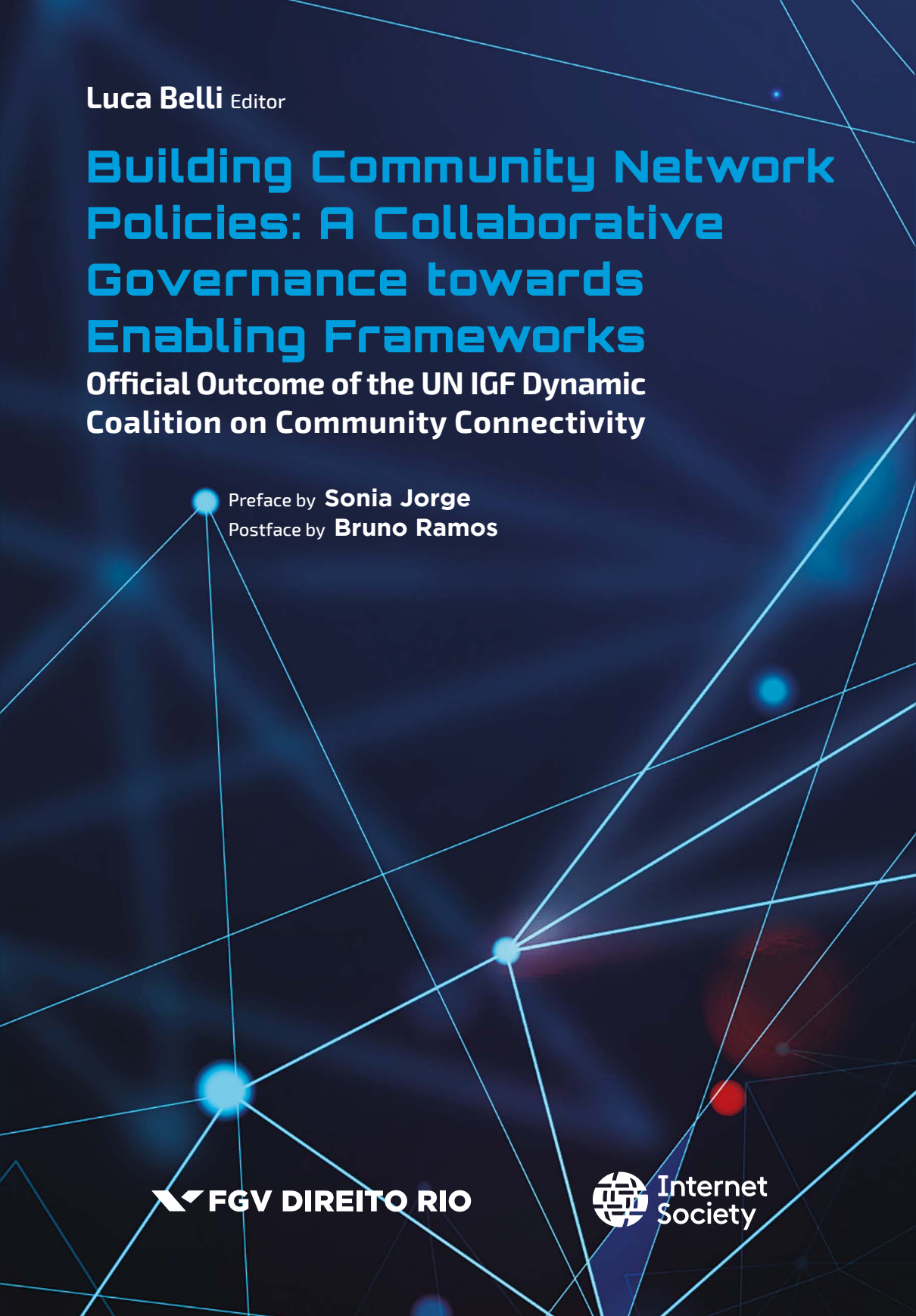
Luca Belli Editor

Building Community Network Policies: A Collaborative Governance towards Enabling Frameworks

Official Outcome of the UN IGF Dynamic Coalition on Community Connectivity

Preface by **Sonia Jorge**
Postface by **Bruno Ramos**



FGV DIREITO RIO

Internet Society

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Edition produced by FGV Direito Rio
Praia de Botafogo, 190 | 13th floor
Rio de Janeiro | RJ | Brasil | Zip code: 22250-900
55 (21) 3799-5445
www.fgv.br/direitorio

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Presented at the
United Nations Internet Governance Forum
Berlin, November 2019

EDITION FGV Direito Rio

Printed in Brazil
Completion of the First Edition in October 2019

Coordination: Rodrigo Vianna, Sérgio França e Thaís Mesquita

Book cover: Andreza Moreira – Tangente Design

Layout: Andreza Moreira – Tangente Design

Reviewer: Luca Belli

Cataloguing data prepared by the Mario Henrique Simonsen/FGV Library

Building community network policies: a collaborative governance towards enabling frameworks / Luca Belli, editor; prefaces by Sonia Jorge; postface by Bruno Ramos. – Rio de Janeiro : FGV Direito Rio, 2019.
84 p.

In partnership with Internet Society and International Telecommunication Union. ISBN: 978-85-9597-037-3

1. Internet governance. 2. Internet - Public Policy. 3. Computer Networks - Social aspects. 4. Telecommunications. 5. Sustainable development. I. Belli, Luca. II. Getulio Vargas Foundation Rio de Janeiro Law School.

CDD – 384.3

CONTENTS

Acknowledgements

This book reflects many of the ideas discussed by the members of the Dynamic Coalition on Community Connectivity (DC3) of the United Nations Internet Governance Forum. The Editor would like to express gratitude to all the DC3 members for their precious inputs to the elaboration of this work.

Particular gratitude goes to Carlos Rey-Moreno and Steve Song for the development of the first version of Section 1 "Enabling Affordable Access for All," and to (in alphabetical order): Carlos Baca, Roger Baig Viñas, Peter Bloom, Walter Britto, Adam Burns, Jane Coffin, Mélanie Dulong de Rosnay, Nicolás Echániz, Bob Frankston, Judith Hellerstein, Kurtis Heimerl, Erik Huerta, Sonia Jorge, Laila Lorenzon, Osama Manzar, Glenn McKnight, Sivasubramanian Muthusamy, Leandro Navarro, Michael Oghia, Bruno Ramos, Ritu Srivastava, Nico Pace, and Karla Velasco for their invaluable contribution to the elaboration of this booklet. Without their excellent ideas, endless energy and invaluable support this booklet would not exist.

The editor would like to express special thanks to ***Fundação Getulio Vargas (FGV)***[1] ***Law School,*** for being a source of intellectual stimulation and guidance, inspiring this research effort; the **Internet Society (ISOC)**[2], for generously supporting the publication of this book and for its commitment to strengthening and promoting community networks globally; and the **International Telecommunication Union (ITU)**[3], for showing

1 FGV is a world-renowned institution of research and quality education. In 2017, FGV was deemed as one of the top 10 think tanks in the world, according to the Global Go To Think Tanks Index 2016, produced by the Pennsylvania University. Besides being the 7th most influential think tank globally, FGV has been ranked as the most influential think tank in Latin America over the past nine years. Currently, FGV has 10 Schools and more than 50 Applied Research Centres in the areas of economics, business administration, public administration, law, social sciences, applied mathematics and international relations. See <http://portal.fgv.br/>.

2 ISOC is a global cause-driven organisation governed by a diverse Board of Trustees that is dedicated to ensuring that the Internet stays open, transparent and defined by the users. ISOC currently features more than 140 member organisations and 130 local and regional chapters, bringing together ISOC members and facilitating a number of programmes and activities. See <https://www.internetsociety.org/>.

3 ITU is the United Nations specialised agency for information and communication technologies. ITU is committed to connecting the entire world's people – wherever they live and whatever their means. ITU is organisation based on public-private partnership since its inception and currently has a membership of 193 countries and almost 800 private-sector entities and academic institutions. Through its work, ITU protects and supports everyone's fundamental right to communicate. See <https://www.itu.int/> .

openness in exploring the incredible potential of community networks to foster connectivity, having already supported the 2018 publication of the Community Network Manual.

