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Contribution by the Secretariat

INTERIM EDITS TO THE FOURTH DRAFT REPORT BY THE ITU SECRETARY-GENERAL

Purpose

This document presents interim edits to the Fourth Draft Report by the ITU Secretary-General for the Seventh World Telecommunication/Information and Communication Technology Policy Forum (WTPF-26). The edits reflect comments and guidance provided by members of the Informal Expert Group during the January 2026 IEG meeting. The document is submitted for consideration to inform preparation of the next draft of the Report.

Action required

The Informal Expert Group on WTPF-26 is invited to **consider** this document.

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References

IEG-WTPF-26 webpage

Fourth draft Report by the ITU Secretary-General
for the World Telecommunication/Information and Communication Technology Policy Forum 2026

1. The Seventh World Telecommunication/Information and Communication Technology Policy Forum 2026 (WTPF-26)

1.1. Originally established by the Plenipotentiary Conference (Kyoto, 1994) of the International Telecommunication Union (ITU), the World Telecommunication/Information and Communication Technology Policy Forum (WTPF) has been successfully convened in 1996, 1998, 2001, 2009, 2013 and 2021. By its Resolution 2 (Rev. Bucharest, 2022), the Plenipotentiary Conference of the ITU resolved to hold the next WTPF in 2026.

1.2. The purpose of WTPF is to provide a venue for exchanging views and information and thereby creating a shared vision among policy-makers worldwide on challenges and opportunities arising from the new and emerging telecommunication/ICT services and technologies, and to consider any other policy issue in telecommunications/ ICTs which would benefit from a global exchange of views, in addition to the adoption of opinions reflecting common viewpoints as per Resolution 2 (Rev. Bucharest, 2022).

1.3. By its Decision 641 (Rev. Council 2024), the ITU Council decided that the theme for WTPF-26 is as follows:

> "***Accelerating an inclusive, sustainable, resilient, and innovative digital future***: In this regard, the WTPF-26 will discuss opportunities, challenges and policies to address the following:
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> – bridging digital divides, particularly on gender and age as well as skills and connectivity
> – green digital transformation: climate change and environmental sustainability
> – resilience of telecommunication/ICTs
> – space connectivity
> – strengthening ICT-centric innovation ecosystems and entrepreneurship"

1.4. WTPF-26 shall not produce prescriptive regulatory outcomes; however, it shall prepare reports and adopt non-binding opinions by consensus for consideration by Member States, Sector Members, and relevant ITU meetings as per Resolution 2 (Rev. Bucharest, 2022).

1.5. More information relating to the preparatory process of WTPF-26 is posted on https://www.itu.int/en/council/Pages/ieg-wtpf-26.aspx.

2. Preparatory process for the ITU Secretary-General's Report

2.1. Discussions at WTPF-26 shall be based solely on a single report by the ITU Secretary-General, and contributions from participants based on that report, prepared in accordance with a procedure adopted by the Council and based on the proposals of Member States and Sector Members, and on the views of Associates, Academia and stakeholders, and WTPF shall not consider drafts of any new opinions that were not presented during the preparatory period foreseen for drawing up the Secretary-General's report prior to the forum as set out in Resolution 2 (Rev. Bucharest, 2022).

2.2. In accordance with Decision 641 (Council 2024), the ITU Secretary-General shall convene a balanced, informal group of experts (IEG), each of whom is active in preparing for WTPF-26 in his/her own country, to assist in this process. In this regard, a circular letter (CL-24/44) has been sent on 14 June 2024 to Member States, the State of Palestine, Sector Members, Associates, Academia, and Organizations which have the right to attend ITU conferences and meetings as observers, calling for nomination of experts to constitute the IEG.

2.3. In line with Resolution 2 (Rev. Bucharest, 2022) and Council Decision 641 (Mod. 2025), this Report was prepared by the Secretary-General through an iterative process of engagement with the IEG, taking into full account the written and oral contributions of Member States and Sector Members. The Report does not represent a negotiated outcome, though it endeavours to take into account the range of views of Member States and Sector Members participating in the IEG. Citation of individual sources does not imply approval or endorsement by that source or their organization/entity.

2.4. The preparatory process will be guided by the timetable set out as in Annex 2 of Decision 641 and in Table 1 below (revised based on agreement of the first IEG meeting).

Table 1: Timetable for the elaboration of the ITU Secretary-General's Report

5 August 2024	A First Draft outline of the Report by the Secretary-General shall be posted online for comments
26 August 2024	Deadline for receipt of comments on the First Draft, and for contribution on outlines for possible draft opinions Deadline for nominations for a balanced group of experts to advise the Secretary-General on further elaboration of the report and of draft opinions associated with it
1st IEG Meeting (7-8 October 2024 during the CWG cluster)	First meeting of the group of experts to discuss the First Draft of the report by the Secretary-General and the comments received
18 November 2024	The Second Draft of the report by the Secretary-General will be posted online, incorporating discussions from the 1st IEG meeting and including outlines of draft Opinions This draft will also be made available online for open public consultations
13 January 2025	Deadline for receipt of comments on the Second Draft and for contribution on possible draft Opinions Deadline for inputs from the open public consultations

