最后报告
ITU-D第2研究组

第10-3/2号课题
农村和边远地区的电信/信息通信技术(ICT)

2010-2014年第5研究期
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第 10-3/2 号课题

农村和边远地区的电信/信息通信技术（ICT）

ITU-D 研究组

作为电信发展局知识共享和能力建设议程的后盾，ITU-D 研究组支持各国实现其发展目标。通过推动为减贫和经济社会发展进行 ICT 知识的创建、共享和运用，ITU-D 研究组鼓励为成员国创作条件，利用知识更有效地实现其发展目标。

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信息交换和知识共享中枢

共同关心议题的共享是通过面对面会议、电子论坛和远程与会，在鼓励公开讨论和信息交流的气氛中实现的。

信息存储库

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第 2 研究组

第 2 研究组由 WTDC-10 受命研究涉及信息通信基础设施和技术发展、应急通信和适应气候变化等领域的九项课题。着重为在规划、发展、实施、运营、维护和持续提供电信服务过程中能够优化用户得到的服务价值，并能最合适、最成功地提供服务的方法和方式。该工作包括将具体工作重点放在宽带网络、移动无线电通信和农村与边远地区的电信/ICT、发展中国家对频谱管理的需要、ICT 在缓解气候变化对发展中国家的影响中的使用、用于减轻自然灾害和赈灾的电信/ICT、合规性和互操作性测试及电子应用，特别强调通过电信/ICT 手段支持的应用。该项工作还研究探讨信息通信技术的实施，同时兼顾 ITU-T 和 ITU-R 开展研究的成果以及发展中国家的优先事宜。

第 2 研究组与 ITU-R 第 1 研究组一道共同负责涉及第 9 号决议（WTDC-10，修订版）问题的研究 – 各国，特别是发展中国家对频谱管理的参与。

本报告是由来自不同主管部门和组织的众多志愿人员编写的。文中提到了某些公司或产品，但这并不意味着它们得到了国际电联的认可或推崇。文中表述的仅为作者的意见，与国际电联无关。

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1 概述

2010 年世界电信发展大会（WTDC-10，印度海得拉巴）通过了 ITU-D 第 2 研究组第 10-3/2 号课题及其职责范围，并对此前研究期的课题标题做了增加“信息通信技术（ICT）”的小修改。课题强调了向农村和边远地区提供宽带通信的重要性。有关向农村和边远地区提供通信的研究课题可追溯至 WTDC-94（阿根廷，布宜诺斯艾利斯），当时《布宜诺斯行动计划》（BAP-94）通过的课题为有关农村和边远地区通信的第 4/2 号课题。WTDC-98（马耳他瓦莱塔）的《瓦莱塔行动计划》（VAP-98）也通过了相同标题的课题。会议就以下议项研究达成一致：

– 农村和边远地区的通信

– 建设多用途社区电信中心

– 农村电信普及率和业务目标

– 定义一系列描述一国农村电信网络和业务发展状况的指标

– 农村和边远地区的话音、广播电视和通信

– 评估信息通信技术对农村和边远地区影响

– 通过利用通信，提高非政府组织的能力，以实现发展目标

WTDC-02（土耳其伊斯坦布尔）的《伊斯坦布尔行动计划》（IsAP-2002）延续了这项编号为 Q10-1/2 号课题的研究工作。WTDC-06（卡塔尔多哈）的《多哈行动计划》（DAP-2006）同意对第 10-2/2 课题稍做修改，将标题改为“农村和边远地区通信”。现将第 10-3/2 号课题的职责范围归纳如下：

第 1 步 – 确定农村和边远地区电信/ICT 应用提供具有巨大影响的技术和解决方案。

第 2 步 – 继续研究和报告上述技术是怎样提供农村和边远社区所需的各类服务和应用的。

第 3 步 – 确定、评估和综合发展中国家在农村和边远地区建设低成本可持续电信基础设施方面遇到的挑战。

第 4 步 – 描述农村网络系统要求的演变，具体说明农村部署工作中遇到的挑战。

第 5 步 – 继续审议上述步骤提出的技术和解决方案的可持续性。

第 6 步 – 充实有关一系列案例研究的报告，说明一系列基于新技术的旨在提出削减投入和运作成本、降低（GH G）排放量的解决方案并增加社区参与的技能，是怎样使宽带电信/ICT 基础设施在农村和边远地区最大限度地发挥优势的。

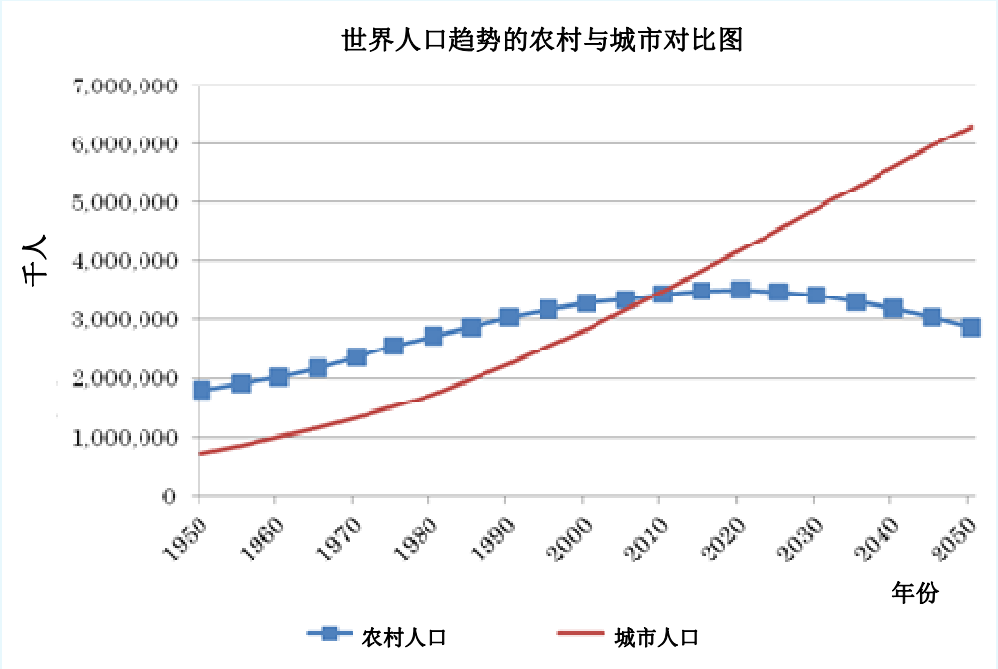
成员国、部门成员、部门准成员和学术成员为行使该课题的上述职责，在研究期当中向研究组和报告人组会议提交的文稿（需采取行动和通报情况）见报告的**附件 1** 和 ITU-D 案例

研究库（https://extranet.itu.int/itu-d/studygroups_caselib/Lists/Case%20Library%20Documents/AllItems.aspx）。

信息社会世界峰会（WSIS）（2003 年，日内瓦）的《日内瓦行动计划》确定了到 2015 年实现对全球每一个人的互联网覆盖的目标。根据图 1 显示的联合国人口处（2009 年）的统计数据，近一半的世界人口居住在农村地区。

根据世界银行和国际电联 2012 年出版的《世界发展数据手册》（LDB），全球的移动电话签约用户已超过 60 亿，但世界三分之二的人口依然与网络无缘。互联网用户达 24 亿，而固定（有线）宽带订户数量接近 6 亿。宽带移动普及率十分有限。但另一方面，发展中国家的智能电话用户迅猛增长。许多国家面临与农村和边远地区宽带基础设施建设相关的挑战。本报告是根据国际电联成员国、部门成员、部门准成员和学术成员提出的意见和文稿编写而成的，以满足既定职责范围的要求。

图1：世界人口趋势，农村与城市的对比



来源：联合国开发计划署，2009年

2 引言

报告人组根据成员提交的文稿和案例研究并通过 ITU-D 网站的电子论坛讨论和宽带委员会的报告，对课题进行了研究。研究的重点是为发展农村和边远地区而部署的有效技术、应用和解决方案。该组还通过对当前和以往研究期采集的案例研究的分析，研究了电信发展的社会经济效益。Q10-3/2 的电子论坛探讨了“农村和边远地区”的定义，还讨论了适用于向农村和边远地区提供各类电信/ICT/宽带业务所需的最低限度的带宽要求，有人认为，至少需要 256/512 Kbps（上行/下行）。国际电联和联合国教科文组织共同成立的宽带委员会在其报告中论述了“宽带”的定义。宽带委员会的报告指出，难以以具体速率定义“宽带”，因为需求正在随着业务和应用的不断涌现而快速变化。

在研究期当中，电信发展局向主管部门分发了问卷调查表，以调查成员国农村和边远地区电信/ICT/宽带建设的现状。多个国家在回复中提供了有关不同数据速率目标的信息，其中包括 2Mbps 的农村下载速率目标。

报告人组根据课题的职责范围，与 ITU-D 第 1 研究组第 7-3/1、22-1/1、24/1 和第 2 研究组第 25/2 号课题开展了紧密合作。

ITU-D 第 10-3/2 号课题研究的农村和边远地区被定义为远离大城市或城镇且与城市和城郊地区相比人口较稀少的地区。某些国家将这类地区定义为人口少于 2 500 的地区。农村地区对农耕活动的依赖程度很高，并可能具有以下特征：

1) 由于距离、地形、公路/运输网络不健全和某些农村社区边远而造成交通不便问题；

2) 缺乏充足的正常电力供应等基本有利的基础设施；

3) 缺乏充足的电信基础设施；

4) 因以上任何因素的组合造成的高物理接入和设备安装费用；

5) 目标人口的地理密度低（村庄人口少，社区居民分散，与其他地区地理隔离）；

6) 农村人口收入较低，缺乏可支配收入且相对贫困；

7) 某些农村地区文盲率较高；

8) 对现代电信业务的优势了解甚少（甚至不了解），导致某些地区当前需求低；

9) 全面缺乏（公共和私营）资金；

10) 其他。

以下发展中国家具体的农村和边远地区服务覆盖不足，未能享受到现代电信/ICT 服务。

2.1 内陆地区

内陆发展中地区在陆地的全面或接近全面的包围之中，缺少陆地出海口，并远离和脱离市场。高中转费用严重局限了社会经济发展。这些恶劣的环境对建设向这些地区提供电信/ICT 服务的电信基础设施具有极大影响。

2.2 山村

山村居民小股散居于山坡、山脊和山谷间的地区，其中包括南亚的喜马拉雅山村和拉美或其它地方的这类村庄。在这些地区建设并维护电信基础设施的成本高昂，但投资收益有限，压缩了电信/ICT 业务提供商提供业务的获利空间。

2.3 小岛屿发展中国家（SIDS）的偏远岛屿

在巴西里约热内卢（1992 年 6 月 3-14 日）举行的联合国环境和发展大会（UNCED），亦称地球峰会，将面临具体社会、经济和环境脆弱性的小岛屿发展中国家（SIDS）视为一个独特的发展中国家群体。联合国将 38 个联合国成员国确认为 SIDS 在联合国成立的特别谈判机构小岛屿国家联盟（AOSIS）的成员。加勒比、太平洋和大西洋、印度洋、地中海和南中国海（AIMS）被确认为 SIDS 所在的三个地理区域。SIDS 在其可持续发展工作中大多面临同样

的障碍，例如资源底子薄使他们不能享受规模经济效益；国内市场小并且极大依赖于外部和远方市场；能源、基础设施、运输、通信和服务成本高昂。或许可以通过卫星链路或光纤电缆而非地面传输媒体向偏远岛屿提供连接。

2.4 广大农村（沙漠、森林、无社会基础设施等地区）的偏远村庄

国际电联世界各区域的广大农村地区的沙漠和森林地区散布着一些偏远村庄。它们远隔千山万水，因地形复杂而难以到达。这些村庄或许尚无道路可通，也未建设地面接入网络基础设施，只能通过卫星链路连接。选择适当技术是向这些地区经济高效地提供连接是一项挑战，但为了当地居民的生活质量，即有必要提供电信/ICT 服务。

因此，建议为上述发展中国家的农村和边远地区解决提供多媒体信息通信技术服务的固定和移动网络系统和设备的挑战和要求问题。许多农村面临的问题超出了电信单独解决的能力，需要对农村电气化、交通网络的发展、教育和培训计划进行必要的统筹协调。

有必要在考虑到农村社区的需求和节约原则的情况下，为农村地区设计出更经济高效的技术解决方案。

3 农村和边远地区电信/ICT 建设的挑战

3.1 背景介绍

多数发展中和最不发达国家（LDC）农村和边远地区的社会经济和基础设施建设指数依然很糟。一旦我们了解农村和边远地区的欠发达问题，也就容易理解与这些地区电信/ICT 部门发展相关的挑战，因为它对这些地区的电信/ICT 宽带建设具有直接或间接的影响。

3.2 农村边远地区电信/ICT/宽带发展面临的挑战

农村和边远地区电信/ICT/宽带发展面临诸多挑战。我们从整个电信/ICT/宽带生态系统组成部分的角度介绍这些挑战，并通过此报告确定政府、监管机构、电信业务提供商、客户驻地设备（CPE）制造商、基础设施制造商（厂商）、增值业务（VAS）提供商、内容开发商、双边和多边捐助机构、民间团体机构和消费者作为电信/ICT/宽带价值链中的主要利益攸关方。

即便存在竞争，无线电频率频谱和通行权一类的公共资源也得到充分使用，大幅提高连接水平所需的成本依然是无法快速吸引私营部门投资的一个主要障碍。而且，竞争甚至可能削弱实现普遍服务目标的某些手段。过去，来自某些业务的内部交叉补贴，使主体运营商能够以低于成本的价格，在农村和低收入地区提供标准电话业务。竞争可能最终推动业务覆盖到盈利性更高地区以外的区域。但是，明确的监管计划应考虑到某些运营商只“摘选”最诱人市场的趋势。

解决内部交叉补贴不足的普遍做法是对普遍接入收费，从而建立一个可用于反向补贴拍卖的基金。其他以地理因素为主的解决方案还包括根据具体地区核发许可证、免除许可证和频谱费、鼓励运营商之间建立伙伴关系，以及在许可证方面结合考虑盈利地区与服务欠缺的农村地区。

鼓励建立支持性的骨干网络也很必要，尤其是在农村地区为部署基础设施建立这种网络。

3.2.1 政策、法律和监管视角

通过强有力的政策领导、精心协调各项计划和允许投资来鼓励使用宽带，这种领导并不一定意味着政府的积极建设和运营。多数情况下，私营公司建立和运营网络的效率更高。政府应考虑只在市场失效，如农村地区资金回报低或无资金回报的情况下，才进行直接投资。

各国应谨慎确保各项国家目标不会因为未能考虑部分地区（如边远地区或农村地区）的需求和地理因素而带来不利影响。各项目标还需现实、相关、务实，不能变成抽象空泛、好高骛远的摆设。

公私伙伴关系（PPP）可以帮助推动宽带的部署，在农村和服务欠缺的地区尤其如此。应不断开展工作，鼓励公共和私营部门共同支持显著改善基本的 ICT 基础设施，对此类设施最为缺乏的国家如此，对农村和边远地区以及弱势群体也是如此。在此方面，应注意一些特殊解决方案特定的适应性，例如，移动宽带以及光纤回传能力强的卫星系统所具有的潜力，可以满足最不发达国家和其他国家的特殊需求。

应开展一项与农村和边远地区以及弱势群体相关的经济分析，以确定适宜的营业模式，使在最低收入水平的宽带投资可以获得充分回报，并在当地社会和经济的多个部门中实现最大的溢出效益。同样情形适用于农村和边远地区以及弱势群体。应考虑“数字红利”的创新性使用。

但是，在以市场为主导的做法中，激励措施的设计应围绕基础设施的推出进行，以确保成本固定且高昂的电信网络能在可盈利的城市地区以外，也覆及农村社区。否则，宽带网络的成功部署可能最多只是面向一部分人，农村人口和许多需求最为强烈的人口依然被排除在外。

根据成熟的做法和经验，绝不可能完全依靠市场力量在农村和边远地区开展电信/ICT/宽带基础设施和服务的开发、拓展与多样化工作。政府和监管机构似乎不可避免地需要进行具体政策、法律和监管干预。但发展中国家和最不发达国家的政府总在为这一目的筹措资本密集资金的问题上遇到困难。政府面临将现有资金分配给卫生、教育、安全和法律与法制等优先领域工作的迫切需求。由于缺少适当的经济和商业模式以及国际最佳做法的知识，政府和监管机构无法制定出可行的工作模式。而开放市场则可在为私有运营商制定许可证条件的同时，将农村和边远地区业务提供的义务付诸实施，还可落实提供基础设施和服务的普遍服务义务（USO）基金的筹集和及时支付，同时制定激励性规定，收取非对称连接费，并通过基础设施共享避免重复投资。

国际上还有多种不同做法。根据一个国家的具体情况制定和实施某种对农村和边远地区可行的工作模式，对于政府和监管机构是一项挑战。时间在流逝，但政府却没有任何政策、法律和监管框架，即使有这类松散的框架，落实工作依然受阻或成为软肋，而且边远地区的居民享受不到人们最渴望和追求的电信/ICT/宽带服务。政府应充分利用电信/ICT/宽带提升农村和边远地区社会和经济发展现状，但这需要做出规划与计划。

向经济上更为边缘化的地区推广基础设施的政策基于以下认识，即，如果不能实现这种成功的基础设施扩展，数字差距会持续并扩大，在发展中国家与发达国家之间、城市与农村地区之间，都是如此。在通过推广宽带接入缩小这种差距的过程中，监管机构起着至关重要的作用。

监管机构可以有多种方式解决实际的接入差距问题，包括：向特殊的农村运营商发放许可证，以便在规定地区部署宽带网络。通过招标挑选要求补贴最少的运营商发放许可证，从

而实现一些具体目标。通过这种方法，监管机构可以加速推动新技术从城市向农村地区的传播。

给予直接和间接的资金支持，以实现宽带网络的部署：对在农村地区建设基础设施的运营商，政府可向其提供免税政策。在这类政策尚不足以吸引商业运营商的地区，政府可以提供全额或部分补贴，或提供有优惠利率的贷款。

连贯一致的许可证发放和授权框架：尽管通常要求大型宽带基础设施运营商持有许可证或一般性授权，一些监管机构开始逐渐降低对小地区、边远和农村地区的运营商和服务提供商的要求。帮助宽带市场进入上述地区，可以使服务提供商得以在小范围内测试其宽带运营模式。其中一些提供商之后可能决定是否开展更大规模的部署。

在宽带接入仅用于公共服务的领域，如用于卫生设施或学校，监管机构可以质疑是否确实需要许可证发放制度。如果不能一律取消该领域的许可证制度，尽可能降低对极小型宽带供应商的许可收费也尤为重要。同样在农村地区，可以在不要求任何许可证的前提下，允许宽带业务的再出售。例如，可以允许农村地区的宽带用户利用其连接开办公共书报亭并出售服务。否则，这类书报亭的客户可能完全无法负担这种服务。

技术中立：具有技术中立性和服务中立性的许可证和授权也能使宽带提供商在农村地区提供全方位的服务（包括多种播放），增加收入流选择。例如，在委内瑞拉，农村许可证使运营商除固定接入、长途和国际业务外，也能提供移动和多媒体业务。

优化无线电频率频谱的使用：不加区分地进行频率再分配会导致农村地区居民选择减少，而且应特别注重帮助发展中国家制定这一领域的优化政策。

基础设施共享和公开获取：如果各家公司都建立自己的基础设施，为覆及农村地区部署移动基站或骨干光纤网络，这种做法可能是一种浪费。但是，不同公司可以共享同样的基础设施，但同时又在所提供的服务上展开竞争。

应对宽带挑战：监管机构在宽带领域显然面临着多项挑战。具体来说，许多国家明显缺乏对宽带的本地需求和可用的收入流。这可能会使宽带接入网络的商业部署出现延迟，至少会延迟大型网络运营商尤其在农村地区的部署。

一些可供监管机构采用的选择如下：

– 适用于小型宽带提供商的监管框架可以帮助并鼓励当地提供商在农村地区运用宽带技术的潜能、实现更加广泛的宽带接入；

– 可以通过进行基础设施共享方面的安排，保障所有竞争运营商的公开获取，以此鼓励有竞争力的大型运营商把网络扩展到农村地区；

– 可以采取激励措施，向进行网络部署的有竞争力的大型运营商给予适当回报；

– 监管机构可以从普遍接入基金中拨款，用作面向所有宽带供应商、有针对性的直接补贴，或向他们提供间接经济利益（如免税），以此鼓励部署宽带接入网络。

3.2.2 运营商视角

从运营商的角度看，农村电信投资也能确保好的经营前景：即可持续和有生命力的业务。以下方面给电信服务提供商带来了附加问题和挑战，并使他们无法专注于核心业务。这些问题主要包括：

– 缺少通往目标站点的运输设施：无公路或航路；

– 缺少国家电网的电力供应，即使有，也会因为限电和其基础设施连接电网而只满足部分要求；

– 无法正确选择适用技术；

– 投资于错误技术；

– 政府/监管机构错过分配适用频谱的适当时机；

– 未提供回程服务；

– 农村家庭居住分散孤立的特性；

– 农村客户无法承受基于资费的成本；

– 后付费模式使电信服务费的收取遇到困难；

– 因农村人口教育水平低而且不了解电信服务和设备的使用与应用而难以形成需求；

– 每个用户平均收入（ARPU）、投资回报率（ROI）、内部回报率（IRR）和还款周期等，均对运营商不利。农村地区的 ARPU 预计很低。ROI 可能更低。还款期或许较长。而且有在款未还清而部署的技术已过时的风险。为实现有限资金的高使用率。每用户的投资成本必须要低，但这在农村地区不可能实现；

– 迟迟拿不到铺设光纤电缆、在制高点建塔等路权许可；

– 无一条龙式许可服务 – 花大量时间为获得许可奔走于各个部门 – 无论设备进口或路权批准，还是外汇支付无一例外；

– 缺少合格的人力资源；

– 冗长的站点恢复和维护时间。

3.2.3 客户角度

消费者希望电信服务可靠、可承受且高质量。农村地区消费者面临大量以下挑战：

– 服务收费高；

– 服务的获取和提供差；

– 现有服务的质量低劣；

– 识字少和缺少对业务的了解使农村的消费者无法充分利用现有服务；

– 即使他们知道如何使用这些设备，也用不起先进设备；

– 无电力供应给他们低耗电设备和较长电池寿命的设备充电造成困难；

– 未提供具有当地语言和内容的用户友好型设备。

3.2.4 厂商角度

厂商在农村地区面临多挑战，其中包括但不限于以下方面：

– 重量轻、足迹小的设计；

– 能够承受功率浮动的低功率设备和基础设施的设计；

– 设计能够在环境因素影响的条件下工作的结实耐用并经得起粗暴使用且维护需求少的室外设备；

– 符合绿色要求；

– 用于高效接入和带宽节省回程网络设计的创新技术；

– 大量投资于满足所有这些要求的研发工作。

3.2.5 CPE 制造商视角

用户端设备（CPE）制造商应具有设计出以下特性的创新能力：

– 低成本；

– 低功率；

– 重量轻；

– 用户友好；

– 可支持当地语言；

– 对失明和失聪等不同残疾人友好。

3.2.6 内容开发商视角

研究表明，一个典型发展中国家的电话普及率每增长 10%，GDP 增加 0.6%。同样，宽带提高 10%，GDP 增长 1.8%。使农村订户受益于电信连接的挑战在于开发出可供农村人口使用的应用/信息/内容，并为社会经济增长做出贡献。电子/移动教育、电子/移动卫生、电子/移动政务服务的开发，将无疑使电信服务的用户提高其社会经济价值，失明和失聪软件应用和内容的开发可使盲人和聋人提高其社会价值。对于内容开发商而言，开发这类服务并在潜在业务使用者当中形成需求是一项挑战。

3.2.7 国际组织和双边及多边捐助机构视角

人们注意到，捐助机构大规模参与了推进发展中国家和最不发达国家农村地区社会经济和人文发展以及基础设施建设的活动。事实上，这些活动是供应驱动而非需求驱动的，而且相互独立，没有采取统一全面的做法。

捐助工作需要协调，需要在了解根本性基础设施建设的同时，对农村和边远地区电信/ICT/宽带业务的提供做出说明。他们还应了解电信/ICT/宽带业务可为所有其它类型的发展提供有利环境。在开发所有电信/ICT/宽带服务项目的同时，在捐助方及政府和捐助方之间实现统一、整合和协调是重复工作带来的一项挑战。

4 电信/ICT 服务/应用内容、收益/重要性和连通未享受服务人口的影响

4.1 背景

数字差距不仅存在于发达和发展中国家之间，还存在于各国的城乡乃至经济地位和教育水平不同的个人和家庭之间，也存在于青年人和老年人及正常人和残疾人之间。农村和边远地区的经济、教育、年龄段和能力问题比城市地区更为突出。

传统的农村发展方式不仅费用让人却步，而且实施进程缓慢。然而正是农村人口的发展和生活质量方面的渴望，需要最新的电信/ICT/宽带干预。

全球许多国家正在考虑在众多农村社区建设信息高速路。通过这些新的数字高速路传送的信息服务、应用和内容，无疑将像早些时候改变了农村社区的跨州公路系统和铁路那样改革农村经济。显然，几乎全球所有国家的经济都不可能支持将铁路和多车道的州际公路延伸至每一个农村社区。但是，技术，尤其是无线技术的进步，为使世界各地无论多么边远的农村社区，都可有效使用二十一世纪信息高速路创造了经济可行性。部分社区将更快获得更好的接入。但显而易见的是，那些享受国家和国际信息高速路的农村社区比那些无法享受这一优势的社区具有更健全的本地经济基础。

移动宽带、固定无线宽带和固定无线宽带业务正在涌现，但向农村和边远地区的普及仍有待时日。允许各移动运营商在农村地区第二代和第三代（2G 和 3G）网络相互漫游，既可扩大覆盖范围，亦可大幅节省网络成本。在一些地方，市场竞争者也开始在非农地区共享大量无线接入网络设施：澳大利亚电信（Telstra）与和记黄埔（Hutchison）在澳大利亚共享 3G 网络就是一例。同样，法国也允许 2G 运营商共享基础设施，以覆盖没有服务的农村地区。这种漫游和基础设施共享的安排也可适用于新的无线宽带网络。

WSIS《日内瓦原则宣言》指出：“我们，世界人民的代表，于 2003 年 12 月 10 日至 12 日汇聚在日内瓦，出席信息社会世界高峰会议第一阶段会议，宣告我们建设一个以人为本、具有包容性和面向发展的信息社会的共同愿望与承诺。在此信息社会中，人人可以创造、获取、使用和分享信息和知识，使个人、社区和各国人民均能充分发挥各自的潜力，促进实现可持续发展并提高生活质量。这一信息社会以《联合国宪章》的宗旨和原则为前提，并完全尊重和维护《世界人权宣言》。”[1]

《日内瓦行动计划》确定了 11 个行动方面[2]，其中包括：各国政府和所有利益相关方在推动信息通信技术促进发展方面的作用；信息通信基础设施：获取信息和知识；能力建设；树立使用信息通信技术的信心并提高安全性；有利环境；包括电子政务、电子商务、电子教学、电子卫生、电子环境、电子农业和电子科学在内的信息通信技术应用：文化多样性与特征，语言多样性与本地内容；媒体；信息社会的道德内涵；国际和区域性合作。

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[1] WSIS 2003 年《日内瓦原则宣言》，http://www.itu.int/wsis/documents/doc_multi.asp?lang=en&id=1161%7C0。

[2] WSIS 2003 年《日内瓦行动计划》，http://www.itu.int/wsis/documents/doc_multi.asp?id=1160%7C0&lang=en。

国际电联和联合国教科文组织共同成立的宽带数字发展委员会，旨在强化联合国实现千年发展目标（MDG）的行动。目前可将 ICT 的巨大能力用于议程的制定，通过电子卫生、电子教育、电子政务、电子农业等加速 MGD 的实现。[3]宽带可应用于能源部门、医疗保健、教育、环境和传送网络，并加速实现 MDG 的步伐。[4]宽带委员会网站是国际 ICT/宽带使用最佳做法的独立存储库。

世界各地的许多农村和边远地区无法真正使用PSTN设施。然而，即使在农村和边远地区，移动电话的使用量也是惊人的。通过农村和边远地区移动网络提供的语音服务和低速数据服务与宽带网络相比，只能提供有限的具有改革潜力的应用。正如人们在ICT业界看到的情况，没有内容的连接能力使最先进的技术失去用武之地，或限制了其作用的发挥。在当今的虚拟世界，政府一定不能忽视内容的重要性[5]。

4.2 应用和服务的分类

与改善生活质量、医疗保健、教育和政务相关的宽带应用可分为以下类型：

– 基于视频的应用；

– 远程医疗应用；

– 远程教学应用；

– 电子政务应用；以及

– 应急管理操作应用。

但是，这些应用领域只占宽带潜在用途的一小部分。

基于视频的应用。视频传送是众多不同应用的组成部分。面向娱乐的应用事例包括媒体下载和在线多方参与的游戏以及包括多点视频会议的面向商业的应用。

媒体下载。电影和电视节目下载是一项很大的业务。

多方在线视频游戏。

多点视频会议。多点视频会议是指从不同地点同时发送和接收视频和音频内容。这不同于仅两个终端用户相互通信的端到端用户视频会议。

电信网络可提供不胜枚举的应用服务，如电子商务、电子教学、电子卫生、游戏、音视频流、股票价格、新闻、板球、远程投票、聊天、天文学等。每项业务都在内容、成本和需求方面存在差异，并可为不同的消费者群体量身定制。印度电信监管机构将应用主要分为以下类别[6]：

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[3] http://www.broadbandcommission.org/about/background.aspx。

[4] 同上

[5] 《2010 年领导人要务：建筑在宽带上的未来》，宽带委员会的报告。

[6] 印度电信监管机构（TRAI）有关应用服务的建议，2012 年 5 月。

(i) 娱乐应用业务：音乐、铃声、视频和游戏等业务非常流行，并且极大推动了应用服务的增长；

(ii) 信息应用业务：诸如电子教育、电子卫生、新闻和银行账户信息、房地产、教育、旅游、板球等业务被划入信息应用；

(iii) 交易业务应用：使客户能够通过电话开展理财和支付等交易。

4.3 电子应用

WSIS 在 2003 年《日内瓦行动计划》中确定类一系列电子应用和服务领域，为方便参引起见，现将它们罗列如下：[7]

– **电子政务**实施旨在创新和提高公共管理与民主进程的透明度、提高效率和密切与民众关系的电子政务战略，适应公民和企业的需要，以实现资源和公共物资的更有效分配，增强各级政府的透明度、责任心并提高效率。

– **电子商务**宣传国际贸易可带来的益处，努力激励私营部门进行投资，促进新的应用和内容开发，并形成公私合作伙伴关系。

– **电子学习**信息通信技术可以通过提供教育和师资培训、通过改善终身教育条件(包括正规教育以外人群的终身教育条件)以及提高专业技能，在世界范围内进行成年人扫盲，使所有人都能提高信息通信技术方面的技能，让 ICT 教育面向年轻女性，以增加从事信息通信技术工作的妇女人数。

– **电子卫生**建立可靠、及时、优质和价格可承受的卫生保健和卫生信息系统，并利用信息通信技术加强持续的医疗培训、教育和研究工作，同时尊重和保护公民的隐私权；促进对世界医学知识和本地相关内容资源的利用，以加强公共卫生研究和预防计划并增进女性和男性的健康，这些内容可为涉及性和生殖健康、性传播疾病和有关艾滋病病毒/艾滋病、疟疾和肺结核等引起全世界关注的疾病的内容；通过改善共同信息系统，对传染性疾病的传播发出警告并进行监测和控制；推动医疗数据交换国际标准的制定，同时顾及人们对隐私的关注；改善和扩大对边远地区与服务欠缺地区以及弱势人口的医疗保健和医疗信息系统，同时认识到妇女在其家庭和社区中作为医疗服务提供者所发挥的作用；为灾难和突发事件提供医疗和人道主义援助。

– **电子就业**推广远程办公，以使公民、特别是发展中国家、最不发达国家和小型经济体的公民在其社会的任何地方生活和工作，并增加妇女和残疾人的就业机会。

– **电子环境**使用和推行信息通信技术，将其作为保护环境和可持续使用自然资源的手段；实施促进可持续生产和消费的项目和计划，并实施以有利于环境安全的方式处理和循环利用废弃的信息通信技术硬件与组件的项目和计划；利用信息通信技术建立监测系统，预报并监测自然灾害和人为灾害重点对发展中国家、最不发达国家和小型经济体的影响。

[7] WSIS《日内瓦行动计划》，http://www.itu.int/wsis/documents/doc_multi.asp?id=1160%7C0&lang=en。

– **电子农业**利用信息通信技术，确保有关农业、畜牧业、渔业、林业和食品业的信息得到系统化传播，以方便公众（特别是农村地区的公众）获得全面、及时和详细的知识与信息；最大程度地发挥信息通信技术作为改进生产（数量和质量）的手段的作用。

– **电子科学**在生成信息和知识、开展教育和培训方面发挥关键作用，并鼓励在这些机构间建立伙伴关系、开展合作和交流。推广电子出版、差别定价和开放接入的举措，使所有国家都能在平等基础上以可承受的价格获取科学信息。提倡利用同行的对口技术，以共享科学知识，共享已放弃收费权利的科学著作作者撰写的预印和再版的科学著作。提倡在所有国家长期、系统和有效地收集、传播和保存诸如人口和气象数据等重要的科学数字数据。制定原则和源数据标准，以推动合作和酌情有效利用收集到的科学信息与数据开展科学研究。

4.4 对农村和边远地区至关重要的应用

1) 电子学习：

信息通信技术可以通过提供教育和师资培训、通过改善终身教育条件(包括正规教育以外人群的终身教育条件)以及提高专业技能，在世界范围内帮助实现普及教育。这可酌情适用于农村和边远地区。世界上多数国家已对教育部门实行开放政策。我们既看到政府和公共实体建立、支持和管理的教育系统，也看到私营实体建立和管理的教育机构。鉴于公共和私营机构的具体特点，我们发现在这两种教育体制当中存在质量差异。这在农村和边远地区则表现得更为突出，因为胜任的人力资源最不愿去那里工作。这种差距只能通过 ICT 干预和电子学习/移动学习/电子教育等受欢迎的方式加以解决。

尤其是个人电脑等现代技术制备的应用，加之移动电话、媒体播放器、游戏控制手柄以及平板电脑技术的发展进步，使教育和教学拥有了两大优势。首先，它利用广泛的不同媒体（文本、图片、图形、音频文档和电影）向学生提供教学内容。其次，学生可根据标准或特别软件积极利用和修改这一内容，并创建新的内容。互联网连接使教师和学员都能方便地获取大量信息，并通过电子邮件、在线聊天以及音视频会议[8]为各种通信形式远程提供基础设施。

发展中国家和农村地区的基础设施薄弱，资源获取可能面临挑战，移动教学（mLearning）对这些地区尤其具有深远意义。经由移动技术的传送，移动教学可以随时随地提供教育内容。

千年村项目将教育作为整个撒哈拉以南非洲地区农村综合发展的核心。“为学习而连通”在各方合作伙伴专业特长的基础上，确定了把教师职业发展与基于 ICT 的 21 世纪课堂教学、工具和实践相结合的战略。

[8] 《农村地区的创新型电子教学：综述》，Lutz Laschewski。网络推动“电子教学促进农村发展”、电子农村网络，LLP 横向计划关键活动 3 ICT – 网络，2013 年 2 月。

穷人、农村人口、残疾人士和其他弱势群体尽管有特殊的教育需求，但所接受的教育质量却常常很低。所面临的挑战是要确保 ICT 的应用能有利于所有人的教育，减少不平等现象。

技术使个人化的学习成为可能，从而改善了教育机会，同时也增强了集体式教育的学习潜能，并增强了教育资源的获取，即便对边远和农村地区的学校，也是如此。

尽管许多国家已有宽带政策，而且许多国家的教育部已经呼吁实现所有学校的宽带连接，但尤其是因为许多发展中国家在收集与 ICT 接入和使用相关的数据时，不对连接类型加以区分，导致实现这些目标的进展依然呈现不规则之势，而且难以跟踪。几个人口集中的加勒比小国，包括巴巴多斯、英属维尔京群岛、圣基茨和尼维斯、圣卢西亚和圣马丁，都报告称 100%的小学和中学有固定宽带连接（教科文组织统计研究所（UIS），2012 年）。乌拉圭已经能在城市和城乡交界地区为 95%的小学和 100%的中学提供固定宽带连接。但对该地区较大的国家而言，网络连接依然是一个挑战。例如，在哥伦比亚，75%的小学和中学实现了互联网连接，但所有学校中只有 9%是通过固定宽带实现连接。

尽管取得了进步，发展中国家依然存在宽带覆盖上的障碍。这些障碍包括宽带成本和无障碍获取——宽带成本比发达国家高，无障碍获取则因缺乏具有成本效益的基础设施和设备而受限，其中农村和边远地区尤其受限。

全球教师危机是由于缺乏训练有素的教师，而且教师培训质量低劣，农村和边远地区尤其突出。宽带使教师有可能在线获取优质的教育资源和协作式的职业发展。

2) 电子卫生：

电子卫生是一个处于医疗信息学、公众健康和商业的交汇点上的新兴领域，涉及通过互联网及相关技术提供和增强的卫生服务和信息。广而言之，电子医疗保健不仅标志着技术的发展，而且标志着一种新的工作方式、一种态度以及对网络化、全球化思维的一种承诺，以便利用信息通信技术改善本地、区域和世界范围的医疗保健[9]。

研究表明，农村地区医疗保健服务的分配与电子卫生的使用[10]相互关联。农村地区的挑战体现为明显的地理因素，包括少数人的离群索居、公共交通和道路基础设施有限以及由此引起的与医院的长距离阻隔。为农村医疗保健服务招聘合格和经验丰富的人员也是一大难题。而且专业二级保健服务走向集中且老年人口占总人口当中的比例上升更使上述情况愈演愈烈。研究的结果表明，通过提高医疗保健服务提供和增加在边远地区就业对医疗保健人员的吸引力有益或可能有益于电子卫生系统。

缺乏可以获取的卫生服务对边远农村地区的妇女是个尤为突出的问题。移动技术也可以用于向父母传播健康和卫生方面的基本信息（如疫苗提醒以及关于母婴卫生和营养的建议）、培训介于医患之间的卫生保健工作人员和农村医生、跟踪疾病和疫情的暴发、对患者进行远程监测、在需要服药或去医院体检时向病人发出提醒。有互联网接入的社区中心在实现重要连接和提供卫生信息方面，正在发挥越来越重要的作用，而且这对农村和边远地区的妇女尤其重要。

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[9] 同上

[10] 《电子医疗怎样惠及农村地区—— 来自挪威的文献综述》，挪威电子医疗中心，Robert Myrvang 和 Thomas Rosenlund，2007 年 4 月。

可以有效利用与宽带骨干网络相连的主要医院，向当地人群提供更低带宽的服务（如对地处农村更边远地区的诊所进行基本监测并与其沟通）。可以有效利用一些简单业务（如短信提示、预约或患者提醒）来改善卫生服务的提供，并降低次级成本（如前往边远诊所的差旅成本）。

3) 电子政务：

电子政务是公共部门机构（政府）利用信息通信技术（ICT）向公众提供服务和信息的方式方法。这种服务的例子包括但不限于在线支付政府税收和公用事业账单；在线登记地址、出生和婚姻及死亡变更信息；电子卫生服务；电子教育；电子选举等。面向电子政务的技术和服务正在全球迅速发展进步。电子政务工作旨在受益于最具创新形式的信息技术、尤其是基于网络的互联网应用，以提供政府的根本职能。这些职能是目前推广移动和无线技术的使用，并开辟新的方向：移动政府（移动政务）[11]。这些服务既可以是政府之间（政府到政府）；政府与国民之间（政府到国民），也可以是政府与公司之间（政府到公司），以及公司与国民（公司到国民）之间。

4.5 内容

为强调应用和内容的重要性，美国联邦通信委员会（FCC）于 2010 年发布的国家宽带计划指出，“宽带的价值最终是通过向最终用户提供实用的应用和内容实现的。”[12]

2013 年《日内瓦行动计划》将重点放在题为“文化多样性与特征，语言多样性与本地内容”的 C8 行动方面，具体涉及

– 拟定文化政策，推动文化、教育和科学内容的制作；

– 支持地方主管部门进行的本地内容的开发、翻译和改编，支持他们创建的数字档案馆和多种形式的数字和传统媒体；

– 通过获得传统和数字媒体服务，提供与信息社会中个人的文化和语言相适应的内容；

– 鼓励创作形式多样的本地及本国内容，包括以用户本国语言提供的内容；

– 培养本地人才，开发并传播以本地语言制作的软件及适应包括文盲、残疾人、社会经济地位低下群体和弱势群体在内的不同群体需求的内容；

– 增强原住民以本族语言开发内容的能力。

4.6 不同应用的速率要求

我们在以下表格（表 1）中列出了不同级别服务的部分速率要求。

[11] 《从电子政务到移动政务：面对不可避免的趋势》日本国际大学 Ibrahim Kushchu 和西南大学商业信息系统学院 Halid Kuscu。

表1：应用速率要求等级

应用	级别
简单文本文件的电子邮件	基本
具有 2 MBs 或更大附件的文件的电子邮件	基本
下载小型文件（最高至 2 MBs）	基本
在线电子商务	中级
非同步在线描述	中级
端到端单用户视频会议	中级
通过虚拟专用网（VPN）的远程接入	中级
多点视频会议	高级
远程办公	高级
远程教学	高级

来源：哥伦比亚电信公司，2010 年

表 2[13]根据以不同连接速率有效完成任务所用的时间，对各项应用进行审议。这项信息摘自 SBA 对一系列面向商业的应用对带宽要求进行的研究（利用极适用、适用和不适用几个类别）（哥伦比亚电信公司，2010 年）。

表2：以不同连接速率完成应用的时间

应用	网络下载速率			
	4 Mbps	10 Mbps	20 Mbps	50 Mbps
多点视频会议	不适用	适用	适用	适用
下载高清晰度视频	不适用	不适用	适用	极适用
服务器备份（1 太字节容量）	不适用	不适用	不适用	极适用
远程办公	不适用	不适用	不适用	极适用
远程教学	不适用	不适用	不适用	极适用
远程医疗	不适用	不适用	不适用	极适用

来源：哥伦比亚电信公司，2010 年

4.7 连接无连接者的重要性和影响

我们在上述段落中看到了向消费者提供各类业务的可能性。每种业务适合每种具体需要，并具有其自己的重要性。从社会经济发展、农村人口能力建设和政府服务提供角度看，并不是所有服务都具有同等重要性。我们需要为将提供的业务进行优先排序，并建议政府将

[13] http://www.firstmonday.org/ojs/index.php/fm/rt/printerFriendly/4066/3355#tab2。

电子教育、电子医疗和电子政务服务作为重点。电子商务的重要性还在于将农村人口纳入主流金融系统。

在许多新兴经济体和农村地区，妇女依然在经济和社会上处于边缘地位，缺乏文化教育，就业情况相对较差。ICT 和宽带对于向她们赋权增能和实现性别平等非常重要。

5 对回程和接入技术用于连接农村和边远地区的评估

5.1 光纤技术

光纤技术因容量大、衰减低、体积小、重量轻、抗干扰性能强、节约有色金属以及易扩展的特性而广泛用于当今世界。接入部分采用的三网合一技术使新技术得到部署，从而降低了成本并实现了光纤到户。而回程方面只能考虑采用适合高速的拓扑。光纤骨干网络可以增大数字用户线路（DSL）网络的容量。使光纤技术进入农村地区也有利于无线宽带技术的互联网回程。同样，监管机构也可以在使用内部通信连接的不同设施或项目之间发挥合力，而不必单单依赖一家“超级”光纤骨干网络运营商。例如，能源和运输基础设施项目也可以用于光纤部署。这样，电信运营商就可以接入这些设施，使其网络得到提升。

