

ITU-D第5/1号课题输出成果报告 农村和偏远地区的电信/ 信息通信技术

2022-2025年研究期



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鸣谢

国际电联电信发展部门（ITU-D）研究组提供了一个中立性平台，来自世界各地的政府、业界、电信组织和学术界的专家可在此汇聚一堂，开发解决发展问题的实用工具和资源。为此，ITU-D的两个研究组负责在成员所提出输入意见的基础上编写报告、导则和建议。研究课题每四年由世界电信发展大会（WTDC）确定。国际电联成员于2022年6月在基加利举行的WTDC-22上商定，在2022-2025年期间，第1研究组将在“为有意义的连接创造有利环境”的总体范围内处理七项课题。

本报告是针对“第5/1号课题：**农村和偏远地区的电信/ICT**”编写的，由ITU-D第1研究组的管理班子进行全面指导和协调。该研究组由主席Regina Fleur Assoumou-Bessou女士（科特迪瓦共和国）领导，并得到以下副主席的支持：Ali Rasheed Hamad Al-Hamad先生（科威特国），Amah Vinyo Capo先生（多哥共和国）、George Anthony Giannoumis先生（挪威）、Roberto Mitsuke Hirayama先生（巴西联邦共和国）、Sangwon Ko先生（韩国）、Umida Musaeva女士（乌兹别克斯坦共和国）、Caecilia Nyamutswa女士（津巴布韦共和国）、Memiko Otsuki女士（日本）、Khayala Pashazade女士（阿塞拜疆共和国）、Sunil Singhal先生（印度共和国）和Mehmet Alper Tekin先生（土耳其共和国）。

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内容提要

本报告介绍了2022-2025年研究期ITU-D关于农村和偏远地区的信息通信技术的第5/1号课题的研究结果。

报告共分六章：

- 上一研究期（2018-2021年）的概述和结论，当前研究的范围，
- 连接农村和偏远地区的经济高效的电信/ICT解决方案，
- 服务质量和农村电信基础设施的维护和运营方面，
- 网络和服务可持续发展的适用商业模式，
- 普遍服务基金（USF）的有效利用和互联网应用在农村和偏远社区日常生活中的融合，以及
- 关于农村和偏远地区信息通信技术（ICT）连接的结论和导则。

本报告的内容来自国际电联发展部门成员的书面文稿，这些成员参加了研究课题报告人组会议和第1研究组会议。他们代表了成员国、部门成员和学术成员。

大部分文稿采用案例研究的形式。本报告附件A载有所有文稿的摘要。

报告第6章介绍了研究结论，并提供了可供成员国、部门成员、电信/ICT服务运营商和监管机构使用的导则。

主要研究结论是包括宽带连接在内的有意义的¹连接已成为农村和偏远地区的迫切需求。没有宽带连接，服务提供将受到不利影响，特别是在紧急情况和疫情期间。缩小城乡差距的解决方案多种多样，没有放之四海而皆准的解决方案。可再生能源在可持续提供宽带服务方面发挥着关键作用，电信服务提供商需要采用具有成本效益的解决方案，使其能够通过高质量的网络优先为农村和偏远地区提供服务。普遍服务基金如果得到有效利用，将在基础设施建设以及农村和偏远社区以可承受的价格获得电信/ICT服务和应用方面颠覆游戏规则。在地形复杂和偏远地区，卫星技术可以与其他网络解决方案相辅相成，发挥重要作用。本报告还涉及数字化素养、本地内容、新兴技术的可负担性和无障碍获取的重要性，以及成员国和利益攸关方为确保这些方面所开展的工作。

本报告介绍的导则鼓励成员国和利益攸关方通过扩大卫星连接增强的光纤网络、协作监管和有效利用普遍服务基金，集中精力连接剩余的未连接人群。

¹ 有意义的连接是一种允许用户以可承受的成本获得安全、满意、丰富和高效的在线体验的连接水平。

本报告还强调了未来研究需要关注的问题，包括在农村和偏远地区应用人工智能（AI）的相关议题，特别是农村和偏远地区采用AI的好处和挑战，以及利用AI提升农村社区数字素养和技能。

缩写词和首字母缩略语

该表包含与国际、区域或超国家机构、法律文件或案文相关的缩略语/首字母缩略词，以及本报告中使用的技术和其他术语。

国家机构、法律文件或文本的缩略语/首字母缩略词在与相关国家有关的文本中进行了解释，因此不包括在本表中。

缩略语	术语
2G/3G/4G/5G/6G	第二代/第三代/第四代/第五代/第六代移动通信（见以下注1）
AI	人工智能
ANATEL	巴西电信管理局
ARPU	每用户平均收入
CN	社区网络
DSL	数字用户线路
FTTH	光纤到户
FWA	固定无线接入
G3ICT	包容性ICT全球举措
HAPS	高空平台台站
IDB	美洲间开发银行
IoT	物联网
ITU-D	国际电联电信发展部门
ITU-R	国际电联无线电通信部门
ITU-T	国际电联电信标准化部门
IXP	互联网交换点
LDC	最不发达国家
LEO	低地球轨道
LLDC	内陆发展中国家
MNO	移动网络运营商
NTIA	国家电信和信息管理局
NGSO	非对地静止卫星轨道
NRA	国家监管机构
PPP	公私伙伴关系

(续)

缩略语	术语
QoS	服务质量
RAN	无线接入网
RIFEN	国际数字技术女性专家网络（缩写词为法文）
RMIO	农村移动基础设施运营商
SIDS	小岛屿发展中国家
SDG	可持续发展目标
SME	中小企业
TVWS	电视白色空间
USF	普遍服务基金
USO	普遍服务义务
USOF	普遍服务义务基金

注

1 尽管本文件谨慎适当地使用并参引了各代IMT的官方定义（见[ITU-R第56号决议](#)“国际移动通信的命名”），但ITU-D希望指出，本文件的某些部分包含了成员提供的涉及常用市场名称“xG”的资料：这些资料不一定与某一代特定的IMT相对应，因为成员的基础标准尚不清楚，但总体而言，IMT-2000、IMT-Advanced、IMT-2020和IMT-2030分别被称为3G/4G/5G/6G。此外，全球移动通信系统（GSM）、EDGE和通用分组无线电业务（GPRS）等较早可用的技术被市场称为“2G”，在国际电联的文件和规则中可以被认为是“前IMT”或“前IMT-2000”的技术。

第1章 – 上一研究期（2018-2021年）的研究结果概述以及当前研究期（2022-2025年）的范围

1.1 引言

据估计，世界上仍有26亿人未接入互联网，其中大部分生活在发展中国家（包括最不发达国家（LDC）、内陆发展中国家（LLDC）和小岛屿发展中国家（SID））的农村和偏远地区。在某些情况下，即使提供了连接，其速度也通常无法实现有意义的数字服务连接。因此，总体上对宽带连接的需求很大，包括地面和非地面高速高质量宽带网络技术，这些技术可支持用户所需的最常见的宽带应用，促进实现数字公平和可持续发展目标（SDG）。

1.2 上一研究期（2018-2021年）研究结果概述

2018年至2021年研究期第5/1号课题报告指出，通过部署适合农村和偏远地区的下一代高速地面和非地面移动网络以及固定宽带有线和无线传输系统等新兴技术，安装经济高效且可持续的数字基础设施，是需要进一步研究的一个重要方面。

报告强调，供应商社区需要提供宽带互联网连接，以支持最新的电子服务，从而提高农村和偏远地区居民的生活质量。现有的网络系统主要针对城市地区设计，而这些地区拥有充足的必要配套基础设施，包括充足的电力、建筑/居所、无障碍设施和熟练的人力，因此需要创新的解决方案来解决农村宽带连接相关问题。在新冠肺炎（COVID 19）疫情期间，缩小城乡数字鸿沟的必要性更加明显，因为疫情有可能阻碍可持续发展目标的实现，使至少27亿人在数字领域处于落后状态。

1.3 当前研究的范围

现有的网络系统主要针对城市地区设计，这些地区假定已经具备建立宽带电信网络所需的配套基础设施（充足的电力、建筑和居所、无障碍设施、熟练的专业操作技能等）。这就需要网络系统能够充分适应农村的具体需求，以便广泛部署。

电力短缺、地形复杂、缺乏熟练的专业技术力量、道路交通不便、网络安装和维护困难，这些挑战仍然影响着ICT基础设施向农村、偏远内陆地区和偏远岛屿的扩展。

这是一个需要详细研究的案例，以应对在农村和偏远地区部署经济高效、可持续的下一代宽带ICT基础设施所面临的挑战，而且这些研究需要考虑到数字化转型和社会创新的需求。

更新有关农村和偏远地区宽带数字连接、宽带服务的采用和使用、能力建设和适用政策的研究非常重要，特别是在发展中国家，包括LDC、LLDC和SIDS。因此，本报告更新了关于农村和偏远地区宽带数字连接的研究，涵盖以下方面：

- 上一研究期（2018-2021年）研究结果概述；
- 影响农村和偏远地区ICT的提供以及宽带数字基础设施可用性的现代技能、技术和可持续且成本高效的解决方案；
- 缩小数字鸿沟的政策、机制和监管举措；
- 网络和服务可持续发展的商业模式；
- 整合和推广面向农村和偏远地区的互联网应用；
- 结论和导则。

1.4 方法

本研究组采用的方法包括收集文稿、分析文稿并总结内容，以便纳入本报告适当的章节；收集和分析案例研究；组织讲习班并分析结果。

第2章 – 影响农村和偏远地区ICT的提供和宽带数字基础设施可用性的现代技能、技术和可持续且经济高效的解决方案

本章介绍了多种可以促进和增强ICT服务提供和宽带基础设施可用性的技能、技术和经济高效的解决方案。

可促进农村和偏远地区宽带连通性的技术包括光缆、5G移动网络、对地静止、低地球轨道和多轨道卫星系统、无线网状网、Wi-Fi（包括Wi-Fi 6和6E）、电视空白频谱（TVWS）技术、Li-Fi（光照上网）技术、低功耗广域网（LPWAN）、网络功能虚拟化（NFV）和软件定义网络（SDN）。正如本报告所示，扩大ICT提供的最佳技术或技术组合往往取决于当地情况和消费者需求。

通过利用节能、绿色基础设施来部署这些ICT技术，并利用包括太阳能、风能和水电在内的可再生能源为其供电，可以确保其长期的环境可持续性。

ICT项目的经济可持续性可通过各种解决方案来支持，包括基础设施共享、社区拥有的网络、众包和开源解决方案、社区主导的全面通信举措以及开源软件和硬件、低成本基础设施（例如竹塔等）、社区驱动的网络部署、公共Wi-Fi热点、以农村为重点的初创企业、社会创业模式、补贴方案和政府举措。

私营部门投资、合作筹资和公私伙伴关系（PPP）等筹资技术以及数字素养和技能开发、本地内容和服务开发等刺激需求的技术，也有助于增加农村和偏远地区ICT的部署。

为了更全面地理解这些技术的好处，需了解以下几个分议题，即：

- 服务质量（QoS），包括维护和运营方面
- 以经济和社会指标为基础，在农村和偏远地区可持续地部署网络和服务
- 融资机制，包括普遍服务基金（USF）
- 社区网络（CN）

2.1 服务质量，包括维护和运营方面

在农村和偏远地区提供有意义的连接受到一系列独特且相互强化的挑战的影响，这些挑战既有经济和技术方面的，也有社会和政策方面的。

人口稀少的农村和偏远地区的网络维护成本更高，而且投资回报率（RoI）通常不高²。

² 法国国际商会提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0078/>。

大多数关于农村和偏远地区连通性的讨论都忽略了一个事实，即如果要缩小城市与农村/偏远地区之间的数字鸿沟并促进数字包容性，仅有网络覆盖是不够的。连接必须配合高服务质量（QoS），国际电联将其定义为“电信服务的全部特征，这些特征影响到电信服务满足用户明确和隐含需求的能力”。³要确保QoS，就必须定期进行网络监控、维护、系统升级以及定期和不定期的维修和维护。

服务质量受益于国家在网络和服务提供方面促进投资、竞争和创新的举措，正如网络和服务的利用可能受益于国家在数字素养和技能发展方面的投资，以及相关内容的开发，包括通过政府电子服务推动采用。

澳大利亚政府通过“偏远原住民电信（RICT）”计划，为向大约457个规模小且偏远的原住民人口（原住民）社区提供基本的公共电信服务提供资金。澳大利亚国家原住民机构（NIAA）与一家电信提供商签订了合同，负责监测、维护和提供这些服务，包括数据、提供系统升级、年度定期维护访问以及不定期维修和维护。要确保QoS，就必须定期进行网络监控、维护、系统升级以及定期和非定期维修和维护。为此，在澳大利亚，偏远社区的电信服务网络提供商也需要提供与QoS相关的服务⁴。

巴勒斯坦国的空间和地理区划⁵导致无法在约旦河西岸和加沙地带通过综合、连续的网络提供移动通信覆盖和服务。这极大地影响了无线通信服务的效率和质量。因此，可能有必要提供更适合该地区独特情况的新的质量和控制标准⁶。

根据**海地**的经验，电信网络和基础设施的被动复原力取决于设备和架构的质量和种类，而主动复原力则由电信运营商和服务提供商的反应或适应能力构成。必须强调的是，设备的质量和类型必须得到制造商的保证。冗余策略主要由服务提供商和电信运营商负责。此外，还需要改进现有架构，特别是在路由分集方面⁷。

2.2 以经济和社会指标为基础，在农村和偏远地区可持续地部署网络和服务

经济和社会指标是在农村和偏远地区部署网络和服务时的决策依据。国际电联成员采取了各种措施，以价格可承受和可持续的方式将ICT网络和服务扩展到无服务和不足地区。这些措施包括扩大国家光纤骨干网或信号塔等公共基础设施的接入、使用邮局和其他公共设施作为宽带接入的锚定机构、支持电力等公用事业的发展、政府支持扩大具体宽带接入技术的覆盖，以及固定无线接入（FWA）等。

通用基础设施接入

在**马达加斯加共和国**，国家光纤骨干网多年来一直由一家运营商管理，这使得最终用户的宽带费用过高，因为上游成本被转嫁给了他们。因此，监管机构决定开放国家骨

³ ITU-T E.800建议书(09/08)<https://www.itu.int/rec/T-REC-E.800-200809-I/> 值得注意的是，重点是将服务作为考虑的实体，而不是网络（鉴于可以使用多种网络来提供服务），也不将最终用户视为人（将“最终用户”可能视为机器）。

⁴ 澳大利亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0259/>

⁵ 巴勒斯坦不是国际电联的成员国；巴勒斯坦在国际电联的地位是由国际电联全权代表大会第99号决议（2018年，迪拜，修订版）决定的。

⁶ 巴勒斯坦国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0175/>

⁷ 海地提交的ITU-D文件<https://www.itu.int/md/D22-SG01-RGQ-C-0165/>

干网参与竞争。目前，两家运营商共享国家光纤骨干网市场。希望这一政策最终能大幅降低宽带接入价格⁸。

中非共和国通过数字经济和邮电部与南非移动电话网（MTN）全球公司建立了公私伙伴关系，对国家光纤骨干网进行商业开发，以连接城乡地区未获得服务和不足的人口，并保证国家光纤骨干网的价格在可承受的范围⁹。

同样，**不丹王国**政府通过其“不丹电信和宽带政策”创建了一个需求聚合项目，该项目开发了国家光纤网并向电信运营商出租接入权，以降低宽带资费，使所有市民都能负担得起。不丹的ICT行业在过去二十年中经历了快速增长，通过提高生产率促进了经济活动，并为国内消费者带来巨大利益¹⁰。

布隆迪共和国绝大多数人口生活在农村地区，自给性农业是其主要经济活动。出台连接农村地区的政策和战略，将有助于人口的经济和社会繁荣。国家发展计划¹¹（2018-2027）特别注重战略性ICT基础设施建设，包括全国各地的光纤、2G/3G/4G移动网络和社区电信中心¹²。

在**巴西**，政府制定了监管和经济激励措施，以刺激独立、充满活力和可持续的杆塔行业的发展，这对于巴西农村地区移动通信的未来发展至关重要。¹³

锚定机构和社区中心

许多国家的邮政网络提供了独特的关键国家基础设施，为未实现连接的社区提供有意义的连接并弥合数字鸿沟。互联邮政为数字经济的可持续和包容性发展提供必不可少的政务、商业和金融服务。**万国邮政联盟（UPU）**发起了“互联邮政”倡议，希望到2030年全球所有邮政网点都连接到互联网，从而为社区内其所服务的企业和个人实现实际的数字包容性。

在**印度**，**印度邮政**开展了一项大规模的邮局连通项目，利用多协议标签交换（MPLS）、无线/无线电频率（RF）、虚拟专用网（VPN）、宽带、国家光纤网（NOFN）/FTTH（光纤到户）和基于3G/4G用户识别模块（SIM）卡的连接等各种技术，将全国155 000个邮局联网。

在**意大利**，**意大利邮政**于2023年1月启动了Polis项目¹⁴，将邮局改造成数字服务中心（“case dei servizi digitali”），使7 000个人口少于15 000的城市能够方便快捷地获得各种公共行政服务。除了邮政、银行、包裹、保险和电信服务外，公民还可以申请户籍和公民身份证明、电子身份证、护照、新生儿税号、社会保障和司法证明以及其他各种服务¹⁵。

⁸ 马达加斯加提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0039/>

⁹ 中非共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0167/>

¹⁰ 不丹提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0048/>

¹¹ <https://www.presidence.gov.bi/wp-content/uploads/2018/08/PND-Burundi-2018-2027-Version-Finale.pdf>

¹² 布隆迪提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0054/>

¹³ 巴西提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0049/>

¹⁴ <https://www.posteitaliane.it/en/press-releases/posteitalianepoli-1476578364058.html>

¹⁵ 英特尔公司（美国）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0200/>

在**巴勒斯坦国**，电信和信息技术部（MTIT）制定了一项计划，利用现有的邮局网络作为一站式服务点。¹⁶

喀麦隆共和国的相关活动以可持续发展目标（SDG）为指导，旨在建立促进可持续发展和均衡连通枢纽。¹⁷

由于缺乏可靠且可无障碍使用的ICT基础设施，农村地区数字鸿沟持续扩大，这与当地电力供应的缺失或不足密切相关。鉴于能源获取与连通性之间的联系，国际电联出版物《从电力网到宽带互联网：农村连通性的可持续和创新型电力解决方案》¹⁸探讨了提供电力供应所面临的挑战，电力供应对于将农村地区连接到互联网至关重要。

俄罗斯无线电研究和发展研究院¹⁹开发了一种新的国内解决方案，向该国偏远地区提供通信。该解决方案是一个可完全自主供电的电信综合体。即使在北极条件下也可以使用。电力由安装在综合体的风能太阳能装置产生，生产出的电力储存在埋在地下的电池中²⁰。

政府对具体宽带接入技术的支持

尽管人们普遍建议政府在扩大宽带技术的使用方面采取技术中立的立场，但在某些情况下，政府对具体技术的支持有助于创造新的市场和新的机遇，从而缩小数字鸿沟。

ICC《提供普遍有意义的连接》白皮书²¹提供了一系列具体的政策方案，供决策者考虑、组合并针对其具体需求做出调整。白皮书借鉴了现实的案例研究，以探讨可互操作、无缝的ICT生态系统面临的各种障碍，并展示克服这些障碍的创新型方法。这一生态系统对于帮助人们从ICT中获益并获得进一步的发展机会至关重要。**布隆迪**的PaFEN项目旨在实现布隆迪数字基础设施的现代化，并扩大农村地区的高速连接。项目的“本地连接接入”分项目专门针对农村地区，这些地区针对网络扩展的商业激励不足以刺激投资。该分项目的主要目标包括：

- 通过填补覆盖空白，促进农村地区的高速接入；
- 促进服务不足地区数字基础设施的现代化；
- 促进数字包容性，特别是针对妇女和青年；
- 筹集私人资本支持连接基础设施的发展²²。

为了克服**中国**贫困、山区和偏远地区行政村居民的通信困难，工业和信息化部（MIIT）与财政部自2015年起通力协作，推进电信普遍服务，支持农村和偏远地区通信网络建设。截至2021年底，中国现有行政村已全面实现宽带接入，打通了农村地区进入数字经济时代的“信息大动脉”，长期困扰贫困地区的通信难题得到解决。这些措施为

¹⁶ 巴勒斯坦国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0104/>

¹⁷ SUP' PTIC（喀麦隆）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0036/>

¹⁸ <https://www.itu.int/en/ITU-D/Technology/Documents/Publications/From%20electricity%20grid%20to%20broadband.pdf>

¹⁹ <https://www.niir.ru/en>

²⁰ 俄罗斯联邦提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0068/>

²¹ 法国国际商会提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0078/>

²² 布隆迪提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0210/>

全面推进乡村振兴、加快农业农村现代化提供了坚实的网络基础。MIIT将按照农业高质高效、乡村宜居宜业、农民富裕富足的目标，引导高质量农村网络发展。中国逐年加大对农村5G网络建设的支持力度，并鼓励基础电信运营商在农村地区建设高质量的5G和千兆光纤网，逐步扩大覆盖范围，提高网络质量²³。

国际电联报告《ICT基础设施业务规划工具包 - 5G网络》2023年版²⁴审议了支持可持续5G技术推广的网络设计。5G网络具有扩大高速连接的潜力，但在许多发展中国家，采用5G网络仍是一项挑战。该工具包涉及评估5G项目可持续性的机制²⁵。

卫星

2024年4月，Telesat和加拿大政府就支持Telesat Lightspeed项目的21.4亿加元贷款的最终条款达成一致。预计，Telesat Lightspeed服务将于2027年启动，提供下一代企业级近地轨道（LEO）网络，提供具有复原力、高容量的连接²⁶。

亚马逊的目标是推出一个名为“柯伊伯计划”（Project Kuiper）的非对地静止（NGSO）卫星系统，该系统将扩大全球未连接和连接不足地区的连接，包括发展中国家的农村和偏远社区。柯伊伯计划将改善无法获得可靠、价格可承受的宽带的社区中单个家庭以及学校、医院、图书馆、企业和政府机构的连接。通过提供速度和延迟与传统光纤网络相当的网络服务，NGSO卫星可以帮助这些社区进入数字时代。^{27, 28}

在多米尼加共和国，INDOTEL-RD电信发展基金2021-2022年两年期项目计划“将未连接者连接起来”，通过为该国三个最贫穷、最不发达省份的八个社区安装互联网卫星套件实现了连接。在这些互联网卫星套件的基础上，利用Wi-Fi 5（802.11ac）技术在每个受益社区实施了无线互联网接入网，目的是为居民提供高效、高质量的连接。这些互联网卫星套件由Starlink根据SpaceX与INDOTEL之间的特许协议所规定的义务提供²⁹。

2.3 包括普遍服务基金在内的融资机制

数字连接和采用有不同的融资机制，大致可分为以下几类：

- 公共融资机制，包括普遍服务基金（USF）、政府拨款和补贴、公私伙伴关系（PPP）、国家宽带计划基金、缩小数字鸿沟计划、ICT投资税收优惠、国家支持的贷款和担保
- 私人融资机制还包括：风险投资和私募股权、企业社会责任倡议、众筹、私营部门主导的PPP、基础设施投资基金、电信公司投资
- 国际融资机制，多边金融机构也能提供很大帮助。

²³ 中华人民共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0041/>

²⁴ https://www.itu.int/en/publications/ITU-D/pages/publications.aspx?parent=D-PREF-EF.ICT_STRUCT_KIT-2023&media=electronic

²⁵ 电信发展局提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0081/>

²⁶ https://www.itu.int/dms_pub/itu-d/oth/07/31/D07310000040038PDFE.pdf

²⁷ 亚马逊提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0095/>

²⁸ https://www.itu.int/dms_pub/itu-d/oth/07/31/D07310000040037PDFE.pdf

²⁹ 多米尼加共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0167/>

还可以实施的创新型融资模式以及其他可行的模式包括现用现付模式、收入分成协议、社会影响债券、可持续ICT基础设施的绿色债券、基于社区的融资倡议、合作社所有制模式、汇集市场需求活动以及设备融资和补贴。

普遍电信服务

为了解决数字鸿沟问题，许多国家政府都设立了普遍服务基金（USF）。如果这些基金得到有效、高效地利用，可确保每个人，无论身处何地或收入水平如何，都能获得重要的电信服务。³⁰³¹ 任何普遍服务计划都需要确定由谁提供服务 and 由谁付费这两方面。为普遍服务提供资金的主要模式有以下四种：

- 单一运营商模式；
- 多运营商模式；
- 政府资助模式，和
- 补贴、频谱拍卖和被用于置换投资承诺的罚款³²。

制定面向家庭、学校、大学等的国家宽带和计算机方案对于实现数字公平、提升数字技能以及促进数字经济发展至关重要，各国可考虑利用普遍服务基金和开发银行等其他融资渠道支持这些方案³³。

阿尔及利亚人民共和国政府通过电信部与邮电管理局合作，并与各方面协作，根据该领域的现行法规，实施多种网络连接和覆盖项目。普遍电信服务已成为政府政策的核心支柱，旨在实现电信行业的社会公平和覆盖未覆盖地区。**阿拉伯叙利亚共和国**电信管理局通过制定一系列必要的监管规则来管理普遍服务的提供，这些规则旨在使每个人都能以适合各群体的价格和质量获得电信服务，无论其地理分布如何，同时不会给他们带来沉重的经济负担³⁴。

在**乌干达共和国**，乌干达通信委员会在通信普遍服务和接入基金的支持下，于2020年开展了一项分阶段试点项目，为农村家庭提供通信设备。为了评估该项目的影响，乌干达通信委员会（UCC）与全球数字包容性伙伴关系（GDIP）合作，评估该项目的影响和可持续性，同时重点关注社会经济影响、为受益者提供的数字技能培训的有效性以及用户满意度和体验等方面³⁵。

³⁰ 美国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0168/>

³¹ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0527/>

³² Axon Partners Group – [国际实践中常见的普遍服务模式及其影响](#)（第5/1号课题和第4/1号课题联合讲习班）

³³ 英特尔公司（美国）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0076/>

³⁴ 阿拉伯叙利亚共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0170/>

³⁵ 乌干达提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0246/>

世界银行数字化发展全球实践项目致力于为数字经济、政府和社会的繁荣发展奠定坚实的基础。通过分析工作计划和战略伙伴关系，如数字化发展伙伴关系³⁶，包括发达国家和私营部门捐助方，世界银行正与客户国密切合作，促进低成本先进技术和创新型商业模式的部署。该团队与世界银行、国际金融公司（IFC）和多边投资担保机构（MIGA）等全球团队合作，部署了一系列产品、服务和伙伴关系，以推进围绕关键数字化发展主题的全球知识，并支持各国确定和实施其数字化转型愿景。这项工作包括以赠款、贷款、担保和风险管理产品的形式向政府提供资金，以支持数字投资项目和实施政策改革³⁷。

社区网络（CN）

在全球范围内，越来越多的CN、市政网络和社会企业正在成功地将那些传统互联网服务提供商历来没有提供服务或提供服务不足的群体连接起来。虽然与其他连接方法相比，许多补充性连接和接入解决方案的启动成本较低，但获得政府资助也会对其成功大有裨益。获得额外政府资金可以带来显著的积极影响，尤其是这些解决方案通常在人口密度低的地区和低收入社区推出。通常情况下，在达到经济平衡和规模之前，只需要资金来帮助启动和维持CN。需要以创新的方式从公共和私营部门获得资金，以实现到2030年将未连接者连接起来的目标。在私营部门，关键是帮助宽带基础设施的资助者确定投资补充性连接和接入解决方案的机会。资助者可考虑参与混合资本结构，并确定这些创新性连接解决方案在其生命周期内不断变化的融资需求和资本结构。³⁸

关于补充性连接和接入解决方案创新筹资机制的建议：

- 尚未制定普遍服务计划的国家应考虑制定一项包括支持CN和其他小型运营商的计划，或设立基金以支持创新型连接项目。设立了USF的国家应考虑修订计划，将社区网络纳入其中，并/或专门针对CN创造更多的筹资机会。这可能需要一个单独的补助计划，支持公私伙伴关系（PPP），或提供低息贷款机会。例如，平价互联网联盟（A4AI）和Web基金会2018年的一份报告提出多边贷款机构帮助缩小包容性“差距”并研究如何腾出更多资源的方法³⁹。
- 在制定运营模式时，考虑免除CN的各种税收、监管和许可费以及进口费要求或降低费用。英国的千兆宽带优惠券计划⁴⁰是英国政府千兆项目（Project Gigabit）计划的一部分。千兆宽带优惠券计划将符合条件的农村地区的家庭和企业的需求集中起来，帮助不在千兆基础设施补贴（G采购范围内的对象支付部署千兆宽带基础设施的费用。千兆项目的重点是支持难以覆盖地区的接入，并利用政府补贴来补充（而不是取代）商业推广计划。该计划的运作方式是将某一地理区域的家庭和企业集中起来，由符合条件的宽带供应商提出一个项目提案，然后由该供应商直接获得“优惠券”资金。这有助于克服单个用户在尝试请求连接时可能遇到的限制，因为通过汇总一个地理区域的需求，这种商业模式在孤立的情况下可能并不可行。每张优惠券（每驻地一张，截至2022年）都是一次性捐助，价值高达4 500英镑，超过215

³⁶ <https://www.digitaldevelopmentpartnership.org/>

³⁷ 世界银行提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0070/>

³⁸ 《本地拥有的互联网基础设施的融资机制》第102-105页：<https://www.internetsociety.org/resources/doc/2022/financing-mechanisms-for-locally-owned-internet-infrastructure/>

³⁹ 《缩小投资差距：多边开发银行如何促进数字包容性》<https://a4ai.org/research/closing-the-investment-gap-how-multilateral-development-banks-can-contribute-to-digital-inclusion/>

⁴⁰ 千兆优惠券（Gigabit Vouchers）<https://gigabitvoucher.culture.gov.uk/>

家不同的供应商在该计划中注册，为英国广泛而多样化的通信市场提供支持。截至2023年9月，已有超过100 000张优惠券用于资助新的千兆位宽带连接到场所（家庭和企业）。该项目为各种规模较小的宽带供应商提供了支持。这促进了英国更加多样化、更具竞争力的宽带市场的发展。⁴¹

澳大利亚政府通过“偏远原住民电信”计划，为向大约457个规模小且偏远的原住民（原住民）社区提供基本的公共电信服务提供资金。根据这项安排，原住民社区可以免费使用公共电话和互联网服务（包括社区电话、Wi-Fi集线器和Wi-Fi电话）。从历史上看，建立这些服务的目的是为那些无法根据普遍服务义务获得或负担得起服务的非常偏远的原住民社区提供服务⁴²。

在沙特阿拉伯王国⁴³，农村宽带部署的重要激励措施包括税收优惠、补助金以及公私伙伴关系，以筹集资金用于服务不足地区的基础设施投资。

在美国⁴⁴，为了满足不同的社区需求，美国国家电信和信息管理局（NTIA）在“全民互联网”倡议下设计了多项计划，以解决包括部落民族和少数民族社区在内的缺乏连接的问题。这些计划同样旨在创造就业机会和新的制造业，促进数字技能，并解决接入的价格可承受性问题。这些计划包括：

- 宽带公平、接入和部署（BEAD）：BEAD提供424.5亿美元资金，通过资助美国各地的规划、基础设施部署和采用计划，扩大高速互联网接入。
- 部落宽带连接计划：这项计划耗资30亿美元，支持部落政府为将高速互联网引入部落地区所做的努力。为确保实现有意义的数字化转型，NTIA已拨款超过18.6亿美元，用于支持226个部落实体的网络部署以及设备和数字技能培训。
- 宽带基础设施计划（BIP）和连接少数民族社区（CMC）试点计划：BIP为各州和互联网提供商提供2.88亿美元，用于将互联网接入扩展到没有宽带服务的地区，尤其是农村地区。CMC认识到互联网接入对通过教育增加机会的重要性，提供2.68亿美元帮助为少数民族和部落社区服务的学院和机构购买宽带互联网接入服务和符合条件的设备，或雇用并培训信息技术人员。
- 数字公平法案补助计划：美国《数字公平法案》响应了“数字接入本身并不能带来变革或包容”这一重要原则，为三项新计划提供了27.5亿美元的资金，以帮助确保所有人和社区都能掌握必要的技能、技术和能力，从数字经济中充分获益。

南非共和国的经验强调激励措施对于实现农村宽带接入的重要性。这些激励措施包括税收优惠、补助金和公私伙伴关系（PPP），以筹集资金用于服务不足地区的基础设施投资。⁴⁵