PREFACE

Community Networks to Ensure No One is Shut Out of the Digital Revolution

Sonia Jorge
Executive Director, Alliance for Affordable Internet (A4AI)

Community networks have emerged as an increasingly powerful means to providing affordable access — particularly for rural communities — and are an important strategy for governments to consider as part of a policy framework to achieve universal access. In fact, the 2019 Affordability Report by the Alliance for Affordable Internet[4] shows that competitive broadband markets alone won't reach everyone — that's why public access options like free Wi-Fi and alternative models like **community networks are crucial to ensure no one is shut out of the digital revolution.**

But for this to be a reality, it is important for policy makers and regulators to understand and act on their role and responsibility to support open market participation through their licensing regime and spectrum allocation practices. Such actions can facilitate smaller enterprises to enter the market and for alternative models, such as community networks, to thrive. Promoting market diversity is an imperative in a broadband environment where commercial markets will simply not deliver to all. While it is important to continue supporting competition at all levels of the sector, the reality is that public access and community networks are an important aspect of broadband market health and resilience.

Community networks[5] are a subset of crowdsourced networks, designed to be open, free, and neutral, and often reliant on shared infrastructure as a common resource. They are generally owned collectively, employ social management, open design, and open participation principles, and use technologies and software based on open standards. Most importantly, they offer the public access to the internet.

4 See <https://a4ai.org/affordability-report/>.

5 See <https://comconnectivity.org/article/dc3-working-definitions-and-principles/>.

Though the ability of community members to own and operate these local connectivity solutions helps to tackle some sustainability concerns, it is important to consider the training and financial support that is needed to ensure the sustainability of these initiatives. Government and private sector entities can step in to support or fill in these funding gaps — a move that is likely to have long-term socio-economic benefits for them as well.

In **India**, the Digital Empowerment Foundation[6] (DEF) is working to provide affordable, ubiquitous and democratically controlled internet access in rural regions of the country through its Wireless for Communities[7] (W4C) program, an interesting example of an initiative working actively to address the access and sustainability challenge.

Governments must also support community networks as a public access solution to affordability challenges through policy that opens up the space these networks need to operate. In **Mexico**, for example, the government in mid-2014 assigned spectrum, on an experimental basis, to develop community networks[8] in indigenous areas in the state of Oaxaca. After the success of this trial, the government announced a plan to reserve certain blocs of spectrum for community use under non-profit licenses. Spectrum allocation can enable the development of community networks, and can be further supported through the award of special licenses for this purpose, or through allowances to use unlicensed spectrum[9], where feasible. Governments can also support community networks by facilitating — and even incentivizing — partnerships with mobile phone operators

Public access and community networks complement the commercial market. They supply access where there are market gaps, expand connectivity to more people, build digital skills in new communities, and cultivate demand for internet access. They can also increase competition by providing more choice to consumers, which adds pressure for operators to improve services and lower prices.

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6 See <http://defindia.org/>.

7 See <http://wforc.in/>.

8 See <https://www.tic-ac.org/>.

9 See <https://comconnectivity.org/article/dc3-working-definitions-and-principles/>.

Market competition and public access options are powerful, complementary forces that motivate providers to innovate and provide affordable, quality services for users. Governments should use their regulatory powers to support a competitive market environment as well as invest to open up markets to new providers and end users. By taking these steps to shape healthy, stable broadband markets, governments will help more citizens get online with affordable internet access.

This book is a welcome addition to a growing body of evidence on community networks and the critical role they play to contribute to universal access. Most importantly, it provides policy makers and regulators with guidance on what to do to promote and facilitate affordable and meaningful connectivity through community networks. A4AI looks forward to working with all players to support this urgent effort.

INTRODUCTION

Community Networks: Empowering Individuals, Expanding Connectivity, Promoting Network Self-determination

Luca Belli
Professor of Internet Governance and Regulation at Fundação Getulio Vargas (FGV) Law School

This booklet is the Official 2019 Outcome of the Dynamic Coalition on Community Connectivity (DC3) of the United Nations Internet Governance Forum (IGF). The DC3 is a multistakeholder group, fostering a cooperative analysis of community networks, exploring how such initiatives can improve and expand connectivity while empowering Internet users.

Community Networks (CNs) are crowd-sourced collaborative networks, developed in a bottom-up fashion by groups of individuals – *i.e.* communities – that design, develop and manage the network infrastructure as a common resource. Importantly, at the centre of CNs and the socio-economic ecosystems they generate lay the communities and their members, who are essential to initiate, maintain and guarantee the success of these connectivity efforts[10]. In fact, community networks are managed according to the governance models established by their community members in a democratic fashion and can be operated by groups of self-organised individuals or entities such as non-governmental organisations (NGOs), local businesses or public administrations.

Besides providing access to previously disconnected populations, these networks are particularly interesting as they give rise to an ample range of positive externalities. These positive external effects include the construction of new infrastructure with limited investment, the engagement of locals in the development of new

10 In this perspective, the 2017 DC3 Report was tellingly dedicated to "Community Networks: the Internet by the People for the People." See <http://communityconnectivity.xyz/>.

self-governance models and the revitalisation of social interactions amongst local community members and the emergence of new opportunities for accessing information, learning, doing business and creating employment[11].

In this perspective the establishment and promotion of CNs allows individuals and communities "*to freely associate in order to define, in a democratic fashion, the design, development and management of network infrastructure as a common good, so that all individuals can freely seek, impart and receive information and innovation*[12]." This principle, referred to as "Network Self-determination[13]" is based on the consideration that well-functioning network infrastructure on affordable and non-discriminatory terms facilitates significantly the full enjoyment of every person's fundamental rights. Indeed, as Internet users we can easily access information, knowledge and education, but also utilise connectivity to become entrepreneurs, share the fruit of our creativity and conduct (digital) businesses, and have access to an increasing number of digitalised public services, ranging from paying taxes to applying to schools and housing opportunities of receiving remote medical consultations. As connected individuals, we can state that connectivity affects substantially how we self-determine ourselves: how we form our opinions, how we learn and socialise and, ultimately, what opportunities we are able to grasp over the course of our lives. Such observation, though, makes even deeper the divides between those who can enjoy unrestricted and affordable connectivity and those who cannot. In this perspective, regulators as well as other stakeholders need to adopt innovative thinking to explore alternative options that can truly give to the currently unconnected a credible chance to enjoy the same opportunities that the connected are already enjoying.

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11 See, in the Informative Material Section: Luca Belli (2017). Network Self-Determination and the Positive Externalities of Community Networks. ; Nicola Bidwell and Michael Jensen. (2019). Bottom-up Connectivity Strategies: Community-led small-scale telecommunication infrastructure networks in the global South. Association for Progressive Communications.

12 See: Luca Belli (2017). Network Self-Determination and the Positive Externalities of Community Networks. <https://bibliotecadigital.fgv.br/dspace/handle/10438/19924>.

13 *Idem.*

1. Why Regulators Should Care about Network Self-determination

The emergence of CNs allows an increasing number of individuals to enjoy network self-determination, which is a principle that finds solid bases in both international law and the fundamental rights principles enshrined in almost every existing national constitution. The fundamental nature of these principles means that every public body, including regulators, has not only a duty to respect them but also a positive obligation to promote them.

First, the network self-determination principle directly stems from the right to freely associate, which is explicitly protected by Article 22 of the International Covenant on Civil and Political Rights (ICCPR) and several other binding regional instruments. Second, the emergence and dissemination of community networks allows individuals and communities to self-determine in the purest sense of the term: to enjoy their fundamental right to pursue their economic, social and cultural development through the opportunities that connectivity can offer. Self-determination is so fundamental in the UN legal system that both the first article of the Charter of the United Nations and the first article the International Covenant on Civil and Political Rights (ICCPR) and the International Covenant on Economic, Social and Cultural Rights (ICESCR) mandate its protection. In accordance with these instruments of international law, the UN member states agreed that "all peoples have the right to self-determination" and that "by virtue of that right, they are free to determine their political status and pursue their economic, social and cultural development." Article 1 (3) of both International Covenants obliges the signatories to "promote the realization of the right to self-determination."