5.2 光纤用户的接入拓扑

光纤可用于点到点模式，或以无源光网络（PON）的形式出现，在这种情况下，其容量可为多个家庭共享。目前采用的术语如下：

– FTTB（光纤到楼）：将光纤延伸至楼宇后，再由 DSL、WiMAX、WiFi、以太网等技术提供后续服务；

– FTTC（光纤到路边）：将光纤铺设至为多栋楼提供服务的配线架，然后利用上述技术构成用户链路；

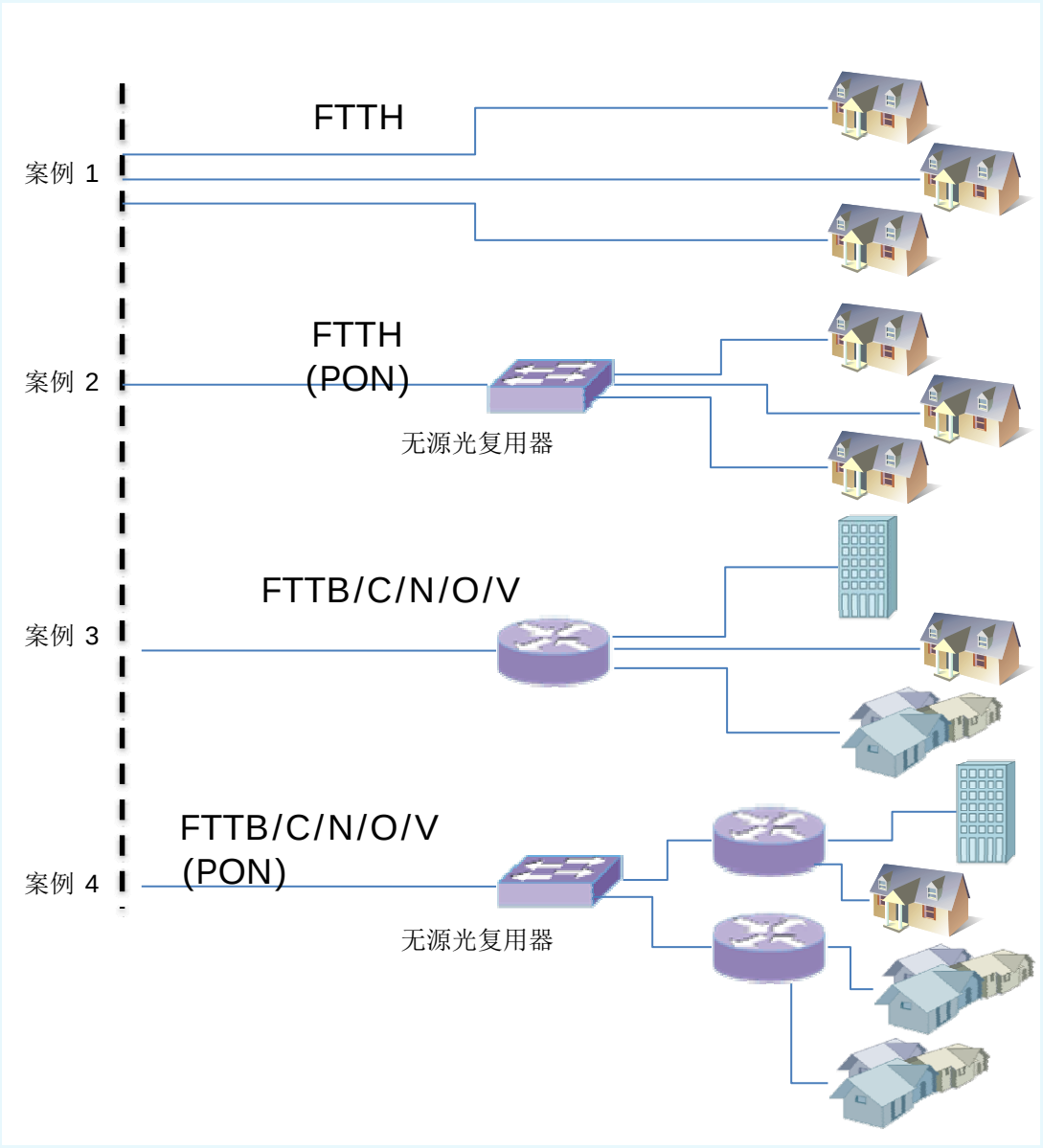
– FTTH（光纤到户）：光纤延伸至用户家庭，并支持极高速率；

– FTTO（光纤到办公室）：光纤延伸至办公室后，那里的链路通常以太网或 WiFi 技术为基础；

– FTTN（光纤到社区）：光纤延伸至社区，自那里起的个人用户链路是以 DSL、WiMAX、WiFi、以太网等技术建成的。这种拓扑亦称“光纤到节点”；

– 以及与农村和边远地区尤其相关的 FTTV（光纤到村），即光纤拓扑被部署至村庄内/附近的节点，自那起的链路通常是以 DSL 或 WiMAX 技术构建的。

图2：光纤用户接入拓扑



来源：国际电联

案例 1：点到点光纤将用户设备与网络相连接。使用的传输技术为 100 Mbit/s 或 1 Gbit/s 以太网的标准化技术。对于内联网互连、主机接入、云计算或要求极高速率的应用可采用 10 Gbit/s 的速率。

案例 2：无源光网络，即 EPON（以太网 PON）、GPON（吉比 PON）、GEPON（吉比 EPON）、10G-PON（10 吉比 PON）、10G-EPON、G.epon 或 WDM PON（波分复用 PON），可从单一光网络连接点向多个用户提供服务这一只向每个用户提供部分现有速率的解决方案具有成本较低的优势，因为单一的网络接入点和靠近接入点的单一光纤可被用于向数十位用户提供服务。无源 100 Mbit/s 光纤网络仅限于提供数据传输、电话和遥测等传统应用。高速无源网络和 WDM PON 可提供三网合一服务、视频点播和其它需要高传输容量的服务。

案例 3、案例 4：这里显示了连接至社区（FTTC 或 FTTN）、楼宇（FTTB）或村庄（FTTV）服务的用户群的连接情况。多数电信和电缆运营商都在使用这类回程服务。连接的最后部分采用 VDSL、CATV 或有可能采用 WiFi 技术。

随着光缆成本的下降，可考虑在农村和边远地区，尤其是符合以下前提条件的地区，部署光纤用户接入：

– 用户基础相对集中，而且宽带需求较大（相对集中是指两个最近的宽带用户之间的电缆距离不应超过 1 公里）；

– 电缆偷盗严重，被盗电缆不少于 100 对，或在被盗电缆被切换后可拆换的电缆长度为 1.5 公里或更长；

– 为提高网络质量：电缆长度超过 2 公里，具有宽带需求，电缆老化而且严重故障经常发生，许多客户投诉且维护成本高昂；

– 给铜资源注入新的活力：只要可拆除的电缆价值高于光纤接入投资，就可能以光纤代替铜缆，但总体的要求是，可拆除电缆超过 200 对，同一方向的长度大于 2 公里。

中国正在使用光纤宽带促进农村信息基础设施的部署，旨在实现光纤到城镇，并在 2015 年使农村家庭的基本互联网带宽超过 4Mbps。此外，中国的电信运营商采用 FTTH 技术扩展网络覆盖，并提高农村宽带接入质量，以满足相对富庶的中国东部农村地区农民对宽带业务的需求。

5.3 P2P 光纤接入和 PON 的技术特性

5.3.1 点到点光纤接入（EFM：以太网第一英里）

点到点用户接入较点到多点更为昂贵（高约 10%），因为每个用户都需要一个光纤和一个网络连接点。另一方面，这种拓扑能够提供极高的传输速率。点到点接入通常利用以太网二层技术，其范围独立于速率，因为光纤对不同传输速率的衰减相同。

在 IEEE 802.3ah 标准中，这项技术亦称为 EFM（以太网第一英里）。下述文件对其配备有光纤的物理层做了说明：

– 100BASE-LX10：经利用 1 310 纳米波长的单模光纤对传送 100 Mbit/s；范围达 10 公里；

– 100BASE-BX10：为上行和下行方向经采用 1 310 和 1 550 纳米波长的个体单模光纤传送 100 Mbit/s；范围达 10 公里；

– 1000BASE-LX10：经利用 1 310 纳米波长的单模光纤对传送 1 Gbit/s；范围达 10 公里；

– 1000BASE-BX10：为上行和下行方向经采用 1 310 和 1 550 纳米波长的个体单模光纤传送 1 Gbit/s；范围达 10 公里；

– 10GBASE-LR：经利用 1 310 纳米波长的单模光纤对传送 10 Gbit/s；范围达 10 公里；

– 10GBASE-LW：经利用 1 310 纳米波长的单模光纤对传送 10 Gbit/s；范围达 10 公里；用于 SDH/SONET 设备的连接。

为满足更高速率的要求，对采用一系列不同波长的接口做出如下规定：

– 40GBASE-LR4：经利用 1 270、1 290、1 310 和 1 330 纳米波长的单模光纤对传送 40 Gbit/s，每个波长传送 10 Gbit/s；范围达 10 公里；

– 100GBASE-LR4：经利用 1 295、1 300、1 305 和 1 310 纳米波长的单模光纤对传送 100 Gbit/s，每个波长传送 25 Gbit/s；范围达 10 公里。

5.3.2 EPON/GEPON/10G-EPON（以太网无源光网络/吉比以太网 PON/10 吉比以太网 PON）

除点到点光接入外 IEEE 802.3ah 标准还定义了以无源光网络形式出现的用户接入。时分复用技术能够实现将 1 Gbit/s 的光信道容量分配给连接 PON 的 8、16、32、64 或 128 个用户。它根据位于撞击检测共用媒体和点到点以太网之间的传输模式使用本机以太网协议。

在下游方向，以太网广播模式可使信息在不增加具体措施的情况下，传输给每个用户。接收设备的 MAC 地址有助于为每个用户提取适用流。在其它方向，问题则更为复杂。

一系列用户系统可能具有同时的物理媒体和传送信息接入。已根据 IEEE 802.3ah 标准制定了具体协议。这项被称为 MPCP（多点控制协议）的协议有助于传输信道容量的有效分配。为 EPON/GEPON 确定的物理媒体如下：

– 1000BASE0PX10：为传输的上行和下行方向在经采用 1 310 和 1 490 纳米波长的个体单模光纤上提供点到多点接入；范围达 10 公里；

– 1000BASE-PX20：1 Gbit/s 为传输的上行和下行方向利用 1 270 和 1 590 纳米波长的个体单模光纤提供点到多点接入；范围达 10 公里（PR10）或 20 公里（PR20）。

2008 年发布的 IEEE 802.3av 标准介绍了 10 Gbit/s 无源光网络，并建立了两种变量，即 1:16 或 1:32 光复用。第一种变量是对称的，提供双方向的 10 Gbit/s。第二种变量支持下行方向的 10 Gbit/s，和上行方向的 1.25 Gbit/s。具体的物理媒体如下：

– 10GBASE-PR：为传输的上行和下行方向利用 1 270 和 1 590 纳米波长的个体单模光纤传送对称的 10 Gbit/s；范围达 10 公里（PR10）或 20 公里（PR20）；

– 10/1GBASE-PRX：为传输的上行和下行方向利用 1 270 和 1 590 纳米波长的个体单模光纤传送下行 10 Gbit/s 和上行 1.25Gbit/s；范围达 10 公里（PR10）或 20 公里（PR20）。

5.3.3 GPON/10G-PON（吉比就绪 PON 或吉比 PON/10 吉比 PON)

根据 ATM、APON（ATM PON）和 BPON（宽带 PON）技术建成两类无源光网络后，国际电联定义了 GPON。对 GPON 做出说明的 ITU-T G.984 建议书允许采用不同数据速率，而行业选择了 2.5 Gbit/s 为下行速率，1.25 Gbit/s 为上行速率。GPON 主要因为其规格可变帧和高效的封装机制而较其前一代系统极大地提高了效率。10G-PON 提供 10 Gbit/s 的下行速率和 1.25、2.5 或 10 Gbit/s 的上行速率。这些同步数字序列的实际数值为 1.244 Gbit/s、2.488 Gbit/s 和 9.953 Gbit/s。为 10G-PON 选择的波长能够与 GPON 在同一无源光网络上共存，使它能够按用户逐个提升系统。

– G.984：1 Gbit/s，为传输的上行和下行方向利用 1 310 和 1 490 纳米波长的个体单模光纤提供点到多点接入；范围达 20 公里；

– G.987：10 Gbit/s，为传输的上行和下行方向利用 1 270 和 1 5770 纳米波长的个体单模光纤提供点到多点接入；范围达 20 公里。

5.3.4 G.epon/SIEPON

ITU-T 将定义 G.epon，并将于 2013 年 7 月实现标准化，形成 ITU-T 版本的经 IEEE P1904.1 WG 定义的 SIEPON（EPON 业务互操作性）组建 B 标准，以提高 EPON（包括 GE-PON 和 10G-EPON）的互操作性。这些标准定义了系统及规范，如 EPON 架构模式、服务质量、ONU 电源管理、保护交换和 OAM（运行、管理和维护）功能。此外，G.epon 可支持 ITU-T G.988 定义的 B-PON/G-PON/XG-PON 等其它 ITU-T PON 相同的通用 OMCI 管理。

5.3.5 WDM PON（波分复用 PON）

波分复用无源光网络能够在每个用户和网络终端之间提供极高的传输速率。它比传统 PON 的费用高，但可通过向每个用户提供单独的光信道，例如向每个商业综合体的各个企业或住宅楼中的每个公寓提供单独的光纤信道。WDM PON 技术虽然已得到一些设备提供商的改进，但尚未实现标准化。

表3：P2P光纤接入和PON的利弊

	优点	缺点
点到点	– 极高速独立链路 – 长距离（≥10 公里） – 与现有和未来业务兼容 – 无需数据加密的安全传输 – FTTH 的安全演进，因为用户和网络设备之间的光纤是透明的	– 因为需要全面铺设光纤（土木工程）而费用最高 – 由于需要为每个用户铺设光纤而推出速度较慢。
PON	– 最大限度减少光纤部署和网络端口数量 – 通过用户间共享传输容量降低成本 – 可提供组播服务 – 用户和交换之间没有有源成份；减少维护 – FTTH 的安全演进，因为用户和网络设备之间的光纤是透明的 – 较点到点的推出速度更快	– 由于媒体共享而必须对数据加密 – 用户共享容量 – 较点到点更难以去绑定

5.3.6 对光用户接入技术的展望

光接入（FTTx – 光纤到楼、光纤到路边、光纤到户等）是增长最快的市场部分。光纤是唯一能够向 10 公里或更远距离提供三网合一业务所需数据速率的有线媒体。它将以 CATV 或 VDSL 回程系统、用户的点到点链路或无源光网络的形式得到确立。作为最先上市系统的 EPON/GEPON 主要在亚洲市场得到部署，GPON 则在美国得到广泛采用。

5.4 光回程拓扑

光纤在多数情况下是网络边缘和核心之间回程的理想媒体。鉴于用户间数据交换量的显著增长，回程必须应对三网合一、视频点播、HDTV、IPTV、视频会议、互动视频和视频游戏、云计算和数据传送等需极高数据速率的不断增长的需求。

下图对三种回程拓扑做了比较：SDH（同步数字序列）环；以太网环的点到点链路；以及具有可重新配置光分插多路复用器的光环（ROADM）。

表4：回程光技术的利弊

	优点	缺点
SDH	– 灵活强健的技术 – 控制要素被纳入帧头 – 分支的可见性 – 确保网络同步的持续性	– 仅传送一个网络的同步性（多运营商系统） – 较以太网技术费用更高
运营商以太网	– 特定比特率的成本较低 – 与用于网络末端的 IP/以太网技术兼容	– 需确保同步持续性的附加机制 – 缺少对业务质量和性能的信心
ROADM 上的以太网	– 光纤层的分插 – 方便规划和提供光信道 – 光设备远程重新配置的灵活性（任何地点的所有波长） – 维护费用下降预期	– 技术尚未标准化

5.4.1 同步数字序列（SDH）回程

同步数字序列（SDH）是国际电联于上世纪八十年代在贝尔公司研发的 SONET（同步光纤网络）的基础上开发的。提供的速率有：155.52 Mbit/s、622.08 Mbit/s、2.488 Gbit/s、9.953 Gbit/s 和 39.813 Gbit/s。

上述复用结构使同步系列中的适当“容器”能够以 E1/T1（2.048/1.544 Mbit/s）、E3/T3（44.736/34.368 Mbit/s）和 E4（139.264 Mbit/s）的速率承载一系列准同步数字序列（PDH）流。可在每个 SDH 交叉连接节点的 SDH 传输当中方便地分插这些准同步流。1991 年春天发布的重要的 SDH 建议书如下：

– G.707：同步数字系列（SDH）的一般特性；

– G.708：同步数字系列（SDH）的网络节点接口；

– G.709：同步复用机构。

与需要具体措施的互联网衍生的其它技术不同，SDH 具有无需任何具体行动就能确保网络同步延续性的优势。

SDH 可以多种不同拓扑执行。点对点最为简单，只需在每端设置一个复用器 – 解复用器。通过在插分分支中接纳复用器就可创建总线。最常见的拓扑是具有分支插分复用器的环。SDH 技术还能够使人们借助对比特率没有限制的分支插分数字交叉连接，采用网状拓扑。

SDH 传输系统在单模光纤上采用 1 310 或 1 550 纳米波长。覆盖的距离为 15 公里（G.652 光纤）、40 公里（G.652 光纤，1 310 纳米）和 60 公里（G.652、G.653 或 G.654 光纤，1 550 纳米）。

SDH 可将光波分复用技术用于传输系统运行，从而使回程电路容量倍增。

5.4.2 以太网回程（电信及以太网）

回程容量需求的增长速度，预计将大大超过运营商从中获取收入的速度。该需求当中越来越大的部分与尽力而为的业务相关，这将鼓励参与者寻求更具优势、灵活和有效的解决方案。鉴于回程业务的演变、全 IP 下一代网络（NGN）的采用和购买和管理同步系统的费用，回程将转而采用以太网技术。

向完全基于以太网技术（企业级以太网）的传输概念的过渡，使运营商面临确保网络同步延续的问题，这是（比如说）现有蜂窝系统和四代系统的必须。传输网络的经营者可能是向多个移动网络运营商提供传输容量的批发运营商，这就需要多运营商同步的延续性。现有的分组网络同步化的解决方案很多，如国际电联的 SyncEthernet、IEEE 的精密时间协议（PTP）或 GPS 同步化。

标准机构和制造商为客服运营商网络中以太网的局限做出了切实努力，并形成了一系列新的标准，其中主要涉及接口速率、管理问题和以太网的伸缩性：

– IEEE 802.1 ad – 提供商桥接：使用户自己的 VLAN 能够并入运营商的 VLAN；将多个 VLAN 标签纳入同一以太网帧。

– IEEE 802.1 ah – 提供商骨干桥接：对 IEEE 802.1 ad 的补充

– IEEE 802.1 ag – 连接故障管理

– IEEE 802.1 Qay – 供应商骨干桥接 – 业务工程：旨在使以太网协议可伸缩、起决定作用并提高其可靠性。

– Y.1731：基于以太网网络的 OAM 功能和机制

此外，人们已就高速以太网接口提出建议或正在使接口标准化的过程中：

– 10GBASE-E：经采用 15 550 纳米波长的单模光纤对传送 10 Gbit/s；范围达 40 公里。

– 100GBASE-ER4：经采用 1 295、1 300、1 305 和 1 310 纳米波长的单模光纤对传送 100 Gbit/s，每个波长承载 25 Gbit/s 达 40 公里。

5.4.3 配备插分光波长的以太网回程

光传输网络向极高数据速率的演进，依赖于能够从远程控制中心在环形或网状网络的任何节点插分光流的光波分复用技术和设备。

国际电联在一系列建议书中定义了光传输网络（OTN）的概念，其中包括：

– G.872：定义了 OTN 框架，旨在为多业务网络的部署建立标准化框架。

– G.709：描述了网络节点接口、数据速率及其与 SDH 和速率高达 100 Gbit/s 以太网的一致性。

可重新配置的光插分复用器（ROADM）的概念也出于同样的开发阶段。设备提供商提出的目标是降低配置费用并提高光网络管理的灵活性。插分节点的信道交换（光波长）是根据用户需求在光层进行的，而在光和电器元件之间没有信号转换。这项目前已上市的技术尚未得到标准化。

5.4.4 光回程技术展望

多数全球运营商已经将以太网技术用于回程，还有许多运营商正计划实现全以太网化。然而在实现这一目标前，他们希望得到性能和服务质量有保障的证明。有些要求是以太网技术无法单独满足的，因为这项技术是为提供尽力而为的服务而研发的。不少人支持走以太网之路：例如，实际情况是业务处于 IP/以太网络的边缘，或以太网由于其极大规模的不可阻挡的部署而降低了成本。根据企业级以太网概念，以太网（纯以太网）可以轻易地与 SDH 传输系统或 MPLS（多协议标签交换）共同部署。

5.5 地面无线技术

当有线技术出现以下情况时，无线解决方案便成为入选的部署方案：

– 过于昂贵/难以安装；

– 部署速度过于缓慢；

– 不适合游牧/移动使用要求。

典型的无线解决方案可分为两种基本类型：

1 点到点（PTP）：作为两地之间采用专用频谱资源的专用带宽和信道解决方案，它们适用于跳距为 1 公里至几十公里的微波链路。这类解决方案通常需要两个端点之间的视距（LOS）才能运行。

2 点到多点：配备有用于连接 n x 端点的共用集中机站/集中器的共用带宽无线信道；这些解决方案适用于跳距通常只有几公里的 WiFi 或移动网络，通常无需视距，如短程非视距（NLOS）即可运行。这类解决方案依赖于回到网真的回程解决方案，而这可由上述 1 中的方案或由卫星链路提供。

移动网络运营商（MNO）通常部署覆盖大片地区（例如，比目前 WiFi 小区覆盖更广的大片地区）的高功率“宏”小区。这类在 700 MHz/800MHz 频段采用新 IMT 移动技术的解决方案，具有向农村地区大型小区（10 公里以上）提供大规模通量的潜力。同样，现在也开始采用一种低成本的无线解决方案，这种方案可以在频率低于 1GHz 的未经使用的“空白频谱”上利用专有技术和基于标准的技术，如 Wi-Fi 技术，为数公里（10 公里以上）范围内的区域提供高容量宽带接入。

另一种已出现的使用移动网络运营商现有频谱的方法，是部署“小型小区”或“城市小区”。城市小区是可部署于农村地区的室外和住宅或商业地产室内的小型低功率机站。其优势在于小巧轻便、节省能源，安装和运行费用较低。城市小区的部署方法与 WiFi 接入点相同，并且可向数据解决方案一样提供移动性和语音覆盖。无线运营商已在发达国家实现了小型小区的成功部署，通过这种方式，可以填补网络覆盖空白，或在信号未穿透室内的网络边缘实现扩展覆盖。例如，在英国等国部署的“毫微微蜂窝”已被证实是一种能成功向难以企及的农村和边远地区提供服务的有效手段。继这些成功的案例之后，无线运营商现在正在发展中国家使用同样的技术，以使更多地方能接入移动宽带应用。

5.5.1 频谱和带宽需求

无线解决方案需要频谱才能运行。频谱可分两种基本类型：

1 已获许可的频谱，由监管机构直接分配给运营商，或通过第一持照人进行二次交易分给运营商，因此具有一定程度的干扰保护。

2 没有许可授权的频谱，即运营商（或者更笼统的说是频谱用户）在达到最起码的技术要求之前，在没有注册、也无任何形式的干扰保护的情况下，使用向所有人开放的频谱。在某些国家（如英国），有一部分没有许可授权的频谱，称为“简单许可”频谱，只需在监管机构的数据库注册，并缴纳小额年费，但没有任何形式的干扰保护。现在还出现一种新的技术，可以通过监管机构的频率数据库获取免许可或没有许可的频谱。而且，一些国家已经制定（如美国）或正在制定（如加拿大、新加坡和英国）监管框架，以便支持在未经使用的 VHF 和 UHF 电视频段（“电视空白频谱”）使用这些技术，同时确保其运行不干扰持有许可的主体运营商。

具有传播特性和信道带宽，并可能受到拥塞和干扰。某些频谱的传播良好（长波长频谱），但通常其信道带宽小且在 NLOS 条件下运行，而其它频谱的传播较差（短波长），但具有高信道带宽。

无线容量主要取决于信道带宽。极高频链路可采用高达和包括 1Gbps 的宽信道，虽然目前部署的多数链路为了实用和传播的原因而处于 2-155Mbps 范围。

5.5.2 可行解决方案的范围

因此，最佳宽带无线解决方案的选择取决于以下基本标准：

– 所需连接的距离；

– 所需连接的带宽；

– 所需的固定/游牧或移动解决方案；

– 经许可或未经许可的频谱利用。

以下表 5 依照上述条件为点到点（PTP）微波链路和点到多点（PMP）解决方案提出了可行的解决方案。

表5：用于点到点（PTP）微波链路和点到多点（PMP）的可行解决方案

标准/解决方案	PTP微波 (7-38GHz)	PTP微波 (80GHz)	PTP 5.8GHz	PMP 2.4GHz/ 5GHz (Wi-Fi)	PMP 3.5/10GHz	PMP IMT-2000 移动网络	PMP IMT-A dvanced 移动网络
跳距	1 至 30 公里 LOS	0-3 公里 LOS	0-7 公里 LOS 0-1 公里 NLOS	0.02 公里 LOS 0.01 公里 NLOS	达 5 公里 LOS 1 公里 NLOS	达 5 公里 LOS 1 公里 NLOS	10 公里 + LOS
带宽（通量）	高达 600Mbps，通常为 155Mbps	1Gbps	通常为 30Mbps	通常共享 30Mbps	通常共用 34Mbps	通常共用 14Mbps	通常共用 30Mbps
固定/游牧/移动	F	F	F	F/N	F/N	F/N/M	F/N/M
未经许可/经许可的频谱	L	视国家而定（英国和美国的宽松许可）	U （宽松许可） 干扰	U (5.8GHz 宽松许可)	L	L	L
备注	高带宽可用性解决方案，但须缴纳运行费用（每链路向 OFCOM 缴纳 500 英镑）	用于短跳的低运行支出和高带宽解决方案（每链路向 OFCOM 每年缴纳 1 英镑）	适用于低运行支出的解决方案，但通常可用性较低（多个指向性天线）省钱但具有噪声风险	城市小区技术可提供与 MNO 合作的类似解决方案	固定无线解决方案，部署需要许可合作	IMT-2000 频段的 IMT-2000 技术	700/ 800 MHz 频段的 IMT-Advanced 技术

注：可利用容量转换中继器改进部分上述技术。

5.5.3 接入部署

从上表可以看出，可通过部署多个无线解决方案满足不同的带宽要求、预期的可用性、频谱许可制度和缴费时间表。移动网络是将宽带推广到移动用户以及农村和边远地区的关键传送平台。

应特别注意的是，随着 LTE 等新型无线技术的出现，峰值数据速率和频谱效率（每赫兹比特率）都有大幅度提高。然而，为保证每用户 1.5Mbps 的峰值数据速率，还需要看任何特定机站服务的运营所在地的数量是否与最初为语音服务设计的移动网络相同。无线网络的峰值数据速率随着发射机距离的延长而下降。如果能够利用具体的无线网络为所有客户提供 1.5Mbps 峰值数据速率，网络必须具有向所有小区边缘的经营场所提供 1.5Mbps 峰值速率的能力。这样做的结果是，接近小区机站的用户得到的数据速率远高于 1.5Mbps，可高达 100Mbps。然而，如果电信网络的设计容量小于所有接入连接之和，这就需要它们以最大潜力同时运行，从而因为所谓“竞争”而限制了性能。竞争在无线等共用接入媒体上尤为突出。一扇形小区 30Mbps 容量的机站可同时向经营驻地提供平均 1.5Mbps 的数据速率。

5.5.4 中间传输媒体

“中地球轨道”（MEO）卫星系统最适于为国家电信运营商、移动运营商、互联网业务提供商、大型企业和政府机构提供“中间 1 英里”集群和回程能力。由于 MEO 卫星系统较对地静止卫星更接近地球，信号延迟小得多，这对于许多当今基于 IP 和宽带的业务至关重要。

低延迟外加大带宽和高通量，MEO 卫星系统可为传统地面和对地静止卫星技术未能或无法提供必要带宽容量的农村和边远地区提供急需的中间 1 英里。例如，O3b 网络可以极低的时延（往返少于 150 毫秒）提供大通量（每个转发器 1.2 Gbits）和高带宽（高达每个转发器 216 MHz）。MEO 卫星小于对地静止卫星，因此制造和发射费用较低，从而使卫星宽带容量价格更可承受，同时又将数据速率提高到可与光纤相媲美。

具有可指向波束的 MEO 卫星系统可向容量客户提供必要时随时部署高速 IP 中继的服务。例如，O3b 卫星具有动态和方向可控波束设计，能够轻松地向国家的农村和边远地区，即国内电信公司、移动运营商、ISP 和政府机构的需要地方，部署极高速率的宽带容量，（以便向国家 ICT 规划提供支持）。此外，为满足增加和计划的客户需求，MEO 卫星系统可重新确定波束指向，向某一区域提供更多波束和向国际电联申报的同一轨道平面和高度发射附加卫星。

5.5.5 回程

用户数量的增长和日益流行的应用的采用，都将从根本上影响移动回程网络。移动回程网络是向最终用户提供宽带解决方案的要素之一。除上述表 1 列出的 PTP 技术外，可考虑采用下述解决方案：

– 利用提供大约 30Mbps 通量的 5GHz 宽松许可频段运行的点到点/点到多点链路，向运营驻地提供专用带宽；

– 社区网状无线接入。可将多个无线接入点网状结合，利用在标准 WiFi AP 设备上运行的专用网状算法的社区接入点（AP）提升覆盖面和适应性；

– LTE-A 包括具有中继的自我回程能力。中继构成的有效方便方法可在无需回程或安装大型塔架的情况下扩展覆盖并提高小区边缘性能。更多常规 eNB 可随业务量的增长随后安装；

– 容量转移中继器是移动蜂窝网络基础设施的要件。中继器的使用独立于技术和标准。此项技术的部署使资金和运行费用减少了一半或三分之二，使节电性能提高了 2.5 到 4 倍。

5.6 连通边远地区和农村社区的技术

可以根据当地条件，如地理位置、经济状况、农村或城市环境和当地地形地势，通过多种不同的技术解决方案来提供宽带接入——从光缆到固定无线，从卫星到微波，从 xDSL 到移动技术，凡此种种，不一而足。

5.6.1 卫星解决方案概述

宽带接入是经济发展的一项重要指标。在一些国家，可以通过铺设国家光纤骨干网络基础设施，向人口密集的主要城市和城市地区提供宽带服务。人口密度高的城市地区可能更倾

向于使用光纤骨干网络基础设施，而在不太可能扩展铺设地面光纤的边远地区、农村地区或人口稀少的地区，卫星技术则发挥着重要作用。各国政府目前正在不断为确保全体公民均能享受宽带接入而制定目标与战略，但却在边远和农村地区实现相关目标方面却遇到了挑战。许多国家宽带目标的实现都有赖于多种宽带技术的组合，其中包括电缆、光纤、无线及卫星技术。不同技术具有不同优势，但卫星通信技术显然在快速向大量人口部署“普遍”宽带业务时具有重要优势。在边远地区、农村地区或人口稀少的地区，已证实卫星宽带可成为一种理想的解决方案，而卫星技术在农村和大都市也都能实现全面覆盖。地面基础设施通常集中在城区，边远和农村地区的覆盖有限，部分人口无法享受信息社会带来的益处。

卫星技术可提供宝贵技术解决方案，尤其能在难以企及的农村地区提供容量，并为其他运营商提供连接客户所需的重要的回程容量。

卫星网络、地面设备和应用的不断进步已逐渐使卫星技术成为一种高性价比的方案--亦是电信和宽带接入战略与国家宽带计划中的关键一环，特别是在确保边远和农村地区覆盖方面。基于卫星的互联网和宽带业务，是回传网解决方案之外的又一机遇，可将网络连接拓展至地面（有线或无线）业务无法提供或部署价格过于昂贵的最边远地区。随着需求的增长以及农村或普遍接入宽带战略的部署，边远和农村地区对卫星解决方案的需求也与日俱增，其中既包括政府主导的项目也包括旨在接升接入水平的公私合作伙伴关系。本节概述了部分已进入实用阶段的和新兴的卫星解决方案 – 其中许多已在发展中国家的市场部署。

5.6.1.1 卫星固定业务（FSS）应用

卫星互联网和宽带接入技术及解决方案

目前，卫星业务被作为一种互联网和宽带接入解决方案在发达国家和发展中国家市场部署。基于卫星的业务拥有众多优势，特别是在那些地面基础设施有限的边远和农村地区，例如：

– 涵盖全球各个角落的全面覆盖；

– 对边远和农村地区而亦具高成本效益且便于安装的解决方案；

– 无需大规模地面基础设施投资；

– 可维持大量的最终用户；

– 具备部署大型网络的能力；

– 拥有固定和移动应用；和

– 在出现灾害或紧急情况下，能够提供可靠的服务及备份服务。

可随时在全球部署

通过独特的区域和全球覆盖能力，卫星业务能够利用其现有资源，立即提供互联网和宽带连接服务，甚至是为那些边远地区。这样，卫星业务便可在市场需求的基础上灵活地对服务范围进行扩展，迅速而轻松地将农村地区纳入进来。重要的是，特别是对发展地区而言，最终用户和社区的连通无需大量投资或全面建设便可实现。一旦卫星系统开展运行，可利用便于部署和安装的地面终端进一步将连接扩展至用户所在地。鉴于此方案建设与光纤不同，对距离或位置并不敏感。因此随着用户数量增加，规模效应会降低设备成本，使卫星成为更具竞争力的解决方案。

此外，高密度、小型接收天线的服务可通过更高的 PFD 电平实现，为提供更具成本效益的服务创造了机遇。随着下一代卫星网络的启用，容量与速率的提升以及延迟的降低，将使卫星成为一种更具吸引力的解决方案。

用于农村/边远地区 ICT 连接的中地轨道非对地静止卫星

非对地静止轨道（NGSO）卫星系统的轨道通常低于对地静止卫星（GSO）系统，其运行高度约为 36 000 公里。其中一类 NGSO 卫星系统使用中地球轨道（“MEO”），在围绕赤道的圆形轨道上运行。其它 NGSO 卫星系统在低地球轨道（LEO）运行，有时为圆形轨道，但其倾角为斯堪的纳维亚国家等地区提供了更好的覆盖。另有一些其它 MEO 系统采用了椭圆轨道，此类轨道同时拥有近地点和远地点。

NGSO 卫星系统示例：O3b

O3b 是一种使用中地球轨道（MEO）的 NGSO 卫星系统，用于 Ka 频段的卫星固定业务（FSS）。O3b 选择使用赤道上空 8 062 公里的圆形轨道，绕地球一周 288 分钟，以此平衡绕行一周产生的发射延迟；卫星和发射成本；及操作便利性之间的关系。O3b MEO 轨道高度比 GSO 与地球间的距离要近 4 倍，产生同样的 EIRP 可使用更小、价格更低的卫星。各 O3b 卫星每天围绕地球五周，考虑到地球的自转，其将在同一地点上空经过四次。此 MEO 允许各卫星为全球多个地区灵活地提供服务，并不象 GSO 那样仅为一个区域服务。这些功能的结合使 MEO 卫星的价格比 GSO 卫星的价格更容易接受。

O3b 的特有 MEO 卫星网络设计将为赤道南北各 45 度提供连续覆盖，为全球约 70%的人口提供光纤质量的互联网连接。O3b 于 2013 年发射了最初的 8 颗卫星，设立了 7 个服务区域（参见下图标明的区域网关）。其它在建的四颗卫星，发射之后将进一步提高全球范围的服务区面积。与 MEO 卫星一起工作的网关和本地客户地球站将跟踪天空中的每颗卫星，以维护高可用性的无缝通信。

O3b MEO 卫星的设计有若干重要优势：

– 高可用性：光纤并不总是随处可用，特别是对内陆国家、农村和边远地区而言。此外，某些国家或区域（如太平洋岛国）的 GSO 覆盖可能并不完善。O3b 能够拓展其它技术的覆盖范围，依照政府或电信运营商的愿望，随时可将与光纤容量相仿的接入部署于全国各地。随着当地对容量需求的增长，O3b 亦可通过增加波束，动态地提升其容量。

– 可接受的成本：与 GSO 容量或为连接城镇而建立并维护几千公里的光纤设施以及几百个无线电发射塔相比，O3b 的 MEO 设计将带来大量节余。由若干中小城镇组成的农村地区，在启动此项服务前仅需少量的基建投资，便可获得低延迟、高速率的互联网连接。

– 大吞吐量：吞吐量是指在稳定状态下以兆字节每秒（Mbps） 为单位测量出的数值，其对下载大型文件、观看视频或其它带宽密集型的使用而言十分重要。在晴空条件下，O3b 可提供从每波束 100 Mbps 到 1.2 Gbps 的可升级带宽。在部署光纤之前，每条地面上 700 公里宽的波束能进行任何方式的位置调整，根据人口统计或市场需求的变化，为在全国范围推出宽带和移动业务提供更多地灵活性。O3b 的高功率卫星使其能够为直接安装于蜂窝塔台的小型终端提供高吞吐量业务。

– 低延迟：延迟是指各数据包在计算机和服务器之间往返一次所需的时间。延迟决定了网页加载的速度以及网上协作应用程序的工作成效。与 GSO 卫星约 500-600ms 的延迟相比，O3b 使用的 MEO 高度使客户 – 网关往返延迟时间<150ms，与纯地面光纤网的感受相差无几，这对提供实时的互动应用非常关键。此外，由于当今的基站回传（cellular backhaul）主要由话音业务构成，因此 O3b MEO 系统的低延迟能够支持高质量的话音，是回传业务的一种很好的解决方案。如果数字化的基础设施将来要真正成为经济引擎，除高吞吐量之外，网络运营商还必须考虑将低延迟作为成功部署宽带网络的核心驱动因素。

– 巨大的公共效益：在电信和移动运营商考虑如何修建网络，以满足其为本国农村和边远地区服务的义务之时，各国政府亦在衡量各自在为加速向急需网络服务的群体提供宽带技术方面发挥的职能。O3b 的波束灵活性为各国政府提供了一种重要工具，使其能够按照宣布的宏伟目标实施国家宽带计划。此外，O3b 的 MEO 卫星容量作为一种易于部署的高速通信骨干网，可用于灾害恢复，为长途光纤电缆提供重要的冗余（在某国内部或针对为某国服务的海底电缆）。

连通的世界有助于加深了解、分享理念，且对经济增长、知识拓展和高效治理的影响也是有目共睹。但是，这一连通的世界，需要得到现代化的适应性通信基础设施的支撑。

O3b 网络致力于满足世界上尚未享受到高速互联网服务的“其它 30 亿人”的需求。2013 年，O3b 网络将发射其最新 MEO 卫星系统，藉此缩小此数字差距。

O3b 网络与全球各地的电信运营商、ISP、移动运营商、大型企业和政府机构合作，为需求最为迫切的群体提供价格可承受的、光纤速度的卫星宽带连接。

MEO 卫星的设计有若干重要优势：

– 高可用性：光纤并不总是随处可用，特别是对内陆国家、农村和边远地区而言。此外，某些国家或区域（如太平洋岛国）的 GSO 覆盖可能并不完善。

– 可接受的成本：与 GSO 容量或为连接城镇而建立并维护几千公里的光纤设施以及几百个无线电发射塔相比，O3b 的 MEO 设计将带来大量节余。由若干中小城镇组成的农村地区，在启动此项服务前仅需少量的基建投资，便可获得低延迟、高速率的互联网连接。

– 大吞吐量：吞吐量是指在稳定状态下以兆字节每秒（Mbps）为单位测量出的数值，其对下载大型文件、观看视频或其它带宽密集型的使用而言十分重要。在部署光纤之前，拟用的 NGSO 系统提供的可扩容带宽与点波束能进行任何方式的位置调整，根据人口统计或市场需求的变化，为在全国范围推出宽带和移动业务提供更多地灵活性。

– 低延迟：延迟是指各数据包在计算机和服务器之间往返一次所需的时间。延迟决定了网页加载的速度以及网上协作应用程序的工作成效。与 GSO 卫星约 500-600ms 的延迟相比，O3b 使用的 MEO 高度使客户-网关往返延迟时间<150ms，与纯地面光纤网的感受相差无几，这对提供实时的互动应用非常关键。此外，由于当今的基站回传（cellular backhaul）主要由话音业务构成，因此 MEO 系统的低延迟能够支持高质量的话音，是回传业务的一种很好的解决方案。如果数字化的基础设施将来要真正成为经济引擎，除高吞吐量之外，网络运营商还必须考虑将低延迟作为成功部署宽带网络的核心驱动因素。

– 巨大的公共效益：在电信和移动运营商考虑如何修建网络，以满足其为本国农村和边远地区服务的义务之时，各国政府亦在衡量各自在为加速向急需网络服务的群体提供宽带技术方面发挥的职能。MEO 的波束灵活性为各国政府提供了一种重要工具，使其能够按照宣布的宏伟目标实施国家宽带计划。此外，MEO 卫星容量作为一种易于部署的高速通信骨干网，可用于灾害恢复，为长途光纤电缆提供重要的冗余（在某国内部或针对为某国服务的海底电缆）。

连通的世界有助于加深了解、分享理念，且对经济增长、知识拓展和高效治理的影响也是有目共睹。但是，这一连通的世界需要得到现代化的适应性通信基础设施的支撑。

中距离传输媒介

中地球轨道（“MEO”）卫星系统最适于为国家电信运营商、移动运营商、互联网业务提供商、大型企业和政府机构提供“中间 1 英里”集群和回程能力。由于 MEO 卫星系统比对地静止卫星距地球更近，因此信号延迟要低很多，这对当今众多基于 IP 的业务和宽带业务非常重要。

具备了低延迟、高带宽和大吞吐量等特性，MEO 卫星系统可为边远和农村地区提供急需的中间 1 英里服务。在这一领域，传统的地面和对地静止卫星技术尚未或无法提供必要的宽带容量。

卫星宽带业务

过去几年，卫星被用于为 xDSL 或电缆等地面基础设施无法到达地区的用户提供宽带服务，并在出现灾害或其它类型网络中断的情况下，为地面链路提供冗余备份。

甚小口径终端（VSAT）

伴随电子治理举措、公司网络、农村对宽带的需求、电视和移动电话以及移动宽带业务的不断涌现，第三世界各国 VSAT 部署的增长也呈现出翻天覆地的变化。公司 VSAT 网的核心作用日益凸显，因为各公司及其分布在城市和农村的工作人员都要依赖可靠、可扩容的连接

来获取包括电子邮件、互联网到内联网在内的各种接入。此类网络在出现灾害或其它中断时，还扮演着为重要网络提供冗余或连接备份的关键角色。

此外，不断发展的直接入户卫星宽带业务可供发展中国家选用。正在寻求农村和边远地区互联网接入替代方案的服务提供商发现，卫星宽带是一种颇具吸引力的解决方案 – 且该方案已经过验证并易于部署。

例如，某些联合国机构在为全球各地的专项任务及驻地工作提供服务时，使用了可支持边远地区操作的全球 VSAT 网。联合国难民事务高级专员公署（UNHCR）的 7 500 多名国内外员工，正在 110 个国家的 350 多个办事处辛勤工作。UNHCR 的驻地工作位于边远地区，只有 VSAT 能够作为提供宽带数据服务的可靠通信手段。

UNHCR 的全球 VSAT 网络是全球广域网（G-WAN）的卫星部分，旨在通过多种要素（MPLS IPVPN WAN、VPN、卫星等）确保其行动的网络连接和冗余备份。VSAT 网络为 36 个国家的 125 个 UNHCR 站址提供连接，其天线为 2.4m 和 3.8m，工作频段为 C 频段或扩展 C 频段。VSAT 网络既为偏远地点提供连接，也可在主要网络出现故障的情况下提供冗余备份或确保操作的连续性，使卫星连接成为 UNHCR 全球驻地工作中重要的一环。