2nd IEG Meeting (13 – 14 February 2025 during the CWG cluster)	Second meeting of the group of experts to discuss the Second Draft of the report by the Secretary-General as well as the possible draft Opinions and the comments received, including from the open public consultation
31 March 2025	The Third Draft of the report by the Secretary-General will be posted online, incorporating discussions from the 2nd IEG meeting, and including the text of the possible draft Opinions as an Annex This draft will also be made available online for open public consultations.
16 June 2025	Deadline for receipt of comments on the Third Draft, including the possible draft Opinions Deadline for receipt of comments from the open public consultation
7 August 2025	Interim deadline for written inputs following the publication, on 16 June 2025, of the Chair's Report, containing baseline draft Opinions The deadline is intended to support continued consideration of the draft Opinions ahead of the next meeting of the Informal Expert Group
3rd IEG Meeting (17-19 September 2025 during the CWG cluster)	Third meeting of the group of experts to discuss the Third Draft of the report by the Secretary-General as well as the draft Opinions and the comments received, including from the open public consultation
3 November 2025	The Fourth Draft of the report by the Secretary-General will be posted online, incorporating discussions from the 3rd IEG meeting and including the draft Opinions as an Annex
19 December 2025	Deadline for receipt of comments on the Fourth Draft, including the text of the draft Opinions
4th IEG Meeting (21 -23 January 2026 during the CWG cluster)	Fourth meeting of the group of experts to finalize the Draft Report by the Secretary-General, including the final text of the draft Opinions to be submitted to the seventh WTPF
13 April 2026	The final report of the Secretary-General to WTPF will be posted online, including the draft Opinions
8-11 June 2026	Seventh World Telecommunication/Information and Communication Technology WTPF (WTPF-26) in the Bahamas from 9 to 11 June 2026, with a Strategic Dialogue hosted on 8 June 2026

3. Theme for WTPF-26

3.1. By Decision 641 (Council 2024), the 2024 session of Council decided that the theme for WTPF-26 is as set out in paragraph 1.3.

3.2. With the aim to accelerate an inclusive, sustainable, resilient and innovative digital future, the theme presents five key topics for consideration and discussion at WTPF-26. As technological breakthroughs in areas such as Artificial Intelligence (AI), Quantum Computing, Space Technologies and others reshape the global digital economy, it is essential to address a wide range of interconnected issues while designing public policy interventions that can maximize opportunities and address the challenges related to the adoption and use of new and emerging telecommunication/ICT services and technologies. Looking towards 2026 and beyond, and recognizing the limited time left for the global community to make progress on the 17 UN Sustainable Development Goals (SDGs), it is imperative for policymakers and other stakeholders to adopt a holistic and complementary approach for developing the integrated policy frameworks necessary to address the topics presented in the theme.

3.3. A robust enabling environment through effective policymaking is key for facilitating efforts, particularly in developing countries, to ensure universally accessible, affordable, high-quality, interoperable, and secure infrastructure and services, for enhanced international coordination and the international standardization of telecommunication/ICT services and technologies, and to leverage existing and emerging technologies, connectivity solutions, and business models to close the digital divide, ensuring access in all countries and regions.

3.4. This report was developed through an open and inclusive preparatory process in accordance with the schedule set out in Decision 641 (Council, 2024) and will serve as the basis for discussions at the WTPF-26, considering the inputs and contributions from experts and stakeholders.

3.5. The report presents the policy issues and key questions for consideration for each of the topics of the theme, with an aim to help policymakers explore ways to leverage new and emerging telecommunication/ICT services and technologies for sustainable development, build an inclusive society and economy, work to close the digital divide for everyone, including women and girls, youth, indigenous peoples, older persons, persons with disabilities, and persons with specific needs, and promote and enable digital transformation across all spheres of life and activity – particularly to address the dual climate and environmental crisis, foster the continued advancement of science, promote the sustainable exploration of Earth and space, and encourage resource use for the benefit of all.

3.6. Each of the topics is explored in the following sections and the Draft Opinions as agreed by the Informal Expert Group during the preparatory process are presented in the Annex:

- Section 4: Bridging digital divides, particularly on gender and age as well as skills and connectivity
- Section 5: Green digital transformation: climate change and environmental sustainability
- Section 6: Resilience of telecommunication/ICTs
- Section 7: Space connectivity
- Section 8: Strengthening ICT-centric innovation ecosystems and entrepreneurship
- Annex: Draft Opinions

4. Bridging digital divides, particularly on gender and age as well as skills and connectivity

4.1. Previous iterations of the WTPF recognized that bridging digital divides requires sustained commitment and multistakeholder collaboration. Today's digital divides are more complex and multifaceted than ever, encompassing not just connectivity gaps, but fundamental disparities in digital skills, age-related barriers, and gender-based exclusion. The concept of universal and meaningful connectivity (UMC), as developed through ITU's work with the 2024 G20 Digital Economy Working Group, provides a comprehensive framework for addressing these interrelated challenges.

State of the Digital Divide at a Glance:

- Approximately 74% of the world's population (6 billion people) is now online, while 2.2 billion people (26% of the global population) remain offline.
- In high-income countries, 94% of the population uses the Internet, while in low-income countries, only 23% of people are online.
- Women are 15% less likely to use the internet than men in developing countries, highlighting persistent gender-based disparities in digital access and use.