Network self-determination can also be considered as the collective enjoyment of the right to free development of the personality, which allows a community to determine its own destiny, promoting socioeconomic development and self-organization. In this perspective, if they so wish, individuals should be able to autonomously determine how to build and organize the network infrastructure, allowing them to improve their political,

economic and social status and independently decide which kind of technology, applications and content are best suited to meet the needs of their local community[14].

Hence, the deployment of CNs creates new socioeconomic opportunities for previously disconnected populations and allows each user to enjoy the benefits of connectivity being both a consumer and a producer of online content, applications and services. Therefore, CN members, in their quality of "prosumer" – i.e. potential producers and consumers of innovation – can contribute to decentralize the Internet, stimulating the creation of new digital products and services that meet the needs of local communities, precisely because they are developed by the local community to solve problems and necessities of the local community. Crucially, such virtuous circle of decentralised knowledge and innovation can positively contribute to reverse the current tendency to concentration[15] of the Internet ecosystem, by stimulating the inclusion and creativity of new empowered Internet users.

Importantly, the possibility to be both a recipient and a creator of information, innovation, culture and knowledge allowed by the self-determination of digital networks is instrumental for the self-determination of every individual with regard to the free development of one's personality. This latter point is highlighted by the ICCPR in relation to the fundamental right education, which "must be directed to the full development of the human personality and the sense of its dignity [...] and allow all people to participate effectively in society" (article 13.1). Furthermore, the ICCPR considers the free development of the personality as an instrumental element to exercise the fundamental right to" participate in cultural life [and] take advantage of the benefits of scientific progress and its applications "(article 15).

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14 See, section 3 of this booklet: Leandro Navarro (Ed.) (2016). Report on Existing Community Networks and their Organization; Luca Belli (Ed). (2017). Community Networks: The Internet by the People, for the People; GISWatch. (2018). Global Information Society Watch 2018: Community Networks 2018.

15 See Internet Society. (2019). The Global Internet Report: Consolidation in the Internet Economy. <https://future.internetsociety.org/2019>.

2. The Need to Promote Innovative Solutions such as Community Networks

We must acknowledge that the traditional strategies to promote the expansion of Internet access present some clear limitations. These limitations are tellingly exemplified by the almost 4 billion individuals[16] that, to date, are still disconnected from the Internet and by the very denomination used to define the areas where disconnected individuals live. Indeed, these rural or peripheral areas are commonly referred to as "market failure" areas precisely because those are the regions where the market fails to provide Internet access services, due to scarce return on investment.

On the contrary, CNs offer concrete examples of the existence of alternative and valuable approaches to expand connectivity and to fulfil the United Nations Sustainable Development Goals[17] while empowering individuals through bottom-up strategies. CNs represent a long-awaited solution for members[18] of the International Telecommunication Union to implement the ITU Recommendation D.19 on Telecommunication for Rural and Remote Areas.

Indeed, while considering "that the provision of telecommunications, ICT services and applications can make significant contribution to the quality of life of the population living rural and remote areas [and] that access to telecommunications/ICTs for all will maximise social welfare, increase productivity, conserve resources and will contribute to safeguarding human right", the ITU recommends to its members "that local institutions, such as village committees should be involved in planning and implementing ICT." In addition, the Recommendations emphasises that "[b]usiness models which can achieve financial and operational sustainability can be operated by local entrepreneurs supported by a variety of initiatives [...] including Universal Service Funds [...][19]."

16 For a precise estimate, compare the number of global Internet users and the world population in <http://www.internetlivestats.com/internet-users/> and <http://www.worldometers.info/world-population/>.

17 Notably, Goal 9 establishes the United Nations members' commitment to "build resilient infrastructure, promote sustainable industrialization and foster innovation." See <https://www.un.org/sustainabledevelopment/infrastructure-industrialization/>.

18 For the list of 193 ITU member states, see <https://www.itu.int/online/mm/scripts/gensel8>.

19 See ITU Recommendation D.19 (03/10) <https://www.itu.int/rec/D-REC-D.19-201003-I/en>.

It is important to highlight that CNs should not be considered as antagonistic to traditional state or market solutions. On the contrary, CNs complement public and private strategies with an alternative commons-based approach that allows filling the existing digital divides.[20]. Thus, the promotion and implementation of alternative models based on participatory mechanisms and on the management of network infrastructure as common assets should be actively promoted by regulators, as they are an additional and valid option to fulfil their duties.

Considering that CNs present substantial differences from state or commercial projects – as the same people who use the networks are those who build, maintain and operate them – it seems important to provide to regulators some elements to seize the specificities of CNs and elaborate the most enabling framework, allowing CN to thrive. For this reason, this booklet aims at providing useful suggestions on how regulators and other stakeholders alike should approach CNs, in order to understand their dynamics and, ideally, facilitate their establishment and operation.

Before entering into the discussion of the policy elements that should be considered to promote CNs, it seems important to highlight that the existing multistakeholder cooperation, research initiatives and projects regarding CNs provide an interesting case study of Internet governance. This interesting facet of the CN debate will be briefly analysed in the following section to conclude this introduction and project the reader into the core of this booklet.

3. Community Networks as an Instance of Internet Governance

The rise of CNs offers an occasion to analyse how specific Internet governance processes allow different stakeholders to cooperate, to pursue and ideally achieve shared goals, raising awareness on specific issues and concretely influencing the evolution of digital policies. In fact, despite the fact that CNs have been analysed for more than twenty years, these initiatives entered the international

20 For an analysis of existing digital divides, see World Bank. (2016). World Development Report 2016: Digital Dividends. Washington, DC: World Bank; ITU Broadband Commission (2017). Connecting the Unconnected: Working together to achieve Connect 2020 Agenda Targets.

policy arena mainly due to the IGF and the platform for visibility and organisation that this unique UN forum offers, particularly thanks to the possibility to create self-organised working groups – called "Dynamic Coalitions[21]" – dedicated to specific topics.

The potential of these groups is often underestimated and underexploited but, as the DC3 example demonstrates, they can play an incredibly important function, allowing individuals and entities interested in a common issue to associate and organise with continuity and jointly propose "principles, rules, decision-making procedures and shared programs that shape the evolution and use of the Internet[22]."

The open nature of the IGF and the non-binding nature of the IGF outcomes, which are simple suggestions to be utilized only as long as they prove to be useful, is a perfect framework to facilitate the interactions of DC3 members and the elaboration of this booklet. The three sections of this volume have been crafted in a collaborative fashion with the goal of offering a pragmatic guide to any stakeholder interested in understanding what CNs are[23], which elements and actions are essential to develop CN policies[24], and how such elements could look like in a potential policy blueprint[25].

Importantly, the section providing insights on research and studies analysing CNs has been included as the last one not for its reduced relevance but simply because it features material that DC3 members have developed over the past years, including the annual DC3 outcomes dedicated to explore the various facets of CN governance, architectures and regulations. In this perspective, it was deemed more useful to start by providing novel elements on CN policies, developed thanks to the previous works, rather than by repeating what has already been thoroughly analysed by DC3 members over the past years.

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21 For an analysis of how dynamic coalitions can be considered as collaborative instruments oriented towards the elaboration of digital policy proposals, see Luca Belli. (2016). De la gouvernance à la régulation de l'Internet. Paris : Berger-Levrault. pp. 368-374.

22 Such activities constitute the definition of Internet governance, according to the Tunis Agenda for the Information Society, adopted by the World Summit on the Information Society of the UN in December 2005. See <http://www.itu.int/net/wsis/docs2/tunis/off/6rev1-es.pdf >.