社区接入点

VSAT 与无线的结合是许多农村应用的一种有效解决方案。农村人口通常集中在村庄周围，大多在方圆 1 至 5 公里的范围内。一套将无线本地环路当作最后一英里连接的 VSAT 设备能够为整个村庄提供服务。无线的优势在于能够跨越河流或其它障碍，为电缆盗窃猖獗的地区提供更为可靠的连接。

目前，一种可用的解决方案涉及集成的 VSAT 系统，该系统使用全部安装于 10 米杆上的本地环路基站的太阳能系统供电。此解决方案易于安装，能够帮助克服建筑物的障碍，可以解决电源问题且非常安全。

卫星 VSAT 和互联网的连接与多用户 WiFi 本地接入的组合，能够按市场所需降低单位用户成本，特别是在农村和边远地区。卫星连接可将互联网数据流接入村庄，WiFi 接入点进一步将连接扩展至家庭、学校和公共建筑。用户能够通过订购或其它联合支付计划分担设备和连接成本。

降低成本的核心要素包括：

– 使用低成本的设备 – 现成的开放标准设备（DSL/Wifi/有线调制解调器）可以大规模生产。基于被全球广泛接受标准的集成式卫星设备，可大幅降低设备成本。

– 实现每个网关的用户数量最大化– 更大的用户群降低了每个用户的设备成本。在分享单一连接方面，更大的用户群也更为有效。关键问题在于将标准 WiFi 设备的范围扩大，使其能够允许一套 VSAT 为整个村庄服务。

此类解决方案实现了互动卫星宽带业务与现有最后一英里基础设施，如铜线、电视电缆或无线电网络的结合。在集中地点安装单一的中心卫星天线 – 即社区街道边的机柜、有线电视的前端或 WiFi 杆。这样便可通过现有的最后一英里设施或 WiFi 接入为最终用户提供宽带连接，让所有家庭以 8 Mbit/s 的速率接入互联网。最终用户不需要在家安装卫星天线，仅需支付 DSL 连接和标准宽带设备的费用。

卫星宽带部署的示例

阿尔巴尼亚一半以上的人口居住在没有宽带网络的农村地区。作为政府缩小数字差距项目的组成部分，邮政机构通过乡村邮局的双向宽带连接，引入了可以迅速部署的可靠互联网接入。550 家邮局中的 300 家均装备了卫星宽带终端，使用户能够接入并浏览互联网，使用电子商务或 VOIP 电话，免费进行网上支付。与此同时，阿尔巴尼亚邮政将该技术用于日常工作，通过宽带卫星数据网大幅削减了成本。

此外，同样的卫星宽带解决方案还被阿尔巴尼亚教育部用于农村地区的 300 多家学校。此系统能够访问网上信息，开展远程学习项目和培训，帮助学员弥合数字鸿沟。

5.6.1.2 卫星回传方案

基于卫星的 IMT 回传在扩大全球移动电话和移动宽带网络范围方面发挥着愈发重要的作用，特别是在发展中国家市场。技术的进步产生了更具成本效益、更为强大的卫星解决方案，使其成为移动网络部署市场不可分割的组成部分。政府谋求确保为所有公民提供移动连通服务，其中卫星回转将继续扮演重要角色，为仅靠地面技术无法实现经济可行方案的地区提供连接。

卫星通信以为核心网提供价格可承受、可靠的宽带回传链路的方式，成为蜂窝网基础设施设计的关键要素。通过卫星连接移动交换中心和基站控制器，克服了距离、地形、地面设施和扩展网络覆盖可能产生的任何障碍。

卫星固定业务能够：

– 为地面连接无法到达的区域提供覆盖；

– 通过移动回传快速扩大网络覆盖范围；

– 随着业务增长进行网络扩容；

– 实现网络多样化。

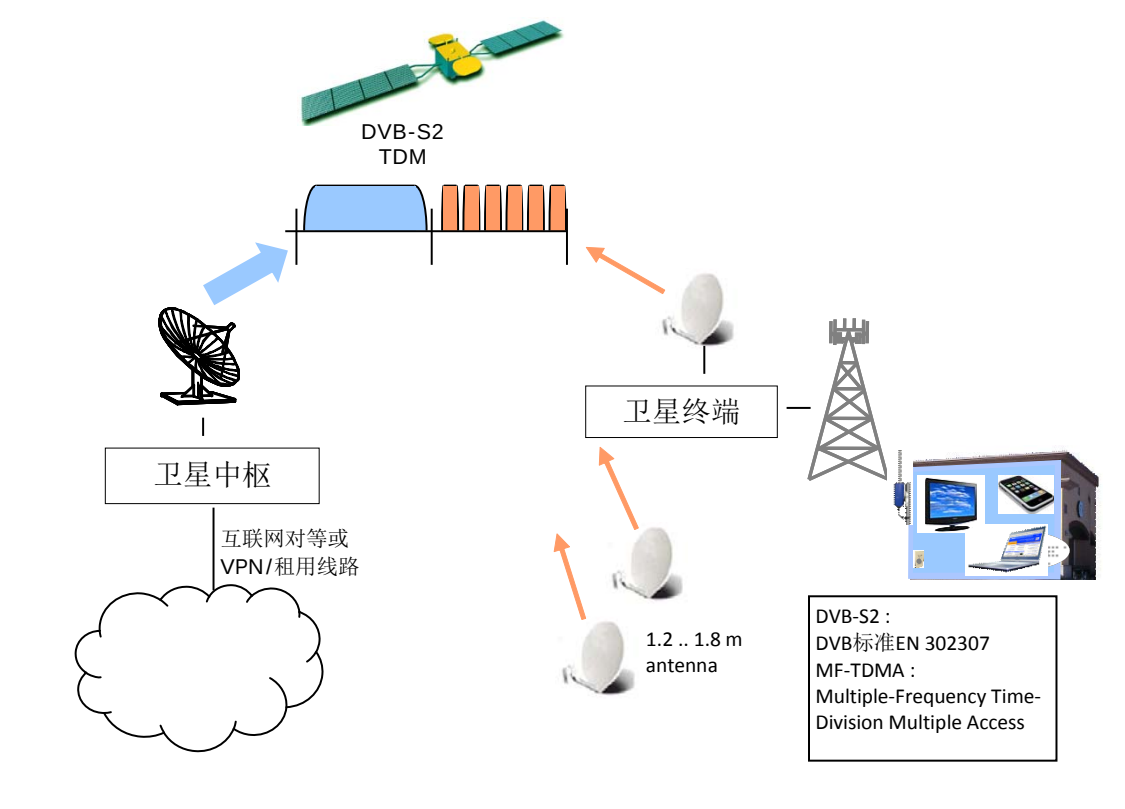
卫星回传的益处

使用卫星回传拓展宽带业务所带来的益处涉及覆盖、成本、安全性和冗余等方面。对地静止轨道（GEO）卫星仅需少量基础设施支持，就可为广大地区提供回传服务。卫星回传方案支持运营商将基站部署在可为用户带来最大效益的地点，基本不需考虑地面基础设施的位置。鉴于光纤修建成本对核心网之间的距离和位置十分敏感，因此卫星或许是在农村或边远地区修建回传基站成本最低的解决方案。

使用卫星回传亦可提供连接冗余。光纤骨干网的损坏可能会导致地面基站与核心网的联络中断，而卫星回传提供的额外分集，可确保即使是在地面基础设施受到严重破坏的情况下，连接也不受干扰。

鉴于各国正不断谋求部署 4G-LTE 网络，卫星系统已可实现高吞吐量的卫星回传，展现出支持更高带宽传输的能力。

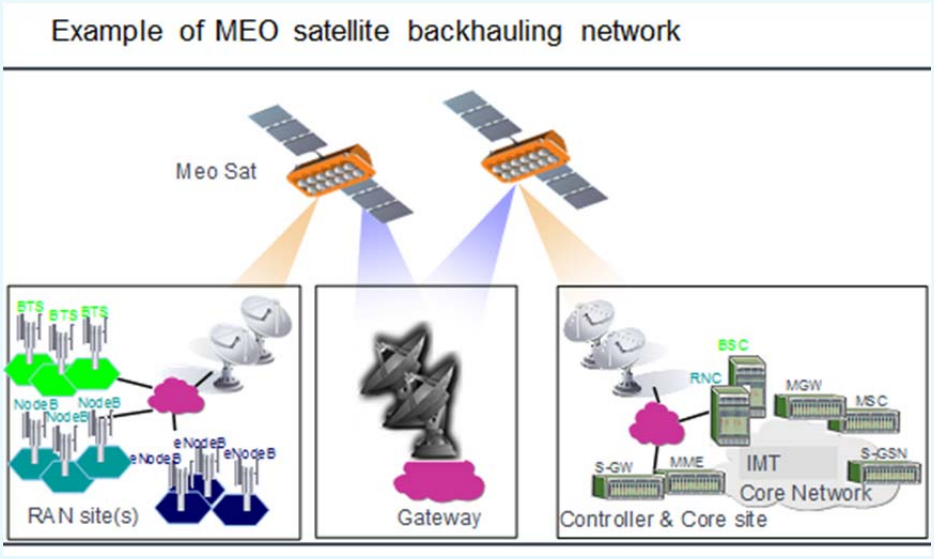
图3：对地静止卫星回传网的示例



中地球轨道（“MEO”）卫星回传

MEO 卫星系统可能是边远孤立地区回传操作的理想系统。低延迟、高吞吐量和可调节点波束的结合，共同为目标区域提供了最大容量。

图4：中地球轨道卫星回传网的示例



随着移动电话普及率在人口密集区的上升，发展中国家的移动运营商正越来越多地使用卫星 GSM 回传，向农村市场不断扩展。卫星是唯一种能向未连接与欠连接群体提供连接的、经济可行的方式。通过近期的 3G 牌照拍卖，以及全网高吞吐量数据业务的推出，回传需求可能会出现爆炸式增长。

5.6.1.3 有关卫星频谱的考虑

使用的频段会影响所需天线的尺寸及能力：

– 由于 C 频段范围内发射的波长更长，因此 C 频段（4/6 GHz）的发射需要更大的天线。C 频段发射受雨衰和其它气象条件的影响较少，因为此频段的传播特性十分有利。应用包括 GSM 回传、公共交换网、公司网和互联网中继。

– Ku 频段（11-12/14 GHz）的波长稍短，可使用短于 C 频段的更小天线。但是，较高的频率使 Ku 频段更易受雨衰等大气条件的影响。应用包括 VSAT、农村电话和宽带、卫星新闻采集、回传链路、视频会议和多媒体。

– Ka 频段（20/30 GHz）的波长短于 Ku 频段，可使用更小的天线；但发射也更易受不良天气条件的影响。高带宽互动业务可能包括高速互联网、视频会议和多媒体应用。

5.6.1.4 有关农村和边远地区的考虑

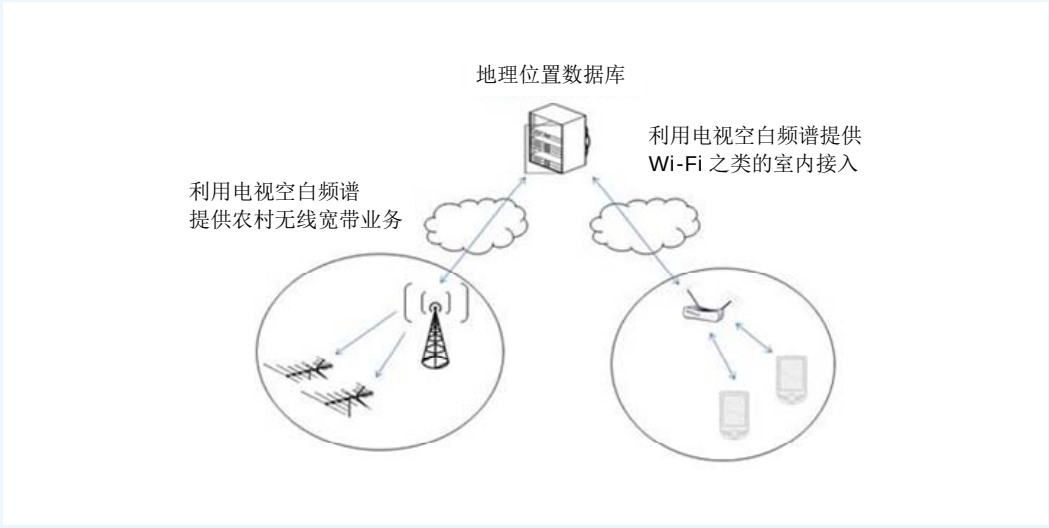
经 C 频段提供的业务始终是全球电信基础设施中的基本要素。在雨衰的情况下，C 频段固定卫星业务可提供高于 Ku 和 Ka 频段网络的可靠性与可用性，可通过全球波束提供广泛的区域覆盖。为此，为实现连接地域广阔和/或经常遭受不良气象条件影响的发展中国家的边远地区的任务，C 频段通常会成为不二之选。

5.6.2 基于动态频谱接入的解决方案概述

动态频谱接入（DSA）是一系列技术和技术手段，通过使用可启用无线电、具有地点感知功能的智能设备和在线数据库，可以在没有许可或免于许可的基础上，使用未经使用且可用的无线电频谱择机发射。DSA 技术使得无线电设备可以(i)使用频谱感应、地理位置数据库或二者结合使用，来评估所处的无线电频率环境；(ii)确定哪些频率可在无干扰的前提下予以使用；以及(iii)自身进行重新配置，以便在所确认的频率上运行。

在电视频段中，地理位置数据库确保保护数字地面电视（DTT）业务、节目制作和特殊活动（PMSE）应用和其他主体业务不受干扰。数据库基于一份包含所有使用中、受保护的频率列表，识别出适宜的频道，并且指示设备，可以在什么频道、以多大的功率，在当前位置进行发射。

图5：动态频谱利用解决方案示例



第一次全球统一使用 DSA 技术和技术手段将选在电视频段的“空白频谱”，即未经使用、免于许可的 VHF 和 UHF 电视频道进行。与目前使用 WiFi 频谱可实现的覆盖相比，这项技术的使用可以推动无线宽带接入实现更加广泛的地区覆盖。这项技术的示范工作已在比利时、肯尼亚、瑞士、新加坡、英国、美国、乌拉圭和其他一些国家成功开展。通过采取宽松许可和免除许可的做法，越来越多的监管机构能够满足这项技术的要求，从而使频谱得到最大程度的利用，并以经济的方式实现动态技术升级，同时降低准入门槛。

6 包括案例库和电子讨论论坛在内的相关文稿摘要

本研究期内与第 10-3/2 号课题相关的文稿清单请参见本《最后报告》的附件 1。这些输入内容对小组成员研究本课题非常有益，且对完成《最后报告》起到了至关重要的作用。

报告人组收集了各研究期内的研究案例，并以发布分析报告的形式展示了各成员国的最佳做法。此外，这些案例还展示了赋予发展中国家农村和边远地区能力的各种技术、解决方案、电子应用、融资方法和社会经济影响等。最佳做法将在本国或他国的类似环境下推广应用。在此研究期期间，电信发展局重新制定了同样适用于其它 ITU-D 研究课题的“案例研究”提交格式。电信发展局正在将以原有格式向第 10-3/2 号课题提交的案例研究转化为新的格式，并在新的案例研究库中公布。这样，ITU-D 为第 10-3/2 号课题建立的新案例库便可接纳以新案例研究格式编写的案例研究内容。

鉴于全面讨论向会议提交的文稿或其它成员感兴趣课题的时间有限，第 2 研究组和报告人组会议期间自始至终均采用网了上讨论的形式。那些因经济原因或其它限制而无法参会的成员，亦可从网上讨论中受益。为此，在本研究期内电信发展局为 ITU-D 第 1 和第 2 研究组的各课题建立了新的电子论坛网站。第 10-3/2 号课题网上讨论的网址经过重新调整后实现了与 ITU-D 网站新电子论坛的兼容。农村和边远地区的定义以及宽带的定义等课题，均使用了新老版本的网上论坛进行了讨论。许多注册成员参加了讨论，其颇有见地的意见将在第 10-3/2 号课题的小组讨论中得到体现，并被纳入该课题的《最后报告》。但是，鉴于电子论坛的工作语文为英语，因此英语非母语的成员参与讨论时遇到了语言障碍。将来或可采取某些

措施消除这一障碍，例如通过将电子论坛网页翻译成国际电联所有语文的方式，鼓励成员积极参与。

7 选定的国家案例研究

下文摘录了本研究期期间收集的各种案例。这些案例还可通过 ITU-D 案例研究库获取。这些案例均为以弥合数字鸿沟为宗旨的国家项目、私营举措项目和联合项目。所有这些项目的启动资金都是来自国家普遍服务基金、国际基金或国际援助机构。但是，在任何情况下，提供农村通信服务都务必要考虑到项目操作、维护和持续性的问题。电子卫生、电子教育、电子行政、电子商务和其它电子服务应用均是通过互联网协议平台提供或规划。此外，除话音业务还为农村地区提供了 WiMAX 和 GSM 网络。

在许多情况下，项目的实施促成了公共与私营部门在技术和监管方面协同作战，相互合作。

7.1 卫星宽带为布基纳法索的选举提供支持（布基纳法索/SES World Skies（荷兰））

[14]随着政府谋求提高透明性及向公民提供电子服务，确保边远和农村地区能够享用电子政务服务变得尤为关键。利用此项技术为选举提供支持，便是体现其关键性的领域之一。2012 年 12 月，SES 宽带业务公司为布基纳法索的议会和市政选择提供了卫星宽带服务。

作为与布基纳法索国家独立选举委员会（CENI）协议的一部分，SES 宽带服务公司及其伙伴 Newtec、Access Sat 和中国联通共同为连接 45 个选区办公室提供了卫星设备和带宽，这些办公室将该国 14 698 个投票站及首都瓦加杜古的中央选举办公室连接在了一起。该系统用于视频会议、视频监视、互联网接入，以及选票信息的快速安全传递。

SES 宽带服务使用了东经 5 度的一颗 SES 卫星提供的容量和 Newtec 提供的硬件和枢纽基础设施。安装 VSAT 终端的工作由 Access Sat 承担，视频和 LAN 网络设备由中国联通提供。

在此案例中，卫星技术被视作为布基纳法索偏远站点提供连通保障的可行方式，其优势在于部署迅速、覆盖快捷、可用性好。重要的是，部署的基础设施在大选之后将为布基纳法索政府提供互联网接入，为学校、公共办公场所和偏远乡村提供数字服务。

CENI 使用卫星业务是为了促进选举进程的透明，提供迅捷、高度可靠和安全的数据传输。所选卫星 VSAT 平台的优势在于，能够快速部署可从边远地区快速回传选举数据的设备。

卫星技术的优势包括：迅速、数据采集安全、集成、可提供传输和认证；各站点之间稳定、可持续的通信系统可提高选举进程的安全性，还可重复利用和重新部署原有的顶层通信系统。现行系统能够实现在选举后一周宣布选举结果，且在结果确定之后，几乎立即就能向大众公布。

[14] 卫星宽带为布基纳法索的选举提供支持（案例研究库的链接）。

7.2 连通的阿根廷（Argentina Conectada）（阿根廷）

[15]阿根廷的国家电信规划 – “ARGENTINA CONECTADA”是一项总体性连通战略，旨在强化不同政府部门间的跨部门工作。此项计划将与不同的公共政策相结合，基中有些政策业已存在，例如当前通过国家行政权力实施的下述政策：

– 阿根廷数字地面电视系统；

– 我的数字电视 – 接入计划；

– 卫星数字电视；

– 数字音像节点计划；

– Conectar Igualdad.com.ar 计划。

这些举措/项目应用的目标和实施细节如下：

– 为 1 700 多处地点提供骨干光纤覆盖（拟进行基础设施投标）；

– 提高固定宽带连接的质量，将每个家庭 10 Mbps 作为新网络的技术水平门槛；

– 拓展国家、省市各级政府机构的连通范围；

– 实现公立学校的全面连通；

– 安装 2 000 架通过卫星连接提供互联网服务的天线（覆盖农村学校）；

– 在公共和教育场所安装 11 000 架数字卫星电视天线；

– 设立 250 个知识中心（Núcleos de acceso al Conocimiento – NAC）；

– 实现全国数字接入点（DAP）翻番；

– 频谱重整；

– 为农村家庭和学校提供卫星互联网连接；

– 为农村和边远学校提供设备及数字卫星电视信号。

通过向政府公司 ARSAT S.A.划拨国家预算开展融资，建立伙伴关系。

7.3 阿根廷农村学校的卫星连接计划（阿根廷）

数字电视

[16]阿根廷在部署开放、免费的数字电视的计划框架内，制定了在农村和边远地区的学校安装卫星天线的国家计划。

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[15] 连通的阿根廷（Argentina Conectada）（案例研究库的链接）。

[16] 在农村和边远地区的学校安装卫星天线的国家计划（RGQ10-3/2/14 号文件）。

为落实此任务，需要在联邦规划部、公共投资和服务部、国家通信委员会（一家分权管理机构）和教育部之间展开协作。

此任务旨在将开放的数字电视频道带到阿根廷数字电视覆盖范围以外的农村和边远地区的学校，为此需采用经由数字到户（DTH）系统的卫星传输。

在阿根廷 2 791 810 平方公里的陆地面积内，受此国策覆盖的教育机构总数约为 1.2 万所，其中涉及大约 130 万名学生和 30 万名教师。

这些已安装卫星设备的学校也被纳入一项跟踪和监测计划，这项计划也由国家通信委员会负责开展，旨在确定该机构在多大程度上使用以及如何使用所收到的电视内容。在受访的学校中，72%来自农村，28%来自城市。

互联网连接

[17]该国的国家电信计划名为“连通的阿根廷”，旨在将网络扩展到阿根廷农村和边境地区的校园，并希望利用 VSAT 卫星天线（VSAT）提供卫星互联网连接。

此项战略的启动是“连通的阿根廷”国家电信计划的一部分，其目标是将网络扩展到阿根廷农村和边境地区的校园，并希望利用 VSAT 卫星天线（VSAT）提供卫星互联网连接。

该举措是对阿根廷境内联邦光纤网络部署的补充，农村和边境地区近 2 500 家学校均免费安装了固定天线，用于访问提供互联网连接业务的 VSAT 卫星。学生们可以利用信息通信技术求学。

最初，此项计划将涉及农村和边境地区 2 428 所学校的 141 000 多名学生。

安装工作始于 2012 年 2 月中旬，在受普耶韦火山灰影响的边境省份 Neuquén、Río Negro 和 Chubut 先行展开。

近期，没有获得有关安装进展的典型数据。但是，在 60 所学校开展的计划实施试点，迄今为止取得了令人满意的成果。

此项公共政策是阿根廷政府采取的一系列措施之一，目的是通过综合性电信服务，在平等的基础上让人人享有技术发展带来的益处，从而实现数字包容性。数据业务的使用在发展中国家尚处于萌芽阶段。

7.4 通过可持续和生态友好型 ICT 电信中心创造就业机会，开展文化保护（马绍尔群岛）

[18]该项目的目标是：

– 通过研究如何以宽带 IP 平台为媒介部署多媒体业务，如为边远的 Mejit 岛提供地电子商务、汇款业务、信用卡交易业务、电子治理、移动电话业务和互联网业务，推动开展能够促进经济增长，有助于提高 Mejit 人民生活水平的行动。

[17] 阿根廷农村学校的卫星互联网连接计划（2/160 号文件）。

[18] 通过可持续和生态友好型 ICT 电信中心创造就业机会、开展文化保护（案例研究库的链接）。

– 让 Mejit 岛的居民了解，在商业和个人通信方面，有比高频无线电更为高效的交流方式，即宽带解决方案。这种方案不仅能够吸引游客，还能提高该岛居民的社会福利，从而拉动旅游、促进相关投资、发展当地经济并丰富岛民的生活。

– 研究哪种适用于 Mejit 的宽带技术具有可持续性，寻找能够启动项目二期，即项目部署工作的潜在赞助方。

– 鼓励岛民利用技术保留“叶编绳织”等文化，通过基于城市标准的更高质量的基本教育，丰富偏远岛屿下一代岛民的文化生活。

此试点项目可使社会和政府领导者意识到 ICT 在个人日常生活中的用处。通过 ICT，马绍尔的居民可以保留文化传统，刺激地区经济的发展。试点项目还将促进在其它尚未得到电信运营商服务的地区建立 ICT 电信中心。与互联网数字世界隔绝的农村地区，可将建立 ICT 电信中心作为一种备选方案。

监管和政策问题集中于卫星接入、电力供应、本地交换（仅在 Majuro 提供）、IP 网络、人力资源和安全性。

鉴于马绍尔群岛面临的经济挑战，MINTA 从亚洲租用了价格可接受性更强且更为经济的设备。

此计划由相关组织/机构合作伙伴关系（APT、KDDI 基金、交通和通信部、教育部、卫生部、Mejit Atoll 地方政府（市长和市议会）、Mejit 议员、酋长和地产主、马绍尔岛游艇俱乐部、马绍尔能源公司、马绍尔群岛国家电信管理机构）出资。

7.5 日本的移动 WiMAX（日本）

[19]UQ 通信公司是日本唯一一家提供移动 WiMAX 服务的公司。为提供移动 WiMAX 业务，在 2.5 GHz 频段为 UQ 划拨了 30 MHz 带宽（2595 MHz 至 2625 MHz）。

影响运营环境的其它因素包括：

– 充分承诺经 WiMAX 论坛认证的设备与基础设施，可在供应商之间实现互操作；

– UQ WiMAX 加速提供“开放模型”；

– 用户能够选择其希望得到的设备，在最喜欢的商店购买这些产品，按照自己的愿望启动和取消其计划，在计划中增加设备，以及访问其想访问的所有内容和应用。

签约：用户无需再到运营商的商店签约。他们可以使用无线传输（OTA）应用程序通过互联网签约。继 OTA 应用之后，WiMAX 设备/服务将被启用。UQ 目前正在向众多移动虚拟网络运营商（MVNO）提供 WiMAX 网络/平台。

MVNO 方式使 WiMAX 运营商能够以最小的努力和成本发展品牌、开设零售商店，逐步推出广告宣传。

– MVNO 可以开发自己的设备/终端；

[19] 日本的移动 WiMAX（案例研究库的链接）。

– MVNO 可自行决定其资费价格；

– MVNO 可提供自有内容/应用；

– 许多诱人的服务来自各行各业。

7.6 利用 ICT 改善老挝人民民主共和国农村地区卫生医药环境试点项目（老挝人民民主共和国/日本）

[20]此项目旨在在中心医院与省级医院间建立电子卫生网络视频会议系统，使医生之间的交流更加顺畅。

有必要完善万象与各省医院医生之间的通信，使其能够以会诊的形式讨论患者的病情，决定是否应将患者转院至万象进行特殊治疗或实施手术。

边远地区的护士和医药工程人员存在教育方面的需求。

此项目由亚太电信组织（APT）和相关计划出资：预算外资金由日本提供。此项目已获得 15 GHz 微波无线电频率的许可。

7.7 APT J3 项目：密克罗尼西亚农村地区和偏远岛屿建立远程教育和卫生保健电信服务中心的试点（密克罗尼西亚/日本）

[21]此项目致力于在农村地区和偏远岛屿试点安装电信服务中心，在这些闭塞的村庄，村民对 ICT 一无所知，既无法理解其带来的益处也不知道如何使用。因此，本项目向这些地区的村民和决策者展示了如何通过增长 ICT 知识来获益，以及如何维护具备可持续发展能力的电信服务中心。

密克罗尼西亚联邦（FSM）交通、通信和基础设施部正在谋求通过设立电信服务中心的方式，弥合 FSM 各岛之间以及其与外部世界的数字鸿沟。2006 年，该部以申请亚太电信组织人力资源发展项目（J2）的形式，在密克罗尼西亚启动了电信服务中心模式研究项目。次年，他们与 APT 专家团共同研究了可持续发展电信服务中心取得成功的关键要素。2008 年，为了迈出第二步，即在 FSM 设立电信服务中心，通过 APT ICT 发展项目（J3）开展了项目安装试点，同时 KDDI 也参与了研究模型及关键要素的应用和完善工作。

此项目在 FSM 的各州（3 个岛屿）建立了 5 个试点电信服务中心：

1. Kosrae 州

   Kosrae 岛：Walung 村小学

2. Pohnpei 州

   Ponpei 岛：Madolenihmw 区：高中、小学、市政厅

[20] 利用 ICT 改善老挝人民民主共和国农村地区卫生医药环境试点项目（案例研究库的链接）。

[21] APT J3 项目：密克罗尼西亚农村地区和偏远岛屿建立远程教育和卫生保健电信服务中心的试点（案例研究库的链接）。

3. Chuuk 州

Tonoas 岛：Sino memorial 小学

建立这些电信服务中心前，这些农村和边远岛屿上的人们只是在封闭的社会中不断传承着其传统模式的经济/知识。此试点项目推行之后，他们现在也开始考虑使用 ICT 实现其经济与外部世界的连通。这仅是在尊重其传统文化和活动基础上，为弥合数字鸿沟迈出的第一步。

7.8 特设通信网络为日本长野县盐尻市农村地区开展的电信/ICT 开发项目，日本（日本）

[22]盐尻市位于长野县的中心，背靠人称日本“阿尔卑斯”的宏伟的山脉。但是，该市是一个危险地区，糸鱼川 – 静冈构造线南北横穿长野县，市区周边遍布断层带。据国家地震调查指出，该地区三十年内发生 8.0 级左右地震的概率为 14%，其所在地区严酷的自然环境需要设立防灾机构。

鉴于这些情况，作为内务省（通信部）2012 财年“促进 ICT 城市发展项目”的承办方，该市创建了一个由大量相互连通的传感器构成的特设无线通信网，旨在缓解灾害、创建高级风险管理系统、建立安全城市来稳定地方基建设施，实现传感器制造的本地化，为地区工业发展做出贡献。

此系统可与盐尻市现有 FTTH 网络兼容，通过专设无线通信网络的传感器共同收集泥石流探测器、水位探测器、兽害探测器、城内环线公交跟踪探测器，以及儿童和老人定位探测器的数据，并将采集来的数据置于专用的云环境内。此外，该项目还提供移动终端，同时通过互联网、扩展 WiFi 网和区域性 1 段广播展示采集的数据。

此系统不仅能够用于应急或救灾，亦能用于人民的日常生活。WiFi 热点和移动 DTV 台站被作为人们收集信息和相互会面的信息交流场所。

7.9 移动卫生信息系统：向医疗保健人员提供获取信息的途径（南非项目/高通公司（美国））

[23]撒哈拉以南非洲地区的人们每天都无谓地死于各种传染疾病，其中包括疟疾、肺结核、艾滋病毒/艾滋病，肺炎和腹泻。生活方式引发的慢性病亦将给脆弱的卫生系统造成负担。项目提供的无线接入，使医疗卫生机构能够了解有关预防措施和有关更加健康生活方式的信息，并就电话的功能开展了培训。

无线连通（Wireless Reach）致力于帮助地方政府获取信息通信技术（ICT）并实现普遍服务的目标，包括提高电话普及率和互联网的渗透率，利用 ICT 实现教育、环境和医疗卫生方面的目标。

本项目的目标是提高护理站获取最新医疗信息的能力，使医护人员能够更好地为东开普省的患者进行诊断和治疗。

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[22] 特设通信网络为日本长野县盐尻市农村地区开展的电信/ICT 开发项目，日本（案例研究库的链接）。

[23] 移动卫生信息系统：向医疗保健人员提供获取信息的途径（案例研究库的链接）。

移动卫生信息系统（MHIS）试图借助移动技术的力量，克服互联网接入的障碍，解决信息贫瘠的问题。移动图书馆的设计旨在提供全面的病人护理服务，包括提供数字化医疗指引、协议、诊断工具和药品处方，用以改善病人的护理。

以力求提升看护水平为己任的 FHI 360 小组，在高通公司无线连通（Qualcomm Wireless Reach）项目以及 Henry E. Niles 和 John M. Lloyd 基金的资助下，规划、设施并实施了 MHIS 项目。此项工作有多家机构参与，其中包括东开普省卫生局、伊丽莎白港医院综合大楼、MTN 南非、纳尔逊曼德拉都市大学和项目资助方。

MHIS 意在通过商用移动设备，为城市和农村医疗卫生工作者提供可靠、精确的本地临床信息，以提高其照看患者的能力。每种设备均可提供由 FHI 360 开发的、预先加载的临床和教育资源库，以及由 MTN 南非提供的、可通过无线宽带连接访问的动态互联网内容。

项目提供培训课程，教授护士如何使用智能手机访问相关信息并与同事分享。纳尔逊曼德拉都市大学对该系统开展的全面评估显示，为护士赋予无线访问卫生资源的能力，大幅提升了其看护患者的水平。

项目的融资和技术实施采用了不同的结构：政府、大学、网络提供商（政府与私营部门间的合作伙伴关系）。东开普省卫生局通过其下属的伊丽莎白港医院综合大楼，获得了必要的法律及研究批文，由其负责项目的协调工作和为护士提供技术支持。

FHI 360 将项目概念化，并以项目主导实施伙伴的身份创建了移动图书馆，为项目参与方提供培训。MTN 南非作为无线网络提供商，在整个项目过程中为无线通信服务提供专业技术技能服务。这些公司还以实物捐赠的方式充当了共同出资人，以低于市场成本的价格提供设备和服务。纳尔逊曼德拉都市大学的护理科学系在护士间开展初步信息需求预估，并实施了最终项目评估。自 2008 年以来，“无线连通”不仅提供了项目管理和技术支持，还提供了总额超过 400 000 美元的现金捐助。MTN 的现有商用设施得到了利用。

7.10 移动小额贷款和应用实验室项目（印度尼西亚项目/高通公司（美国））

[24]项目实施合作伙伴格莱珉基金会通过与应用实验室（AppLab）举措的协作，确定了一套可通过两个分配渠道获取的多层数据服务：（1）Ruma 企业家机构，即由拥有和负责运营移动小额贷款业务的、以妇女为主体构成的网络，以及（2）商用电话和大众市场。该计划的核心概念简单、有效且具有可持续性：当地的小企业主使用微贷款采购包含手机的预装工具包，然后将“通话分钟数”转售给邻居。移动电话可作为一个平台，为进一步提高收入和效益提供更多的应用和服务。当前，该项目亦在通过大众市场渠道发布新型应用和服务，为最贫困企业家直接提供支持。

印度尼西亚已为 3G 移动业务颁发了无线电频谱，成立了 USO 基金（尽管本项目无法直接获得此基金，但项目合作伙伴或可独立获得此项基金）。

[24] 移动小额贷款和应用实验室项目（高通公司（案例研究库的链接）。

7.11 农村和边远地区（马达加斯加）

[25]各国针对发展农村和边远地区基础设施提供了各类机制。就马达加斯加而言，为帮助发展电信和 ICT 融资并以扩展电信和 ICT 服务的方式为尚未享受到此类服务的农村地区提供接入，该国设立了电信和 ICT 发展基金。

政府通过该基金为铺设电信基础设施的项目拨款。为此，政府在公私合作伙伴关系的基础上与一家运营商达成了协议。相关支出由该基金提供。

7.12 为农村地区提供基本电话服务（多哥）

[26]多哥已为发展 ICT 实施了多项计划。本文稿所述项目的主题是提供普遍服务。自 2008 年以来，新普遍服务战略的定义覆盖了农村的多个社区，以便能为这些社区的居民提供基本电信服务。

自 2008 年起，在以普遍服务替代税收这一激励原则下，新推出的普遍服务战略取得了巨大成效，帮助多个地区实现了移动网络覆盖：2008 年的覆盖区域为 73 个地点，2010 年为 87 个地点。2012 年 5 月，电信部与运营商之间签署的其它三份协议，承诺将于 2013 年实现对另外 182 个地点的移动网络覆盖。

运营商在协议中给出了实施时间表。在实施阶段过程中，计划进行定期检查，同时规定了项目的完工时间。这些控制手段是为了确保能够有效地为这些地区提供各项基本服务，其中包括：话音业务、SMS 和数据（互联网）。

检查过程中得出了若干观察结论，特别是如下几点：

– 这些业务的存在会促进农村人口购买移动电话，尽管他们收入不高；

– 移动电话用户在手机维护方面面临着诸多困难。这些困难包括：售后服务、设备维修和电池充电。

因此，为农村地区提供价格可承受的可用通信是一项基本愿望，需考虑采用一种既能使贫困人口便利地使用这些服务同时又能维持低维护成本的战略。

发现的问题可分为两类：即运营商角度的问题和用户角度的问题。从用户角度来看，这些问题可能包括：

– 充电地点远离住宅区，仅在基础设施运营商所在地提供；

– 移动电话电池的寿命有限，各厂家的差异很大：2、3 天或最多 4 天；

– 支持连续服务的资金有限。

除农村用户面临的困难之外，农村网络也存在着种种不足，经常导致服务中断。现举例如下：

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[25] 农村和边远边远地区（2/162 号文件）。

[26] 为农村地区提供基本电话服务（2/188 号文件）。

– 管控部门忘记启动发电机为电池充电，使电池无法给用电设备供电；

– 由于维护不及时带来的维护问题，通常是因技术人员居住的市中心距维护地点较远；

– 发电机补充燃料困难等。

7.13 地面无线宽带连接项目（布隆迪）

[27]此项目是美国克雷格和苏珊·麦考基金会（Craig & Susan McCaw）馈赠的礼物。通过与国际电联的合作，项目提供了宽带无线连接及 ICT 应用，为布隆迪的学校和医院，以及农村和边远地区的欠服务人口提供免费或低成本的数字接入。

布隆迪政府为与 ONATEL 的合作项目提供了所有必要批文，为项目设备免除了一切费用（关税，其它税费），并为无线网络指派了 36 MHz 的带宽，与此同时，国际电联为项目管理提供了必要的人力资源（立项、实施、监督、监测和评估）。

项目将铺设无线宽带基础设施，开展人力资源建设，以确保网络的可持续发展。

7.14 伊朗的农村 ICT 开发项目（伊朗）

[28]伊朗伊斯兰共和国为实现下述目标，自 2005 年起实施了若干重大步骤：

– 实现村庄与信息电信网络的连接，为农村边远地区提供全面接入；

– 弥合数字鸿沟。

由伊朗电信公司（TCI）出资为各村庄提供如下设备和设施：

– 安装有火险探测（告警）和防火（安全）系统的建筑物；

– 计算机设备和软件应用：路由器、分/插设备、个人电脑、服务器、打印机、扫描仪、摄像头、电话、传真和各村至少 64K 的互联网接入容量；

– 邮政设备：数字平衡装置、托运货物的分类货架、邮箱、托运货物的交通运输轨道、银行票据、文件等；

– 银行设备：保险箱、取款机、验钞机、计算器、打印机和所需的软件应用程序。

此类设备和设施可支持：

– 与信息通信技术相关的服务：获取信息、新闻… 接入网络，固定和移动业务互联网以及电子政务服务（例如，报名表的更新、文件登记、警察服务，U.E.E 学员的注册和选课…在村内进行）、电子购物、对售货亭用户及访客提出的所有需求做出应答；

– 邮政服务：控制内外部邮件的进入（普通邮件和定制邮件）、村民产品的营销、分拣信函，邮寄国籍卡申请单、入学考试登记表、加油卡和村内账单；

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[27] 地面无线宽带连接项目（RGQ10-3/2/5 号文件）。

[28] 伊朗的农村 ICT 开发项目（案例研究库的链接）。

– 银行服务：开立活期账户、储蓄账户、长期和短期账户…，水、电、气和电话账单的支付，处理执照、护照及其它相关问题（邮政银行）。

7.15 无线宽带接入和 GSM 蜂窝网络的节能和低成本技术（OJSC Intellect-Telecom（俄罗斯联邦））

[29]OJSC Intellect-Telecom（俄罗斯联邦）发明的技术/方法与现有网络相比，可将无线宽带接入和 GSM 蜂窝网络的功耗降低 50-60%。

此项技术/方法的基础设施是基于标准基站（BTS）与容量转换中继（CTR）的组合。这些基础设施将不受技术和选用标准（GSM、UMTS、CDMA 等）的影响；中继器的选择将取决于选定的标准，不仅与基站实现连接而且要在自身之间建立连接。此项技术/方法已在俄罗斯下诺夫哥罗德地区 450 公里的公路和 Gornoaltaysk 镇北部地区使用，产生的能源节约效应是原来的 2-3 倍。

7.16 Mawingu 项目：在肯尼亚农村利用电视空白频谱提供宽带接入（肯尼亚项目/微软公司（美国））

[30]这项名为 Mawingu（斯瓦希里语意为“云”）的项目，是第一次在非洲针对没有宽带接入的社区部署电视空白频谱技术，而且项目重点测试向之前缺乏服务的地点提供低成本高速无线宽带接入的商业可行性。为最大限度地扩大覆盖和带宽，同时保持成本最低，Mawingu 网络依靠的是结合“无许可”和“免于许可”的无线技术，包括使用 13GHz、5GHz 和 2.4GHz 等补充频段的 Wi-Fi 和 TVWS 基站以及未经使用的 UHF 电视频段。纳纽基（Nanyuki）附近的首批安装包括 6 个客户地点：Burguret 药房（医保诊所）、男子小学、男子中学、Gakawa 中学、Laikipia 郡县政府办公室以及当地的红十字会办公室。Kalema 的安装将从一个基站开始，该基站连接至肯尼亚农业技术推广办公室下的政府机构，然后再在网络上逐渐增加 14 个地点。

7.17 评估不同的接入技术选择（埃及）

[31]这项案例研究总结了研究和磋商意见，认为最常引用的缺乏对下一代接入（NGA）投入的原因是，“在可预见的未来，没有很多应用有对 NGA 带宽的要求”。要了解对 NGA 领域不同类型运营商的激励措施，NGA 的驱动因素十分重要。尽管某些因素可能是普遍因素（希望获取优质的商业服务、对带宽的需求增加等），但它们影响不同运营商的方式不同。技术选择对运营模式的影响主要体现在两个方面：对成本优化和业务或发展的限制。研究将展示和评估不同做法及其影响。经证明，共同投资的做法和批发模式是可以增强运营模式核心要素及其对投资回报影响的有效策略。改进安装的基础设施（HSPA/xDSL）质量可能是一种短期有效的解决方案。从中长期的战略角度来看，实施 LTE 或 GPON 是最合适的解决方案。

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[29] 无线宽带接入和 GSM 蜂窝网络的节能和低成本技术（俄罗斯联邦）http://www.itu.int/md/D10-RGQ10.3.2-INF-0007（RGQ10-3/2/INF/07 号文件）

[30] Mawingu 项目：在肯尼亚农村使用电视空白频谱提供宽带接入（案例研究库的链接）。

[31] 评估不同的接入技术选择（案例研究库的链接）。

7.18 不丹农村地区的 WiMax 和光纤 WiFi 宽带（不丹）

[32]该试点项目旨在研究在人口稀少的农村社区和借由 3G、EDGE 或 GPRS 互联网业务部署光纤 WiFi 和奥维通 WiMAX 宽带的可行性。在项目开展之前，全部四个村子的试点项目对象都是使用 3G 数据卡或通过签约移动网络接入互联网，而且村民们要花半天时间出行，才能用上互联网。考虑到村中缺乏对 IT 知识和技术诀窍的了解，项目到客户驻地的连接是由 Tashi 信息通信有限公司（TICL）负责。为确保项目的可持续性，TICL 公司将在政府部门不进行任何干预的情况下，负责项目的运营。尽管经济规模的局限和 IT 知识的缺乏对项目实施形成了较大挑战，社区缺乏提供互联网服务的 ICT 基础设施也使情况雪上加霜，但使用 WiMAX 而不使用光缆，在村子里实现了简单快捷的宽带部署。

7.19 3G 网络实现渔区改善（巴西项目/高通公司（美国））

[33]该项目旨在通过实现与渔民和海产品养殖户（多为女性的牡蛎养殖户）的数字和社会连接，推动南部巴伊亚州 Santa Cruz Cabrália 地区的经济和社会发展。项目的目标是，通过使用支持 3G 网络、带有客户定制应用的智能手机和平板电脑，支持移动教育和针对渔民、海产品养殖户及青年人的新经济活动的开发。当前的项目期将展示当地社区如何逐步发挥 24/7 移动连接的优势，转变学习方式和创造新的商业机会。高通“无线关爱”计划已与合作伙伴协作，开展项目接下来的三期：第一期——3G 连接，第二期——收入多元化，以及第三期——移动教育和技术创新。每一期的目标相互补充，旨在改善渔区人民的生活、工作条件和机会。项目已对 Santa Cruz Cabrália 地区所有年龄层的社区成员产生了积极影响。

