With the end-user's permission, service providers are allowed to provide personalized service, such as contents recommendation, personalized user interface, personalized advertisement and some interactive services. Application can be realized based on the existing IPTV architecture to help in providing various kinds of IPTV personalized services. This work item is intended to study the requirement of personalized IPTV service and describe some use cases.

286. 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.

287. 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.

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

289. 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.

290. 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.

291. 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

292. ITU Membership outreach:

- 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 Bureaux and Sectors, the ITU regional and area offices and the relevant international organisations and national authorities. Recently approved ITU-R outputs are available here.

- Member States of ITU and Sector Members participate actively in the work of the 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;

  - Over 1,000 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.

293. 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.

294. In order to promote gender equality amongst the membership, the Radiocommunication Assembly 2023 (RA-23) adopted a resolution on gender equality to strengthen, accelerate and widen the active involvement of women in the work of the ITU Radiocommunication Sector (ITU-R). The resolution adopted at the RA-23 calls on the ITU Radiocommunication Sector to strengthen and accelerate all efforts to ensure that its policies, work programmes, information dissemination activities, publications, study groups, seminars, courses, assemblies and conferences reflect the commitment to gender equality and the empowerment of women. The adoption of the gender resolution was called for by the 2019 World Radiocommunication Conference's “Declaration on Promoting Gender

Equality, Equity and Parity in the ITU Radiocommunication Sector." Over 3,900 delegates from 163 Member States attended WRC-23, including 88 ministerial-level participants. Women made up 22 per cent of all WRC-23 delegates, an increase from 18 per cent at WRC-19 in 2019.

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.

295. UNESCO organised a WSIS Action Line C10 session on "The Future of the Ethical Dimensions of the Information Society: Impact of Artificial Intelligence" on Wednesday, 29 May 2024 at the WSIS+20 Forum High-Level Event 2024. The session revolved around ethical implications of AI on the information society at large and proposed actionable solutions to address the current challenges posed by the steadfast integration of AI across every layer of society. Details of the session are available here.

296. The WSIS Prizes 2024 Winner for the Action Line C10 is: Smartpur, Finland. Details of the project are available here.+

Action Line C11: International and Regional Cooperation

Related to the SDGs: SDG 17

297. The Action Line C11 Facilitation Meeting was held on Thursday, 30 May 2024 together with the Action Lines C1. The title of this session was Journey to "Building Our Multistakeholder Digital Future".

298. The WSIS Prizes 2024 Winner for the Action Line 11 International and Regional Cooperation is: University Diploma in Internet Governance and Regulations, Argentina. Details of the project are available here.

299. 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.

300. 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.

301. During the last World Radiocommunication Conference 2023 (WRC-23) held in Dubai last November and December, the ITU Member States decided to include the topic of radio spectrum management on the Moon on the agenda of the next Conference, which will be held in 2027. The appetite for connectivity has no limit, but this is also a testimony to the enduring willingness of the ITU family to ensure international legal and regulatory frameworks keep pace with new technologies. Such a positive state of mind needs to be leveraged and extended to devise future evolutions of these legal frameworks that would ensure more and more persons on this planet have the opportunity to benefit from a connection to our digital world.

302. The WSIS+20 Plan of Action already recognized the essential role of satellite systems for connectivity when calling “to develop and strengthen national, regional and international broadband network infrastructure, including delivery by satellite and other systems, to help in providing the capacity to match the needs of countries and their citizens and for the delivery of new ICT-based services”. Since 2003, multiple and diverse initiatives have been developed by an evergrowing number of States to ensure the availability of such satellite services.

303. In parallel with governmental initiatives and also at an unprecedented pace, the satellite industry has produced countless innovations in several areas ranging from: the dramatic increase in throughput delivered by satellite systems: as reflected by the evolution from the rather outdated reference to “high-speed satellite services” in the 2003 WSIS Plan of Action to the current widespread adoption of the terms “Very High Throughput Satellites”, or the publicly famous use of lower orbits, to the ability to seamlessly integrate with terrestrial systems.

304. The 2023 World Radiocommunication Conference, which allocated new spectrum resources in light of recent technological innovations in order to deepen global connectivity, increase access to and equitable use of space-based radio resources, and enhance safety at sea, in the air, and on land. The regulatory framework agreed

to at the conference, ensures the continued coexistence of different radiocommunication services while maintaining the stability required to attract investments and enabling the continued growth of telecommunications and ICTs. Digital technologies have opened the doors to new applications that are spurring greater interest in, and demand for, the world's limited spectrum and orbital resources. This growing demand sometimes requires updates to the regulatory framework.

305. Over the years, the ITU Radio Regulations have continuously enabled technological developments to increase the efficient use and access to radio frequency. Modifications to the international treaty have addressed the spectrum requirements of both new and existing services; ensured the timely availability of spectrum and corresponding regulatory provisions; and promoted the benefits of globally harmonized frequency bands. The member states have now embarked on the implementation of the changes that the WRC-23 brought to the Radio Regulations by way of revising their national regulations and, as necessary, their licensing requirements. However, building effective partnerships is not without challenges. It requires mutual trust, shared goals, and a willingness to collaborate.

d) WSIS Implementation at the Regional Level

306. 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.

307. The WSIS Process at the regional level is coordinated and effectively implemented by the UN Regional Commissions, ITU Regional Offices, Regional Technical Organizations in close collaboration with other UN Agencies and all stakeholders.

308. UN Regional Commissions are working towards Regional WSIS Implementation and Review at the Regional Level. ECLAC is the chair (2024-2025) for the WSIS-UN Regional Commissions.

309. ITU is collaborating closely with UN Regional Commissions and other regional organizations, to enhance regional engagement in the WSIS process by conducting regional WSIS reviews to explore the implementation of WSIS Action Lines to advance the achievement of regional sustainable development goals across different regions. These reviews serve as a platform to assess the implementation of WSIS Action Lines and SDGs at the national and regional levels and provide input towards WSIS review and vision beyond 2025.

310. ITU plays a crucial role in regional partnerships, contributing to various significant events. Recent contributions include:

- Arab Consultative Conference on WSIS+20 and GDC processes on 22 May 2024, co-convened by UN-ESCWA and the League of Arab States, and hosted by the Telecommunication and Digital Government Regulatory Authority (TDRA) of UAE.