Source: International Telecommunications Union, "Facts and Figures 2025 - Report Index"

4.2. Achieving universal digital inclusion requires a dual focus on expanding infrastructure reach and building digital capabilities. Ensuring that rural, remote, and marginalized communities have access to affordable, reliable, and meaningful connectivity (encompassing quality of service and relevance of content) remains a priority, alongside recognizing that access must be complemented by skills development. Digital literacy, skills, and competencies serve as the bridge between connectivity and meaningful use, enabling all populations to actively engage with digital opportunities in online services, education, healthcare, and governance, and to facilitate economic participation. This comprehensive approach empowers older generations to confidently navigate digital spaces, enables youth to actively shape the digital future, and ensures that women and girls have equal opportunities to participate in the digital world. Because the rapid evolution of technology demands continuous upskilling, it is vital to embed digital literacy into education systems and foster partnerships among governments, industry, and civil society to build digitally capable and resilient populations.

4.3. This multidimensional understanding of digital divides, grounded in the UMC framework, underscores that achieving true digital inclusion necessitates a holistic approach. It emphasizes the importance of gender-responsive strategies, collaborative learning opportunities, and fostering meaningful engagement to empower all individuals in the digital ecosystem.

4.4. The digital skills gap represents a particularly pressing challenge, as technological advancement continues to outpace skills development in many communities. This is especially acute among people living in rural and remote communities, and marginalized groups as well as older populations, who may face multiple barriers to digital adoption. Additionally, persistent gender divides in both access and skills development continue to limit women and girls' participation in the digital economy and their access to government services, education, and other digital opportunities, particularly in developing countries.

4.5. The rapid development of new and emerging telecommunication/ICT services and technologies, particularly artificial intelligence, brings new challenges to bridging digital divides. New gaps in access to and use of these technologies are becoming increasingly prominent, especially in developing countries, highlighting the need for enhanced international cooperation on capacity-building in this field.

4.6. Urgent action is required by all relevant stakeholders – governments, private sector, educational and training institutes, international organizations and civil society – to address the global digital skills gap.

> Digital Skills
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> By 2030, 90% of all jobs will require some level of digital skills. These include both basic digital skills as well as advanced skills related to AI, data analysis, cloud computing and cybersecurity; at the same time, 75% of organizations struggle to find the necessary skills to adopt AI technologies and there is an estimated lack of 7 million cybersecurity professionals in the global labour market. The skills demand goes beyond technical skills and includes interpersonal and soft skills.
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> *Source: International Telecommunication Union, "Skills development for the digital economy", November 2024*

> Case Study: Digital Skills Toolkit & AI Skills Coalition
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> The ITU Digital Skills Toolkit 2024 offers a comprehensive, step-by-step guide to support the ITU membership to create effective national digital skills strategies and policies. This practical resource offers actionable insights and examples, making it a valuable tool for countries at all stages of digital development. At its core, it provides a concrete roadmap for creating a digital skills strategy, including all elements from the planning to the design and implementation stage.
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> Launched by ITU under the AI for Good Impact Initiative, the AI Skills Coalition is a global, open, and inclusive platform advancing AI education and capacity-building worldwide. It unites governments, UN agencies, academia, and industry to democratize access to trusted AI learning resources and strengthen national capacities for responsible AI development. The Coalition focuses on leveraging strategic resources and building strong collaborations with key stakeholders to design and implement large-scale, high-impact projects targeting priority audiences, particularly in developing countries and underserved communities, to ensure that the benefits of the AI revolution are shared equitably, sustainably, and in a context-relevant manner.

4.7. Small Island Developing States and many developing countries face compounded challenges in bridging digital divides, including geographic isolation, limited infrastructure, climate vulnerability, and constrained financial and human resources, requiring tailored approaches and enhanced international cooperation.

4.8. Evidence-based policymaking benefits from robust monitoring frameworks and metrics that can accurately assess the impact of digital inclusion programs, enabling adaptive learning, accountability, and informed decision-making.

4.9. IEG members held a diversity of views on methods for implementation and applicability of digital public infrastructure within the context of bridging digital divides.

4.10. Against the backdrop of these considerations, some telecommunication/ICT services and technologies policy questions that could be studied include:

4.10.1. How can strategies and policies foster investments in affordable and accessible telecommunications infrastructure, digital products and services, digital platforms in local languages, and age-friendly technologies to bridge the digital divide across gender, age, socio-economic, and urban-rural disparities?

4.10.2. What strategies can policymakers adopt to promote digital literacy, skills development, and access to in-demand skills, ensuring equal opportunities for individuals across various demographics, while involving the private sector and civil society in these efforts?

4.10.3. How can national and international organizations collaborate to develop innovative technologies, scale solutions, and take initiatives to connect the unconnected, improve digital affordability, and enhance global digital literacy?

4.10.4. How can educational institutions and policymakers promote innovation, entrepreneurship, and equitable access to digital resources for students and entrepreneurs, addressing barriers caused by the digital divide?

4.10.5. What are the key challenges faced by developing countries including Small Island Developing States (SIDS) in adopting emerging technologies required to bridge the digital divide, and how can stakeholders support them in building the necessary capacity?

4.10.6. How can existing monitoring frameworks and metrics be refined or how can new ones be developed to effectively assess the impact of programs and policies designed to bridge the digital divide?

5. Green Digital Transformation: Climate Change and Environmental Sustainability

5.1. Technology can play a critical role in monitoring, mitigating and adapting to environmental sustainability and climate change. Meanwhile, digital transformation brings significant implications, including rising greenhouse gas emissions and energy use from the telecommunication/ICT sector along with growing volumes of e-waste. New and emerging telecommunication/ICT services and technologies, in particular, AI, are proving transformative in advancing environmental protection and climate action. AI applications are being deployed to optimize energy efficiency, predict extreme weather events, monitor biodiversity, and enhance climate modelling. These technologies are also enabling other sectors such as energy, manufacturing industry, transportation and construction, to reduce the negative climate impact.