7.20 “让我们做好准备！”移动安全项目（中国项目/高通公司（美国））

[34]芝麻街工作室、高通“无线关爱”计划、中国电信股份有限公司贵州分公司和中国青少年发展基金会共同设计、实施并逐步开展引人瞩目的支持 3G 的交互式内容，帮助孩子和家庭以亲身参与的方式，学习如何更好地应对紧急情况。在试点阶段，31 个有 3 至 6 岁孩子的家庭分别收到一部支持 3G 高通骁龙处理器（Snapdragon™）的智能手机，手机预安装了移动工具、无线连接、数据计划和长约一小时的个人技术导航。一个优化移动平台并可连接所有 3G 智能手机的 HTML5 网站已经开发，用来提供交互式游戏和活动。2013 年 6 月试点结束后，移动网站及其 Android 应用程序将向中国全国开放。

7.21 中国农村的 WLAN 覆盖解决方案（中国）

[35]从微观上看，中国农村的宽带用户分布十分密集，但从宏观上看则非常稀疏，而且边远乡村的有线网络资源极其匮乏。与固定宽带接入网络相比，WLAN 的特点是有移动限制、带宽高和建立成本低，可以进行灵活的部署和使用，这意味着 WLAN 往往能更好地满足农村地区的宽带数据接入需求。对于具有大量潜在用户和高市场需求的乡村，建议将 WLAN 的接

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[32] 不丹农村地区的 WiMax 和光纤 WiFi 宽带（案例研究库的链接）。

[33] 3G 网络实现渔区改善（案例研究库的链接）。

[34] 大家准备好！移动安全项目（案例研究库的链接）。

[35] 中国农村的 WLAN 覆盖解决方案（案例研究库的链接）。

入点安装在电线杆上，以便覆盖整个村庄，确保网络容量和用户感应，而对于需求低的村庄，开始可将 WLAN 建立在已有的网络资源上，即，将接入点安装在农村基站塔上，并通过高增益 CPE 发射信号，结合高增益天线使用基站接入点，覆盖一个村庄。进入之后的项目阶段，当用户数量达到一定规模时，再考虑其他方法。关于农村 WLAN 的交通技术，考虑到中国农村的情况背景，中国农村的 WLAN 项目大都使用 PTN 技术（如 ITU-T G.8113.1 和 G.8113.2）作为回传解决方案。

7.22 为农村地区宽带使用而设计的创新技术解决方案——农村应用交换数据（C-DoT 公司的 D-Rax）（印度）

[36]该项目对系统平台和 ICT 的服务应用软件进行个性化定制，从而简化用户交互，以便于农村居民的有效使用。项目的重点是使农村居民能以方便和自发的方式，直接连接到不断扩大的信息网络。鉴于该产品特有的重要价值，预计该产品将使信息网络更加贴近群众，并且即便不能完全消除数字鸿沟的弊端，也能使鸿沟缩小。该平台还在实地部署的试点阶段，但已受到了用户的大量好评。

7.23 在印度东北部偏远地区针对农村人口成功采取的电子举措——社区积极参与可持续性建设（印度）

[37]本文简要分析了印度东北部地区针对农村贫穷人口采取的两项成功 ICT 项目电子举措的关键因素，以期为落后地区部署 ICT 制定可持续性的战略。阿鲁纳恰尔邦（印度东北部行政区）的偏远部族村落实施了旨在为当地提供 ICT 基础设施的项目，以便在当地社区中建立对电子手段的认识并普及电子手段的知识。东 Siang 区从战略角度出发，挑选了处于村落群中心地带的 10 个村庄安装电子中心。此外，为向特里普拉邦（印度东北部行政区）的农村社区提供优质的卫生保健，特里普拉邦政府设计了旨在为本邦减少盲症的远程眼科项目。项目成功的关键因素已经确认，将用于在发展中地区的农村和边远地区实施可持续的电子举措。

7.24 来自宽带委员会报告的案例研究

数字学校项目（塞尔维亚）

数字学校项目是塞尔维亚共和国最大的国家项目，它通过为所有小学配备计算机实验室，全面支持在教育过程中纳入数字手段。项目由该国电信部和信息协会管理并资助，与各地方政府和学校形成密切的合作伙伴关系。通过提高小学教师和学生对数字技术的认识，减少第一次使用 ICT 的用户的恐惧和焦虑，促进全面教育和创新的教学方法，缩小城乡之间在数字技术方面的知识差距（目前农村和城市的数字技术知识普及率分别为 11.4%和 38.9%，电脑使用率分别为 38.3%和 58.7%），以及为社会全体成员提供在线安全方面的教育，该项目极大促进了塞尔维亚共和国的信息社会建设。

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[36] 为农村地区宽带使用设计的创新技术解决方案——农村应用交换数据（案例研究库的链接）。

[37] 在印度东北部偏远地区针对农村人口成功采取的电子举措——社区积极参与可持续性建设（案例研究库的链接）。

尼日利亚：促进政府学校、图书馆和机构之间的连接

在尼日利亚，从 2008 年至今，普遍服务提供基金（USPF）提供的资金（每所学校 10 万美元）和支持都用于在超过 1 千所学校部署英特尔学习系列解决方案（Intel LS）。USPF 的任务之一是在全国缺乏服务的地区和农村地区，推动实现政府学校、图书馆和机构之间的宽带网络连接。

巴基斯坦：通过移动电话推动文盲教育

该项目基于伊斯兰堡女子理工学院的建议，由联合国教科文组织（UNESCO）和巴基斯坦 Mobilink 公司与 Bunyad 基金会共同实施。联邦和省级的教育部、信息技术和电信部以及多个技术教育委员会对项目进行监测。项目旨在解决农村妇女识字率低的问题。项目尤其注重性别平等，目标是通过使用移动电话，提高农村妇女的识字率。

中国：为农民解决气候相关风险

气候引发的危险能产生自然灾害，影响着粮食安全、饮用水供应、生态系统的稳定性和人类健康，使几亿农民的生计受到威胁。

中国移动正在通过建设农村通信信息网络，解决中国贫困农民所面临的挑战。到 2010 年底，89,000 个偏远乡村已纳入该移动通信网络，为中国大陆在 2010 年实现“村村通”的 100%覆盖国家目标做出了贡献。到 2010 年底，超过 1900 万农村用户通过农村信息服务发送的短信总量为日均 1950 万条。ICT 应用中包括自动化的监测控制系统、自动滴灌、对淡水养殖的无线水质监测和水利服务。例如，气象数据的远程传输为新疆的 1100 个监测地区提供及时的天气预报，并在灾害天气来临时向农民发出准确预警。通过移动信息服务，29 家组织能够收集和发布洪涝信息，并对新疆全部 12 个区进行远程监测。在福建的另一项 ICT 应用中，农村小额信贷自助服务信息平台使农民能在手机和农村信息终端上，通过发送短信申请贷款，进一步实现了贷款申请和批准流程的无纸化。

宽带普及率和负担能力的差距不仅长期存在于不同国家之间，在一国内的城乡之间也持续存在。数字鸿沟依然是实现进步的一个顽固障碍。

卢旺达和印度：从推到拉

以卢旺达为例，在 20 世纪 90 年代晚期制定统一 ICT 政策的非洲国家寥寥无几，卢旺达是其中之一。该国有一项普遍接入基金，旨在平衡城乡间的使用，并加强 ICT 的社区接入。

在印度，全国电子政府计划正在把越来越多的政府服务转移上线，并在全国范围内创造对 ICT 的需求，以此在全国实行“去物质形式”的行政管理。已经起草了第 41 号 m-治理政策，通过移动电话提供服务，包括基本的银行服务。从中学或大学入学到养老金支付和初级卫生服务，这些服务都将能够在线获取。一些关键的社会部委，如教育部、卫生部和农村发展部，也都有雄心勃勃的数字化、内容创造和电子服务交付方面的计划和项目在进行。所有这些都将增加宽带业务的使用，同时减少二氧化碳足迹并增强社会的包容性。

坦桑尼亚：非洲大湖地区的农村宽带研究基础设施

坦桑尼亚 ICT 促进农村发展计划 25 是一项关于泛在包容性宽带接入的研究计划。该计划已经启动了第一英里范围内的举措，摸索农村地区建立宽带市场的战略。由于可预见的风险很高，导致农村地区有宽带需求，但没有供应。已经制定的一项成功战略，是以支持千年发展目标进展的卫生保健、药品安全、教育和地方政府的基本公共服务为重点，吸引投资，然后努力寻找客户，以维持宽带网络和服务。所面临的挑战包括网络组件的设计、电力供应薄

弱或缺失、供应链薄弱有待加强，以及可持续运营模式的制定。下一阶段正在规划之中，将在这一阶段把该计划推广至非洲大湖地区。

7.25 所选案例研究的分析

7.25.1 政策和监管解决方案

为给部署宽带连接制定政策和监管框架，应当考虑如下问题并将其分为两大类：普通问题和按需供给问题。从供给角度看，基础设施开发发挥着核心作用：

- **利用 USO 基金部署宽带网络：**使用此项基金创建或发展国家光纤网络容量，可为宽带基础设施供应商提供经济上的优势。
- **促进市场竞争：**严格应用公平竞争规则并引入新的保障，对提供宽带服务至关重要。
- **坚定地应用公平竞争规则**并引入新的保障，对提供宽带服务至关重要：使用额外的无线电频谱应支付合理的价格。重要的是应确保频谱的稀缺性不会导致价格过高。要实现这一目标，可对部分频谱的划分拍卖条款加以完善。
- **利用互连互通收费，鼓励基础设施建设：**提高农村用户的终接费，可作为刺激向农村地区投资的奖励机制。
- **使用高容量骨干网基础设施提供无线电接入**的必要性。
- **为取得路权提供便利：**预计政府机构将为农村地区宽带基础设施建设提供的资金，包括普遍服务义务资金，发挥着非常关键的作用，因为这些资金可用于应对获取乡村地区路权方面的挑战。
- **最终用户补助金：**以可承受的价格提供宽带接入，将鼓励用户订购和使用宽带。
- **服务提供商补助金：**较之为运营支出提供补贴而言，为服务提供商的基建开发提供补助，在降低最终用户价格问题上效果更佳。
- **宽带与其它业务间的交叉补贴：**强制服务提供商降低宽带接入收费，但允许其通过提高话音呼叫等其它业务的资费来弥补损失，或降低互连互通资费，使运营商增加收益并为宽带服务提供商的生存贡献力量。
- **监管举措：**应允许运营商在农村和边远地区部署网络和提供新业务。关键是要为吸引运营商或投资人提供激励机制。此外，当运营商在农村和边远地区部署网络时，配套设施必须到位。
- **创建网络接入基金**并在多国提供服务，为有意在农村地区安装基础设施并开展业务的运营商提供补贴。监管和决策机构必须通过建立适当的监管架构共同采取 ICT 举措，作为向农村和边远地区推广电信服务的手段。连通非洲峰会的目标 2 提出，到 2015 年，所有非洲村庄都应能够使用 ICT 服务。

7.25.2 拟采取的措施和行动

- 在发展中国家的农村和边远地区建立 ICT 设施，以减缓人口流失。

– 各国必须建立能够更好适应日新月异的新技术和新服务环境的监管框架，以便在农村和边远地区发展 ICT。

– 必须降低公共机构对电信业务提供的收费和对进口设备的关税，以减轻服务用户的直接财务负担。

– 必须向农村和边远地区提供电力设施。

负责政策的主管部门必须了解在农村和边远地区发展电信的战略作用。

– 与它国分享发达国家在此领域的经验；

– 推动使用新能源；

– 促进设备制造降低能耗，可使用太阳能和/或风能；

– 在相关地区设立的普遍服务系统内免费或以较低价格提供充电手机；

– 鼓励电信部与能源部相互协作，为在该地区建立两网：电力网和电话网，共同采取行动；

– 考虑制造商是否能够延长手机电池的寿命；

– 促进太阳能设备的制造；

– 推动太阳能电池的开发；

– 推进太阳能充电池的发展；等。

7.26 ITU-D SG2 Q10-3/2 案例研究中的技术、应用和资金来源表

表6：ITU-D SG2 Q10-3/2案例研究中的技术、应用和资金来源表

No	国家	项目名称	技术	应用	资金来源
1	布基纳法索（荷兰 SES World Skies 公司的项目）	卫星宽带为布基纳法索的选举提供支持	卫星（VSAT）	视频会议；视频监视；互联网接入；以及选票信息的快速安全传递	国家预算
2	阿根廷	阿根廷农村学校的卫星互联网连接计划	VSAT	数据（互联网）	国家基金（基于国家电信计划）
3	马绍尔群岛	通过可持续和生态友好型 ICT 电信中心创造就业机会，开展文化保护	光纤电缆（海底电缆） 卫星 GSM（蜂窝） Wifi 和 Femto-cell	远程学习 电子卫生 固定电话、移动电话和互联网接入	APT 补助金 政府支持（实物及电信服务中心建设）
4	日本（日本 KDDI 公司的项目）	日本的移动 WiMAX	WiMAX	所有类型的（数据）应用，包括 VoIP（话音）	商业资本（无政府资金）

No	国家	项目名称	技术	应用	资金来源
5	老挝人民民主共和国（日本富士通公司的项目）	利用 ICT 改善老挝人民民主共和国农村地区卫生医药环境试点项目	地面无线业务 15GHz	为政府提供的电子卫生应用，包括话音、视频、图像传输	由 APT 资助
6	密克罗尼西亚（日本 KDDI 公司的项目）	密克罗尼西亚农村地区和偏远岛屿建立远程教育和卫生保健电信服务中心的试点	无线本地环路：铜线 无线本地环路 固定无线接入（长距离） 无线 LANS 和基于 IP 的相关网络	电子卫生 远程教育 电子培训 ICT 培训	由 APT 资助
7	日本	特设通信网络为日本长野县盐尻市农村地区开展的电信/ICT 开发项目，日本	FTTH 专设无线通信网 Wi-fi DTV（1 段移动广播） 传感器（水位、儿童和老人定位等）	应急电信 电子农业（动物探测） 公交跟踪 儿童和老人定位	MIC（内务省（通信部）），日本
8	南非（美国高通公司的项目）	移动卫生信息系统：向医疗保健人员提供获取信息的途径	3G 蜂窝网络（现有网络）	接入预先加载的临床和教育资源库 可通过无线宽带连接访问的动态互联网内容	高通公司无线连通项目 Henry E. Niles 和 John M. Lloyd 基金 MTN 南非（实物捐赠）
9	印度尼西亚（美国高通公司的项目）	移动小额贷款和应用实验室项目	由 CDMA2000 宽带无线网承载 SMS、电话和 IP 数据	Brew（通过移动操作系统开发和部署基于应用的服务） 开发和部署 SMS 和基于 IP 的应用	高通公司无线连通项目 USO 基金（项目合作伙伴或可独立获得此项基金）
10	马达加斯加	农村和边远地区	卫星、光纤、WiMax	未知	国家基金（电信和 ICT 发展基金）
11	多哥	为农村地区提供基本电话服务（多哥）	移动技术（蜂窝）	话音业务、SMS 和数据（互联网）	针对运营商的激励机制（普遍服务）
12	布隆迪	地面无线宽带连接项目	无线宽带	远程学习（连通学校） 电子卫生（连通医院）	Craig 和 Suzan McCAW 基金 ITU（实物捐赠） 布隆迪政府
13	伊朗	伊朗的农村 ICT 开发项目	多种技术（用于互联网接入）	电子政务 电子购物 电子银行 邮政服务	伊朗电信公司（TCI）

No	国家	项目名称	技术	应用	资金来源
14	密克罗尼西亚（日本 KDDI 公司的项目）	密克罗尼西亚农村地区和偏远岛屿建立远程教育和卫生保健电信服务中心的试点	无线本地环路：铜线 无线本地环路 固定无线接入（长距离） 无线 LANS 和基于 IP 的相关网络	电子卫生 远程教育 电子培训 ICT 培训	APT 资助
15	OJSC Intellect-Telecom（俄罗斯联邦）	无线宽带接入和 GSM 蜂窝网络的节能和低成本技术	无线宽带 移动技术（蜂窝）	系统能够承载任何话音/数据	
16	肯尼亚	Mawingu 项目：在肯尼亚农村使用电视空白频谱提供宽带接入	无线 宽带	互联网接入 电子学习（连接学校） 电子卫生（连接诊所） 电子政府（连接政府办公室）	微软 USAID Indigo 电信公司
17	埃及	评估不同的接入技术选择	无线（HSPA/HSPA+、LTE、Wimax） 有线（DSL、PON）	宽带	
18	不丹	不丹农村地区的 WiMax 和光纤 WiFi 宽带	WiMAX WiFi	互联网接入	APT 资助（J3）
19	巴西（美国高通公司的项目）	3G 网络实现渔区改善	UMTS/WCDMA 移动网络	短信、电话业务和数据 智能手机	高通“无线关爱” Telefonica Vivo 基金会 USAID
20	中国（美国高通公司的项目）	让我们做好准备！移动安全项目	CDMA2000 1x /EV-DO 移动网络	短信、电话业务和数据 智能手机	高通“无线关爱”
21	中国	中国农村的 WLAN 覆盖解决方案	PON、PTN 和 MSTP（包括无线）	互联网接入等	
22	印度	为农村地区宽带使用设计的创新技术解决方案——农村应用交换数据	EV-DO DTV 广域网 MPLS	电子农业 电子卫生	印度政府
23	印度	在印度东北部偏远地区针对农村人口成功采取的电子举措——社区积极参与可持续性建设	互联网	电子政府、电子教育等（为没有 ICT 技能的用户提供的多语言平台）	印度政府

8 结论和建议

报告人组研究了第 10-3/2 号课题的文稿，提交的案例研究成果以及问卷调查表从各成员处收到的回复，同时在一年两届会议，即第 2 研究组每年的秋季会议和报告人组的春季会议期间，还通过电子论坛开展了网上辩论。

如雨后春笋般出现的新兴技术有些适用于上文所述农村和边远地区的严酷环境。收集的案例研究显示，这些技术被应用于发展中国家农村和边远地区的多媒体服务与应用。

这些案例研究中观察发现的两大技术包括 WiFi、WiMAX 和 CDMA 等地面技术，以及与对地静止卫星（GEO）结合使用的 VSAT 卫星技术。近来，中轨道卫星（MEO）业务已经启动，并提议 ITU-D SG2 将其作为向农村和边远地区提供高成本效益低延迟服务的一种方案。从成本效益的角度来看，这两种技术方案比其它技术方案更为适用。

喜马拉雅山村网络是地面无线网络的典型示例，可为无法阅读报纸的山区村民提供多媒体服务、校园连网、医疗邮件和公告板新闻服务。太平洋岛国（SIDS）提交的案例研究中提出了 VSAT 加 GEO 技术方案。似乎卫星技术能够最效地将 SIDS 的外部各岛连接起来。光纤技术能为农村和边远地区提供稳定的宽带服务，但其没非总能以高性价比的方式满足农村和边远地区对通信基础设施的需求。最不发达国家提交的案例研究中，有一项已经使用了光纤地线或光纤复合架空地线（OPGW），且这种方式被认为适用于在农村和边远地区部署宽带网络。

农村和边远地区的定义在报告人组会议和电子论坛分别进行了讨论。多国对电信发展局的问卷调查表做出了回复，声明其国家发展政策对农村和边远地区定义的依据是该地区人的口疏密程度。

宽带的定义在电子论坛进行了探讨，其内容涉及上下行数据传输速率的最低要求，例如随着各类业务的不断涌现，这些速率可分别为 64Kbps/128Kbps、128Kbps/256Kbps 或 256Kbps/512Kbps。宽带委员会 2012 年 9 月向第 2 研究组报告人组提交的报告认为，鉴于技术进步飞速且农村和边远地区正不断出现新的业务，因此不能用数据速率来定义宽带。该报告认为宽带是一种高容量的永远在线服务（不需要用户每次都新建与服务器的连接）：每秒应能承载大量数据，速率并无一定之规。报告还得出结论，宽带支持联合提供话音、数据和视频服务。若干国家对电信发展局问卷调查表中有关宽带服务各种数据速率的问题作出了回复，但有些国家指出，应在本国政策中将下载数据速率确定为 2Mbps，或为其它国家的光纤网络定义更高的速率。

9 鸣谢

报告人 Yasuhiko Kawasumi 先生（日本总务省）赞赏副报告人、志愿者、电信发展局第 10-3/2 号课题联络人及该局其它员工为完成本《最后报告》给予的协作。另外，本报告人亦对提交了输入文稿的各成员国、部门成员、部门准成员、学术成员表示赞赏，感谢他们在第 10-3/2 号课题的本研究期内参与了报告人组的工作。

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10 首字母缩写和缩略语

APT 亚太电信组织

BDT 电信发展局

BTS 基站

CDMA 码分多址

CPE 客户驻地设备

DSL 数字用户线

FSS 卫星固定业务

FTTx 光纤到 x（建筑物、路边、房屋等）

GDP 国内生产总值

GHG 温室气体

GPS 全球定位系统

GSM 全球移动通信系统

GSO 对地静止卫星

ICT 信息通信技术

IEEE 电气电子工程师协会

IP 互联网协议

ISP 互联网服务提供商

LAN 局域网

LDC 最不发达国家

LTE 长期演进

MDG 千年发展目标

MEO 中地球轨道

MPLS 多协议标签交换

OAM 运行、行政管理和管理

P2P 点对点

PMP 单点对多点

PON 无源光网络

PSTN 公共交换电话网

SDH 同步数字层

SIDS 小岛屿发展中国家

SMS 短消息业务

UNESCO 联合国教科文组织

UNHCR 联合国难民事务高级专员

USF 普遍服务基金

USO 普遍服务义务

VoIP 通过互联网协议传输话音

VPN 虚拟专用网

VSAT 甚小孔径终端（与卫星系统共用）

WDM 波分复用

WiFi 基于 IEEE 802.11 标准的无线局域网（WLAN）产品

WiMAX 全球微波接入互操作性

WSIS 信息社会世界峰会

WTDC 世界电信发展大会

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Annexes

Annex 1: **List of input contributions during the study period 2010-2014 and their summaries**

Annex 2: **Analysis of questionnaire replies for the global survey on policy initiatives/interventions on telecommunications/ICTs/broadband development**

Annex 1: List of input contributions during the study period 2010–2014 and their summaries

List of contributions submitted to Question 10–3/2 (*for action*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/002	12–Jul–10	OJSC Intellect Telecom (Russian Federa–tion)	Cellular telecommunic ation network with capacity transfer. Study Question 10 2/2 – Telecommu–nications/ ICT for rural and remote areas	In accordance with the theme of Step 1 of study Question 10–2/2, it is proposed that a study should be made of one of the methods of tackling the task defined by ITU using a "cellular communication system with capacity transfer". The proposed solution is the project "Cellular telecommunication network with capacity transfer". This uses the latest technologies that have been developed with a view to reducing capital and operating costs. Use of this solution wherever possible promotes convergence between services and applications, and reduces energy consumption and greenhouse gas emissions.	New technology (broadband wireless)
2/25	31–Aug–10	China (People's Republic of)	Draft Proposal on Research Plan of Telecommuni cations for rural and remote areas	The text proposed a research plan in 2011–2014 for the Question 10–2/2 on "telecommunications for rural and remote areas".	Research plan
2/40	10–Sep–10	KDDI Japan	Pilot installation of Tele–Center for remote Education and Health–Care in Rural Area and Isolated Islands in Micronesia	This contribution provides the graphical information for the project called "Pilot installation of Tele–Center for remote Education and Health–Care in Rural Area and Isolated Islands in Micronesia" to supplement the text information which is the only way we can use currently to report the project on the "Case Library for Rural Communications" in ITU–D Web site. This contribution also proposes the upgrade of "Case Library" function, enabling the use of graphical information.	Case study (e–education, e–health)
RGQ10-3/2/3	15–Feb–11	Nepal Telecommu nications Authority	Policy and Regulatory Intervention for Telecom Growth in Rural Nepal	Due to her very peculiar topography, Nepal poses a great challenge for the development of telecommunications and ICT infrastructures. Other socio–economic and cultural indicators also do not directly support the uses and adoption of relatively newer telecommunications and ICT services. It is evident from the government targets set through the three consecutive development plans–the ninth and tenth five– year and the interim three– year development plans adopted by the Government of Nepal which aimed to achieve the availability of two telephone lines in each of the 3915 Village Development Committees (VDCs). These targets were met only by the end of the three–year interim plan (FY 63/64–66/67). This target was achieved not as a matter of course–but because of the fact that there were several policy and regulatory interventions made by the Government of Nepal and the Nepal Telecommunications Authority (NTA). This story highlights the importance of specific policy and regulatory interventions for telecom growth in rural Nepal.	Case study (universal access)

List of contributions submitted to Question 10–3/2 (*for action*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
				However, such government and regulatory initiatives are not without criticisms from different corners specifically from the perspectives of transparency, professionalism, efficiency and independence of such initiatives. In this paper we highlight some of the major initiatives made by the government and the regulator and the objectives achieved.	
RGQ10-3/2/4	16–Feb–11	Nepal Telecommunications Authority	Rural Challenges: Telecommunications/ICT Development Perspectives	Rural and remote areas of most of the developing countries are characterized by difficulty in accessibility by any means of transportation either ground or air, absence of national grid for electricity, absence of any kind of skilled human resources, low literacy, sparsely populated areas with lower population density, absence of good health care facilities, no employment opportunities, low paying capacities of the people, no access to information sources resulting in the lower socio–economic indicators as well as lowest state of infrastructure development. When these indicators are low, they have direct or indirect impact on the development of telecommunications/ICTs in such areas. The major stakeholders in the entire telecommuni–cations/ICT value chain and ecosystem face a number of challenges from their own perspectives when they want to contribute to the development of telecommunications/ICTs in the rural and remote areas of developing countries. In this contribution, we have identified the government, the regulator, the telecom service providers, the CPE manufacturers, the infrastructure manufacturer (vendors), the VAS providers, the content developers, the bilateral and multilateral donor agencies, the civil society organizations, the consumers etc., as the major stakeholders in the telecommunications/ICT value chain. Each one of them face specific challenges from their own perspectives and these challenges are enumerated in this paper. During the next five years we have to work hard to achieve the targets set in the WSIS Action Plan and the related action lines. The way forward to address these challenges is also recommended.	Case study (stakeholder analysis)
RGQ10-3/2/5	22–Feb–11	Burundi Ministry of Telecoms, Informa–tion, Communication and Relations with Parliament	Connectivity project broadband wireless	The project is a gift to the Foundation Craig & Suzan McCAW and consists of: – Deployment of broadband infrastructure in identified areas in Burundi, by mutual agreement with the ITU – The development of ICT applications – Training of local experts to operate the installed network – The development of a national plan to deploy a broadband ICT network providing free or inexpensive to underserved populations in rural and remote areas.	Case study (broadband wireless)

List of contributions submitted to Question 10–3/2 (*for action*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
RGQ10-3/2/6	25–Feb–11	Uganda Communications Commission	Universalizing Access to ICTs for Social and Economic Development: Lessons and Experiences learnt from Uganda	This paper attempts to analyze Uganda's experiences with regard to her universal access policy and objectives. The objective is to derive best practices that Uganda and other developing countries may consider adopting in their quest to improve delivery of ICT services in the underserved areas in order to stimulate social and economic transformation of the rural areas. The paper contends that an effective policy and regulatory framework has been the cornerstone to driving universal access agenda to ICTs in Uganda. However, in order to move a sustainable universal access policy, the requirement for effective problem definition, feasibility analysis and objectives setting that are in line with the local conditions is of critical importance. In doing this, consideration should be taken to build in synergy and developing partnerships with other stakeholders. This should be followed by formulation of the business concept even though the initiative is for commercial and/or meeting social obligations.	Case study (universal access)
RGQ10-3/2/7	28–Feb–11	Chad	The development of telecom–munications/ ICTs for rural and remote areas in Chad	In Chad, telecommunications development is primarily the work of the government. The government has installed VSAT stations in the regions and in departments of Chad, which permit authorized licencees to install VSAT stations in any corner of Chad to operate their independent networks.	Case study (satellite)
2/93	18–Jul–11	OJSC Intellect–Telecom (Russian Federation)	Reducing energy costs through the implementa–tion of a cellular telecommuni–cation network with capacity transfer for rural and remote areas	This document provides some further information on the study presented in OJSC Intellect Telecom's earlier proposal in Document 2/002–E titled "Cellular telecommunication network with capacity transfer", which would significantly reduce energy consumption. The proposed technology for the deployment and operation of the associated (broadband) cellular telecommunication system will reduce capital costs (CAPEX) by a factor of 2–3, operational costs (OPEX) by a factor of 2–3 and energy consumption by a factor of 2–4, as well as using alternative energy sources.	New technology (broadband wireless)
2/94	18–Jul–11	OJSC Intellect–Telecom (Russian Federation)	Reducing energy costs through the implementa–tion of a "cellular telecommu–nication network with capacity transfer" for rural and remote areas	This document provides some further information on the study presented in OJSC Intellect Telecom's earlier proposal in Document 2/002–E titled "Cellular telecommunication network with capacity transfer", which would significantly reduce energy consumption. In contributions and materials for the meeting of the Rapporteur Group on Question 10–3/2 held on 22–23 March 2011 in Geneva, it was stated that solving the problem of telecommunication development in rural and remote areas will depend to a large extent on the implementation of technologies with reduced energy consumption. This document provides some additional information in this regard.	New technology (broadband wireless)

List of contributions submitted to Question 10–3/2 (*for action*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/100	10–Aug–11	Viet Nam	Strategic Action Plan for Telecommu–nication/ICT Development for Rural and Remote Areas	This contribution provides information regarding to Viet Nam's Strategic Plan on Information and Communications Development from now to 2020, with emphasis on relevant information regarding telecommunication and ICTs for rural and remote areas. Viet Nam hopes that this Strategic Plan can be useful to developing countries. Viet Nam looks forward to receiving comments from delegates and representatives from the membership.	National plan
2/101	11–Aug–11	Rwanda Utilities Regulatory Agency (Rwanda)	Rwanda National Broadband within ICT Plans and Objectives for Success	This contribution gives the current status of efforts that Rwanda provides in building broadband. It mainly focuses on the fiber optic deployment and lightly on other broadband technologies.	Case study (optical fiber)
2/102	18–Aug–11	People's Republic of China	EPON in the Rural Areas of China	This text describes the main characteristics of Ethernet Passive Optical Network (EPON) and its typical application in building rural broadband networks in China. Additionally, the text compares the project costs of FTTH and FTTV which are the two main ways to deploy EPON in rural China.	Case study (optical fiber)
2/105	10–Aug–11	Mongolia	National Broadband Program of Mongolia	This contribution from Mongolia shares information about the National Broadband Program of Mongolia approved by the Cabinet of Government to achieve the goals of the Broadband Commission and ITU Declarations. Globally, information and communication technology is developing rapidly and emerging technologies and services are extensively based on the broadband network and the internet. For Mongolia, the new technology and services entail a greater need for IP–based network infrastructure, along with the need for effective implementation, involving a steady demand for the development and implementation of a national program to create a favorable legal and regulatory environment and to identify required measures and action for the establishment, extension, use, possession and development of a broadband network. As a result of extensive surveying of Mongolia's current broadband network, along with international best practices, Recommendations from ITU and the Broadband Commission, global pacts and Conventions, as well as world trends regarding high–speed broadband networks and potential services deliverables through the network and the awareness of the importance of broadband use, a 5–year National Program (2011–2015) for nationwide implementation has developed and approved by the Cabinet of the Government of Mongolia on 03 May'2011, Resolution number 145.	National plan

List of contributions submitted to Question 10–3/2 (*for action*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
RGQ10-3/2/14	13–Jan–12	Argentine Republic	National Plan for the equipment of rural and border–area schools with satellite antennas	Through this planning we are seeking to bring digital terrestrial television to educational establishments in rural and semi–urban locations, as a tool for social inclusion and for bringing ICTs to those pupils most in need.	National plan (satellite)
RGQ10-3/2/16	20–Jan–12	Malawi	Regulatory Challenges for Rural Telecommunications in Malawi	This contribution presents constraints facing Malawi's rural telecommunication growth and the regulatory challenges to universal access in the country. Malawi Communications Regulatory Authority (MACRA), established under section 3 of the Communications Act (1998) had been charged with the functions of ensuring that as far as it is practicable, reliable and affordable communi–cation services sufficient are provided throughout the country to meet the demand. MACRA's main function is to promote universal access to ICT services in Malawi. MACRA discharges its functions in such a way that it plans how the sector shall be developed in accordance with government policy for the sector. MACRA is mandated not only to plan how the sector shall be developed but also to monitor the growth of the sector. Like in most developing countries, observations have shown that it becomes very difficult to access Internet services in the rural and remote areas in Malawi. Though there has been some remarkable growth for mobile telephony, internet services are not available in most rural and remote areas of Malawi. This disadvantages the people living in the rural and remote areas. This disparity in access to ICT services is one of the challenges which the regulatory authority in Malawi is geared to address.	Case study (universal access)

List of contributions submitted to Question 10–3/2 (*for action*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
RGQ10-3/2/17	08–Feb–12	Nepal (Federal Democratic Republic of)	Draft text for survey: "Developing a global compendium of policy and regulatory initiatives/ interventions for developing telecommu–nications/ICTs /broadband in rural and remote areas"	Telecommunications/ICTs/Broadband has been considered sine qua non for the overall national development. Direct/indirect correlation has been established between meeting the MDGs targets and the availability, use and applications of Telecommunications/ICTs/Broadband. Most of the countries of the world have liberalized the telecom sector. However our experiences suffice to claim that without policy/regulatory interventions/ initia–tives, Telecommunications/ICTs/Broadband can be expanded in the rural and remote areas even in the developed countries. Many governments and regulators around the world have thus intervened with specific policy and regulatory measures so that the rural and remote areas of the country are also provided with Telecommunications/ICTs/Broadband services in a sustainable manner in a competitive prices and quality. This contribution has two parts. The second part of this contribution is an annex to the first part and is a questionnaire to collect information from the ITU member states/sector members to develop a global compendium of such policy and regulatory initiatives and interventions for developing Telecommunica–tions/ICTs/Broadband in rural and remote areas. Once such a compendium is developed, then this can be shared for benefit of the member states.	National Plan, Questionnaire for survey
RGQ10-3/2/18	14–Feb–12	Alcatel–Lucent (France)	Terrestrial wireless technologies for connecting rural communities	It is well known that there is a 'divide' between those with access to broadband solutions and those, typically in more rural areas (but also in non–rural but under–served areas) who have limited or no access to broadband services. It is now considered that the current usage of video for key service applications requires a minimum of 1.5 mega bit per second downlink speed. Even so, recent advances in wireless broadband technologies and regulation provide a large range of solutions for deployment where wired solutions are too expensive or difficult to install, too slow to deploy or not well adapted to usage requirements. These trends in rural telecom deployment solutions are particularly important in developing countries as far as they address technical, social and economic targets. This contribution summarizes a large range of possible solutions deployable in licensed or unlicensed spectrum, either for access or for backhauling purposes, addressing fixed/nomadic as well as mobile connectivity in rural and under–served areas.	New technology (broadband wireless)

List of contributions submitted to Question 10–3/2 (*for action*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
RGQ10-3/2/19	28–Feb–12	Rappor–teurs for Questions 22–1/2 and 25/2	Report on develop–ments at WRC–12 of possible interest to developing countries	The World Radiocommunication Conference 2012 (WRC–12) was held in Geneva, Switzerland from 23 January – 17 February. At the request of Mr. Mokrane Akli, Chairman of Study Group 2, the Rapporteurs were asked to provide a brief summary of the conclusions of WRC–12 that might be of interest to developing country participants at the Rapporteur Group meetings in March 2012. The following represents the personal views of the Rapporteurs and not the views of any administration. Given the short time available to process the results of the WRC, this is only a high–level summary. Participants are encouraged to review the Provisional Final Acts now available on–line: www.itu.int/md/R12–WRC12–R–0001/en. Where possible, this contribution provides references to the Resolution numbers so the complete texts may be more easily located in the Provisional Acts.	Report (WRC–12)
RGQ10-3/2/24	15–Mar–12	Nippon Telegraph and Telephone Corpora–tion (NTT), Japan	Proposal of high–speed/high–quality FWA system which achieves more economical broadband access network in rural areas	In developing countries, it may take a long time before the optical access network is deployed. WIPAS (Wireless IP Access System) is an FWA system which provides high–speed broadband service to such countries quickly and economically. WIPAS has actually commercialized in some countries since 2003. It can be also applied to mobile backhaul (MBH) and several kinds of ICT applications. This contribution proposes that the WIPAS overview, its target applications and deployment examples, which are presented in this document, be considered to be used as materials for the future report on the Question 10–3/2 of ITU–D.	New technology (broadband wireless)
RGQ10-3/2/25	16–Mar–12	Japan	Case studies of rural telecommu–nications/ICT projects	The Government of Japan has set forward various telecommunications and ICT projects for the development in rural and remote areas on bilateral and multilateral basis. This document tries to share some of the recent experiences of such projects. The examples shown in the document are: 1. Pilot project for improved health & medical environment with ICT for rural areas in Lao P.D.R, 2. Broadband farm to market ecosystem for fisherfolk communities in Philippines, and 3. ICT for human development and human security project in 12 countries in the South Pacific.	Case study (e–health, e–agriculture, e–education)

List of contributions submitted to Question 10–3/2 (*for action*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/158	09–Jul–12	BDT Programme 1	Rural Broadband for Developing Countries: Options and Challenges	This contribution provides an overview of a BDT report prepared on rural broadband with a focus on experience of India but equally relevant for developing countries in general. This report focuses on two forces opposing and neutralizing each other to bring broadband connectivity to a situation of stalemate. One is the technological option of developing suitable infrastructure that incorporates both the advantage of advanced technology and at the same time keeps the cost to the level of affordability of the target population in the remote and rural areas. The other is the realization that the cost of connectivity alone cannot ensure acceptance of broadband connectivity by the rural population. For the service provider as a business model it is finally the balance between the revenue and cost. The development perspective, however, has to go beyond the balance sheet and connectivity has to be connected with the development goals with tangible benefits.	Report
2/160	12–Jul–12	Argentina	Satellite Internet connectivity plan for rural schools in Argentina	This document informs participants of the plan to bring Internet connectivity to rural and border area schools in Argentina using satellite antennas.	National plan (satellite)
2/162	24–Jul–12	Madagascar	Rural and remote areas	Realization of the Millennium Development Goals aimed at improving connectivity and access to ICTs for everyone by 2015 requires the development of infrastructure in the rural and remote areas of developing countries, where over half of the world's population lives. This contribution (revision of contribution No. RGQ10–3/2/INF/5) presents some ideas concerning ICTs, economic and technological solutions for rural communities, the regulatory environment required and, globally, the manner in which ICTs can help to improve quality of life in rural and remote areas.	Case study
2/167	27–Jul–12	Madagascar	Widening access to mobile telephone services in Madagascar through the Cloud Phone system	Widening access to mobile telephone services in Madagascar through the Cloud Phone system.	Case study (universal access)
2/168	03–Aug–12	OJSC Intellect–Telecom (Russian Federation)	Inexpensive, sustainable and energy–saving communica–tion infrastructure for rural and remote areas based on the "mobile	This document explains the result of examination of "Mobile cellular network with capacity transfer." The use of the proposed technology reduces the capital and operating cost by two or three times and reduces electricity consumption by 2.5 to four times. In addition, the examination has highlighted that the capacity transfer repeaters are the key element of the network infrastructure in the mobile cellular network.	New technology (broadband wireless)

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No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
			cellular network with capacity transfer"		
2/188	29–Aug–12	Togo	Provision of basic services in rural telephony	The Millennium Development Goals aim to improve connectivity and access to ICT for all by 2015. To achieve these objectives, Togo has implemented several programs to ICT development. The program which is the subject of this contribution is the universal service. Since 2008, the definition of a new strategy of universal service has covered many places in rural areas in order to make available basic telecommunications services to the people of these communities. This contribution aims to share the experiences of Togo in its program of development of ICT in remote rural areas and the difficulties he faced in the field.	Case study (universal access)
2/190	31–Aug–12	Fujitsu Limited, Japan	Application of sensor network for agriculture	There is an increasing demand for ICT application for agriculture in Japan and in other countries. Fujitsu conducted sensor network trials for collecting field data such as temperature and humidity from the vineyards and sweet–corn fields and analyzed harvesting time or used for controlling air ventilation. This document introduces the overview of the trials and our findings and action items for future deployment.	Case study (e–agriculture)
2/198	05–Sep–12	Russian Federation	Proposal of FWA system in 400 MHz for providing broadband wireless access in rural areas	The critical issue in many developing countries is huge gap between urban and rural areas in providing of broadband access services. The Russian Federation has vast territory with difficult climate and long distances between the populated areas. For this reason much attention is paid to connecting rural and remote areas of Russian Federation. In particular Russian Federation has long standing experience in using 400 MHz band for that purpose. The microwave point–to–point radio that uses this band provides low–cost and quick deployment of carrier networks for connection rural and remote areas with low density of populations where fiber or copper cabling is quite expensive or technically impossible. The equipment operates in UHF range and is able to transmit information over long distances up to 100 km. It could be modified to operate in any band in the 300–3000 MHz range. This contribution includes microwave point–to–point fixed link overview, purpose of the system and networking examples. This material is proposed to be included into the Report on Question 10–3/2. Annex 1 contains information on FWA system according to Case Study Library Template. This information has been added to the case study library on Question 10–3/2 via ITU web site section for previous study period.	New technology (broadband wireless)

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No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/219	10–Sep–12	ITU Association of Japan, Japan	A plan of cost–effectively penetrating "real" broadband infrastructure into rural and remote areas in developing countries	This contribution proposes a plan to penetrate a "real" broadband infrastructure at relatively low cost in rural and remote areas in developing countries. The key is lightweight, thin, robust optical cables and their low–cost installation techniques that would open up a new door to penetrate ICT services into such areas thus effectively and quickly closing the digital divide. The plan was presented at TDAG and ASTAP both in 2012, and seventeen countries have so far expressed support in conducting the field trials in their countries. Practical comments and suggestions are invited particularly from developing countries.	New technology (fiber)
2/222	10–Sep–12	Nepal (Federal Democratic Republic of)	Revised draft text for survey: "Developing a global compendium of policy and regulatory initiatives/ interventions for developing telecommunications/ ICTs/ broadband in rural and remote areas"	This document presents the revised draft questionnaire aimed to collect information to develop a compendium to be included in the outputs of the Question.	Questionnaire for survey
2/226	11–Sep–12	Brazil (Federative Republic of)	New Brazilian General Plan for Universal Service – PGMU and 450 MHz	The Brazilian General Plan for Universalization brought great advance for fixed telephony in rural areas in Brazil. After its update, there are new goals for individual and collective access in rural areas with the use of 450MHz that need to be implemented country wide until December 2015.	National Plan (Universal Service)
2/228	12–Sep–12	Tanzania (United Republic of)	Status of eHealth in the United Republic of Tanzania	This document reviews the status of current and on–going initiatives by the Government of Tanzania on e–health services. Having completed the implementation of national fiber optic backbone that connect all regions, during year 2011 and 2012, the Minister of Communications, Science and Technologies convened several meetings with stakeholders to deliberate e–health issues. He also formed a National Committee to oversee the implementation of e–health services which will start to ensure five hospitals are connected before the end of 2012. This paper provides brief overview on two major pilot projects which has been planned to take place this year and the way forward	Case study (e–health)
2/237	18–Sep–12	General Secretariat	Broadband Commission presentation	The Broadband Commission for Digital Development was established by ITU and UNESCO in response to UN Secretary–General Ban Ki–Moon's call to step up efforts to achieve the MDGs. Launched in May 2010, the Commission comprises government leaders from around the world and top–level representatives and leaders from relevant industries and international agencies and organizations concerned with	Report