⁴¹ 英国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0246/>

⁴² 澳大利亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0259/>

⁴³ 沙特阿拉伯提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0224/>

⁴⁴ 美国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0247/>

⁴⁵ 南非提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0249/>

GSM协会（GSMA）的农村连接创新基金旨在测试创新解决方案，为农村社区带来可持续的连接⁴⁶。该基金与沃达丰加纳公司（Vodafone Ghana）和MTN乌干达公司（MTN Uganda）合作，向iSAT Africa和NuRAN Wireless提供了两笔赠款，用于在乌干达和加纳部署移动网络站点。在乌干达，iSAT Africa与MTN Uganda合作部署了五个移动网络站点，这些站点采用了创新的解决方案提供覆盖，包括非混凝土塔、太阳能和开放式无线接入网（RAN）技术。在加纳，NuRAN与Vodafone Ghana合作，利用专用的低成本RAN设备和可再生太阳能在七个站点提供连接。这两个受资助项目都成功地为乌干达和加纳服务不足的地区提供了连接⁴⁷。

⁴⁶ GSMA（2023年），《加速农村连接：GSMA农村连接创新基金的见解》<https://www.gsma.com/mobilefordevelopment/resources/accelerating-rural-connectivity-insights-from-the-gsma-innovation-fund-for-rural-connectivity/>

⁴⁷ GSMA和Orange（法国）提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0203/>

第3章 – 缩小数字鸿沟的政策、机制和监管举措

本章探讨了旨在缩小数字鸿沟的各种政策、机制和监管举措。本章介绍了一系列政策、机制和监管举措，强调了缩小数字鸿沟和确保所有社区平等获取ICT所需的多层面方法。

3.1 城市与农村和偏远地区之间的数字鸿沟

普遍电信服务对个人、社会和国家都具有重要意义，也是社会进步和经济发展的主要推动力。

- **构建信息社会：**在信息社会中，普及电信服务能够弥合数字鸿沟，从而促进信息社会的发展。**布隆迪**的案例强调，一个国家经济和社会发展的固有组成部分是发展与所有形式的人类活动相关的信息管理能力和⁴⁸**阿尔及利亚**普遍电信服务的案例帮助调和区域差异和减少公民之间的不平等来促进区域凝聚力。⁴⁹
- **提升国家经济实力：**宽带普及率与社会经济发展水平密切相关。研究表明，在大多数发达经济体，宽带普及率与国内生产总值（GDP）增长和稳定呈正相关关系。⁵⁰
- **关爱特殊群体：**低收入人群和残疾人等具体人群是电信普遍服务补贴的主要受益者，使其能够以合理且可承受的价格获得电信服务。**阿拉伯叙利亚共和国**的案例强调，普遍服务政策和规章需要涵盖规则、程序、项目选择和实施标准以及预期发展指标增长的计算，如有具体需求人群的电信和ICT服务的无障碍获取，以及使用电信和ICT降低和管理灾害风险的可能性。⁵¹**泰国**的案例表明，普遍电信服务为市民们，特别是农村和偏远地区的居民、低收入群体、残疾人、儿童、老年人和社会经济地位低下的群体，提供了获取和使用基本电信服务的机会和发展。⁵²**布隆迪**的国家战略将普遍服务重点放在国家优先目标群体，例如残疾人、原住民和难民，以克服数字接入的障碍。⁵³在印度，印度政府于2019年发起了一项数字扫盲运动“Pradhan Mantri Gramin Digital Saksharta Abhiyan”（PMGDISA），该运动优先关注非主流群体，例如社会经济地位低下的群体、妇女和女童。PMGDISA致力于促进社会包容、减贫和农村全面发展。⁵⁴

根据本报告中介绍的文稿，造成城乡数字鸿沟的主要因素可概述如下：

⁴⁸ 布隆迪提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0054/>

⁴⁹ 阿尔及利亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0160/>

⁵⁰ 布隆迪提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0054/>

⁵¹ 阿拉伯叙利亚共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0170/>

⁵² 泰国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0186/>

⁵³ 布隆迪提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0187/>

⁵⁴ 宽带印度论坛（印度）提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0209/>

- **基础设施不足：**经济市场的发展会受到电信基础设施建设和普及不足以及政策和法规制定不完善的制约。**喀麦隆**强调，政府的开放政策和竞争性市场机制可以如何促进电信基础设施的发展⁵⁵。**中国和不丹**的文稿强调了地理条件的复杂性和多样性，例如山区、沙漠、高原和其他地理条件恶劣的地区，通常为偏远和农村地区，通常这些地区的电信基础设施建设和维护成本更高，⁵⁶且投资回报率（ROI）较低。**爱立信与华为、诺基亚和中兴通讯**联合提交的一份报告探讨了农村连接项目给网络运营商带来的一些挑战。每用户平均收入（ARPU）可能非常低，尤其是与城市和郊区相比，因此，商业投资案例通常相当薄弱。⁵⁸
 - **价格可承受性：**这一与互联网手机的价格可承受性相关的因素包括手机价格水平、用户收入水平、用户消费意愿和消费者信心等。**乌干达**强调，在高度父权制的家庭中，设备共享并不可行，因为使用设备的主要是男性。为了促进可持续性，这样的家庭结构需要一台以上的设备才能达到预期目标⁵⁹。移动数据的价格可承受性是另一个弥合数字鸿沟的主要障碍。全球约有41%的国家⁶⁰未达到国际电联关于移动宽带服务价格可承受性的标准，即移动宽带服务占人均国民总收入（GNI）的百分比中位数低于2%。影响移动数据价格可承受性的因素包括移动服务的价格水平和用户收入水平等。
- 来自**马达加斯加**的文稿强调了价格挤压带来的定价问题，由于上游成本转嫁给了最终用户，导致最终用户的宽带费用过高⁶¹。
- 中非共和国**强调，向全民提供高速网络宽带接入价格是该国面临的主要挑战之一，⁶²同时还伴随着可靠且价格可承受的电力，⁶³以及频谱的价格可承受性的挑战。**马达加斯加**的一项案例研究显示，一些运营商不愿负担频率分配价格，为最终就合适的价格达成一致进行了大量谈判⁶⁴。
- **缺乏读写能力和数字技能：**这一因素包括缺乏读写能力；不知道如何使用手机；不知道如何利用手机上网；没有时间学习如何使用手机上网；没有得到足够的支持来学习如何使用手机上网。
 - **缺乏认知：**一份来自**乌干达**的文稿强调，提高识字率是如何直接解决了与对相关设备和应用的认知和了解不足有关的采用和使用挑战。有必要专门针对受益者的需求开展持续的教育和培训活动，以确保受益者掌握必要的技能，以最大限度地提高使用率。⁶⁵
 - **对于网络安全的担忧：**这一因素包括对个人信息隐私泄露等风险的担忧。

⁵⁵ SUP'PTIC（喀麦隆）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0036/>

⁵⁶ 中国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0041/>

⁵⁷ 不丹提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0349/>

⁵⁸ 爱立信提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0010/>

⁵⁹ 乌干达提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0246/>

⁶⁰ GSMA：2023年移动互联网连接状况<https://www.gsma.com/r/wp-content/uploads/2023/10/The-State-of-Mobile-Internet-Connectivity-Report-2023.pdf>

⁶¹ 马达加斯加提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0039/>

⁶² 中非共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0189/>

⁶³ 电信发展局提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0060/>

⁶⁴ 马达加斯加提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0029/>

⁶⁵ 乌干达提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0246/>

3.2 ICT融入教育的战略、促进创新，以实现国民经济发展和增长

ICT在实现《2030年可持续发展议程》和构建全球包容性数字社会方面发挥着至关重要的作用。将ICT融入教育是促进数字技能发展和满足宽带需求的关键推动力。各成员国和实体提交的文稿强调了将ICT融入教育、促进创新以实现国民经济发展和增长的各种战略。本节对这些战略进行了总结。

促进数字包容性的整体方法包括电信网络和服务的接入、价格可承受的资费 and 终端以及培训，是实现数字包容的基础。⁶⁶

印度的一项研究提出了连接服务不足的农村和偏远地区的长期和短期方法，并混合使用这两种策略。⁶⁷

喀麦隆的一项研究强调了将数字扫盲计划纳入基础教育系统、高等院校和大学机构的必要性。⁶⁸

在**不丹**，一个名为“Druk研究与教育网”的研究和教育网于2018年建立，旨在将所有研究和教育机构、学校和医院互连起来，并为成员提供专用高速互联网连接（最高可达1Gbps）。⁶⁹

能力建设显然是缩小数字鸿沟的一个重要因素，这一点可以从国际数字技术女性专家网络（RIFEN）提交的关于在网络安全、农业和数字素养方面增强农村地区妇女和青年权能的若干文稿中看出，其中包括来自喀麦隆和布隆迪等国的案例研究。⁷⁰

布隆迪的一项研究介绍了连接农村地区的政策和战略，并强调一国经济和社会发展的固有内容是发展管理与所有形式的人类活动相关的信息的能力。⁷¹

世界银行数字化发展全球实践局帮助推动围绕关键数字化发展主题的全球知识，从而进一步帮助各国确定和落实其数字化转型愿景⁷²。**英特尔公司**强调了ICT与教育的结合的重要性，并指出计算机对于实现所有可持续发展目标、增强妇女和女童权能的计划及其他应用至关重要⁷³。

国际电联电信发展局（BDT）分享了有关IMT 2020/5G的信息，涉及技术援助以及向成员国提供的资源，以促进在各自国家和区域推进ICT基础设施、政策和战略的实施。⁷⁴

⁶⁶ 塞内加尔提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0392/>

⁶⁷ 印度提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0393/>

⁶⁸ SUP'TIC（喀麦隆）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0036/>

⁶⁹ 不丹提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0048/>

⁷⁰ RIFEN提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0371/>，<https://www.itu.int/md/D22-SG01-C-0374/>，<https://www.itu.int/md/D22-SG01-C-0377/>和<https://www.itu.int/md/D22-SG01-C-0396/>

⁷¹ 布隆迪提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0054/>

⁷² 世界银行提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0070/>

⁷³ 英特尔公司（美国）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0076/>

⁷⁴ 电信发展局提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0060/>

布基纳法索的一项研究强调了向受不安全和恐怖主义团体影响的地区和地方的消费者提供通信服务的经验。布基纳法索设立了一个支持基金，用于在电子通信行业实施特殊措施，为修复被毁坏的电信站提供资金。⁷⁵

为加强ICT领域的能力建设，**南非**成立了“.za”域名管理局（ZADNA），这是一个非营利性实体，负责规范和管理.za命名空间，确保命名空间的安全，特别是农村和偏远地区。⁷⁶

海地的一项研究探讨了该国在提高宽带服务采用率方面取得的进展，具体措施包括通过实施电子签名提升用户信心，并在全国范围内普及这一能力。电子签名能力与其他电子应用一道，成为有利环境中推动数字化转型的催化剂。⁷⁷

巴勒斯坦国的一项研究强调了电信和信息技术部发起的宽带普及举措和项目，包括利用现有的邮局网络作为一站式服务点，连接大多数服务不足地区的学校。⁷⁸

巴西的报告详细介绍了巴西国家电信局（ANATEL）如何成功利用众包和数据分析来确定连接差距，并制定规划，将宽带连接引入未连接地区。⁷⁹

在**莫桑比克共和国**，非营利组织Kamaleon开发了交互式移动数字单元（IMDU），该平台可通过拖车进行运输。IMDU旨在为发展中国家偏远农村地区及难以到达的社区提供ICT，特别关注残障人士及其他具有特定需求人群的需求。IMDU能够提供广泛的数字服务，包括电子教育、远程医疗、农村银行业务和电子政务服务，促进社会经济发展和最弱势社区的公民参与。IMDU采用基于“通用学习设计”的通信方法，致力于推动农村社区的数字包容性。⁸⁰

阿根廷共和国概述了联邦培训计划，这项计划旨在发展ICT行业的技术和数字技能，主要是在联邦光纤网已经或将要开通的地方，从而为当地的青年和成年人提供就业机会。⁸¹

印度尼西亚共和国强调了渔民包容性通信计划，以解决因渔民对频率的不当使用而对航空移动业务（AMS）频率造成干扰的问题。⁸²

在**塞内加尔**，“塞内加尔渔业无线解决方案”（WISE）项目利用先进的无线技术来提高小型渔业和加工经营者的收入和生计，支持可持续的捕鱼方式，改善渔民的安全和保障。⁸³

保加利亚共和国的报告表明，为了在该国许多地区部署超大容量网络（VHCN），需要投资光纤网，以便向偏远和人口稀少的地区进行传输。⁸⁴

⁷⁵ 布基纳法索提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0173/>

⁷⁶ 南非提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0072/>

⁷⁷ 海地提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0369/>

⁷⁸ 巴勒斯坦国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0104/>

⁷⁹ 巴西提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0107/>

⁸⁰ Kamaleon（莫桑比克）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0147/>

⁸¹ 阿根廷提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0180/>

⁸² 印度尼西亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0195/>

⁸³ 塞内加尔提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0149/>

⁸⁴ 保加利亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0304/>

3.3 用当地语言为原住民和有具体需求人士提供服务

语言、文化、身份认同和知识在促进包容性方面具有巨大的作用。保护和推广原住民语言对于保护文化遗产至关重要。为原住民和有具体需求的人们提供宽带服务，需要采取包容性的做法和措施，以确保机会均等，具体如下：

澳大利亚政府致力于向大约457个规模小且偏远的原住民（原住民）社区提供基本电信服务⁸⁵。

在**墨西哥**，联邦电信研究院组织了一系列讲习班，致力于将500多份信息资料翻译成40种原住民语言。⁸⁶墨西哥采取了多项措施促进原住民语言的使用，包括举办翻译讲习班和培训原住民语言口译员。⁸⁷

乌干达政府委托开展了一个项目，旨在促进农业各利益攸关方采用ICT4Agriculture创新技术，特别关注农村地区的小农户。⁸⁸

布基纳法索的一份报告指出，在实施国家战略时，需要遵循“可用性”、“价格可承受性”和“无障碍性”等指导原则⁸⁹。**Kamaleon（莫桑比克）**的案例研究强调了交互式移动数字单元（IMDU）的重要性，该单元在克服农村地区的无障碍挑战、满足残疾人和有具体需求人士方面发挥着关键作用。**Kamaleon（莫桑比克）**的另一份文稿颇有见地，强调了一般农村社区以及有具体需求人士在获取基本ICT服务方面面临的独特挑战。^{90 91}

这一目标成功的关键在于协作。政府、技术开发商和当地社区必须携手合作，确保不仅提供数字服务，而且确保真正的无障碍性。

3.4 促进中小企业（SME）发展

中小企业（SME）在弥合数字鸿沟方面可以发挥关键作用。各成员国已采取多项举措，推动SME发展，促进宽带连接的普及。

国际电联-亚太电信组织印度基金会重点介绍了用于增加**印度**宽带部署的策略，即通过公共数据办公室使用Wi-Fi连接，在印度通常称为Wi-Fi接入网接口。⁹²

大韩民国详细介绍了秘鲁独特的基础设施共享模式，该模式与其他基础设施模式相结合，通过农村移动基础设施运营商（RMIO）为秘鲁政府指定的农村和首选的具有社会利益的地点提供覆盖。⁹³

⁸⁵ 澳大利亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0259/>

⁸⁶ 墨西哥提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0101/>

⁸⁷ 墨西哥提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0098/>

⁸⁸ 乌干达提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0043/>

⁸⁹ 布基纳法索提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0173/>

⁹⁰ Kamaleon（莫桑比克）提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0007/>

⁹¹ Kamaleon（莫桑比克）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0147/>

⁹² 国际电联-亚太电信组织印度基金会提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0091/>

⁹³ 大韩民国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0026/>

互联网协会的一份文稿强调了为补充性连接和接入解决方案以及互联网交换点（IXP）营造有利的监管环境的重要性。IXP有助于为互联网流量创建更短、更直接的路径，这对于在发展中国家构建可持续的连接环境至关重要。⁹⁴

在研究了埃塞俄比亚联邦民主共和国和亚太地区的案例研究后，**英国Access Partnership**提出以下政策建议：

为了增强SME的能力，努力缩小数字鸿沟，政府、监管机构和行业利益攸关方必须合作制定有利的政策框架：

- 1) 员工队伍培训：**各国政府应与教育机构和科技公司合作，开设课程，使个人掌握网络技术、编码、数据分析、数字营销、电子商务和网络安全方面的技能。在**南非**，与政府和思科网络技术学院建立了公私伙伴关系，在政府办公室内设立了一个专用实验室。该实验室为政府雇员提供网络安全培训，利用网络技术学院的课程来提升他们的技能和知识。⁹⁵
- 2) 公私伙伴关系（PPP）：**促进强有力的公私伙伴关系，以增强数字基础设施和无障碍性，特别是针对农村和服务不足的城市地区的中小企业。
- 3) 监管沙箱：**专门为SME实施监管沙箱，以测试新产品和服务，而无需立即履行完全合规义务。⁹⁶

3.5 农村和偏远地区服务/设备的价格可承受性

在农村和偏远地区，服务和设备的价格可承受性以及获得价格可承受的互联网连接是确保数字化发展和缩小数字鸿沟的关键因素。世界银行的一份重要文稿概述了有助于建立有利于电信/ICT发展的环境的三种关键方法：

- 宽带连接、接入和使用；
- ICT产业与数字化就业；以及
- 数字数据基础设施。⁹⁷
- **阿根廷共和国**强调了通过社区主导的方法扩大农村地区连通性的努力。⁹⁸

在**喀麦隆**，**国家邮政、电信和信息通信技术高等学校**强调需要与其他国家合作，以解决连通性和专业知识方面的差距。⁹⁹

⁹⁴ 互联网协会提交的ITU-D文件<https://www.itu.int/md/D22-SG01-RGQ-C-0094/>

⁹⁵ BBC：思科如何弥合全球“数字鸿沟”以连通世界，见：<https://www.bbc.com/worklife/article/20240119-how-cisco-is-bridging-the-global-digital-divide-to-connect-the-world>

⁹⁶ Access Partnership（英国）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0401/>

⁹⁷ 世界银行提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0070/>

⁹⁸ 阿根廷提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0085/>

⁹⁹ SUP'PTIC（喀麦隆）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0036/>

中国提交的文稿强调了中国通过推广电信普遍服务的政策来提高农村互联网接入的努力。这些措施包括加强自上而下的规划、增加资金投入以及优化技术应用。¹⁰⁰

国际商会（ICC）《提供普遍有意义的连接白皮书》强调了可互操作、无缝的ICT生态系统在促进ICT和发展机遇方面的重要性，特别是在发展中国家。¹⁰¹

大韩民国的文稿讨论了农村移动基础设施运营商（RMIO）模式，该模式涉及在之前没有移动网络运营商（MNO）建立自己的网络的地区部署和运营网络设施。¹⁰²

坦桑尼亚实施了各种项目，包括为电信塔提供价值1.003亿美元的补贴以及向公立学校提供ICT设备和互联网连接。¹⁰³

南非的文稿强调了频谱拍卖的好处，并强调了电信运营商连接学校、诊所和医院、传统权力机构办公室、图书馆和政府服务中心的社会义务。¹⁰⁴

进步通信协会（APC）的文稿强调了社区连接提供商面临的挑战。协会强调，需要建立有利的监管环境和融资战略来支持小规模网络。¹⁰⁵

不丹的文稿强调了发展ICT基础设施对于改善网络连接和ICT服务采用的重要性。不丹信息通信部实施了多项战略，在国内部署高速宽带连接，包括向电信运营商提供基础设施建设补贴/激励，以及向运营商租赁基础设施。¹⁰⁶

布基纳法索的报告强调其致力于促进社会经济发展、环境可持续性和性别平等。¹⁰⁷

阿拉伯埃及共和国强调了埃及宽带战略在改善整个宽带生态系统方面的重要性。¹⁰⁸

中非共和国的一份报告重点介绍了该国如何实施战略和政策，以确保所有人都能使用宽带。欧盟和非洲联盟的资助促进了光纤的部署。¹⁰⁹

科摩罗联邦正在制定立法措施，筹集资金用于投资现代基础设施，并制定政策，在全国推广ICT服务。¹¹⁰在世界银行的支持下，科摩罗已着手重新起草2014年法律，并重新引入普遍服务基金。此举旨在满足第11号决议（2022年，基加利，修订版）以及第2号决议（2022年，基加利，修订版）附件2的要求，¹¹¹鼓励发展中国家继续努力，并通过激励性监管加大对普遍服务基金的投入¹¹²。

¹⁰⁰ 中国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0223/>

¹⁰¹ 国际商会（法国）提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0078/>

¹⁰² 大韩民国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0026/>

¹⁰³ 坦桑尼亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0085/>

¹⁰⁴ 南非提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0115/>

¹⁰⁵ 进步通信协会提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0071/>

¹⁰⁶ 不丹提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0048/>

¹⁰⁷ 布基纳法索提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0173/>

¹⁰⁸ 埃及提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0018/>

¹⁰⁹ 中非共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0167/>

¹¹⁰ 科摩罗提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0031/>

¹¹¹ WTDC《最后报告》，卢旺达基加利（2022年6月6-16日）https://www.itu.int/dms_pub/itu-d/opb/tdc/D-TDC-WTDC-2022-PDF-E.pdf

¹¹² 科摩罗提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0031/>

为解决贫困山区和偏远地区行政村居民的通信难问题，**中国**工业和信息化部与财政部联合推进电信普遍服务，支持农村和偏远地区通信网络建设¹¹³。**不丹**信息通信部利用USF向农村和偏远社区提供电话和入门级宽带服务¹¹⁴。

布隆迪的政策旨在“实现ICT的普遍接入，以促进经济增长，并在2025年之前成为ICT行业的高级培训中心和区域典范”¹¹⁵。

英特尔公司的文稿提供了有关计算机和宽带计划对家庭、学生和教育的重要性的信息，以及包括USF在内的多种融资机制¹¹⁶。

俄罗斯联邦对普遍服务基金的运作方式是指定一家网络运营商提供“普遍通信服务”。俄罗斯电信公司Rostelecom作为普遍通信服务的唯一指定运营商，通过免费Wi-Fi接入点的宽带扩展了网络连接，并通过现有的付费电话扩展了电话接入。¹¹⁷

中国的普遍服务政策包括：

- 争取财政补贴，加强财务管理；
- 部署和建设任务；
- 提供补贴资金，鼓励企业加大投资；
- 改善公共服务，加强基础设施建设；
- 促进新技术赋能，扩大支持内容。¹¹⁸

美国联邦通信委员会（FCC）负责USF的总体管理和监督，包括所有政策决策。USF包括以下四个关键计划：

- 连通美国基金：支持农村和其他高成本地区的服务
- 生命线：降低低收入消费者的费用
- E-Rate：降低学校和图书馆的费用
- 农村医疗保健：降低医疗保健服务的费用。¹¹⁹

¹¹³ 中华人民共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0041/>

¹¹⁴ 不丹提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0048/>

¹¹⁵ 布隆迪提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0054/>

¹¹⁶ 英特尔公司（美国）提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0076/>

¹¹⁷ 俄罗斯普遍服务基金https://www.itu.int/dms_pub/itu-d/oth/07/2e/D072E0000040029PDFE.pdf（2023年第5/1号课题和第4/1号课题联合讲习班）

¹¹⁸ 中国，弥合城乡数字鸿沟https://www.itu.int/dms_pub/itu-d/oth/07/2e/D072E0000040028PDFE.pdf（2023年第5/1号课题和第4/1号课题联合讲习班）

¹¹⁹ 美国（FCC），《普遍服务基金在农村和偏远地区建设宽带和数字基础设施中的作用》，https://www.itu.int/dms_pub/itu-d/oth/07/2e/D072E0000040016PDFE.pdf（2023年第5/1号课题和第4/1号课题联合讲习班）

英国的普遍服务做法包括义务模式。英国的宽带普遍服务义务（USO）于2018年通过立法确立，并由英国通信管理局（Ofcom）于2020年实施，以保障每个人都能在家中“使用‘良好的’固定宽带连接”¹²⁰。

埃及对USF的做法包括：

- 将无障碍性从基本电信服务扩展到4G和光纤部署；
- 将无障碍性扩展到包括区域和社区的覆盖；以及
- 无障碍性扩展到国家项目/举措¹²¹。

德勤开发的信息概览利用地理建模，提供了服务不足地区现有的宽带基础设施、接入和潜在服务情况。监管机构可利用该工具在农村、无服务和/或服务不足地区部署宽带基础设施，以确定普遍服务基金应在哪些领域进行干预¹²²。

APC拥有在私人投资和普遍服务基金都无法覆盖的地区建立“补充网络”的经验。APC还与互联网协会（ISOC）和Connect Humanity¹²³合作发表了一篇文章¹²⁴。

西非国家经济共同体（ECOWAS）战略规划认识到，数字化为该地区的发展挑战提供了解决方案，并指出需要努力保障普遍接入。各国政府还重点关注“性别数字鸿沟”和减贫问题¹²⁵。

新冠肺炎（COVID-19）疫情凸显了连通性的重要性，无论是在宽带的采用还是数字技能的提升方面。根据国际电联¹²⁶和A4AI¹²⁷的报告，由于治理不善、目标不明确或无法衡量、协调不力以及资源分配过程不公，USF一直未得到充分利用，哥斯达黎加的“联网家庭”和多米尼加共和国的“将未连接者连接起来”计划就是利用USF促进宽带采用的良好范例。同样重要的是，利用USF为无服务/服务不足地区建立数字技能计划。在美国，宽带公平、接入和部署（BEAD）计划提供了424.5亿美元，通过资助规划、基础设施部署和采用计划，包括ICT的使用、数字技能和劳动力发展，扩大高速互联网接入。该计划优先考虑没有互联网接入或接入速度低于25/3 Mbps的无服务地区以及接入速度低于100/20 Mbps的服务不足地区。¹²⁸

¹²⁰ 英国 – 《普遍服务：英国的经验》https://www.itu.int/dms_pub/itu-d/oth/07/2e/D072E0000040023PDFE.pdf（2023年第5/1号课题和第4/1号课题联合讲习班）

¹²¹ 埃及 – 《增强ICT服务的无障碍性》https://www.itu.int/dms_pub/itu-d/oth/07/2e/D072E0000040017PDFE.pdf（2023年第5/1号课题和第4/1号课题联合讲习班）

¹²² 德勤 – 《如何确定普遍服务基金（USF）应首先在哪些领域进行干预？》https://www.itu.int/dms_pub/itu-d/oth/07/2e/D072E0000040020PDFE.pdf（2023年第5/1号课题和第4/1号课题联合讲习班）

¹²³ <https://www.apc.org/en/pubs/financing-mechanisms-locally-owned-internet-infrastructure>

¹²⁴ AlterMundi和APC实验室 – 社区网络 – 发言https://www.itu.int/dms_pub/itu-d/oth/07/2e/D072E0000040035PDFS.pdf（2023年第5/1号课题和第4/1号课题联合讲习班）

¹²⁵ 塞内加尔 – ECOWAS普遍服务机制和普遍服务基金将如何演进？https://www.itu.int/dms_pub/itu-d/oth/07/2e/D072E0000040025PDFE.pdf（2023年第5/1号课题和第4/1号课题联合讲习班）

¹²⁶ https://www.itu.int/dms_pub/itu-d/opb/pref/D-PREF-EF-2021-ECO_FIN-PDF-E.pdf

¹²⁷ <https://webfoundation.org/docs/2018/03/Using-USAFs-to-Close-the-Gender-Digital-Divide-in-Africa.pdf>

¹²⁸ 英特尔公司（美国） – 促进ICT使用和数字技能的USF政策https://www.itu.int/dms_pub/itu-d/oth/07/2e/D072E0000040019PDFE.pdf（2023年第5/1号课题和第4/1号课题联合讲习班）

欧盟的普遍服务政策从单纯的电话扩展到宽带和互联网接入，并基于两大原则：可用性和价格可承受性。2020年的BEREC报告概述了“适足宽带”的最佳做法，成员国在建立自己的制度时也可借鉴。¹²⁹

国际电联的“普遍服务融资效率工具包¹³⁰”为政策制定者提供实用指导，帮助他们评估普遍服务政策以及使用/覆盖差距。国际电联Datahub¹³¹的资料来源于国际电联的三项主要调查：统计调查、资费政策调查和监管调查。重要的是要注意具有普遍服务相关数据的“Datahub”的各个方面，例如主管部门如何处理“[普遍接入/服务定义](#)”、融资和管理等议题¹³²。

在阿尔及利亚，电信普遍服务由运营商出资，并在全国范围内开展普查，覆盖所有地区，包括那些被归类为没有电话或互联网网络覆盖的白色地带。¹³³

在多米尼加共和国，作为普遍连接战略的一部分，Indotel正在实施一项计划，利用美洲开发银行（IDB）提供的1.15亿美元的资金，扩大连接，促进该国的数字化转型。¹³⁴

在阿拉伯叙利亚共和国，首先有必要制定一项普遍服务政策，作为在农村和服务不足地区部署电信和ICT服务的基本指南。¹³⁵

在泰国，普遍服务义务（USO）局确定了两个基本目的：

- 促进并发展电信网络及服务在本地和偏远地区的延伸。
- 为居住在本地和偏远地区的居民、低收入群体、残疾人士、儿童、老年人和社会经济地位低下的群体提供机会和发展。自2005年以来，泰国USO局已制定了四版USO总体规划。当前版本的第4号USO总体规划（2023年）针对宽带服务采用了普遍接入/服务框架政策。¹³⁶

在印度，普遍服务义务基金（USOF）一直是在该国农村和偏远地区建立高质量网络基础设施的幕后推手。通过USOF资助了多个项目，包括BharatNet旗舰项目，该项目包括部署海底电缆，为安达曼和尼科巴群岛以及拉克沙群岛沿线提供高速网络连接，安装移动信号塔和卫星连接，以确保为岛上未实现覆盖的偏远地区和村庄提供最后一英里连接，并提供资金支持，促进电信研究和设计生态系统。1999年的新电信政策规定，履行普遍服务义务（USO）所需的资源将通过“普遍接入税”来筹集，该税按运营商依据各类许可证所获收入的一定比例征收。经议会批准获得的7860亿卢比资金已用于实现USOF在发展和扩建电信基础设施方面的目标。截至2023年，作为USOF潜在资金来源的“普遍接入税”余额为7710亿卢比。¹³⁷

¹²⁹ https://www.berec.europa.eu/sites/default/files/files/document_register_store/2021/6/BoR_%2821%29_70_BEREC_Annual_Reports_2020.pdf

¹³⁰ <https://www.itu.int/itu-d/reports/regulatory-market/usf-financial-efficiency-toolkit/>

¹³¹ <https://datahub.itu.int/>

¹³² 国际电联 – 电信发展局关于USF的工作（第5/1号课题和第4/1号课题联合讲习班上关于[普遍服务融资效率工具包](#)、[普遍服务政策](#)、[农村连接的可持续和创新电力解决方案](#)的发言，2023年5月）

¹³³ 阿尔及利亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0166/>

¹³⁴ 多米尼加共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0166/>

¹³⁵ 阿拉伯叙利亚共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0170/>

¹³⁶ 泰国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0186/>

¹³⁷ 印度提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0206/>

在**中非共和国**，政府已与南非电信公司MTN Global签署了一项公私伙伴关系（PPP）协议，目标是通过将光纤基础设施的国家覆盖范围扩展到服务空白地区，在国内和国际光纤骨干网实现极高的速率，从而在该国整合和实施ICT服务。运营商的缴款率设定为各运营商上年度营业额的百分之二。这使电子通信和邮政监管机构（ARCEP）能够收回资金，以便为非农村和城市地区得不到服务或服务不足的人群提供服务。¹³⁸

布隆迪政府拟定了“PAFEN 2022-2027”项目，以支持数字经济的基础，耗资5000万美元。额外4200万美元的资金正在最终敲定中，该项目将延长至2028年8月。¹³⁹

只要城乡之间的数字鸿沟依然存在，就需要各方通力合作，共同应对农村社区面临的价格可承受性挑战。

3.6 农村和偏远地区新兴技术的整合与实施

数字连接是我们日常生活、获取知识和全球经济繁荣的基础。随着我们对通信的依赖不断加大，以及此类技术的规模和覆盖范围的不断扩大，进一步发展通信技术和网络的需求依然存在。¹⁴⁰

在农村地区，创新和新技术的出现可能有多种来源。然而，与城市相比，农村地区的创新通常有所不同，可以采取若干不同的形式。创新的采用需要与创新的发源地建立联系，同时需要获取和引进新技术的资源。¹⁴¹

在此背景下，**墨西哥**联邦电信研究院¹⁴²编写了一项题为“不平等及其对信息技术获取的影响”的研究，旨在评估移动终端与计算机的普及程度、移动服务覆盖范围以及固定互联网服务对国家发展所产生的影响程度。为克服农村地区连接基础设施的地理障碍，可考虑以下方面：