- Ministerial Conference on Digital Inclusion and Transformation for Asia-Pacific (ESCAP), 4 September 2024, Astana, Kazakhstan. A joint open consultation meeting organized by ESCAP, CSTD and ITU was held during this event. Details of the meeting and outcomes are available here. The meeting also adopted the Astana Ministerial Declaration on Digital Inclusion and Transformation in Asia and the Pacific.
- Eighth session of the Asia-Pacific Information Superhighway Steering Committee and the Regional Review of WSIS (ESCAP), 25-26 September 2024, Jeju, Republic of Korea.
- The Africa WSIS+20 Regional Review Meeting 2024 (ECA), 9-11 October 2024, Dar es Salaam, Tanzania.

Upcoming events include:

- Ministerial Conference on the Information Society for Latin America and the Caribbean (ECLAC), 7-8 November 2024, Santiago, Chile.
- Digital Cooperation and Development Forum (DCDF2024), (ESCWA), Amman, Jordan, postponed to February 2025.

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

311. 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.

312. UNESCO took over the Chairship of UNGIS for period 2024-2025. The Vice-Chairs for this period are ITU, UNDP, UNCTAD, and UN ECLAC representing the UN Regional Commissions as Vice-Chair.

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

314. UNGIS events/contributions to global processes:

1. **GDC consultations** (please visit UNGIS website for more details)
   - UNGIS inputs to the informal consultations and subsequent intergovernmental negotiations on a Global Digital Compact, 12-13 February 2024
   - UNGIS input to the Second Stakeholder Consultation on the Global Digital Compact, 1 March 2024
   - UNGIS Statement to Global Digital Compact - Stakeholders Session, 24 April 2024

- Statement on behalf of UNGIS Global Digital Compact - Stakeholders Session, 22 August 2024

2. **High-Level Political Forum (HLPF) 2024**
   - UNGIS Input to the United Nations High-level Political Forum 2024
   - UNGIS side event: WSIS towards Summit of the Future and Beyond.
3. **Summit of the Future**
   - UNGIS/WSIS organized a side event during the Summit of the Future Action Days on 20 September 2024, co-sponsored by Malaysia, Romania, South Africa, and the United Kingdom. Details of the side event and its outcomes are available here.
4. **Internet Governance Forum (IGF) 2024**
   - UNGIS plans to organize a side event at the IGF 2024 in December 2024.
5. **Third UN Conference on Landlocked Developing Countries (LLDC3)**
   - UNGIS/WSIS will organize a side event on 13 December 2024 from 08:15 to 09:45 AM (UTC+2) in Gaborone, Botswana. This event will highlight how digital transformation, in alignment with WSIS goals, can advance sustainable development by addressing the challenges faced by LLDCs and the broader African region.

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

315. In 2022-2024, 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), 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. Note that the World Telecommunication/ICT Indicators Database was discontinued in 2024. All the data is now available free of charge on ITU DataHub subject to updated Terms of Use.

316. ITU is an active member of the Partnership on Measuring ICT for Development[6] and one of the three members of its Steering

[6] 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

Committee, together with UNCTAD and UN DESA. The Partnership has been very active in collecting the data for indicators that can be used to track the progress of the WSIS Targets, has made a concerted effort to highlight the importance of measuring ICT access and use in achieving the SDGs and has taken a lead role in increasing awareness about the importance of 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 endorsed by the United Nations Statistical Commission, provides the basis for the production of ICT statistics in countries all over the world.

317. 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.

318. 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.

319. During the WSIS+20 Forum High-Level Event 2024, the Partnership organised a session on "Strengthening the Measurement of ICT for Sustainable Development: 20 Years of Progress and New Frontiers" that was held on 30 May 2024. This session highlighted the achievements of the Partnership, showcasing how its initiatives have enabled evidence-based decision-making in diverse contexts. Partners presented the results of the stocktaking exercise on the core ICT indicators, highlighting progress across regions and sectors, and areas that need improvement.

320. The 15th Meeting of the Expert Group on Telecommunication/ICT Indicators (EGTI) and the 12th Meeting of the Expert Group on ICT Household Indicators (EGH) took place back-to-back in a hybrid format, from 25 to 26 September 2024. More than 200

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.

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 reviewing the IDI (jointly with EGTI) and a report of the subgroup on ICT skills. The topics covered during the EGTI meeting included a report of the subgroup on reviewing the IDI (jointly with EGH) and a report of the subgroup on ICT prices. The meeting also offered an opportunity to discuss the measurement of quality of service and quality of experience, explore the approaches to measuring the environmental footprint of the ICT sector, and exchange national best practices on collecting ICT/telecommunication market data

321. The 19th World Telecommunication/ICT Indicators Symposium (WTIS-24) was held from 23 to 24 September 2024 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 "Metrics to action: Bridging data gaps for universal and meaningful connectivity", the Symposium highlighted the importance of adequately measuring the enablers of connectivity and showcase promising approaches.

322. The 2023 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.

323. 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 8th International Conference on Big Data and Data Science for Official Statistics held in June 2024 in Bilbao, Spain.

324. 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).

325. 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.

326. 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.

327. 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.

328. 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 2024**, that was released at the WSIS+20 Forum High-Level Event 2024.

h) Emergency Telecommunications (Para 91 of TAIS)

BDT events

329. In 2022 the United Nations Secretary General António launched the Early Warnings for All (EW4A) Initiative, which stipulates that every person in the world should be protected by an early warning system by 2027. ITU is leading the initiative's Pillar 3 on "Warning Dissemination and Communication " to look at last-mile connectivity and to ensure that warnings reach the people at risk in time to take action. ITU participated in the Barbados National Consultative Workshop on Early Warning Systems (EW4ALL) convened on 1st and 2nd November 2023 by the United Nations EW4ALL Pillar leaders (UNDRR, WMO, ITU, IFRC) in collaboration with the Department of Emergency Management (DEM) of Barbados. ITU presented the pillar 3 discussions and activities with key stakeholders in the country.

330. ITU participated in the Antigua and Barbuda National Consultative Workshop on Early Warning Systems (EW4ALL) convened on 12th December 2023 by the United Nations EW4ALL Pillar leaders (UNDRR, WMO, ITU, IFRC) in collaboration with the National Office of Disaster Services of Antigua and Barbuda. ITU presented the pillar 3 discussions and activities with key stakeholders in the country.

331. BDT jointly with ETC and GSMA jointly organized a Caribbean workshop on the role of telecommunications in disaster preparedness, response and recovery, that took place from 21 to 23 November 2023 in Bridgetown Barbados. This event presented and discussed how ICT solutions and digital technologies can be used for disaster management and risk reduction in the region. The event also considered the importance and the benefits of emerging technologies for early warning and early action, how simulation exercises can help in increasing resilience to natural hazards and how the mobile industry plays a key role and contributes to build disaster resilience in the region. A SIMEX took place during the second and third day of the event. During this exercise, participants had the opportunity to simulate, through a simulated real experience how to respond to cascading catastrophic events.