23 See Section 3 Informative Material for Well-informed Regulators.

24 See Section 1 Enabling Affordable Access for All

25 See Section 2 Policy Elements on Community Network

Since the organisation of the first IGF workshop dedicated to CNs at the IGF 2015 (which led to the establishment of the DC3), a growing number of individuals and organisations from around the world has started to work on CN research, projects and initiatives[26] aimed at exploring the potential of CNs as a concrete solution to overcome digital divides. The fact that several countries, such as Mexico[27] and Argentina[28], have already elaborated dedicated CN policies and regulations demonstrates that their potential and importance is starting to not only to be officially acknowledged but also to be explicitly promoted.

The purpose of this volume is therefore to offer a solid base for discussion on how CN policies and regulations might be elaborated, in the hope that such suggestions can be useful to start a constructive multistakeholder dialogue leading to positive change.

26 In this sense, it is sufficient to analyse the programmes of major Internet governance events, such as the IGF, the ITU WTDC, RightsCon, EuroDIG, etc. and the grant projects of organisations such as Mozilla, ISOC, RIPENCC, APNIC, etc. to notice the appearance and the considerable diffusion of CN-related initiatives, since the establishment of the DC3, at the end of 2015.

27 On 15 August 2018, Argentina approved Resolution 4958/2018 which regulates Community Networks, defining them as "networks comprising infrastructure managed by their users or by non-profit entities that group them, that allow and promote their expansion by incorporating new users or connecting to neighboring Community Networks, in populations of no more than FIVE THOUSAND (5,000) inhabitants." <https://www.argentina.gob.ar/normativa/resoluci%C3%B3n-4958-2018-313590/texto>.

28 In 2014, Mexico adopted a new Federal Telecommunications and Broadcasting Act, establishing the possibility of tetecommunication concessions for social community use as well as for indigenous social use. See <http://www.dof.gob.mx/nota_detalle.php?codigo=5352323&fecha=14/07/2014>. Furthermore Mexico's telecommunications regulator, the Federal Telecommunications Institute (IFT) issued guidelines on Community Cellular Telephony. See <http://www.dof.gob.mx/nota_detalle.php?codigo=5352323&fecha=14/07/2014>.


SECTION 1

1 Enabling Affordable Access for All

The initial version of this text was drafted by Carlos Rey-Moreno and Steve Song.

The growth of telecommunication infrastructure around the world is slowing down, whether you look at **mobile subscribers** or **internet penetration**. In its most recent report dedicated to *The State of Broadband 2019: Broadband as Foundation for Sustainable Development*, the Broadband Commission for Sustainable Development reveals that "*global growth in the **percentage of households connected to the internet** is slowing, rising only slightly to 54.8% from 53.1% last year. In low-income countries, household internet adoption improved by a mere 0.8% on average*."[29] In a context in which Internet growth is stalling, the International Telecommunication Union itself has recently recognised that a focus shifts towards "meaningful universal connectivity" is needed to drive global development.

The abovementioned scenario is well-known to community network developers and researchers, who have been exploring alternative connectivity strategies over the past decades, aware of the limits that traditional connectivity options may have. Indeed, to date, a combination of public and private investments in telecommunications has managed to connect about half the world to the internet. However, they **have connected the easy-to-connect half of the world's population**, the relatively wealthy living in relatively densely populated areas. Connecting poor people in sparsely populated rural areas is a much bigger challenge; one for which the larger overheads and one-size-fits-all models of large telecommunications operators are often not well suited.

Happily, this is no longer the only option available. Thanks to the growth of mass market manufacturing and a host of technological innovations in the sector, it is now possible for anyone to build meaningful, affordable internet infrastructure. This makes it possible for local entrepreneurs and/or community groups develop

29 See Broadband Commission for Sustainable Development. (2019). The State of Broadband 2019: Broadband as Foundation for Sustainable Development. <https://broadbandcommission.org/Documents/StateofBroadband19.pdf>.

innovative and sustainable solutions to their own access challenges. However, policies and regulations for telecommunications have historically been designed for large-scale, for-profit corporations. What is missing are enabling regulations to unleash the potential of community networks and other small network operators to deliver affordable access everywhere while allowing potentially anyone to enjoy network self-determination.

Importantly, these considerations have been echoed by the United Nations' High Level Panel on Digital Cooperation, which recently affirmed that "*[c]reating the foundation of universal, affordable access to electricity and the internet will often require innovative approaches, such as community groups operating rural networks, or incentives such as public sector support*[30]*.*"

In this perspective, some regulatory agencies are already starting to support new strategies. Countries such as Mexico, Argentina, and South Africa have begun to recognise and empower local service providers. This is in line with ITU-D Recommendation 19, which states:

> "*10. that it is important to consider small and non-profit community operators, through appropriate regulatory measures [...]*
>
> *11. that it is also important that administrations, in their radio-spectrum planning and licensing activities, consider mechanisms to facilitate the deployment of broadband services in rural and remote areas by small and non-profit community operators*[31]*.*"

In light of these evolutions and considering the need for innovative thinking with regard to connectivity model, we propose here below some interventions that could help to unleash the potential of local access initiatives, fostering innovative approaches.

30 See United Nations' High Level Panel on Digital Cooperation (2019). The Age of Digital Interdependence: Report of the High-Level Panel on Digital Cooperation. <https://digitalcooperation.org/wp-content/uploads/2019/06/DigitalCooperation-report-web-FINAL-1.pdf>.

31 See ITU Recommendation D.19 (03/10) <https://www.itu.int/rec/D-REC-D.19-201003-I/en>.

1.1 Awareness, recognition and credibility

One of the main barriers to the adoption of new models for access provision is that most people are unaware of the possibilities. This applies not only to the rural communities that are most likely to benefit, but also to policy makers and regulators, and development organisations. Lack of awareness is compounded by the received wisdom among most policy makers and financiers that only large-scale operators can provide services of sufficient quality, and at an affordable price.

Action: Consult the material produced by the IGF Dynamic Coalition on Community Connectivity <https://bit.ly/2lCdsPi>.

Raise awareness of these new models via the training courses organized by APC, Rhizomatica, ISOC and others.

1.2 Licensing

Telecommunications infrastructure deployment and service provision require licenses from the communications regulator. Most developing countries do not have technologically-neutral, simple, and affordable authorizations to permit service provision. National licenses are often the only type available, which can impose a serious bureaucratic and financial burden to new actors. Often the technical and financial requirements are beyond the means of most rural operators.

Action: Create license exemption provisions, or lessen the administrative burden for small operators, non-for-profit, and other actors interested in providing affordable access in localized geographical areas.

1.3 Access to radio spectrum

Due to the potential for interference when two operators use the same frequency, the use of most radio spectrum requires a license. Similar to the licensing issues described above, most licensed spectrum is allocated nationally. This means that, by default, small-scale operators are excluded from access to the radio spectrum required for mobile voice and data services. The spectacular

growth of WiFi-based Internet Service Providers is ample evidence that, given access to even a small amount of spectrum on a shared basis, local service providers can provide meaningful access. Much of the mobile spectrum assigned to national operators, is unused in rural areas. There is an opportunity for innovative approaches to reuse this spectrum to provide affordable access for all.

Action: Provide special spectrum allocations, either primary assignment or allowing secondary use the one that is idle, to those interested in serving the unconnected in remote populations.

1.4 Access to passive infrastructure and backhaul

Even with a license and access to spectrum, it is often impossible to provide affordable access in rural areas if there are no domestic backbones to provide backhaul connections, or if backhaul is not affordable. Aside from limited competition in this area, this is also often because infrastructure-sharing and dig-once policies are not in place to minimize costs and incentivize private operators to roll out pervasive fiber infrastructure. Some fiber is being deployed by governments, but it is often charged at a premium to operators, instead of pricing it as a public utility/enabler. Similarly, access to existing passive infrastructure, such as the towers of mobile operators and the masts and poles of public broadcasters and energy distribution grids, should be more affordable to extend access.