A 无线通信

移动网络：利用现有移动网络或扩大覆盖范围对于连接偏远地区至关重要。诸如4G、5G和6G等技术可提供高速互联网接入。

在无线网络覆盖方面，在**中国**，5G正快速向农村地区延伸。截至2024年8月底，中国累计建成400万个5G基站，实现了“县县通5G”的目标。¹⁴³

卫星通信：在没有地面基础设施的地区，卫星通信可能是一个可行的选择。卫星通信提供快速、灵活且安全的连接，无论在移动中、任何时间、任何地点，甚至偏远地区都能实现通信覆盖。¹⁴⁴运行在低地球轨道（LEO）的卫星可带来多重关键优势，包括为未连接地区提供连接的能力、支持灾难响应、增强网络弹性，并能与现有网络运营商共

¹³⁸ 中非共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0189/>

¹³⁹ 布隆迪提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0210/>

¹⁴⁰ Allen Ben和Al Rawi Anas，2021年，《创新和新兴的通信概念和技术》，Proc. R. Soc. A.4772021084420210844。

¹⁴¹ 加强农村地区的创新，<https://web.archive.oecd.org/2020-10-14/566726-Rural-innovation-background.pdf>

¹⁴² 墨西哥提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0185/>

¹⁴³ 中国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0407/>

¹⁴⁴ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0215/>

同开拓宝贵的新商业模式。^{145 146}通过鼓励地面电信运营商整合卫星通信，各国可以缩短城乡居民采用新技术的时间差。¹⁴⁷例如，通过采用卫星多波束有效载荷、高吞吐量卫星（HTS）等频率复用技术以及下一代软件定义卫星（SDS），可在不影响现有业务的前提下实施频谱共用机制，并推广重耕战略，以优化频谱使用，满足日益增长的无线宽带需求。^{148 149 150 151}

在**多米尼加共和国**，INDOTEL-RD电信发展基金2021-2022年双年度项目规划“连接未连接者”已执行了接入和基础设施两部分，通过为位于该国最贫穷、最不发达的三个省份的八个社区安装九个卫星互联网套件，为偏远的农村社区以及山区和未连接地区提供网络连接。¹⁵²

在**不丹**，向农村地区提供电信和广播服务面临着地理挑战，因此必须采用创新的解决方案。¹⁵³其中一项解决方案是南亚卫星（SAS）地面站网络，该网络在为传统基础设施尚未覆盖的地区提供关键通信服务方面发挥了重要作用。

网状网：建立无线网状网有助于构建分散、可自我维持的通信基础设施。网状网中的每个节点都可以充当中继器，从而进一步扩大覆盖范围。

高空平台台站（HAPS）：HAPS可用作地面网络的延伸，从太空和平流层提供通信覆盖。包括卫星和HAPS在内的非地面网络（NTN）解决方案可增加连通性，覆盖发展中国家和农村地区，确保灾害期间的无缝连接，并可用于提供三维（3D）移动覆盖。¹⁵⁴

B 有线通信

光纤网：虽然铺设光缆的成本高昂，但它能提供高速可靠的连接。在某些情况下，部署光纤基础设施是可行的，尤其是在具有关键或紧急需求的地区。

巴西制定了促进光纤基础设施部署的法规。缺乏长途电信基础设施（也称为回程）是为农村和偏远社区提供连接的主要挑战之一。为解决这一问题，ANATEL采用了两种监管策略：“履行义务”和“普遍化积分”（根据“公共机制提供的固定交换电话业务普及目标总体规划（PGMU）”由公众交换电话网（PSTN）主体运营商持有。¹⁵⁵“履行义务”是可累积适用的制裁方式，主管机关在依据便利性与时机性标准认定时，无论是否附加罚款，若强制要求特定行为或禁止特定行为能更妥善合理地实现公共利益，即可予以实施。适用“履行义务”时必须遵循合法性、合理性、比例性及经济性原则。“PGMU普遍化积分”是与服务提供商谈判达成的一系列义务，用于替代其他类型的强制性监管措施。此类举措具有监管性质，其他国家亦可参考采用。¹⁵⁶

¹⁴⁵ 亚马逊提供的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0095/>

¹⁴⁶ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0527/>

¹⁴⁷ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0109/>

¹⁴⁸ 沙特阿拉伯提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0224/>

¹⁴⁹ 南非提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0249/>

¹⁵⁰ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0454/>

¹⁵¹ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0455/>

¹⁵² 多米尼加共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0167/>

¹⁵³ 不丹提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0349/>

¹⁵⁴ 日本软银公司提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0402/>

¹⁵⁵ PGMU – Plano Geral de Metas de Universalização（普遍化目标总体规划）。

¹⁵⁶ 巴西提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0241/>

本报告第3.2节所述的“在保加利亚境内大规模部署数字基础设施”项目的目标是支持部署包括5G连接在内的超大容量网络（VHCN），重点关注人口较少和偏远的农村地区。¹⁵⁷在印度，有一个项目旨在将光缆连接扩展至所有26万个村庄主管部门。¹⁵⁸在该方案中还有一项规定，利用光缆或替代技术将连接延伸到附近的38万个村庄。该项目已耗资约50亿美元，并计划在未来十年内再投入约160亿美元。

数字用户线路（DSL）：DSL技术可在现有电话线上使用，在无法铺设新电缆的地区提供宽带连接。

电力线通信（PLC）：在电力基础设施比专用通信基础设施更容易获得的地区，使用电力线进行通信是一种选择。

由于缺电导致缺乏可靠、可无障碍获取的ICT基础设施，农村地区的数字鸿沟正在扩大。国际电联开展的一项研究旨在协助成员国，通过整合现代节能技术（如无线电力和电力线通信）来升级其网络。¹⁵⁹

互联网交换点（IXP）可改善流量，帮助人们获得更实惠、更快、更好的互联网服务。¹⁶⁰

C 新兴技术

物联网（IoT）：实施IoT设备可帮助农业、医疗保健和基础设施监测等多个行业，提高效率和生活质量。

可再生能源：利用可再生能源可以应对供电挑战。例如，太阳能通信系统可以在偏远地区发挥有效作用。

电视空白频谱（TVWS）：将电视频谱中未使用的部分用于互联网接入是有益的，尤其是在农村地区。国际商会进行的一项案例研究表明，由于TVWS处于较低频段，信号传输距离较长，可以穿透许多障碍物，因此在偏远地区非常有用，因为这些地区的地形可能会阻碍其他依赖于从基站到天线之间清晰视距的固定无线接入（FWA）技术。¹⁶¹另一方面，无线电频谱不同部分中的一些其他频谱源也可用于为城乡地区提供移动宽带无线接入服务。南非利用补充频段IMT700、IMT800、IMT2600和IMT3500开展了此类研究。¹⁶²

除这些补充频段之外，非洲电信联盟建议政策制定者还可以考虑允许市场参与者之间进行自愿频谱交易，以便专注于服务农村地区的市场参与者可以获得必要的频谱，而这些频谱可能被原许可证持有者闲置，因为其战略计划可能不包括农村网络部署。¹⁶³

这样就可以利用认知无线电技术，共用划分给电视广播机构但在地理上未使用的频谱，并确保不会对现有的电视广播业务造成有害干扰。¹⁶⁴

¹⁵⁷ 保加利亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0304/>

¹⁵⁸ 印度提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0393/>

¹⁵⁹ 电信发展局提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0081/>

¹⁶⁰ 互联网协会提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0094/>

¹⁶¹ 法国国际商会提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0078/>

¹⁶² 南非提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0115/>

¹⁶³ 爱立信提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0010/>

¹⁶⁴ 印度ITU-APT基金会提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0435/>

D 社区参与和教育

让当地社区参与规划和实施进程对于技术举措的成功和可持续性至关重要。

马达加斯加的文稿显示，有必要对日常使用这些技术的群体进行能力建设。¹⁶⁵

泰国国家广播电信委员会得出结论认为，从长远发展来看，偏远地区提供数字服务的基础设施并不能保证扩大这些地区用户对宽带互联网服务的采用¹⁶⁶。为了促进社区参与和开展教育，阿拉伯叙利亚共和国设立了电子公民服务中心，目的是在同一地点提供多种服务，减轻公民的负担。¹⁶⁷在乌干达，向农村和偏远地区的家庭提供了电网和太阳能智能手机设备。这些设备预装了6个月的一次性启动数据套餐。在以下关键指标方面注意到了积极转变：教育赋权、促进经济发展、改善通信、促进健康和信息获取。¹⁶⁸

E 政府和非政府组织举措：

政府和非政府组织可在资助和支持偏远地区的技术项目以及利用物联网（IoT）、人工智能（AI）等创新技术和可再生能源解决方案方面发挥关键作用，可提高农村和偏远地区整合和实施新兴技术的效率和有效性。¹⁶⁹

在此方面，塞内加尔的WISE项目是政府和非政府组织举措的一个很好的示例。¹⁷⁰与许多其他非洲国家一样，乍得共和国政府也采用了ICT，以弥补该国在基础设施方面的一些不足，从而实现经济一体化，获得收益。¹⁷¹

为了利用电信/ICT建设包容性社会，惠及肯尼亚社会中的弱势群体，包括妇女、青年和残疾人，肯尼亚共和国政府¹⁷²在其国家USF的帮助下，正致力于通过利用电子农业内容和利用现有的数字基础设施来促进无障碍获取和包容性。虽然该计划是一项全国性计划，但优先考虑的是农村地区。

作为多米尼加共和国¹⁷³普遍连接战略的一部分，Indotel正在实施一项计划，利用美洲开发银行（IDB）提供的1.15亿美元的资金，扩大连接，促进该国的数字化转型。为了促进布隆迪农村和偏远地区的高速接入，启动了名为“布隆迪政府支持数字经济基础”的项目，因为在这些地区网络扩展的商业激励措施不足以吸引投资。¹⁷⁴在政府和非政府组织举措的背景下，在农村和偏远地区整合和实施新兴技术方面，秘鲁的农村移动基础设施运营商（RMIO）模式可被视为另一个很好的范例¹⁷⁵。RMIO是一种电信模式，专门面向偏远农村地区的小社区提供语音和数据服务。2022年，在国际开发银行的协助下，大

¹⁶⁵ 马达加斯加提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0029/>

¹⁶⁶ 泰国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0186/>

¹⁶⁷ 阿拉伯叙利亚共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0199/>

¹⁶⁸ 乌干达提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0246/>

¹⁶⁹ <https://utilitiesone.com/transforming-rural-areas-infrastructure-development-in-remote-regions>

¹⁷⁰ 塞内加尔提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0149/>

¹⁷¹ 乍得提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0303/>

¹⁷² 乍得提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0316/>

¹⁷³ 科特迪瓦提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0116/>

¹⁷⁴ 布隆迪提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0210/>

¹⁷⁵ 韩国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0026/>

韩民国政府和危地马拉政府开展了一个项目，研究当前危地马拉共和国西北地区的数字鸿沟问题。重点关注西北地区数字鸿沟严重的四个省。¹⁷⁶

这一联合协调项目协助危地马拉制定与农村和偏远地区相关的ICT政策，并加强两国之间的合作，通过分享知识和做法来帮助缩小危地马拉农村和偏远地区的数字鸿沟。

透明度是整合和实施新兴技术的一个重要方面。为了增进透明度，美国国家电信和信息管理局（NTIA）创建了一个资金数据库，供公众在线查询美国各州/领地“全民互联网”拨款的发放情况¹⁷⁷。这使公众能够了解资金流向、项目状况和支出金额。

在农村和偏远地区整合和实施新兴技术，在弥合数字鸿沟、促进经济增长和提高生活质量方面具有巨大的潜力，但前进的道路上挑战和机遇并存。诸如5G、6G和LEO卫星网络以及HAPS等无线通信解决方案已成为克服地理障碍的可行选择，在传统基础设施不足的地区提供可扩展的连接。与此同时，有线通信（通过光纤扩展）在可靠性和速度方面仍然是不可或缺的方式，但其部署往往受到偏远地区高成本和崎岖地形的阻碍。包括人工智能驱动的网络优化和太阳能基站在内的新兴技术，通过提高效率和可持续性，并针对农村和偏远地区的独特需求量身定制解决方案，进一步强化了这些举措。

除了这些技术进步外，还需要补充性的行政措施。社区参与和教育对于确保采用、长期成功和可持续性至关重要。通过培训计划和讲习班等方式促进本地参与，提高居民有效和高效利用这些工具的能力。为了实现这一目标，政府和非政府组织的举措发挥着关键作用，提供必要的资金、政策框架和公私伙伴关系，以抵消经济制约因素并加速部署。类似于上述各类项目或各国普遍服务基金的案例表明，通过协调一致的努力，可以将通信网络延伸至最偏远的地区。

¹⁷⁶ 韩国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0230/>

¹⁷⁷ 美国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0247/>

第4章 – 网络和服务可持续发展的商业模式

本章重点探讨如何改善农村和偏远地区的电信接入，涵盖以下议题：经济高效的连接服务日益普及、符合国家法规的补充接入与乡村网络的作用、服务与设备的可承受性，以及普遍服务基金在农村和偏远地区的有效运用。所提出的各种方法共同致力于弥合数字鸿沟，确保更广泛的数字包容性。本章在相关小标题下对这些问题进行了研究。

4.1 提高电信服务的可用性，以更低的成本提供增强的连接

实现连接的最佳解决方案并非仅仅依靠单一技术，而是多种技术的结合。电信基础设施的日益普及彻底改变了连接方式，增加了高速互联网和移动服务的使用，同时提高了更广泛人群的经济承受能力。虽然取得了这些进步，但在充分满足所有农村社区的需求方面仍然存在挑战。

提供商需要找到创新的连接基础设施的方案，以应对建设和维护昂贵的网络基础设施中的固有风险。实践证明，私营部门与公共部门、投资银行和当地非政府组织相结合的合作模式是成功的。

在**多米尼加共和国**¹⁷⁸，Indotel正在实施一项计划，利用美洲开发银行（IDB）提供的1.15亿美元的资金，扩大该国的连接，促进数字化转型。预计到2026年，该地区至少将有64个中低人口密度的城市地点拥有基于光纤到户（FTTH）基础设施的接入网络。受益人数估计为144 973人。此外，Indotel电信发展基金2021-2022年双年度项目计划“连接未连接者”实施了接入和基础设施部分，为八个社区安装了九个卫星互联网套件。这些套件是使用Wi-Fi 5（802.11ac）技术实施无线互联网接入网的基础。Starlink公司根据SpaceX与INDOTEL之间的特许协议义务提供了这些互联网套件。

在**秘鲁**¹⁷⁹，西班牙电信、Facebook以及两家区域开发银行：IDB Invest和CAF，合作创建了IpT Peru，这是一家农村移动基础设施运营商（RMIO）。这项举措引入了一种新的商业模式，其风险投资属性不同，对投资回报（ROI）的要求也较低。

RMIO模式是一种基础设施共享方式，用于在农村地区和秘鲁政府指定的具有特殊社会利益的地点部署和运营网络设施。RMIO在移动网络运营商（MNO）没有网络的地区向MNO提供批发服务。这种方法有助于克服这些地区投资回报率低的挑战。

截至2021年11月，共有七家RMIO在农村和偏远地区向秘鲁的MNO提供批发服务，其中Mayu Telecom是2016年开始提供服务的第一家RMIO。

RMIO使用的典型技术包括用于回程的微波和卫星技术以及用于接入网的卫星技术。在秘鲁开展业务的Mayu和IPT这两家RMIO最初依靠卫星技术来部署网络。然而，随着这些运营商的扩张，他们面临着与卫星技术相关的严重成本问题。因此，由于明显的成本

¹⁷⁸ 多米尼加共和国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0166/>和<https://www.itu.int/md/D22-SG01.RGQ-C-0167/>

¹⁷⁹ 法国国际商会提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0078/>

问题，Mayu和IPT目前正在转向移动技术。¹⁸⁰RMIO面临的主要挑战是：由于信号质量差、天线未对准或外部干扰导致的高丢包率，主要是为克服树木高度（30-40米）所需的塔架成本高、由于道路缺失导致的高运输成本、不稳定的电力供应、网络管理困难，以及高昂的故障维修成本。

在美国¹⁸¹，由美国国际开发署（USAID）牵头的数字投资计划是一项混合融资举措，该举措与注重影响力的私营部门公司（包括投资基金经理和互联网基础设施开发商）合作，在新兴市场服务不足的社区扩大互联网连接和数字金融服务。

迄今为止，USAID利用美国政府提供的845万美元初始资金，支持数字投资合作伙伴筹集约5亿美元的投资资本。这些合作伙伴筹集了3亿多美元，投资了40个国家的68家互联网服务提供商（ISP）和金融科技公司。因此，这些公司从外部投资者那里额外筹集了12亿美元的资金。通过这一计划，USAID与Roke Telkom合作，在乌干达12个连接不足的地区建设固定无线基础设施，并提供价格可承受的批发服务。在目标地区之一的Yumbe，这一举措已将互联网覆盖扩大到20多万人，包括Bidi Bidi难民定居点的居民，同时使其他ISP能够使用这些基础设施，促进竞争并降低消费价格。

在加纳，30%的人口生活在农村地区，这些地区未实现连接或连接有限，通过一系列的公私伙伴关系实施了多项举措，以改善移动网络和ICT接入。

这些举措包括，由加纳电子通信投资基金（GIFEC）、移动运营商和私人投资者参与的三方合作模式，以优化资本支出（CAPEX）和运营支出（OPEX），部署UMTS 900农村星技术，安装由太阳能和电网供电的站点，三年内部署500个站点，另外部署2 016个站点，以覆盖加纳340万人口，建设社区信息中心（CIC），向农村社区提供获取政府信息和服务的途径，并授权使用800 MHz频段在农村地区部署4G。

移动行业继续寻求新的创新方式，为新地区的宽带技术提供资金并进行部署。从更轻、更容易安装的移动塔和太阳能设备，到部署开源虚拟网络来扩大撒哈拉以南非洲地区的网络覆盖，Orange中东和非洲公司使用更容易安装的更轻的移动塔，以及消耗更少能源且更容易升级到3G + / 4G的太阳能设备。此外，Orange还与中地球轨道卫星提供商合作，帮助连接内陆国家，并加入了非洲海底电缆联盟。在喀麦隆、刚果民主共和国、科特迪瓦、利比里亚共和国、布基纳法索和马达加斯加¹⁸²，Orange与非洲移动网络（AMN）、Vanu和NuRAN的伙伴关系使撒哈拉以南非洲地区的人们首次能够连接互联网，而在喀麦隆和刚果民主共和国部署700多个运营站点，则使得两百万居民能够获取从语音和数据到金融服务的数字移动服务。

6G旨在通过提供无处不在的连接、应对全球连接挑战以及支持联合国可持续发展目标（SDG）来弥合数字鸿沟。经国际电联于2023年6月批准，印度的6G技术旨在将可靠的宽带覆盖延伸至农村及偏远地区，为数十亿未获得服务或服务不足的人群提供连接。这项技术进步将通过为人类与物联网提供高质量连接，为企业和各行各业带来革命性的变化。¹⁸³

¹⁸⁰ 韩国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-RGQ-C-0026/>

¹⁸¹ 美国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0423/>

¹⁸² GSMA和Orange提交的ITU-D文件<https://www.itu.int/md/D22-SG01-RGQ-C-0203/>

¹⁸³ 印度ITU-APT基金会提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0435/>

对于许多服务提供商而言，固定无线接入（FWA）是节省运营成本和优化资本支出的替代方案，与光纤网络相比，其前期成本和每户覆盖成本更低。作为比较，挪威为FWA连接的农村家庭提供的补贴约为1 000美元，而瑞典为光纤连接的农村家庭提供的补贴则高出五倍，约为5 300美元。此外，服务提供商还可实现移动基础设施的更快覆盖和重复使用。在推出5G FWA的新兴市场中，**印度**的Reliance Jio最近承诺用5G FWA连接1亿个家庭和中小企业。¹⁸⁴

作为地面网络的扩展，不同轨道高度的卫星和高空平台台站（HAPS）可在传统网络无法覆盖的偏远地区提供价格可承受的连接。**尼日利亚联邦共和国**的21个州采用了这一方案，部署了500个农村站点，为150万人提供2G和3G连接。

正如第37号决议（2022年，基加利，修订版）所指出的，在地面、平流层和空间业务中，HAPS作为平流层业务的一个示例，将有助于弥合数字鸿沟。高空系统是在平流层飞行或漂浮的无人航空器，通常高度在20公里左右。它们可以是高空自由漂浮气球、飞船或动力固定翼飞机，使用太阳能或机载能源。相比卫星，HAPS平台离地球更近，可以从定向天线向地面投射较小的波束，从而增加了单位面积的传输能力。**GSMA**¹⁸⁵发布的白皮书总结了几种用例场景，例如绿地覆盖、减少白点、应急通信和灾后重建、城市空中交通的连通性以及扩展海上覆盖。**HAPS联盟**¹⁸⁶的文稿提供了有关HAPS的基本信息以及HAPS行业的技术进步¹⁸⁷，并为各国政府在其国家框架内实施适当的HAPS规则提出了监管建议。¹⁸⁸

亚马逊¹⁸⁹指出，非对地静止卫星轨道（NGSO）技术在弥合数字鸿沟方面具有优势，特别是低地球轨道（LEO）卫星，能为世界各地服务不足的人们（包括农村和偏远社区）提供高质量的宽带连接。亚马逊建议各国政府可采取多项措施，以支持LEO卫星网络部署，其中包括：

- 1) 简化NGSO卫星业务的监管流程。
- 2) 对客户终端和网络关口实施一般性授权和一揽子许可制度。
- 3) 建立透明和可预测的监管制度。
- 4) 保留卫星固定业务（FSS）和卫星移动业务（MSS）的频谱划分。
- 5) 通过促进竞争和技术中立的卫星法规。
- 6) 对卫星业务许可发放和授权采用合理的行政收费结构。
- 7) 在非歧视的基础上对卫星通信服务提供商和运营商进行许可和授权。

¹⁸⁴ 瑞典爱立信提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0426/>

¹⁸⁵ 高空平台系统：空中之塔（2.0版），<https://www.gsma.com/futurenetworks/resources/high-altitude-platform-systems-towers-in-the-skies-version-2-0/>。

¹⁸⁶ 日本软银提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0402/>

¹⁸⁷ 释放平流层的潜力（2024年第二季度）（<https://hapsalliance.org/pitch-deck/>）

¹⁸⁸ 为部署HAPS创造有利的监管环境（2024年5月）（<https://hapsalliance.org/publications/>）

¹⁸⁹ 美国亚马逊提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0095/>

在**北极地区**¹⁹⁰，解决物理环境造成的困难的技术解决方案涉及使用LEO连接作为网络的回程，然后通过移动网络分发到整个社区。

部署骨干基础设施有几种可供选择的方案，每种方案都适合不同的环境和需求。**巴西**¹⁹¹正在建设通往亚马逊地区偏远城镇和边境城市的光纤骨干网，通过将电缆埋入河床中，将对环境的影响降到最低。该网络总长14 596公里，服务于1 000万人口。

4.2 遵守国家监管的补充接入和乡村连通网络

各主管部门还可通过各种监管措施来支持乡村连通网络建设，包括频谱许可条件、为站点许可提供便利、允许使用国有资产（例如电线杆和可靠的电源），以及允许在诸如安全的园区内政府大楼附近设置无线电和天线塔以及微波链路。政策制定者还可允许网络运营商签订合作协议，共用无源基础设施部分，特别是在人口稀少和偏远地区。

增加补充接入和乡村连通网络的最关键措施之一是通过明确定义的许可条件对频谱进行战略性管理和划分。正如**爱立信、华为、诺基亚和中兴通讯向非洲电信联盟（ATU）**¹⁹²所阐述的，值得考虑的是，可以调整频谱许可条件，以促进和加速农村连接，包括采用技术中立频谱、为微波回程提供频段、市场参与者之间的自愿频谱交易、促进地面和多轨道基础设施的共存与合作，以及制定包含推动农村网络部署义务的特定频谱许可条件。此外，还可以通过利用未授权频谱（例如未使用的电视VHF/UHF频段）实现价格可承受的宽带连接，同时提高能效以降低基础设施成本。低频段频谱（包括未许可的1GHz以下频段和未使用的电视频道）特别适合农村和偏远地区，因其能够覆盖人口稀少地区的广阔范围。

各国的政策制定机构采用了富有想象力的方法来鼓励和改善许可频谱对农村的覆盖：

- 在**肯尼亚**，用于回程传输的频谱使用费计算公式包含一项优惠政策：位于偏远地区（特定标记线以北）的站点可享受50%的折扣。
- 在**罗马尼亚**，针对800/900/1800/2600 MHz频谱采用了类似时钟拍卖的程序。根据中标频谱块数量，要求800/900 MHz频段的中标者有义务覆盖数百个农村地区。中标者可在一定范围内选择覆盖区域，但最终不得遗漏任何区域。
- 在**德意志联邦共和国**，800/2 100/2 600 MHz频段拍卖规定，在农村地区覆盖义务完全履行之前，禁止在城市地区使用800 MHz频段。800 MHz频段运营商共同承担了农村地区的网络部署义务。
- 在**哥伦比亚共和国**¹⁹³，Anditel得到了信息通信技术部和国家频谱监管机构ANE的大力支持，后者制定了监管框架，实现对UHF频段空闲电视频道（即电视空白频谱（TVWS））的无需许可的二次接入。Anditel利用这项TVWS技术，提供了经济高效的最后一英里连接解决方案，可在农村和偏远地区提供远距离覆盖。

¹⁹⁰ https://www.itu.int/dms_pub/itu-d/oth/07/31/D07310000040036PDFE.pdf

¹⁹¹ 巴西提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0241/>

¹⁹² 爱立信提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0010/>

¹⁹³ 法国国际商会提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0078/>

- 在**巴西**¹⁹⁴，针对5G频谱拍卖（采用非资金筹集形式）的相关义务已被强制实施。预计将有570万人因此获得移动通信服务。

频谱的另一种创新用途是固定无线接入（FWA）。在诸如数字用户线路（DSL）、有线或光纤等固定业务覆盖有限的地区，通过4G或5G提供的FWA是一种成本效益日益提升的宽带替代方案。得益于更大的频谱划分以及4G和5G技术的进步，容量提升成为可能，提高了网络效率并降低了每千兆字节的成本。例如，2019年，**南非MTN公司**¹⁹⁵与爱立信合作推出了一项FWA业务，作为其光纤业务的补充方案，该服务通过MTN商业渠道及外部ISP进行销售。

在**马达加斯加**，800 MHz频段将用于在农村地区部署4G网络。该频段因其覆盖距离更远的特性，特别适合农村地区的覆盖。这使其成为连接偏远村庄的理想选择—这些村庄往往分散在十余公里范围之内。

此外，监管机构还通过了一项新政策，允许所有运营商为其传输网部署光纤。这将有助于提高比特率，从而改善向用户提供的服务质量。监管机构还在考虑几种方案，包括：

- 通过设立“全球”许可证，扩大运营商的授权服务范围，使其能够提供其他服务，从而进一步促进竞争，这对农村地区将大有裨益。
- 不断改进电信/ICT发展基金的使用，此次为运营商引入“付费或参与（Pay or Play）”机制。该机制将征收运营商营业额的2%作为基金来源。该项目包括两种方式，运营商可选择领取补贴用于部署站点，或自行部署由主管部门指定的站点，后者可免除其应缴纳的基金款项。¹⁹⁶

社区网络（CN）利用各种技术来构建本地互联网环境，其设备通常比商业互联网服务提供商（ISP）使用的设备更经济实惠。这种价格可承受性，再加上CN规模较小和地方特性，使其具有经济可持续性。它们还经常使用太阳能等可再生能源，增强了环境可持续性。然而，CN面临着一些障碍，例如获取融资机制、适当的许可以及频谱资源。在**格鲁吉亚**¹⁹⁷，Tusheti地区已接入一个提供前所未有的连接水平的CN。ISOC 2018年的报告《连接Tusheti》（Connecting Tusheti）详细介绍了有利的监管环境如何成为CN成功的关键。Tusheti项目受益于宽松的通信环境和各种国家支持机制。使用无线频谱不需要许可，建立社区Wi-Fi网络或作为互联网服务提供商（ISP）运营也不需要任何许可。只需简单的在线“一般授权”即可。

在**巴西**，为解决缺乏回程连接的问题，ANATEL根据“公共制度中提供的固定交换电话业务普及目标总体规划（PGMU）”，采用了两种监管策略：“履行义务”和“普遍化积分”。这些策略旨在连接2 188个农村社区，全面实施后可能惠及520万人。

- “履行义务”是制裁措施，当主管当局认为执行或不执行某种行为将更好地服务于公共利益时，可单独实施或与罚款同时实施。

¹⁹⁴ 巴西提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0241/>

¹⁹⁵ 法国国际商会提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0078/>

¹⁹⁶ 马达加斯加提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0029/>

¹⁹⁷ 互联网协会提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0094/>

- PGMU普遍化积分是与服务提供商谈判达成的一系列义务，以换取其他类型的强制性监管安排。例如，第10 610/2021号法令规定的最新PGMU规定，固定电话特许经营商有义务在2024年12月31日之前尚未建成光纤传输网（回程）的市镇、村庄、偏远城区和农村聚居区实施此类基础设施，以换取解除其他过时的义务。

4.3 农村和偏远地区服务/设备的价格可承受性

在农村和偏远地区提供宽带接入面临重大挑战，原因在于用户平均收入较低、资本成本高昂以及运营支出巨大。

正如**爱立信、华为、诺基亚和中兴通讯**所指出的，农村连接面临着两大挑战：高昂的部署和维护成本，以及较低的每用户平均收入（ARPU）。要解决这些问题，就需要经济高效的解决方案。利用现有的移动网络基础设施和资产有助于降低成本。采用全球标准实现的规模经济也降低了覆盖费用和移动设备成本，同时提升城乡漫游效益。

智能手机设备的成本大幅下降。然而，正如Sonatel¹⁹⁸所报告的，在**非洲**，5G终端的价格仍然高得令人望而却步，尽管一些国家启动了试点项目，但可用性仍不足以发展真正的生态系统。在GSMA调查的十二个国家中，有八个国家的受访者认为手机成本是阻碍他们使用移动互联网的最重要的原因。除手机成本外，其他成本（如费用和税收）也直接影响最终价格。例如，**卢旺达共和国**¹⁹⁹政府对低成本手机实行免税，以提高设备的价格可承受性。在非洲和中东，Orange与谷歌合作将Sanza Touch手机商业化，售价相当于30美元。

Morey是一项基于**赞比亚共和国**²⁰⁰的举措，致力于使智能手机和笔记本电脑对低收入人群，尤其是农村地区的低收入人群而言，更易于获得、价格更可承受。通过与中国制造商合作，并提供灵活的支付方式，如“先买后付”（BNPL）和政府支持的信用额度，Morey增强了人们获取基本技术的渠道，为教育、创业和数字包容性提供了支持。Morey力求到2025年将设备成本降低30%，建立本地组装厂，并将零售店扩展到500家，最终推动赞比亚及其他国家的经济增长和数字无障碍化。

设备融资也日益受到青睐，特别是在撒哈拉以南非洲地区，移动运营商、金融服务提供商、远程锁定技术公司等参与其中。例如，肯尼亚的Safaricom²⁰¹与谷歌合作，是首家通过其Lipa Mdogo融资计划扩大规模的运营商，目前有50万活跃用户通过分期付款购买手机。

乌干达²⁰²提出一项建议，在政府、私营部门和民间团体组织之间建立协调机制，以提供ICT设备。

¹⁹⁸ ITU-T第3研究组提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0016/>

¹⁹⁹ GSMA和Orange提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0203/>

²⁰⁰ 中国华为技术有限公司提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0416/>

²⁰¹ GSMA和Orange提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0203/>

²⁰² 乌干达提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0043/>

基础设施共享等一些工作由行业直接实施，以减少部署成本。GSMA²⁰³重点介绍了秘鲁Internet para Todos (IpT)的成功案例，这是一家由Telefónica秘鲁公司、Meta、BID Invest和CAF支持的批发网络运营商，致力于为**秘鲁**的农村城镇提供4G移动互联网连接。IpT采用开放创新的模式，通过无线接入网（RAN）共享、网络虚拟化和自动化，提供农村宽带基础设施批发服务。

无源基础设施共享与4G覆盖之间存在相关性。在**津巴布韦**²⁰⁴，运营商为了扩大覆盖范围和节约成本，越来越多地通过互换安排和租赁的方式共享铁塔。目前共享的通信塔共有1 058座。

津巴布韦正在各省加大ICT社区信息中心建设力度，以帮助社区边缘化成员获取ICT服务。迄今为止，已建成169个此类中心，以满足各社区获取社会和商业服务以及推广其产品和服务的需求。