332. During COP-28, on December 1, ITU, together with WMO, UNDRR and IFRC, organized a session featuring the potential of AI to accelerate processes and address gaps to achieve the Early Warnings for All initiative. The session – Early Warnings for All: Artificial Intelligence to unlock the potential of Early Warning Systems, presented recent relevant best practices in the application Artificial Intelligence to make early warnings more accessible, efficient, and actionable.

333. During COP-28 commitments and pledges from the mobile and satellite community to support the multi-channel alert dissemination under EW4All were featured in a side event on 4 December 2023: Digital connectivity and technologies for Early Warning for All initiative. This side event was part of the ITU-led Green Digital Action track.

334. On 29 January 2024, a National Workshop was held in Moldova to hand over the Feasibility Study on the deployment and implementation of a Cell Broadcast Service (CBS) solution for sending alert messages. The feasibility study offered technical, economic, and regulatory support to the Moldovan government for implementing an Early Warning System using Cell Broadcast and other alert dissemination methods, such as radio and TV broadcasting. The deliverable also included technical documentation to support the bidding process for the optimal solution.

335. On 26 and 27 February 2024, a hands-on training on the use of ITU's satellite equipment was delivered in Harare, Zimbabwe, to designated staff from the Ministry of Information and Communication Technology and Courier Services, the Postal and Telecommunications Regulatory Authority of Zimbabwe, POTRAZ and from Zimbabwe's Revenue Authority, ZIMRA. The staff will provide support to the ITU's Area Office by storing the equipment, testing the units before and after deployments, and checking and maintaining the units upon return. ITU HQ team will continue to oversee the overall deployment process of the emergency telecommunication equipment.

336. The Emergency telecommunications team participated in the Mobile World Congress (MWC) , 26-29 Feb 2024 in Barcelona, to promote its work on the *Early Warnings for All* Initiative, highlight its close cooperation with the GSMA and to meet with existing and potential new partners to support ITU in the implementation of this ambitious climate adaptation initiative. For the first time, MWC included a dedicated high level (Ministerial) session on 'Early Warning Systems: The Power of Partnership', which took place at the Ministerial Stage and included the ITU Secretary General, Deputy Head of IFRC, and the Minister of Telecommunications of Columbia.

337. An Inter-agency ICT tabletop simulation exercise training of trainers (ToT) took place in Valencia Spain, from 1 to 3 May 2024. UNICEF, ITU, ETC, and GSMA participated in the ToT where 2 staff from each organization were trained on how to develop ICT table top simulation exercises. This proactive approach has provided the opportunity to these agencies to join hands to design and deliver an interagency SimEx Training of Trainers (ToT), and to jointly support the capacity building of trainers (within/outside their respective agencies) that will be available to support regional, national or local-level emergency telecommunications preparedness SimEx design and delivery. Through this training, each organization would identify and train two of its staff members to be able to organize, design, and conduct simulation exercises in countries that request for this support.

338. ITU participated to the EENA (European Emergency Number Association) conference that took place in Valencia Spain on the 23-26th of April, 2024.

339. The first Rapporteur Group meeting for Study Group 1 took place from 22 April to 3 May 2024. The SQ Question 3/1 on "The use of telecommunications/ICTs for disaster risk reduction and management" was discussed on 26 April 2024. Two workshops took place during the rapporteur meetings, a Joint Q1/1, 3/1 & 5/1 workshop on transformative satellite connectivity (23 April 9:30 -17:30) and a Q3/1 workshop on resilience in Disasters (25 April 14:30-17:30). BDT participated in the joint workshop on Satellite connectivity which discussed how developing countries, particularly unserved or underserved and rural and remote areas, can benefit from these developments. It was broadly discussed that the goal is to support administrations in building their national digital strategies to advance each countries connectivity goals by identifying challenges, potential collaborations to achieve meaningful connectivity with the objective to provide connectivity to all, provide regulatory and business best practices. BDT presented the EW4All initiative and how the satellite sector is key to support its implementation by providing satellite connectivity to

unserved populations so that they can receive early warnings and alerts to take actions to save lives.

340. ITU participated in an virtual Side Event of the G20 DRR Working Group in support of the Brazilian Presidency, focusing on the use of Cell broadcast under the context of Early Warnings for All, on May 8 2024.

341. Sub-working group on AI for EW4All has been formed to specifically show how AI can support the attainment of the EW4All Initiative objectives. Workshop 'Forecasting the future: AI in early warning systems' (attended by 160 people) was organized on the 31 May 2024, as part of the ITU's AI for Good Global Summit, to foster dialogue and collaboration among stakeholders, including donors, present gaps for the achievement of EW4All, encourage new partners to join and make commitments to innovative AI solutions that could contribute to the advancement of the initiative.

342. On 8 July 2024, a closed workshop titled "Building Resilient Communities: Leveraging Cell Broadcast in the Western Balkans" was held with designated contact points from Western Balkan countries. The workshop aimed to enhance dialogue and cooperation with relevant authorities and explore the potential for a regional rollout of Cell Broadcast systems for early warning dissemination. This initiative responds to the request for strengthened ITU support in emergency response and seeks to deepen the collective understanding of each targeted country's context, outlining a clear path for implementing support at both national and regional levels.

ITU's support to develop NETPs

343. In 2024 BDT continued to support countries in the development of their National Emergency Telecommunication Plans. Based on the success of the NETP model for the SADC member states, a new NETP model for the English and Portuguese African speaking countries has been developed. This NETP framework will provide support to countries in terms of prioritizing the emergency telecommunications recommendations to be implemented a national level to help increase resilience of countries and will build up the preparedness measures to provide a fast response when disasters strike. Countries included in this model are: Gambia, Nigeria, Ghana, Liberia, Sierra Leone, Kenya, Angola, Equatorial Guinea, Guinea, Sao Tome, Cape Verde.

344. The Workshop on the Implementation of the National Emergency Telecommunications Plan (NETP) in the Union of Comoros, held in Moroni on 15 to 16 April 2024, concentrated on delineating NETP implementation steps and pinpointing challenges specific to Comoros. Its objective was to equip participants with crucial knowledge and tools to enhance national preparedness through robust NETPs, emphasizing the pivotal role of communications in disaster management. Furthermore, the workshop fostered multi-stakeholder collaboration, provided actionable guidance for NETP implementation, shared best practices to enhance implementation, and facilitated the finalization of a tailored NETP for Comoros.