> Case Study: Green Digital Action (GDA) initiative
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> The Green Digital Action (GDA) initiative brings together partners worldwide to advance climate action through digital innovation. Since its launch at COP28 in 2023, Green Digital Action has been working to unite the global digital community in developing practical solutions, boosting industry-wide climate support, and strengthening global frameworks for monitoring and reporting. GDA represents a key role in advancing the commitments made in the Conference of the Parties COP29 Declaration on Green Digital Action, which aims to accelerate climate-positive digitalisation and emission reductions in the digital technology sector, and enhance accessibility of green digital technologies.

5.2. The rapid growth of digital technologies, including AI, whose computational power doubles every 100 days, also underscores the urgent need for sustainable practices in the digital sector.[1] Digital companies already account for nearly 2% of global electricity use and up to 4% of greenhouse gas emissions, which must be reduced by 45% by 2030 to align with the Paris Agreement.[2] This dependence on finite energy resources presents a fundamental sustainability challenge for the sector, similar to its reliance on critical raw materials, highlighting the need for a transition to renewable energy sources throughout the digital value chain.

5.3. Meanwhile, the world's transition to a circular economy remains slow, with only 7% of economic activities estimated as circular and 82 billion kilos of e-waste projected to be generated by 2030. Furthermore, almost half of all countries lack multi-hazard early warning systems, and data gaps in Least Developed Countries and Small Island Developing States exacerbate their vulnerability to climate risks. Green digital transformation offers an opportunity to address these challenges and build a more sustainable, equitable future.

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1 Ammanath, B. (2024) *How to manage AI's energy demand — today, tomorrow and in the future*. World Economic Forum. Retrieved from https:// www .weforum .org/ agenda/ 2024/ 04/ how -to -manage -ais -energy -demand -today -tomorrow -and -in -the -future/

2 International Telecommunications Union (2025) *Greening Digital Companies.* Retrieved from https://www.itu.int/en/ITU-D/Environment/Pages/Publications/GDC-25.aspx

International Standards at ITU:

ITU has been developing international standards to advance environmental efficiency, climate action, energy efficiency, and the circular economy within the ICT sector and beyond. By establishing methodologies to assess the environmental impact of ICT products, ITU provides frameworks that guide organizations in measuring and reducing their carbon footprints. ITU standards promote sustainable design principles that support resource efficiency and facilitate the shift toward a circular economy. For instance, standards for energy efficiency in telecommunications equipment and green data centres enable significant reductions in energy consumption, supporting organizations in lowering their operational costs while reducing emissions. In terms of climate action, these standards help governments and companies alike adopt practices that minimize emissions and foster resilience to climate impacts. Through standardized reporting mechanisms, ITU enables consistent and transparent tracking of environmental performance, thereby enhancing accountability and driving global efforts toward sustainability.

5.4. A true green digital transformation requires a comprehensive approach that integrates environmental sustainability across the digital ecosystem, including energy efficiency promotion, implementing digital carbon management practices that prioritize material efficiency, adopting circular economy principles, including promoting the reuse of equipment. These strategies minimize the environmental impact of digital infrastructure by reducing the demand for new resources. The circular economy approach emphasizes designing ICT products for durability, repairability, and recyclability, thereby extending product lifecycles and reducing waste. Furthermore, international collaboration is essential for developing sustainable e-waste management systems that ensure proper collection, refurbishment, recycling, and environmentally sound disposal of electronic devices. These combined strategies support a more sustainable and resilient global ICT sector while reducing both resource consumption and emissions.

Global Commitments:

Regulatory approaches globally have begun to address environmental impacts collectively, though with certain challenges remaining. Currently, about 40 per cent of countries have developed e-waste policies, measures, or regulations, with opportunities to strengthen their enforcement and implementation. The field of ICT laws and regulation, including the licensing and regulation of the ICT/telecommunications sector, is still exploring effective ways to address the sector's environmental impact. Additional approaches include mandatory emission reporting requirements, energy consumption monitoring, voluntary climate data disclosure programs, and market reforms to encourage renewable energy investments in the telecommunications sector.

5.4.1. Economies in transition face specific challenges in meeting Paris Agreement targets and facilitating green digital transformation:

- Many developing countries are limited in their ability to attract necessary investment levels to implement Paris Agreement targets
- Recent research by UNCTAD has revealed that 3.3 billion people live in countries that spend more on servicing public debt than on public health or educational services

For emerging and developing countries, interest payments outpace climate-related investments, thus retarding climate change adaptation and mitigation efforts. This leaves limited capacity for public funding of critical ICT initiatives.

> Bridging the gap:
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> The lack of comprehensive data on emissions remains a significant gap in the ICT sector. Addressing this requires approaches such as raising awareness, developing harmonized indicators and knowledge, promoting contributions and investments, sharing best practices, and building capacity. These elements are critical to achieving green digital transformation for climate change mitigation and environmental sustainability. In particular, ITU recommendations and informative deliverables provide industries with essential tools for advancing progress towards the SDGs.