4.4 有效利用普遍服务基金

许多国家政府利用普遍服务基金将电信网络扩展到服务不足的地区和农村地区。

在**阿根廷**²⁰⁵，ENACOM利用普遍服务信托基金批准项目，旨在通过在牌照持有者盈利能力不足的地区部署基础设施来缩小数字鸿沟。移动通信服务接入网部署计划的目的是为在固定网络效率低下的地区提供部署移动网络的资金。这种方法能在偏远地区实现经济高效且覆盖广泛的服务。该计划的创新之处在于，允许企业通过从每月向ENACOM缴纳的费用中扣除成本来为其项目提供资金。此外，项目中标者必须向其他ICT牌照持有者提供语音和数据自动漫游服务，且两年内不收取额外费用。该计划最初针对的是现有移动服务义务未涵盖的、人口不超过500人的地区。

在**坦桑尼亚**²⁰⁶，有两种主要的USF使用模式：

- 提供SMART补贴，通常用于电信铁塔建设，该基金覆盖运营商资本支出的40%，以及
- 为特定项目提供资金支持，同时覆盖支付指定时段的运营成本。例如，某项目允许用户在最初的30分钟内免费使用Wi-Fi，超时后需用户自行充值续费。

2021年，**埃及**²⁰⁷政府启动了针对农村和偏远地区的“体面生活”举措，涵盖约5 000个村庄，该举措承诺，这些地区将从2021年到2024年通过固定无线宽带分三个阶段实现连接。该项目旨在利用能在中短期内提供合适电信服务的宽带光纤到户（FTTH）技术，为4 500多个村庄（占农村地区的99%）提供服务。所需投资预计将按以下方式进行：240亿埃及镑来自政府资金，60亿埃及镑来自普遍服务基金，300亿埃及镑来自私营资本和基于收入的融资渠道。

²⁰³ GSMA和西班牙Telefonica提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0327/>

²⁰⁴ 津巴布韦提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0034/>

²⁰⁵ 阿根廷提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0076/>

²⁰⁶ 坦桑尼亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0085/>

²⁰⁷ 埃及提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0018/>

在加纳²⁰⁸，2008年《电子通信法案》（第775号法案）为设立加纳电子通信投资基金（GIFEC）提供了法律依据。该基金隶属于通信部，旨在为国内未获得服务和不足服务的社区提供基本电话服务的普遍接入。根据第775号法案第32节的规定，GIFEC的业务范围包括：推动电子通信普遍接入的实施、在服务不足和无服务的社区提供互联网接入点、推动能力建设计划、促进ICT融入未获得服务和不足服务的社区、为教育、职业和其他培训机构部署ICT设备。加纳已承诺投入1.55亿欧元用于补充普遍服务基金，以提升农村地区语音及数据服务水平，缩小数字鸿沟。

一些国家已将相关机制纳入其USF框架，以促进CN的发展并改善服务不足地区的连通性。阿根廷²⁰⁹已建立一个框架，通过设立USF机制来激励社区网络许可证的采用，并利用该基金帮助在服务不足的社区成立连接服务提供商。同样，在肯尼亚²¹⁰，国家监管机构近期颁布了社区网络运营商许可证，其2022-2026年USF战略正在探索融资机制，以支持这些网络和其他补充性连接服务提供商。

在津巴布韦²¹¹，USF通过被称为“创新驱动”的普遍服务基金信托创新计划扩大了其范围。这项举措旨在确定、支持和赋权津巴布韦的ICT创新者，帮助其将创意转化为面向本地和全球市场的可行解决方案。“创新驱动”为政府和公共机构的“创新中心”提供资金，用于采购工具和设备。值得注意的是，2022年举办的黑客马拉松产生了多个颇具前景的解决方案。

在印度²¹²，通过USF资助了多个项目，例如BharatNet项目，该项目包括部署海底电缆，为安达曼和尼科巴群岛以及拉克沙群岛沿线提供高速网络连接，安装移动铁塔和卫星连接，以确保为岛上未实现覆盖的偏远地区和村庄提供最后一英里连接，并提供资金支持，促进电信领域研究和设计的生态系统。

阿尔及利亚²¹³在2022年制定了一项计划，在全国范围内开展普查，覆盖所有地区，包括被归类为“白色地带”的地区，这些地区没有电话或互联网网络覆盖，或仅有2G移动网络覆盖，且人口不足2000人。该计划最终确定了全国范围内1400个地区的清单，以便根据普遍服务计划提供移动网络覆盖。

在乌干达²¹⁴，乌干达通信委员会的普遍服务和接入基金补贴计划旨在通过支持电信基础设施建设，扩大服务不足和无服务地区的宽带连接。通过为通信塔公司补贴塔架建设成本，该计划降低了移动网络运营商的资金门槛，鼓励其将网络覆盖延伸至经济上不可行的地区，这与乌干达《2040国家愿景》相契合，并为全球类似举措树立了典范。

²⁰⁸ 加纳提交的ITU-D文件 <https://www.itu.int/md/D22-SG01.RGQ-C-0027/>

²⁰⁹ https://enacom.gob.ar/multimedia/noticias/archivos/202106/archivo_20210625022117_4017.pdf

²¹⁰ <https://www.ca.go.ke/sites/default/files/CA/Universal%20Access/Draft-USF-Strategic-Plan-2022-2026-.pdf>

²¹¹ 津巴布韦提交的ITU-D文件 <https://www.itu.int/md/D22-SG01.RGQ-C-0041/>

²¹² 印度提交的ITU-D文件 <https://www.itu.int/md/D22-SG01.RGQ-C-0206/>

²¹³ 阿尔及利亚提交的ITU-D文件 <https://www.itu.int/md/D22-SG01.RGQ-C-0160/>

²¹⁴ 乌干达提交的ITU-D文件 <https://www.itu.int/md/D22-SG01-C-0430/>

通过实施电信普遍服务，**中国**²¹⁵农村信息基础设施建设取得了显著进展，已实现县县通5G，部分地区宽带接入水平已超过城市地区。到2023年底，农村互联网用户规模达到3.26亿，普及率为66.5%；农村宽带用户增长8.8%，达到1.92亿，增速超过城市地区。电子商务、5G智慧旅游等农村网络应用不断拓展，正在促进农村经济发展，以西江千户苗寨为例，2023年春节期间，旅游收入增长了532.5%。

在**巴西**²¹⁶，可以通过地方资金（例如电信服务普遍基金（FUST））以及5G拍卖的投资覆盖义务来鼓励FWA的部署。例如，到2026年，潜在的FWA项目可从普遍服务基金获得高达8.6亿美元的贷款，用于农村地区或棚户区（favela）的连通项目，包括基础设施和FWA用户终端设备（CPE）。

²¹⁵ 中国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0407/>

²¹⁶ 瑞典爱立信提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0426/>

第5章 – 整合并推广面向农村和偏远地区的互联网应用

正如2018-2021年研究期第5/1号课题报告所强调的那样，农村和偏远地区的电子应用和电子服务是发展的关键，因其能使这些地区的人们能够获得各种服务，包括社会、农业、卫生、金融和政府服务。

本章将提供此类应用的示例，重点是其与农村和偏远社区的相关性、其使用和无障碍性，并讨论了近期的发展和面临的挑战。

正如本报告前几章所述，数字服务的成功在很大程度上取决于对ICT行业的投资，²¹⁷以及提供稳健可靠的宽带连接，同时配备可靠和价格可承受的最后一英里接入。

本章讨论的电子应用和电子服务包括：

- 电子商务应用（第5.1节）
- 电子农业应用（第5.2节）
- 电子学习应用（第5.3节）
- 电子卫生应用（第5.4节）
- 详细的电子应用（第5.5节）

5.1 电子商务

电子商务应用与数字金融服务、电子政务服务共同构成了数字经济的基础。²¹⁸

电子商务应用使农村和偏远地区的居民能够访问本地、国家和区域层面的市场。互联网和手机应用也使生产商能够直接接触客户，而无需向中间商支付报酬。电子商务应用还能创造新的收入来源，刺激农村用户的收入增长。得益于农村地区的电子商务应用，中国农村网上零售总额从2015年的3 530亿元增长到2022年的2.17万亿元。为了使各项应用更贴近农村和偏远地区的居民，中国对不同网络社区的特点和需求进行了深入分析，然后开发和推广适合他们的互联网应用。²¹⁹

电子商务应用可惠及各类企业和公共机构。由**津巴布韦**普遍服务基金支持的黑客馬拉松活动所开发的综合电子商务平台**Tradata**，目前正在开发一项企业对企业（B2B）采购到付款服务，通过企业、政府和中小企业（SME）的采购、供应和物流流程的数字化、简化和优化来节约成本。²²⁰

²¹⁷ 埃及提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0018/>

²¹⁸ 同上。

²¹⁹ 中国提交的ITU-D第1研究组文件<https://www.itu.int/md/D22-SG01-C-0223/>和<https://www.itu.int/md/D22-SG01-C-0407/>

²²⁰ 津巴布韦提交的ITU-D第1研究组文件<https://www.itu.int/md/D22-SG01.RGQ-C-0041/>

电子商务应用的开发需要健全的法律基础和金融行业的数字化。**世界银行**数字发展全球实践局协助各国实现数字化转型，支持监管改革，以促进数字经济的发展。例如在斯威士兰王国，世界银行支持该国政府加强法律基础和制度框架建设，以促进电子交易、强化在线消费者保护，并推动数字化与非接触式支付的发展。²²¹

5.2 电子农业

在农村和偏远社区，农业部门雇佣了大部分人口，其中大多数是小农户。²²²全球80%的贫困人口生活在农村地区，主要从事农业生产，正如世界银行指出的那样：对他们来说，农业对于提高收入、改善粮食安全和减贫至关重要。农业对各国国内生产总值（GDP）的影响可达25%。同时，农业易受气候变化的影响，约占温室气体排放量的25%。因此，数字化是农民在日益复杂的世界中做出反应、适应和生存的关键，能提高其生产力，增强其竞争力，并最终使整个粮食体系更具韧性。²²³

肯尼亚政府通过其国家普遍服务基金（USF），利用现有的数字基础设施，通过利用电子农业内容，努力促进无障碍性和包容性。该举措目前的目标群体是青年和残疾人。虽然该计划是一项全国性计划，但优先考虑的是农村地区。²²⁴

海地关于2020年在两个城市成功开展试点项目的报告描述了（2020年）在试点项目中建立多媒体中心的情况。这些“BIEN中心”（bornes d'inclusion à l'économie numérique或数字经济包容中心）为农村和偏远地区的居民获得基本服务提供便利。BIEN中心还提供了平台，让农村和偏远地区的居民可以将其农业商品和服务商业化，并通过MonCash（一款由Digicel和Sogebank支持的移动银行应用程序）接收付款。由于安全局势，该试点项目不得不中止，但事实证明BIEN中心对居民有所帮助，并改善了他们的经济和财务状况。²²⁵

海地的情况也表明，ICT是网上交易的重要组成部分，有助于加强农村和偏远地区妇女的经济实力。²²⁶这一观点通过对个体女性的具体案例研究得到了印证。

自2021年以来，**阿塞拜疆**农村妇女协会（ARWA）为农村女性农民和女企业家组织了基础ICT技能培训，重点是可以立即适用的实用技能（例如上网、使用智能手机应用程序、在社交媒体上投放广告等）。目前，66%的ARWA成员掌握数字技能，并积极指导其他农村妇女。迄今已有520名农村妇女接受培训。项目评估显示，通过该活动获得赋权的团体平均销售额增长30%，利润提升20%。²²⁷

乌干达推出了一个全国性的电子农业门户网站，旨在促进农村经济和社会发展，尤其针对无服务或服务不足社区的小农户。²²⁸该门户的核心是一个综合决策支持服务平

²²¹ 世界银行提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0070/>

²²² 乌干达提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0043/>

²²³ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0111/>

²²⁴ 肯尼亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0316/>

²²⁵ 海地提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0023/>

²²⁶ 海地提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0306/>

²²⁷ 阿塞拜疆提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0362/>

²²⁸ 乌干达提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0043/>

台，旨在解决农业价值链中决策支持服务缺失的问题。为确保内容质量，所有内容在发布前均经过验证与认证。

该平台可通过多种渠道和形式访问，包括网页端、移动应用程序，以及提供五种语言（英语、卢干达语、鲁尼亚基塔拉语、卢奥语和斯瓦希里语）服务的免费电话。研究表明，农民更倾向于使用本地语言的多格式内容。语音平台为残疾人士和使用2G手机的用户提供了包容性访问渠道。

乌干达推出电子农业门户网站的经验表明：

- 各利益攸关方之间需要采取协调一致的方法：乌干达的平台之所以成功，在于其成功地动员并整合了包括农民、政策制定者、推广人员、物流供应商、学术界和加工企业等在内的多元主体；
- 需要不断加强农民和其他价值链参与方的能力建设：数字技能的匮乏仍是阻碍众多电子农业服务应用的难题，因此仍需借助电视、广播等传统媒体渠道开展宣传，并利用数字交互式语音应答（IVR）呼叫中心实施培训；
- 有必要加强农民对智能手机的使用，并提高他们对数据安全的认识，因为对网络安全的担忧可能会阻碍用户使用电子服务；以及
- 需要加强以当地语言开发本地化内容。²²⁹

Orange在八个非洲国家（马里、马达加斯加、布基纳法索、科特迪瓦、博茨瓦纳共和国、塞内加尔、几内亚共和国和刚果民主共和国）推出的电子农业服务就是多合作伙伴方式的典范。这些服务是与非政府组织、初创企业和政府合作伙伴共同开发的，吸引了80万活跃的移动用户，甚至可以通过没有互联网连接的低成本功能手机访问这些服务。通过减少中间商环节，这些服务帮助农民增加收入，通过在线市场更轻松地销售产品，接收准确的天气预报并投保气候风险，通过手机接收订单和付款，并通过农业技术咨询提高生产力。²³⁰

喀麦隆的成果证实了ICT工具如何有助于改善农业知识和生产力。通过Nda'a农业日项目，向300多名农民提供了移动电话、社区收音机和Web 2.0应用。该举措包括开展调查以确定农民的需求、举办能力建设讲习班，以及传播农业信息。结果表明，农业生产方式得到了改进，有机肥料的使用率得到提高，农民之间的知识共享得到加强，社区参与度得到提升。²³¹

电子农业服务要正常运作，至少需要基础连接能力，尽管宽带连接显然更理想。卫星运营商与MNO之间的合作——例如乍得的情况——有助于提供数字农业服务，包括在偏远农村地区。²³²

正如全球卫星运营商协会（GSOA）所强调的，卫星连接有助于将山区、农村和/或偏远地区的农民连接起来，使其能够通过移动设备或物联网（IoT）收集数据。利用这

²²⁹ 同上。

²³⁰ GSMA和法国Orange提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0203/>

²³¹ RIFEN提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0377/>

²³² GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0112/>

些实时数据的应用可以更好地使用资源和肥料，更好地监测作物、控制病虫害，更好地维护农用车辆等。²³³

卫星连接的影响在**不丹**运用南亚卫星（SAS）满足两大关键需求时尤为显著：（1）为缺乏有线基础设施的农村地区提供全国性电视广播服务；（2）保障灾害期间的通信联络。SAS网络已成功应用于广播领域，近期升级中更将电视频道与广播频道提升至高清（HD）标准。此外，SAS已融入灾害管理系统，具备在农村和偏远地区快速部署通信服务的能力。²³⁴

在使用先进的农业数字技术或“农业4.0”方面存在差距，因为这些技术主要用于大型农场。²³⁵然而，改善连通性以及获取农业和气象信息的途径也能使小农户受益。²³⁶

随着人口覆盖率的提升以及近年来固定宽带服务成本的下降，**中国**的文档表明，农村数字应用正日益多元化：电子商务（参见第5.1节）与电子农业应用使农产品实现一体化管理，同时智能监测、智能灌溉及生产设备的数字化管理也日益普及。²³⁷

津巴布韦一项由普遍服务基金²³⁸支持的黑客马拉松活动，显示了数字农业解决方案的多样性及其复杂性，这些平台协助农民完成整个耕作周期，提供作物种植建议以及管理投入、设备和财务的工具，以及作物病害诊断、土壤诊断、产量追踪功能。活动还探讨了智能电子农业设备，例如智能孵蛋器或温室运营自动化解决方案。

5.3 电子学习

电子学习打破了时间和空间的限制，使随时随地学习成为可能，不受地理位置和时间的限制，大大提高了教育的灵活性和便捷性。此外，电子学习还打破了对年龄限制的关注，使不同年龄的人现在都有机会接受教育。这样，电子学习才能满足社会多样化的教育需求，使教育资源的分配更加公平。

为确保在农村地区提供足够的ICT服务，**布隆迪**通信、信息技术和媒体部启动了一个在学校建立ICT俱乐部的项目。除了与ICT相关的常规课堂学习外，参加此类俱乐部的学生还有机会在课堂外进一步学习，并将所学传递给家人。²³⁹

中国通过深入分析农村居民的特点和需求，扩大了农村市场对数字化应用的需求。电子学习服务不断向农村地区扩展。截至2023年6月，中国农村电子学习用户规模达到6787万，普及率为22.5%。²⁴⁰

GSOA强调了卫星互联网在为学生和学校提供高速宽带方面的重要性。电子学习使学生在生病时、或者由于通勤时间过长、交通堵塞等原因而无法到教室时补上缺失的课

²³³ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0111/>

²³⁴ 不丹提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0349/>

²³⁵ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0111/>和<https://www.itu.int/md/D22-SG01.RGQ-C-0112/>

²³⁶ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0112/>

²³⁷ 中国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0223/>

²³⁸ 津巴布韦提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0041/>

²³⁹ 布隆迪提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0054/>

²⁴⁰ 中国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0223/>

程。在非洲、中东和亚太地区，卫星宽带在电子教育中的应用正展现出最大效益。这些地区人口年轻化，未来十年将呈现快速增长态势。此外，撒哈拉以南非洲地区60%的人口仍处于无网络覆盖状态（欧洲该比例仅为10%）。考虑到非洲大陆的辽阔疆域以及亚太地区数以千计的岛屿，卫星技术对于弥合这一连接鸿沟至关重要。²⁴¹

英特尔公司（美利坚合众国）强调了宽带和数字计划对教育的重要性。据联合国教科文组织（UNESCO）²⁴²称，大多数国家都采用数字化远程学习来确保教育的连续性，这对实现所有SDG也至关重要。学生在学校、大学和家庭中都需要计算机和宽带来接受教育和学习数字技能。本文稿还提供了面向学生和教育的计算机和宽带计划的示例（详见附件A）。²⁴³

Kamaleon（莫桑比克）强调，电子学习能够提高学习效率。研究人员进行了一项对比实验，为10至16岁的儿童提供了转换为数字格式的学校课程。与继续使用传统教学模式学习相同学校课程的同年龄组学生相比，可以明显看出，使用电子学习的学生通过数字教程的学习速度更快。此外，数字教程可以根据残疾人的需求进行调整，使学习体验更具包容性。²⁴⁴

坦桑尼亚政府于2009年设立了一个独立的USF，名为普遍通信服务接入基金（UCSAF），迄今该基金已实施多个项目，总投资额达1.003亿美元。UCSAF举措为公立学校采购ICT设备，并承担其两年期的互联网接入费用。坦桑尼亚农村电信与互联网连接项目已建成1200余座通信塔，覆盖1500多万人，未来两年还将新建800座通信塔。这些项目将为950所学校提供网络连接，并为八所具有特殊需求的学校提供专门的ICT学习设备。²⁴⁵

多年来，**美国**在为数百万人接入电信和互联网服务方面取得了长足进步。联邦通信委员会（FCC）实施了E-Rate计划，该计划重点为教育机构提供支持援助。E-Rate计划为符合条件的学校和图书馆提供折扣通信服务。例如，当某项服务原价100美元时，若以九折优惠提供，USAC将向服务商补偿10美元的差额。此外，服务商可向USAC提交发票，申请报销为学校 and 图书馆提供的网络连接设备成本。2022年，E-Rate计划批准的资金已用于连接超过128 500所学校、校内设施及图书馆。²⁴⁶

津巴布韦在卫生、商业、教育和商业服务领域实施了一系列信息通信技术项目。其中尤为值得关注的是电子学习计划—计划于2021年和2022年期间使1376所学校接入互联网，预计2023年还将有750所学校接入网络。²⁴⁷

柬埔寨王国的初创企业AURA构想出了其他在线学习模式，该平台不仅为残疾学生提供在线访问包含学习资源的社区平台的机会，还提供了一个游戏化的学习环境，学生可以通过完成适合自身能力的任务来赚取代币和/或金钱。AURA得到了国际电联和华为公司“连通的一代青年领袖计划”的支持。²⁴⁸

²⁴¹ GSOA提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0108/>

²⁴² <https://www.unesco.org/en/articles/startling-digital-divides-distance-learning-emerge>

²⁴³ 美国英特尔公司提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0076/>

²⁴⁴ 莫桑比克Kamaleon提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0007/>

²⁴⁵ 坦桑尼亚提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0085/>

²⁴⁶ 美国提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0168/>

²⁴⁷ 津巴布韦提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0034/>

²⁴⁸ 中国华为提交的ITU-D文件<https://www.itu.int/md/D22-SG01-C-0416/>

5.4 电子卫生

数字解决方案不仅可以方便人们获取电子卫生服务，还有助于改变行为，这对于预防疾病和流行病至关重要。在**莫桑比克**，**Kamaleon**这一组织利用交互式移动数字单元（IMDU）和视频广播，在霍乱发病率不断上升的农村地区开展数字宣传活动，提高人们对水处理方法的认识，并向社区传授基本的卫生方法，以保护自己和家人免受霍乱之害。活动开展六个月后，受影响的社区报告称，由于卫生和水处理做法得到改善，霍乱病例大幅减少。类似的数字宣传活动还提供了新冠肺炎疫情的相关信息，并促成行为的即时转变，让以往无法获得ICT或电视服务的极度偏远社区的居民更加积极地避免病毒传播，也更愿意在公共场所掩住口鼻。²⁴⁹

在医疗中心较少的农村和偏远地区，移动电话等数字设备可促进疫苗接种提醒和治疗监测。在**科特迪瓦**，**Orange**携手卫生部及国际合作伙伴，设计和开发了两种在基本功能手机上操作的独特的移动卫生服务。首项服务与全球基金合作推出，便于监测艾滋病患者并收集数据以更好地分析和改进治疗方案；第二项服务“**M-Vaccine**”则与全球疫苗免疫联盟协作部署，通过数字化免疫记录监测母婴健康状况，并提升社区意识，从而提高低接种率地区的疫苗覆盖率。²⁵⁰

津巴布韦的一份文稿指出，后疫情时代农村和偏远地区居民对ICT的需求已发生巨大变化。事实上，农村和偏远地区居民与城市居民之间的需求差距显著缩小，发达国家与发展中国家需求差距也呈现相同趋势。视频会议工具引发了数字革命，使远程医疗成为可能—患者可在线问诊并订购药品，农村地区亦不例外。但这种能力依赖于高速宽带的部署。²⁵¹

只有在医疗中心配备齐全的情况下，患者才有可能获得服务。在**泰国**，国家广播和电信委员会已在约**180**个农村和偏远地区的小型医院安装了**Wi-Fi**，以增进对医疗服务的获取，提高小型医院的效率和绩效。此外，一个远程医疗试点项目针对糖尿病和高血压患者（这类疾病死亡率较高）以及皮肤病和眼科疾病患者（这类疾病缺乏合格的医务人员）。远程医疗减少了前往医院的时间、费用和能耗，减少了到医院就诊的人数，更重要的是，使全国民众都能获得医疗服务。在过去几年中，该项目已为**5万**多人提供了服务。当前主要挑战在于将远程医疗项目的患者数据库与卫生部数据库实现整合。²⁵²

作为**坦桑尼亚**国家经济战略的一部分，为扩大农村和偏远地区基础设施建设以弥合数字鸿沟，该国通过普遍服务基金机制实施了远程医疗项目。该项目是全额资助的范例，通过将地区医院与转诊医院连接起来，使转诊医院的专科医生能够借助ICT媒介，与地区医院的同行共享专业诊疗意见。²⁵³

²⁴⁹ 莫桑比克Kamaleon提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0007/>

²⁵⁰ GSMA和法国Orange提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0203/>

²⁵¹ 津巴布韦提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0034/>

²⁵² 泰国提交的ITU-D文件<https://www.itu.int/md/D22-SG01.RGQ-C-0186/>

²⁵³ 坦桑尼亚提交的ITU-D文件 <https://www.itu.int/md/D22-SG01.RGQ-C-0085/>

5.5 不同部门的电子应用

已为政府、卫生、教育、商业、农业和渔业、银行和金融、娱乐、交通和公用事业等多个部门开发了电子服务应用。按部门划分的电子服务应用扩展清单包括（但不限于）：

电子政务，包括电子签证、电子投票、电子许可、税务申报（e-file）、公共服务门户网站、政府对公民（G2C）服务等。

电子卫生，包括远程医疗、电子健康记录（EHR）、电子处方、电子预约安排和提醒、电子疫苗记录和提醒，以及电子医疗账单。

电子教育，包括在线课程和学位课程、学习管理系统（LMS），和虚拟教室等。

电子银行，涉及在线银行和移动银行服务，以及移动支付和转账、贷款和（微）信贷申请、加密货币交易和基于区块链的金融服务。

电子娱乐，包括流媒体服务（音乐、视频、游戏）、数字媒体分发、虚拟活动和票务、社交媒体和社区平台、数字艺术和设计、虚拟现实（VR）和增强现实（AR），以及电子竞技和竞技游戏。

电子交通，包括网约车和出租车服务、公共交通系统、交通管理系统、车辆跟踪和车队管理，以及无人驾驶车辆。

电子公用事业，包括诸如电、煤气、水费账单和预付费（太阳能）能源服务等公用事业。

电子农业和电子渔业，涉及农业/渔业信息服务，包括气象信息服务。

电子环境，包括环境监测，如空气质量、水质和水量监测。

第6章 – 结论和指导方针

6.1 结论

在ITU-D第1研究组当前研究期（2022-2025年），为推进农村和偏远地区的连通性做出了显著努力。从研究中可以得出以下主要结论：

- 虽然技术取得了显著进步，全球连通性举措层出不穷，但全球仍有约27亿人无法上网，其中大多数居住在发展中国家（特别是最不发达国家（LDC）、内陆发展中国家（LLDC）和小岛屿发展中国家（SIDS））的农村和偏远地区。即使在已经实现连接的地方，也往往无法提供有意义地获取数字服务的网速。
- 本研究期在前期研究成果的基础上，融入了近年来出现的新趋势、新挑战和新的解决方案。新冠肺炎疫情尤其凸显了连通性的重要性，因为它显示了数字接入如何直接影响教育、医疗保健、商业和公共服务，同时也揭示了数字鸿沟的严重后果。

从提交的文稿和所分析的案例研究中得出了几个重要结论：

- **需要多维方法：**弥合数字鸿沟需要解决供给侧因素（基础设施、技术、融资）和需求侧因素（价格可承受性、数字素养、相关内容）。单靠任何一个方面都不足以实现有意义的连接。
- **技术多样性：**没有一种单一的技术解决方案能够解决农村和偏远地区的所有连通性挑战。必须根据当地情况、地理现状、人口密度和经济可行性，部署包括光纤、移动网络、卫星通信、WiFi解决方案和新兴创新在内的一系列技术。
- **可持续的商业模式：**在农村和偏远地区，由于人口密度较低、地理条件恶劣以及每用户平均收入（ARPU）较低，传统的市场驱动型方法往往难以奏效。创新的商业模式、公私伙伴关系、基础设施共享和补充性接入解决方案在各种情况下都取得了成功。
- **普遍服务基金：**虽然USF仍然是一个重要的融资机制，但其有效性在各国之间存在显著差异。成功的关键在于透明的治理、清晰的目标、高效的分配流程以及支持传统电信基础设施之外的多样化连接解决方案的灵活性。
- **地方赋权：**最成功的农村连通举措都有当地社区参与规划、实施和运营。事实证明，社区网络和本地驱动的解决方案在确保可持续性和技术普及方面尤为有效。
- **综合应用：**仅有连接基础设施是不够的；农业、教育、医疗保健、商业和政府服务等领域的电子应用可推动技术普及，并为农村社区创造了切实的利益。
- **有利的监管环境：**政策和监管框架对农村连通性有重大影响。频谱划分、许可要求、基础设施共享政策和服务质量标准都会影响农村部署的经济可行性。

- **数字包容需要无障碍环境：**有意义的连接必须包括通过本地化内容、适当的技术和有针对性的数字扫盲计划，为原住民社区、残疾人、妇女和其他潜在的边缘化群体提供服务。
- **能源解决方案：**电力供应仍然是农村连通性面临的根本挑战。可再生能源解决方案、节能技术和创新的电力系统是可持续农村ICT部署的重要组成部分。
- **新兴技术：**5G、低地球轨道（LEO）卫星、高空平台台站（HAPS）和基于人工智能的网络优化等技术为经济高效的农村连通性提供了新的可能性，但需要适当的监管框架和商业模式。

城乡之间的数字鸿沟依然巨大，但通过政府、私营部门、国际组织、民间团体和地方社区的协调努力，可大幅缩小这一差距。本研究期内记录的经验表明，通过适当的技术、政策、融资机制和地方参与，就能以可持续的方式将有意义的连接扩展到农村和偏远地区。

6.2 指导方针

根据这项研究的结果，提出了以下指导方针，以协助成员国制定和实施改善农村和偏远地区电信/ICT的战略：

6.2.1 基础设施建设和技术选择

- **采用技术中立的方法：**监管框架应做到技术中立，从而根据当地情况部署最合适的技术，而不是强制要求采用特定的解决方案。
- **促进基础设施共享：**制定监管框架，鼓励或强制要求无源和有源基础设施共享，以降低部署成本，提高农村地区的经济可行性。
- **利用补充技术：**实施多种技术，结合地面网络（固定和移动）、卫星通信和其他创新解决方案（如HAPS），以优化覆盖、可靠性和成本效益。
- **优先考虑能源解决方案：**整合可持续电力解决方案（包括太阳能、风能和混合系统），作为农村连通性规划的基本组成部分，同时考虑初始部署和长期运营的可持续性。
- **支持开放标准和互操作性：**鼓励采用开放标准和可互操作的技术，以降低成本、防止供应商锁定并促进未来的技术发展。

6.2.2 融资和商业模式

- **改革普遍服务基金：**确保USF是透明、技术中立的，并支持广泛的连接解决方案，包括社区网络和小供应商。实施衡量有效性的机制，防止资金利用不足。
- **制定混合融资机制：**结合公共资金、私人投资、发展援助和社区资源，为农村连接创建可持续的融资模式。

- **实施明智的补贴：**设计既能激励初期部署，又能鼓励长期可持续性的补贴机制，例如基于结果的融资、优惠券计划和分级支持模式。
- **支持社区网络：**建立具体的监管和财务机制，以支持社区拥有和运营的网络，包括简化的许可程序、频谱获取和专用资金流。
- **促进公私伙伴关系：**制定有效的公私伙伴关系框架，明确界定各方角色、职责和风险分担安排，在确保公共利益目标的同时，充分发挥私营部门的效率优势。

6.2.3 监管和政策框架

- **简化许可流程：**简化农村服务提供商的授权和许可程序，降低小型和社区运营商的费用、报告要求和行政负担。
- **优化频谱管理：**实施创新的频谱划分方法，包括用于农村部署的预留频谱、地理覆盖义务、使用电视空白频谱和动态频谱共用，以最大限度地有效利用这一有限的资源。
- **建立适当的服务质量标准：**制定QoS框架，平衡对适当服务质量的需求与农村部署的实际挑战，包括监测和执行规定。
- **协调公共机构：**建立电信监管机构与其他相关公共机构（能源、交通、教育、卫生、农业；包括国家、次国家和地方层面）之间的协调机制，以制定综合的农村发展方法。
- **协调区域政策：**与邻国合作，协调统一频谱政策、设备标准和跨境连接，以创造规模经济，促进区域性解决方案。

6.2.4 数字技能、普及和应用

- **制定数字扫盲计划：**面向农村社区实施有针对性的数字扫盲举措，将ICT技能发展纳入正规教育，并为成年人提供非正式学习机会。
- **推广相关的本地内容：**支持开发本地语言的内容和应用程序，以满足农村社区的具体需求，特别是在农业、医疗保健、教育和当地商业方面。
- **促进电子政务服务：**优先考虑与农村社区特别相关的政府服务的数字化，为普及连通性提供激励。
- **支持本地创新生态系统：**在农村地区建立创新中心、孵化器和能力建设计划，从而利用地方性技术解决方案应对地方性挑战。
- **优先考虑包容性：**优先考虑与农村社区特别相关的政府服务的数字化，为普及连通性提供激励。

6.2.5 监测、评估和知识共享

- **建立基础型数据：**这包括现有的基础设施、连接差距和人口统计信息，以便为有针对性的干预措施提供信息并衡量进展。

- **制定监测框架：**定期评估连接举措的影响，包括定量指标（覆盖、采用率、QoS等）和定性因素（社会经济效益、用户满意度等）。
- **记录和分享最佳做法：**系统地收集和传播案例研究。
- **参与国际合作：**积极参与国际论坛，促进有关农村连通性的知识交流、能力建设并开展协调行动。
- **预见技术演进：**实施能够适应新兴技术和不断变化的服务需求的框架。

通过根据具体国情实施这些指导方针，成员国可以加快弥合数字鸿沟的进程，并确保每个人，无论身在何处，都能受益于有意义的连接及其带来的机遇。

6.3 第5/1号课题的未来

多年来，在关于农村和偏远地区ICT的第5/1号课题下开展的研究提出了许多有益的建议。在本研究期内，对一些非常重要的方面进行了研究，其中最主要的是普遍服务基金在连接农村和偏远地区以及确保农村和偏远地区的居民不仅能够尽可能地获得ICT服务，而且能够有效利用ICT方面所发挥的作用和做出的贡献。

6.3.1 需要进一步研究

研究过程中逐渐明晰的是，部分研究内容需要进一步深入探讨，同时还发现了亟待开展新研究的空白领域。需要研究的综合方面包括以下内容：

- 利用地面和非地面网络的互补性。
- 现代技术旨在降低基础设施的资本和运营成本，支持服务和应用之间的融合。
- 人工智能如何改善农村基础设施和接入。
- 在农村和偏远地区创建或建设宽带数字基础设施的挑战。
- 通过增加宽带数字接入，缩小城乡数字鸿沟的需求和政策、机制和监管举措。
- 人工智能的优势以及在农村和偏远地区采用人工智能的挑战。
- 利用人工智能提高农村社区的数字素养和技能。
- 提高农村和偏远地区的服务质量。
- 在农村和偏远地区实施ICT服务，包括新技术和新兴技术。
- 与本地内容相关的政策及本地内容的开发。

6.3.2 提案

第6.3.1节所列各个方面已纳入第5/1号课题职责范围并载于**附件A**，将进行讨论、完善，并作为下一个研究周期第5/1号课题未来的初步案文草案予以通过。

Annex A – Summary of contributions

Document [1/31](#) (**Comoros**) shared information on Comoros practices to improve access and connectivity with a view to reducing the gap between rural and urban areas. The document highlighted that the Union of the Comoros, an essentially rural country, has in recent years embarked on a policy aimed at promoting the large-scale use of ICT services, by facilitating access to networks, through a steady reduction in voice and data tariffs, investments, and the deployment by operators of new technologies, resulting in an explosion in the total number of mobile subscribers and accounts for e-money services and the reinstatement of the Universal Service Fund through legislation. Kenya, commenting on Comoros' contribution stressed the importance of digital skilling, which was noted. Mali encouraged the Question 5/1 team to look into the question on how Universal Access Funds are managed and used in different countries. Further interventions including from Brazil, Côte d'Ivoire, Uganda and Kuwait, were noted as the contribution generated a lot of interest.