345. The Workshop on the development of the National Emergency Telecommunications Plan (NETP) for Djibouti, conducted in Djibouti on 5-6 May 2024, aimed to facilitate NETP development through a multi-stakeholder approach, identify stakeholder needs, and draft a customized NETP for Djibouti. Additionally, the workshop established a roadmap for NETP development in Djibouti.

346. Technical support was provided to Georgia through high-level guidance on developing the National Emergency Telecommunication Plan (NETP). The kick-off meeting took place on 18 December 2023, followed by a national workshop on 13 February 2024, where the draft NETP was presented. During the workshop, relevant stakeholders discussed and addressed the steps needed to enhance resiliency.

ITU's Disaster Response

347. As part of the preparedness actions, BDT launched a new initiative in 2023 for pre-positioning ITU satellite equipment. The aim is to reduce response times in the aftermath of disasters so that countries can restore communication links and provide a fast response to affected communities. At the end of 2023, equipment was pre-positioned at: WFP's ETC warehouse in Dubai to assist Arab, ASP as well as African countries; Barbados that will serve as a hub for the Americas and Caribbean region; Zimbabwe, at POTRAZ, where equipment will serve the SADC member states.

348. In July 2024, in order to support the disaster response of hurricane Beryl, the telecommunication development bureau of ITU deployed 7 Iridium satellite phones to Jamaica; 5 Iridium satellite phones to Grenada; and 4 Broadband Global Area Network (BGAN) devices and 4 Iridium satellite phones to St. Vincent and the Grenadines. Hurricane Beryl was recorded to be the earliest Category 5 storm according to the World Meteorological Organization (WMO), and its passage resulted in loss of lives and damage to property and infrastructure, including severe disruptions to communications networks in all of the three islands. In the aftermath of the disaster, the ITU-led Disaster Connectivity Map (DCM) was also activated to support responders with near real-time information on telecommunications connectivity status in Grenada, Jamaica and Saint Vincent and the Grenadines.

Disaster connectivity map

349. The Disaster Connectivity Map is a joint initiative between ITU and Emergency Telecommunications Cluster (ETC) with input from GSMA. Initiated in 2020, the DCM is a live map that provides information on the type, level, and quality of connectivity available on the ground during times of disasters. In 2024, the DCM was showcased or demonstrated on various events, including: ITU Study Group 12 Mozambique workshop (27 Feb 2024);EW4All Fiji workshop (28 Feb 2024);ITU Study Group 12 Geneva workshop (23 Apr 2024); ITU AI4Good Summit (31 May 2024); RRS AMS event in Grenada (25 July 2024).

350. In 2024 the DCM was activated in: Mozambique during 3 – 24 Mar 2024 and Madagascar | 26 Mar – 9 Apr. DCM was activated in Grenada and Saint Vincent and

the Grenadines to support the connectivity monitoring and response effort of Hurricane Beryl, upon request from ETC, since 30 Jun 2024.

351. ITU, together with Microsoft and UNDRR, is developing an innovative map and visualization tool to assess connectivity levels and disaster risks. Based on different data sources and including the use of Artificial Intelligence (AI), this tool, is designed to help assess levels of subnational connectivity using unique, temporal measurements directly from the ITU Disaster Connectivity Maps initiative. It allows decision-makers to visualize localized connectivity levels and identify areas at risk, and paves the way for better national assessments and gap analysis for multi-channel communication strategies. First results of this tool are available for Fiji, Tonga, and Vanuatu.

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

352. ITU-T Study Group 3 continues to study this subject through its current work items via Question 6/3. 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.

353. 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

354. 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).

355. 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).

356. The theme for WTISD-2024 "Digital innovation for sustainable development" aimed to raise awareness on how innovative tech can help tackle the world's most pressing challenges, from fighting climate change to eliminating hunger and poverty. In fact, digital technologies can help achieve 70% of targets under the UN Sustainable Development Goals by 2030.

357. Though still the lack of policies, investment, and digital skills leaves many countries struggling to keep up in the fast-changing digital landscape, ITU's members and partners met to celebrate the day and share their knowledge and experience to help bridge the digital innovation gap. To learn more about ITU's work on innovation: WTISD 2024: Digital innovation for sustainable development. More details about WTISD are available here: https://www.itu.int/wtisd.

k) Bridging the standardization gap (BSG)

358. The BSG Programme is centred around five pillars in line with governing texts, such as PP Resolution 123 (Rev. Bucharest, 2023) 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

359. 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.

360. 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.

361. 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.

362. 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.

363. 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.

364. 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.

365. 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.

366. **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

l) Internet Governance Forum (IGF)

367. The 19th annual meeting of the IGF will be hosted by the Kingdom of Saudi Arabia in Riyadh from 15 to 19 December 2024, under the overarching theme: Building our Multistakeholder Digital Future. WSIS will also organise a consultative meeting for the WSIS+20 High-Level Event 2025 during the IGF 2024.

368. EuroDIG 2024, themed "Balancing Innovation and Regulation," took place from June 17–19 in Vilnius, Lithuania. ITU actively participated with a series of speaking engagements and contributed to discussions with a wide range of stakeholders. These strategic dialogues culminated in the EuroDIG Messages from Vilnius on Global Processes.

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

369. 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.

370. WSIS is an integral and dynamic process which has evolved over the years to be in keeping with technology changes. The WSIS+20 process offers an opportunity to review what needs to be included.

371. WSIS and its elements stand ready to provide all advice and support to ensure that digital plays a crucial role in accelerating the achievement of SDGs, support the Summit of the Future and Beyond.

372. The WSIS+20 review is the opportunity for us to:

    (1) take stock - to consider how best WSIS should further adapt so that it will continue to address new and emerging digital challenges and opportunities.
    (2) to consider how the different processes complement each other – WSIS, Global Digital Compact (GDC), Summit of the Future.

373. The WSIS+20 review holds significant importance as it provides a valuable opportunity to take stock and develop a vision for how WSIS can adapt to effectively address the ever-evolving digital challenges and opportunities.

374. In preparation for the WSIS+20 review, ITU is currently engaged in a collaborative preparatory process with UNESCO, UNDP, UN CSTD, UN DESA working together to ensure synergy and avoid duplication.

V. Forums, innovative initiatives and future actions

a) Forums

WSIS+20 Forum High-Level Event 2024 and its outcomes:

375. 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.