5.4.2. In addition to the green digital transformation strategies outlined in this Report, consideration should also be given to:

- Promoting infrastructure sharing, where technically and economically feasible, to reduce redundant infrastructure, minimize resource consumption, and lower energy usage.
- Responsible communications tower site selection and deployment to help minimize disruption or destruction of sensitive ecosystems and wildlife habitats.
- Ongoing research on the potential impacts of electromagnetic fields on wildlife.
- Establishing the necessary policies, regulations, facilities, and mechanisms to encourage the recycling of ICT equipment and the environmentally sensitive disposal of e-waste.
- Creating and enhancing digital marketplaces and e-commerce platforms to support the exchange of second-hand goods and refurbished products

  This approach would align green digital transformation with both environmental and economic sustainability goals while addressing the specific challenges faced by tourism-dependent economies.

5.5. Some key aspects to consider in this respect are international partnerships that focus on promoting sustainable development and climate action through technological innovation, including satellite communications and AI for climate monitoring and disaster preparedness, support mechanisms for developing countries through targeted assistance and knowledge sharing, application of circular economy approaches across ICT manufacturing, deployment, and disposal to minimize e-waste, leveraging scalable digital solutions to facilitate climate-resilient services, evaluation of social and environmental benefits of digital transformation initiatives, development of industry best practices to examine how telecommunications/ICTs can reduce negative environmental impacts across sectors.

5.6. Regarding the theme of green digital transformation, IEG members held differing views on the relevance of specific climate change terminology, and its framing in the context of this theme. [3]

5.7. During the discussion on the Sustainable Development Goals (SDGs), one member state expressed differing views on the inclusion of these references. Other IEG members supported alignment with the SDGs.[4]

5.8. Given ongoing global developments in regulatory approaches, industry commitments, and collaborative initiatives, several critical questions emerge regarding how to accelerate and expand the telecommunication/ICT services and technology sector's contribution to environmental sustainability:

5.8.1. What actions can ITU take to build international partnerships that promote application of green digital transformation for sustainable development and climate action?

5.8.2. How can telecommunications/ICTs, including satellite communication and IoT, support developing countries in achieving a green digital transformation, particularly through improved climate monitoring, disaster preparedness, and precision agriculture in remote and underserved areas?

5.8.3. What are the good practices of telecommunications/ICTs in reducing the negative impact of industries on the environment, including but not limited to mechanisms such as the integration of circular economy principles in ICT manufacturing, deployment, and disposal to minimize e-waste?

5.8.4. How can international standards assist governments and the ICT sector in reducing the environmental impact of telecommunications/ICTs, while also enabling them to leverage ICT solutions to drive positive environmental impacts within the ICT sector and beyond?

5.8.5. How can policymakers help to reduce the environmental impact of telecommunications/ICTs, and to facilitate ICT's contribution to sustainability and climate action?

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3 The objections referenced here to "climate change" is applicable to subsequent references to climate change throughout the Secretary General's report and its annexed opinions.

4 The objections referenced here to the Sustainable Development Goals are applicable to subsequent references to the Sustainable Development Goals throughout the Secretary General's report and its annexed opinions.

5.8.6. Leveraging existing efforts like Green Digital Action, how can governments, industry, UN agencies, academia and civil society fast-track industry-wide commitments to address climate challenges, put digital solutions at the forefront of climate action and ensure digital literacy and capacity-building initiatives empower communities to participate in green digital ecosystems?

5.8.7. How can policy makers identify most significant data gaps and research needs in green digital transformation, including through development of metrics and indicators to assess environmental footprint and climate impact, and how can this be addressed through international cooperation and knowledge sharing?

6. Building Resilient Telecommunication/ICT Infrastructure and Services

6.1. Resilient telecommunications/ICTs services and technologies are capable of predicting, responding to, and withstanding multiple forms of disruption. The resilience of global telecommunications networks depends on multiple factors such as infrastructure (for e.g. terrestrial networks and submarine cables through which over 99% of global internet traffic passes), satellite systems providing critical redundancy and reach, the availability of relevant skills within the economy, public awareness, early warning systems, cybersecurity measures, and mitigations against the impact of climate change.

> Case Study: Submarine Cable Resilience
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> Recognizing the critical importance of submarine cables to global connectivity and the digital economy, ITU has established an International Advisory Body for Submarine Cable Resilience. This initiative responds to the increasing vulnerability of submarine infrastructure to service outages and aims to enhance the safety, redundancy, and protection of submarine cables through international multistakeholder collaboration. The Advisory Body brings together governments, regulatory authorities, and industry leaders to develop best practices, improve technical frameworks, and strengthen policy approaches for submarine cable protection.

6.2. New and emerging technologies are transforming the approach towards telecommunication/ICT services and technologies resilience. Advanced capabilities such as AI and machine learning are being utilized for real-time risk detection and predictive maintenance of critical infrastructure. Satellite networks are expanding connectivity options for remote regions. Edge computing and digital twins are enabling faster decision-making and improved system modelling to predict and mitigate vulnerabilities. While offering new capabilities, also introduce new considerations for security management, technical expertise requirements, and the sustainability of new telecommunications/ICTs services and technologies.

6.3. Recognizing this, a comprehensive approach to this issue should be adopted that acknowledges that the resilience of telecommunication/ICT services and technologies cuts across many kinds of challenges, such as climate-related disruptions, cyber incidents, non-malicious technical breakdowns, energy infrastructure, and grid resilience. It should also recognize that enhancing the resilience of telecommunication/ICT services and technologies involves wider initiatives, such as public awareness raising, early warning systems, and risk-management planning. A holistic approach includes the following key considerations:

6.3.1. Infrastructure resilience requires coordinated technical frameworks across terrestrial, submarine and space-based networks. Collaborative work must continue in order to analyse these advances and identify how emerging technologies could enhance capabilities of comprehensive protection and rapid recovery.