Document [1/39](#) (**Madagascar**) highlighted how Madagascar through its strategies and policies, had done everything possible to expand broadband access to benefit the entire population, including by capping prices for use of the national backbone network.

Document [1/41](#) (**China**) shared positive results achieved by China in universal telecommunication services, as well as the experience and steps for promoting broadband development and application in rural areas in order to solve the communication difficulties for people in administrative villages in poor mountainous areas and remote areas

Document [1/48](#) (**Bhutan**) shared information on the importance of the development ICT infrastructure to improve network connectivity access and adoptions of ICT services. It also provided the strategies adopted by Ministry of Information and Communications of Bhutan to deploy dedicated high-speed broadband connectivity in Bhutan. The document highlighted that the ICT sector in Bhutan has experienced rapid growth in the past two decades, fostering economic activity in the form of productivity gains and generation of significant consumer benefits within the country.

Document [1/54](#) (**Burundi**) (case study) shared the policies and strategies to connect rural areas to prevent the further concentration of networks and infrastructure in economically profitable areas such as Bujumbura and other urban zones, and will enable the population to flourish economically and socially.

Document [1/56](#) (**Comoros**) (case study) highlighted that the structural and regulatory reforms of the ICT sector of Comoros, carefully carried out under the Regional Communications Infrastructure Programme Phase 4 (RCIP4) of the World Bank, with the involvement of the National Regulatory Authority for Information and Communication of the Comoros (ANRTIC), resulted in the expansion and consolidation of the supply of ICT products and services.

Document [1/68](#) (**Russian Federation**) shared information regarding an autonomous complex developed by the institute for providing cellular connectivity in remote areas of the Russian Federation, including those associated with harsh weather conditions. A wind/solar-powered self-sustaining autonomous complex has low operating costs and can, in addition to supporting cellular connectivity, also support ecological and meteorological monitoring. The document outlined that this contribution was prepared to familiarize meeting participants with the practices of the Russian Federation, on providing communications for remote areas, as well as to its materials included in the final report on Question 5/1. Togo requested of the Russian Federation to provide an insight into the investment concerned so that Member States would have an idea of the costs involved. The Russian Federation informed participants that feedback would be given in future contributions, but not necessarily for the meeting of May 2023.

Document [1/72 \(Rep. of Korea\)](#) (case study) shared the case of Korean (UAV/UAS) on using unmanned aerial vehicle (UAV) technology in rural and remote areas. The document highlighted that unmanned aerial vehicle (UAV) or drone technology is now undergoing experimentation, and is being used in different rural and remote area settings around the world. From humanitarian aid, environment monitoring, and medical supplies to usage in agriculture, commercial logistics, and the security sector, UAVs and unmanned aircraft systems (UASs) are used to overcome unique challenges faced due to difficult terrain. UAVs pose several advantages over other technologies such as low deployment costs, high manoeuvrability, and the ability to operate in hazardous environments.

Document [1/85 \(Argentina\)](#) shared some highlights of the regulatory framework in Argentina to allow CNs to obtain an ICT licence and provide Internet access services in rural, remote, unserved, or underserved areas. The document outlined the lessons learned and suggested best-practices. It was noted to be mindful with the use of the term CNs in the final report so as not to open discussions that had been resolved by WTDC-22 and the Plenipotentiary Conference 2022. Study Group 1 Chair gave guidance on the approach to be taken on the issue.

Document [1/36 \(SUP'PTIC, Cameroon\)](#) (case study), highlighted how the country intends to convert rural areas into smart cities and communities, with the support of telecommunication operators and ministries and agencies responsible for local development, in order to respond to evolutions in digital technologies (the financial cost of the project amounts to USD 500 million).

Document [1/70 \(World Bank\)](#) shared information about the World Bank Digital Development (DDG) Global Practice that seeks to help developing countries build sustainable digital economies. The practice helps advance global knowledge around key digital development topics that help countries define and implement their vision for digital transformation. The World Bank DDG practice provides financing to governments in the form of grants, loans and guarantees, to support digital investment projects and to implement policy reforms. Additionally, it provides advisory services, such as policy guidance, technical assistance, capacity building, and knowledge products, such as data and diagnostics for actionable insights. It also brings together key public and private sector stakeholders involved in advancing global digital development. The aim of the World Bank DDG practice is to help the development of digital and connectivity infrastructure through investment in broadband connectivity, and the ICT industry, and to foster a culture of data consumption through improved digital literacy and affordable access to devices and services.

Document [1/76 \(Intel Corporation\)](#) provides information on the importance of computer and broadband connectivity programmes for households, students, and education. The contribution further provides examples of computer and broadband programmes for students and education. In Costa Rica, the Connected Homes programme has launched the "Bicentennial Educational Network" for creating a broadband network throughout the country to serve all public schools and high schools. In the United States, the Affordable Connectivity Programme provides affordable broadband, to ensure the need of schools, etc. In Malaysia, the universal service provision fund, utilised for the provision of 1 668 772 netbooks to underserved communities and the Cerdik project, provided 150 000 devices, and data connectivity to underprivileged students from low-income families, for information technology education. In Republic of Singapore, the NEU PC PLUS programme provides financial assistance for subsidized personal computers (PCs) and free broadband connectivity to full-time students from low-income households. In Italy, European Union State Aid provides EUR 325 million in public support to connect 12 000 schools in Italy to very high-speed Internet. In Kenya, education programmes implemented the Digital Literacy programme (laptop project) and 1.2 million devices (including wireless routers) were distributed to 22 891 public primary schools, and the National Education Management Information System (NEMIS) to manage information on schools and candidates, has been implemented. In Republic of Croatia, the CROATIA e-schools project implemented ICT infrastructure, and developed educational software for public primary and secondary schools, to improve teaching, learning and administration in the country.

Document [1/91 \(ITU-APT Foundation, India\)](#) shared information regarding strategies used to increase the deployment of broadband in India using Wi-Fi connectivity through Public Data Office (PDO),

popularly known in India as the Wi-Fi Access Network Interface, and anyone, whether business person, resident, student, small grocery/tea shop owner, or restaurant owner can function as a PDO.

Document [1/60 \(BDT Focal Points\)](#) provided the ITU membership with information on work by BDT in the area of ICT Infrastructure activities, which has been developed since the last ITU-D Study Groups meetings. ITU-D Study Group members were invited to raise awareness and share the information received during the meeting within their work environments, as well as with their national and regional interested stakeholders, in order to leverage local, national and regional knowledge and accelerate related implementation, as well as contribute to achievement of the overarching goal of building inclusive digital societies globally.

Document [SG1RGQ/107 \(Brazil\)](#) detailed how the National Telecommunications Agency (ANATEL) in Brazil, had successfully used crowdsourcing and data analytics to identify the connectivity gap and enable planning to bring broadband connectivity to unconnected areas. The use of crowdsourcing and data analytics as a formal tool for planning and policy purposes was first deployed by ANATEL with the purpose of mapping the existing connectivity infrastructure and the digital gaps in the country. The tool has helped the agency to analyse billions of updated empirical observations, organizing them into millions of geographic grid quadrants and pinpoints with great precision areas with unmet demand for broadband services. The tool has also been used to map public schools and health facilities in Brazil that do not have access to broadband Internet, and in the design of a public policy strategy for public facilities in the cities and in the outskirts of the big urban centres.

Document [SG1RGQ/18+Annex \(Egypt\)](#) outlined the National Broadband Strategy for 2022-2025, aimed at improving the overall broadband ecosystem of Egypt. The contribution highlighted that the country's investment in broadband is expected to reach USD 2 billion by 2025. This is expected to boost the growth of digital services and e-government services, and the digital economy as a whole. Egypt informed the meeting that the content of this document would be suitable for chapters 3 and 4 of the final report.

Document [SG1RGQ/23\(Rev.1\) \(Haiti\)](#) shared the use of BIEN (multimedia digital economy inclusion centres), to facilitate access to ICTs, and economic development of rural and remote areas. Pilot projects had been conducted since 2017, and these had enabled inhabitants of rural and remote areas to market and sell their produce, receive payment through mobile banking applications, access systems for e-education, e-agriculture, financial inclusion (online banking), and e-health thus improving their livelihoods. The contribution elaborated the high level social and economic needs, and the demand for multimedia services, content, and applications. It also proposed a reflection on technologies for rural and remote areas, as well as financing mechanisms and partnerships. One obstacle faced by the BIEN centres is security as some centres have been vandalized and taken over by armed groups. Kenya asked whether there were strategies for sustainability and for the security of the infrastructure. Haiti responded that efforts to continuously improve implementation were being made.

Document [SG1RGQ/26 \(Rep. of Korea\)](#) shared the case of the rural mobile infrastructure operator (RMIO) model in Peru. Korea Information Society Development Institute (KISDI) has worked with the Government of Peru to assess the RMIO model, in providing coverage to rural, and preferred social interest locations. RMIOs have contracts with mobile network operators (MNOs) to provide last-mile connectivity to end users, where the return on investment (RoI) is low and long-term. As of 2021, there were seven main RMIOs in Peru, which had wholesale service agreements with one or two MNOs. The contribution detailed the extent of RMIOs in Peru, the technologies used, and challenges faced, as well as the network topology and CAPEX/OPEX features.

Document [SG1RGQ/27 \(Ghana\)](#) shared the strategy of Ghana to extend basic telephone voice and data connectivity to underserved and unserved communities. In order to boost voice and data services and reduce the urban-rural digital divide, Ghana has committed EUR 155 million to supplement its universal service fund. The universal service fund (the Ghana Investment Fund for Electronic Communications, GIFEC), was established by the Electronic Communications Act (Act 775) 2008. In a tripartite co-operation between the GIFEC, MNOs and private investors, Ghana has deployed 500 rural

sites with UMTS 900 rural star technology over three years and plans to deploy 2 016 sites by 2023, to provide coverage to 3.4 million Ghanaians. The sites are solar, and electrical grid powered. Community Information Centres have also been established to provide access to government information and services, and to provide ICT training for schools.

Document [SG1RGQ/29 \(Madagascar\)](#) detailed how the regulator in Madagascar has championed digital inclusion through authorization of the use of the 800 MHz frequency band, for the deployment of 4G in rural areas, as this band can cover great distances (Decision No. 2022/001-ARTEC/DG/L of 10 May 2022). An appropriate spectrum allocation price was negotiated with the operators, who are encouraged to share their infrastructure. In addition to this, the regulator adopted a new policy of allowing all operators to deploy optical fibre for their transmission network. The regulator is also considering further measures, including the creation of a "GLOBAL" licence to allow operators to deploy further services. Intel Corporation intervened to ask whether there were any plans to introduce 5G in Madagascar. Madagascar responded that 5G was still only in the experimental stage in in Madagascar but plans to introduce it in the future were in the offing.

Document [SG1RGQ/30 \(Kenya\)](#) highlighted need to secure base transmitter stations (BTS) in northern regions of Kenya from militants and criminals, by using promotion of community ownership, robust design and construction of the BTS sites, drone technology, and air patrols. Liberia asked what strategies Kenya was using to protect its infrastructure from militants. Kenya responded that in addition to the already highlighted strategies, they were using trusted partnerships. The issue of security was discussed at length with Mali and Côte d'Ivoire intervening. The Chairman also highlighted that insurance should be included as part of the strategies.

Document [SG1RGQ/34 \(Zimbabwe\)](#) highlighted the convergence of the ICT needs of rural and remote communities, with those of their urban counterparts in the post COVID-19 era, thereby necessitating the acceleration of broadband connectivity in rural and remote areas in Zimbabwe. Various programmes have been implemented including infrastructure sharing by operators, increased construction of ICT community information centres, the E-Learning Programme, the E-Health Programme, the E-Government Programme, and the Accessibility programme to meet the increased demand for broadband services in rural and remote areas. Questions from the floor from South Africa, Liberia, and Kenya were raised on how Zimbabwe had implemented infrastructure sharing, whether literacy was a problem with regards to rural and remote inhabitants, and how rural and remote people got connectivity to use conferencing applications such as Zoom.

Zimbabwe responded that the village community information centres were being used as a solution where there was no last mile connectivity to the home. Infrastructure sharing was implemented through the passing of a law which governs sharing on a voluntary basis. It was also highlighted that while Zimbabwe is a highly literate country, ICT skills training was being rolled out in the community information centres. On whether it was not costly to construct community information centres across the country, and employ people to run them, Zimbabwe informed the meeting that the universal service fund had partnered with the main postal service operator that has premises suitable for use all over the country, including in rural areas, and that the postal service operator also employed local people to run the community information centres.

Document [SG1RGQ/41 \(Zimbabwe\)](#) detailed the involvement of the universal service fund in financing innovation. The contribution summarised digital solutions created by young innovators during hackathons sponsored by the universal service fund of Zimbabwe, resulting in practical solutions to help Zimbabwe achieve the SDGs. The solutions include applications in agriculture (digital agriculture platforms, farm managing and automation platforms, smart egg incubators), e-commerce, healthcare (tele-healthcare), and security (biometric identification). Questions asked by South Africa, Ericsson, Kenya, and Liberia centred on whether it was appropriate to use the universal service fund to fund development of solutions for SDGs. Zimbabwe responded that it was high time that people stopped thinking that connecting the rural areas is the sum of all the efforts that we need to make, because connectivity without use is meaningless unless there is development of local practical solutions that rural communities can use. The purpose of USFs should be diversified, at least to kick start innovation.

Document [SG1RGQ/43 \(Uganda\)](#) shared information about the implementation strategy, adoption, and outcomes of e-agriculture, in rural, unserved, and underserved communities in Uganda. The document highlighted the main outcomes of the project to accelerate uptake of ICT4Agric innovations, including increased consumption of ICT services by farmers and other stakeholders, the establishment of a framework for content development, certification, and delivery, and the enhancement of the digital skills of farmers and value chain actors. Some of the challenges highlighted include uncoordinated agriculture content development and distribution to farmers, the accessibility of the content which was mostly text based and in English, network access issues, and difficulties in the acquisition of smart phone devices.

Document [SG1RGQ/47 \(Burundi\)](#) presented the national policy, regulations and strategy of Burundi to provide telecommunications/ICT access in rural and remote areas. The National ICT Development Policy (PNDTIC 2011-2025) comprises 10 axis strategic elements, designed to achieve universal access to ICTs in order to accelerate economic growth, so that Burundi can become a centre of excellence, and a regional reference point in the ICT sector by 2025.

Document [SG1RGQ/52 \(Burkina Faso\)](#) highlights current experience of Burkina Faso in providing communication services to consumers, in areas and localities affected by insecurity and terrorist groups. These issues were also introduced under Q3/1. Specifically, it presents the mechanisms implemented by Burkina Faso, to restore telecommunication infrastructure that was destroyed or vandalized by armed terrorist groups. The measures involved the re-establishment of destroyed sites to restore electronic communications in the affected areas and thereby ensure the availability and accessibility of digital services.

Document [SG1RGQ/72 \(South Africa\)](#) outlined the South African .za Domain Name Authority (ZADNA) training programmes on the domain name system (DNS), and other skills for rural and remote communities. In order to bridge the digital divide and promote inclusive development in rural areas, ZADNA has implemented the ZA Schools Digitisation Programme (ensuring schools have domain names, websites, and email addresses for educators); the .za education and awareness programme (promoting .za domain name registrations and online safety); "Alternative Dispute Resolution" workshops (educating participants on preventing and mitigating DNS abuse); and registrar reseller training. As a not-for-profit entity established under the Electronic Communications and Transactions Act 25 of 2002, ZADNA ensures a secure namespace, safeguarding the rights and interests of users in South Africa, while promoting the growth and use of the namespace. ZADNA also hosts domain name system (DNS) training courses, in order to familiarize selected communities and stakeholders with DNS, with a focus on women, youth, and people with disabilities. As elaborated in detail in the contribution, this training also addresses the shortage of DNS skills in South Africa. It was proposed to incorporate the content of the document in Chapter 3 (3.1, 3.2, and 3.4) of the report.

Document [SG1RGQ/76+Annex \(Argentina\)](#) presented the universal service fund (USF) programme of Argentina for the deployment of access networks to mobile communications services, in cities with up to 500 inhabitants, which is funded by the USF. The programme was designed to finance the deployment of access networks in localities and geographical areas where the implementation of fixed networks is not efficient. An innovative feature of the programme enabled companies that were awarded projects, to finance the deployment work by deducting costs from their monthly contributions to the universal service fund that they are obliged to make to ENACOM. The annex to the contribution provides details on the project deployment in specific towns such as Coomé (Salta), Pichi Huinca (La Pampa) and General Urquiza (Misiones).

Document [SG1RGQ/84 \(Rep. of Korea\)](#) presented general information on the universal service system in Rep. of Korea, which was introduced in 1998, and that has undergone several revisions in response to changes in the telecommunications market environment, and technological advances. The document highlights the basic structure of the universal service system, the designation of universal service providers, and the universal service cost calculation method and settlement system, as well as future development directions. The contribution was submitted following a Q5/1 Co-rapporteur's request during the previous meeting for Member States to submit cases on financial mechanisms related to

the universal service fund (USF), and this contribution will be included in the annual deliverables for a joint workshop between Q4/1 and Q5/1.

Document [SG1RGQ/85 \(Tanzania\)](#) highlighted the national economic strategies on expansion of rural and remote infrastructure, to bridge the digital divide, using universal service fund mechanisms. The document shared sustainable and cost-effective solutions to enhance the availability of broadband Internet in rural areas through universal service funding. Tanzania established a stand-alone universal service fund in 2009, and has already implemented several projects with investments of USD 100.3 million, such as providing ICT equipment and Internet connectivity in rural areas, telemedicine, and community radio projects. Best practices in deploying broadband Internet in rural areas include collaborating with all stakeholders, designing digital strategies and national broadband plans using a whole of Government approach, lowering deployment costs to stimulate competition, and encouraging demand for broadband by making it more affordable, relevant, usable and safer for everyone. Comments from the flow raised the need for Tanzania to explain how operators who are to benefit from allocation of USF funds are selected.

Document [SG1RGQ/98 \(Mexico\)](#) shared how the National Institute of Indigenous Peoples (INPI), has carried out diagnoses of mobile coverage (2G, 3G and 4G) in localities of the country, where indigenous people reside in order to assist efforts to improve and expand the coverage and use of telecommunications/ICTs among indigenous people. On average, 80 per cent of the indigenous population has mobile service coverage in at least one technology (2G, 3G or 4G). Although the study notes improvements in coverage over the last five years, there are also localities in which the coverage is non-existent. The study, therefore, opened new scenarios to improve and expand the coverage and use of telecommunications/ICTs among indigenous people. This contribution has been proposed to be included in Chapter 3 of the final report.

Document [SG1RGQ/101 \(Mexico\)](#) highlighted how the Mexican telecommunications regulatory body, the Federal Telecommunications Institute, promoted the generation of content in indigenous languages through translation workshops. The workshops have translated more than 500 materials into 40 indigenous languages, related to the rights of users and the mechanisms to present complaints, information tools, and cybersecurity.

Document [SG1RGQ/104 \(State of Palestine\)](#) highlighted recent initiatives and projects for broadband connectivity in the State of Palestine, launched by the Ministry of Telecommunications and Information Technology, to ensure equitable access to Internet and e-service in rural and remote areas, as well as for vulnerable people. This was designed to ensure equitable access to Internet and e-services in rural and remote areas, as well as for vulnerable people. Digital access points in post offices have been treated as good practice to ensure equitable access to services by the poor and vulnerable, including persons with disabilities.

Document [SG1RGQ/105 \(State of Palestine\)](#) shared information about the roll out of fibre to the home (FTTH) connections in the State of Palestine, and the challenges in the expansion of FTTH connections, including restrictions on building infrastructure, spectrum allocation for 3G/4G and 5G mobile broadband, ICT equipment imports, and deployment. The document recommended adoption of flexible policies for technology selection (e.g., aerial cables, micro-ducting, etc.) for the success of FTTH roll out. Subsequent to the decision of the Ministry of Telecommunications and Information Technology to liberalise the sector and open the market for all Internet service providers (ISPs), a total of 7 185 kilometres of fibre-optic networks had been laid, and a total of 53 724 FTTH connections were provided, until the end of 2022.

Document [SG1RGQ/115 \(South Africa\)](#) shared experience from South Africa on the licensing process for international mobile telecommunications (IMT), in respect of the provision of mobile broadband wireless access services for urban and rural areas, using the complementary bands, IMT700, IMT800, IMT2600 AND IMT3500 provided by the Independent Communications Authority of South Africa (ICASA). Some lessons learned from the experience were that the auction is a great milestone that could lead to lower communication costs, expanded network reach to rural and outlying areas,

improved network quality and enhanced competition. The regulatory authority has social obligations for telecommunications operators to connect 18 520 schools, 5 731 clinics and hospitals, 8 241 traditional authority offices, and 949 libraries and government service centres. While the revenue collected from the auction will go to support national priorities, the allocation of the high-demand spectrum will speed up the roll-out of new technologies, such as fifth generation (5G), reduce the cost of mobile data, and ensure greater Internet connectivity. The allocation of the spectrum will also enable the roll-out of 5G networks, which will accelerate the process towards universal connectivity, and the deployment of the digital technologies and services that are driving the fourth industrial revolution. This contribution is considered for Chapter 3 of the final report.

Document [SG1RGQ/8 \(Intel Corporation, United States\)](#) updated information on the global status of 5G which included updated information on 5G networks status, the growth rate of 5G, and a comparison with previous generations of cellular technologies, as well as 5G device status. It stressed that 5G is a key technology for high-speed broadband digital infrastructure, digital economy, and enhancing the quality of life of people, that the most important factor for the timely introduction of commercial 5G services, is to assign 5G related low-mid-high frequency bands to operators, and that sound policies and regulations will accelerate the deployment of 5G in developing countries. This contribution was also presented for Question 1/1.

Document [SG1RGQ/9 \(Intel Corporation, United States\)](#) shared updated information on the global status of Wi-Fi 6, including Wi-Fi 6E, and how Wi-Fi 6 and 5G are two complementary technologies from which developing countries should be able to achieve maximum benefit, as these are advanced high-speed wireless broadband technologies for the digital economy.

Document [SG1RGQ/93+Annex \(Intel Corporation, United States\)](#) presented the WBA white paper on rural Wi-Fi connectivity. The white paper focuses on the critical factors applicable to Wi-Fi networks in rural areas, including broadband deployment challenges, relevant use cases, best practices, real-world case studies, and business models from different regions. The white paper also focuses on the importance of unlicensed spectrum for Wi-Fi to connect the unconnected. This contribution was also presented for Question 1/1.

Document [SG1RGQ/10+Annex \(Ericsson, Sweden\)](#) shared its recommendations on rural connectivity and drew attention to the useful annex, jointly submitted by mobile infrastructure vendors Ericsson, Huawei, Nokia and ZTE to the African Telecommunications Union (ATU) Task Group on Rural Connectivity. This document was submitted because it offers recommendations that should further the cause of rural connectivity, and of bridging the digital divide. It was also intended to draw the attention of the rapporteurs and vice-rapporteurs of Study Group 1 Questions 1/1 and 5/1, to the work being done in this policy space by the African Telecommunications Union through its task group. While the document was written with African countries in mind, Ericsson believes the arguments and the recommendations equally apply to developing countries everywhere. This contribution was introduced in Q1/1.

Document [SG1RGQ/114+Annex \(Ericsson, Sweden\)](#) shared the Ericsson Mobility Report of February 2023. The report and annex shares data and insights on the mobile industry's development, discussing key trends and disruptive events that continue to impact and shape the industry, as well as the technology forecast. It specifically discusses 5G and fixed wireless access (FWA), and the related cost advantages.

Document [SG1RGQ/109+Annex \(GSOA\)](#) shared information on satellite communications and their role in enabling 6G. The contribution provides information on global coverage, sustainability, reliability, resilience, security and authentication, meeting capacity requirements and positioning, and timing services. This contribution was discussed in Q1/1 and Q4/1.

Document [SG1RGQ/111+Annex \(GSOA\)](#) shared a contribution on satellite communications in the field of agriculture. It explained the role of satellite communications to support the agri-food system, in order to achieve the SDG on "zero hunger" by 2030.

The document highlighted that satellite communications along with other digital technologies can play a role in changing consumer preferences, e-commerce, climate change, and other factors, and enables farmers to react, adapt, and survive in an increasingly complex world, by enhancing their productivity, making them more competitive, and ultimately making the entire food system more resilient. This contribution was introduced in Q1/1.

Document [SG1RGQ/112+Annex \(GSOA\)](#) detailed the impact of satellite communications technology with its potential to help bring the remaining 2.7 billion unconnected people online. The evolution of satellite communications (Satcoms) spans from the increasing capabilities of technological solutions, to the progress made in developing standards around non-terrestrial networks which is contributing to connecting everyone, everywhere. This contribution was introduced also for Q1/1.

Document [SG1RGQ/7 \(Kamaleon, Mozambique\)](#) (also for Q7/1) shared information about an audiovisual and interactive mobile digital unit (IMDU), developed by Kamaleon, a non-profit organization, in partnership with the Government of Mozambique, to promote broadcasting on digital literacy, capacity building, and empowerment, using a realistic digital learning format adapted to the adversities of underdeveloped communities, and inclusive to persons with disabilities. The document highlighted various advantages of the IMDU as compared to the conventional methods of information sharing and learning, including, e-learning in schools, commerce, and agriculture, spreading awareness about cholera and COVID-19, financial education, and youth empowerment.

Document [SG1RGQ/49+Annex \(SBA Communications, Brazil\)](#) highlighted the need to develop an independent, vibrant, and sustainable tower industry, which is critical for the future development of mobile telecommunications. Various causality factors were highlighted in relation to the tower industry and the development of mobile industry, including, higher 4G coverage, faster wireless broadband speed, lower mobile broadband prices, higher mobile broadband adoption, higher competition in the mobile industry, and better provisioning of services by telecommunications operators. The document proposed that public policies and regulatory frameworks, that encourage sharing and the orderly and efficient deployment of passive infrastructure, be given due consideration by governments and regulators. This contribution was considered for Chapter 3 and Chapter 4 of the final report.

Document [SG1RGQ/71+Annex \(APC\)](#) highlighted that the community connectivity providers struggle to access capital, and discussed the regulatory barriers faced by them. The document shared information about a report published by APC and partners, on financing and business models which aim to address information gaps, and guide funding strategies for small scale networks. This contribution was introduced during the joint workshop between Q4/1 and Q5/1.

Document [SG1RGQ/78 \(International Chamber of Commerce \(ICC\)\)](#) presented a white paper on "Delivering universal meaningful connectivity", which showcases how an interoperable, seamless ICT ecosystem is crucial to help populations reap the benefits of ICT and development opportunities, particularly in developing countries. The document encouraged policymakers to facilitate investment, competition, and innovation throughout this ICT ecosystem: in broadband services and connectivity devices to make them accessible and affordable; in the development of content, applications and services that helps drive and sustain adoption; as well as in digital literacy and skills development. Partnership models which bring together the private sector and public sector, investment banks and local non-governmental organizations (NGOs) have proven successful in ensuring delivery and maintenance of networks in rural, sparsely populated, remote or hard-to-reach areas, where the return on investment (RoI) is uncertain. Effective spectrum management was also mentioned as a key to leverage shared and unlicensed spectrum resources such as TV white spaces and fixed-wireless access. Finally, policymaking and regulation were encouraged to be grounded in evidence and data, transparent, inclusive of all interested stakeholders, and aimed at improving the ease and predictability of doing business. This contribution was also introduced to Q1/1.

Document [SG1RGQ/94 \(Internet Society\)](#) highlighted the importance of creating an enabling regulatory environment for "complementary connectivity and access solutions," and Internet exchange points (IXPs). As complementary connectivity and access solutions are a key infrastructure component

of connectivity ecosystems, they help connect the unconnected in under-connected areas, and are a complementary solution for connecting rural, remote, and underserved areas in an affordable manner. In addition to improving affordability and connectivity, these networks bring digital skills and tools to rural, remote, and underserved areas. Governments can foster enabling environments for deployment and financing of "complementary connectivity and access solutions." Once connectivity is established, IXPs improve traffic flow and help people get cheaper, faster, and better Internet service. IXPs help create shorter, more direct routes for Internet traffic. They provide a more affordable alternative to sending local Internet traffic abroad, only to have to return that same traffic via an international link, which can be an expensive business. Keeping traffic local is key to developing a sustainable connectivity environment in developing countries. The Internet Society has been helping to address connectivity gaps for many years, by building complementary connectivity and access solutions and by building and supporting IXPs. This document provides information relevant to Q1/1 and Q5/1.

Document [SG1RGQ/95 \(Amazon\)](#) shared details on bridging the digital divide through advances in satellite technology. It highlighted how satellites that operate in low earth orbit (LEO) offer underserved communities around the world, the high-speed, high-quality broadband network connectivity they need to participate in the modern digital era. The document highlighted that LEO satellites can offer several critical benefits including the power to connect the unconnected, support for disaster response and network resiliency, and valuable new business models in conjunction with incumbent network operators. Further development of policies and regulatory regimes, and alignment among countries, can help support the deployment of LEO satellite networks, and the expansion of broadband connectivity in underserved communities around the world. Recommendations were made such as simplifying the regulatory processes and procedures for obtaining authorizations to provide NGSO satellite services, and adoption of general authorization and blanket licensing regimes to expedite practical, widespread, and economical deployment of customer terminals and network gateways, creating and safeguarding transparent and predictable regulatory regimes, including the preservation of spectrum allocations to the fixed satellite service (FSS) and mobile-satellite service (MSS), and adopting satellite regulations that promote competition and technology neutrality, etc. This contribution was also submitted to Q1/1.