376. The WSIS+20 High-Level Event 2024 was co-hosted by the ITU and the Swiss Confederation, and co-organized with UNESCO, UNDP, and UNCTAD. The Event took place from 27 to 31 May 2024 in Geneva, Switzerland. The five-day high-level event's sessions took place from Monday to Wednesday at the International Conference Centre Geneva (CICG), and on Thursday and Friday, the sessions hosted at the ITU Headquarters.

377. The Event gathered over 4,000 participants onsite and online, including nearly 80 ministers, deputies, and heads of regulatory authorities. With representation from 160 countries, the Event featured more than 500 high-level participants engaging in around 200 sessions with over 100 speakers. 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.

378. The five-day event brought together multi-stakeholder participants, including government, the private sector, academia, the technical community, and civil society. It covered a wide range of topics, including emerging technologies, WSIS+20, digital inclusion, digital governance processes, the Global Digital Compact, the Summit of the Future, digital health, universal connectivity, sustainable digital transformation, cybersecurity, digital public infrastructure, and many more.

379. The WSIS+20 High-Level Event 2024 was chaired by H.E. Mr. Albert Rösti, Federal Councillor, Federal Department of the Environment, Transport, Energy, and Communications (DETEC), Switzerland. In the closing ceremony, the Chair of the WSIS+20 Forum presented the Chair's Summary, encapsulated the discussions from the Chair's perspective, highlighting key insights and future directions emerging from the Event.

380. The High-Level Policy sessions, rebranded as Leaders TalkX 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.

b) WSIS Action Lines and SDGs Matrix

381. 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".

382. 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.

383. 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.

384. 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.

385. 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.

386. With the newly adopted 2030 Agenda for Sustainable Development, 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

387. 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.

388. 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

389. 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 2024 contest.

390. 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.

391. 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.

392. 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.

393. The 13rd edition of the WSIS Prizes has received another record number of submissions, with over 1,000 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 28 May 2024 in Geneva.

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

395. The WSIS Prizes 2024 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	ENTITY NAME	COUNTRY
Category 1 — AL C1. The role of governments and all stakeholders in the promotion of ICTs for development.	The National Data Bank (NDB) and Estishraf	Saudi Data & AI Authority	Kingdom of Saudi Arabia
Category 2 — AL C2. Information and communication infrastructure	Empowering Disaster Response in Northern Mindanao through the use of Local Radio Networks	Department of Information and Communications Technology - Region 10	Philippines
Category 3 — AL C3. Access to information and knowledge	Tanzania Digital Inclusion Project	Organization for Digital Africa & Internet Society Tanzania Chapter.	United Republic of Tanzania
Category 4 — AL C4. Capacity building	JaWAra Internet Sehat (Cyberwise Champion)	Perkumpulan Mitra TIK Indonesia (ICT Watch)	Republic of Indonesia
Category 5 — AL C5. Building confidence and security in use of ICTs	NationalConnect: Empowering Governance, Education, and Sustainability through Secure Government Video Conferencing"	Bangladesh Computer Council	People's Republic of Bangladesh
Category 6 — AL C6. Enabling environment	Interactive Tool of Policies, Terms and Conditions Applicable in the use of Digital Platforms	Federal Telecommunications Institute	Mexico
Category 7 — AL C7. ICT applications: benefits in all aspects of life — E-government	mygov	Innovation and Digital Development Agency	Republic of Azerbaijan
Category 8 — AL C7. ICT applications: benefits in all aspects of life — E-business	Analytical Portal (Bayanat)	Financial Service Authority (FSA)	Sultanate of Oman

Category 9 — AL C7. ICT applications: benefits in all aspects of life — E-learning	Young ArcHers project.	Universitat Autonoma de Barcelona	Spain
Category 10 — AL C7. ICT applications: benefits in all aspects of life — E-health	Check Me	Check Me Ltd	Republic of Rwanda
Category 11 — AL C7. ICT applications: benefits in all aspects of life — E-employment	Smart Employee	Digital Dubai Authority	United Arab Emirates
Category 12 — AL C7. ICT applications: benefits in all aspects of life — E-environment	AIS E-Waste+ Application	Advanced Info Service Public Company Limited (AIS)	Thailand
Category 13 — AL C7. ICT applications: benefits in all aspects of life — E-agriculture	GeoTanaman	Department of Agriculture	Malaysia
Category 14 — AL C7. ICT applications: benefits in all aspects of life — E-science	Large-Capacity Wide-Area Data Express for Scientific Computing Breakthroughs	China Mobile Communications Group Co., Ltd.	People's Republic of China
Category 15 — AL C8. Cultural diversity and identity, linguistic diversity and local content	Center for Digitization and Documentation of Heritage and Arts Setif	DIGITIZATION ASSOCIATION FOR TECHNOLOGY AND SCIENCE	People's Democratic Republic of Algeria
Category 16 — AL C9. Media	Upview - One-stop AI Solution for content creators to go viral - consistently!	Upview	United States of America
Category 17 — AL C10. Ethical dimensions of the Information Society	Smartpur	Nokia	India
Category 18 — AL C11. International and regional cooperation	University Diploma in Internet Governance and Regulations	South School on Internet Governance	Argentine Republic

396. Detailed descriptions of all WSIS Prizes 2024 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.

397. 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.

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

399. 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 2025:

400. ITU is pleased to announce that the WSIS Prizes 2025 call, 14th 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.

e) WSIS Stocktaking Portal

401. 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.

402. 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.

403. 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.

404. WSIS Stocktaking continues to diversify its database with 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.

405. The new call for update and new entries 2025 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 2025, while the 6 regional reports will be published as part of the 6th series of regional reporting and will be released during the WSIS Forum 2025, branded as the WSIS+20 High-Level Event 2025.

f) WSIS Stocktaking Publications

406. In 2024, the WSIS Stocktaking Global Report publication contains more than 1,000 submissions, including those submitted to the WSIS Prizes and special prizes.

407. WSIS-related publications, including the WSIS Stocktaking reports are available to download at the ITU Bookshop.

408. 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.

409. 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.

g) WSIS Forum Photo Contest 2024

410. This year's photo contest received 193 submissions in total; 89 finalists; 10 winners, 3 from Arab States, 2 from Europe, 2 from Asia, and 3 from Africa. 7 finalists are from the Americas.