6.3.2. Policy and regulatory approaches must address resilience across all infrastructure layers, including but not limited to early-warning detection and cybersecurity.

6.3.3. Capacity building and skills development are essential for operating, maintaining and protecting complex, multi-layered communication systems.

6.3.4. International cooperation mechanisms strengthen global telecommunications infrastructure resilience through sharing of best practices, information exchange, and coordinated response capabilities.

Case Study: Network Resilience Through Standards

To strengthen these global cooperation mechanisms, ITU has been developing international standards (recommendations) for enhancing network resiliency. They include protection switching, performance monitoring, fault management, network element management functions for various transport technologies such as optical transport network (OTN), Ethernet, MPLS-TP. Protection switching function pre-assigns some capacity between nodes so that the original traffic can be carried using this capacity in case of a failure on the original route.

6.4. Building resilient Telecommunications/ICT infrastructure in underserved and disaster-prone regions requires addressing financing mechanisms and investment models that support long-term sustainability. Resilience must extend beyond physical infrastructure to encompass cybersecurity measures, ensuring networks remain operational during crises when they are most critical. Design of resilient ICT systems should prioritize accessibility for all populations, including persons with disabilities, older persons, and those in remote areas, to ensure emergency communications and essential digital services reach everyone during disasters and recovery efforts.

6.5. Given the urgency of these issues in the face of an ever-evolving landscape of complex and multifaceted challenges, the following questions are intended to guide policymakers and stakeholders toward meaningful and productive tools to help build resilient telecommunication and ICT infrastructure and services:

6.5.1. How can emerging technologies and innovations improve the resilience of telecommunications and ICT infrastructure and the interdependence with other critical sectors like energy, health, and transportation to mitigate cascading failures during disasters?

6.5.2. What policy and regulatory frameworks are needed to foster resilient telecommunication/ICT service and technology systems?

6.5.3. How can public awareness and preparedness contribute to telecommunication/ICT services and technology resilience?

6.5.4. What capacity building and skills development initiatives are needed to support telecommunication/ICT services and technologies resilience?

6.5.5. How can international cooperation and collaboration strengthen telecommunication/ICT services and technologies resilience?

6.5.6. How can networks, including NRENs (National Research and Education Networks), leverage existing infrastructure, technologies, and community assets to enhance the resilience of telecommunications and telecommunication/ICT services?

6.5.7. How can telecommunication/ICT services and technologies infrastructure and services be strengthened to ensure reliable performance in times of crisis, including natural disasters, supporting timely response and recovery efforts?

6.5.8. How can policymakers create frameworks for monitoring and evaluating the resilience of telecommunication/ICT services and technologies?

6.5.9. What financing models, investment strategies, and public-private partnerships can support the development of resilient ICT infrastructure, particularly in underserved and disaster-prone regions?

7. Space Connectivity

7.1. Space connectivity has become fundamental to achieving global digital inclusion. Satellite technologies have a transformative role in providing universal connectivity, particularly for unserved and underserved areas where terrestrial infrastructure deployment faces geographical, technical and/or economic challenges.

7.2. The space connectivity landscape is evolving rapidly through the deployment of Very-High-Throughput Satellites in Geostationary Orbit (GSO), advances in non-geostationary orbit (NGSO) satellite constellations, including in Low Earth Orbit (LEO) and Medium Earth Orbit (MEO), and innovative business partnerships between satellite and terrestrial telecommunications providers.

Understanding the space arena:

The space economy demonstrates significant growth potential, with forecasts indicating it will reach USD 1.8 trillion by 2035, growing at an average of 9% per year. This growth will largely be built upon space-based and/or enabled technologies such as communications; positioning, navigation and timing; and Earth observation.

Source: "Space: The $1.8 Trillion Opportunity for Global Economic Growth." World Economic Forum, April 2024

7.3. The integration of satellite and terrestrial networks is creating new possibilities for connectivity. Such integration is particularly significant as it enables cost-effective and reliable communications in areas where terrestrial infrastructure has been geographically, technically and/or economically challenging.

7.4. Countries are increasingly adopting forward-looking regulatory frameworks that address several aspects including:

- efficient authorization processes for both GSO and NGSO systems, mechanisms to encourage investment in space infrastructure,
- requirements for security and data protection provisions for industry partnerships and collaborations
- measures to protect and optimize existing networks while enabling new connectivity-related telecommunication/ICT services and technologies

7.5. Advancements in space connectivity must also support space sustainability to ensure long-term accessibility of orbital resources.

7.6. Space connectivity plays a vital role in disaster preparedness, early-warning systems, and climate monitoring, particularly in regions without robust terrestrial infrastructure. Strengthening voluntary data-sharing on environmental and disaster-related information within the scope of space connectivity activities can enhance resilience and global cooperation.

7.7. As space connectivity expands, fostering trust, transparency, and peaceful cooperation among actors is essential to ensure that new technologies contribute to inclusive and sustainable development.