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				development. The Broadband Commission embraces a range of different perspectives in a multi–stakeholder approach to promoting the roll–out of broadband, and provides a fresh approach to UN and business engagement. To date, the Commission has published a number of high–level policy reports, as well as a number of best practices and case studies to promote the roll–out of broadband networks and services in developing countries to help achieve the MDGs.	
RGQ10-3/2/27	16–Oct–12	ITU–R Study Groups – Working Party 5D	Liaison Statement to ITU–R Working Parties 4B and 5C, ITU–T SG 13 Question 15/13 and ITU–D SG2 Questions 10–3/2 and 25/2, on the Appointment of Sub–Working Group Handbook Chairman and Work Progress	At its 14th meeting, Working Party 5D has appointed Dr. Bienvenu A. Soglo as chairman of Sub Working Group Handbook. WP 5D concurs with this initial organization and has considered placement of material and made modifications included at the appropriate location in the revised working document (Att. 3.13 to Document 5D/196).At this meeting, WP 5D also revised the work plan (Att. 3.14 to Document 5D/196) for the development of the handbook. Both working document and work plan are attached to this document. The meeting participants are invited to consider this document.	Report
RGQ10-3/2/28	08–Jan–13	Rwanda (Republic of)	Access to telecommunication/ICT services by persons with disabilities and with special needs	According to the World Health Organization (WHO), it is estimated that 650 million people in the world live with some type of disability; 80% of the people live in low income countries such as East Africa member states and the number continues to grow creating survival challenges due to over dependence. As the world continues to witness the dynamism in the growth of ICT sector, it should be noted that greater social inclusion needs to be considered at all levels for sustainable ICT growth, economic development and reduction of dependence that results from excluding people/consumers with special needs and hence negating efforts put in development. This contribution puts forward some policy and regulatory remedies in order to improve access to services by people with disabilities and gives also current status of projects which gives access to telecommunication/ICT services for persons with disabilities and with special needs in Rwanda.	Case Study (e–health)

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No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
RGQ10-3/2/31	04–Feb–13	International Telecommunications Satellite Organization (ITSO)	Reference and resource for the Draft Report on Question 10–3/2	This document contains a Report from an ITU–ITSO workshop on "Satellites: A Solution for Broadband Access" that is relevant to the implementation of universal access to broadband services worldwide. The outcomes of this seminar may be useful to consider for the work towards a revised version of the Draft Report, particularly in elaborating sections of the report related to the role of satellite communications in broadband deployment plans and policies.	Report
RGQ10-3/2/32	09–Feb–13	International Telecom–munications Satellite Organization (ITSO) International Mobile Satellite Organization (IMSO) European Telecom–munications Satellite Organization (EUTELSAT IGO)	Satellite Solutions for Digital Inclusion	Given their special characteristics, rapid deployment and ubiquitous coverage, satellite–based solutions have been increasingly utilized to help achieve universal broadband coverage, particularly for remote and rural areas where terrestrial infrastructure is limited, as well as providing coverage of the oceans, where other infrastructures are obviously unavailable. In light of the importance of the work of the UN Broadband Commission to the implementation of the Work Plan for Study Question 10–3/2, the co–authors invite the Rapporteur Group to consider the attached extracts from the Broadband Commission's Report – State of Broadband 2012: Achieving Digital Inclusion for All when developing the Draft Report.	Report
RGQ10-3/2/34	29–Jan–13	International Telecommunication Academy (Russian Federation)	ITU–D Study Group Question 10–3/2: Survey on Policy and Regulatory Initiatives for Developing Telecommu–nications/ ICTs/Broad–band in Rural and Remote Areas	In response to the above survey on policy and regulatory initiatives for developing telecom–munications/ ICTs/broadband in rural and remote areas, we propose an analysis of the situation in the Russian Federation and put forward a number of initiatives by the International Telecommu–nication Academy with a view to achieving improvements in this sector.	Report
RGQ10-3/2/35	26–Feb–13	KDDI Corpora–tion	Contribution to Case Study Library: Mobile WiMAX in Japan	This contribution is modified content of "Mobile WiMAX in Japan" for the new case study library.	Case Study (broadband wireless)

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No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
RGQ10-3/2/36	03–Mar–13	Marshall Islands (Republic of)	Contribution to Case Study Library: Livelihood opportunities and culture preservation through a sustainable and eco–friendly ICT telecenter	This contribution is about a ICT development project in Mejit Island, one of the many under developed islands in the Marshall Islands. The Ministry of Transportation and Communications (MOTC) in cooperation with Mejit Local Government would create a COPRA COOPERATIVE or similar SUSTAINABILITY plan to stimulate the economic growth in the island, at the same time educating the community and the youths. Femto technology is the proposed solution for the outer island as an alternative to the expensive setup of GSM configuration which requires airconditioning unit and high cost of equipments.	Case Study (broadband wireless)
RGQ10-3/2/38	05–Mar–13	SES WORLD SKIES (Nether–lands)	Emergency.lu Rapid Response Communi–cations Solution	Natural or man–made disasters and humanitarian emergencies often require rapid deployment of communications solutions to restore connectivity. Due to the volume of data required to coordinate a response, broadband connectivity is becoming increasingly essential to effective disaster response. Luxembourg companies have partnered with the Ministry of Foreign Affairs of Luxembourg to form emergency.lu, a satellite communication solution that can be installed within hours of a disaster. emergeny.lu has been useful in supporting humanitarian missions in South Sudan and Venezuela, and in providing training exercises for emergency aid workers	Case Study (emergency communica–tion, satellite)
RGQ10-3/2/44	27–Mar–13	Qualcomm Incorpo–rated (United States of America)	Contribution to Case Study Library: Mobile Health Information System: Providing access to information for health care workers	Through a collaboration of Qualcomm Wireless Reach, FHI 360, Eastern Cape Department of Health, MTN, Nelson Mandela Metropolitan University, and South Africa Partners, nurses and doctors in the East London Health Complex are using 3G wireless technologies to receive the latest health information and provide better care to their patients.	Case Study (e–health)
RGQ10-3/2/45	27–Mar–13	Qualcomm Incorpo–rated (United States of America)	Contribution to Case Study Library: Mobile Microfranchi–sing & AppLab Project in Indonesia	In Indonesia, underserved residents, most of whom are women, are using mobile technology to access unique business opportunities and gain the skills needed to lift themselves out of poverty. Implementing partner Grameen Foundation, through its Mobile Microfranching and Application Laboratory (AppLab) initiatives, is working with Qualcomm Wireless Reach and Ruma, a social enterprise that empowers the poor using mobile phone technology, to establish a multi–tier suite of data services that can be accessed via two distribution channels: (1) Ruma Entrepreneurs, a human network of mostly women who own and operate mobile microfranchise businesses, and (2) commercially available phones in the mass market.	Case Study (e–business)

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No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/267	5–Jun–13	ITU–R Study Groups – Working Party 5A	Liaison Statement from ITU–R WP5A to ITU–D SG 2 on the use of spectrum and radio technology low cost sustainable telecommu–nication infrastructure for rural communica–tions in developing countries	This document contains an incoming liaison statement from ITU–R WP5A, concerning the use of spectrum and radio technology low cost sustainable telecommunication infrastructure for rural communications in developing countries. It is sent for information to the ITU–D/ITU–R Joint Group for Resolution 9 (Rev. Hyderabad, 2010) and ITU–D Study Group 2.	Statement
2/297	9–Jul–13	General Secretariat	UNGIS Joint Statement on the Post 2015 Development Agenda	In keeping with its mandate to promote policy coherence and programme coordination in the UN system, as well as provide guidance on issues related to information and communications technologies (ICTs) in support of internationally agreed development goals, the 30 members of the UN Group on the Information Society (UNGIS) will respectfully submit a joint statement to the UN Secretary General and the UN Task Team. The statement is a collective contribution to the dialogue on the Post–2015 Development Agenda, a unified effort to harness inter–agency expertise and experience to support deliberations on Post–2015 priorities, and a united commitment to a UN community poised to address development challenges in the 21st century. Reference: www.ungis.org/Portals/0/documents/JointInitiatives/UNGIS.Joint.Statement.pdf	Statement
2/306	22–Jul–13	ITU–R Study Groups – Working Party 5D	Liaison Statement from ITU–R WP5D to ITU–D Study Group 2 on the use of spectrum and radio technology low cost sustainable telecommu–nication infrastruc–ture for rural communica–tions in developing countries	(COPY TO ITU–D study group 2 and ITU–R WP 5a FOR INFORMATION) Working Party 5D endorses the liaison statement from Working Party 5A in Document 5D/331 in response to the liaison statement from ITU–T Study Group 5 in Document 5A/211 “Use of spectrum and radio technology low cost sustainable telecommu–nication infrastructure for rural commu–nications in developing countries”. As also advised by ITU–R WP 5A, we agree that spectrum and radio technologies are clearly within the mandate of ITU–R and not ITU–T.	Statement

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No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/312	29–Jul–13	Egypt (Arab Republic of)	Evaluating different access technology options	This contribution presents the summery of studies and consultations of "Evaluating Different Access technology options" performed by national telecommunications regulatory authority of Egypt in collaboration with vendors and some independent consultancy firms. The contribution consists of five major parts. The first part describes the purpose of such studies. The second parts identify the scope of the study. The third part demonstrates the assessment criteria. The fourth part includes the technology evaluation and analysis of the results and the last part highlights the key findings.	Report
2/322	18–Aug–13	China (People's Republic of)	WLAN Coverage solutions in rural China	The distribution of broadband users in rural China is dense at micro level while scattered from the macro perspective, and the wired network resource in remote villages is extreme inadequate. Contrary to the fixed broadband access network, WLAN with limited mobility, high bandwidth and low building cost, can be flexibly deployed and utilized, which means WLAN tends to better satisfy the broadband data access demand in rural areas. This contribution describes 3 kinds of WLAN Solutions in Rural China and transportation technologies for rural WLANs.	Case study
2/339	6–Sep–13	Qualcomm Incorpora–ted (United States of America)	Contribution to case study library: Fishing with 3G Nets (Environment and Entrepreneurs hips Project)	Qualcomm Wireless Reach™, Telefonica Vivo Foundation, the United States Agency for International Development, Editacuja Publishing and the Instituto Ambiental Brasil Sustentavel (IABS), a Brazilian environmental nonprofit organization, are collaborating on a project to promote sustainable social and economic development in fishing communities in the city of Santa Cruz Cabralia, in northeastern Brazil, through digital and social inclusion. Fishing is one of the main economic activities in the region and provides a living for families who have been in the business for years using techniques inherited from their ancestors. Over fishing, coupled with the lack of investment, has resulted in diminishing opportunities, reducing the income of the fishing communities and resulting in the emigration of young people to other cities in search of jobs. The project 'Fishing with 3G Nets' aims to support the implementation of new economic activities through the use of 3G connected smartphone and tablet applications.	Case study
2/340	6–Sep–13	Qualcomm Incorpora–ted (United States of America)	Contribution to case study library: Let's Get Ready! Mobile Safety Project	Qualcomm Wireless Reach™ and Sesame Workshop, the nonprofit educational organization behind Sesame Street, are collaborating on a 3G mobile safety project to help families with young children in China learn about emergency preparedness. The "Let's Get Ready!" project uses a 3G mobile website, mobile application and fun content featuring Sesame Street characters to create an interactive and engaging learning experience for children ages 3–6 and their caregivers. The project emphasizes the importance of knowing your name and address, having an emergency plan, packing an emergency kit, and learning about people and places within the community that can help in an emergency.	Case study

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No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/INF/3	03–Sep–10	Korea (Republic of)	The INV (Information Network Village) Project	The INV project was created by the Ministry of Government Administration and Home Affairs (MOGAHA), now restructured and renamed as MOPAS (Ministry of Public Administrations and Security), in order to allow the public in remote areas to have easier access to content on, for instance, education, medical information, and agricultural skills to reduce the digital gap between geographical locations. It also enables direct supply of local products to consumers. The project plays an important role in boosting the local economy and in balancing regional development, which have been among the main objectives of the national agenda in Korea. At the beginning, the government took a cautious approach to avoid a potential waste of resources by using a step–by–step strategy. From August 2001 to May 2002, the first phase of the project had been carried out involving 25 villages which are mainly located in agricultural and fishing areas. Since it was launched, the project has gone through 8 phases until the end of 2009, with each phase taking a year.	Case study (broadband access)
2/INF/4	06–Sep–10	TURK TELEKOMUNIKASYON A.S.	Turkey's rural transforma–tion project	By the increasing importance of ICT regarding the development of economies, especially in developing countries, telecommunication investment for rural and remote areas should be considered as a strategic vehicle to overcome the social, cultural and economic bottlenecks towards an integrated economy. In this context, Turk Telekomunikasyon Group has taken this issue on its agenda since 2007 and invested heavily over a wide range of Turkey with the inferior conditions and limited access to common welfare. In the scope of this project, fixed division of Turk Telekom Group achieved the rural transformation of the telecom infrastructure successfully in a shorter time period and made it ready for Next Generation Network.	Case study (NGN)
2/INF/7	07–Sep–10	Republic of Korea	Korean Case Study of Inducing Middle–aged People to Use Internet	There are two types of internet population growth model: equilibrium and disequilibrium. Disequi–librium may cause digital divide. Generally young people are very good at new trend but old people are not. So the main issue is how to induce the old group to join the internet population. Here is one effort, as an equilibrium model, from the Korean government for bridging digital divide between generations. The Korean government task force group studied the profile and requirement of the lagging group and found killer application for them, along with learning opportunities on PC operation. And the private sector developed service applications needed.	Case study

List of contributions submitted to Question 10–3/2 (*for information*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/INF/16	06–Jun–11	ITU–T Study Group 5	Response on the request for information regarding up–to–date power supply solutions for telecommu–nications/ICT infrastruc–ture for rural and remote areas	ITU–T Study Group 5, Question 22/5 will share the requested information with ITU–D Study Group 2 Question 10, 22 and 25 once this material becomes available.	Report
2/INF/21	20–Jul–11	Cameroun	The new legislative and regulatory environment for electronic communi–cations	This document is submitted for information, gives some developments of the reform of telecommu–nications and ICT business in Cameroon there are more than 10 years.	Case study (ICT policy)
2/INF/25	08–Aug–11	Republic of the Marshall Islands	Livelihood Opportuni–ties and Culture Preservation through a Sustainable and Eco–Friendly ICT Telecenter	Mejit Island is one of the many under developed islands in the Marshall Islands that has 80 households (300–400 inhabitants), more or less, living on a 0.72 square miles of land mass, and roughly 1 mile stretch from end to end of the inhabited area. The inhabitants have a little means of livelihood, or even none. Most of them only rely on their daily sustenance from crops and riches of the ocean. Mejit is known for their special kind of weaving pattern. Leaf–weaving is one of the cultures that the Marshallese need to carry on to the next generation. With the deployment of ICT in the island, this will attract tourist and prospected international investors to the leaf weaving and rope making with the proper information campaign. The rope making culture is dying right now and the government leaders must act to preserve the culture through the use of ICT, and e–learning. Mejit is one of the islands that is deprived of computer access due to economical circumstances, this depriving them from education. As for communication, the only means is through HF radio. This has been there for more or less two (2) decades now. The Ministry of Transportation and Communications (MOTC) in cooperation with Mejit Local Government would create a COPRA Cooperative or similar Sustainability Plan to stimulate the economic growth in the island, at the same time educating the community and the youths. Educating the public thru ICT also includes the preservation of the natural habitat and this is the same reason we will harness the power of the sun and wind. Internet access can be done by	Case study (broadband access)

List of contributions submitted to Question 10–3/2 (*for information*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
				"internet access scratch card" for those who have their own computers with wireless access since WIFI will be deployed to cater to business, individuals, and tourists. With the deployment of both hardware and software mechanism, this will minimize the need for telecenter accountants or cashiers. MOTC will have an ICT awareness training program for the teachers that would be dispatched to the Mej.	
2/INF/26	09–Aug–11	Korea Communi–cations Commi–ssion (KCC) (Republic of Korea)	Broadband Internet in Rural and Remote Areas of Korea	Rural broadband has been completed in Korea through the cooperation of private telecoms operator (KT, former state–owned operator) and the Government (central and local) by 2008 and currently Next Generation Network is under construction in the rural areas. KT's cooperation was ensured by the 'Decree of Universal Service Obligation of KT' which has been prepared to impose KT to fulfill the duty of rural broadband internet connectivity even after the privatization of KT. However, broadband construction in the far remote areas such as the village of less than 50 households could be a financial burden for KT and therefore, the Korean Government has decided to provide financial subsidies for the construction of broadband networks for deep remote areas. The financial subsidy has amounted to 50% of the total construction cost and it was shared by central and local Government by half and half. This policy has enabled households in rural areas to subscribe broadband internet at the same price with same quality as urban households. KT has been cooperative on this project since KT, as a nation–wide operator, can compensate the profit loss in the areas where a few household subscribes broadband with the profit gained in other areas where sufficient subscribers are secured.	Case study (broadband access)
2/INF/34	9–Aug–11	Congo (Democra–tic Republic of)	ICT communica–tions in remote rural areas	The problem of telecommunications in the DRC still arises due to lack of adequate infrastructure that allows for a harmonious development. Though the installation of the long–awaited fiber optic cable has been completed, operation drags for reasons unknown.	
2/INF/36	15–Aug–11	Bangladesh Teleco–mmunica–tion Regulatory Commi–ssion (Ban–gladesh)	Statistics and Strategic Action Plan of Telecommu–nication/ICT Development in Bangladesh: Rural and Remote Areas	This contribution provides information on Bangladesh's status with respect to access to technology for broadband telecommunications including IMT. It also covers relevant information regarding telecommunication and ICTs for rural and remote areas of Bangladesh.	Case study (broadband access)

List of contributions submitted to Question 10–3/2 (*for information*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/INF/38	05–Aug–11	Pakistan	Telecom/ICTs for Rural and Remote Areas – Universal Service Experience of Pakistan	The document is presented to share the experience of Ministry of Information Technology and other stakeholders in the successful roll out of telecommunications/ICT services in rural and remote areas of Pakistan through the Universal Service Policy framework and corporate structure (Public – Private Partnership). The document also enlists the challenges faced by Ministry of Information Technology and stakeholders in the actual implementation of the programme. Member states may be encouraged to share their experience in this regard.	Case study (universal access)
2/INF/41	10–Aug–11	Uganda	Uganda's Approach to Implemen–ting Broadband Connectivity in Underserved Areas	This document presents Uganda's Approach to Implementing Broadband Connectivity in Underserved Areas and Uganda's Universal Access Policy (2010) (available at: www.ucc.co.ug/rcdf/rcdf–Policy.pdf). Internet penetration, access and usage in Uganda is still very low. This is also largely confined to urban commercial centers. Although Uganda's previous universal access policy had supported the installation of Internet points of presence in all the underserved districts, the internet bandwidth speeds and quality of service issues has been of major concern by the end users. Therefore the new policy objective is expected improve broadband uptake in selected underserved areas as a pilot case. The pilot project will offer experiences for developing a national broadband policy and strategies for its implementation.	Case study (broadband access)
2/INF/55	09–Sep–11	Japan	Overview of Fixed and Mobile Broadband environment in Japan	Japan would like to inform the meeting about the situation of Fixed and Mobile Broadband services, especially LTE services delivered by NTT DoCoMo.	Case study (broadband wireless)
2/INF/74	14–Sep–11	Teleco–mmunica–tion Standardiza tion Bureau	Future Networks by ITU–T	The attached presentation provides an overview of the work of ITU–T Study Group 13 and the dedicated Focus Group on Future Networks.	Report
2/INF/76	14–Sep–11	Türk Telekom Group, Turkey	Fiber Effect	The attached presentation provides an overview of the correlation between fibre, broadband penetration and incomes and how fibre can accelerate the growth of the broadband incomes.	Case study (optical fiber)

List of contributions submitted to Question 10–3/2 (*for information*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
RGQ 10-3/2/INF/4	22–Dec–11	The Abdus Salam Interna–tional Centre for Theoretical Physics	ICTP's Fifteen Years Experience in ICT Training and Dissemina–tion	The Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy, has been active in knowledge dissemination, focusing on training of young scientists that could diffuse the acquired knowledge further in their native regions. ICTP has been playing a leading role in the field of training in ICT for developing countries. In the last fifteen years, more than 40 training activities on wireless networking have been organized both in house as in–situ. Several projects have been developed starting from training activities, and the knowledge acquired has been widely disseminated.	Case study (training)
RGQ 10-3/2/INF/5	30–Jan–12	Madagas–car (Republic of)	Contribution of Telecommu–nications / ICT to improve the quality of life in rural and remote areas	To achieve the Millennium Development Goals aimed at improving connectivity and access to ICT for all by 2015, it is essential to develop infrastructure in rural and remote areas of developing countries, where there is more than half of the world population. This paper presents some ideas on ICT technology solutions for rural economic and regulatory environment necessary and generally how ICT can improve the quality of life in rural and remote areas.	Case study (universal access)
2/INF/79	16–Jul–12	BDT Programme 1	Status Report on the Implementa–tion of ITU Conformance and Interopera–bility (C&I) Programme	PP–10 Resolution 177 endorsed the objectives of WTSA–08 Resolution 76 and WTDC–10 Resolution 47 as well as the recommendations of the Director of TSB endorsed by Council–09, and asked "that this programme of work be implemented in parallel without any delay." In January 2012 the Assembly of the Radiocommunication sector of ITU approved the Resolution 62 titled "Studies related to testing for conformance with ITU R Recommendations and interoperability of radiocommunication equipment and systems on conformity and interoperability" so that all the sectors, now, have a resolution on this topic. A Business Plan on C&I, based on four pillars, has been developed by KPMG, a consultancy with excellent credentials in business plan preparation and the results of the studies will be presented to the next ITU Council. Within the ITU Secretariat, a C&I Task Force has been set up with participation of representative of all ITU Bureaux to mobilize resources internally and co–ordinate the implementation of the four pillars. This document summarizes the status of imple–mentation of the respective Resolutions.	Report

List of contributions submitted to Question 10–3/2 (*for information*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/INF/082	07–Sep–12	Japan	Country case study: Pilot project for the improved health & medical environment with ICT for rural areas in Lao P.D.R.	This document tries to share the information of the ICT project, "Pilot project for improved health & medical environment with ICT for rural areas in Lao P.D.R", which was introduced in the Document RGQ10–3/2/25–E, in the format provided in the Document 2/195–E.	Case study (e–health)
RGQ 10-3/2/INF/07	25–Mar–13	OJSC Intellect–Telecom (Russian Federation)	Energy effective and low cost technology for wireless broadband access and GSM cellular networks	This document presents the next step of development of the "Energy effective and low cost technology for wireless broadband access and GSM cellular networks", for real 450 km motor road in Nizhny Novgorod region and the Northern part of the town of Gornoaltaysk in Russia. Energy saving effect of these projects is no less than 2–3 times, confirming the indexes shown in documents C–094, C–0168.	New technology (broadband wireless)
2/INF/83	19–Jul–13	Bhutan (Kingdom of)	Case Study: WiMAX and FiberWiFi Broadband in Rural Areas of Bhutan	This document is related to the Broadband Pilot Project Report. Pilot project clients in all fours geogs (villages) prior to the pilot project were using 3G data card or subscribed to mobile internet to access Internet. People in these geogs had to travel more than half a day to access Internet. Given the lack of IT literacy and technical know–how in the geogs, for the project connectivity until the customer premises is managed by Tashi InfoComm Limited (TICL). To ensure project sustainability, TICL will manage the business aspect of project without any intervention from department. Broadband through WiMAX provided easy and fast deployment in the geogs, than fiber optic cable.	Case Study
2/INF/84	1–Aug–13	India (Republic of)	Innovative technological solution for broadband use in rural areas – Data Rural Application Exchange (D–Rax from C–DoT)	The contribution is a case about an innovative project in making broadband services accessible to rural masses with low literacy and ICT skillsets challenges. The objective of this contribution is a case study of a product from CDoT1 that exclusively developed to take care of limitation of ICT skillsets in rural people. The product is significant as it deals with one of the fundamental issues i.e. lack of ICT skillsets and literacy rampant for large masses to benefit from the broadband services to exploit the opportunities for their socio economic development.	Case Study
2/INF/85	1–Aug–13	India (Republic of)	A concept paper on setting up of Tele–education Network in developing countries	The contribution is a case on implementation of Tele–education project through Pan – African E–Network Project by M/s Telecom Consultants of India Limited, a Government of India Enterprise. The project has been very successful and won several awards for innovation. This model could be used as an example for providing educational services through ICTs in the developing countries.	Case Study

List of contributions submitted to Question 10–3/2 (*for information*)					
No.	**Date**	**Source**	**Title**	**Abstract**	**Remarks**
2/INF/86	1–Aug–13	India (Republic of)	Successful e–initiative for rural people in remote North Eastern part of India – Active com–munity participation for sustainability	The contribution briefly analyzes key factors of two successful e–initiative of ICT projects for rural poor in North Eastern part of India, with a view to frame a sustainable strategy for ICT deployment in the backward regions. The community participation (mainly of rural tribal women) for framing policies and their active involvement throughout implementation of ICT projects had become mandatory for any sustainable development in the remote tribal areas.	Case Study
2/INF/88	9–Aug–13	Japan	Country Case Study: Telecommu–nications/ICT development by ad–hoc communica–tions network for rural Shiojiri City in Nagano prefecture (Japan)	This document shares information on the ICT project, “Telecommunications/ICT development by ad–hoc communications network for rural Shiojiri City in Nagano prefecture, Japan”, which was introduced during the April 2013 meeting (Document RGQ10–3/2/48–E) and using the new case study format provided in the Document 2/195.	Case Study
2/INF/92	20–Aug–13	Côte d’Ivoire (Républi–que de)	Evolution of the regulatory and institutional framework in the field of Telecommuni cations / ICT in Côte d'Ivoire	This paper has the following two main objectives: i. Briefly present the evolution of the regulatory reform and institutional framework of Teleco–mmunications / ICT in Côte d'Ivoire; ii. Allow an update of information on the experience of Côte d' Ivoire, in the reports for the issues discussed in the committees Studies 1 & 2 of the ITU–D.	Case Study
2/INF/93	16–Sep–13	Telecom–munication Develop–ment Bureau	Case Study submitted to the Case Study Library: Satellite broadband supporting elections in Burkina Faso	This document contains a case study that was submitted by SES World Skies (Netherlands) to the Case Study Library on “Satellite broadband supporting elections in Burkina Faso”. In December 2012, SES Broadband Services provided satellite broadband services for the parliamentary and municipal elections in Burkina Faso.As part of the agreement with the Independent National Elections Committee (CENI) in Burkina Faso, SES Broadband Services and its partners Newtec, Access Sat and Unicom provided satellite equipment and bandwidth to enable connectivity between the 45 electoral district offices, which serve as the hubs for 14,698 polling stations across the country, and the central election office in the capital, Ouagadougou. The system was used for video conferencing, video surveillance, Internet access, and fast and secure communication of ballots.	Case Study

Annex 2: Analysis of questionnaire replies for global survey on policy initiatives/interventions on telecommunications/ICTs/broadband development

1 Survey background

The overall aim of ITU–D Study Group 2 Question 10–3/2 is to study "the range and scope of techniques and solutions that are expected to play a significant role in the provision of e–application services for rural and remote areas." In order for the Question to successfully complete its work for the 2010–2014 further input is needed from the ITU membership on techniques that can be used to best deliver the range of services, and applications required by rural and remote communities and adapted to the needs of their users.

2 Survey objectives

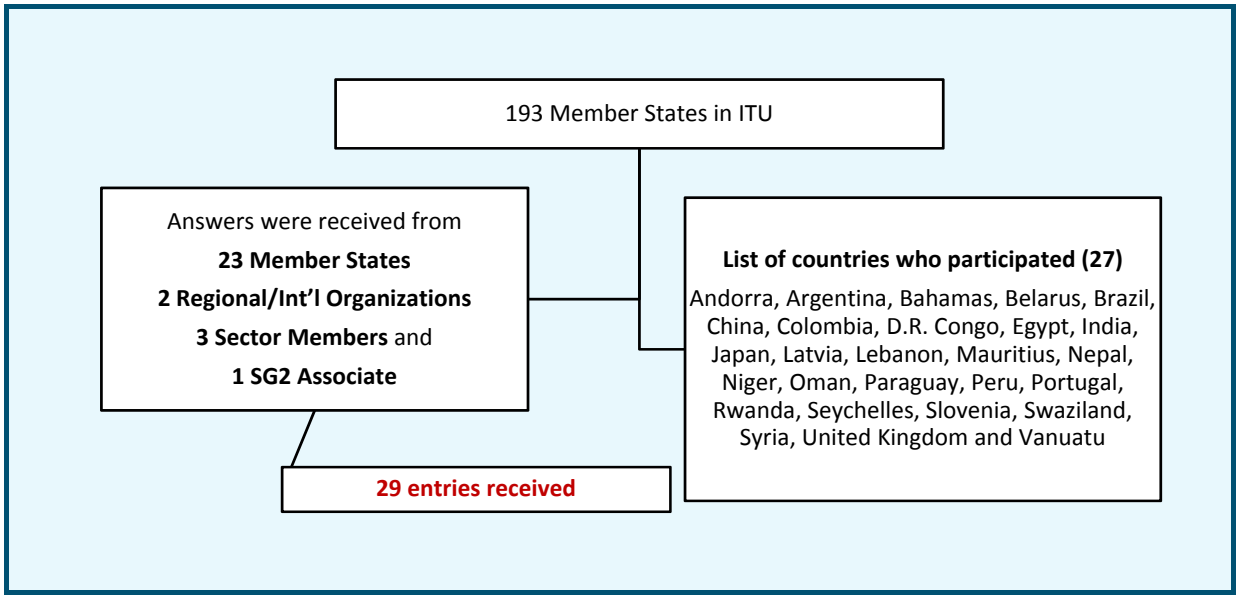
The purpose of this survey is to gather detailed information on policy and regulatory measures that have been taken by the governments around the world and economic and business models for telecommunication/ICT growth in rural and remote areas. The survey also seeks to collect information on possible impact and analysis of such interventions/initiatives.

The input received through this survey will be used as part of the outputs of the Question for the 2010–2014 study period, intended to assist countries in strengthening their capacity to address challenges for the development of telecommunications/ICTs/broadband in rural and remote areas.

3 Survey range

The Questionnaire was sent to Administrations of ITU Member States and Observer (Res. 99), ITU–D Sector Members, Associates and Academia, Management Teams for ITU–D Study Groups 1 and 2, and Observers (Regional and International Organizations).

Total of 29 entries from 27 countries were received.



Among 29 entries received, entries received from Sector Members and Regional/Int'l Organizations are; Cellular Operators Association of India, United Kingdom Telecommunications Academy (International), AHCIET, ABI Research (United States), The Egyptian Company for Mobile Services and Cable Bahamas Limited

4 Survey Questions

The questions asked in the survey were as below;

CONTACT INFORMATION

a. Contact details

b. Please select the name of your Administration/Organization from the list.
(If it is not available, indicate the name in the field below the list)

c. Region where your organization is based:
Africa
The Americas
Asia and Pacific
Arab States
CIS countries
Europe

d. Country/countries where your organization is based

SURVEY

1 Is there a formal definition of 'rural' or 'remote' areas?
Yes
No

1A If yes, please provide the definition(s).

1B If no, how do you handle policy related issues pertaining to telecommunications/ICTs /Broadband in rural and remote areas? (Please specify the present situation and eventual future policies)

2 Is there any specific government policy on Telecommunications/ICTs/Broadband development in rural and remote areas?
Yes
No

3 If a government policy does exist, please specify which one:
Telecommunications in rural and remote areas
ICTs in rural and remote areas
Broadband in rural and remote areas
Other

4 What are the major features of such a policy? (Please make 2 or 3 proposals of these features)

5 If no specific government policy on Telecommunications/ICTs/Broadband exists, how are the issues of Telecommunications/ICTs/Broadband in rural and remote areas being handled?

6 Is this a part of the national telecommunication/ICTs/broadband policy?
- Yes
- No

7 If it is part of the national telecommunication /ICT/Broadband policy, what provisions are made in the broad policy framework?

8 If it is not part of the national telecommunication /ICT/Broadband policy, is there any project in the future for it to be come part of it?
- Yes
- No

Please specify in either case: _____

9 Is the Telecommunications/ICTs/Broadband in rural and remote areas considered a universal service/access obligation?
- Yes
- No

10 If it is, how is that obligation defined?

11 Is there a provision of Universal Service Fund or similar type of fund for the development of Telecommunications/ICTs/Broadband in rural and remote areas?
- Yes
- No

12 If such a provision exists, how are the funds collected?
- As a % of annual Gross Revenue
- As a fixed amount every year from the operators providing telecom services, etc.
- As committed by the service provider during licensing process
- Other scheme

If "Other scheme" was selected, please specify: _____

13 Who is responsible for disbursement in question 12?
- The government ministry
- The telecom regulator
- A separate body established for this purpose
- Other provision

If "Other provision" was selected, please specify: _____

14 Who is responsible for managing those funds?
- The government ministry
- The telecom regulator
- A separate body established for this purpose
- Other provision

If "Other provision" was selected, please specify: _____

15 What kind of economic model is being employed for the development of Telecommunications/ICTs/Broadband in rural and remote areas?
- Free market
- Capital subsidy provided for existing operator
- Capital and ongoing subsidy for existing operator
- Other

If "Other" was selected, please specify: _____

16 What kind of business model is being developed?

Government owned incumbent operator mandated to provide the service
Public–Private Partnership model (Private operators with capital subsidy)
Private Operators with no subsidy but with other regulatory incentives
Multi–stakeholders partnership model
Other model

If "Other model" was selected, please specify: _____

17 How is major backbone infrastructure being developed in rural and remote areas? There is a National Broadband Network funded by:

Government's special budget
Through the USO fund
Any other sources such as donor agencies' assistance
Other source for funding
Operators are building their own backbone network in isolation
Operators are sharing their backbone networks
Other scheme

If "Other source for funding" was selected, please elaborate: _____
If "Other scheme" was selected, please specify: _____

18 Do you have any specific policy, legal and/or regulatory framework for infrastructure sharing, especially in the rural and remote areas, for example optical fiber cable and BTS/Microwave towers and the related support infrastructures?

Yes
No

19 If such a framework exists, who issues such instruments?

Government
Regulator
Other competent authority

If "Other competent authority" was selected, please specify: _____

20 Are there any instances of infrastructure sharing even in the absence of such instruments mentioned in Question 9–3/2?

Yes
No

If yes, please elaborate: _____

21 Are you planning to bring such guidelines to address the rural challenges?

Yes
No

22 Does your government provide any kind of tax rebate for import of equipments for providing Telecommunications/ICTs/Broadband in rural and remote areas?

Yes
No

23 Do the license conditions oblige the Operator/Service provider to provide service in rural and remote areas?

Yes
No

24 Do you provide a specific rural/remote area license to Telecommunications/ ICTs/Broadband providers in rural and remote areas?

Yes
No

25 If you answered yes to question 24, are these providers allowed to provide services in urban areas once rural and remote obligations are met?

Yes
No

26 What backhaul/backbone technologies are being used in your country for connecting rural and remote areas ? Please tick all that applies

Satellite/V–SAT
Optical Fiber
Cable
Terrestrial Microwave
Wireless such as WiFi, WiMax, LTE, etc
Other technology
If “Other technology” was selected, please specify: _____

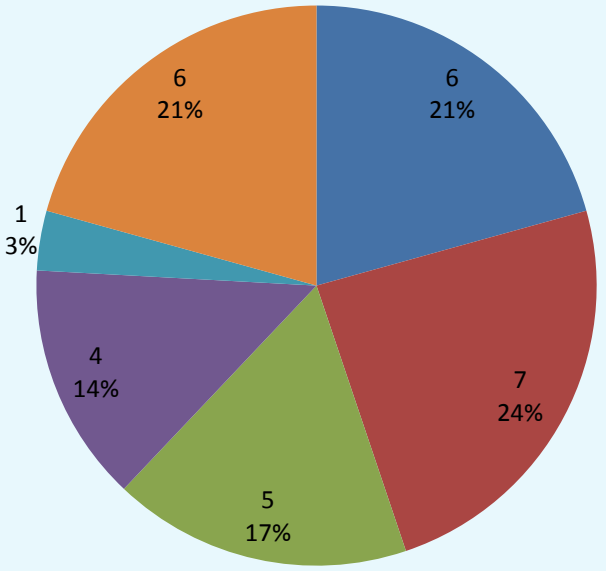
27 What access technologies are being used in your country for connecting rural and remote areas ? Please tick all that applies

Copper
Cable
Fibre
Fixed Wireless Acess
Mobile such as GSM,CDMA, etc.
Broadband such as 3G, WiMax, 4G, etc.
Other technology
If “Other technology” was selected, please specify: _____

28 If there is any other specific policy/regulatory intervention/initiatives by your government or regulator–please elaborate.

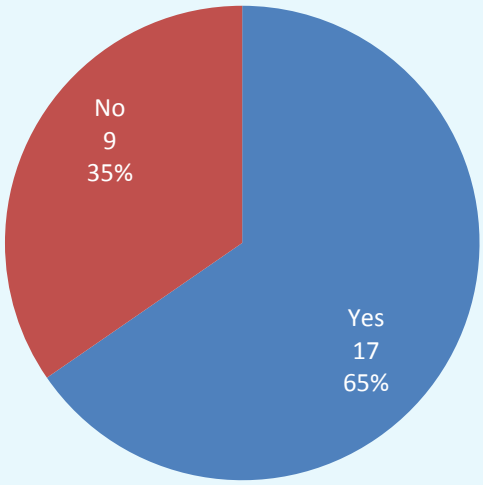
5 Survey Results

0 Region where your organization is based:



Development level of responding countries	
Developed countries	24.14%
Transition countries	3.45%
Developing countries	55.17%
Least developed countries	17.24%

1 Is there a formal definition of 'rural' or 'remote' areas?



By level of development	
Developed countries	60%
Transition countries	100%
Developing countries	60%
Least developed countries	80%

*28 organizations from 26 countries replied to this question
*replies merged when multiple organizations in same country replied.

1.a If yes, please provide the definition

United Kingdom Telecommunications Academy (UKTA) (International)	UKTA is committed to providing eEducation on Policy & Regulation to the Least Developed Countries of the World.
ABI Research (United States)	The Rural Definition was introduced in 2004 as a joint project between the Commission for Rural Communities (CRC – formerly the Countryside Agency), the Department for Environment, Food and Rural Affairs (Defra), the Office for National Statistics (ONS), the Office of the Deputy Prime Minister (ODPM) and the Welsh Assembly. It was delivered by the Rural Evidence Research Centre at Birkbeck College (RERC). Areas forming settlements with populations of over 10,000 are urban, as defined by ONS urban area boundaries based upon land use. The remainder are defined as rural town and fringe, village or hamlet and dispersed using detailed postcode data. These (rural) settlement types are defined using population density at different scales. Once identified these are used to characterize census units (such as Output Areas and wards). Rural town and fringe areas tend to be relatively densely populated over an extended area, whereas village and hamlet areas generally have lower population densities and smaller settled areas.
The Egyptian Company for Mobile Services (MOBILNIL)	Towns or villages that have a population of less than 2500 inhabitants.
Ministerio de Tecnologías de la Información y las Comunicaciones (Colombia)	The national statistics authority defines a rural zone as that where dwellings and land or fishing farms are dispersed and where, generally speaking, public services are not available. Human settlements in rural areas are defined as concentrations counting at least 20 adjacent houses.
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	Telecommunications service for locations which are not or not adequately served by existing services
Ministère de la Communication et des Nouvelles Technologies (Niger)	Sparsely–populated areas with little or no basic social infrastructure (telephony, electricity, schools, dispensaries, etc.) and deemed unprofitable in terms of the heavy investment required for the deployment of a telecommunication/ICT infrastructure owing to the low revenues of rural populations.
Syrian Telecommunication Regulatory Authority (SyTRA) (Syrian Arab Republic)	Rural or remote areas are areas or villages that are relatively distant from towns; the population of these areas does not exceed 2 000.
Nepal Telecommunications Authority (NTA) (Nepal (Republic of)	Rural Areas: Those Village Development Committees (VDCs) excluding Kathmandu Valley, Metropolitan Cities, Sub–Metropolitan Cities, Municipalities and its adjoining VDCs are referred to as Rural Areas.
CATR of Ministry of Industry and Information Technology (MIIT) (China)	Rural areas are divided into incorporated (administrative) villages and unincorporated (natural) villages. An incorporated village refers to the very basic rural administrative unit established by the government under the township level for the sake of organization. It is comprised of several natural villages. In terms of the relationship between these two terms, a natural village is under an incorporated village, i.e. several small neighbouring villages may form a bigger incorporated village. This incorporated village is administrated by a leading group (party branch and villagers' committee), while different administrative groups (villagers' groups) are established in its subordinate natural villages, with a leader appointed for each group. Unincorporated villages are administrated and led by the villagers' committee of the corresponding incorporated village and the party branch of the village.

AHCIET (Colombia)	Rural areas are understood to mean those with population centres of fewer than 2 500 inhabitants and as a rule dispersed, with little in the way of mobile or fixed infrastructures. They are normally classified as universal service objectives, and state investment is crucial because of the limited economic interest for operators, given that the cost of providing some services is too great for a company acting on its own and potential profits are low. Public intervention is crucial for achieving digital inclusion of these areas, and the State must develop the best ways of channelling the necessary investment.
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	Population centres meeting the following criteria are defined as rural areas: 1 They do not form part of urban areas as defined by the Instituto Nacional de Estadística e Informática (INEI). According to INEI, the concept of urban area refers to that part of the territory of a district that is made up of urban population centres; that part may be made up of one or more urban population centres, a population centre being a location comprising a minimum of 100 residences grouped together forming blocks and streets. In addition, all district capitals are considered to be urban population centres even if they do not meet this criterion. An urban population centre is generally made up of one or more urban concentrations. 2 They have a population of less than 3 000 inhabitants, according to the latest population census or official forecast. 3 They have scarce basic services. Those localities with a teledensity of less than 2 fixed lines per 100 inhabitants are also considered to be rural areas without necessarily having to meet the above criteria.
Ministry of Communications and Informatization (Belarus)	The category “rural centres of population” comprises: – Agro–townships: well–equipped centres provided with production and social infrastructure to ensure that minimum state standards of social amenities are met for the inhabitants of these centres and of the surrounding areas. – Settlements, villages: centres of population provided with production and social infrastructure and not classified as agro–settlements. – Farmsteads: populated centres not classified as agro–townships, villages or settlements.
Agência Nacional de Telecomunicações – ANATEL (Brazil)	There are several definitions for rural and remote areas depending on applicable laws, sector and jurisdiction. In Brazil, the Federal Law 5.172/1966 defines that urban area must have at least two of the following items: curb or sidewalk, with piped water; water supply; sewer system; public lightning; primary school or healthcare institution less than 3 kilometres from the reference building. Therefore, rural and remote areas are any area that don't fit those requirements. Furthermore, each and every city may further this definition, as long as it doesn't contradict the Federal Law. The Telecommunications Agency defines rural areas in Decret 7.512/2011 as every region outside the Basic Tax Areas (set of continuous Cities in the same State).
Ministry of Transport of the Republic of Latvia (Latvia)	A rural area is a geographic area that is located outside the cities and towns.
Office of the President, Department of Information Communication Technology (Seychelles)	The outer islands in Seychelles are considered as remote areas. There are 72 outer islands.
Oman Telecommunications Regulatory Authority (TRA) (Oman)	The rural areas are the areas outside the main cities with a population from 200–2000 inhabitants, but the remote areas are the areas with a population below 200 inhabitants.
Rwanda Utilities Regulatory Authority (RURA) (Rwanda)	Area out of delimited boundaries of towns and cities.