411. The winners are from Algeria, Nigeria, the Philippines, Senegal, Slovenia, Thailand, Türkiye, the United States of America, Zimbabwe. The photos are available here.

h) Exhibition

412. The WSIS+20 Forum High-Level Event 2024 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.

413. 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+20 Forum High-Level Event 2024 partners also exhibited their projects and initiatives. The exhibition area and open spaces also displayed photographic works from the WSIS Forum 2024 photo contest winners, artistically showcasing the significant connection between ICTs and the sustainable development goals of the international community. Also, a digital photo booth was provided from Happy Booth for participants to freely explore digital photo services and leave meaningful memories of the event.

414. The Exhibition Inauguration took place on 27 May 2024 at 11:30 AM (UTC+02:00), in the open space of the CICG ground floor, honored by Ms. Doreen Bogdan-Martin, Secretary General of ITU, and Mr. Thomas Schneider, Ambassador and Director of International Affairs of the Federal Office of Communication (OFCOM) of Switzerland, as well as H.E. Eng. Majed Sultan Al Mesmar, Director General of the Telecommunications and Digital Government Regulatory Authority (TDRA) of the United Arab Emirates.

415. The WSIS+20 Forum High-Level Event 2024 exhibition highlighted a significant milestone as WSIS and AI for Good joined forces to host the events simultaneously for the first time during the last two days of the WSIS event. This unique collaboration led to the exhibition being held in two distinct locations - the CICG ground floor and the ITU HQ open space. Exhibitors had the opportunity to engage with attendees in both venues, allowing them to immerse themselves in the vibrant atmosphere of the ITU HQ while showcasing their innovations and technologies. The dual-venue setup added a new dynamic to the event, providing a diverse and enriched experience for all participants.

i) WSIS Special Initiatives

416. **ICTs and Gender Mainstreaming.** As part of the Gender Mainstreaming initiatives, the WSIS Gender Trendsetters contributed to the 68th Commission on the Status of Women by participating in a side-event on *Empowering and Investing in Women*, organised by ITU, Broadband Commissions, and WSIS. The event was held virtually on 11 March 2024. Details of the event are available here.

417. **ICTs and Older Persons:** The fourth edition of the WSIS Healthy Ageing Innovation Prize was organised as part of the WSIS+20 Forum High-Level Event 2024. Four finalists in each category were selected for their outstanding projects in supporting healthy ageing for older persons. The winner of the Prize was Stitch: addressing loneliness & isolation for older adults. For more information, please read here.

418. **ICTs and Youth:** Youth inclusion is a vital component of the WSIS initiatives, highlighting the importance of empowering young people to contribute their unique perspectives and innovative solutions to global digital challenges. At the WSIS+20 Forum High-Level Event 2024, youth track was also organised through Geneva Trialogue 2024. More information, please read here.

j) The Global Cyber Security Agenda (GCA)

419. 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.

420. Second Open Consultation on the draft Guidelines for utilization of the GCA was held during the WSIS Forum 2021 on 1 March 2021.

k) Connect 2030 Agenda for global telecommunication/ICT development

Background

421. 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.

422. 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.

423. 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.

Progress for the reporting period measurement, monitoring and reporting

424. 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).

425. 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.

426. 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. `

427. Each year, the 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

428. 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

429. 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.

Roadmap for 2030

430. ITU will further advance the implementation of Connect 2030 by:

- *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.
- *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.*

l) Broadband Commission for Sustainable Development

431. 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.

432. 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.

433. 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.

434. 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 2023 has 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.

435. 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.

436. 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.

437. 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.

438. 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.

439. 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.

440. 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.

m)AI for Good Global Summit

Introduction

441. 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

442. 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.

443. 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.

444. 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.

445. AI4Good Global Summit 2024 was held on 30-31 May 2024, in conjunction with the WSIS+20 Forum High-Level Event 2024. This year's AI for Good Global Summit showcased innovations in generative AI, robotics, and brain-machine interfaces that can accelerate progress in areas such as climate action, accessibility, health, education and disaster response.

446. AI Governance Day and the AI for Good Global Summit brought together government officials, industry leaders, UN heads, technical experts, academics and civil society representatives from 29 to 31 May.

n) Girls in ICT Day

447. In 2024, International Girls in ICT Day was celebrated on 25 April. This year the global ITU celebration was held in the Philippines and kindly hosted by the Department of Information and Communications Technology (DICT). This year's theme for the Girls in ICT day celebrations is "**Leadership**'', to underscore the critical need for strong female role models in science, technology, engineering, and mathematics (STEM) careers. More information is available at: https://www.itu.int/women-and-girls/girls-in-ict/.

448. ITU Europe Office continued its year-round efforts to promote Girls in ICT throughout 2024 with a focus on "Leadership," highlighting the need for strong female role models in STEM careers. The event engaged a diverse range of stakeholders, including representatives from European Ministries, NGOs, UN organizations, the private sector, and young women across Europe. The event featured open dialogues and personal stories from young people, emphasizing the role of young women in digital transformation and the challenges they face. More information can be found here.

o) Equals in Tech Awards

449. For the past 11 years, the EQUALS in Tech Awards have been recognizing outstanding projects and initiatives around the world that are working towards bridging the gender digital divide. They have been highlighting impactful work that is bettering the lives of girls and women everywhere. Prizes are awarded for outstanding achievement and innovative strategies in five categories: Access, Skills, Leadership in Technology, Leadership in SME (small and medium enterprises) and Research.

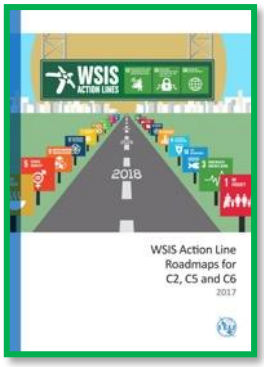
450. The 2023 EQUALS in Tech Award winners were announced at the ceremony on 12 December 2023, during Partner2Connect Annual Meeting at ITU headquarters in Geneva, Switzerland. More information is available at: https://www.equalsintech.org/.

451. The 2024 EQUALS in Tech Award winners received almost 400 nomination for +100 countries and winners of each category will be announced at the ceremony back to back Partner2Connect Annual Meeting at ITU headquarters in Geneva, Switzerland in 2025. More information is available at: https://www.equalsintech.org/.

p) Roadmaps for WSIS Action Lines C2, C4, C5, C6

452. 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).



453. 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:

- 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;
- 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

454. 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.

455. 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 https://www.itu.int/en/itu-wsis/Pages/default.aspx.

456. 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.

q) Communication and Outreach

457. WSIS Flash: is a monthly newsletter on WSIS Related news, projects and activities. https://www.itu.int/net4/wsis/stocktaking/Flash/Newsletter

458. ImeetyouatWSIS provides all registered onsite participants of the WSIS Forum with an online social networking community experience, now featured on WSIS Process

LinkedIn group. This component of the WSIS Forum has been specially designed for the WSIS Forum onsite and remote participants.