Document [SG1RGQ/108+Annex \(GSOA\)](#) presented a study by VVA and LSTelcom. The purpose of the study, conducted for the Global Satellite Operators Association (GSOA), is to assess the socio-economic benefits of satellite communications (satcoms), in different use cases across the globe, given the physical and geographical limitations that impact on terrestrial infrastructure. It also highlighted that satellites offer a cost-effective means to cover large swaths of the earth's surface, reaching people where terrestrial networks are unavailable, and generating substantial direct and indirect social and economic benefits.

Document [SG1RGQ/81 \(BDT focal point\)](#) (also for Q1/1, Q2/1, Q4/2, Q7/2) shared the BDT report on "Future Networks and Digital Infrastructure", including resources, and activities and work undertaken since the last ITU-D Study Group meetings.

These include the following; "From electricity grid to broadband Internet: Sustainable and innovative power solutions for rural connectivity", "ICT infrastructure business planning toolkit 5G networks 2023 edition", "ICT Business Planning Toolkit training" (in Spanish). Updates on the national broadband mapping systems, work on development of future networks and spectrum management in Asia and the Pacific, last mile connectivity toolkit, ICT infrastructure mapping, satellite communications workshop, and the Giga infrastructure toolkit.

Document [1/135 \(Question 4/1 and 5/1 Workshop Report\)](#) shares the report of the joint workshop with Question 5/1 entitled "Challenges and opportunities of the use of USF for bridging the digital divide" held on 15 May 2023, the programme for which is available at: <https://www.itu.int/en/ITU-D/Study-Groups/2022-2025/Pages/meetings/joint-session-Q4-1-Q5-1-may23.aspx>

The content of the report as well as the presentations and documents shared were utilised for the joint deliverable and the final output report of Question 4/1 and Question 5/1, as applicable.

Document [1/167 \(Central African Rep.\)](#) discusses how the Central African Republic is deploying optical fibre, using grants from the European Union and the African Union. Broadband access and the digital divide are a challenge for many developing countries. The Central African Republic is instituting strategies and policies to do everything possible to universalize broadband access, and ensure that no one is left behind. This includes connecting unserved and underserved segments of the population in rural and urban areas, and keeping prices on the national backbone affordable.

Document [1/170 \(Burundi\)](#) highlights efforts in Burundi to review policies for deployment of ICT infrastructure in order to increase network coverage and decrease the digital divide, especially in rural and remote areas. The digitalisation of public services will be the intended consequence of proper planning of the deployment and sharing of ICT infrastructures.

Document [1/173 \(Burkina Faso\)](#) highlights the adoption of Law No. 061-2008/AN of 27 November 2008, on the general regulation of electronic communications networks and services in Burkina Faso, and Decree No. 2011-093/PRES/PM/MPTIC/MI of 28 February 2011, which defines the modalities for the implementation of universal access and service for electronic communications and the modalities for the management of the fund for universal access and service for communications.

Document [1/175 \(State of Palestine\)](#) proposes the need for quality of service (QoS) and quality of experience (QoE) KPI thresholds and values, and recommends an international benchmarking report on the main QoE and QoS KPIs.

Document [1/178 \(Argentina\)](#) provides insights into the Plan Conectar, managed by Arsat, the state-owned satellite solutions company, focusing on public investments in connectivity. There are four pillars to the Plan Conectar:

- Reactivation of the Argentine satellite system, with the construction of the ARSAT-SG1 satellite to provide connectivity to homes in rural areas and neighbouring countries;
- Update and expansion of the Federal Fibre-Optic Network, with the goal of building and illuminating 4 408 kilometres of fibre-optic network;
- Enhancement of the National Data Centre, including the expansion of cloud services, updating of backup systems, and contingency policies;
- Recovery of the Open Digital Television, with the updating and recovery of transmission stations, renewal of the platform and strengthening of the equipment.

Document [1/180 \(Argentina\)](#) presents the Mi Pueblo Conectado Programme, carried out by the Secretariat of Public Innovation of the Chief of Cabinet of Ministers' Office in Argentina, which seeks to promote the digital development of provincial and municipal government, improving public services, and reducing the digital divide in 377 locations. The plan includes satellite connectivity provided by Arsat, the state-owned satellite services company, and government financing Internet services for 12 months, in various provinces.

Document [1/185 \(Burkina Faso\)](#) shares details of the implementation of digital boxes in rural and isolated areas or white areas of Burkina Faso.

Document [1/195 \(Indonesia\)](#) details how, due to limited communications resources while at sea, Indonesian fishermen with non-SOLAS fishing vessels, had been using radio communications frequencies incorrectly, including the Aeronautical Mobile Service frequencies. As a result of fishermen's unauthorised usage of Aeronautical Mobile Service frequencies, Indonesian aviation, during the period 2014-2021, suffered from interference. This long-standing problem affected other neighbouring countries and therefore required special attention and action from the Government. As a response, the Ministry of Communication and Information of Indonesia (MCI), conducted an

"Inclusive Communication for Fishermen" programme in 2019, to solve this issue. This initiative has been effective in reducing interference to the Aeronautical Mobile Service, and in boosting the productivity of the fisheries sector by increasing fish yields, and providing a useful aid for their economic viability.

Document [1/223 \(China\)](#) introduces universal service policies and practices in China, summarizes the latest developments of telecommunications infrastructure in rural areas, and the actions taken to improve mechanisms and enrich rural Internet applications. The experience and practices accumulated by China are of great practical significance in promoting the inclusive development of global digital technology and hopefully will provide useful a reference for relevant countries and regions.

Document [1/246 \(United Kingdom\)](#) summarises the experience to date with the United Kingdom Gigabit Broadband Voucher Scheme, a part of the Government's Project Gigabit programme. The Gigabit Broadband Voucher Scheme, pools demand among homes and businesses in eligible rural areas, to help cover the cost of deploying gigabit-capable broadband infrastructure, in areas where there is no entitlement to a Gigabit Infrastructure Subsidy (GIS) procurement.

Document [1/259 \(Australia\)](#) details how the Government of Australia funds delivery of basic publicly accessible telecommunications services, in approximately 457 small remote First Nations (indigenous) communities under the Remote Indigenous Telecommunications (RICT) programme. Under this programme, First Nations communities have access to free public telephone and Internet services (including community telephones, Wi-Fi hubs, and Wi-Fi telephones). The National Indigenous Australians Agency (NIAA) has a contract with a telecommunications provider for the monitoring, maintenance, and delivery of these services.

Document [1/147 \(Kamaleon, Mozambique\)](#) discusses strategies to limit barriers and harness the power of digital technologies to build inclusive digital societies in developing countries. This requires a multidimensional and versatile approach to digital inclusion. The interactive mobile digital unit (IMDU) was developed to overcome accessibility challenges of rural areas, and enable inclusion of persons with disabilities and with specific needs, and to also to meet requirements to deliver a wide range of digital services, from e-education and e-health, to rural banking or e-government, enhancing socio-economic development and civic participation of the most vulnerable communities. This will contribute to more inclusive and participative societies as result of the positive impact of digital transformation in developing countries.

Document [1/199 \(Intel Corporation, United States\)](#) provides updated information from [Wi-Fi Alliance](#) and [Wireless Broadband Alliance](#) on the progress and global status of Wi-Fi technology including Wi-Fi 6E, Wi-Fi 7, and the benefits to countries.

Document [1/200 \(Intel Corporation, United States\)](#) updates information from [Wi-Fi Alliance](#) and [Wireless Broadband Alliance](#) on the progress and global status of Wi-Fi technology including Wi-Fi 6E, Wi-Fi 7 and benefits to countries.

Document [1/204 \(GSOA\)](#) presents the proposal and concept for a joint Q1/1, Q3/1 and Q5/1 workshop. This workshop was proposed to be held over one day within the time management plan of the 2024 Rapporteur Group meetings of ITU-D SG1 to support Q1/1, Q5/1 and 3/1 The goal is to support administrations in building their national digital strategies and to advance each country's connectivity goals by identifying challenges and potential collaborations to achieve meaningful connectivity, with the objective to provide connectivity to all, provide regulatory and business best practices, and to showcase the key role of satellite services in day to day situations, as well as in disaster situations.

Document [1/235 \(Deloitte, France\)](#) highlights the need to have a national network coverage policy, and a comprehensive vision of the different areas for intervention and their profitability. This step is crucial to define the Universal Service policy. This contribution proposes some methods from Deloitte's experience to calculate amounts and financing mechanisms (private or public via USF) to allocate to each area.

Document [1/238+Annex \(Ericsson, Sweden\)](#) provides a brief overview of satellite systems, delineates the use cases and business models that inform the ongoing paradigm shift in the space industry, and details the 3GPP initiative on non-terrestrial networks (NTNs) along with the NTN standardization timeline in various working groups of the 3GPP. The paper posits that a 3GPP-compliant NTN solution would, in contrast to the bulky and expensive terminals used in non-3GPP-based legacy-MSS systems, provide immediate compatibility with mass-market smartphones, allowing terrestrial operators to boost their geographical coverage, and close the connectivity gap with respect to voice and data coverage in sparsely populated areas, including rural settings, while serving new use cases such as maritime coverage.

Document [1/239 \(Association for Progressive Communications\)](#) highlights that community Internet networks (CNS) in Argentina, have played a key role in the search for greater digital inclusion and in bridging the digital divide, especially in the most underserved areas of the country. With more than a decade of existence and more than six years of active collaboration and clear communication with ENACOM, as well as with other autonomous agencies and governmental bodies, these CNS have achieved remarkable progress in local connectivity and community empowerment. From this accumulated experience, valuable analyses and proposals can be drawn, that go beyond the simple expansion of connectivity services, or the delivery of devices. The key to addressing digital inclusion, especially in areas where the digital divide is most pronounced, lies in the creation of creative proposals and models. These models must include the active participation of people and territorial organisations that do not yet enjoy significant connectivity and digitisation, but have the capacity to advocate for it. Technological appropriation should be promoted in a way that has a positive impact on daily life, on production and marketing systems, on access to rights, on the production and dissemination of local culture, on the right to access information and communication, as well as on the capacity to decide and create their own way of communicating and cohabiting on the Internet.

Document [1/251+Annex* \(GSOA\)](#) details how satellite technology plays a crucial role in advancing the United Nations SDGs in various ways.

Document [1/261* \(BDT Focal Points\)](#) provides insight into how digital technologies and connectivity are key to achieving the United Nations sustainable development goals (SDGs). Satellite technology plays a crucial role in advancing the SDGs in various ways. Please see the annex on satellite technology for SDGs, for more information.

[SG1RGQ/149 \(Senegal\)](#) outlines how the fisheries industry in Senegal has benefitted from the Wireless Solutions for Fisheries in Senegal (WISE) project. The project provides users with access to meteorological and maritime resources, current market prices for fresh and processed fish, affordable loans and mobile financial services, best practices for fish processing, and hygiene and health education in multimedia formats.

[SG1RGQ/160 \(Algeria\)](#) detailed how through the universal service fund, Algeria is implementing various network connection and coverage projects to ensure universal telecommunication service. The meeting noted the document.

[SG1RGQ/165 \(Haiti\)](#) presents the final report on the resilience assessment for ICT networks and infrastructure, initiated by the International Telecommunication Union, and supported by the National Telecommunication Council (Conseil National des Télécommunications, CONATEL) of Haiti. The meeting noted the document.

[SG1RGQ/166+Annex \(Dominican Rep.\)](#) details how Indotel is implementing a plan for the expansion of connectivity for digital transformation in the country, with USD 115 million in financing from IDB.

[SG1RGQ/167+Annex \(Dominican Rep.\)](#) highlights how the Biennial Project Plan of the Telecommunications Development Fund of INDOTEL-RD for 2021-2022, "Connecting the Unconnected", has executed an "Access and Infrastructure" component to bring connectivity to small and isolated rural communities, and mountainous and unserved regions, through the installation of nine Internet

satellite kits for eight communities located in three of the poorest, least developed provinces of the country.

[SG1RGQ/170+Annex \(Syria\)](#) (also for Q3/1) proposes measures for the deployment of universal service in the telecommunication and information and communication technology (ICT) sector in rural areas, with the aim of improving development indicators and the accessibility of telecommunication and ICTs.

[SG1RGQ/180 \(Côte d'Ivoire\)](#) shared key issues to be considered for implementing a telecommunication/ICT accessibility policy and regulatory framework, for persons with disabilities and persons with specific needs in all countries.

[SG1RGQ/185 \(Mexico\)](#) shared a study on "Inequality and its impact on access to information technologies", prepared by the Federal Telecommunications Institute of Mexico.

[SG1RGQ/186 \(Thailand\)](#) covers the benefits of projects that have provided an opportunity for people, residing in remote, areas, low-income persons, disabled persons, children, the elderly, and underprivileged persons to access and engage in basic telecommunication services.

[SG1RGQ/187 \(Burundi\)](#) highlights efforts by Burundi with the assistance of ITU, to establish a National Digital Inclusion and Accessibility Strategy.

[SG1RGQ/189 \(Central African Rep.\)](#) outlines how Central African Republic, faced with the challenge of implementing high-speed and digital communications is publicising the use of high-speed broadband and regulating national backbone price caps, while integrating and implementing ICT services, including new and emerging technologies.

[SG1RGQ/199 \(Syria\)](#) highlights how Syria is developing a set of strategies for digital development, through the Ministry of Communications and Technology, with the assistance of other government agencies and their affiliated bodies.

[SG1RGQ/206 \(India\)](#) (also for Q1/1) presents the role of the Universal Service Obligation Fund (USOF) in India, in enabling non-discriminatory access to good quality, reliable and affordable telecommunication services. It updates the status of the expenditure and various projects being undertaken under USOF.

[SG1RGQ/210 \(Burundi\)](#) details the Government of Burundi project (PAFEN 2022-2027) to support the foundation of the digital economy, and fill existing gaps in network coverage on the supply side, by prioritizing unserved rural groupings and strategic sectors.

[SG1RGQ/224 \(Saudi Arabia\)](#) highlights how innovative spectrum management and licensing methods, alongside satellite connectivity, emerge as crucial strategies for rural connectivity. The document generated a lot of interest and was noted with appreciation.

[SG1RGQ/230 \(Rep. of Korea\)](#) details the project to look into the current digital divide in the north-western region of Guatemala, which was conducted in 2022, by the Government of Rep. of Korea and the Government of Guatemala, with assistance from the Inter-American Development Bank (IDB). The jointly coordinated project is expected to assist Guatemala with ICT policies relating to rural and remote areas, as well as strengthening cooperation between the two countries. This sharing of knowledge and practices assists in reducing the digital divide in rural and remote areas of Guatemala.

[SG1RGQ/241 \(Brazil\)](#) presents recent actions taken by the telecommunications regulator of Brazil to foster infrastructure expansion towards rural areas and communities.

[SG1RGQ/245 \(Zimbabwe\)](#) highlights the impact of having content on the Internet and other electronic platforms only in major languages. It explores the need for creating local content and the availability of content in indigenous languages. It also recommends deliberate programmes to encourage the creation of local content, and content in indigenous languages.

[SG1RGQ/246 \(Uganda\)](#) covers the Uganda Communications Commission pilot project in 2020, for providing rural households with communication devices.

[SG1RGQ/247 \(United States\)](#) describes the ongoing experiences of the United States National Telecommunications and Information Administration (NTIA), during the 2022-25 Study Cycle with broadband connectivity, adoption, digital inclusion, and equity, especially through the Internet for All initiative. This includes the Broadband Equity, Access, and Deployment (BEAD) programme, the Tribal Broadband Connectivity programme, and three new Digital Equity programmes.

[SG1RGQ/249 \(South Africa\)](#) highlights how integrating new technologies, implementing supportive policies, and fostering cooperation and the widespread availability of high-speed broadband infrastructure in rural areas, can be achieved, thereby improving access to essential e-services and enhancing the quality of life for inhabitants.

[SG1RGQ/159 \(SUP'PTIC, Cameroon\)](#) (also for Q6/1 & Q7/1) highlights how technological aids for people with disabilities, brought in from other countries, continue to require tropicalization and contextualization to improve inclusion for the population of persons with disabilities in Cameroon.

[SG1RGQ/195 \(RIFEN\)](#) (also for Q6/1, Q7/1 & Q5/2) draws attention to the need to design ICT connectivity for women and girls in a manner that seamlessly and meaningfully integrates digital skills and ICTs into their lives, bringing manifold benefits and positive and sustained multiplier effects in the concerned community.

[SG1RGQ/203 \(GSMA & Orange, France\)](#) highlights the technological innovations and partnerships that mobile network operators (MNOs) have funded to address the digital divide, in particular the usage gap, by improving affordability and digital skills, and creating more meaningful and relevant digital ecosystems.

[SG1RGQ/205 \(Softbank Corporation, Japan\)](#) provides an overview of high altitude platform station (HAPS) systems, emphasizing the stability, coverage capabilities, and spectrum expansion achieved through international agreements.

[SG1RGQ/209 \(Broadband India Forum\)](#) provides a presentation on the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISA), a digital literacy mission of the Government of India launched in 2019, with the main objective being to impart digital literacy training to one person per household.

[SG1RGQ/215+Annex \(GSOA\)](#) (also for Q1/1) highlights how satellite networks operating in mobile satellite services with allocated bands, have provided ubiquitous global connectivity to users on land, sea, and in the air.

Document [1/303 \(Chad\)](#) highlights how Chad faces significant challenges in its digital development due to infrastructural weaknesses, limited resources, and a reliance on neighbouring countries for connectivity. The Government has prioritized ICT development as part of its national development plan, aiming to integrate the country into the international broadband network, and promote digital inclusion, especially in rural areas. Efforts include deploying a fibre-optic network, expanding 4G coverage, and creating community telecentres. Despite progress, issues such as low Internet penetration, regulatory gaps, and inadequate basic infrastructure hinder progress. Chad envisions leveraging digitalization to modernize public services, enhance e-governance, and stimulate economic growth, aiming to become a regional ICT hub by 2030.

Document [1/304 \(Bulgaria\)](#) aims to expand high-capacity digital networks, including 5G, to underserved rural and remote areas, in order to enhance socio-economic development, and reduce the digital divide. With a focus on fibre-optic networks and universal mobile access, the project targets connectivity for over 200 000 households and emphasizes training, remote work, and access to essential services such as education, healthcare, and e-governance. Private investment challenges in low-density areas are addressed through public funding, with a total budget of EUR 240.25 million.

Scheduled from November 2023 to August 2026, the project envisions a dynamic, inclusive economy powered by widespread digital connectivity.

Document [1/306 \(Haiti\)](#) shows that ICTs have significantly impacted the commercial activities of Haitian women in rural areas, who play a critical role in the local economy despite facing challenges including limited resources, inadequate training, and economic vulnerability. Women engage in diverse activities such as farming, livestock rearing, and small-scale trading, contributing up to 50 per cent of agricultural production. ICTs have improved business efficiency by enabling online sales, better communication, and informed decision-making through access to information. Women now use tools such as online platforms, mobile payment apps, and messaging services to expand markets, reduce risks, and lower costs. However, access to ICTs remains limited, hindering progress. Proposed strategies include promoting climate-resilient agricultural technologies, providing better access to microfinance, and enhancing digital education, all aimed at empowering women economically and improving their livelihoods in rural Haiti.

Document [1/369 \(Haiti\)](#) has made significant strides in implementing electronic signatures, a digital equivalent of handwritten signatures, to integrate into the digital economy and ensure document authenticity and integrity. Governed by legislation passed in 2014, and reinforced by subsequent decrees, the National Telecommunications Council (CONATEL) is tasked with implementing the law, and managing the associated technical and regulatory frameworks. Key advancements include signing agreements to establish an object identifier (OID) registration authority, recognized by international bodies such as ITU and ISO, and promoting awareness through workshops and training for stakeholders. Despite progress, challenges remain, including finalizing a draft implementing decree, defining regulations for electronic document admissibility, and establishing a public key infrastructure. Efforts by CONATEL, in collaboration with the Haitian Standardization Bureau (BHN) and the National Electrotechnical Committee (CEN), aim to address these issues and ensure widespread adoption of electronic signatures across Haiti.

Document [1/316 \(Kenya\)](#). The e-Agriculture initiative in Kenya is a pivotal effort to bridge the digital divide and achieve meaningful connectivity for rural and marginalized communities. Aligned with global goals such as the United Nations SDGs and Kenya's Vision 2030, the project focuses on digitizing agricultural content, translating it into local languages, and disseminating it through ICT infrastructure to empower women, youth, and persons with disabilities. The initiative leverages partnerships between government agencies, such as the Communications Authority, ICT Authority, and Kenya Agricultural Livestock and Research Organization (KALRO), with the support of the USF. The first phase, implemented in six rural counties, has successfully digitized content for 16 agricultural value chains in nine local languages, improving farm productivity and socio-economic development. However, challenges including limited broadband penetration, resource constraints, and digital skills gaps persist, underscoring the need for sustainable strategies, including public-private partnerships, diverse financing mechanisms, and global collaboration, to enhance digital inclusivity and reduce the "usage gap" for marginalized groups.

Document [1/349 \(Bhutan\)](#). The experience of Bhutan with the South Asia Satellite (SAS) showcases the transformative role of satellite communication in addressing connectivity challenges in rural areas and enhancing disaster resilience. The SAS network bridges the digital divide by providing high-definition (HD) broadcasting services to unserved regions, ensuring equitable access to information and entertainment. It also plays a pivotal role in disaster communication, maintaining reliable emergency communication when conventional systems fail. The dual-use infrastructure of Bhutan, combining broadcasting and disaster response, demonstrates efficient resource utilization and resilience. By sharing lessons learned, including the importance of stakeholder collaboration and upgrading rural broadcasting services, Bhutan aims to inspire similar initiatives globally while advocating for ITU support in satellite communication research and capacity building.

Document [1/358 \(Colombia, United States\)](#). The ProICT programme, part of the Digital Connectivity and Cybersecurity Partnership of the United States Government, collaborated with Colombian MinTIC and ANE, to design an innovative 5G spectrum auction in 2023. The auction, held on December

2023, was groundbreaking in its approach, incorporating in-kind obligations that secured new fixed Internet connections for nearly 1 200 schools benefiting around 73 000 children, and expanded 4G coverage along 700 kilometres of roadways. The multi-stage auction allowed the entry of a new operator and awarded 83 per cent of available spectrum for COP 1.5 billion, with successful bidders beginning 5G infrastructure rollout in February 2024. This collaborative effort demonstrated a successful international partnership in digital transformation, combining global best practices with local regulatory knowledge to achieve significant connectivity improvements, including faster Internet speeds, expanded network coverage, and multiple potential socioeconomic benefits for Colombia.

Document [1/423 \(United States\)](#). USAID's Digital Invest programme demonstrates an innovative approach to expanding digital access in emerging markets through blended finance and strategic co-creation with private sector partners. By leveraging an initial USD 8.45 million in United States Government funding, the programme has helped mobilize an estimated USD 500 million in investment capital, with partners raising over USD 300 million and investing in 68 Internet service providers (ISPs) and fintech companies across 40 countries, leading to an additional USD 1.2 billion in external financing. The programme's success is built on its collaborative approach, where USAID engages in extensive co-creation activities with funding recipients, to design customized solutions for expanding broadband Internet and digital financial services to underserved populations. This is exemplified in successful partnerships such as Roke Telkom in Uganda, which now provides Internet coverage to over 200 000 people including residents of the Bidi Bidi refugee settlement, and Lendable's MSME Fintech Credit Fund, which has raised over USD 110 million in debt financing for fintech companies serving micro, small, and medium enterprises across 15 countries. Through these initiatives, the Digital Invest programme has demonstrated how public-private partnerships can effectively bridge digital divides, and promote responsible technology use while working toward achieving the United Nations' sustainable development goals (SDGs).

Document [1/362 \(Azerbaijan\)](#). The Azerbaijan Rural Women's Association (ARWA) launched the Digital Empowerment Campaign in 2021, to address the digital divide facing rural women, who comprise nearly half of the rural population of 4.6 million in Azerbaijan. Initially sparked by COVID-19 restrictions, the campaign has evolved through strategic partnerships with organizations such as FAO, T-Mobile USA, Samsung, USAID, and UNDP, providing essential digital resources and training to rural women farmers and entrepreneurs. The programme focuses on practical ICT skills, including smartphone usage, video creation, social media marketing, and virtual meeting platforms, enabling participants to better access markets and knowledge. Through this initiative, 520 rural women have been trained, with 66 per cent of ARWA members now digitally skilled and actively mentoring others. The impact has been significant, with participating groups reporting an average 30 per cent increase in sales and 20 per cent rise in profits. The success of the programme, which operates through 54 Women Development and Enterprise Groups (WDEGs) and 14 Women's Cooperatives, demonstrates how targeted digital literacy initiatives can effectively empower rural communities, and create sustainable economic growth, particularly in addressing the challenges faced by women in remote areas who previously had limited access to smart devices and digital skills training.

Document [1/380 \(Rep. of Congo\)](#). The COVID-19 pandemic has significantly impacted Africa's digital infrastructure development, where an estimated 900 million people still lack Internet access and only 0.4 per cent of the population subscribes to fixed broadband services. The pandemic caused delays in the deployment of advanced telecommunications infrastructure through factory closures, travel restrictions, and supply chain disruptions, resulting in slower 5G network deployment, and increased equipment costs. In response, the European Union has launched the "Global Gateway" strategy, mobilizing EUR 300 billion between 2021-2027, to support connectivity projects. Mobile technology has become Africa's primary telecommunications infrastructure, with some markets having up to 99 per cent of connections through mobile networks. While 5G deployment is underway in some countries such as South Africa, offering opportunities for remote monitoring and smart agriculture, its implementation requires significant additional investment due to technical requirements. The European Investment Bank, through the Digital4Development platform, is addressing these challenges by using blended finance mechanisms to reduce investment risks, attract private sector investors,

and promote infrastructure sharing to increase rural connectivity. This comprehensive approach aims to accelerate Africa's digital transition and ensure inclusive access to digital services, particularly crucial after the COVID-19 pandemic highlighted how lack of Internet connectivity affected access to healthcare, education, and overall productivity.

Document [1/392 \(Senegal\)](#). Senegal has made notable progress in digital connectivity, aiming to become a digital hub in Africa, yet challenges such as rural coverage gaps, high connectivity costs for disadvantaged populations, and a persistent digital divide remain. To address these, the Regulatory Authority for Telecommunications and Posts (ARTP) in Senegal initiated in 2024, a consultation on "Enhancing Digital Inclusion," focusing on affordability, universal access, and equitable digital participation. Recommendations include reducing connectivity costs, improving rural and gender-specific access, expanding public Wi-Fi, ensuring emergency network coverage, and enhancing service quality. A clear national strategy emphasizing training, affordability, and infrastructure deployment, alongside transparency in the use of universal service funds, is essential. Greater partnerships between stakeholders, and innovative regulatory frameworks are also critical to fostering digital inclusion. By addressing these priorities, Senegal can leverage digital technology for economic growth, social integration, and improved public services, such as education and healthcare, particularly in underserved regions.

Document [1/393 \(India\)](#). The document explores international best practices and initiatives in India for connecting rural and remote areas, emphasizing a balance between long-term and short-term approaches. Long-term strategies focus on sustainable infrastructure development, such as the BharatNet and submarine cable projects, which ensure future readiness and extended service life. Short-term strategies prioritize immediate support through subsidies, device provisioning, and welfare schemes for underserved populations. India has demonstrated significant progress through its Universal Service Obligation Fund (USOF), now expanded as Digital Bharat Nidhi (DBN), collecting USD 1.5 billion annually to fund telecommunications initiatives. Notable projects include extending 4G mobile connectivity, funding R&D for indigenous telecommunications technologies, and providing affordable broadband access in remote areas. India seeks to collaborate with other nations by sharing its experiences, learning from their initiatives, and addressing connectivity challenges collectively.

Document [1/407 \(China\)](#). China has prioritized universal telecommunications services in rural areas, focusing on broadband infrastructure development and digital villages as strategic goals. Through policies such as the Universal Telecommunications Service Mechanism, significant advancements have been achieved in bridging the digital divide, with broadband and 5G networks reaching all administrative villages and border regions. The "5G Application Sailing Action Plan" integrates 5G with agriculture, governance, and public services, while initiatives such as the "Broadband Frontier" policy enhance connectivity in remote areas. By 2024, China had over 4 million 5G base stations, achieving "5G in every county," and rural Internet penetration had reached 66.5 per cent. Digital applications have transformed rural agriculture, governance, and e-commerce, driving economic growth and innovation. Examples include precision farming with digital tools in Nanjing, the integration of rural e-commerce platforms boosting agricultural sales, and digital governance models improving administrative efficiency. Moving forward, China aims to strengthen universal telecommunications services and foster a resilient digital society.

Document [1/430 \(Uganda\)](#). In Uganda the Vision 2040 policy emphasizes the development of robust communication infrastructure to drive socio-economic growth and bridge the digital divide, with a focus on underserved and unserved areas. In line with this, the Uganda Communications Commission leverages subsidy financing through its universal service fund (USF) to support tower companies in constructing passive telecommunications infrastructure. This model promotes infrastructure sharing, reduces costs for mobile network operators (MNOs), and enhances broadband coverage. The programme involves identifying coverage gaps, providing financial incentives, fostering public-private partnerships, and ensuring minimum 3G coverage in targeted areas. Despite challenges such as high deployment costs, low population density, and alignment issues between stakeholders, the initiative aims to improve access to digital services, foster economic growth, and strengthen public-private

collaboration. Community engagement and a robust monitoring framework ensure sustainability, with expected outcomes including increased connectivity, social inclusion, and job creation. The project serves as a model for addressing digital infrastructure gaps in similar regions globally.

Document [1/327 \(GSMA, Telefonica S.A\)](#). At the end of 2023, approximately 350 million people (4 per cent of the global population) remained without mobile broadband coverage, predominantly in rural, poor, and sparsely populated areas. To address this coverage gap, which requires an estimated USD 430 billion investment by 2030, voluntary infrastructure sharing between telecommunications providers has emerged as an effective solution. This approach is exemplified by Internet para Todos (IpT) in Peru, a collaborative initiative established in 2019, by Telefónica, Meta, BID Invest, and CAF. Through shared infrastructure agreements and network virtualization, IpT has successfully connected over 18 000 rural population centres to 4G, benefiting more than 3.6 million people, with particularly positive impacts on traditionally underserved communities including women, rural populations, and those with limited education. While infrastructure sharing (both active and passive) has shown promising results in expanding coverage and reducing costs, the implementation remains limited globally, with regulatory frameworks often not reflecting the consensus on its benefits. The success of IpT demonstrates that voluntary, market-driven infrastructure sharing agreements, supported by appropriate regulatory frameworks, can effectively address the digital divide, while promoting efficient network deployment, and economic growth in underserved areas.

Document [1/399 \(GSMA\)](#). The mobile industry continues to be a significant driver of sustainable development, achieving 58 per cent of its potential contribution to the SDGs in 2023, up from 31 per cent in 2015. The industry's most substantial impact was on SDG 9 (Industry, Innovation and Infrastructure), with mobile broadband coverage reaching 96 per cent of the global population, leaving only 350 million people (4 per cent) without coverage, while 4.6 billion people (57 per cent) actively used mobile Internet. Mobile financial services played a crucial role, with 3 billion people (54 per cent of mobile subscribers) using these services in 2023, contributing to multiple SDGs including poverty reduction and economic growth. Despite widespread coverage, the industry faces a significant usage gap, with many people living within coverage areas but unable to connect due to barriers such as affordability, digital literacy, and relevance. To address these challenges, operators have implemented various initiatives, including smartphone financing options, digital skills training, and relevant content development. Rural connectivity has shown notable progress, with mobile Internet adoption reaching 41 per cent (1.4 billion people) by the end of 2023, representing an increase of 420 million users since 2015, supported by innovations such as Nokia Rural Connect for reliable rural coverage deployment.

Document [1/418 \(GSMA\)](#). The GSMA 2024 State of Mobile Internet Connectivity Report reveals that while mobile Internet connectivity continues to grow, reaching 57 per cent of the global population (4.6 billion people) by the end of 2023, the growth rate has plateaued with only 160 million new users added in 2023. The digital divide remains significant, with 3.45 billion people still unconnected to mobile Internet. This divide is manifested in two ways: a 'coverage gap' affecting 350 million people (4 per cent of global population) who live in areas without mobile broadband coverage, predominantly in least developed, landlocked, or small island developing states; and a much larger 'usage gap' affecting 3.1 billion people (39 per cent of global population) who live within coverage areas but face adoption barriers. The report identifies handset affordability as the primary barrier to adoption, alongside literacy and digital skills challenges, particularly in low- and middle-income countries (LMICs) where 95 per cent of the unconnected population resides. The comprehensive analysis includes detailed findings on global and regional connectivity figures, rural-urban disparities, device ownership, network coverage and quality, usage patterns, and specific barriers to adoption, concluding with policy recommendations focused on expanding digital skills initiatives and improving device affordability through financing options.