Action: Promote and enforce clear guidelines and transparent pricing models for infrastructure sharing will contribute to this end.

1.5 Access to network information

Even if fiber is available nearby, it is often very difficult for a new operator to know where the nearest point of presence is, so it can design and cost the network accordingly. It is also difficult to know who owns allocated radio frequencies that might be unoccupied or unused in rural areas. Similarly, access to information on tower locations is needed so both governments and other actors can identify the connectivity gaps and adopt the best approach to close them.

Action: Promote open data strategies to make this information public and open will enable more stakeholders to participate in looking for solutions to close the digital divide.

1.6 Taxes associated with services provision

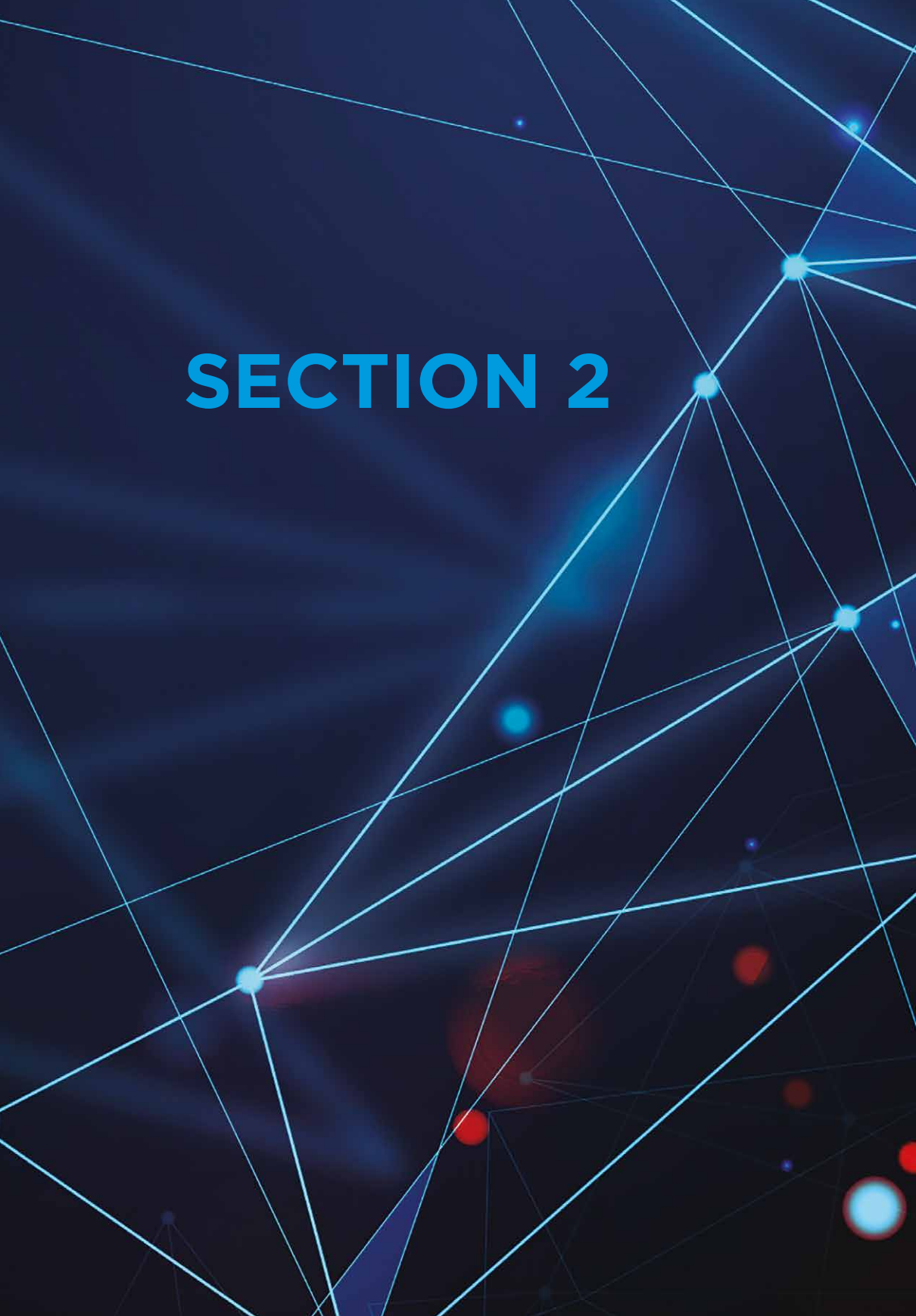
There are many taxes that add to the burden of starting and operating networks. In some countries import taxes are up to 40% of the total cost of the equipment. Other taxes include fees per mast and device installed and contributions to universal service funds, among others. These added costs must be recovered from end users, which further limits the service's affordability.

Action: Consider special tax breaks for small operators providing affordable access in rural and remote areas.

1.7 Financing programmes

Lastly, there is a wide range of financing programmes that can play an important role in supporting the establishment of community networks and complementing their internal resource management, thus facilitating their financial sustainability. Such financing options include the creation of dedicated funds and support programmes by private institutions and public bodies; the establishment of financing strategies focused on collaboration and coordination between public cooperation agencies and NGOs; the public and private support of research aimed at having a better understanding of what are the most efficient financing options and what are the most performing technologies to support community networks.

Action: Consider dedicating or earmarking a portion of the Universal Access Funds to support community networking initiatives, especially in rural areas. Both public and private financial institutions could consider supporting research and development related to community networks as well as microcredit lines for both community networks and micro operators alike.


SECTION 2

2 Policy Elements on Community Networks

These Policy Elements on Community Networks (hereinafter "the Policy Elements") were elaborated through a multi-stakeholder process, started in May 2019 and facilitated by the UN IGF Dynamic Coalition on Community Connectivity (DC3).

These Policy Elements should be seen as suggestions for the consideration of those stakeholders interested in having an understanding of what specific issues may facilitate the deployment CNs. All those who have contributed to the elaboration of these Policy Elements agree that their aim is to put forward a concrete and constructive text around which discussions may be started with local stakeholders. The cultural, regulatory and economic specificities of each country require to be considered and understood in order to put in perspective and make the best possible use of the Policy Elements.

The Policy Elements are based on the policy suggestions and principle declarations as elaborated and proposed by DC3 and its members[32] since the creation of the DC3 in 2016, and particularly since the elaboration of the Guadalajara Declaration on Community Connectivity[33], the first multi-stakeholder document providing definitions on what are community networks (CNs), the characteristics of their users, and the principles underpinning their functioning[34].

Since the creation of the DC3, CNs have raised unprecedented interest from policy-makers, academics, local communities, and other stakeholders due to their ability to offer high-quality and affordable Internet connectivity, while concurrently stimulating citizen engagement, Internet decentralisation, education, and innovation, mitigating Internet concentration, and providing an inclusive and just option for expanding the network of networks.

32 As an instance, the Declaration of the First Latin American Summit of Community Networks provided recommendations included int for policy makers, telecommunications regulators, and all interested stakeholders

33 The Consolidated version of the Guadalajara Declaration can be accessed here <https://www.intgovforum.org/multilingual/index.php?q=filedepot_download/4391/1316>.

34 The DC3 outcome documents, including the Declaration and the annual reports providing useful insight on the evolution of the CN policy and technology debates, since the DC3 inception, can be accessed here <https://www.intgovforum.org/multilingual/content/dynamic-coalition-on-community-connectivity-dc3-0?qt-dynamic_coalition_on_community_c=4>.

Hence, the Policy Elements aim at offering a working-material that can be utilised by a wide range of stakeholders, to have a better understanding of the needs of CNs, take inspiration and consolidating the issues explored in the various documents elaborated by DC3 members and partners.

CNs vary considerably in terms of size, network technologies employed, and political perspectives. They provide broadband connectivity not only to tens of thousands of individuals in both rural or urban environments, but also to a variety of organisations including small and medium-sized companies, schools, healthcare centers, social initiatives, and many more. Community networks can be both cheaper and faster than incumbents, foster research, and help local hosting and service providers come together to mutualise investments and share costs, thus creating and enabling a wide range of positive externalities.