459. 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

460. @WSISprocess on X: The WSIS X page gives opportunity for stakeholders to get informed and actively participate at the page: https://x.com/wsisprocess

461. WSIS Process on YouTube: WSIS Forum highlights, interviews and all the important WSIS Related Videos are available on the WSIS Forum You Tube site: https://www.youtube.com/wsisprocess

462. 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 .

463. 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://www.itu.int/en/itunews/Pages/default.aspx

464. 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/

r) WSIS Fund in Trust

465. 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.

466. 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.

467. 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

468. We thank the United Arab Emirates, Saudi Arabia, Digital Cooperation Organization, Japan, Huawei, IEEE, Rwanda, Switzerland, United Kingdom, ICANN, EY, Internet Society, Belgium - Wallonia-Brussels in Geneva, Permanent Mission of Belgium to the UN, Permanent Mission of Canada in Geneva, Global Coalition on Aging, and IFIP, for their contributions to the WSIS Fund in Trust in 2024 to accelerate the implementation of the WSIS related activities undertaken by ITU.

s) Future Actions

469. The WSIS+20 High-Level Event 2025 is scheduled to be held from 7 to 11 July 2025 in Geneva, Switzerland. Please find out more on the WSIS&SDG activities and events on our website: www.wsis.org/forum.

470. 2025 calls for contributions for the WSIS+20 High-Level Event 2025 have been launched, including:

1. **Open Consultation Process (OCP)**

   The Open Consultation Process is an open and inclusive consultation with WSIS stakeholders to prepare for the event, including developing the event programme, identifying gaps in the implementation of the Geneva Plan of Action and the WSIS Action Lines, and contribute to the WSIS+20 review process. Please see below the schedule for the OCP consultative meetings:

   1. 1st Meeting, ITU HQ, Geneva, Switzerland: 18 November 2024 (with remote participation facilities)
   2. 2nd Meeting during IGF-24, Riyadh, Saudi Arabia: 18 December 2024 (with remote participation facilities)
   3. 3rd Meeting during 42nd CWG-WSIS&SDG, ITU HQ, Geneva, Switzerland: 10-21 February 2025 -tbc (with remote participation facilities)
   4. 4th Meeting during the UNESCO event: Global Forum on AI and Digital Transformation in the Public Sector, UNESCO HQ, Paris, France: 12-13 February 2025 (with remote participation facilities)
   5. Final Brief, ITU HQ, Geneva, Switzerland: 10 June 2025 (with remote participation facilities)

   Submit your official contribution through the online form by **14 March 2025**.

2. **WSIS Stocktaking 2025**

   WSIS Stocktaking platform has served as a global repository for collecting and reporting on ICT-related projects which implement the WSIS Outcomes. With

over 10,000 projects, it has also proved to be an efficient mechanism for sharing best practices towards advancing Sustainable Development Goals.

Update and submit new entries to the WSIS Stocktaking repository.

3. **WSIS Prizes 2025**

The WSIS Prizes awards outstanding projects that leverage the power of information and communication technology to accelerate achievement of the Sustainable Development Goals.

Submit your projects through the online form before **10 February 2025**.

4. **WSIS Fund in Trust**

Support the WSIS process by contributing to the WSIS Fund in Trust. WSIS is extrabudgetary and every year we raise funds to defray the operational costs through partnerships.

Sponsorship packages are available here.

VI. WSIS+20: Review and WSIS Beyond 2025

471. 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.

472. Resolution 70/125 requests the General Assembly 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 (referred as "WSIS+20"), 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. It also recommends that the outcome of the high-level meeting be considered as an input into the review process for the 2030 Agenda for Sustainable Development, including outcomes of the SDG Summit in 2023 and inputs to the next SDG Summit in 2027.

473. WSIS+20 roadmaps:

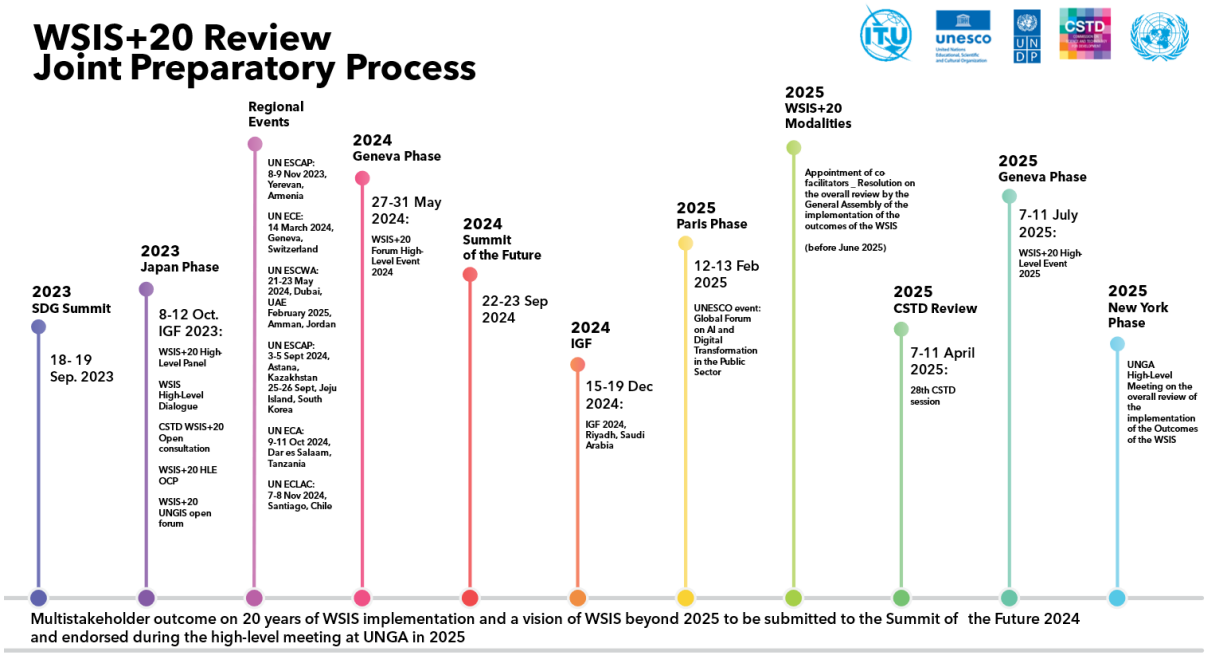
- *Report by the Director General on implementation of the World Summit on the Information Society (WSIS) outcomes*, elaborates UNESCO's roadmap towards the WSIS+20 review.
- *World Summit on the Information Society (WSIS)+20: WSIS Beyond 2025: WSIS+20 Roadmap*; elaborates the ITU Secretary-General's roadmap on the role of ITU in the WSIS+20 Review process and its preparations.
- CSTD Roadmap for the WSIS+20 Review United Nations Conference on Trade and Development.