Document [1/371 \(RIFEN\)](#). The International Network of Women Digital Experts (RIFEN) and Smart Africa Digital Academy (SADA), collaborated to deliver an intensive cybersecurity training programme aimed at enhancing digital security awareness and skills among African youth. The comprehensive programme consisted of fourteen modules covering essential topics including cybersecurity

fundamentals, data protection, network security infrastructure, and operating systems such as Windows and Linux. The training successfully equipped participants with practical knowledge to identify and address cybersecurity threats, vulnerabilities, and attacks, while also developing crucial skills in teaching, teamwork, problem-solving, and technical communication. Participants gained Support Technician Cybersecurity certification, improving their job prospects in the cybersecurity sector, and were able to mentor other young talents, creating a ripple effect of knowledge sharing. The initiative, which reached over a thousand participants, emphasizes the importance of cultural shift in cybersecurity awareness and highlights the need for collaboration at government, business, and societal levels within an African Cybersecurity Awareness Framework. The success of the programme demonstrates its effectiveness in building a new generation of cybersecurity professionals capable of protecting African digital infrastructure, and contributing to the development of the continent through enhanced cyber resilience.

Document [1/374 \(RIFEN\)](#). The use of the Internet in Burundi has significantly impacted daily life, education, and economic activities, though challenges persist. Stable and affordable Internet access is essential for productivity, yet many face barriers due to high costs, inadequate infrastructure, and digital illiteracy. While mobile technologies have driven increased Internet penetration, disparities between urban and rural areas remain pronounced. The Internet supports education, entrepreneurship, and access to information, but its potential is hindered by the digital divide. Regulatory bodies and telecommunications operators must improve infrastructure, reduce costs, and ensure service reliability. Digital education and targeted training programmes can enhance user skills, while promoting local innovation and supporting tech startups is vital for economic growth. By fostering an inclusive digital environment, prioritizing cybersecurity, and enacting data-driven public policies, Burundi can leverage the Internet as a catalyst for socio-economic development, ensuring broader benefits for its population.

Document [1/377\(Rev.1\) \(RIFEN\)](#). The study explores how Information and Communication Technologies (ICTs) can promote sustainable agriculture in rural Cameroon, focusing on the Nda'a community in the Western Region. Agriculture, critical to the economy of Cameroon, faces challenges including low productivity, poor access to improved inputs, and limited technical knowledge. ICT tools such as mobile phones, community radios, and Web 2.0 applications were integrated through the Nda'a Agricultural Days project to address these issues. The initiative involved surveys to identify the needs of farmers, capacity-building workshops, and the dissemination of agricultural information. Results showed improved agricultural practices, greater adoption of organic fertilizers, enhanced knowledge sharing among farmers, and strengthened community engagement. The project reached over 300 farmers, organized workshops, and mobilized resources for sustainable agricultural development, highlighting the potential of ICTs in transforming rural livelihoods.

Document [1/396 \(RIFEN\)](#). Digital connectivity is a key driver of socio-economic development in Africa, yet significant gender gaps persist in access to and usage of technology, particularly in rural areas. Women in the Sub-Sahara Africa region are disproportionately affected by digital exclusion, facing barriers such as lower income, limited educational opportunities, social norms, and high costs of digital devices. Despite improvements in mobile Internet coverage, usage gaps remain, with women lagging behind men in smartphone ownership and digital literacy. To bridge this gap, it is crucial to ensure affordable and accessible digital technologies, invest in digital skills development, and promote digital financial inclusion. Organizations such as the International Network of Women Digital Experts (RIFEN) are making efforts to empower women through digital skilling programmes and entrepreneurship initiatives. Recommendations to address these issues include fostering public-private partnerships, leveraging universal service funds for empowerment of women, and encouraging policies that promote women's access to digital content and leadership roles in the tech space. These efforts aim to reduce the gender digital divide and enhance the participation of women in digital socio-economic activities across Africa.

Document [1/401 \(Access Partnerships, United Kingdom\)](#). The digital divide continues to hinder global progress, particularly for small and medium enterprises (SMEs) in underserved areas, with

limited access to technology and the Internet. To address this, governments and organizations are implementing policies and initiatives to enhance digital infrastructure, optimize network and security management, and promote equitable access. Solutions such as routed optical networking, and software-defined wide area networks (SD-WAN) help SMEs lower costs, improve connectivity, and strengthen cybersecurity, empowering them to adopt digital tools. Case studies from Ethiopia and the Asia-Pacific region demonstrate the benefits of these technologies in reducing operational expenses and enhancing network resilience. Policy recommendations, including workforce training, public-private partnerships, and regulatory sandboxes, are essential to enable SMEs to thrive and bridge the digital divide. These efforts are critical for empowering SMEs to access the digital tools and resources necessary for success in the digital economy.

Document [1/402 \(SoftBank Corp., Japan\)](#). This contribution, developed by the HAPS Alliance Telecom WG and submitted by SoftBank Corp., highlights the significance of high altitude platform stations (HAPS) as a key component of modern 3D telecommunication infrastructure, alongside satellite constellations and terrestrial networks. HAPS offer telecommunications providers and governments a solution to address coverage challenges in underserved areas and provide rapid response during natural disasters, offering advantages such as faster connection speeds, lower latency, better indoor penetration, and higher network capacity compared to satellites. The contribution includes two key deliverables: Attachment 1, outlines the mission, vision, and technological advancements of HAPS towards commercialization, while Attachment 2, presents regulatory recommendations to enable HAPS deployment, including recent developments such as the WRC-23 expansion of HAPS service-link frequencies, to guide governments in creating effective national regulations for HAPS implementation.

Document [1/416 \(Huawei\)](#). The Generation Connect Young Leaders Programme (GCYLP) youth projects emphasize closing digital divides globally through innovative approaches. In Zambia, the Morey initiative focuses on making essential electronic devices affordable via partnerships and flexible financing, targeting rural populations. In Pakistan, the DIGITAL ROHI project aims to connect remote areas such as the Cholistan Desert, using solar-powered Internet stations and locally tailored solutions. In Cambodia, the AURA project empowers persons with disabilities by leveraging Web3 and GameFi technologies to provide digital inclusion and passive income. These projects align with multiple sustainable development goals (SDGs), such as reducing inequalities, and fostering sustainable innovation, offering scalable models to promote inclusive socioeconomic growth across underserved regions.

Document [1/426 \(Ericsson\)](#). The FWA Handbook 2024, offers six actionable insights for leveraging 5G technology to extend rural connectivity, with global fixed wireless access (FWA) service provider adoption reaching 80 per cent. It highlights the growing momentum of 5G FWA, with 121 providers offering services and 30 per cent adopting speed-based tariffs. The handbook explores value creation through revenue growth, operational efficiencies, and shared CAPEX strategies, while emphasizing the potential of FWA to bridge the digital divide by extending urban investments into suburban and rural areas. It outlines strategies to accelerate FWA uptake by integrating it into existing business processes, and evaluates the evolving customer premises equipment (CPE) ecosystem for performance and profitability. Lastly, it details steps for network evolution to ensure FWA growth and sustainability over time.

Document [1/427 \(Ericsson\)](#). The Ericsson Mobility Report 2024, provides industry-leading analyses and projections on mobile industry trends, including 5G, mobile subscriptions, data traffic, FWA, and Internet of things (IoT). Since 2011, the report has been a key resource for understanding telecommunications developments, offering insights into current market dynamics and future forecasts validated by extensive network measurements. This edition highlights the continued global expansion of 5G, with nearly 600 million new 5G subscriptions expected in 2024, driven by deployments in India, and North America. However, only 25 per cent of global sites outside China have adopted mid-band 5G, despite its significant user experience benefits. The report also explores the potential of high-performing, open 5G standalone networks for service innovation and performance-based business models. Additionally, it emphasizes FWA as a crucial 5G use case, especially in regions such as the

Middle East region and Africa, where it enables service providers to monetize networks, and bridge connectivity gaps in areas with limited landline access. Insights on 5G FWA and its monetization potential are integrated throughout the report.

Document [1/428](#) (**GSOA**). The GSR24 Outcomes and the GSOA Contribution highlight the critical role of satellite technology in addressing the digital divide, connecting 2.6 billion unconnected individuals, and advancing global digitalization. With demand for ubiquitous and reliable connectivity rising, satellites, and particularly in non-terrestrial networks (NTNs), offer transformative solutions for rural and underserved areas. Key advancements in satellite and antenna technologies enable cost-effective broadband services, including residential, business to business (B2B), and direct-to-device offerings, driving socio-economic development. Policymakers face challenges in leveraging these technologies effectively, such as fostering inclusivity, regulatory certainty, and global standards. Recommendations emphasize creating a predictable regulatory environment, encouraging public-private partnerships, reducing barriers such as spectrum costs and licensing restrictions, and aligning with international standards to promote innovation and investment. These measures, combined with collaborative efforts between terrestrial and non-terrestrial service providers, are vital to achieving global connectivity goals, and ensuring the inclusive adoption of transformative technologies for a sustainable digital future.

Document [1/435](#) (**ITU APT foundation of India**). Broadband connectivity in rural and remote areas can transform lifestyles, improve business opportunities, and bridge the digital divide. Broadband connectivity enables advancements in healthcare, education, agriculture, and employment through technologies such as distance learning, e-agriculture, and weather forecasting. However, rural areas face challenges including low population density, poor infrastructure, and high deployment costs, leaving them largely underserved. Emerging technologies, such as non-terrestrial networks (NTN), cognitive radios, dynamic spectrum access, and renewable energy, offer sustainable solutions. The integration of terrestrial and non-terrestrial networks, leveraging standards such as IEEE 802.22 WRAN, IEEE 802.11af White-Fi, and IEEE 802.11ah WiFi HaLow can ensure affordable and efficient broadband access. These technologies utilize unused spectrum (e.g., TV White Spaces) and are designed for energy efficiency, long-range connectivity, and low operational costs. Governments, regulatory bodies, and local micro-operators must collaborate to address challenges, promote digital literacy, and develop sustainable business models. By adopting these approaches, broadband access can be extended to underserved areas, fostering economic and societal benefits while supporting the United Nations sustainable development goals (SDGs).

Document [1/452](#) (**Deloitte**). The study, "Building a Digital Inclusion Index: The Case of Tunisia", aligns with the Digital Strategy 2021-2025 in Tunisia, which aims to position the country as a leader in digital communications technology by leveraging ICTs for social and economic development. Acknowledging the importance of digital inclusion, and ensuring equitable access to the internet and related skills, the study evaluates disparities across demographics and regions through a customized "Digital Inclusion Index". This multidimensional index measures three key areas: access (availability of infrastructure and affordability), aptitude (technical skills and socio-cultural mindset), and usage (intensity and diversity of Internet use). Drawing from international frameworks and tailored to the context of Tunisia, the analysis, conducted in collaboration with key national institutions, identifies priorities to guide public policies for improving digital inclusion and bridging the digital divide.

Document [1/454](#) (**GSOA**). Innovative satellite technologies, including multi-orbit networks, inter-satellite links, software-defined satellites, and in-orbit servicing, are revolutionizing global connectivity. Satellites have long supported critical services such as Internet access, remote sensing, weather forecasting, and positioning, navigation, and timing (PNT) bridging gaps for remote regions and disaster-stricken areas. The integration of non-terrestrial networks (NTNs) into 5G and 6G ecosystems is further enhancing connectivity, enabling seamless communication through small antennas on smartphones, vehicles, and fixed terminals. These advancements highlight the role of the satellite industry in providing scalable, cost-effective, and reliable solutions to meet growing global demands for connectivity, fostering inclusivity and bridging the digital divide.

Document [1/455 \(GSOA\)](#). The emergence of satellite direct-to-device (D2D) connectivity represents a significant advancement in satellite communications, offering consumers seamless and ubiquitous connectivity using their existing devices. This paper explores two key variants: D2D in mobile-satellite service (MSS) bands, which leverages spectrum already allocated to mobile-satellite services for seamless integration with 3GPP NTN standards, and D2D in MS bands, which uses mobile service (MS) spectrum to extend connectivity to commercial mobile devices. While D2D in MSS bands benefits from established protocols and minimal regulatory challenges, D2D in MS bands presents technical and regulatory hurdles, but provides a complementary solution to terrestrial networks in underserved areas. Realizing the full potential of satellite D2D connectivity requires collaboration among satellite operators, mobile network operators (MNOs), and regulatory bodies to address challenges and unlock new opportunities in global communication.

Document [1/446 \(BDT\)](#). The "Giga Barbados and OECS Connectivity to Community Programme" is an ITU-UNICEF pilot project in Barbados aimed at enhancing Internet access in schools and community centres, while promoting child online safety in countries of the Organisation of Eastern Caribbean States (OECS). With a budget of USD 178 000, the programme upgraded broadband infrastructure in 27 schools, benefiting over 18 000 students and 1 300 teachers, and in two community centres, where Internet speeds increased to 250 Mbit/s, and IT equipment was installed. Over 200 community members registered for digital skills training, with 55 completing the programme. Despite improved network performance, challenges with Internet reliability and funding remain, highlighting the need for additional investments in bandwidth, ICT policy, and curriculum reform. The proposal to establish Barbados as a "Digital Transformation Centre" offers a potential pathway to sustain and expand digital skills development.

Document [1/346 \(Rapporteurs for Q1/1, Q3/1 & Q5/1\)](#). The "Transformative Connectivity: Satellite Workshop" highlighted the rapid innovation in the satellite industry and its potential to bridge the digital divide, especially in underserved and remote areas. The workshop, structured into four sessions, addressed key themes including affordability, sustainable business models, regulatory frameworks, and the integration of non-terrestrial networks (NTNs) with terrestrial technologies. Discussions emphasized the role of satellites in delivering broadband connectivity, supporting disaster mitigation and recovery, and enabling services in education, healthcare, and agriculture. Success stories of LEO constellations and initiatives such as "Early Warnings for All" were shared, alongside challenges such as affordability and regulatory complexities. The integration of NTNs with 5G and future 6G ecosystems was recognized as pivotal for seamless global connectivity. Stakeholder collaboration, effective spectrum management, and user-centric approaches were deemed essential for leveraging satellite technologies to create a more connected, resilient world. The outcomes of the workshop will contribute to further discussions and reports.

Document [1/334 \(BDT Focal Points\)](#). The BDT report highlights significant progress in ICT infrastructure development since the last ITU-D Study Group meeting, focusing on geospatial tools, training programmes, and business planning initiatives to bridge digital divides. Efforts include broadband mapping projects such as Africa-BB-Maps, which aims to boost digital transformation in 11 African nations with EUR 15 million funding, and specialized training programmes on ICT infrastructure planning, including 5G deployment strategies. The ICT Infrastructure Business Planning Toolkit has been updated to support sustainable 5G rollouts, offering training sessions globally. The report also covers emerging technologies, with a project led by MSIT/Rep. of Korea and ITU promoting capacity building in AI, data, and cloud technologies to foster digital prosperity. Additionally, technical assistance has been provided to countries including Republic of the Gambia, Republic of Djibouti, and Islamic Republic of Mauritania, focusing on spectrum management, digital television transitions, and infrastructure mapping to enhance affordable and modern connectivity solutions.

Annex B – List of lessons learned

Web	Received	Source	Title
1/455	2024-10-22	Global Satellite Operators' Association (GSOA)	The future of satellite connectivity: Various approaches to direct-to-device services

The advent of satellite direct-to-device connectivity heralds an exciting era for the telecommunications industry. Introducing novel services that offer consumers ubiquitous connectivity benefits, this paper examines two variants of satellite direct-to-device (D2D) applications, focusing on their significance within the satellite communication market.

Satellite D2D service presents both promising opportunities alongside some challenges. Exploring the two variants, D2D in mobile-satellite service (MSS) bands and D2D in MS bands, underscores the innovative landscape of satellite communications.

Collaboration between satellite operators, MNOs, and regulatory bodies is indispensable to realize the full potential of satellite D2D connectivity and usher in a new era of ubiquitous and seamless communications.

Web	Received	Source	Title
1/454	2024-10-22	Global Satellite Operators' Association (GSOA)	New satellite technologies for transformative connectivity

The paper highlights the importance of integrating non-terrestrial networks (NTN) with terrestrial systems, using multi-orbit satellites and software-defined architectures for scalable, affordable and reliable connectivity. Artificial intelligence, machine learning, and quantum technologies are recommended for optimizing operations and improving security, while inter-satellite links enhance real-time data transfer. Best practices include leveraging these advancements to meet growing global demand for secure, high-capacity communications and ensuring seamless, efficient, and resilient connectivity by adopting a unified, software-driven, and multi-layered satellite approach.

Web	Received	Source	Title
1/452 +Ann.1	2024-10-31	Deloitte Risk Advisory S.r.l., France	Construction of a digital inclusion index: The case of Tunisia

Developing countries need to adopt a more comprehensive vision of digitalisation. This does not simply mean accelerating access, but also taking into account other dimensions of digital inclusion, such as intensity of use and diversification of uses. (Original in French)

Web	Received	Source	Title
1/448	2024-10-29	Global Satellite Operators' Association (GSOA)	GSOA comments to Question 5/1 Report Draft

Improving this report now is essential, providing ample time to refine and enhance its accuracy, coherence, and impact before WTDC25 and ensuring that it is future proof. By addressing gaps, clarifying points, and ensuring alignment a strong foundation is set for the final stages of the report.

Web	Received	Source	Title
1/435	2024-10-22	ITU-APT Foundation of India	Minimum basic broadband services for rural and remote areas in developing countries

This contribution draws attention to the provision of broadband service for rural and remote areas, to reduce the digital divide in developing countries with the help of reliable mobile and non-terrestrial network technology, which can provide coverage in rural and remote areas and connect millions of unconnected or under-connected people. With high quality broadband connectivity for humans and machines, Internet of things (IoT) can revolutionize business processes bringing new opportunities for both people and businesses.

Web	Received	Source	Title
1/430	2024-10-22	Uganda	Expansion of mobile network infrastructure in underserved and unserved areas through subsidy financing to tower companies

- 1) Regulations need to be put in place to ensure that mobile operators must take up sites where subsidies have been provided by the regulator to tower companies to expand mobile coverage.
- 2) The parties (the regulator, the mobile network operators (MNOs) and the tower companies) must discuss and collaborate before agreeing on which unserved and underserved areas require subsidy intervention, as one way of trying to align with their rollout plans.
- 3) Enhance community engagement: Involve the local communities throughout the project lifecycle to inform communities about the benefits of improved connectivity while overcoming any community resistance to tower installations due to health or aesthetic concerns.
- 4) Streamlined regulatory processes: Advocating for simplified regulatory frameworks and faster permitting processes which can facilitate faster infrastructure deployment.
- 5) Holistic infrastructure development plans: Investing in complementary infrastructure, such as roads and power supply, can address logistical challenges associated with project implementation.
- 6) The low penetration rate of digital devices in most unserved and underserved areas makes mobile network operators hesitant to enter into rental agreements with the tower companies, as they believe that even though the rental costs are subsidized, the average revenue per user (ARPU) will be low. There is a need for a sustainable strategy on ways to increase the penetration of digital devices in unserved and underserved areas which includes undertaking other programmes such as digital skills training.

Web	Received	Source	Title
1/428	2024-10-22	Global Satellite Operators' Association (GSOA)	GSR24 Outcomes and GSOA Contribution

GSOA would like to bring to the attention of the administrations their contribution submitted to the ITU consultation on GSR24 Best Practice Guidelines, "Charting the Course of Transformative Technologies for Positive Impact" that we consider relevant to the ITU-D reports and specially in building for the preparatory work for WTDC25. Equally, this document highlights the outcomes concluded during the industry meeting IAGDI-CRO for the consideration of the meeting.

Web	Received	Source	Title
1/399	2024-10-21	GSM Association	2024 mobile industry impact Report: Sustainable development goals

- 1) A case study discussing the Data Insights for Social & Humanitarian Action (DISHA) a platform for planning disaster response deployment and observing the medium/long-term impact of poverty alleviation programs is provided. The solution uses anonymized mobile phone data from telecommunication companies and aggregates them to detect major population movement across target areas. It also correlates utilization of the telecommunication association's products with historical census poverty data to estimate how poverty rates change over time.
- 2) A case study showcasing Nokia Rural Connect, a solution enabling operators to provide reliable rural coverage quickly, with a secure power supply, is presented.
- 3) The report contains insights on the work of Bharti Airtel to improve knowledge and skills in India. It also includes a spotlight on the Whiz Kids Project, conducted by Turkcell in collaboration with the Ministry of National Education, aims to introduce talented students in Türkiye to technology, and develop their technical abilities at an early age. The objective is to foster a generation aged 8-18 who not only consume technology but also contribute to its development.
- 4) Case studies showcasing solutions of Ericsson and Kiona to save energy and decarbonize residential homes, and work of Reliance Jio to improve the energy efficiency of mobile networks are presented.
- 5) The report presents the case study of IoT solutions from Telia to improve health outcomes for older populations.

Web	Received	Source	Title
1/358	2024-09-19	Colombia, United States	Spectrum auctions with in-kind payment obligations, cross-country digital transformation collaboration and lessons learned

The partnership between Colombia and the United States described in this contribution represents a positive example of cross-country collaboration on 5G radio spectrum auction design and implementation. Among other benefits, the work undertaken as part of this collaboration supports digital transformation to achieve SDGs, and ongoing efforts to provide access and connectivity to all.

Traditional auction processes can be tailored to achieve specific infrastructure requirements of unserved or underserved regions. For example, "in-kind" payment obligations, which allow operators to provide connectivity to underserved or unserved locations in lieu of some portion of licensing fees can be included in auction design to increase competitive bidding.

To achieve a successful outcome, specific market attributes and market maturity must be taken into consideration. Adequate stakeholder consultation is essential for assessing market specificities.

Developing trusted relationships between the policy advisors and host government counterparts is vitally important. Sustained engagement over a number of months increased the ability of partner teams (ProICT and MinTIC) to achieve consensus on project design and goals, proving pivotal to the project's success.

Web	Received	Source	Title
1/327	2024-09-18	GSM Association	Advancing digital inclusion through infrastructure sharing

Regulators dealing with the issue of extending coverage to remote and rural areas should facilitate and encourage infrastructure sharing models which, by generating operational and financial efficiencies in the deployment of networks in rural areas, can help lower the cost of extending coverage to these areas.

Network sharing can be less appealing to operators in markets, particularly in emerging economies which consider coverage to be a competitive advantage. In cases such as these, compelling market actors to enter infrastructure sharing agreements may reduce their incentives to invest and expand to new areas. In order not to disincentivize investment, sharing agreements should therefore be driven by market considerations, and should not be made mandatory. Operators' use of network sharing agreements is therefore likely to facilitate a faster and more efficient rollout in congested urban areas as well.

Web	Received	Source	Title
1/306	2024-09-11	Haiti	Impact of ICTs on the commercial activities of Haitian women in rural areas

ICTs are a vital part of online trade and contribute to strengthening the economy for women in rural and remote areas.

Web	Received	Source	Title
1/304	2024-09-10	Bulgaria	Large-scale deployment of digital infrastructure on the territory of Bulgaria

In order to deploy very high capacity networks (VHCN) in many areas of the country, investments need to be made in fibre-optic networks for transmission to remote and sparsely populated locations. Without such investments, telecommunications and other network operators will have no market interest in further investment in VHCN in such locations. Private operators are reluctant to invest in transmission and access networks in these areas due to declining population densities and the relatively low purchasing power of local residents. The State supports the investments in fibre-optic networks for transmission to remote and sparsely populated areas with various projects, such as the project presented in the document.

Web	Received	Source	Title
1/303	2024-09-05	Chad	Assessing the impact of deploying broadband infrastructure for remote areas and digitalizing services

The digitalization of public services requires deploying broadband networks and bridging the digital divide. This poses a major challenge for developing countries: how to extend the network to unserved or underserved areas to interconnect institutions and businesses. Broadband infrastructure, applications and services offer important opportunities for boosting economic growth, enhancing communications, improving energy efficiency, safeguarding the planet and improving people's lives. It should be noted that access to broadband has had a significant impact on the world economy. Rapid evolution and new business opportunities are driving rapid if uneven growth in digital technologies.

Web	Received	Source	Title
1/259 +Ann.1	2023-10-16	Australia	Remote indigenous telecommunications (RICT) programme

- Robust design to protect hardware against harsh environmental conditions has improved overall reliability and longevity of equipment.
- The RICT programme includes a focus on preventative maintenance, with the service provider visiting all sites at least once each year.

Web	Received	Source	Title
1/251 +Ann.1	2023-10-11	Global Satellite Operators' Association	Satellite for SDGs – Transforming lives

Satellite connectivity plays a critical role in connecting the 2.6 billion that remain unconnected. The optimum solution for future connectivity does not lie with one technology alone, but through a combination of multiple technologies, pooling their different strengths to increase cost efficiency, whilst simultaneously working together to deliver the exceptional resilience and greater availability for a much larger number of citizens.

Web	Received	Source	Title
1/246	2023-10-10	United Kingdom	Case Study: Gigabit broadband voucher scheme

This experience helps inform new strategies for pooling resources, identifying gaps in supply versus demand for ICT services, and funding infrastructure rollout in a way that supports market competition by supporting a range of suppliers. For this example, ICT policymakers and regulators should:

- Pool together market demand in rural and remote areas to better encourage investment in under-served areas;
- Define open rules that encourage market competition and support a diverse range of Internet service providers within the market;
- Provide targeted participation materials for different stakeholder groups, such as consumers and service providers of various sizes and business models, as demonstrated in the Gigabit Broadband Voucher Scheme (GBVS) materials; and
- Publish regular programme updates to demonstrate transparency, build accountability, and inform future investments in infrastructure deployment, as demonstrated in the quarterly reports in this contribution.

Web	Received	Source	Title
1/239	2023-10-10	Association for Progressive Communications	Reflections on the status of community networks in Argentina and on the public policies that enhance them

These recommendations can be found in greater context in the text of the document. By way of summary, we can distinguish the following proposals and challenges from the perspective of Argentinean community networks and particularly from the perspective of the AlterMundi Civil Association:

- Need for regulations and programmes to access the long-term universal service fund (USF), with a focus on initial training and capacity building, and with the active participation of the community in decision-making on the management and design of their own telecommunications infrastructure.
- Deepen the communication between community networks, civil society organizations, regulators, and entities that share the objective of fostering more meaningful connectivity, especially in unconnected or underserved territories and social groups.
- Create, maintain, and deepen channels of communication and joint working groups in order to work from the perspective of community networks. Through this communication, improve and adapt regulations and policies to increase their penetration in unconnected territories.
- Diversify connectivity models and digitalization of processes with the aim of improving and dignifying peasant, indigenous and suburban life.
- In particular regarding the Roberto Arias Programme, reallocate funds for its continuity, taking into account the projects already presented that have not yet been approved and those that will be presented during the two years of its extension.
- Protect funds for the deployment of community infrastructure, preventing their use for commercial projects or other purposes, guaranteeing that community networks have the time and tools necessary to access a fund exclusively for them.
- Promote free peering between networks built with public resources and community networks.
- Allow community networks to take advantage of the idle international transit bandwidth available to State entities and agencies.

Web	Received	Source	Title
1/238 +Ann.1	2023-10-10	Ericsson Ltd.	Using 3GPP technology for satellite communication

Satellite connectivity based on open 3rd Generation Partnership Project (3GPP) specifications offers the best opportunity to create a large non-terrestrial network (NTN) ecosystem, enabling connectivity between terrestrial systems and satellite systems on the same mobile platform. As satellite systems will not have the same capacity as terrestrial systems, they should be viewed as complementary rather than competing systems. We expect to see more cooperation between satellite operators and terrestrial communication service providers (CSPs) in the years ahead to achieve mutual benefits in this area.

Web	Received	Source	Title
1/235	2023-10-10	Deloitte	How to identify areas where the universal service fund (USF) should intervene first?

- Universal service policy cannot be separated from a national broadband plan.
- Suitable tools are needed to evaluate demand and potential and deployment costs and explore financing mechanisms.
- An in-depth quantitative analysis of financing needs can enable optimized use of universal service funds.

Web	Received	Source	Title
1/185	2023-10-02	Burkina Faso	Setting up digital boxes for the benefit of populations living in white space areas

The development of broadband connectivity remains a major challenge for Burkina Faso:

- Network extension for unserved areas;
- The price of broadband accessible to the population.

Member States are encouraged to strengthen their regulatory, institutional, and technical capacity as part of the opening-up strategies which today promote the accessibility, availability, and affordability of broadband for a greater number of our fellow citizens.

Web	Received	Source	Title
1/180	2023-09-29	Argentina	Federal ICT training plan

In terms of lessons learned, the importance of reviewing and thinking about the best way to promote the reduction of gender disparity in this type of training is highlighted, taking into account that a great difference continues to be registered in terms of the number of male registrations over those of women.

Web	Received	Source	Title
1/179	2023-09-29	Argentina	Mi Pueblo Conectado Programme

The main lesson learned was to understand the relevance of having specific programmes that contemplate particular situations within the country (geographic, population, productive development, etc.) for the different localities that lack access to connectivity or have very poor access. Its implementation demonstrated and highlighted the need to guarantee the right to connectivity, essential in the era of digital transformation. Likewise, it reinforced the importance of the Government of Argentina, as an active actor to effectively reach all the people who are currently disconnected throughout our country. "Mi Pueblo Conectado" means for many people, the opportunity to access the Internet, digital services, and is a basic right of citizenship.

Another lesson learned was understanding that the implementation of a public policy does not always correspond to its original planning. This happens due to the complexity of achieving clear communication with multiple actors, and the significant deployment throughout the country that this programme required, which required us to adapt to the circumstances and have flexibility in the implementation process, beyond what was planned.

Web	Received	Source	Title
1/178	2023-09-29	Argentina	Plan Conectar

The role of ICT was reinforced during the COVID-19 pandemic. Connectivity became essential for citizens to continue with their jobs, education, communication and entertainment. Without it, people risk being excluded from the digital economy. Providing connectivity to all of Argentina involves thinking about various specific strategies that are integrated into a general strategy.

Through the Conectar Plan, the Government of Argentina has worked to deliver connectivity infrastructure to remote areas so that everyone can participate in digital technologies and take advantage of their full potential. Regarding the Conectar Plan, a lesson learned that stands out, is that it is a public policy that has been sustained over time and that transcends the various administrations that have succeeded each other in the National Executive Branch. In this sense, the connectivity policy that is reflected in the Conectar Plan is a continuation of the different initiatives implemented by the National Government since 2010, in which the Argentina Conectada Plan emerged.

Adopting a personalized approach for each region of our country, considering its singularities, involves providing a digital solution that fits the needs of the region, and providing satellite or fibre-optics according to the characteristics of each region and province. For almost unreachable areas, satellite connectivity worked as an effective solution to connect small towns and cities where it is difficult to deploy fibre-optics. Therefore, it is important to diversify investments in connectivity to effectively connect the unconnected, and strategically allocate public resources.

Web	Received	Source	Title
1/173	2023-09-24	Burkina Faso	Evaluation of the National strategy for the development of access and universal service

Several lessons have been learned from the implementation of the 2017-2021 national access and universal service strategy. We can cite among others:

- The importance of respecting the monitoring and evaluation system, this will make it possible to avoid or minimize errors observed;
- The efficient and effective development and implementation of a strategy, presupposes the existence of a solid and appropriate legal and institutional framework that clearly defines the roles and responsibilities of the different stakeholders involved.

Web	Received	Source	Title
1/170	2023-09-16	Burundi	The impact of the deployment of ICT infrastructures in the digitalization of services

The digitalization of public services requires deployment of broadband networks and efforts to overcome the digital divide. The task of extending network coverage to unserved or underserved areas for the interconnection of institutions and businesses, constitutes a great challenge for developing countries.

Web	Received	Source	Title
1/167	2023-09-07	Central African Republic	Strategy for extending connectivity to unserved and underserved segments of the population in rural and urban areas

Deployment of an optical fibre network remains a major challenge for developing countries. It comprises the challenge of extending the network to reach unserved and underserved areas, and the challenge of keeping the price of broadband access affordable for all.

Member States are encouraged to strengthen their regulatory, institutional and technical capacities, with national strategies and plans for optical fibre deployment, in order to guarantee access to broadband for the broadest possible community of users.

Web	Received	Source	Title
1/153 +Ann.1	2023-09-07	Rep. of Korea	Case studies utilizing TV platform to enable inclusive communication

Through the two projects, it has been proved that TV is one of impactful platforms to deliver social value to the deaf people. The two projects presented in this contribution, funded by Government, are just a starting point as the featured AI-based sign language translation technology is still in an early stage of development. There was a proof of concept (POC) project by two leading TV manufacturers to implement avatar sign language on their user guide. As the technology is evolving, we can expect all contents on TV to be automatically translated into avatar sign language. To make this a practical reality, there needs to be strong support from government on development of AI training datasets (parallel corpus of sign language and spoken language) and on an effective translation engine.