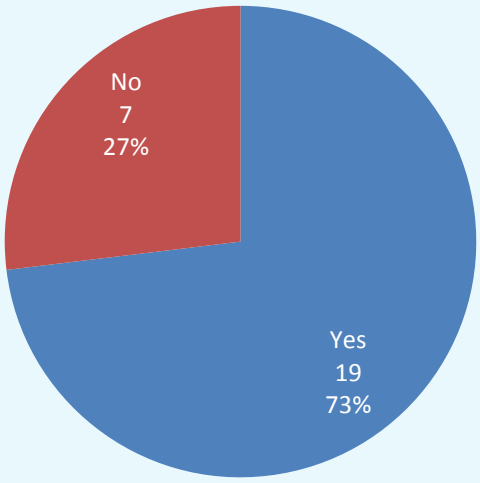
ICP – Autoridade Nacional de Comunicações (ANACOM) (Portugal)	In terms of policy for the development of high–speed networks/NGAs (in rural areas), these are defined as parts of the national territory, mainly rural, where it is unlikely that, in the near future, the market will generate the incentives necessary for operators to invest in new infrastructure for the provision of broadband access services (especially high–speed), e.g. due to factors critical to the investment, such as population density (which determines the cost of bringing the network to households) and socio–economic factors such as age, education level and per capita income (which determine the potential revenue generated by the network). It is noted that in each of these areas, the municipalities covered are those with no competition at retail level, particularly those without cable network coverage and coverage by (co–located) alternative operators.
Comisión Nacional de Comunicaciones (CNC) (Argentina)	The definition is contained in Decree No. 264/98 art. 3. The rural area includes towns with fewer than five hundred (500) people who are at a distance greater than fifteen (15) kilometers from the boundary of Basic Rates Area (TBA) of the licensee companies historical basic telephone service.

1.b If not, how do you handle policy related issues pertaining to telecommunications/ ICTs /Broadband in rural and remote areas? (Please specify the present situation and eventual future policies) (cont'd)

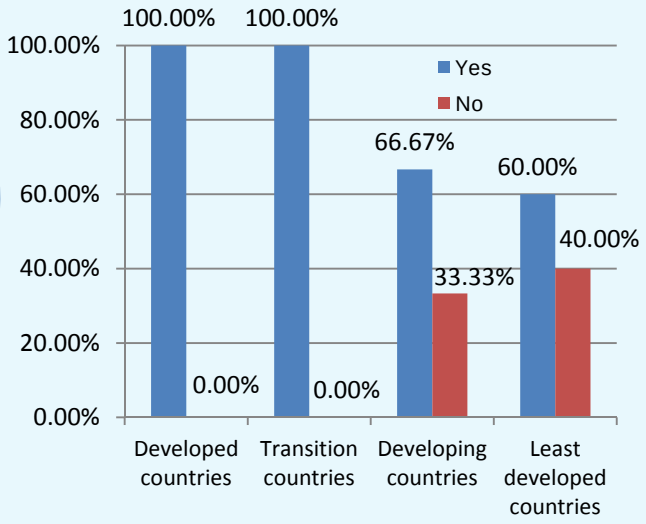
Cellular Operators Association of India (COAI) (India)	The Government of India only has a definition for "Urban" which is: **Rural and Urban areas** Village or Town is recognised as the basic area of habitation. In all censuses throughout the world this dishotomy of Rural and Urban areas is recognised and the data are generally presented for the rural and urban areas separately. In the rural areas the smallest area of habitation, viz., the village generally follows the limits of a revenue village that is recognised by the normal district administration. The revenue village need not necessarily be a single agglomeration of the habitations. But the revenue village has a definite surveyed boundary and each village is a separate administrative unit with separate village accounts. It may have one or more hamlets. The entire revenue village is one unit. There may be unsurveyed villages within forests etc., where the locally recognised boundaries of each habitation area is followed within the larger unit of say the forest range officers jurisdiction. It is in defining the Urbans areas that problems generally arise. However for the 1971 Census the definition adopted for an urban area which follows the pattern of 1961 was as follows:– (a) all places with a Municipality, Corporation or Cantonment or Notified Town Area (b) all other places which satisfied the following criteria: (i) a minimum population of 5,000. (ii) at least 75% of the male working population was non–agricultural. (iii) a density of population of at least 400 sq. Km. (i.e. 1000 per sq. Mile). The Director of Census of each State/Union Territory was, however, given some discretion in respect of some marginal cases, in consultation with the State Govt., to include some places that had other distinct urban characteristics and to exclude undeserving cases. **Standard Urban areas** A new concept that had been developed for the 1971 Census for the tabulation of certain urban data was the Standard Urban Area. The essential of a Standard Urban Area are : (i) it should have a core town of a minimum population size of 50,000, (ii) the contiguous areas made up of other urban as well as rural administrative units should have close utual socio– economic links with the core town and (iii) the probabilities are that this entire area will get fully urbanised in a period of two to three decades.

	The idea is that it should be possible to provide comparable data for a definite area of urbanisation continuously for three decades which would give a meaningful picture. This replaced the concepts of Town Group that was in vogue at the 1961 Census. The town group was made up of independent urban units not necessarily contiguous to one another but were to some extent inter–dependent. The data for such town groups became incomparable from census to census as the boundaries of the towns themselves changed and the intermediate areas were left out of account; this concept came for criticism at one of the symposium of the International Geographic Union in Nov.–Dec.1968 and the concept of Standard Urban Area came to be developed for adoption at the 1971 Census. If data for this Standard Area were to be made available in the next two or three successive censuses it is likely to yield much more meaningful picture to study urbanisation around large urban nuclei. Ref : http://censusindia.gov.in/Data_Products/Library/Indian_perceptive_link/Census_Terms_link/censusterms.html
Telecommunications Regulatory Authority (Lebanon)	TRA relies on the Telecommunications Law 431/2002 in preparing the regulatory framework in relation to Telecommunications. In regards to Telecommunications policy, the Ministry of Telecommunications (MOT) is in charge of drafting such policy.
The Egyptian Company for Mobile Services (MOBINIL) (Egypt)	By law, all operators must extend cellular coverage to 98% of population. Fortunately, Egypt has unique demographics: the majority of population lives in only 5%–6% of its area, around the river basin, a handful of oasis and along the sea shores. So if we cover these regions, by default, we are covering 99% of the population, whether living in urban or rural areas.
Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	Conatel defines, within each project, those areas of public of social interest (Zonas de interés público o social, ZIPS), which are susceptible of being subsidized. They are areas without access to the telephone service and with a population of over 1000 inhabitants (according to the 2002 census). Municipalities without broadband access also fall within this definition.
Swaziland Posts and Telecommunications Corporation (SPTC) (Swaziland)	General understanding is that rural areas are areas that are outside urban and peri–urban areas.
Post and Electronic Communications Agency (APEK) (Slovenia)	The level of development and availability of broadband networks in Slovenia varies by region. Remote, poorly developed and isolated areas in Slovenia, in which broadband networks are not developed due to marketconditions, are therefore treated differently from areas in which, despite a high density of users, higher purchasing power, overall economic development and infrastructure equipment, there are still many obstacles to the more diverse and faster development of broadband networks.
Autorité de Régulation de la Poste et des Télécommunications (Dem. Rep. of the Congo)	In the current context, policy–related issues are handled by operators which, pursuant to one of the clauses of their terms of reference, are required to establish themselves in rural or remote areas and provide broadband services. The new draft law on ICTs provides for the granting of a licence for universal service in rural or remote areas.
Ministry of Information and Communication Technology (Mauritius)	There is no formal definition of rural and remote areas in Mauritius as it is a very small country/island. There are 5 cities and approximately 135 villages. Any policy issues pertaining to Telecommunications/ICTs/Broadband or any other sector applies to the whole country.
Cable Bahamas Limited (Bahamas)	The rural areas of specifically name. So in the Bahamas that would generally be all islands except New Providence and Grand Bahama.

2 Is there any specific government policy on telecommunications/ICTs/broadband development in rural and remote areas?

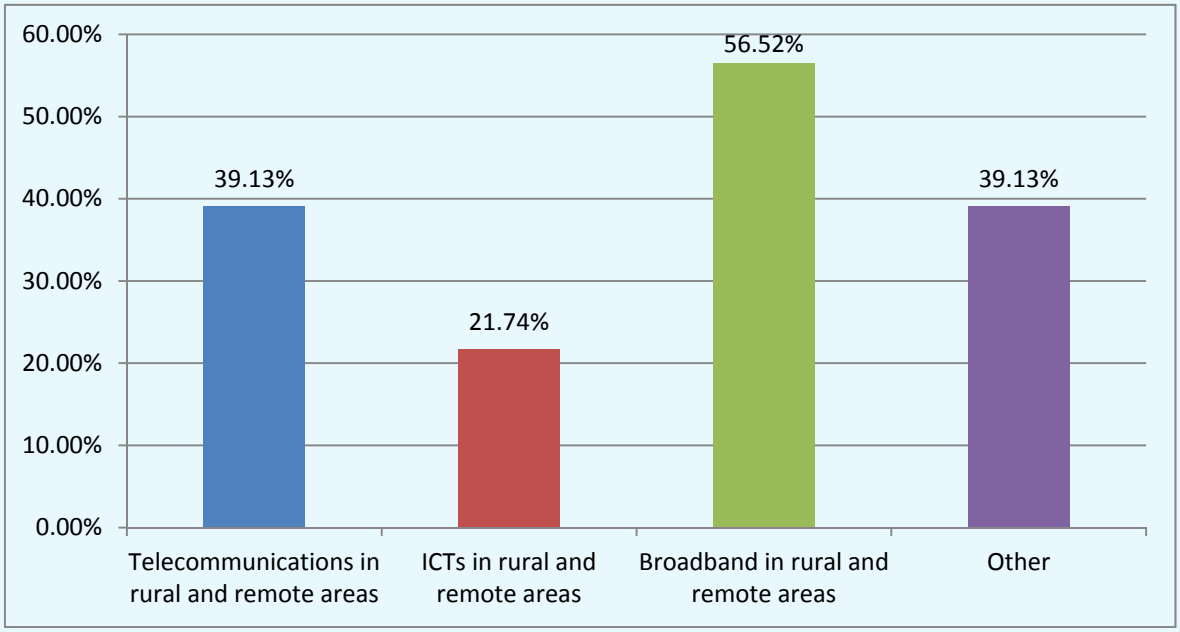


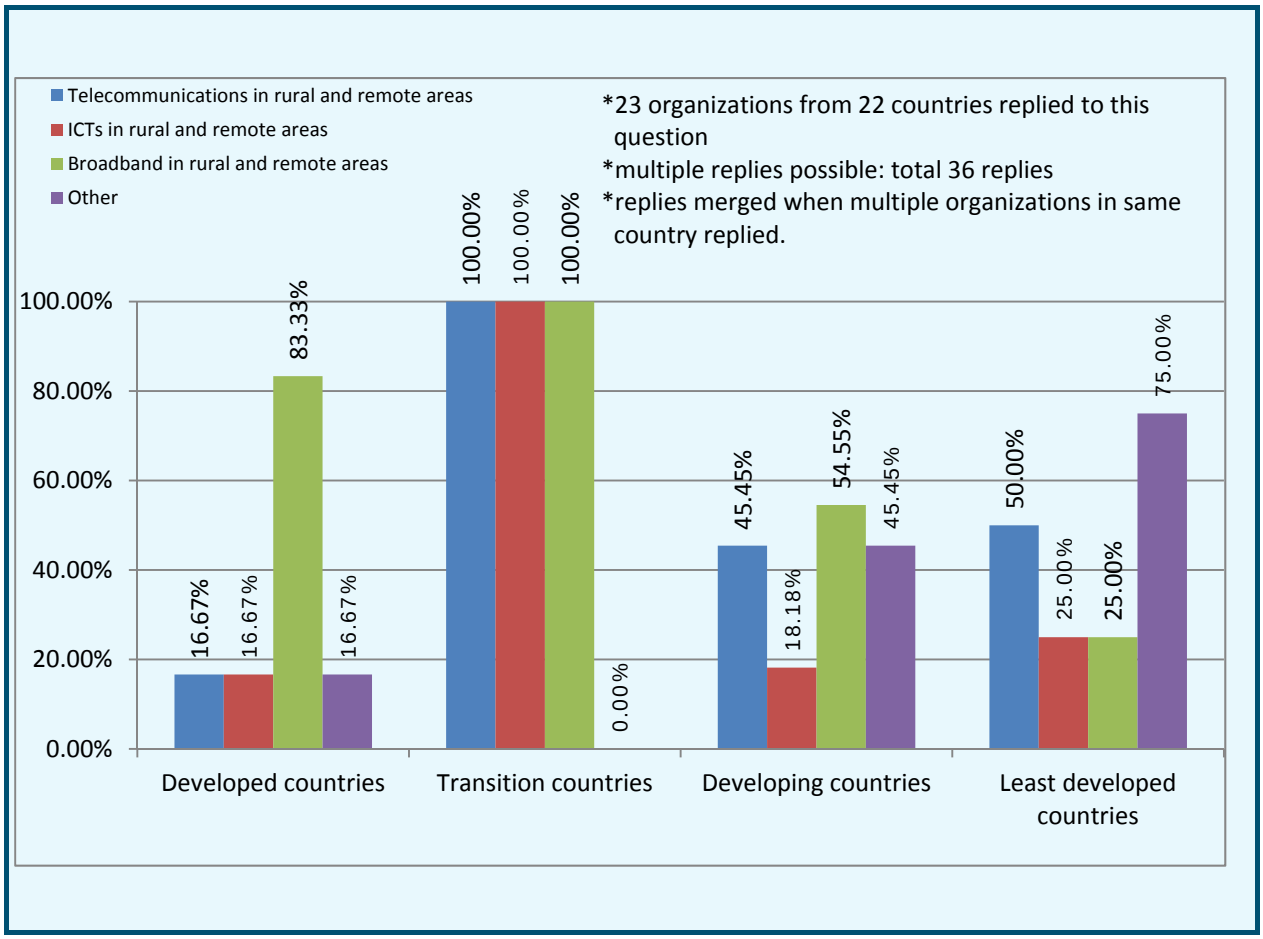
By level of development:



*28 organizations from 26 countries replied to this question
*replies merged when multiple organizations in same country replied.

3 If a government policy does exist, please specify which one:





If "Other" was selected, please specify:

Cellular Operators Association of India (COAI) (India)	The Government has mandated a 'Roll–out Condition" for provision of Telecommunication services in Rural areas . These apply only for wireless and not for wire–line. The conditions are : (i) Roll–out obligations shall apply for wireless network only and not for wireline network (ii) The Licensee shall ensure that metro service area of Delhi, Mumbai, Kolkatta and Chennai are covered within one year of date of allocation of start up spectrum. (iii) In non–metro service areas, the licensee shall ensure that in first phase of roll out obligation at least 10% of District HQs where startup spectrum has been allocated are covered within one year of such spectrum. The date of allocation of frequency shall be considered for computing a final date of roll–out obligation. (iv) Further, in second phase II of rollout obligation, the licensee shall ensure that at least 50% of DHQs, where start up spectrum has been allocated are covered within three years of date of allocation of such spectrum in non metro service areas. For Broadband and ICT services the Government of India has launched a major OFC plan to connect 250,000 "panchayats" i.e. lowest government office with 6 villages in its vicinity by 2014 end. This is a $4 billion project funded by the Universal Service Obligation Fund
The Egyptian Company for Mobile Services (MOBINIL) (Egypt)	There is no government policy specifically for people living in rural or remote areas.
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	Priority Action Agenda 2006 – 2015, Implementation policy for Millennium Challenge Goal for Vanuatu, Telecommunications Policy Statement of Vanuatu Government 2007, Universal Access Policy for ten sites, UAP Broadband Pilot Project 4 sites 2011.

Ministère de la Communication et des Nouvelles Technologies (Niger)	Two strategic approaches have been identified within the framework of the telecommunication/ICT policy: – Promotion of universal access to ICT services – Development of broadband infrastructures to provide the country with national, transnational and international coverage.
Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	According to the National Telecommunication Plan (Plan Nacional de Telecomunicaciones, PNT), the objectives for 2015 are: – Municipalities connected by optical fibre: 200 – Municipalities connected by broadband: 200 – Broadband penetration: 50% – Digital TV penetration: 50%
Nepal Telecommunications Authority (NTA) (Nepal (Republic of))	Telecommunications Policy 2004 exits which is a broad policy covering telecommunications development in rural as well as urban areas.
Post and Electronic Communications Agency (APEK) (Slovenia)	BROADBAND NETWORK DEVELOPMENT STRATEGY IN THE REPUBLIC OF SLOVENIA (2008)
Cable Bahamas Limited (Bahamas)	Television
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	The established policies are designed to promote telecommunications in rural areas and places of preferential social interest. The policies are governed by the following legislation: – Law awarding the Telecommunications Investment Fund (FITEL) legal personality under public law, assigned to the Transport and Communications sector – Law No. 28900. – Guidelines for the development and strengthening of competition and expansion of telecommunication services in Peru – Supreme Decree No. 003–2007–MTC. – General Regulatory Framework for promotion of the development of public telecommunication services in rural areas and places of preferential social interest – Supreme Decree No. 024–2008–MTC. – Law for the Promotion of Broadband and Construction of the National Fibre Optic Backbone Network – Law No 29904.
Ministry of Internal Affairs and Communications (Japan)	National broadband plan
Oman Telecommunications Regulatory Authority (TRA) (Oman)	Universal Service Policy and Implementation Strategy
Ministry of Information and Communication Technology (Mauritius)	National Broadband Policy 2012–2020 www.gov.mu/portal/goc/telecomit/file/NationalBroadband.pdf It is inclusive in the National Policy for the whole country
Rwanda Utilities Regulatory Authority (RURA) (Rwanda)	Broadcasting policy focusing on transition from Analog to Digital

4 What are the major features of such a policy ? (Please make 2 or 3 proposals of these features)

Cellular Operators Association of India (COAI) (India)	The major features of this above and the recently announced NAtiona;l Telecom Policy (NTP) 2012 are:– Tele–density: Increase in rural tele–density from 35% to 100% by 2020 Broadband: 175 million by 2015, Broadband on demand by 2015 and 600 million connections by 2020 National Optical Fibre Network (NOFN)High speed and high quality broadband access to all village panchayats through a combination of technologies by the year 2014. Download speed to be increased from 512 Kbps to 2Mbps Leveraging USO funds for faster expansion of broadband
Servei de Telecomunicacions d'Andorra (STA) (Andorra)	All telecommunications services in Andorra are universal, that is, the same service is provided with the same quality and price for the whole of the population.
ABI Research (United States) (United Kingdom)	– BDUK management and allocation of £530 million for the 'final third' – The Mobile Infrastructure Project (MIP); – Superconnected Cities; – Rural Community Broadband Fund (DEFRA); The Broadband Task Force (November 2002) established with a remit to work on extending affordable broadband access especially in rural areas. The Task Force has developed the Broadband Aggregation Project, which aggregates public sector demand including in rural and remote areas. In May 2003, a new Rural Broadband Unit was created in the Department of Trade and Industry. Working with the Department of Environment, Food and Rural Affairs and Regional Development Agencies, their role will be to identify ways of accelerating the availability of broadband access in rural areas.
Telecommunications Regulatory Authority (Lebanon)	Remote areas (remote villages and villages with mountainous terrain)are being interconnected over fixed wireless services provided by the MOT. In addition, such connections provide voice as well as Broadband data services.
Ministerio de Tecnologías de la Información y las Comunicaciones (Colombia)	They are included in the national development plan and, in general, are contained in universal access goal frameworks, together with appropriation strategies.
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	Improving access to telecommunications service for locations which are not or not adequately served by existing services at affordable prices to the consumers, PAA 2006–2015, Telecom Policy Statement new entrant with license obligation for 85% coverage after two years of operations (access to voice and data). UAP Ten sites for remote uneconomic locations, UAP Broadband Pilot Project to pilot the connect school, connect community initiative with a view to replicate the concept to other remote locations.
Ministère de la Communication et des Nouvelles Technologies (Niger)	– Implementation of a digital literacy programme through the creation of community centres providing such training to the public – Implementation of a “Connect a school, connect a community” programme – Project for the creation of an agency to manage the universal access fund.
Syrian Telecommunication Regulatory Authority (SyTRA) (Syrian Arab Republic)	• The establishment of a special scheme to serve rural areas (Rural schemes 1, 2 and 3) • The provision of telecommunication services to all rural areas regardless of economic feasibility • Consideration given to making use of all available technical resources to serve rural areas.

Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	– Encourage private investment in infrastructure – Subsidy by Conatel wherever required – Improve the quality of services
Nepal Telecommunications Authority (NTA) (Nepal (Republic of)	i. Telecommunications service shall be available at shouting distance ii. Telecommunications service shall be made available to the consumers through shared telephone and other services pertaining to ICT through community centers iii. ICT services in rural areas will be made available through small service providers i.e. license fee and annual fees will be waived if the annual income is less than US$ 250,000
CATR of Ministry of Industry and Information Technology (MIIT) (China)	Universal telecommunication service
Post and Electronic Communications Agency (APEK) (Slovenia)	The broadband network development strategy is therefore a document that defines in great detail the development of broadband networks within the framework of the RSvID strategy. The strategy reflects the movement of European Union's political guidelines, which emphasise the necessity for European states to catch up with more developed markets regarding the use of ICT. The general opinion is that the freeing up of the electronic communications services markets is of key importance in the attainment of the Lisbon objectives. The freeing of markets and competition in OECD countries have, for example, reduced prices, and the provision of new products and services has encouraged investment and demand for communications access and services, from which positive social effects and related new knowledge and skills of users have been identified.
AHCIET (Colombia)	– Public – private collaboration in designing investment and service delivery. – Expanding public use of the Internet by developing the necessary infrastructure to meet the requirements for broadband Internet access and all the services derived from it, with the ultimate goal of eliminating the digital divide, stimulating user demand, and developing applications that apply the technology and develop content (setting up technocentres and training centres). Setting up e–government services and strengthening the ICT industry. – Developing a fibre optic network and allocating subsidies for fixed broadband consumption.
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	Policies exist for the provision of universal access. They are implemented by the Telecommunications Investment Fund (FITEL) (Law awarding the Telecommunications Investment Fund (FITEL) legal personality under public law, assigned to the Transport and Communications sector – Law No. 28900). There is also a Rural Service Tariff System, applied to communications between users of the public telephone service in rural areas and places of preferential social interest (Resolution of the Governing Council of the Supervisory Authority for Private Investment in Telecommunications – OSIPTEL No. 022–99–CD/OSIPTEL). In addition, differentiated interconnection charge schemes have been introduced for rural areas (Consolidated Amended Text of Interconnection Regulations – Governing Council Resolution No. 134–2012–CD/OSIPTEL). Also under way is the procedure for regulating rural charge and tariff caps (Regulation of Tariff Caps and Interconnection Charges Applicable in the Provision of the Fixed Telephone Service in Rural Areas and Places of Preferential Social Interest – Resolution No. 024–2008–CD/OSIPTEL).
Ministry of Communications and Informatization (Belarus)	Development of data transmission network infrastructure with a view to achieving maximum coverage of the country's population in terms of broadband access, using new (including wireless) data transmission technologies; Modernization of existing fibre optic communications infrastructure using modern transmission systems.

Agência Nacional de Telecomunicações – ANATEL (Brazil)	Bidings on public auctions for radiofrequency specify obligations towards offering telecommunications in rural and remote areas, like auction for frequencies 451MHz to 458MHz, that stablished that winners would have to: offer telecommunication services in rural and remote areas; offer broadband access, free of charge, to public rural schools in the service areas; interconnect at low prices with small telecommunications companies; and cover up a radius of 30km from the urban boundaries. Also PSTN incumbents must deploy public telephone booths near specific buildings like public schools, healthcare centers etc.
Ministry of Internal Affairs and Communications (Japan)	Support from the government to local governments based on the state–funded privatized plan implementation integrated with introduction of public applications
Ministry of Transport of the Republic of Latvia (Latvia)	In 2012 Latvian Government approved a policy planning document "The broadband network development 2013–2020". Latvian National broadband plan meet the coverage, speed and take–up targets defined in the Digital Agenda for Europe. The Latvian population of regions will be ensured fast, high quality access to resources on the Internet. Targeted state aid in the field of broadband services can help to reduce the isolation of the country between areas, which offers a competitive broadband services at an affordable price, and the territories, that such services do not. In 2011 the European Commission approved State Aid scheme “Next Generation Network for rural area”, which foresees support to development and establishment of the infrastructure to provide wholesale broadband services in rural areas of Latvia, which are currently not served and where are no plans for development of next generation network in the near future– three year period. The scope of the aid scheme is to support next generation network (NGN) project, witch will ensure: – connection to NGN local governments (centre of municipality) and administrative entities (centres of rural territories, schools, hospitals, ambulances, libraries etc.); – possibility to get NGN service in 100% of Latvian rural territory.
Oman Telecommunications Regulatory Authority (TRA) (Oman)	1. providing voice services to unserved areas providing internet services with a minimum speed of 512 kbs to the public providing internet services with a minumum speed of 2 Mbs to government institution such as schools , health centres. police stations
Ministry of Information and Communication Technology (Mauritius)	1. By 2014, at least 60% of homes should have affordable access to actual download speeds of at least 10 Mbps and actual upload speeds of at least 5 Mbps; and by 2020, almost 100% of home should have affordable access to actual download of 100 Mbps. 2. By 2020, every public institution should have affordable access to at least 100 Mbps broadband service to anchor institutions such as schools, hospitals and government buildings.
Rwanda Utilities Regulatory Authority (RURA) (Rwanda)	Operator network rollout plan is part of biding documents for Operator license contain plans on how the rural and remote area will be covered The rollout plan is part of license obligation Optic Network covering the whole country VSAT network for remote areas Universal Access Fund for subisidy of connectivity in rural and remote area Legal and regulatory framework for open competition and technological neutral
Cable Bahamas Limited (Bahamas)	Provision of fixed voice to populated areas in the islands, high speed data services and connectivity as well as basic dial–up internet. A six channel television service (two of the channels have to be Government's run station).

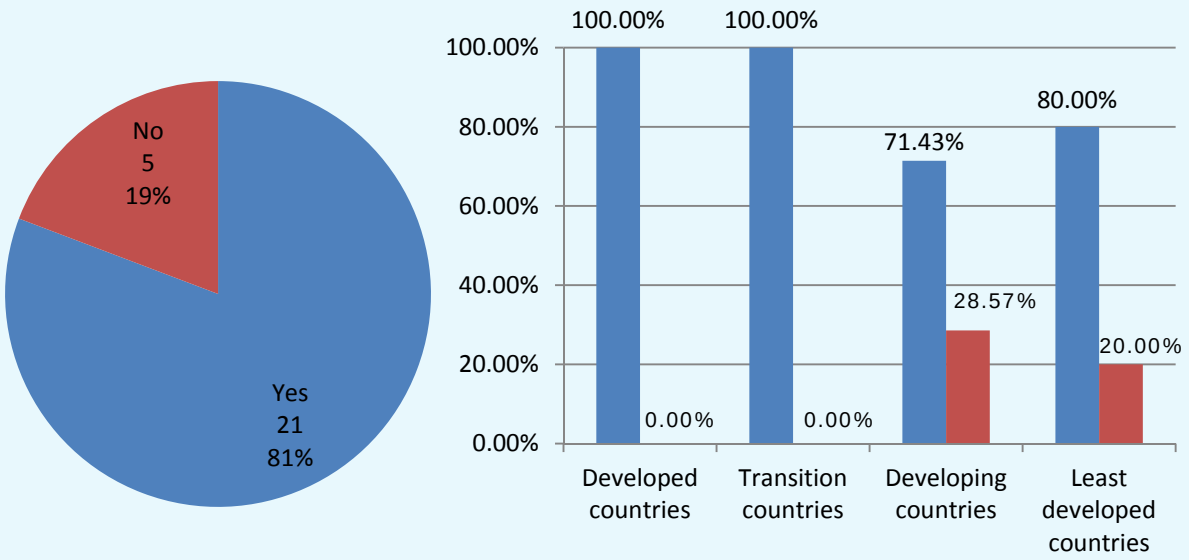
ICP – Autoridade Nacional de Comunicações (ANACOM) (Portugal)	NGAs (very high–speed broadband) in rural areas can contribute to equality of opportunity for all citizens, promoting info–inclusion and the development of human capital and contributing to the creation of externalities in rural development policy at the level of employment, growth, competitiveness and sustainability of the industries located in these areas. In order to ensure territorial cohesion and to uphold equality of opportunity, in 2009 the Government decided to launch five Public Tenders for the construction, installation, financing, operation and maintenance of NGA, with co–financing, with the aim of addressing possible market failures in 139 municipalities, divided into five regions (the Centre, Alentejo and Algarve, North, Madeira and the Azores). The municipalities covered in each of these areas are those without coaxial cable networks and without co–located operators and when all the parishes comprising the municipality are classified as rural by the European Agricultural Fund for Rural Development (EAFRD).
Comisión Nacional de Comunicaciones (CNC) (Argentina)	Promote the development of telecommunications infrastructure throughout the country and provide universal Internet access. Achieving social inclusion of vulnerable sections of society. Encourage ownership and benefits of ICT to the less favorecidos.ya children of school age. Telephone and Internet Program for towns without provision of basic telephone service. For areas with less than 250 inhabitants, the object is the provision of local telephone service, long distance and international and as optional internet access. For locations with more than 250 inhabitants, the object is the provision of local telephone service, long distance and international together with internet access.

5 If no specific government policy on Telecommunications/ICTs/Broadband exists, how are the issues of Telecommunications/ICTs/Broadband in rural and remote areas being handled?

Telecommunications Regulatory Authority (Lebanon)	See question 4.
The Egyptian Company for Mobile Services (MOBINIL) (Egypt)	Handled like any other area. There is a cellular network and coverage that is controlled and monitored by the company – and the government – similarly. In case of say, a complaint, it is reported to the Ministry of ICT or the Consumer Protection Agencies – or – the company itself and is handled as per the existing process and within the framework of the law.
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	Where there is no specific government policy, Regulator in tasked with development of telecommunications services with consultation with the operators. Office of the ICT under the ministry is responsible for ICT to government agencies and schools and health centers. Competitive Market also drives expansion of telecommunica-tions/ICT/Broadband into rural and remote areas of Vanuatu.
Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	The National Telecommunication Plan (Plan Nacional de Telecomunicaciones, PNT) is the policy implemented by Conatel, as government regulator.
Nepal Telecommunications Authority (NTA) (Nepal (Republic of))	Using the provisions available in a. Telecommunications Act, 1997 b. Telecommunications Regulation, 1998 c. Telecommunications Policy, 2004 d. RTDF Disbursement bylaw
Swaziland Posts and Telecommunications Corporation (SPTC) (Swaziland)	Swaziland is currently using the Universal Service Obligation draft policy to service the rural underserviced remote areas.

Autorité de Régulation de la Poste et des Télécommunications (Dem. Rep. of the Congo)	In line with the obligations stipulated in their terms of reference, operators seek to introduce appropriate solutions in the rural or remote areas in which they are established.
Office of the President, Department of Information Communication Technology (Seychelles)	National ICT Policy 2007
Oman Telecommunications Regulatory Authority (TRA) (Oman)	TRA imposed certain license obligations in the telecom service providers to cover some remote areas with set of telecom services which was very helpful
Ministry of Information and Communication Technology (Mauritius)	The same policy applies to the whole country.

6 Is this a part of the national telecommunication/ICTs/broadband policy?



* 27 organizations from 26 countries replied to this question
* Replies merged when multiple organizations in same country replied.

7 If it is part of the national telecommunication/ICT/Broadband policy, what provisions are made in the broad policy framework?

Cellular Operators Association of India (COAI) (India)	**Key Highlights of the Policy** Infrastructure status to the telecom sector 'One nation–one license' Inclusive growth by focusing on rural market License issuance de–linked from spectrum allocation Future spectrum allocations at market valuations Trading, sharing and pooling of spectrum to be permitted 'Right to Broadband' Focus on indigenization of telecom equipment products and equipment

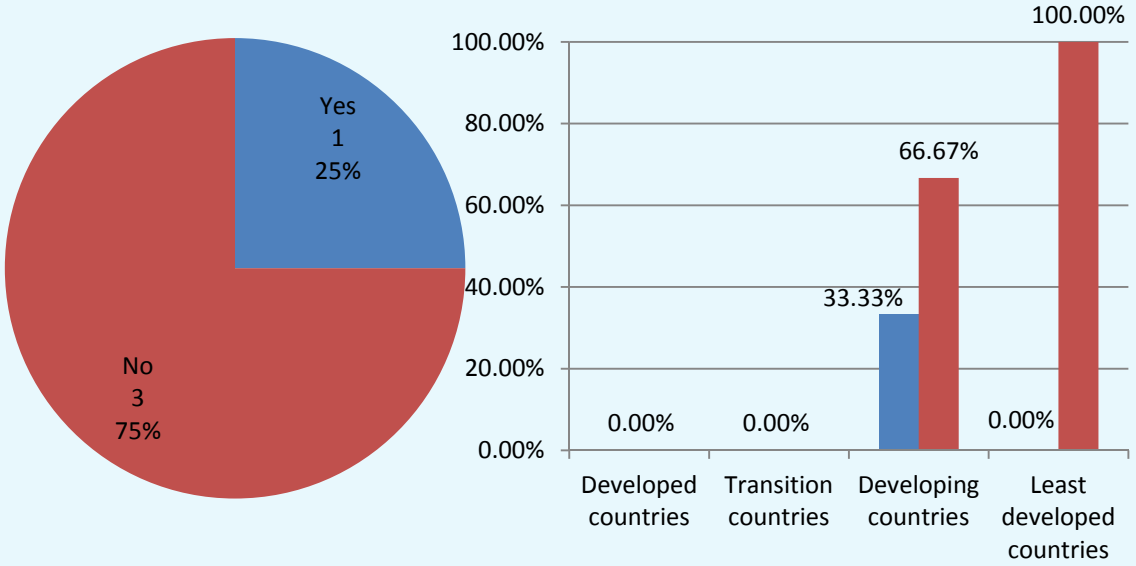
	Convergence of voice, data, video, Internet, multimedia, broadcasting and value added services Spectrum: 500 MHz to be made available of which 300 MHz of spectrum to be made available for IMT services by 2017 Another 200 MHz of spectrum to be made available by 2020
Servei de Telecomunicacions d'Andorra (STA) (Andorra)	All telecommunications services in Andorra are universal, that is, the same service is provided with the same quality and price for the whole of the population.
ABI Research (United States) (United Kingdom)	Four rural areas that include some of the most remote and geographically challenging parts of the UK were selected in 2010 to pilot the next generation of high speed broadband. Each area is allocated around £5–10m from a total of £530m funding to support the roll–out of broadband until 2015 to areas that the market alone will not reach. Parts of Cumbria, the Highlands and Islands, North Yorkshire and the Golden Valley in Herefordshire will all be connected at speeds only usually found in densely populated urban areas.
Ministerio de Tecnologías de la Información y las Comunicaciones (Colombia)	In Colombia, national ICT policy is embodied in the Plan Vive Digital, integrated by the various dimensions of the digital ecosystem, that is: users, infrastructure, services and applications, and where each of these components has had its own goals and objectives developed.
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	Broad Policy Framework is set out in PAA 2006 – 2015 in line with MDG for Vanuatu, specific provision for establishment of liberalised telecommunications market was set out in the 2007 Telecommunications Statement of Vanuatu Government, outlining the regulatory framework, developed into the unilateral Telecom Licences and new telecommunications and radiocommunications legislation in 2009. UAP Policy in 2010 sets out remote telecommunications infrastructure for 10 sites.
Ministère de la Communication et des Nouvelles Technologies (Niger)	The President of the Republic of Niger's programme of recognition includes the Plan for Economic and Social Development (PDES 2012–2015). Within this subsector, the PDES will focus on the development of information and communication technologies capable of satisfying the modernization requirements of the economic sectors. This will entail consolidating the achievements made to date while at the same time developing new, innovative programmes and projects to build up the information society, through: (i) the establishment of an enabling legal and institutional environment in the telecom/ICT sphere; (ii) the creation of a technology and infrastructure environment conducive to telecom/ICT development; (iii) support for the implementation of sectoral ICT strategies; (iv) the pursuit of communication, training, research and capacity–building activities in the ICT sphere; (v) the promotion of access to modern postal services throughout the country.
Syrian Telecommunication Regulatory Authority (SyTRA) (Syrian Arab Republic)	A universal service fund was created pursuant to the 2010 telecommunication law.
Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	A National Broadband Plan does not yet exist. The PNT is the current framework.
Nepal Telecommunications Authority (NTA) (Nepal (Republic of)	Provisions in broad sense for rural development: a. Telecommunications Act, 1997 has the provisions that the operators have to invest 15% of their annual investment in rural areas. b. Telecommunications Regulation, 1998 has mandated the regulator to collect 2% of AGR from service provider as contribution to the RTDF (USO) fund c. Telecommunication Policy has the provisions: i. Telecommunications service shall be available at shouting distance ii. Telecommunications service shall be made available to the consumers through shared telephone and other services pertaining to ICT through community centers

	iii. ICT services in rural areas will be made available through small service providers i.e. license fee and annual fees will be waived if the annual income is less than US$ 250,000 d. District optical fiber network (DOFN) project document has been developed and has been expected to utilizing the RTDF fund e. In technical collaboration with the ITU, NTA has developed "Wireless Broadband Master Plan" which has provisions for rural development f. The Draft Broadband Policy has also been developed which also focuses on rural telecommunications development .
CATR of Ministry of Industry and Information Technology (MIIT) (China)	Universal telecommunication service
Post and Electronic Communications Agency (APEK) (Slovenia)	Broadband Network Development Strategy in RS is a document intended for economy, civil society, state and public administration bodies of RS, or any participants in the field of electronic communications who are or will actively participate in the transition to a developed and advanced information society. The strategy represents an improvement and upgrade of the document Broadband network development strategy in the Republic of Slovenia adopted by the Slovenian Government in 2004.
AHCIET (Colombia)	– Deployment of a fibre optic network and allocation of subsidies for fixed broadband consumption. – Ensure that 50 per cent of households and SMEs have Internet connection. – Quadruple the current number of Internet connections. – Triple the number of municipalities with fibre optic Internet connection. – By 2014, ensure that 50 per cent of households have a connection capacity of at least 1 Mbps. Guarantee that all towns of more than 100 inhabitants have at least one communal Internet access point. – Increase the total number of connections from 2.2 million to 8.8 million by 2014, and increase the current number of local authorities connected from 300 to 700. – Ensure that 50 per cent of households are connected (25 per cent currently).
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	Regulations applicable nationwide are established by both OSIPTEL and the Ministry of Transport and Communications. The former is responsible for regulating and supervising the public telecommunication services market, the former for putting forward policies to promote the development of communication services and universal access to them.
Ministry of Communications and Informatization (Belarus)	The National Programme for accelerated development of ICT services for 2011–2015 was adopted by Council of Ministers Order No. 384 of 28 March 2011.
Agência Nacional de Telecomunicações – ANATEL (Brazil)	The National Broadband Plan, created by Decret 175/2010, defines the Ministry of Communications, a public company (Telebrás) and the regulation agency (Anatel) as responsibles for the plan. Also, the incumbents signed treaties to fund certain aspects of the Plan, like offering broadband access at low prices.
Ministry of Internal Affairs and Communications (Japan)	Approvals of preparation plans, grants, guarantees for debts.
Ministry of Transport of the Republic of Latvia (Latvia)	In 2012 Latvian Government approved a policy planning document „The broadband network development 2013–2020". In January 2012 was adopted the Government's Regulation on the implementation of the EU funded broadband development project „Next Generation Network for rural area". In 2012 was approved „Latvian national development plan in 2014 to 2020 (NAP2020)".

Office of the President, Department of Information Communication Technology (Seychelles)	– Promote and encourage the existence of a countrywide reliable and efficient ICT infrastructure which shall have sufficient capacity and network speeds, provide improved connectivity, be cost–effective and adaptive to the needs of the country. – Promote widespread accessibility to ICT services. – Promote and encourage deployment and maintenance of networks that are interoperable on a national basis.
Rwanda Utilities Regulatory Authority (RURA) (Rwanda)	Broadband policy currently under development
ICP – Autoridade Nacional de Comunicações (ANACOM) (Portugal)	In Portugal, a Resolution of the Council of Ministers of July 2008 determined that the investment on next generation access networks should be deemed as one of the strategic priorities for the Country as far as the electronic communications sector is concerned. The Government took the responsibility to evaluate the measures that could be adopted in order to foster the development of next generation networks, namely in geographical areas with low broadband penetration, as well as to modernize network infrastructure. Accordingly, and considering NGA as a generator of economic opportunities, training and development, the Portuguese government launched in 2009 the above mentioned five Public Tenders for the installation and operation of "High–Speed Networks in Rural Areas", covering 139 municipalities, which are currently being deployed and open for service during 2013. Currently, the Digital Agenda for Portugal, published in Diário da República (Official Journal) on 31 December (Resolution of the Council of Ministers no. 112/2012), aims to stimulate the digital economy and the information, communications and electronics technologies sector, through the use and development of tradable and competitive goods and services for international markets. Portugal's (new) National Agenda envisages strong involvement by civil society and by the private sector, especially in the information and communication technologies (ICT) sector, entailing the launch of a raft of initial measures to be implemented by 2016, in the following six action areas: • broadband access and access to the digital market; • investment in research and development (R&D) and innovation; • improving digital literacy, inclusion and qualification; • combating tax and contributory fraud and evasion; • addressing societal challenges; • entrepreneurship and internationalization of the ICT sector. The Digital Agenda for Portugal sets out the following objectives: • promote the development of broadband infrastructure so that citizens have access to broadband speeds of 30 Mbps or more, by 2020; • promote the development of broadband infrastructure so that 50 per cent of households have access to broadband Internet with speeds of 100 Mbps or more, by 2020; • create conditions enabling an increase of 50 percent, compared to 2011, in the number of businesses using e–commerce in Portugal by 2016; • promote the use of online public services, so that they are used by 50 percent of the population, by 2016; • create conditions enabling a 20 percent increase in ICT exports, in accumulated terms, by 2016, over 2011; • promote the use of new technologies, so that the number of people who have never used the internet can be reduced by 30 percent, by 2016.
Cable Bahamas Limited (Bahamas)	The provisions in the policy framework provide for it under the Universal Service Obligations.
Comisión Nacional de Comunicaciones (CNC) (Argentina)	Argentina Connected is a comprehensive five–year plan defining infrastructure and telecommunications services for the entire country. The aim is to achieve the deployment of national infrastructure to ensure access to ICT to the population and, through investment in its development, obtain a reduction in service costs. This National Plan seeks to expand broadband connectivity through the development of a national fiber optic network and thereby reduce the digital divide between citizens and

	the different areas of the country. The goal is to reach the year 2015 with 10 million connected households. The strategic axes defined in the policy are: Digital Inclusion: which aims to ensure the benefits of new technologies to all Argentines equal, enshrining the right of access to information, through greater connectivity and full convergence of networks and services. Optimizing the Use of Radio Spectrum: since it is an essential and finite resource to achieve the functionality of the telecommunications sector. It is also planning priority derivative of the digital dividend spectrum, caused by the adoption of a standard for digital television. Universal Service Development: is intended that the services and programs defined by the National reach citizens regardless of their geographical location and their social and economic conditions, promoting their development through existing funds in the Universal Service. National Production and Employment Generation Telecommunications Sector: it seeks to promote the growth of the sector, and to promote strategic alliances between public and private sector that results in new jobs, higher grade, either in the preparation of the necessary equipment for the deployment of infrastructure and related items. Training and Research in Communications Technology: With the deployment of the services shall worked in parallel on an academic who is at the height of technological change and generate new professionals and researchers trained to accompany and contribute in the process. Infrastructure and Connectivity: to achieve the planned infrastructure development is necessary to coordinate the existing connectivity plans with the needs of the villages still have no connection, to focus on the deployment of the network effectively and efficiently. Enhance Competition: With the development of fiber optic network intended that municipal / provincial advocate to the provision of last mile which will result in a greater number of service providers, either through telephone cooperatives , small businesses and new entrants.

8 If it is not part of the national Telecommunication/ICT/Broadband policy, is there any project in the future for it to become part of it?