7.8. During the discussion on space connectivity, IEG members addressed the intersection of space connectivity and national regulatory frameworks, with divergent views emerging on the inclusion of security-related language. Some IEG members emphasized that the rapid

deployment of non-GSO satellite constellations involves national security considerations and requirements for data security that should be recognized to ensure a balanced regulatory approach. Conversely, some IEG members opposed the inclusion of security and data protection aspects, arguing that such matters fall outside the technical mandate of the ITU and are a matter of sovereign policy. This debate extended to the affirmation of sovereign rights in authorizing satellite services, where some IEG members suggested that such references are redundant, whereas other IEG members maintained that an explicit reference was necessary to safeguard the principle of sovereignty in the context of emerging space technologies. These divergent perspectives are noted here.

7.9. IEG members expressed divergent views on the necessity of including specific references to non-discriminatory and equitable access to orbital and spectrum resources.

7.10. IEG members also addressed the role of technology transfer in supporting the development of satellite and telecommunication infrastructure, with divergent views on the framing of technology transfer.

> Case Study: Space Sustainability Forum
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> The Space Sustainability Forum has convened top leaders and subject matter experts from the satellite and space industries, space and telecom agencies, governments and other space stakeholders committed to the responsible use of outer space. Across its two editions, the Forum has provided a platform to discuss and explore the policies, best practices, guidelines and strategies needed to ensure that space remains accessible and sustainable for the growing range of space activities envisioned today and in the future.

7.11. As the space connectivity sector continues its rapid evolution, several important aspects emerge for consideration at the intersection of technological advancement, universal access, and sustainable space operations:

7.11.1. Emerging trends and developments in space connectivity focus on creating innovative solutions for inclusive and sustainable digital futures.

7.11.2. Bridging the digital divide through space-based connectivity can help to address the needs of unserved and underserved communities.

7.11.3. Enabling policy and regulatory frameworks support the responsible deployment and sustainable use of space-based connectivity systems. There is broad recognition that space connectivity themes fall under the mandates of different UN entities related to outer space, such as the United Nations Office for Outer Space Affairs (UNOOSA), the Committee on the Peaceful Uses of Outer Space (COPUOS), and ITU. Within ITU specifically, there are established global regulatory frameworks governing these sectors, particularly through the World Radiocommunication Conferences.

7.11.4. Complementarity between different space-based systems and terrestrial networks creates opportunities for enhanced connectivity solutions.

7.11.5. The spectrum and related satellite orbits being limited; it is necessary to use them optimally by updating regulatory frameworks in order to maximize spectral efficiency and employ modern spectrum management techniques, with rational, equitable, efficient and economical use access for all countries, especially developing countries.

7.11.6. Public private partnership and economic incentive by governments can accelerate the deployment of space-based telecommunication/ICT services and technologies which can accelerate access to connectivity in underserved and unserved regions.

7.12. Given these considerations in space-based telecommunication/ICT connectivity and sustainability, policymakers and stakeholders should address the following questions to ensure responsible development of space-based telecommunication/ICT services and technologies:

7.12.1. What challenges, trends and developments in space-based telecommunication/ICT connectivity contribute to an inclusive, sustainable, resilient, affordable and innovative digital future? How can governments, the public sector, the private sector, and civil society, each in its respective role, build upon these developments?

7.12.2. How can space -based telecommunication/ICT connectivity bridge digital divides and contribute to sustainable development, particularly in historically underserved and unserved communities, while addressing various stakeholder priorities including accessibility, affordability and resilience of communications?

7.12.3. How can administrations act at the national, regional, and international levels to create an enabling policy and regulatory environment for the deployment and use of space-based telecommunication/ICT connectivity? How can regulatory frameworks be harmonized across different countries to facilitate the deployment and operation of space-based telecommunication/ICT connectivity systems?

7.12.4. How can complementarities among different space-based telecommunication/ICT connectivity systems and between space-based telecommunication/ICT connectivity systems and terrestrial networks contribute to an inclusive and innovative digital future? How can policymakers help enable connectivity services that evolve from these complementarities and what regulatory mechanisms can be put in place to foster collaboration?

7.12.5. Recognizing the mandate of ITU and its regulatory framework and sectors, particularly the world radiocommunication conferences, how can international coordination and collaboration be improved to manage the) use of radio frequency spectrum for space-based telecommunication/ICT services, ensuring equitable access to space resources for all countries?

7.12.6. What regulatory frameworks need to be established to ensure Space Traffic Coordination (STC) and to enable efficient use of orbits? How can countries collaborate to develop and implement space traffic coordination systems that ensure the safety and sustainability of space connectivity activities?

7.12.7. How to promote widespread affordable access to space-based telecommunication/ICT connectivity solutions, particularly in developing and least developed countries and low-income and remote communities, by encouraging competition, innovation, private investment, and public-private partnerships, among other mechanisms?

7.12.8. How can the environmental impact of space connectivity operations be minimized, and what technically informed measures or policies can promote environmentally sustainable practices in the space industry? Recognizing the respective mandates of different UN entities related to the outer space, such as ITU, UNOOSA and COPUOS, how can the ITU support coordination and dialogue on space debris, and how can international cooperation be enhanced to ensure sustainable space operations? What innovative approaches are being considered to mitigate these challenges related to environmental risks and the long-term sustainable use of outer space?

7.12.9. What policies can support ongoing innovation and research in space -based telecommunication/ICT connectivity technologies, and how can these policies ensure that advancements benefit all sectors of society?

7.12.10. What policy and regulatory measures based on good practices countries can take to ensure security, trust, and resilience regarding space-based services for communication? How can these measures be coordinated and harmonized internationally?