474. At the WSIS+20 Forum High-Level Event 2024, several multistakeholder dialogues and discussions were held to discuss on the preliminary steps towards the WSIS+20 review process. The sessions were included as part of the *Digital Governance Processes: WSIS, GDC/ Summit of the Future Special Track.*

475. The WSIS Forum 2025 will be branded as the WSIS+20 High-level Event 2025 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 7 to 11 July 2025 in Geneva, Switzerland.

476. Towards the WSIS+20 review, efforts have been made to establish a unified WSIS+20 review process involving all UN Agencies, including ITU, UNESCO, UNDP, UNCTAD, UN DESA, and UN CSTD. Regular meetings are organised to facilitate collaborative discussions and planning, reflecting our joint and dedicated approach towards the WSIS+20 review. Kindly refer to the timeline of the joint preparatory process below.

477. In accordance with ITU Council Resolution 1332, ITU has launched a call for inputs on WSIS+20 review. Members and other stakeholders are invited by the Chair of the CWG WSIS&SDG to contribute their views on the work of the ITU in the WSIS+20 review, including ideas related to the review of the WSIS Action Lines.



Timeline of the WSIS+20 review joint preparatory process

VII. Global Digital Compact

478. On 22 September 2024, Member States adopted the Summit's outcome document, the Pact for the Future, along with its annexes which includes the Global Digital Compact and the Declaration of Future Generations (A/79/L.2; A/RES/79/1).

479. ITU contributed at every opportunity in the process to develop the GDC, including in the thematic deep-dive consultations organized by the co-facilitators and providing keynote remarks and expert statements. ITU also contributed to the GDC online consultation process led by the UN Secretary-General's Envoy on Technology (OSET) and hosted roundtables in Geneva during the WSIS Forum 2023 for the co-facilitators to interact with civil society, technical community and private sector stakeholders and provided several opportunities during the WSIS+20 Forum High-Level Event 2024 to collect inputs from multistakeholders. Recognizing that the process is an intergovernmental one, ITU met with Permanent Missions and other agencies to advance discussions on the GDC in Geneva and New York. This includes hosting consultations at the ITU between the Co-facilitators of the GDC and representatives of Permanent Missions in Geneva, and another one with the UNGIS. As the UNGIS co-chair in 2023 and rotational vice-chair in 2024, and the UNGIS Permanent Secretariat, ITU has coordinated in collaboration with UNESCO, UNDP, UNCTAD, UNESCAP and UNECLAC four UNGIS inputs to the informal consultations on GDC. ITU's engagement spans various levels of the development process, including delivering speeches aligned with UNGIS in nonstate stakeholder consultations on the GDC.

480. ITU places great emphasis on the critical role of ICTs for sustainable development while minimizing potential risks. Our messages to the GDC processes have been based on discussions held during key ITU events, e.g., the consultations during the Plenipotentiary Conference (PP-22) and the Ministerial Roundtable in Bucharest, the World Telecommunication Development Conference (WTDC-22) in Kigali, WSIS Forum 2023 and the WSIS+20 Forum High-Level Event 2024 in Geneva, as well as the outcomes of the last World Telecommunication/ICT Policy Forum (WTPF) and relevant PP Resolutions. ITU's inputs for future digital technology development are, for example but not limited to, promoting connectivity for all people and all schools worldwide to the Internet, based on future-oriented policies and collaborative regulatory frameworks ensuring availability and inclusiveness. The ITU Secretary-General also made a statement to the Ministerial for the Summit of the Future on 21 September 2023 at UN Headquarters in New York during the UNGA High-Level Week.

481. The GDC referenced established processes, such as WSIS, to build on the foundations of multistakeholder collaboration and support the development of global digital frameworks. It envisions an inclusive, open, sustainable, fair, safe and secure digital future for all.

482. These similarities reflect a unified vision for leveraging technology to foster sustainable development and create a more equitable world.

483. The synergies between GDC and the WSIS are evident, as both frameworks emphasize the importance of collaboration among stakeholders to achieve a digital future that is equitable and accessible. They share a commitment to fostering digital inclusion, forging international cooperation, and promoting sustainable development.

484. By building on their shared principles, WSIS can effectively serve as a follow-up mechanism for the GDC, ensuring that the global community remains aligned in its pursuit of a transformative digital landscape.

485. WSIS Process and 2030 Agenda – GDC Matrix is being prepared in consultation with WSIS Action Lines facilitators and UNGIS members.

486. WSIS framework remains relevant and robust in the face of technological advancements. The WSIS elements, such as the WSIS Forum, IGF, WSIS Stocktaking, WSIS Prizes, Partnership for Development, UNGIS among others, stand ready to provide advice and support, reinforcing digital cooperation as a cornerstone for accelerating the achievement of the SDGs.

487. The WSIS process has long been a model for inclusive multistakeholder engagement. ITU remains committed to bringing together governments, the private sector, civil society, technical community, and academia—just as we have through WSIS— to drive a collaborative and inclusive digital future.

488. UNGIS remains committed to advancing the goals of the GDC and supporting the broader UN digital cooperation agenda. Kindly refer to UNGIS section above for details of UNGIS contributions to GDC.

489. ITU organized a breakfast meeting titled "Let's Talk Digital - Advancing the GDC in Geneva" on 9 October 2024 with Geneva-based UN agencies to foster collective action towards achieving the GDC and to prepare for the upcoming WSIS+20 review process. The meeting aimed to establish a network of Geneva-based UN agencies, including focal points (name, title, contact information), and to initiate the development of a "Geneva Action Plan" for implementing the GDC over the next two months. Once finalized, the action plan will be shared with the UN Secretary-General for consideration in his roadmap for GDC implementation, serving as a unified endorsement of the Compact.

VIII. Final conclusions

490. The ITU is committed to connecting the world in its role as one of the lead facilitating organizations for the WSIS Process. In 2024, 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.

491. 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.

492. 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 digital technologies are accessible to all.

493. 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 digital technologies is leveraged for achieving the SDGs by 2030.