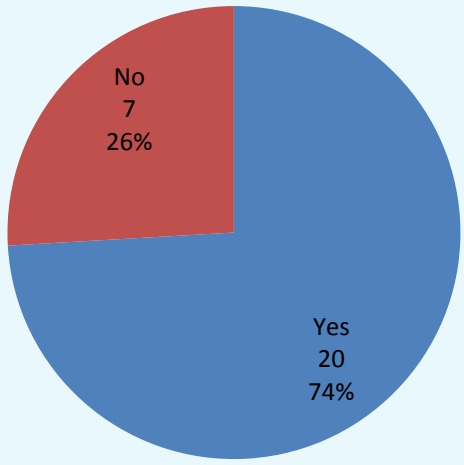


* This question was only relevant if the answer was 'no' to question 6.
* 4 organizations from 4 countries replied to this question

Please specify in either case:

Telecommunications Regulatory Authority (Lebanon)	It is expected to be part of the policy that will be issued by the MOT, in addition the TRA has the responsibility to implement universal service and ensure service to remote and rural areas.
The Egyptian Company for Mobile Services (MOBINIL) (Egypt)	If there is, then i am not aware of. All i know is that the Ministry of ICT follows the evolution of the cellular network and ensures that the required KPI like call drop rate or call block rate or other indicators are met.
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	Connect Schools, Connect Community initiative is being piloted, lessons learn and concept could be rollout into other remote areas, improving broadband access to schools and community through use of community telecenters in the remote areas.
Ministère de la Communication et des Nouvelles Technologies (Niger)	ICT development in remote or rural areas is an integral part of the national policy on universal access.
Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	It is expected that, in the near future, a National Broadband Plan will be implemented, which will cover government and society.
Swaziland Posts and Telecommunications Corporation (SPTC) (Swaziland)	Swaziland has an approved National Information & Communications Infrastructure Policy which is not specifically for rural remote areas, however, it does alude to universal access.
Autorité de Régulation de la Poste et des Télécommunications (Dem. Rep. of the Congo)	It is planned to elaborate a national policy on broadband in rural or remote areas.

9 Is the Telecommunications/ICT/Broadband in rural and remote areas considered a universal service/access obligation?



By development level	
Developed countries	50%
Transition countries	100%
Developing countries	73.33%
Least developed countries	100%

* 28 organizations from 27 countries replied to this question
* Replies merged when multiple organizations in same country replied.

10 How is that obligation defined?

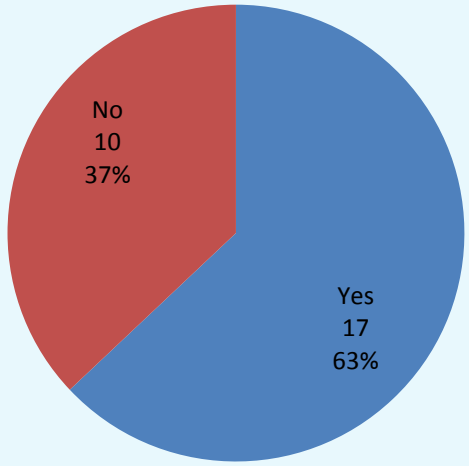
Cellular Operators Association of India (COAI) (India)	All telecom operators give 5% of their Annual Gross Revenue as their contribution to the USO Fund. The Government , through the USoFund administrator brings out schemes for extending telecom and ICT services to the rural areas. Currently the following schemes are under execution in India. **Stream–1**: Provision of Public Access Service: **Stream–II**: Provision of Household Telephones in Rural and Remote Areas as may be Determined by the Central Government from Time to Time: **Stream–III**: Creation of Infrastructure for provision of Mobile Services in Rural and Remote Areas. The assets constituting the infrastructure for provision of mobile services shall be determined by the Central Government from time to time (Mobile Infrastructure (Phase–I)). **Stream–IV**: Provision of Broadband Connectivity to rural & remote areas in a phased manner (Wire Line Broadband, Rural Public Service Terminals (RPST)). **Stream–V**: Creation of General Infrastructure in Rural and Remote Areas for Development of Telecommunication facilities. The items of general infrastructure to be taken up for development shall be determined by the Central Government from time to time (Optical Fiber Cable(OFC) for Assam). **Stream–VI**: Induction of new technological developments in the telecom sector in Rural and Remote Areas: Pilot projects to establish new technological developments in the telecom sector, which can be deployed in the Rural and Remote Areas, may be supported with the approval of the Central Government (Solar Mobile Charging Facility(SMCF)). In addition there are two Special Schemes as below:– – Gender based Schemes In recognition of the requirements of Gender Responsive Budgeting, preferential allocation of broadband connections to women's SHGs has been incorporated in the USOF Wire Line Broadband Scheme. Further, a special scheme for provisions of broadband enabled Rural Public Service Terminals to SHGs has been incorporated in the Fund's activities. These terminals will enable SHGs to provide banking, financial services and other broadband enabled Value Added Services (VAS) to the rural population. – Sanchar Shakti In addition, USOF intends to initiate a series of pilots aimed at empowerment of women through mobile VAS and ICT related skills. The focus of activity shall be women's SHGs. Seven projects have been accepted by competent authority for signing of MoU for Proof of Concept. 2. ICT for Persons With Disabilities (PwD). This is under finalisation. Objectives of the Scheme 2.1 Primary objective of the scheme is to provide PwDs in rural India with meaningful access to telecommunications facilities and through telecommunications facilities enable them to access public services, information, educational and employment opportunities thereby helping them to achieve self–reliance and facilitate their inclusion in mainstream society. 2.2 The scheme, via pilot projects, seeks to effectively demonstrate and highlight the utility and benefits of AT enabled ICTs to PwDs and their families in rural India and to institutions/organizations dealing with PwDs and to service providers, equipment manufacturers and content providers etc. The scheme seeks to encourage service providers and other stakeholders to take up such initiatives on a larger scale in order to address the needs of PwDs.
Servei de Telecomunicacions d'Andorra (STA) (Andorra)	All telecommunications services in Andorra are universal, that is, the same service is provided with the same quality and price for the whole of the population.

ABI Research (United States) (United Kingdom)	It is currently only defined as a "commitment" by Ofcom. Both BT and KCom are subject to a Universal Service Obligation which requires them to provide a telephone line to any household that requests one, subject to a 'reasonable cost' limit (currently set at £3400 by BT). As a result the vast majority of consumers are able to get a fixed telephone line if they wish. The Universal Service Obligation requires that a telephone line must support "functional internet access". However, the directive was written before broadband was prevalent and, in the UK, the obligations currently only extend to the provision of a line that is capable of supporting dial–up modem connections of 28kbit/s.
The Egyptian Company for Mobile Services (MOBINIL) (Egypt)	Just recently this Universal Service has surfaced. I am aware that there are very remote areas in central Sinai that may finally benefit from this fund.
Ministerio de Tecnologías de la Información y las Comunicaci (Colombia)	In Colombia, the law gives priority to access goals instead of services and these are defined by the provision of coverage or services in areas outside the market.
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	The obligation is defined with the Telecommunications licenses and Telecommunications and Radio–communications Act, as improving access to telecommunications service for locations which are not or not adequately served by existing services. These are developed by the Government in consultation the operators. Regulator performs the administration functions of implementing and monitoring the obligations on behalf of the Government.
Ministère de la Communication et des Nouvelles Technologies (Niger)	It is an obligation that enables the State to ensure ICT connectivity in remote areas deemed to be unprofitable.
Nepal Telecommunications Authority (NTA) (Nepal (Republic of)	Obligations: a. Telecommunications Act, 1997 has the provisions that the operators have to invest 15% of their annual investment in rural areas. b. Telecommunications service shall be made available at shouting distance (at least two telephone lines/public call office in a VDC)
CATR of Ministry of Industry and Information Technology (MIIT) (China)	A telecommunication service provider shall fulfill its universal telecommunication service obligations in accordance with various national regulations. The agency responsible for information industry under the State Council may determine specific universal telecommunication service obligations for each telecommunication service provider by means of designation or public bidding.
Swaziland Posts and Telecommunications Corporation (SPTC) (Swaziland)	Universal Service Obligation belongs to the policy maker. This is only defined in the New ICT Bill which is being debated in Parliament.
AHCIET (Colombia)	– By a combination of investments to implement the plan, combining public and private funding to develop broadband. – Planned investment in the creation of technocentres to improve connectivity of local authorities and improve terminals. – Provision of subsidies for broadband consumption by the general public.
Autorité de Régulation de la Poste et des Télécommunications (Dem. Rep. of the Congo)	In the draft law, it is considered an obligation in the same way as universal service and universal access.
Cable Bahamas Limited (Bahamas)	The overreaching goal is set out in the policy and then more define requirements are set out in the legislation.

Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	(Based on the Law awarding the Telecommunications Investment Fund (FITEL) legal personality under public law, assigned to the Transport and Communications sector – Law No. 28900 and Article 7 of Supreme Decree No. 024–2008–MTC approving the General Regulatory Framework for promotion of the development of public telecommunication services in rural areas and places of preferential social interest). Universal Access has been defined in Peru as access within the national territory to a set of basic telecommunication services with the capacity to transmit voice and data, such as fixed telephony, mobile services, long distance, local carrier, Internet, as well as the use of broadband to provide such services. The handling of free calls to emergency services is also considered to be a basic public telecommunication service. Universal access also includes training in the use of information and communication technologies (based on Article 7 of Supreme Decree No. 024–2008–MTC approving the General Regulatory Framework for promotion of the development of public telecommunication services in rural areas and places of preferential social interest).
Ministry of Communications and Informatization (Belarus)	Council of Ministers Order No. 889 of 15 July 2006 concerning universal services.
Agência Nacional de Telecomunicações – ANATEL (Brazil)	Act 9.472/1997 defines that universal service obligations are stablished by Anatel for services in the public regime. The obligation is defined by the Universalization Golas General Plan (PGMU) for the PSTN communications, that was recently revised and updated by Act 7.512, of 30 of June of 2011. These goals are periodically revised.
Ministry of Information and Communication Technology (Mauritius)	It is defined under the Information and Communication Technologies (Universal Service Fund) Regulations 2008 under section 21 and 48 of the ICT Act 2001 (as amended) and the contract between designated USPs (Universal Service Providers)and the regulator.
Ministry of Internal Affairs and Communications (Japan)	The obligation of NTT East and NTT West under the law to provide telephones (basic fee), fibre IP phones corresponding to telephones, public telephones of category one (public telephones installed based on the MIC criteria), or emargency numbers (No.110, No.118, No. 119), which are essential communications service for the people's daily lives, universally in Japan.
Ministry of Transport of the Republic of Latvia (Latvia)	Universal Telecommunication service/access obligation is defined in accordance with the Regulator (Public Utilities Commission) provisions.
Oman Telecommunications Regulatory Authority (TRA) (Oman)	In the course to achieve the economic and social objectives of the telecommunications sector and after presentation for the council of ministers, shall decide the following: 1. to expand the telecommmunications services and networks in defined areas according to geographical location or number of inhabitants and to establish public telecommunications centers including payphones in these areas 2. to specify the basic public telecommunications services which the licensee is obliged to provide to any requesting beneficiary at a reasonable price as decided by the Authority in the service area. 3. to provide maritime telecommunications services 4. to provide telecommunications services to persons with special needs
Rwanda Utilities Regulatory Authority (RURA) (Rwanda)	Operator have rollout plan include in license obligations provided to operators Universal Access for subzidising connectivity to make it affordable to rural and remote area.
ICP – Autoridade Nacional de Comunicações (ANACOM) (Portugal)	There is a USO generic obligation – although not specifically to rural and remote areas but to all the country – to provide telecommunication services (telephony and narrowband internet services), according with the Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive).

Comisión Nacional de Comunicaciones (CNC) (Argentina)	Decree 558/2008 establishes SECTION 2. – UNIVERSAL SERVICE. The set of services and programs, time–varying, defined by the national, aimed at the general population with a certain quality at affordable prices, which it must have access, regardless of their geographical location and conditions social, economic and related to physical disabilities. To do the ratings of the services and programs, the enforcement authority may consider the totality of telecommunications services, regardless technologies. The Enforcement Authority may modify, adapt and integrate services and programs, according to the needs of the population required. Without prejudice to the services and programs that define the implementing authority under the present rules, Basic Telephone Service Licensees (LSB) are required to expand the fixed telephone network within sixty (60) months, the total geographical area of their respective regions, as of the effective date hereof. The Enforcement Authority shall determine in each case whether the LSB will be compensated with funds from the Universal Service Trust Fund.

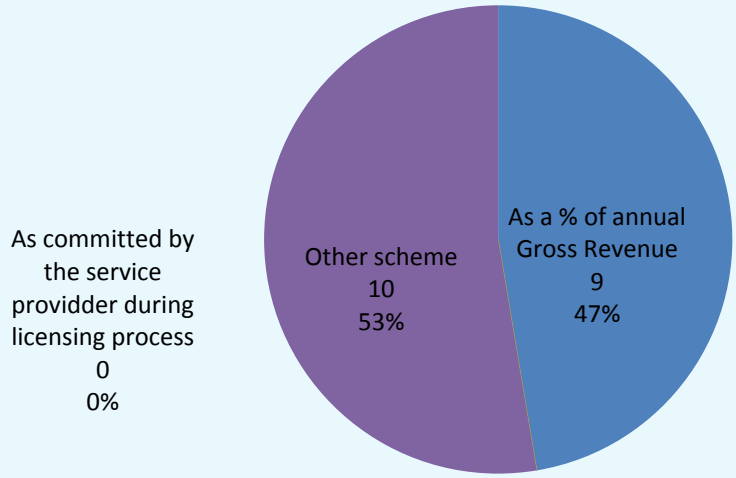
11 Is there a provision of Universal Service Fund or similar type of fund for the development of Telecommunications/ICTs/Broadband in rural and remote areas?



Percentage of countries by level of development where such a provision exists:	
Developed countries	40%
Transition countries	100%
Developing countries	62.5%
Least developed countries	80%

* 28 organizations from 27 countries replied to this question
* Replies merged when multiple organizations in same country replied.

12 If such a provision exists, how are the funds collected?



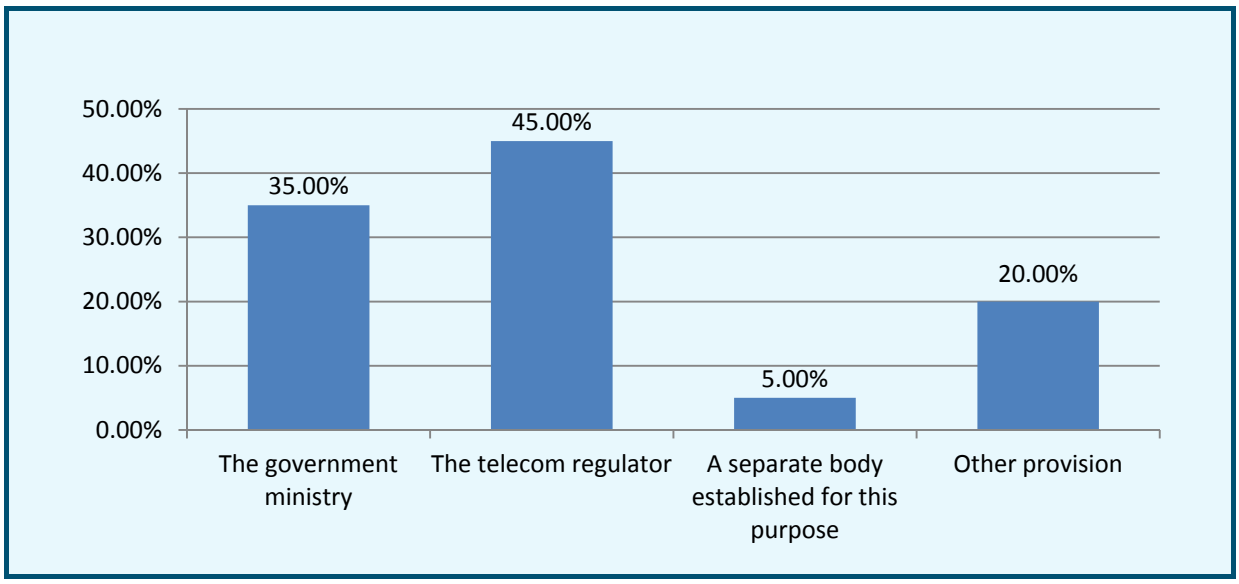
* 19 organizations from 18 countries replied to this question

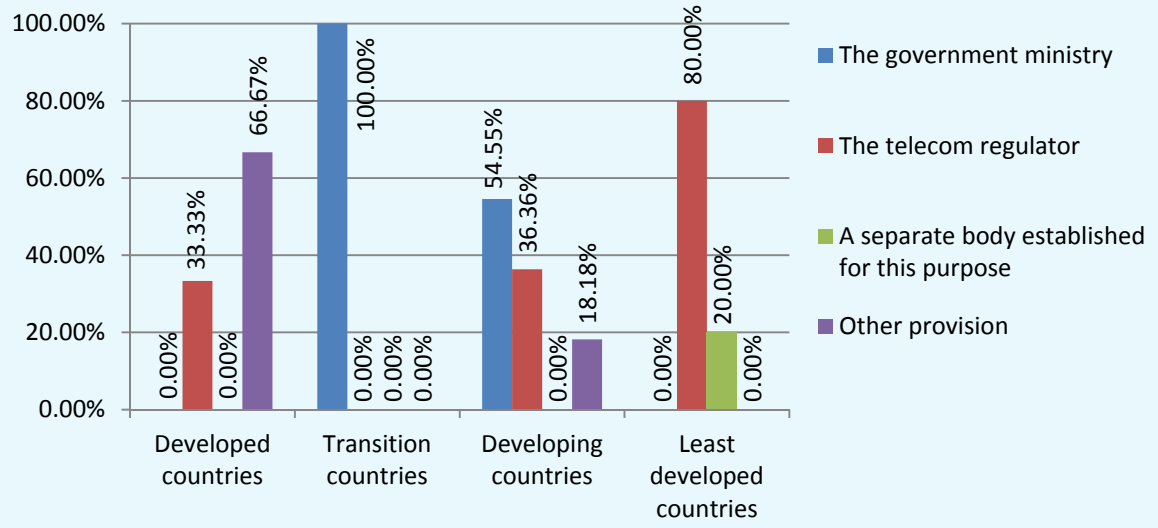
If "Other scheme" was selected, please specify:

ABI Research (United States) (United Kingdom)	Combination of government spending, european regional development fund and ISP contributions, including some derived from the licensing fees perceived by the BBC.
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	As a % of Annual Net Revenue in the basis of the estimate cost of the UA Project.
Syrian Telecommunication Regulatory Authority (SyTRA) (Syrian Arab Republic)	Not yet determined.
AHCIET (Colombia)	Combination of public investment by the State, via funds similar to those intended for universal service, and investment by private operators, an example of public–private financing.
Autorité de Régulation de la Poste et des Télécommunications (Dem. Rep. of the Congo)	2% of pre–tax turnover.
Ministry of Communications and Informatization (Belarus)	A universal services reserve is funded by compulsory contributions from telecommunication operators to the tune of 1 per cent of telecommunication service revenues.
Oman Telecommunications Regulatory Authority (TRA) (Oman)	the government intend to establish a new company "Oman Broadband company " to provide BB to all areas ,including the remote areas
Cable Bahamas Limited (Bahamas)	An application has to be made for reimbursement and then it is collected from operators. The scheme is still being developed.
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	(Based on the Law awarding the Telecommunications Investment Fund (FITEL) legal personality under public law, assigned to the Transport and Communications sector – Law No. 28900, Consolidated Amended Text of the Telecommunications Law (approved by Supreme Decree No. 013–93–TCC of 6 May 1993 and Law for the Promotion of Broadband and Construction of the National Fibre Optic Backbone Network – Law No. 29904.) The Telecommunications Investment Fund (FITEL) has been set up for the provision of universal access to telecommunications. It was established by the Consolidated Amended Text of the Telecommunications Law. FITEL has the following resources: 1 One per cent (1%) of the income invoiced and collected by carrier service operators in general, public end services, public end services in the public cable broadcasting distribution service and the public value–added service (Internet access), as referred to by Article 12 of the Consolidated Amended Text of the Telecommunications Law, approved by Supreme Decree No. 013–93–TCC. 2 A percentage of the fee collected for use of the radio frequency spectrum for public telecommunication services (this percentage shall in no case be less than 20 per cent of such collection), as referred to by Article 60 of the Consolidated Amended Text of the Telecommunications Law, approved by Supreme Decree No. 013–93–TCC, with the percentage being set by supreme decree. 3 The resources transferred by the public treasury. 4 The financial income generated by the FITEL resources. 5 The contributions, allocations, donations or transfers made by whatever token, from national or foreign natural or legal persons. 6 Other forms established by supreme decree.

	7 Resources from counterfactual sources obtained by the State pursuant to the terms and conditions agreed to in the public telecommunication services licensing contracts. These resources are distinct from those deriving from the concepts foreseen in the General Telecommunications Law, and shall be used solely to finance the telecommunication transport networks. (Based on Article 13 of the Regulations of Law No. 28900, awarding the Telecommunications Investment Fund (FITEL) legal personality under public law, and the Additional Final Provisions of Law No. 29904 – Law for the Promotion of Broadband and Construction of the National Fibre Optic Backbone Network.)
Ministry of Information and Communication Technology (Mauritius)	As per Regulation 3 of GN 206 of 2008 (amended by GN 207 of 2010) (a) For the purposes of section 21(2) of the Act, the annual contribution payable by a public operator into the Fund shall be paid in monthly instalments. (b) Every monthly instalment payable under paragraph (a) shall consist of – (i) 5 per cent of the gross revenue which the public operator generates from the provision of international roaming service for that month: (ii) 0.025 US Dollar on every minute of international calls which the public operator terminates in Mauritius that month, and shall be paid no later than 60 days after the end of that month.
Comisión Nacional de Comunicaciones (CNC) (Argentina)	The telecom service providers in the country, must provide one percent (1%) of all revenue earned from the provision of telecommunications services, net of taxes and duties levied.

13 Who is responsible for the disbursement in question 12?



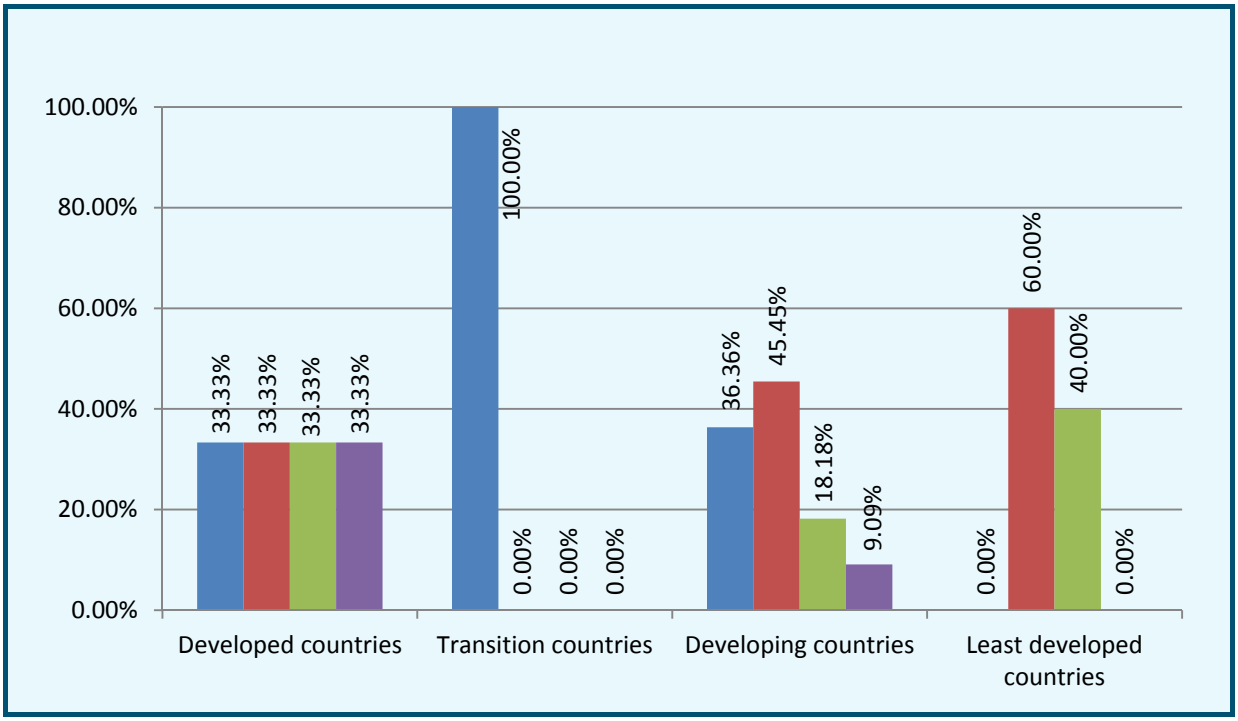


*21 organizations from 20 countries replied to this question
*Multiple replies possible: total 22 replies
*replies merged when multiple organizations in one country replied.

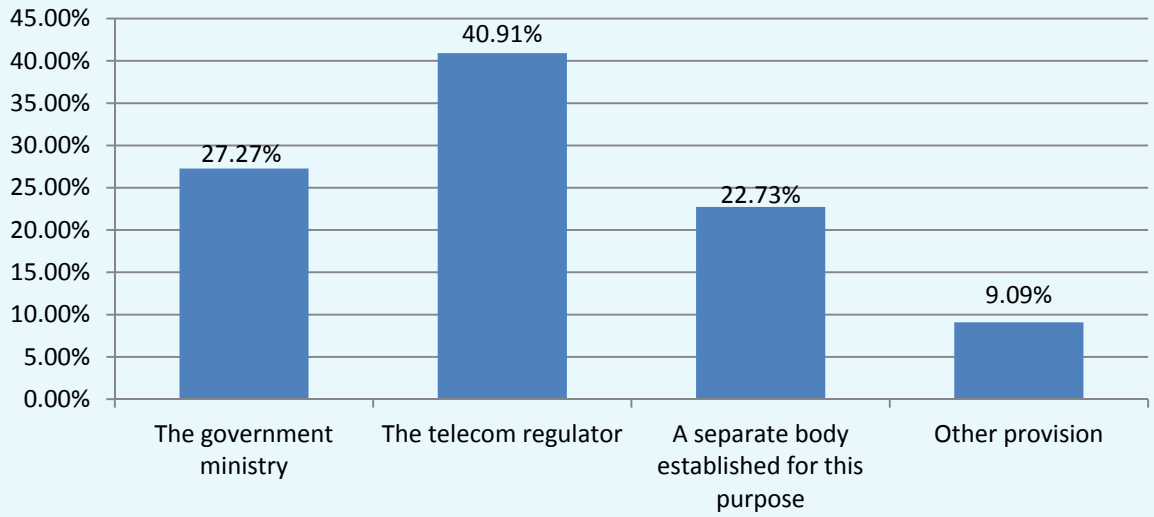
If "Other provision" was selected, please specify:

Servei de Telecomunicacions d'Andorra (STA) (Andorra)	Servei de Telecomunicacions d'Andorra
ABI Research (United States) (United Kingdom)	The government allocates the funds to local councils, who are helped by various devolved administrations, to manage bids and spend the funds.
Syrian Telecommunication Regulatory Authority (SyTRA) (Syrian Arab Republic)	The universal service fund will be created by presidential decree in which all details (funding, costs / payment management, etc.) will be specified.
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	FITEL's budget comes under the portfolio of the Ministry of Transport and Communications, in the Transport and Communications sector (based on Ministerial Resolution No. 879–2011–MTC/01).
Comisión Nacional de Comunicaciones (CNC) (Argentina)	The investment contributions are administered through the Universal Service Trust, whose trustee is chosen by a selection process that ensures the audience, to the satisfaction of the Ministry of Communications.

14 Who is responsible for managing those funds?



By level of development:

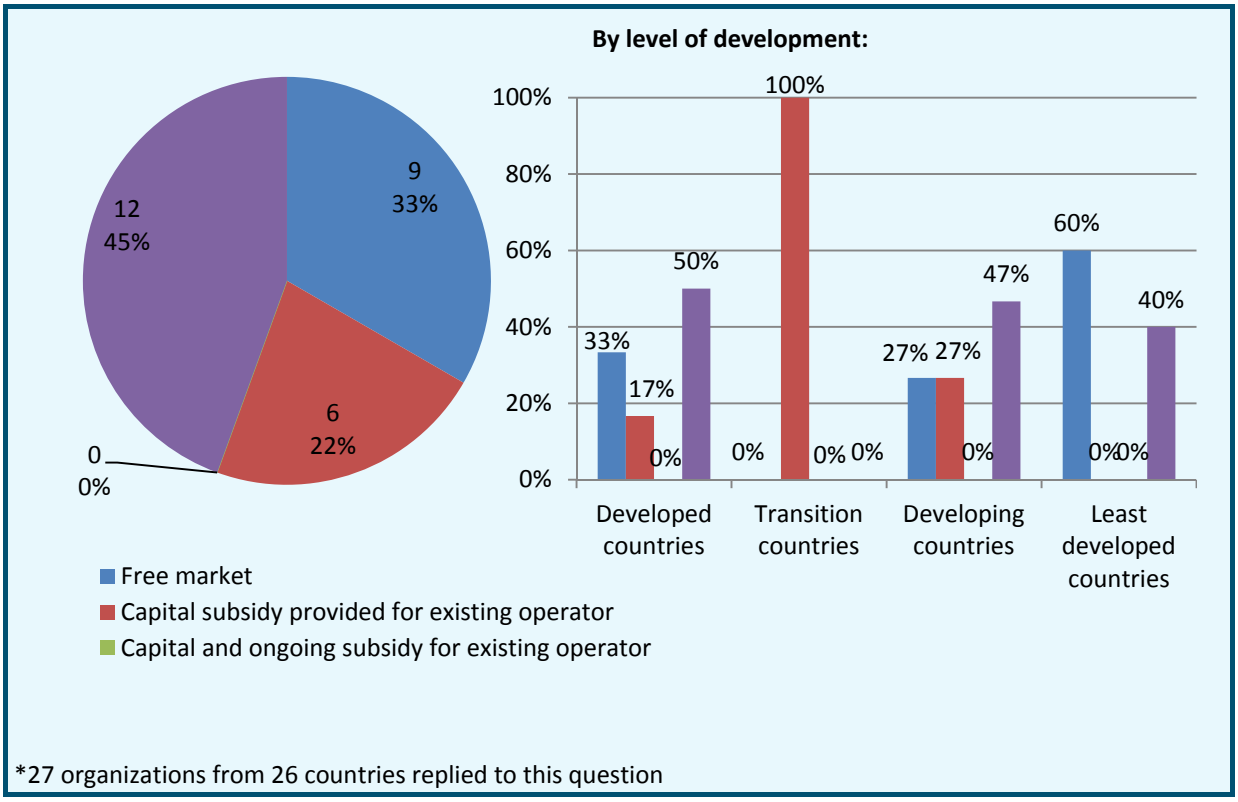


*21 organizations from 20 countries replied to this question
*Multiple replies possible: total 23 replies
*replies merged when multiple organizations in one country replied.

ABI Research (United States) (United Kingdom)	Broadband Delivery UK (BDUK), a unit within DCMS, is responsible for managing the Government's broadband funding. Individual projects are the responsibility of local authorities and the Devolved Administrations, as set out in BDUK's delivery model.
Servei de Telecomunicacions d'Andorra (STA) (Andorra)	Servei de Telecomunicacions d'Andorra

Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	Article 8 of Law No. 28900 provides that FITEL is administered by a directorate chaired by the Minister of Transport and Communications and which includes the Minister of the Economy and Finances and the Chairman of the Governing Council of the Supervisory Authority for Private Investment in Telecommunications – OSIPTEL. Moreover, pursuant to Article 7 of the Administrative and Operational Regulations of the Telecommunications Investment Fund (FITEL), FITEL's Governing Council is responsible for establishing FITEL's general policy and administrative policy.
Comisión Nacional de Comunicaciones (CNC) (Argentina)	There is a Technical Committee composed of seven members: a) two appointed by the Minister of Communications. b) one, the National Communications Commission. c) three, by providers (two appointed by the Licensees and the third by the other providers, excluding independent operators) and one Independent Operators. Its main function is to receive from the Enforcement Authority's payroll and issued programs or services on technical, economic and financing of them, the latter, according to the financial capacity of the Trust Fund.

15 What kind of economic model is being employed for the development of Telecommunications/ICTs/Broadband in rural and remote areas?



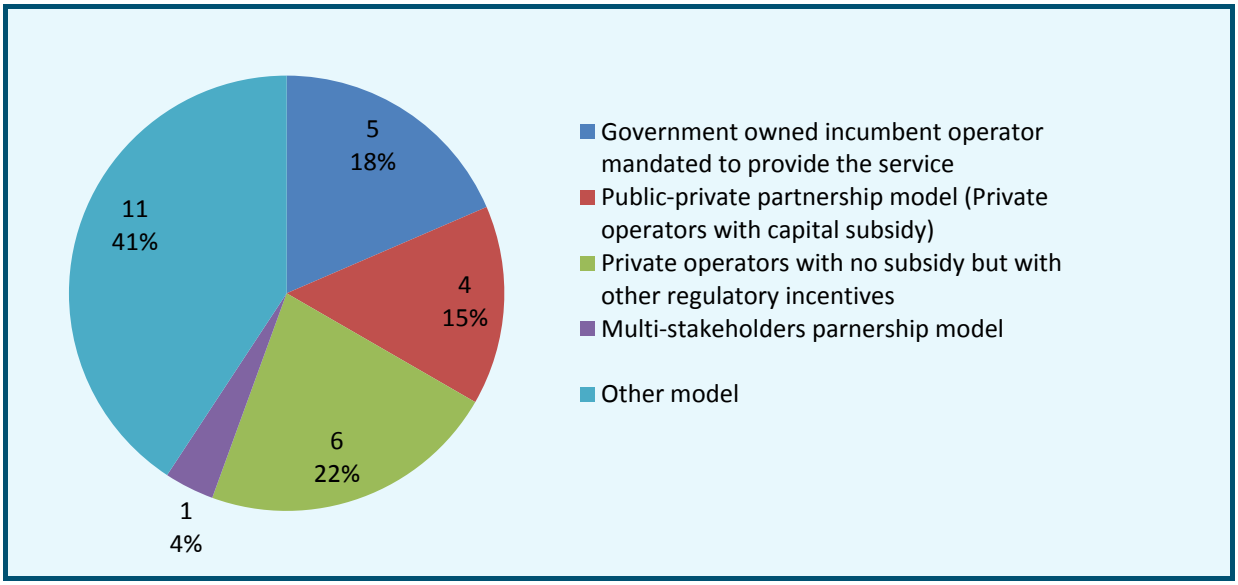
*27 organizations from 26 countries replied to this question

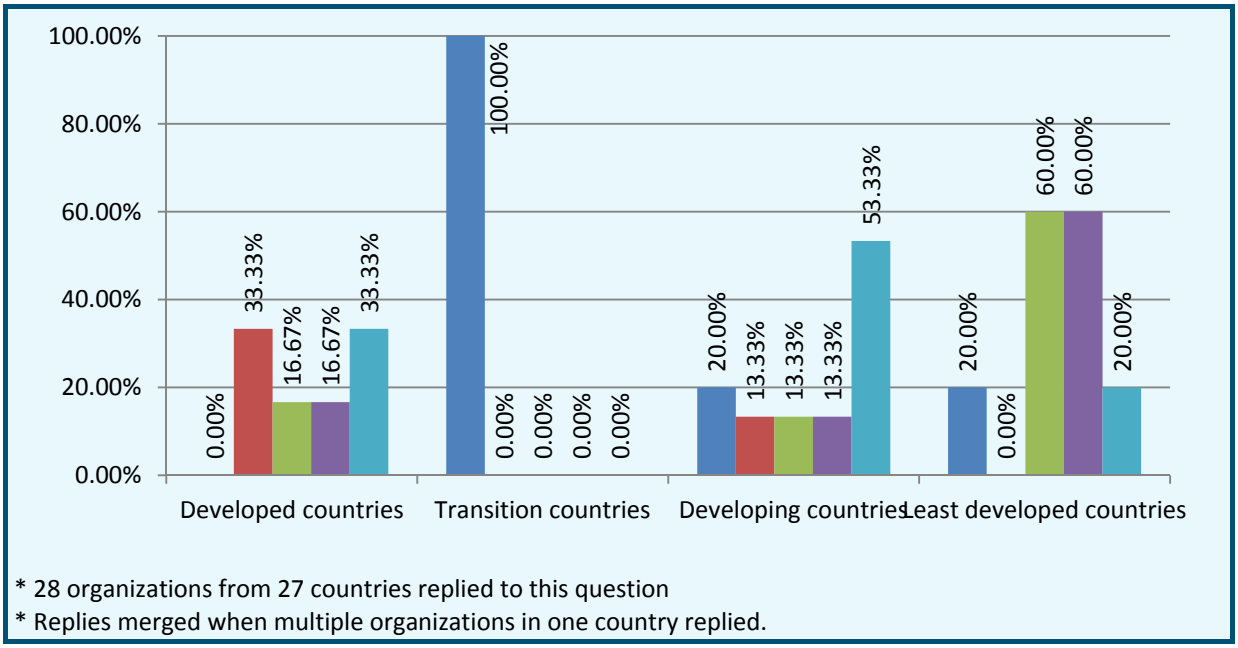
If "other" was selected, please specify:

ABI Research (United States) (United Kingdom)	Free market underpinned by capital subsidy for local councils
Telecommunications Regulatory Authority (Lebanon)	See 4
Syrian Telecommunication Regulatory Authority (SyTRA) (Syrian Arab Republic)	Not currently in existence.

Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	To date the govt has not set a specific project, but free market is taking effect, rolling out up to 90% voice and data access. Data access is at 90% for GPRS, Edge Access, Broadband, 3G, Wifi, and wimax provides for 20%.
Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	Biddings take place in order to subsidize the expansion of the infrastructure. The bidders are existing operators concerned by the infrastructure to be subsidized.
Nepal Telecommunications Authority (NTA) (Nepal (Republic of)	We are following all the above mentioned options: Free market, capital subsidy provided for existing operator, capital and ongoing subsidy for existing operator
AHCIET (Colombia)	Public–private combination. The operator and MINTIC contribute to the ICT programme. In specific terms, the State through the Ministry of Technology has made an initial investment of 228 million dollars and private operators have invested 439 million.
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	There is one model according to which the operator brings the service to rural areas or places of preferential social interest as part of certain obligations stipulated in the operator's licensing contract; and there is another model involving the subsidization of telecommunication projects in rural areas or places of preferential social interest. In this second model, FITEL is responsible for managing such projects, and finances the capital and/or operating costs.
Agência Nacional de Telecomunicações – ANATEL (Brazil)	Universalization Goals General Plan (PGMU) defines obligations for rural and remote areas. Also, auctions for radiofrequency are establishing obligations as well for anyone who wins the auctions. Capital subsidy provided for existing operators are also used, since auction prices are defined considering the cost of the obligation.
Ministry of Transport of the Republic of Latvia (Latvia)	State aid programme for private operator
Rwanda Utilities Regulatory Authority (RURA) (Rwanda)	Free market and open competition among operators to deliver services all over the country. Subsidy to Operator using Universal Access Fund for connectivity and coverage in remote and rural area. Government Optic fiber network backbone covering the whole country for broadband services
ICP – Autoridade Nacional de Comunicações (ANACOM) (Portugal)	Within the scope of the national Strategic Reference Framework (QREN), public investments made on high throughput broadband infrastructure in areas where market agents do not find the needed operating conditions to offer these services, namely concerning demographic density, might be eligible for support. The above mentioned five projects for the construction, installation, financing, operation and maintenance of NGA in rural areas are co–financed – the tenderers submitting winning bids were DSTelecom (Alentejo and Algarve Zone and North Zone) and Viatel (in the Central zone and in the areas of the autonomous regions), whereas the signing of the contracts was subject to approval by the European Commission (and according with the European
Cable Bahamas Limited (Bahamas)	Operator has to provide the service and then request reimbursement for the unavoidable costs.
Comisión Nacional de Comunicaciones (CNC) (Argentina)	The projects are funded by the Universal Service Fund. The deployment of fiber optic (Fibre Federal Network) is funded by state ARSAT SA

16 What kind of business model is being developed?



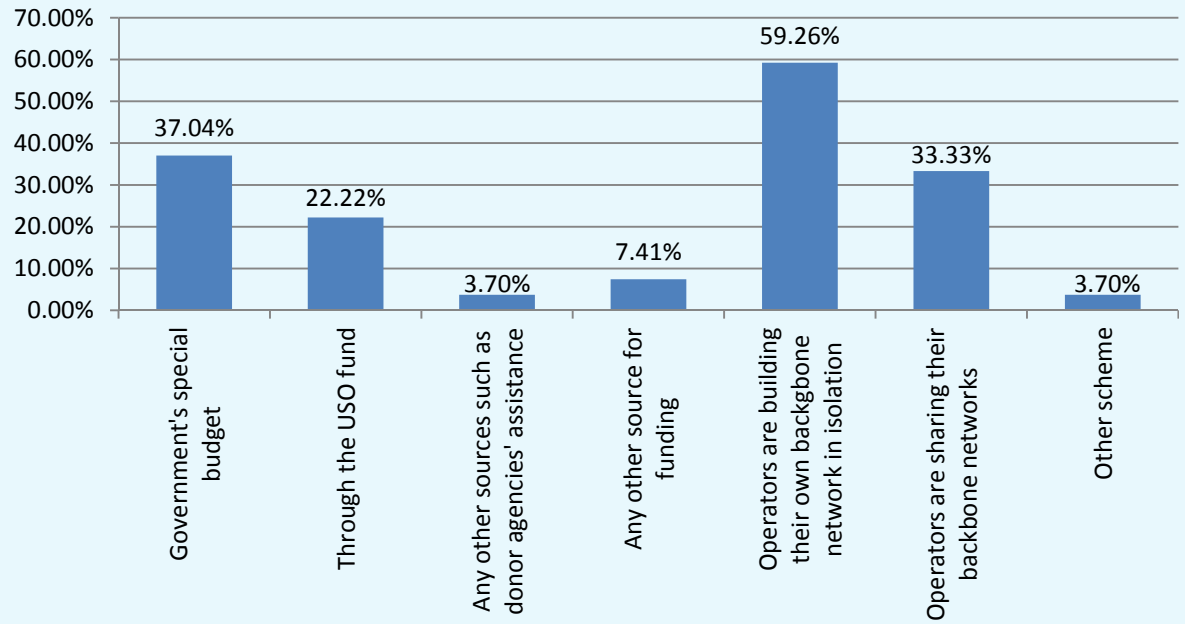


* 28 organizations from 27 countries replied to this question
* Replies merged when multiple organizations in one country replied.

If "other model" was selected, please specify:

Cellular Operators Association of India (COAI) (India)	The different schemes as listed above in the 6 Streams have different models. Some have Capex subsidy mostly to the Government owned Public Sector undertaking BSNL. For the scheme for rural telephones it is a combination of CAPEX+OPEX for PSU and Private service providers. In the recent case of the OFC for panchayats, the Government has floated a new company by the name of " Bharat Broadband Network Limited – BBNL" . This has funding from the USO Fund and partnership with the government owned public undertakings – BSNL, RailTel, Powergrid Corporation of India. These companies will pool in existing resources of OFC and will lay "incremental OFC" to areas where new OFC is required for extension till the panchayat office. The Bandwidth will be provided on open access to seekers.
Servei de Telecomunicacions d'Andorra (STA) (Andorra)	The Operator (which is government–owned) provides the service.
Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	Conatel provides the subsidy, but the infrastructure remains the property of the operator who has been awarded the contract.
Nepal Telecommunications Authority (NTA) (Nepal (Republic of)	We are adopting all of the above business models depending on the case: (1) Government owned incumbent operator mandated to provide the service (2) Public–Private Partnership model (Private operators with capital subsidy) (3) Private Operators with no subsidy but with other regulatory incentives (4) Multi–stakeholders partnership model
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	On one hand there is the case of companies operating in rural areas or places of preferential social interest without government subsidies; and on the other, the Public Private Partnership model, wherein the State finances the projects or part thereof, with project execution by private players.
Agência Nacional de Telecomunicações – ANATEL (Brazil)	Both the Government owned incumbent operator mandated to provide the service and private operators with some subsidy are used.
Ministry of Transport of the Republic of Latvia (Latvia)	Government owned infrastructure operator with EU funds support.
Office of the President, Department of Information Communication Technology (Seychelles)	Cost–Based basis
Oman Telecommunications Regulatory Authority (TRA) (Oman)	Government BB Company will be providing the passive infrastructure for the telecom operators in the remote areas
Cable Bahamas Limited (Bahamas)	Government owned incumbent operator as well as a monopoly public company required to provide services.
Comisión Nacional de Comunicaciones (CNC) (Argentina)	The state company has ownership ARSAT network.