7.12.11. How can space-based telecommunication/ICT connectivity support disaster preparedness, early-warning systems, and climate monitoring, particularly in vulnerable regions? Within ITU's coordination role, what cooperation mechanisms can promote timely voluntary data-sharing and integration with terrestrial emergency-response systems?

8. Strengthening ICT-centric Innovation Ecosystems and Entrepreneurship

8.1. Entrepreneurial ecosystems are essential to drive sustainable development while increasing inclusion, providing economies of scale, and bridging digital divides.

8.2. However, there is a growing digital innovation divide among countries that inhibits access to equitable benefits for all.

8.3. Supportive policies and regulations are key to enable innovation and support Micro, Small and Medium-sized Enterprises (MSMEs), as well as enhanced collaboration efforts among key stakeholders, including policymakers, industry and academia.

Case Study: Digital Innovation Profiles and ITU Acceleration Centres

ITU collaborates with countries to provide accurate assessments of the health of their digital innovation ecosystems. This helps them develop strategies to inform national policies and initiatives. The ITU has delivered assessments to numerous countries, offering a comprehensive roadmap for ecosystem-driven innovation strategies.

ITU has supported countries in establishing new ecosystem acceleration centers that provide a coordinated implementation and governance framework for their digital ecosystems, helping them achieve national goals.

8.4. The participation of MSMEs in ICT innovation within developing countries faces multiple barriers. These include challenges related to intellectual-property protection and technology transfer, limited commercialization opportunities due to business environments still adapting to new technologies, and still-developing governmental support in areas such as funding and incubators. Additionally, while the digital infrastructure is improving, as evidenced by high internet penetration rates, many small businesses still lack digital integration, operating without web presence or digital payment solutions in predominantly paper-based environments.

Case Study: Innovation and Entrepreneurship Alliance for Digital Development

ITU has launched the Innovation and Entrepreneurship Alliance for Digital Development to support Members with new, more resilient, and forward-thinking approaches that help build local innovation capacity. This is achieved through a network of ITU Acceleration Centres equipped with key capabilities in strategic foresight, project co-design, open technology cluster development, policy experimentation, and support for the growth of startups and SMEs. Each centre is nationally owned but collaborates with other centres to ensure that capabilities, knowledge, and opportunities are accelerated across their innovation ecosystems.

Together, this network builds the innovation capacity needed to drive an equitable future where innovation and entrepreneurship are the engine of growth for digital development.

8.5. Given the importance of the role of innovation as a driver of sustainable development and the growing innovation divide between developing and developed countries, several important considerations require attention:

8.5.1. Trends research readiness: Adapting to the fast-changing digital environment requires institutions and other ecosystem stakeholders to stay ahead of the curve and effectively interpret the evolution of technology, policy and innovation dynamics. This requires new thinking and approaches, such as equipping countries with foresight capabilities and strategic research.

8.5.2. Open innovation: Harnessing technological know-how for competitive digital economy value chain, embracing open innovation and multistakeholder mechanisms, appropriate access to emerging technology for all. Promoting collaboration and synergies that scale digital innovations and achieve cross-cutting sectoral value for a competitive digital economy.

8.5.3. Entrepreneurship and MSMEs growth: Accelerating the uptake of digital innovation-driven entrepreneurship and opportunities for talent to achieve socio economic inclusion in their communities need renewed focus. Integrating emerging technologies into curricula and supporting innovation ecosystems within academic institutions can unlock local talent and foster inclusive economic growth.

8.5.4. Appropriate Policy: Crafting flexible and forward-thinking policies that encourage innovation, support ecosystem stakeholders, and enhance investment opportunities. International collaboration plays a crucial role in driving knowledge exchange, capacity development, and harmonization of standards

8.6. To address these challenges in ICT innovation ecosystems, several questions require consideration, particularly regarding the role of MSMEs in driving digital transformation:

8.6.1. What are the barriers for MSMEs to innovate and to contribute to the telecommunication/ICT services and technology innovation ecosystem?

8.6.2. How can policy makers help MSMEs digitally transform their telecommunication/ICT service and technology innovation ecosystems efficiently and sustainable and support them in collaboration with large enterprises?

8.6.3. How can policy makers help MSMEs innovate, grow and integrate into the telecommunication/ICT services and technology innovation ecosystem more efficiently?

8.6.4. How can ITU assist policy makers to work with relevant stakeholders to invest in telecommunication/ICT services and technology research and development for new innovative products and services for MSMEs?

8.6.5. How can ITU assist policy makers to bring intellectual property developed by MSMEs to market and to the telecommunication/ICT services and technology innovation ecosystem?

8.6.6. How can policy makers, universities, research institutes, innovation hubs and enterprises in the telecommunication/ICT services and technology innovation sector promote, invest, support and develop entrepreneurship and enhance the supply of digital talents for enterprises?

8.6.7. How can policy makers promote competition and improve access to open markets to foster entrepreneurship?

8.6.8. How can the ITU and international cooperation support enhancing telecommunication/ICT services and technology-centric innovation and entrepreneurship by providing platforms for building cooperation networks for knowledge and capability sharing, for evaluation and training, for bringing telecommunication/ICT services and technology innovations into standardization, for regulatory toolkits and sandboxes?

8.6.9. How can reducing regulatory barriers to market entry enable telecommunication/ICT services and technology -centric innovation?

8.6.10. What capacities do public bodies need to support an innovative telecommunication/ICT services and technology sector and to anticipate emerging issues?