Web	Received	Source	Title
1/147	2023-09-07	Kamaleon, Mozambique	Universal design for inclusive digital societies

The universal design (UD) of the interactive mobile digital unit (IMDU) is further facilitated by the universal design for learning- (UDL)-based communication approach, that uses a combination of various technological and digital tools with different types of "teaching-learning" communication processes. These development initiatives have a multidimensional effect on the cognition of communities, that translates into greater impact of the message delivered, and consequently into social and behavioural changes. This means that the IMDU is well adapted for the promotion of digital inclusion of rural communities in development countries. The IMDU is a cross-functional platform that benefits communities in the following ways: (a) allows direct and individual interaction with specialists for; (b) faster comprehension of the message while; (c) ensuring the inclusion of persons with disabilities, with auditory processing disorders, and with visual impairments. The IMDU leads to a more comprehensive approach to attaining global SDGs: the IMDU concept is (i) designed to promote quality education and capacity building (SDG 4); (ii) a green innovation solution using renewable resources and clean energy (SDG 7 and SDG 13); (iii) providing inclusive digital tools to remote and hard to reach communities (SDG 10); through which (iv) vocational training for women is delivered (SDG 5); (v) basic services such as healthcare provided (SDG 3); and (vi) effective government-citizen information flow facilitated (SDG 16).

Web	Received	Source	Title
1/85	2022-11-15	Argentina	Regulatory framework to include community networks in the strategy of connecting rural and remote areas in Argentina

- Considers the benefits of including local actors in the connectivity strategies;
- Small and medium sized service providers can play an important role in the deployment of broadband networks, especially in rural and remote areas;
- Providing connectivity in rural, remote, unserved and underserved areas, in which the inhabitants themselves are part of the solution, is a valid alternative;
- Promoting access to telecommunication/ICT services in unserved and underserved areas has proven to be a tool for bridging the digital divide.

Web	Received	Source	Title
1/70	2022-11-14	World Bank	World Bank Study Group 1 Submission: Enabling environment for meaningful connectivity

The World Bank Group stands ready to support its least developed client countries with a special emphasis on fragility, conflict and violence (FCV), and small island developing states (SIDS). Through the analytical work programme and strategic partnerships (e.g., the [Digital Development Partnership](#), including developed countries and private sector donors) the World Bank is working closely with client countries to promote the deployment of low cost advanced technologies and innovative business models to expand access to digital services, not only in rural and remote areas, but also in the peri-urban areas where so many are not able use the Internet productively.

This work will involve piloting new, agile approaches to regulations, open data/standard infrastructure mapping, and new approaches to empowering citizens, small business, schools, and health clinics to acquire the devices and skills they need. The World Bank is also developing tools and approaches to assist client countries ensure that the connectivity that is being provided can be trusted by consumers through safe and private access.

Web	Received	Source	Title
1/56	2022-10-21	Comoros	Project to stimulate demand for ICTs: impact on closing the urban/rural divide

For people-centric ICT projects, in particular in rural areas, several factors need to be taken into account: infrastructure deployment, access, the cost of connectivity, availability of terminal equipment, and access to a stable power supply. Subsequently, an impact assessment should be carried out to determine the real impact of such deployments. If only some of these conditions are met, the project may not survive, or be sustainable. Consequently, there is an urgent need to carry out an assessment for the project, which should be bolstered with complementary means to ensure its sustainability.

Web	Received	Source	Title
1/54	2022-11-13	Burundi	Policy and strategies in place to connect rural and remote areas

- The [National ICT Development Policy \(2011-2015\)](#) covers all socio-economic sectors in the country, given the cross-cutting nature of ICTs. The policy includes measures on rural connectivity and universal access, which are set out in detail in strategic axis No. 7.
- The [National Development Programme \(2018-2027\)](#) focuses in particular on strategic ICT infrastructure development.
- The Ministry of Communication, Information Technology and Media, has adopted a strategy for the sector, which prioritizes broadband development.
- Burundi is working to deploy optical fibre throughout its national territory. The major provincial centres are all connected to optical fibre, and there is political will to extend optical fibre to rural district centres. (Burundi is the first country to establish fibre-optic coverage across distances of multiple kilometres.)
- 2G/3G/4G networks have been deployed throughout the country, with the participation of three operators: Onatel, Econet Leo, and Viettel.
- Community telecentres, connected to optical fibre, have been established in rural and remote areas to give the local population access to ICT-based services and stable connectivity.
- To ensure sufficient ICT services in rural areas, the Ministry of Communication, Information Technology and Media, has launched a project to establish ICT clubs in schools. In addition to the usual ICT-related classroom learning, students participating in such clubs also have the opportunity to further their learning outside the classroom, which in turn they pass on to their households.
- A universal service fund has been established.

Web	Received	Source	Title
1/48	2022-10-13	Bhutan	Strategies: Deployment of broadband in Bhutan

In order to operate and manage the network, it is necessary to involve our stakeholders in ensuring reliable and available service anytime.

Government needs to provide subsidies/incentives to telecommunications operators for development of ICT Infrastructures.

Government developed an infrastructure (fibre-optic network) that was leased to telecommunications operators and initiated a Demand Aggregation Project reducing the tariff to make it affordable for communities.

Web	Received	Source	Title
1/31	2022-10-05	Comoros	The case of the Comoros: practices to improve access and connectivity with a view to reducing the gap between rural, remote and urban areas

Comoros should revitalize its ICT capital goods import policy through preferential customs duties, but should also implement ICT services projects, such as the national digital health strategy or the implementation of a data centre. These are necessary conditions for the efficient use of the country's available capacity (submarine cables).

Web	Received	Source	Title
SG1RGQ/2447	2024-04-02	United States	Programmes that reflect a whole-of-nation approach to high-speed Internet to increase connectivity and digital inclusion

NTIA notes that the Internet for All initiative is still ongoing, with some programmes yet to launch. Some preliminary lessons learned include:

- Holding public consultations with the fullest range of stakeholders, is key for digital inclusion and Internet access programmes to ensure inclusive, effective programming. NTIA held national-level public consultations before issuing Notices of Funding Opportunity (NOFO) for these programmes. In addition, the 56 states and territories of the United States also pursued public consultations prior to submission of their BEAD initial proposals.
- Effective broadband grant programmes need broad participation from a variety of providers, as well as safeguards to ensure appropriate use of public funds.
- Maintaining flexibility in administering requirements enables participation from a broader range of providers. For instance, after NTIA received feedback that BEAD's letter of credit requirement could limit participation in the programme, NTIA issued a waiver providing specific alternatives that will encourage participation from a wide range of providers, while still protecting taxpayer dollars.
- Stakeholder engagement during broadband grants proposals development at the state and local level should include:
 - Letting community priorities drive the planning process
 - Encouraging deep community engagement and outreach
 - Cultivating win/win partnerships
 - Leveraging local assets
 - Articulating a broadband vision
- The United States looks forward to sharing additional lessons learned as these critical connectivity programmes are further implemented.

Web	Received	Source	Title
SG1RGQ/246	2024-04-02	Uganda	Impact assessment of rural household devices project by the Uganda Communications Universal Services and Access Fund

- Literacy training programmes – Enhancing literacy levels directly addressed adoption and usage challenges related to low awareness and understanding of the devices and applications. However, there is need for continuous education and training initiatives specifically tailored to the beneficiaries' needs to ensure acquisition of necessary skills by beneficiaries to maximize usage.
- Enhanced sensitization – Increased awareness and understanding of the project's objectives contributed to improved user engagement and participation. Such projects can also be leveraged to create public awareness about the project sponsor and the sponsor's objectives to consumers.
- Multi-stakeholder collaboration – Wider stakeholder engagements ensured inclusion of community leaders, operators, and device manufactures thus fostering a supportive environment for the project to excel.
- Project sustainability – After-sales service is required in each village to ensure sustained usage to maximize the project benefits.
- Impact of cultural norms – The study noted that for highly patriarchal households, device sharing was not feasible with men dominating usage devices. In order to foster sustainability, such family set-ups need more than one device to achieve the desired objective.

Web	Received	Source	Title
SG1RGQ/245	2024-04-02	Zimbabwe	Indigenous languages and access to ICTs by rural and remote communities

Overcoming the language divide with content available in indigenous languages widens access to, and use of ICTs.

Web	Received	Source	Title
SG1RGQ/215	2024-04-01	Global Satellite Operators' Association	Satellite direct-to-device connectivity Bringing connectivity to everyone, everywhere, anytime

Satellite connectivity plays a critical role in connecting the 2.6 billion that remain unconnected. The optimum solution for future connectivity does not lie with one technology alone, but rather through a combination of multiple technologies, pooling their different strengths to increase cost efficiency, whilst simultaneously allowing them to work together to deliver exceptional resilience and greater availability for a much larger number of citizens.

The satellite industry is going through a phase of unprecedented growth and innovation, and is expected to bring an estimated USD 250 billion in social and economic benefits across the world by 2030.

Satellite direct-to-device (D2D) is contributing and will continue to contribute to bridging the digital divide, while improving users' life safety and will open new horizons for connecting everyone. The result is bringing meaningful connectivity to consumers, increased digitalization of services for governments, and new business opportunities for enterprises. The continued development of the global 3GPP defined NTN standard, coupled with a regulatory regime that is transparent, safeguards existing spectrum, enables access to additional harmonized spectrum on a worldwide level, and will ensure that affordable D2D services are available to all.

Web	Received	Source	Title
SG1RGQ/210	2024-03-29	Burundi	Extension of local connectivity in the Digital Economy Support Project in Burundi: Inclusion of areas and populations currently not connected

Introduction

The purpose of this document is to define the framework and steps necessary for the successful implementation of the sub-component "Access to Local Connectivity" within the framework of the Project to Support the Foundations of the Digital Economy (PAFEN) in Burundi. This sub-component, valued at USD 20.1 million, is part of the overall project supported by the Government of Burundi with additional funding of USD 42 million, which is being finalized.

Context and objectives

PAFEN, extending until the end of August 2028, aims to modernize the digital infrastructure of Burundi, and extend access to high-speed connectivity in rural areas. The "Access to Local Connectivity" sub-component specifically targets rural areas where commercial incentives for network expansion are insufficient to stimulate investment.

The main objectives of this sub-component include:

- To stimulate high-speed access in rural areas by filling coverage gaps.
- Promote the modernization of digital infrastructure in underserved areas.
- Promote digital inclusion, particularly with regard to women and youth.
- Mobilize private capital to support the development of connectivity infrastructure.

Steps and tasks

Diagnosis of the high-speed market and roadmap for reforms:

- Evaluation of market structure and value chain.
- Documentary review, interviews with industry stakeholders and field visits.
- Analysis of existing infrastructure and coverage requirements.
- Elaboration of a roadmap for the necessary reforms.
- Mapping and evaluation of network coverage.

Network coverage mapping and assessment:

- Obtain network coverage maps and expansion plans from operators.
- Identify unprofitable areas and evaluate network service coverage.

Analyse the socio-economic indicators used by operators to expand their network.

Web	Received	Source	Title
SG1RGQ/206	2024-03-29	India	Universal Service Obligation Fund (USOF): Promoting access to and delivery of telecommunication services for bridging the digital divide

The broadband connectivity is a pre-requisite for transformation into a digital society. Various e-governance services, banking services, telemedicine, online education, etc., require broadband connectivity. Mobile wireless broadband is one of the most important means of providing broadband Internet access to the general public. The USOF of India has been the force behind establishing of high-quality network infrastructure across the rural and remote areas of the country, enabling non-discriminatory access to good quality reliable and affordable telecommunication services.

Web	Received	Source	Title
SG1RGQ/195	2024-03-22	RIFEN	Women leaders are needed for impactful digital connectivity policies and programmes

The design of programmes that impart digital skills to women, whether they are related to digital literacy or e-services, would benefit much from involving women leaders. The scheme under discussion was a unique policy initiative that involved an expansive interpretation of universal service policy to target rural women in the definition of inclusivity. It was also tailored to ensure the sustained entrenching of digital skills, and digital connectivity benefits seamlessly through careful design, feedback, and course corrections.

Web	Received	Source	Title
SG1RGQ/189	2024-03-06	Central African Republic	Integration and implementation of ICT services in rural and remote areas including new and emerging technologies

Digitization of isolated and underserved areas and deployment of the fibre-optic network remain major challenges for developing countries. These challenges include those of network expansion for unserved or underserved areas, as well as the implementation of high-speed connection prices that are accessible to the entire population.

Member States are encouraged to strengthen their regulatory, institutional and technical capabilities as part of national fibre-optic deployment strategies and plans, ensuring broadband accessibility to as broad a user community as possible.

Web	Received	Source	Title
SG1RGQ/187	2024-03-05	Burundi	Élaboration d'une stratégie nationale pour l'inclusion numérique au Burundi : Orientations de l'UIT pour une transformation holistique et inclusive grâce aux TIC accessibles (Developing a national strategy for digital inclusion in Burundi: ITU guidelines for holistic and inclusive transformation through accessible ICTs)

(continued)

Web	Received	Source	Title
As part of current initiatives to lay the foundations for a digital economy, an ongoing project is focusing on the implementation of the sub-component ‘Facilitating local access and inclusion’. This sub-component aims to: – Target priority populations such as persons with disabilities, indigenous peoples, and refugees in order to overcome barriers to digital access. – Raise awareness of the benefits of accessing and using digital technologies, improve access to broadband-compatible devices, and promote a digital culture for basic use of smart devices and digital applications. – Structure activities to ensure maximum impact, avoiding social friction and complementing other similar initiatives. – Test pilot activities in selected communities, with a focus on rural areas and women, paying particular attention to women's associations. Current efforts aim to address existing demand-side barriers to digital access, focusing on underserved populations, including rural communities, women and girls, and vulnerable subgroups. (Original in French)			

Web	Received	Source	Title
SG1RGQ/186	2024-03-04	Thailand	Rural and remote broadband development in Thailand
– Ensure full implementation of regulations. – Government agencies have to stimulate the digital economies in rural and remote areas with community education efforts and programmes in order for people to understand these new opportunities and the impact of broadband Internet services on individuals, communities, and the economy as a whole. – Motivations and efforts that promote the user adoption of broadband services, personal and societal benefits, and ICT skills are fundamentally recommended.			

Web	Received	Source	Title
SG1RGQ/149	2024-02-18	Senegal	Overview of the Wireless Solutions for Fisheries in Senegal (WISE) project
The WISE project has produced important results for households, by greatly increasing income and the means of livelihood and by providing government bodies with data to improve food security, and prepare for any intervention that might be required. The contribution ends with a strong recommendation to ITU and its partners to support an expansion of the WISE project experience in Senegal, to Africa and developing countries in general.			

Web	Received	Source	Title
SG1RGQ/107	2023-04-25	Brazil	Identifying digital gaps with crowd-sourcing data

The use of crowdsourcing and data analytics as a formal tool for planning and policy purposes was first deployed by ANATEL, for the purpose of mapping the existing connectivity infrastructure and the digital gaps in Brazil. The tool has allowed the agency to analyse billions of updated empirical observations, organizing them into millions of geographic grid quadrants of 150 x 150 square metres. The tool allowed the areas with unmet demand for broadband services, to be pinpointed with great precision. This framework became a fundamental reference for public policies design in Brazil, as well as in several ongoing regulatory initiatives. For example, the tool has been used to map public schools and health facilities in Brazil that do not have access to broadband Internet, and in the design of a public policy strategy that uses these public facilities as inducers for the expansion of the broadband infrastructure in the cities of the interior, and in the outskirts of big urban centres.

Web	Received	Source	Title
SG1RGQ/95	2023-04-25	Amazon Corporation	Bridging the digital divide through advances in satellite technology

Further development of policies and regulatory regimes, and alignment among countries, can help support the deployment low earth orbit (LEO) satellite networks and the expansion of broadband connectivity in underserved communities around the world. As a starting point, ITU Member States can work to modernize and harmonize regulations by undertaking the following measures:

- Simplify the regulatory processes and procedures for obtaining authorizations to provide non-geo-stationary (NGSO) satellite services, and adopt general authorization and blanket licensing regimes to expedite practical, widespread, and economical deployment of customer terminals and network gateways.
- Create and safeguard transparent and predictable regulatory regimes, including the preservation of spectrum allocations to the fixed satellite service (FSS) and mobile-satellite service (“MSS”).
- Adopt satellite regulations that promote competition and technology neutrality.
- Adopt a reasonable, administrative fee structure for the issuance of licenses and authorizations for the provision of satellite services.
- License and authorize satellite communications providers and operators on a non-discriminatory basis.
- Adopt spectrum management practices that recognize the value proposition of satellite services and their role in bridging the digital divide.

Web	Received	Source	Title
SG1RGQ/84	2023-04-25	Rep. of Korea	Universal service regime in Rep. of Korea

Introduces the case of the USF in Rep. of Korea in order to share experiences with other Member States on policy direction to bridge the digital divide.

Web	Received	Source	Title
SG1RGQ/78	2023-04-24	International Chamber of Commerce, France	Delivering universal meaningful connectivity

We find that it takes a unique mix of technology, regulatory approaches, and business models to deliver an ICT ecosystem and appropriately respond to the needs of each community. The ICC White Paper on Delivering Universal Meaningful Connectivity paper provides a menu of concrete policy options for decision-makers to consider, combine and adapt to their specific needs, and includes a number of selected examples.

Web	Received	Source	Title
SG1RGQ/76 +Ann.1	2023-04-25	Argentina	Programme for the deployment of access networks to mobile communications services in cities with up to 500 inhabitants

A rapid impact is generated in small towns by bringing mobile connectivity. Connectivity allows the inhabitants of these areas to improve their quality of life by accessing more varied services, more information, and better opportunities for progress.

Web	Received	Source	Title
SG1RGQ/72	2023-04-24	South Africa	DNS skills for rural and remote communities

Historically, the .za namespace in South Africa was not regulated until the ZADNA was formed. ZADNA is entrusted with the critical role of ensuring a secure namespace, particularly for rural and remote areas where access to information and communication technologies may be limited. Through its mandate, ZADNA seeks to promote the growth and use of the .za namespace, while safeguarding the rights and interests of users in South Africa.

In today's rapidly advancing technological era, access to telecommunications and ICTs has become essential for social and economic development. While urban areas have seen a significant increase in connectivity and access to ICTs, rural and remote areas have lagged due to various infrastructural and geographical challenges. This digital divide between urban and rural areas has been recognized as a major hindrance to the country's overall progress and development. ZADNA aims to help bridge the digital divide and promote inclusive growth. The aim is multifaceted, encompassing the licensing and regulation of service providers, the development of infrastructure, the provision of education and training, and the promotion of innovative solutions to overcome the challenges of providing connectivity in remote areas.

(continued)

Web	Received	Source	Title
ZADNA employs the following methods in its efforts to provide telecommunications and ICTs services in rural and remote areas of South Africa:			
– ZADNA ZA Schools Digitisation Programme			
The overall objective of this project is to bridge the digital divide between private and public, urban and rural schools by ensuring all learners and educators in basic education have an email address, and their respective schools have a domain name and a website irrespective of their geography or financial standing. This provides a digital identity to the schools, learners, and educators while also providing digital skills to parents.			
– za Education and Awareness Programme			
The programme is implemented through a combination of face-to-face engagements, and social and traditional media marketing, and occasionally incorporates alternative dispute resolution (ADR) workshops, which are held throughout the country. Its purpose is to equip historically disadvantaged communities with knowledge about the domain name system (DNS) industry, promote the growth of .za domain name registrations, and encourage South Africans to choose .za as their preferred safe online domain. Furthermore, a key objective of the programme is to promote online safety, which is achieved through collaboration with various stakeholders.			
This programme reached over 16 million people between 2021-2023, in a country with a population of 62 million people. This figure comprises the domain name registration market (potential and existing users) and an empowered 'communities' market (educational market segments of youth, women, and a number of people with disabilities).			
– Alternative dispute resolution (ADR) workshops			
The workshops aim to equip South African communities with domain-related knowledge by educating various participants on protecting their rights and interests . The discussions include how to register a domain, prevent and mitigate DNS abuse, protect against domain name-related data breaches, and ensure the secure transfer of domain names. By participating in the ADR workshop, participants discuss best practices and strategies for enhancing their online security posture and minimizing risk. Overall, the workshops help ensure participants are better equipped to navigate the increasingly challenging and dynamic digital landscape.			
– ADR regulations			
ZADNA currently implements the ADR regulations to address disputes related to abusive or offensive domain name registrations. The ADR regulations provide a clear framework for addressing disputes related to domain registrations, and offer both mediation and arbitration procedures. The ADR regulations also establish procedures for both mediation and arbitration, which ZADNA and the appointed ADR service providers facilitate. These measures help to ensure fair and impartial resolution of disputes promptly and effectively.			

Web	Received	Source	Title
SG1RGQ/72	2023-04-24	South Africa (Republic of)	DNS skills for rural and remote communities

Moreover, ZADNA is currently in a process of driving for the promulgation of the registry and registrar licensing regulations and procedures (RRLR&P), intended to establish clear guidelines and procedures for the management of domain name registrations securely and reliably. By implementing these regulations, ZADNA takes concrete steps to prevent and mitigate DNS abuse, which can help to further build confidence in the reliability and security of the namespace. The development of the RRLR&P represents essential steps towards greater online safety and security.

– [DNS training course](#)

To further enhance awareness, ZADNA hosts and facilitates empowerment sessions for selected communities and stakeholders to impart skills and knowledge. Promoting a new skills set in the ICT sector involves including women, youth, and people with disabilities within the DNS, and exposing them to the working environment. The training course gives the participants a deeper understanding of DNS and its role in online security. By learning about DNS protocols and standards, participants can better identify potential security risks and vulnerabilities in their network infrastructure and exploit the business opportunities.

Moreover, the course provides insights into best practices for securing domain name registration and management, including choosing strong passwords, implementing two-factor authentication, and keeping DNS records up to date. Participants can also learn about DNS security extensions (DNSSEC) and how they can help prevent DNS-related attacks.

– [Registrar-reseller training](#)

A registrar-reseller purchases domain names in bulk from a domain registrar and resells them to end-users, often with added value services such as web hosting, email, and website builders. The registrar reseller training is conducted to promote the transformation of the ISPs environment by upskilling resellers to eventually become fully fledged registrars and access the .za domain namespace market. The training programme is conducted in person and virtually, and targets individuals and small, medium, and micro enterprises (SMME) with the technical knowledge and expertise required to become successful registrar-resellers.

Web	Received	Source	Title
SG1RGQ/71+Ann.1	2023-04-24	Association for Progressive Communications (APC)	Addressing the financial and regulatory barriers faced by community connectivity providers in supporting deployment of digital infrastructure in developing countries

Small scale community connectivity providers face financing and regulatory barriers that can be addressed through appropriate regulatory change and funding strategies. Best practices in this regard include:

- License exemptions or low-cost licenses that reflect the non-profit and small-scale nature of CCPs
- Reduction of other burdensome license conditions such taxation and reporting
- Provision of access to shared or license-exempt spectrum
- Provision of USF financing and smart subsidies for CCPs
- Provision of blended finance for CCPs from development institutions

Web	Received	Source	Title
SG1RGQ/52	2023-04-02	Burkina Faso	Security crisis in Burkina Faso, strengthening the resilience of consumers in localities affected by insecurity through the restoration of electronic communication infrastructures

Telecommunications infrastructures have become a target of choice for armed groups who try to isolate the populations of the affected localities, and compromise the access of the said populations to communication services. Despite the complexity of the situation, the States where these groups operate must take measures to ensure the provision of communication services. Appropriate technological solutions exist and can be implemented by associating telecommunications operators and the regulatory authority. Financial solutions or mechanisms can be considered by the States. Burkina Faso has set up a Support Fund for the implementation of exceptional measures in the electronic communications sector which makes it possible to finance the restoration of destroyed telecommunications sites.

Web	Received	Source	Title
SG1RGQ/49 +Ann.1	2023-03-29	SBA Communications, Brazil	The sharing of passive infrastructure as a tool for bridging the digital divide and economic and social growth

A review of the research literature and interviews of regulators and policymakers has led to the identification of seven types of initiatives that can contribute to the development and sustainability of an independent tower sector:

- No need for service concession: The construction of a cell tower does not rely on a public good, as is the case of spectrum. Therefore, it should not be ruled by a concessionary framework. Furthermore, the tower industry is not a natural monopoly requiring a concessionary regime, as is the case for power transmission, and railways. This concept supports the need to provide public right of way access at market rates. As a caveat, considering that the tower industry is not unlike other forms of private real estate, regulation should be limited to over-deployment, as determined by environmental reasons (see below).
- Need for fast permit approvals driven by consistent and reasonable timeframes: At present, many municipalities in the Latin America region have constitutional autonomy to grant installation permits for antennas, and rights of way for fibre-optic rollout. Accordingly, they can interfere with the provision of telecommunications/Internet services that are under federal authority. Frequently, and in many countries of the region, local regulations for obtaining municipal permits have been imposed over federal authority, becoming very restrictive, not transparent, bureaucratic, and even irrational. These barriers increase the opportunity cost for deploying passive infrastructure, enhancing the cost of deployment.
- Regulations to prevent over-deployment: Tower over-deployment, in many cases driven by financial speculation, is a frequent feature in the Latin America region. The negative consequences of this situation are environmental and economic. Focusing on the latter, a simplified financial model developed for this study indicates that, on average, unless a single tower is supporting the radios of more than one operator (preferably three), its profitability is questionable, especially in suburban and rural settings over a ten-year time horizon. On this basis, governments should promote policies and regulatory frameworks preventing over-deployment while fostering sharing especially in rural areas.

Web	Received	Source	Title
SG1RGQ/49 +Ann.1	2023-03-29	SBA Communications, Brazil	The sharing of passive infrastructure as a tool for bridging the digital divide and economic and social growth

- Establishment of a cap on fees and taxes, and rights of construction: Fees and taxes, also referred to as the "cost of compliance", have an impact on the tower business case. In general terms, most macroeconomic research literature has found that taxation regimes play an important role in driving capital flows, when controlling for economic development, and currency fluctuations. In this context, tower deployment is affected by the fiscal burden imposed by municipalities, in the form of specific fees with the purpose of either limiting deployment of infrastructure, or of increasing revenues. Sometimes these fees become recurrent and even subject to annual increases defined on an ad-hoc basis. Without making any judgement about the need of municipalities to collect revenues to support the delivery of public services, it is also the case that by increasing the pre-tax cost of tower deployment, local authorities limit the capacity for the wireless industry to support the connectivity needs of their population.
- Implement policies to promote development of infrastructure to be shared for deployment of 5G: The deployment of 5G will require significant expansion of the level of densification of radios and antenna arrangements at street level to achieve useful coverage in some high data traffic spaces. Considering the layered architecture of wireless networks that necessitates both macro sites and small cell sites, it is estimated that by 2030, between two and three times the current number of sites will be required. In the context of these deployments, zoning regulation will become critical to address over-deployment, reduce the permit approval process, and to access to public buildings and right-of-way at market prices.
- Do not impose price regulation of tower company contracts with service providers: In economic terms, price regulation is normally justified when markets fail to produce competitive prices. In the past, price regulation has been applied in the telecommunication sector to meet efficiency (under scarcity conditions) and equity objectives (fair access to an essential service). Similarly, interconnection prices have been regulated at times to ensure anti-competitive behaviour of incumbent carriers at times of market liberalization. None of these conditions apply to contracts between a provider of infrastructure and a service provider. Prices to be charged between an independent tower company and wireless operators should not be regulated because: (i) they reflect contracts between private parties based on agreed upon prices; (ii) they do not reflect excessive or unconscionable pricing of an essential good (also called "price gouging"); and (iii) they would represent a disincentive to invest in infrastructure.
- Define long-term guarantees in regulations and permits: Heavy initial CAPEX for tower deployment should be accompanied by relatively stable and predictable rules to ensure profitability and re-investment. While the financial profile developed in the context of this study is calculated over a ten-year timeframe, stability and predictability of regulatory frameworks are a critical industry requirement.

Web	Received	Source	Title
SG1RGQ/47	2023-03-29	Burundi	National policy, regulations and strategy put in place to provide access to telecommunications/ICTs in rural and remote areas

- Establishment of a national ICT development policy
- National fibre-optic backbone
- Implementation of multipurpose community telecentres in rural areas
- Establishment of ICT clubs in schools

Web	Received	Source	Title
SG1RGQ/43	2023-03-23	Zimbabwe	The evolvement of the Universal Service Fund: Financing innovation

- i. ICT capacity building: It was observed that there is need for continuous capacity building training courses among farmers on the use and benefits of ICT.
- ii. ICT devices: Due to the observed prominent degree of a lack of smart devices amongst the majority of the farmers, there is a need to develop coordination mechanisms between government, the private sector, and civil society organizations (CSOs) to provide ICT devices to enhance the farmers' knowledge and use of ICT devices either at low cost or for free.
- iii. Connectivity: There is need for network connectivity improvement especially in rural areas.
- iv. Awareness and sensitization: Most farmers obtain information through the traditional media channels of television and FM radio, thus the need to utilise these channels for more awareness creation and sensitization on the use of ICT4Agriculture.
- v. Extension services: There is need for the establishment of more digital interactive voice recording (IVR) call centres to address the challenges associated with poor extension service delivery by extension workers. This will allow extension workers to provide feedback and guidance to farmers through the established digital IVR call centres within the regions, in local languages that can easily be understood.
- vi. Digital localized content: There are issues related to the availability of digital localized content within extension service delivery, the Government of Uganda through the Ministry of Agriculture, Animal Industry and Fisheries, should streamlining of the development of localized content across the agriculture value chain to support extension services, which could then be centralized on the e-agriculture academy.
- vii. ICT tools and systems for farmers: Given the significant number of farmers without smart phones and the network related issues, there is need for the Ministry of ICT in partnership with the private sector to develop tools that do not need Internet connectivity.
- viii. Cyber security is still a prominent concern especially for the elderly involved in farming, thus the need for strengthening and sensitization on the subject.

Web	Received	Source	Title
SG1RGQ/41	2023-03-23	Zimbabwe	The evolvement of the Universal Service Fund: Financing innovation

Use of universal service funds to fund i-hackathon-based innovations can result in practical solutions.

Web	Received	Source	Title
SG1RGQ/34	2023-03-23	Zimbabwe	The narrowing gap between the needs of rural and remote communities and those of urban communities

There is need to accelerate broadband connectivity in rural and remote areas, as the needs of rural communities are fast converging with those of their urban counterparts.

Web	Received	Source	Title
SG1RGQ/30	2023-03-23	Kenya	The case of Kenya: Managing threats and risks to ICT infrastructure in rural and remote areas
1) Establishment of ICT critical infrastructure (CI) protection and stakeholder forum 2) Resilient designs and constructions 3) Crime prevention and social development 4) Communications strategy 5) Cross-border initiatives			

Web	Received	Source	Title
SG1RGQ/26	2023-03-23	Rep. of Korea	The case of the rural mobile infrastructure operator (RMIO) model in Peru - KISDI consultation on network infrastructure sharing policy in Peru
Introduces the RMIO model in Peru that is helping the country to connect rural and remote areas and provide information on how to further improve the model.			

Web	Received	Source	Title
SG1RGQ/23 (Rev.1)	2023-03-23	Haiti	BIEN digital economy inclusion centres to facilitate access and economic development of rural and remote areas
Lesson learned: For the success of any project, it is vital to ensure sustainability. Suggested best practices: Ensure security at each location in rural and remote areas before starting to set up a project.			

Web	Received	Source	Title
SG1RGQ/18 +Ann.1	2023-03-16	Egypt	National broadband strategy
A corresponding increase in the supply of broadband connectivity to meet rising demand requires robust investment in telecommunications infrastructure. Broadband connectivity is not only important in its own right; it provides a platform for the growth of digital services including online communication tools, e-commerce, digital financial services, and e-government services, which together make up the foundation of a digital economy. Digital services are the enablers of a digital economy, and the success of digital economy initiatives largely depends on a robust, reliable, low-latency, and high-speed broadband infrastructure in the country. The growth and competitiveness of economies will increasingly depend on investments in the information and communications technology (ICT) sector.			

Web	Received	Source	Title
SG1RGQ/5 +Ann.1	2021-08-24	Kuwait	Access to communication and information technology services by persons with disabilities

Pursuant to the regulation, operators and importers of equipment are required to provide software, user interfaces, and emergency services, in conformity with the Web Content Accessibility Guidelines (WCAG 2.0), through multimedia that are accessible to persons with disabilities. They are also required to provide conversion and communication systems, together with special plans and pricing, for all persons with disabilities, and to offer their services to such persons in an accessible format. Operators are required to coordinate with the competent authorities in providing emergency services, that can be used by persons with disabilities, to request assistance through audio calling, video calling or text messages; and to renovate their service centres and equip them with all necessary facilities and apparatus.

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