The aspiration of the following Policy Elements is therefore to provide a useful suggestion to policy-makers, regulators, and international organisations, in order to start a constructive and collaborative debate on CNs in the hope that more CNs can be enabled and helped to thrive.

2.1 Connectivity

Connectivity is the ability to reach all endpoints connected to the Internet without any form of restriction on the data-packets exchanged, enabling end-users to run any application, as well as access and share any type of content and service via any device as long as this does not harm the rights of others. Connectivity is the goal of the Internet.

2.2 Community Networks

Community networks are a vehicle for transformation that increases the agency of all community members, including by fostering gender balance. Community networks are structured to be open, free, and to respect network neutrality.

Community networks are networks collectively owned and managed by the community for non-profit and community purposes. They are constituted by a local community to exercise its right to

communicate, under the principles of democratic participation of their members, fairness, gender equality, diversity, and plurality.

Such networks rely on the active participation of local communities in the design, development, deployment, and management of shared infrastructure as a common resource, owned by the community, and operated in a democratic fashion. Community networks can be operationalised, wholly or partly, through individuals and local stakeholders, non-governmental organisations (NGOs), private sector entities, and/or public administrations. Community networks are recognised by:

a. Collective ownership: the network infrastructure is managed as a common resource by or on behalf of the community where it is deployed;

b. Social management: the network infrastructure is technically operated according to the governance model defined by the community;

c. Open design: the network implementation and management details are public and accessible to everyone;

d. Open participation: anyone is allowed to extend the network, as long as they abide by the principles and design of the network;

e. Promotion of peering and transit: community networks should, whenever possible, be open to settlement-free peering agreements;

f. Promotion of the consideration of security and privacy concerns while designing and operating the network;

g. Promotion of the development and circulation of local content and local applications and services in local languages, thus stimulating community interactions community development.

2.3 Community Network Participants

Community network members are considered active participants, and should be considered both producers and users of content, applications, and services. Notably, community network participants must:

a. Have the freedom to use the network for any purpose as long as they do not harm the operation of the network itself, overburden

the network, the rights of other participants, or violate the principles of neutrality that allow content and services to flow without deliberate interference;

b. Have the right to know the technical details and operation of the network and its components, and to share knowledge of its mechanisms and principles;

c. Have the right to offer services and contents to the network, while establishing their own terms;

d. Have the right to join the network, and the obligation to extend this set of rights to anyone according to these same terms.

e. Promote full gender inclusion as well as the inclusion of marginalised groups and individuals with disabilities.

2.4 Policy Affecting Community Networks

National as well as international policy should facilitate the development of community connectivity and the deployment of community networks. National and international policy should:

a. Take into account individuals' human rights to freedom of expression and privacy;

b. Lower barriers that may hinder individuals' and communities' capability to create connectivity, including gender barriers;

c. Allow the commons-based use of existing unlicensed spectrum bands or unused licensed spectrum for public-interest purposes, and consider the growth in use of unlicensed spectrum bands and the establishment of special licenses which address the needs of community connectivity;

d. Incentivise the development and adoption of technologies based on open standards, free software, and open hardware to improve the replicability and resilience of community networks;

e. Allow for the deployment of technologies based on dynamic access of spectrum and other new technologies that do not necessarily have a full regulatory framework in place supporting them;

f. Promote the elaboration of appropriate frameworks and the utilisation of existing funds, such as universal service funds or other specific telecommunication development funds, towards advancing community connectivity.

2.5 Financing Programmes Supporting the Development of Community Networks

The financing, mentioned in this section, is understood as a complement to the internal economic management that each network organises for its day-to-day sustainability.

a. Annual funds should be used to allocate microcredit or grants for the initiation of community network funds, allowing initiators to meet the initial needs of acquiring equipment for infrastructure, technical support, and training processes;

b. Cooperation agencies and NGOs should develop financing strategies focused on collaboration and coordination for greater impact and benefit in the ecosystem of community networks and their beneficiary populations;

c. Clear and agile policies and mechanisms for the allocation of universal service funds[35] to community networks should be developed;

d. Objective studies should be financed to understand the costs of deploying community networks in underserved areas and to study their added social value;

e. Technology funding bodies and interested for-profit entities should partner in the development of novel technologies (both infrastructure and support) suited to community networks

2.6 Smart Use of Resources for Underserved Areas

Public entities, private operators, and other stakeholders that do not serve areas with scarce or deficient communications infrastructure should encourage and support community networks at little or no cost to themselves. This would enable community networks to keep reducing the connectivity gap while generating a high positive impact towards achieving obligations, mandates, and objectives in relation to the UN Sustainable Development Goals (SDGs) set in the 2030 Agenda as well as creating positive network effects for the Internet itself. To do so, smart resource allocation should be encouraged in the following areas:

35 Universal Service is an economic, legal, and business term used primarily in regulated industries to refer to the practice of providing basic services to all residents of a country. In many states, the creation of universal service funds is the result of the need to reduce the digital divide between rural and urban communities, as well as between the rich and poor, which is generated by the use of private capital to finance telecommunications/ICT projects. see <https://www.itu.int/dms_pub/itu-d/opb/stg/D-STG-SG01.05-2017-PDF-S.pdf (page 41)>.

a. **Idle bandwidth:** there are successful cases regarding the subject of idle bandwidth usage provided by academic entities, which make it available to community networks at times when the resource is being underutilised. These types of agreements could be adopted by various public or private actors, allowing for a more efficient use of the resource;
b. **Extension of public access points:** various government programmes create access points in public places in regions with little connectivity. These programmes should include community networks as a complement to extend connectivity to homes and other points of interest for the local community;
c. **Community management of government plans:** States often deploy infrastructure plans in unattended areas without carrying out a process of popular adoption of technology within the community. This results in an underutilisation of local skills, which would extend the lifetime of the infrastructure;
d. **Access to infrastructure:** free access to towers, poles, pipelines, shelters, data centers, etc. represents a low cost for the entities that would provide access but high value for community networks, facilitating their deployment. In certain cases, this is a necessary condition for their existence;
e. **Free interconnection:** it is important that a regime of free peering between government networks and the community networks deployed in their territory be determined as a default policy in the region. Also, private actors concerned about the reduction of the digital divide could establish similar agreements, which consider the use of idle capacity. It would also be advisable that Internet exchange points (IXP) consider the cost-free participation of community networks;
f. **Transit:** Tier 1 networks with presence in a given region could offer community networks free global transit agreements. Government and private networks with national coverage could offer national or regional transit agreements under the same conditions;
g. **IP resources:** Regional Internet Registries (RIRs) should elaborate policies that would exempt community networks from the costs of obtaining and renewing IP resources and Autonomous System Numbers (ASNs);
h. **Technology Development:** most existing networking infrastructures, such as radios or user management software, is designed and built for traditional, privately owned networks.

There is a robust need for novel technologies that are fundamentally designed to support decentralised, community ownership, operation, and maintenance.

i. **Energy & sustainbility:** Constant, reliable electricity is needed to power telecommunications infrastructure, thus Internet access itself will not be sustainable without a sustainable energy source. The challenge of generating reliable energy to power infrastructure continues to pose a significant barrier to community networks as well as rural and remote communties more broadly, especially in establishing infrastructure, lowering access costs, and enabling networks to scale. Community networks can provide a hub within rural and remote communites disconnected from grid electricity and should be seen as a vehicle that can promote both connectivity as well sustainable energy consumption.

2.7 Regulatory Framework

1. Legalisation

1.1 Licensing: clear and agile mechanisms must be established to facilitate access to the licenses and resources necessary for legally recognised operations, including Internet service provider (ISP), tower, and lawful intercept licenses;

1.2 Declaration of transmitting stations: the governments that require such a declaration, made by registered professionals, of transmitting stations and other network components, should facilitate the process and provide free access to the necessary professional services;

1.3 Approval and harmonisation of equipment: community networks often use ad-hoc, custom, or research equipment developed by them or other small-scale partners. Governments should facilitate the approval procedures for the technical components involved, eliminating economic barriers and encouraging innovation.