17 How is major backbone infrastructure being developed in rural and remote areas?



*28 organizations from 27 countries replied to this question
*Multiple replies possible: total 45 replies
*replies merged when multiple organizations in one country replied.

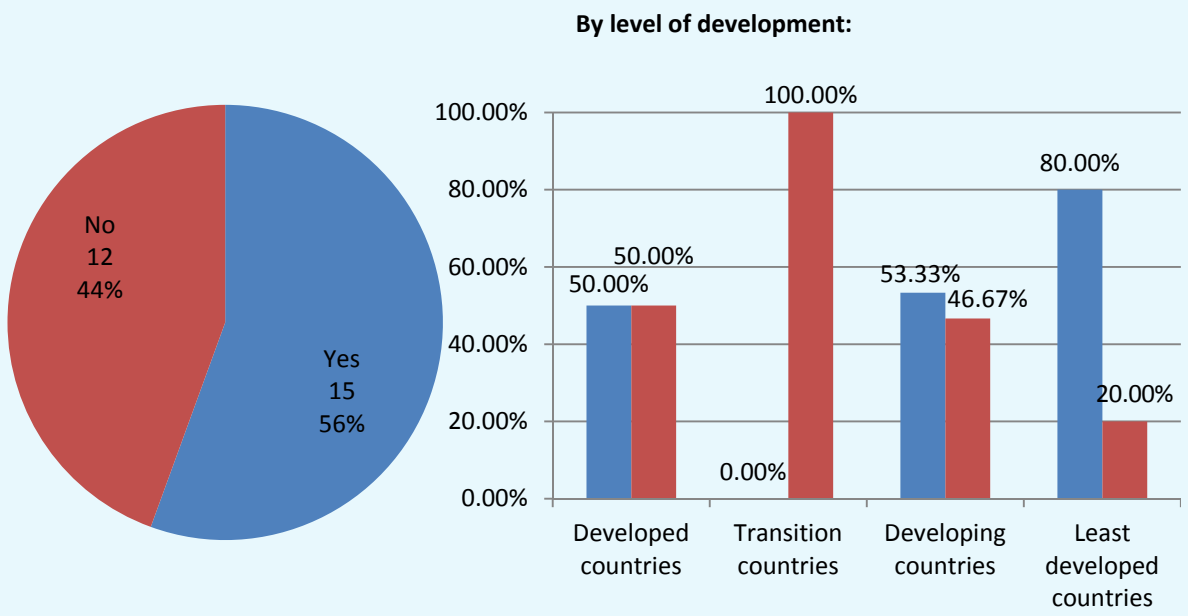
If "any other source" for funding was selected, please elaborate:

Servei de Telecomunicacions d'Andorra (STA) (Andorra)	The Operator has deployed the network.
Ministry of Internal Affairs and Communications (Japan)	Guarantee for a debt
ICP – Autoridade Nacional de Comunicações (ANACOM) (Portugal)	Government and EU funds. See answer to Q.15. Note: The incumbent operator (currently, a private operator) has developed its own national backbone, also in rural and remote areas (areas where it is the only backbone infra–structure in place).

If "other scheme" was selected, please specify:

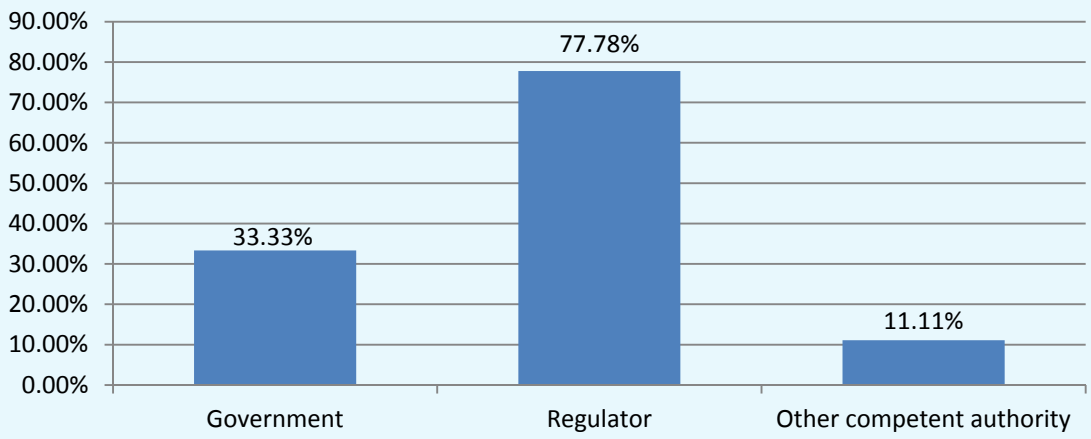
Cable Bahamas Limited (Bahamas)	There is no national broadband network being funded. Each operator is responsible for building the network out of its funds.

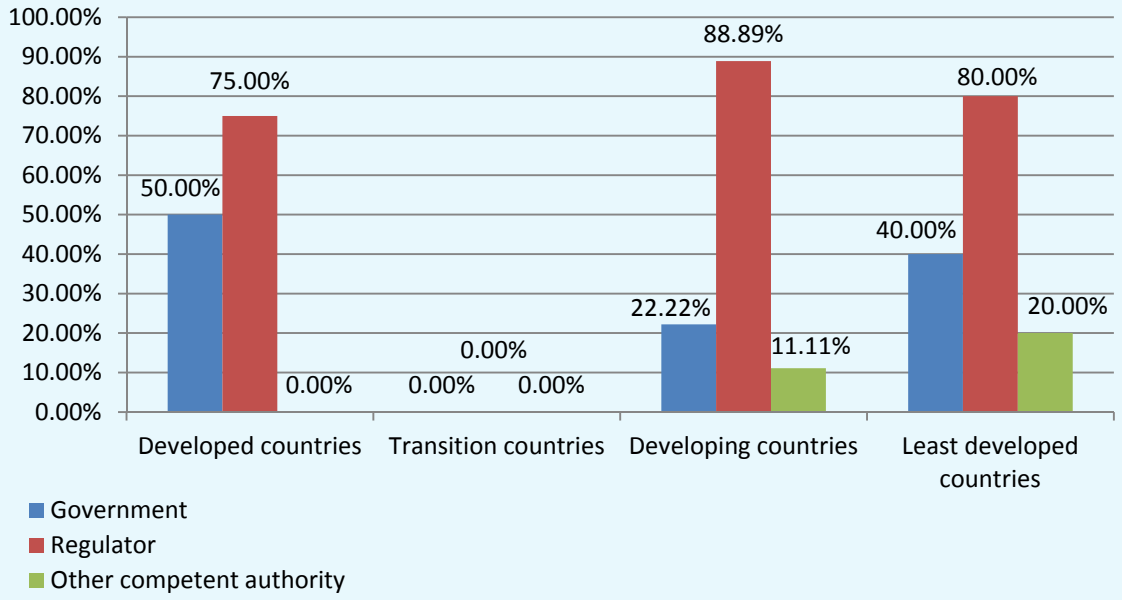
18 Do you have any specific policy, legal and/or regulatory framework for infrastructure sharing, especially in the rural and remote areas, for example optical fiber cable and BTS/Microwave towers and the related support infrastructures?



*28 organizations from 27 countries replied to this question
*replies merged when multiple organizations in one country replied.

19 If such a framework exists, who issues such instruments?



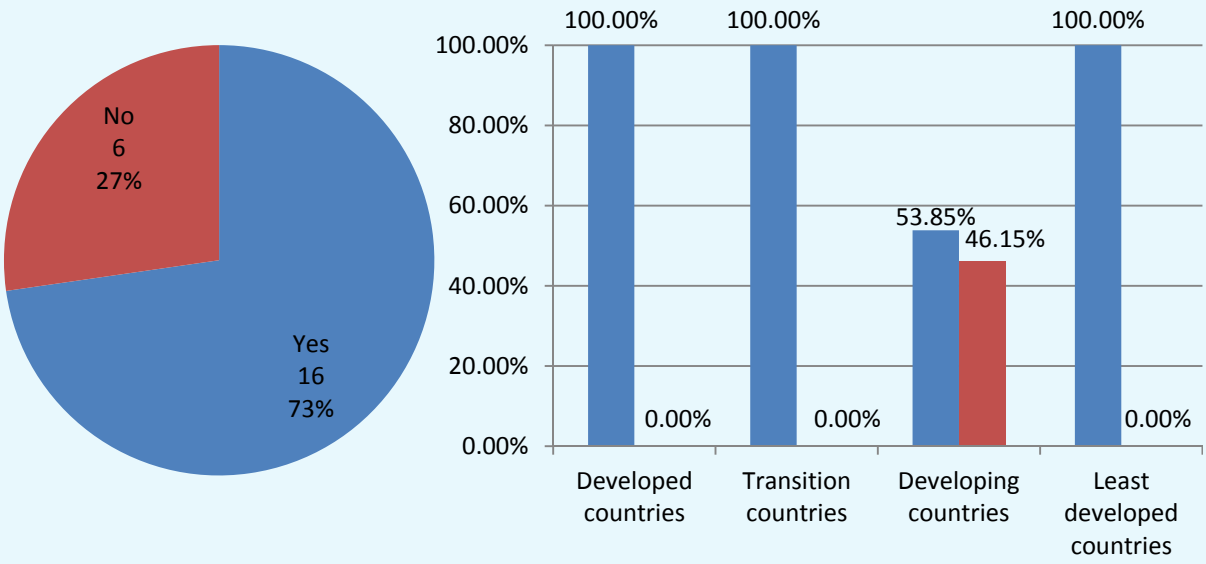


*19 organizations from 18 countries replied to this question
*multiple replies possible: total 22 replies.
*replies merged when multiple organizations in one country replied.

If "Other competent authority" was selected, please specify:

ABI Research (United States) (United Kingdom)	Due to Ofcom's findings that they have significant market power, BT and KCom have regulatory obligations to provide access to their networks and to provide certain wholesale services to third party CPs.
Nepal Telecommunications Authority (NTA) (Nepal (Republic of)	Recently a 13 member special committee has been established for this.
Swaziland Posts and Telecommunications Corporation (SPTC) (Swaziland)	Parliament Act No. 11 of 1983, as amended
ICP – Autoridade Nacional de Comunicações (ANACOM) (Portugal)	Although there is no specific policy for rural and remote areas, the Portuguese Government published in 2009 new legislation on access to passive infrastructure either at the horizontal and vertical levels, that is, access to all ducts and associated infrastructure (from all entities, namely utilities) and also imposing symmetric regulation on the installation and access to in–house wiring (namely fibre). The approval of the Law no. 32/2009, of 9 July, authorized the Government to legislate on the regime of open access (by any operator) to infrastructures suitable for the accommodation of electronic communications networks and to lay down the regime of challenge to measures taken by ICP–ANACOM in the scope of the regime governing the construction, access to and set up of electronic communications networks and infrastructures countrywide. The Decree–Law nr. 123/2009, of 21 May, sets out the general principles, namely the principles of competition, open access, non–discrimination, effectiveness and transparency, concerning the promotion of the construction, set up and access to infrastructures suitable for the accommodation of electronic communications networks – in a technological neutral approach – in property owned by private entities and public bodies across the country and including all areas, namely rural and/or remote. There are also specific sharing/access obligations imposed on the former incumbent operator (e.g., to ducts and poles).

20 Are there any instances of infrastructure sharing even in the absence of such instruments mentioned in Question 10–3/2?



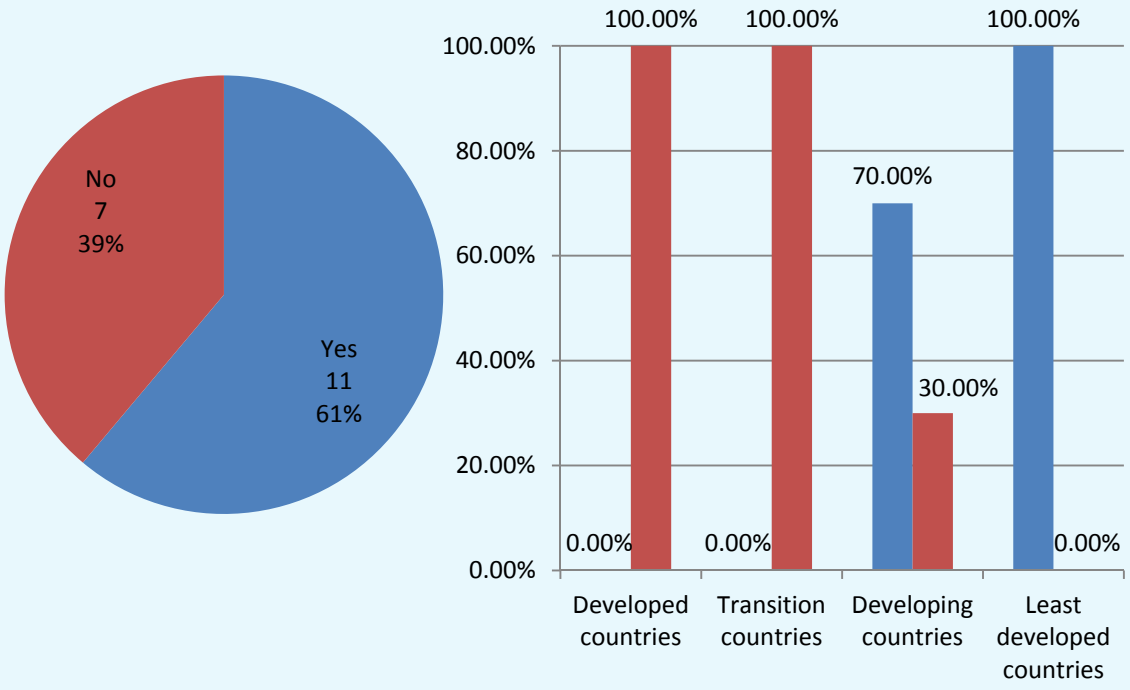
*22 organizations from 22 countries replied to this question

If yes, please elaborate:

Cellular Operators Association of India (COAI) (India)	Sharing of passive infrastructure is widely done in India. India has pioneered the sharing of mobile towers and passive infrastructure sharing. We have the largest Infrastructure Provider companies like Indus towers with more than 100,000 towers in their portfolio. The telecom infrastructure providers now provide an Integrated Neutral Host Platform that is used by diverse and often competing operators resulting in the rapid deployment of networks supporting over 600 million mobile subscribers. The new and upcoming technologies such as 3G and BWA services will be highly successful since the easy availability and accessibility of shared towers, a key input for the growth of this sector.
Servei de Telecomunicacions d'Andorra (STA) (Andorra)	Piping with companies in other sectors.
The Egyptian Company for Mobile Services (MOBINIL) (Egypt)	No 'infrastructure sharing' between operators that I know of. The only 'sharing' we do is site sharing. Two or more operators build their shelters and install their antennae in the same physical location. There is no national roaming either.
Ministerio de Tecnologías de la Información y las Comunicaciones (Colombia)	In Colombia, the deployment of the optical fibre backbone has been based on the electrical interconnection system (concerning approximately 70% of the network).
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	Operators enter into infrastructure sharing commercial arrangements.

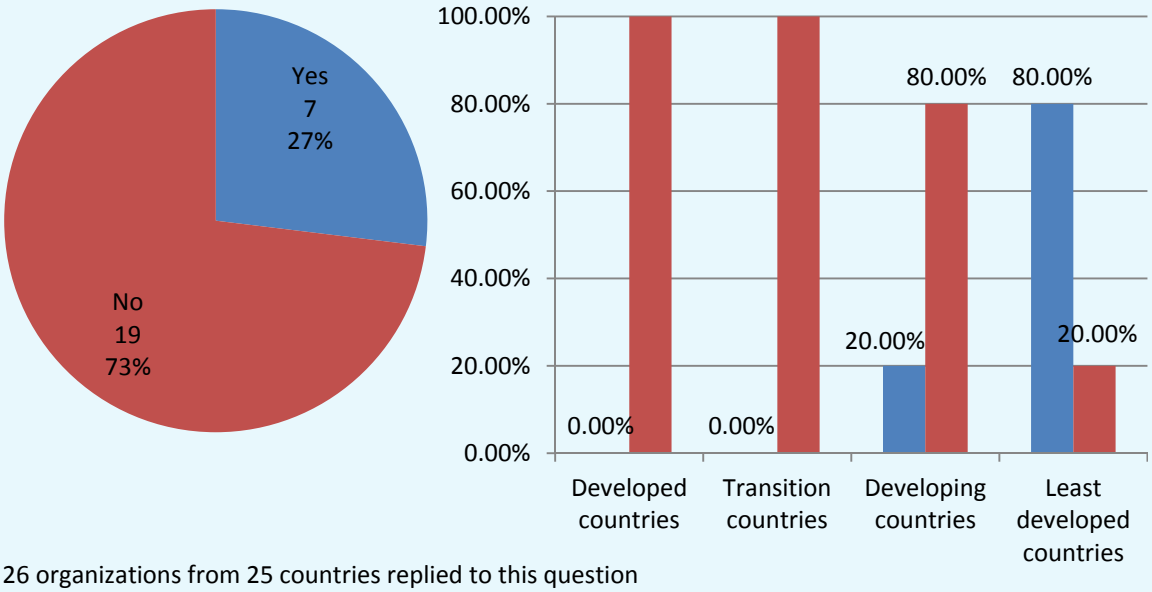
Syrian Telecommunication Regulatory Authority (SyTRA) (Syrian Arab Republic)	There are currently infrastructure partnership agreements between Syrian Telecom (STE) and the cellphone operators in Syria.
Ministère de la Communication et des Nouvelles Technologies (Niger)	With due respect for the interconnection catalogue in force, we have the following sharing arrangements: – Leasing of transmission capacity – Colocation of technical and power equipment – Pylon sharing – Equipment interconnection
Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	These exist in the case of a private arrangement between operators.
Swaziland Posts and Telecommunications Corporation (SPTC) (Swaziland)	Co–location, Masks for wireless systems and backhauling.
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	Private agreements for infrastructure sharing currently exist between different telecommunication operators. If operators do not reach agreement on the conditions applicable to infrastructure sharing, the regulator may intervene to establish an agreement between the parties. Regulations also exist regarding access to the electricity, hydrocarbon transport and road infrastructures, in order to allow telecommunication operators to deploy infrastructures, particularly for fibre optic transport networks.
Ministry of Communications and Informatization (Belarus)	Telecommunication operators share infrastructure, including fibre optic communication links and cellular antenna masts, under contractual arrangements.
Oman Telecommunications Regulatory Authority (TRA) (Oman)	National Roaming is applicable and mandated in some remote areas, so both operators can use same BTS
Rwanda Utilities Regulatory Authority (RURA) (Rwanda)	Regulator published infrastructure sharing guidelines that are applied since 2010.
ICP – Autoridade Nacional de Comunicações (ANACOM) (Portugal)	See answer to Q.18 above.
Cable Bahamas Limited (Bahamas)	The requirement to provide television services was achieved through the cable television company provided the signals and the incumbent telephone operator permitting the cable television company to use its towers and central office to accomodate equipment.

21 Are you planning to bring such guidelines to address the rural challenges?



* 19 organizations from 18 countries replied to this question
* replies merged when multiple organizations in one country replied.

22 Does your government provide any kind of tax rebate for import of equipments for providing Telecommunications/ICTs/Broadband in rural and remote areas?

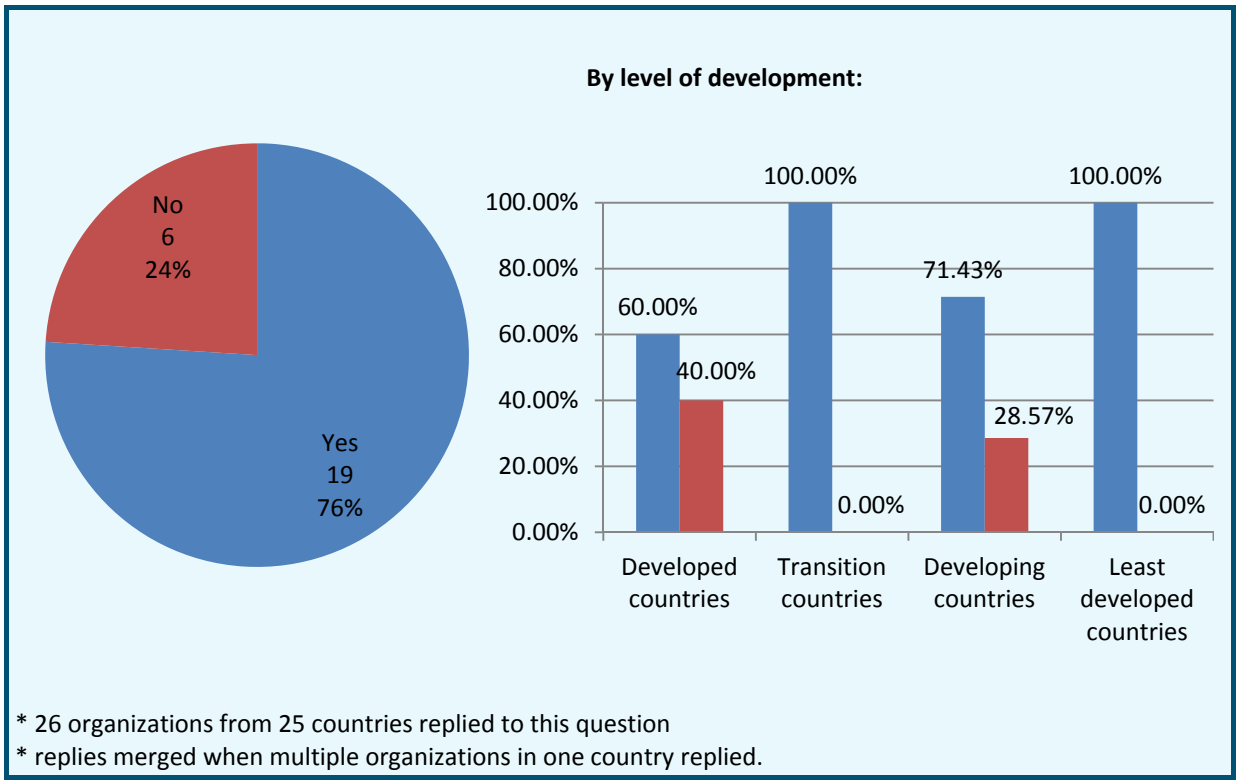


* 26 organizations from 25 countries replied to this question

If yes, please provide details, if applicable:

The Egyptian Company for Mobile Services (MOBINIL) (Egypt)	No tax rebates whatsoever.
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	All ICT related equipment such as Laptops, Mobile Phones and Telecommunications infrastructure equipment are exempted from Import VAT and Duty Tax.
Ministère de la Communication et des Nouvelles Technologies (Niger)	The national ICT policy and strategy document foresees incentives for operators wishing to invest in rural areas, in the form of tax benefits (exemption from import taxes and duties on equipment), together with an attractive legal, institutional and economic framework.
Nepal Telecommunications Authority (NTA) (Nepal (Republic of)	There is a provision that maximum ceiling of 7 % tax will be levied in telecommunications equipment to be used in rural areas in case the tax is above 5% in the import of telecommunications equipment (excluding few).
AHCIET (Colombia)	– Subsidies for fixed broadband consumption – Tax rebates for IT purchases (especially computers) by the public.
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	At present, exemption has been given regarding the payment of duties on the import of telecommunication equipment. The tax refund approach is not applied because importers are unable to pay the relevant duties.
Rwanda Utilities Regulatory Authority (RURA) (Rwanda)	All telecommunications/ ICT equipment are taxes exempted

23 Do the license conditions oblige the Operator/Service provider to provide service in rural and remote areas?



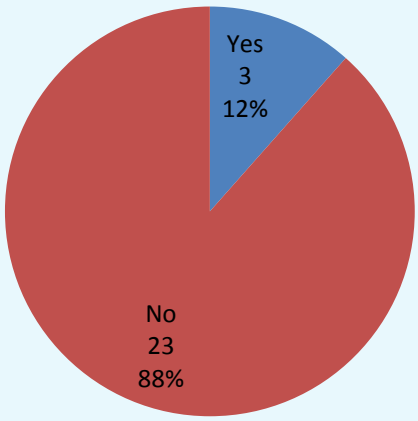
* 26 organizations from 25 countries replied to this question
* replies merged when multiple organizations in one country replied.

If yes, please provide further information

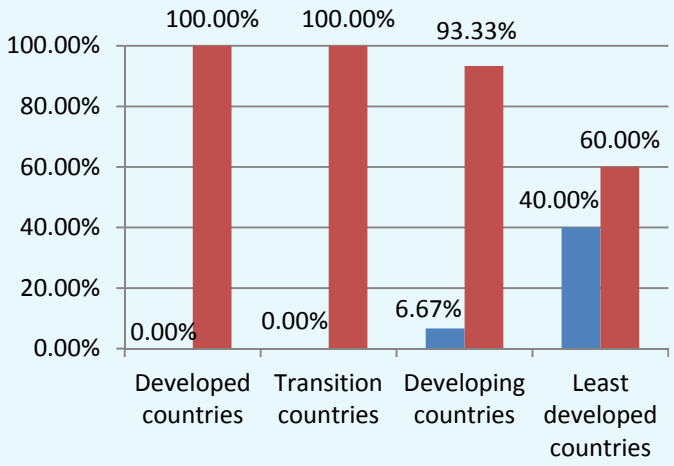
The Egyptian Company for Mobile Services (MOBINIL) (Egypt)	Yes. As mentioned earlier, the license conditions oblige mobile operators to cover at least 98% of population. Since slightly above 50% of the Egyptian population lives in major cities, that leaves the other half living in rural and remote areas which are properly covered.
Ministerio de Tecnologías de la Información y las Comunicaciones (Colombia)	In the case of mobile network operators, the assignment of the license imposes obligations such as cover extension and connectivity services provision to public institutions.
Telecommunication & Radiocommunication Regulator (TRR) (Vanuatu)	New entrant Operator enters into performance guarantee under respective license obligated to roll 85% coverage in the country within two years of operations. Todate market dynamics have seen the coverage to be at 90% after 3.5 years of operation.
Ministère de la Communication et des Nouvelles Technologies (Niger)	The license obliges operators/service providers to provide service in rural and remote areas or participate in the financing of universal access. This obligation is annexed to the terms of reference of each operator at the time of acquisition of its license for the establishment and operation of a public telecommunication network.
Syrian Telecommunication Regulatory Authority (SyTRA) (Syrian Arab Republic)	The 2010 telecommunication law obliges operators to provide universal service to rural areas.
Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	Not in current contracts.
Nepal Telecommunications Authority (NTA) (Nepal (Republic of)	Telecommunications Act, 1997 has the provisions that the operators have to invest 15% of their annual investment in rural areas.
CATR of Ministry of Industry and Information Technology (MIIT) (China)	A basic telecommunication operator has to undertake the universal telecommunication service obligations.
Swaziland Posts and Telecommunications Corporation (SPTC) (Swaziland)	Operators are obliged to pay for Universal Service fund of 5% of NOI. Also ensure service availability in remote rural areas, using the cheapest ways possible e.g. payphones.
AHCIET (Colombia)	Universal service obligations and commitments under the “Vive Digital” Plan.
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	In some cases licences were issued on the condition that the operators provide services in specific rural areas. Nevertheless, not all licences issued are subject to this obligation.
Agência Nacional de Telecomunicações – ANATEL (Brazil)	Universalization Goals General Plan (PGMU) defines obligations for rural and remote areas. Also, auctions for radiofrequency are establishing obligations as well for anyone who wins the auctions. Auctions for 450MHz and 2.5GHz defined obligations to offer data service to rural and remote schools.
Ministry of Internal Affairs and Communications (Japan)	Provision of universal telecommunications service, telephone.

Oman Telecommunications Regulatory Authority (TRA) (Oman)	Yes , but in specific areas , as they have to cover certain percentage of the household in each goveronate
Rwanda Utilities Regulatory Authority (RURA) (Rwanda)	It is part of their license obligation. They have to provide rollout plan when bidding for the operator license.
ICP – Autoridade Nacional de Comunicações (ANACOM) (Portugal)	For example, concerning the licensing of Mobile Network Operators, Digital TV provider, Universal Service provider, etc.
Cable Bahamas Limited (Bahamas)	No, the Communications Act 2009 obliges the Operator/Service provider to provide service in rural and remote areas
Comisión Nacional de Comunicaciones (CNC) (Argentina)	The art. 2 of Decree 558/2008 on Universal Service states that basic telephone service licensees (LSB) are required to expand the fixed telephone network in the total geographical area of their region (North and South)

24 Do you provide a specific rural/remote area license to Telecommunications/ICTs/Broadband providers in rural and remote areas?

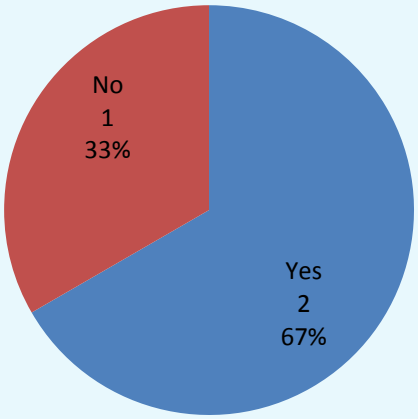


By level of development:



* 27 organizations from 26 countries replied to this question
* replies merged when multiple organizations in one country replied.

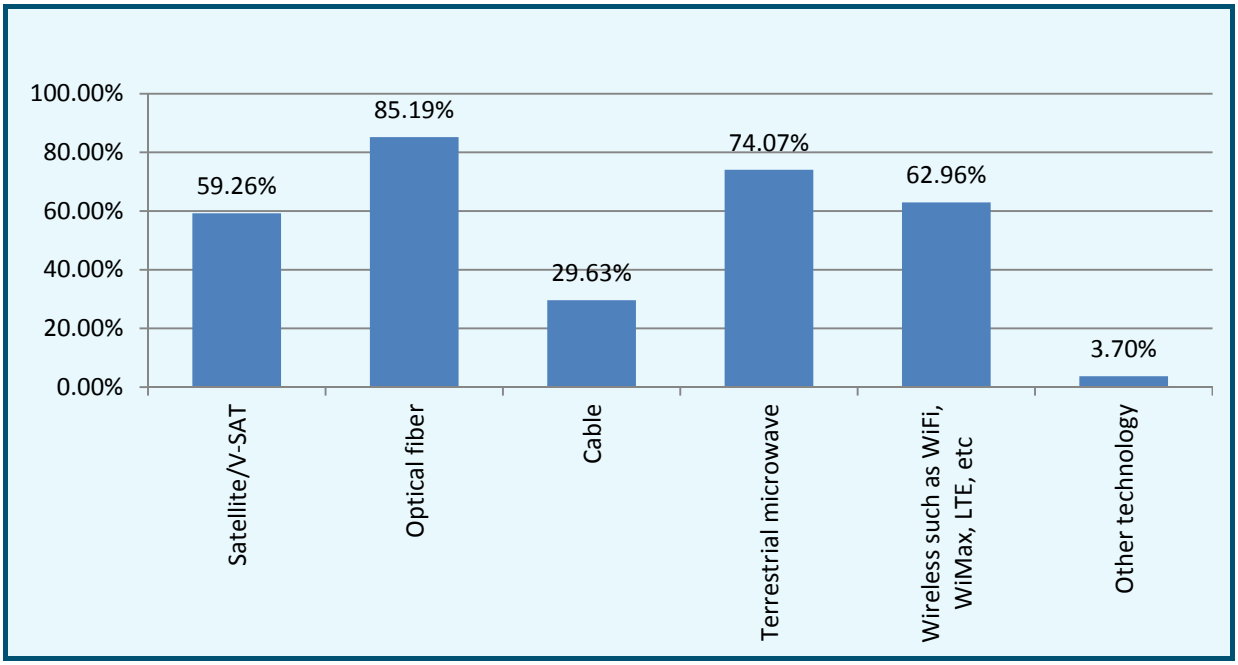
25 If you answered yes to question 24, are these providers allowed to provide services in urban areas once rural and remote obligations are met?

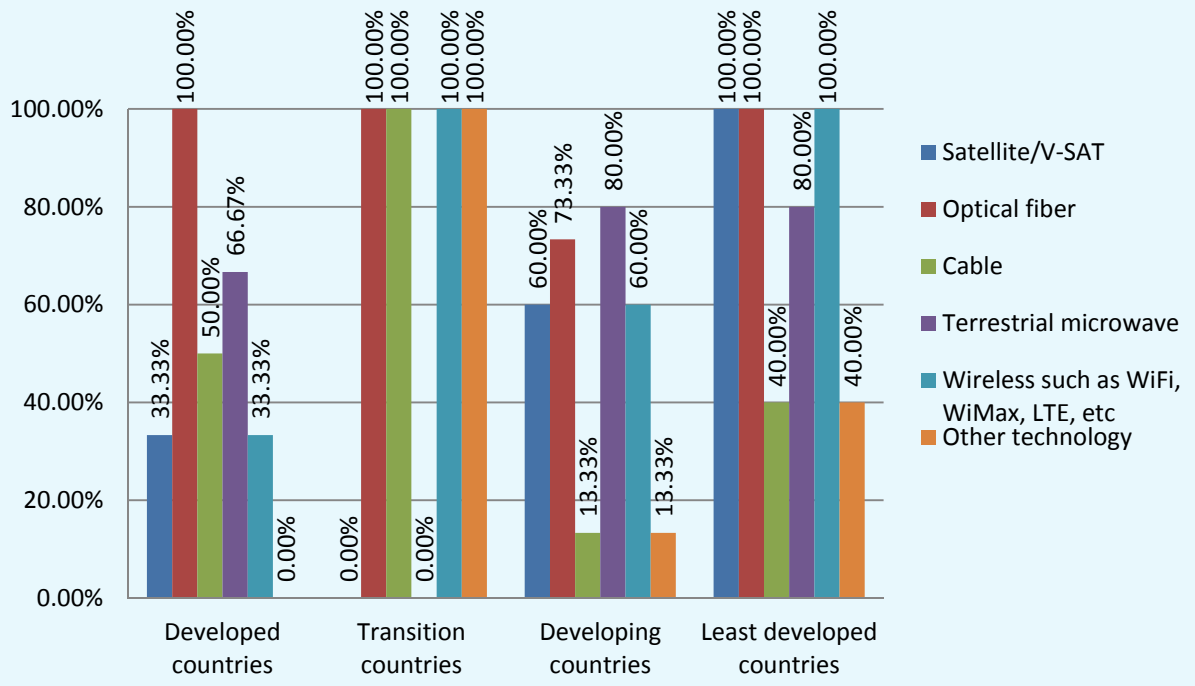


Percentage of countries by level of development where it is allowed:	
Developed countries	0%
Transition countries	0%
Developing countries	100%
Least developed countries	50%

* This question was only relevant if the answer was 'yes' to question 24.
* 3 responses received.

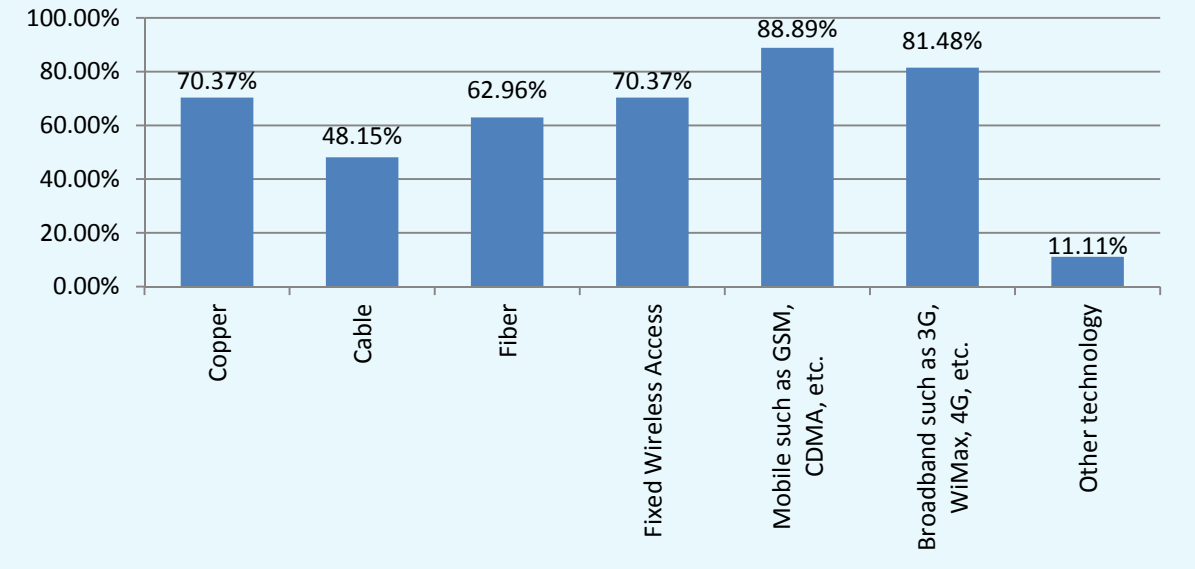
26 What backhaul/backbone technologies are being used in your country for connecting rural and remote areas? Please tick all that applies

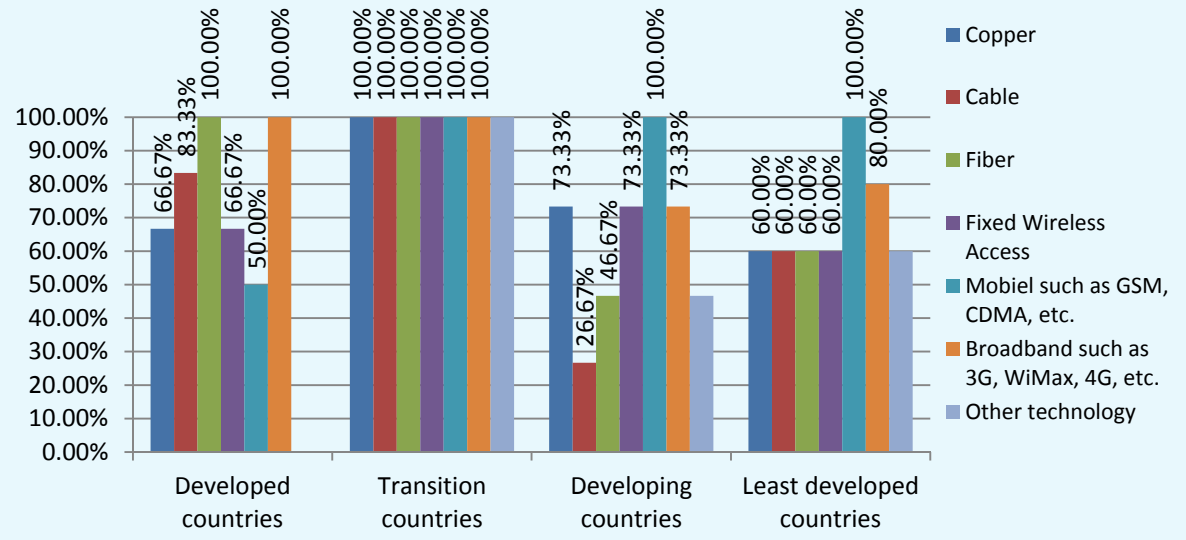




*28 organizations from 27 countries replied to this question
*Multiple replies possible: total 89 replies
*replies merged when multiple organizations in one country replied.

27 What access technologies are being used in your country for connecting rural and remote areas? Please tick all that applies





*28 organizations from 27 countries replied to this question
*Multiple replies possible: total 117 replies
*replies merged when multiple organizations in one country replied.

If "Other technology" was selected, please specify:

Telecommunications Regulatory Authority (Lebanon)	Other wireless technologies such as Pre–Wimax, CDMA etc...
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	Satellite/V–SAT, microwave, WiFi.

28 If there is any other specific policy/regulatory intervention/initiative by your government or regulatory, please elaborate

United Kingdom Telecommunications Academy (UKTA) (International)	UKTA has both UK Government and CEPT Approval to support ITU HCD Initiatives. Should you require more detailed information as to how this is achieved see www.ukta.co.uk/eMCM or eLLM in IT & T (provided at University of Southampton and Open University of Tanzania) on UKTA web site. All these programmes delivered by UKTA cover Policy & Regulation.
Telecommunications Regulatory Authority (Lebanon)	It is envisioned that MOT will soon issue a telecom policy which will address all sorts of access.
Ministère de la Communication et des Nouvelles Technologies (Niger)	– Adoption of a law on the sharing of telecommunication infrastructure – Creation of a regulatory authority specific to the telecommunication and postal sectors, replacing the Multisectoral Regulatory Authority (ARM), which, having been responsible for regulating the telecommunication, transport, postal, water and energy sectors, was deemed too cumbersome an institution after ten years in operation.

Comisión Nacional de Telecomunicaciones (CONATEL) (Paraguay)	The current policy is the National Telecommunications Plan (PNT).
Nepal Telecommunications Authority (NTA) (Nepal (Republic of)	District Optical Fiber Network project being developed; WiMax project by incumbent; Rural ICT projects in multi–stakeholders partnership model
Organismo Supervisor de Inversión Privada en Telecomunicaciones (Peru)	Deployment of the National Fibre Optic Backbone Network, serving all provincial capitals, is currently being planned. It is hoped that this high–speed transport network will provide connectivity at district level, through projects that can be financed by both private operators and district governments.
Autorité de Régulation de la Poste et des Télécommunications (Dem. Rep. of the Congo)	– Establishment of a national broadband policy in rural or remote areas. – Establishment of a regulatory framework governing infrastructure–sharing, particularly in rural or remote areas. – Launch of a public bid for a licence for the universal broadband service. – Establishment of the universal service fund. – Creation of the National ICT Agency (Agence Nationale des TIC) to monitor all issues relating to rural or remote areas.
Oman Telecommunications Regulatory Authority (TRA) (Oman)	Initiative by the regulator to provide coverage to some remote villages 900MHz refarming is the 1st refarming initiative that was conducted between the TRA and the operators in exchange of constructing 120 BTS in the rural areas.operators agreed to install total of 120 BTS site locations (60 omantel & 60 nwaras) 1800 MHz refarming inititative is the 2nd initiative that was conducted between TRA and operators in exchange of additional mobile spectrum in 1800 MHz frequency bands operators agreed to install 80 BTS site locations in rural areas (40 Omantel & 40 Nawras)
Ministry of Information and Communication Technology (Mauritius)	National Information and Communication Technology Strategic Plan (NICTSP) 2011–2014: Towards I–Mauritius www.gov.mu/portal/goc/telecomit/file/ICTplan.pdf Universal Service Fund (USF) Package for Broadband Connection at Rs 200 per month (emanates from budgetary measure 2013) www.icta.mu/mediaoffice/2013/ISPs_Broadband_Connection.html
ICP – Autoridade Nacional de Comunicações (ANACOM) (Portugal)	See more information in, e.g., www.anacom.pt/render.jsp?categoryId=340689 www.anacom.pt/render.jsp?contentId=975261 or www.anacom.pt/render.jsp?contentId=1150167
Comisión Nacional de Comunicaciones (CNC) (Argentina)	National Plan Satellite Dishes Installation of Rural Schools and Border Objective: Bring Open Digital Television to Rural Schools and Border Argentina that are outside the coverage area of Digital Terrestrial TV, using satellite transmission through the system Direct to Home (TDH). Number of educational establishments: 12,000 approximately. Number of beneficiaries: 1,200,000 students and 300,000 teachers, approximately. Internet Program in Educational Establishments (under implementation) Objective: bring the Internet to state–run schools. Stage 1: estimated 4,906 establishments installing internet. Stage 2: 10,000 establishments. And in later will seek to connect to more than 40,000 state–run establishments. Plan My Digital Satellite TV Objective: to bring digital television open to families in rural areas via satellite dishes. To this date, we have connected 101 rural localities. Number of beneficiaries: more than 2,200 rural households across 16 provinces. The amount is estimated to reach 4,300 rural families through satellite transmission.

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