2. Spectrum

2.1 Spectrum planners should provide affordances for social, community, and indigenous uses;

2.2 Spectrum allocation processes should be agile, adequate, and free, for example: by direct assignment;

2.3 Regulators should implement and support mechanisms for efficient use and spectrum sharing, such as secondary use, dynamic access, and allocation of local or regional coverage;

2.4 Experimental licenses must easily transition to definitive licenses once the viability of the project has been demonstrated.

3. Tax Exemptions

3.1 Network, spectrum, and business taxes, fees, and charges, whether one-time or recurrent, should be reduced or eliminated, for type of networks;

3.2 Similarly, equipment import taxes should also be reduced or eliminated.

4. Strategic Goals

The widest possible number of stakeholders should continue working on common strategies in relation to:

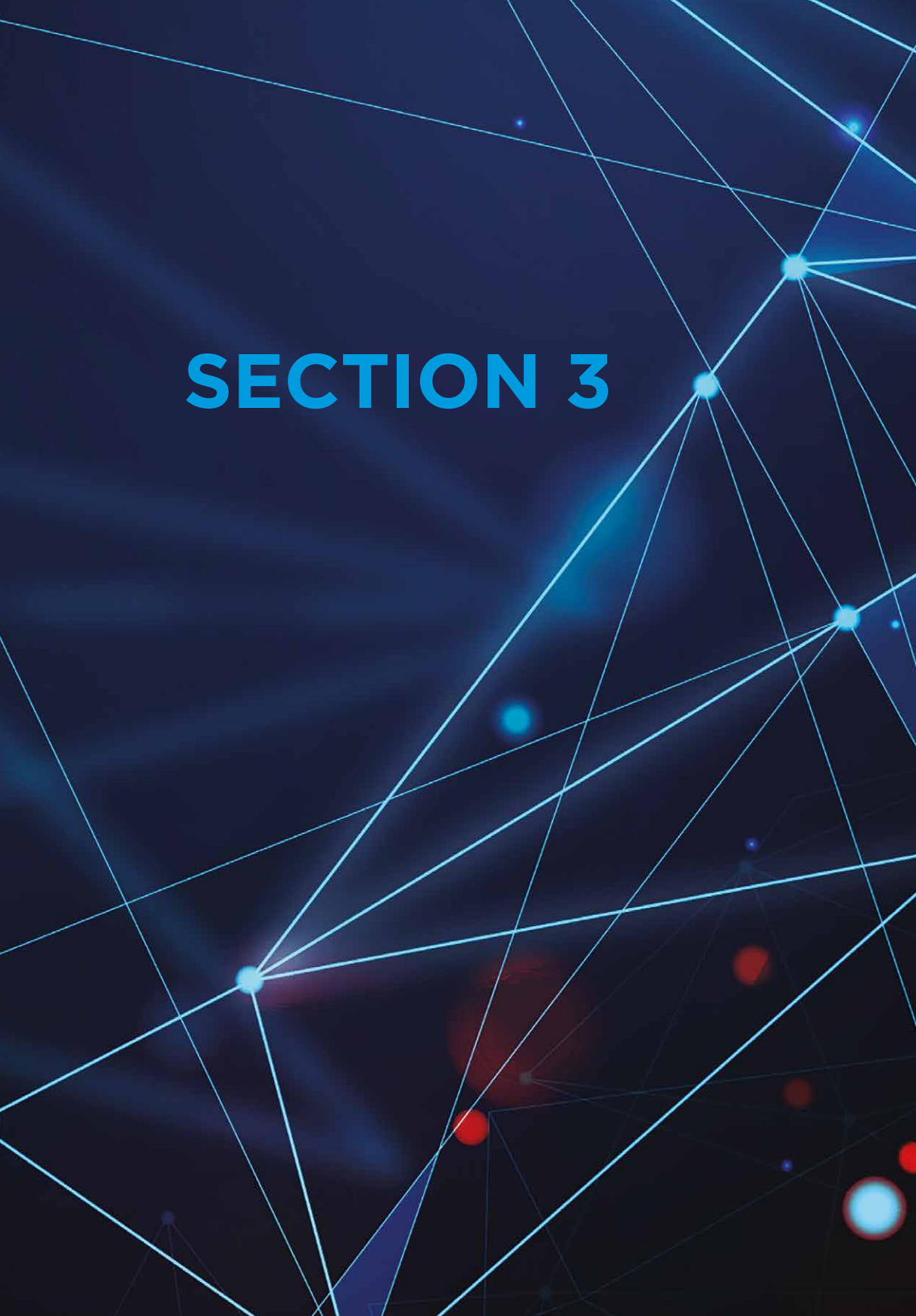
4.1 Training: focusing on the creation of a network of community network schools and scholars that will contribute to the dissemination of information and tools necessary for the creation of new community networks as well as for continuing education and training for existing community network participants.

4.2 Technology: promote the creation of development laboratories that allow for better coordination and use of resources to meet collective needs and develop novel technical solutions.

4.3 Regulatory impact: promote the participation of community network representatives and association within regulatory bodies and other spaces of interest for our sector.

4.4 Impact: encourage the creation of reports focused on the social, economic, and technical value of community networks.

4.5 Local content and services: implement strategies that allow communities to strengthen and preserve their cultural and organisational heritage, safeguard traditional knowledge, and fully and effectively exercise the right to communication, freedom of expression, and self-determination. It is important that local content is shared using technology that is adapted to the possibility of each territory and its agreed licensing, in order to respect the decisions of each community.


SECTION 3

3 Informative Materials for Well-informed Regulators

This section includes references to a selection of documents that may be deemed as useful and informative to understand the main dimensions of CNs. In this spirit, this section will include some reading suggestions aimed at stimulating a better understanding of

1. CN governance and technical architectures;
2. The fundamental rights dimension of connectivity with particular regard to CNs;
3. Innovative access to infrastructure policies, including regarding spectrum;
4. Licensing, fees and compliance issues;
5. Taxation and funding issues that might affect CNs.

3.1 Understanding Community Networks

Luca Belli (Ed). (2016). Community Connectivity: Building the Internet from Scratch. Rio de Janeiro: FGV Direito Rio.
<http://bit.ly/comconnectivity>.

Over four billion people are currently unconnected to the Internet, including around a billion individuals who do not have access to basic telephony services. The IGF Dynamic Coalition on Community Connectivity (DC3) promotes sustainable connectivity, fostering the role of the commons in networks and the elaboration of appropriate frameworks to empower communities and individuals through connectivity. Community networks are a subset of crowdsourced networks, structured to be open, free, and neutral. Such networks rely on the active participation of local communities in the design, development, deployment and management of the shared infrastructure as a common. This Report explores several dimensions of the community network debate. The Report and the Declaration on Community Connectivity are the official outcomes produced by the DC3 in 2016. The Report includes a selection of analyses of different community connectivity issues.

Table of contents

Luca Belli (Ed). (2017). Community Networks: The Internet by the People, for the People. Rio de Janeiro: FGV Direito Rio. <http://bit.ly/cnets2017>.

This book is the Official 2017 Outcome of the UN IGF Dynamic Coalition on Community Connectivity (DC3). DC3 is a multistakeholder group, fostering a cooperative analysis of the community network model, exploring how community networks may be used to improve connectivity while empowering Internet users. This volume explores the benefits of community networks, analysing case studies, focusing on the challenges and opportunities for these networks and putting forward concrete recommendations for their development. The book includes the updated version of the Declaration on Community Connectivity, which was elaborated

through a multistakeholder participatory process, facilitated by the DC3. The Declaration emphasise that community networks are crowdsourced networks structured to be open, free, and to respect network neutrality. Such networks rely on the active participation of local communities in the design, development, deployment, and management of shared infrastructure as a common resource, owned by the community, and operated in a democratic fashion.

Table of contents

Luca Belli (Ed). (2018) The Community Network Manual: How to Build the Internet Yourself. Rio de Janeiro: FGV Direito Rio. <http://bit.ly/cnetmanual>.

This volume is jointly published by the Fundação Getulio Vargas (FGV), the International Telecommunication Union (ITU) and the Internet Society (ISOC). This volume is the result of the 2018 Call for Papers of the UN IGF Dynamic Coalition on Community Connectivity (DC3) and is the Official 2018 DC3 Outcome. DC3 is a multistakeholder group, fostering a cooperative analysis of community networks, exploring how such initiatives may be used to improve connectivity while empowering Internet users, triggering the creation of new content, applications, services and organisations, developed by the local community for the local community. Community networks rely on the active participation of local communities in the design, development and management of network infrastructure as a common resource. These networks give rise to new infrastructures, new governance models and new business opportunities and facilitate the free flow of information and knowledge, filling the lacunae left by the traditional Internet access-provision paradigm. This book is the third volume of a trilogy demonstrating the vitality, quality and interest of the contributions, projects and policy suggestions developed by DC3 members. It also proves that such vitality, quality and interest are not decreasing over time but, on the contrary, ideas and initiatives developed by DC3 members are increasing and cross-fertilising each other's, while some of the most relevant institutions in the world are recognising their importance, value and impact.

Table of contents

- Spencer Sevilla, Pathirat Kosakanchit, Matthew Johnson and Kurtis Heimerl
- The MAZI Toolkit for Do-It-Yourself Networking
- LibreRouter: the Hardware and Software Platform for Community Networking

Part II – Scalable, Sustainable and Law-compliant Community Networks

- Multiple Dimensions of Community Network Scalability
- Federating Community Networks: A Case-study from France
- Fostering Sustainability of Community Networks: Guidelines to Respect the European Legal Framework
- Complementary Networks Meet Complementary Currencies: Guifi.net Meets Sardex.net
- What Could Blockchain do for Community Networks

Declaration on Community Connectivity

Nicola Bidwell and Michael Jensen. (2019). Bottom-up Connectivity Strategies: Community-led small-scale telecommunication infrastructure networks in the global South. Association for Progressive Communications.
<http://bit.ly/bottomupconnect>.

To document the benefits of, and challenges facing, small-scale, community-based connectivity projects, APC researchers visited 12 rural community networks in the global South in 2018 and studied a number of others through desk research and interviews. The primary goal of the research is to provide information that can be used for evidence-based policy making that will contribute to creating a more enabling environment for small community-based local access networks. In addition, the research aimed to identify opportunities for these networks to be more effective and, hopefully, to encourage more organizations to support the development of these networks in future.

Aside from the absence of enabling regulatory environments, community networks, particularly those in the rural global South,

also face other difficulties. Financial resources for their initial deployment are often very limited and there are other factors such as lack of affordable or reliable energy supply, and high costs for backhaul connectivity. Yet, despite these difficulties and their lack of visibility, community networks also appear to have many advantages over traditional large-scale commercial networks, including:

- More local control over how the network is used and the content that is provided over the network.
- Greater potential for attention to the needs of marginalised people and the specific populations of rural communities, including women and older people.
- Lower costs and retention of more funds within the community.
- Increased potential to foster a sense of agency and empowerment among users and those involved in the network.

Table of contents

Section 1.

Section 2.
Community Networks: Operational and Technical Research

- Background
- Research strategy
- The initiatives studied
- Types of connectivity provided
- Underlying motivations and support for setting up community networks
- Motivations for establishing community networks
- Organisations with supporting roles in community networks
- Institutional models and sustainability strategies
- Provisioning models
- Umbrella and support organisations
- Levels of community involvement
- Indirect outcomes: Impacts on the connectivity ecosystem
- A conceptual framework for financial sustainability
- Sustainability challenges
- Recommendations
- Improving policy and regulatory environments
- Recommendations for future research areas
- The study group initiatives in detail
- AlterMundi/*Libre, Córdoba province, Argentina
- Associação Portal Sem Porteiras/Coolab, Monteiro Lobato, São Paulo state, Brazil
- BOSCO – Battery Operated Systems for Community Outreach, Uganda
- Des Hotspot, Banda Aceh, Indonesia
- Gram Marg/IIT Bombay, Maharashtra, India
- Mayutel/Red de Telemedicina del Río Napo/TUCAN3G, Peru
- Pamoja Net, Ensemble Pour la Différence, Idjwi Island, DRC
- Puspindes/Common Room and RelawanTIK, Central Java, Indonesia

- Quilombola Network, Bairro Novo, Maranhão, Brazil
- TakNet/Net2Home, Mae Sot, Tak Province, Thailand
- Telecomunicaciones Indígenas Comunitarias (TIC AC), Oaxaca, Mexico
- Ungu Community 4G/LTE, Bokondini, West Papua, Indonesia
- Village Base Station (VBTS) Konnect Barangay, Aurora, Philippines
- Wireless for Communities (W4C), Digital Empowerment Foundation (DEF), India
- Zenzeleni, Eastern Cape, South Africa
- Technology use details
- Access network technologies
- Technology use insights

Section 3.
The Social Benefits of Rural Community Networks in Six Countries and Recommendations for their Development

- Introduction
- Benefits and capabilities
- Expressing and extending self- and collective efficacy
- Ownership and walking together
- Contributing to local economies
- Facilitating employment and remote work
- Transacting online or circulating money locally
- Extending online time for learning and just-in-time information
- Intermediating, disseminating and producing information
- Human connectedness: Care and communality
- Involving children and teens, and regulating their access
- Local awareness, visibility, safety, security and privacy.
- Creatively connecting technology to local settings
- Challenges and recommendations
- Inclusion in the benefits
- Involvement in, and awareness about, decisions

- Resources for maintaining networks and services
- Geographies of access and involvement
- Temporalities of involvement and access
- Access and involvement across generations
- Women and technical work

GISWatch. (2018). Global Information Society Watch 2018: Community Networks 2018. Association for Progressive Communications and International Development Research Centre. <http://bit.ly/giswatch2018>.

This Global Information Society Watch (GISWatch) focuses on community networks. Community networks are "communication networks built, owned, operated, and used by citizens in a participatory and open manner." This is a starting point. As the 43 country reports gathered here show, in practice, "community networks" can be hybrid systems, with different political and practical objectives. The country reports cover a diverse range of countries such as Georgia, Nepal, South Africa, India, Argentina, Honduras, Portugal, Germany and the Democratic Republic of Congo. Key ideas like participatory governance systems and community ownership and skills transfer, and the "do-it-yourself" spirit that drives community networks, give community networks across the globe a shared purpose and implementation methodology.

Table of contents

- Community networks as a key enabler of sustainable access: A review
- Community networks: Stories and power
- Feminist infrastructure and community networks: An opportunity to rethink our connections from the bottom up, seeking diversity and autonomy
- Decentralising culture: The challenge of local content in community networks

Country Reports

- Introduction
- Argentina
- Australia
- Benin
- Brazil
- Brazil
- Canada
- The Caribbean
- Catalonia
- China
- Colombia
- Congo, Democratic Republic of
- Costa Rica
- Ecuador
- Georgia
- Germany
- Ghana
- Greece
- Honduras
- India
- India
- Indonesia and Malaysia
- Italy
- Kenya
- Kyrgyzstan
- Malaysia
- Mexico
- Myanmar
- Nambia
- Nepal
- Nigeria
- Pakistan
- Peru
- Philippines
- Portugal
- Seychelles
- South Africa
- Tanzania
- Thailand
- Tunisia
- Uganda
- United States
- Venezuela
- Zambia

Leandro Navarro (Ed.) (2016). Report on Existing Community Networks and their Organization. Network Infrastructure as Commons Co-Funded by the Horizon 2020 programme of the European Union Grant Number 688768.
<http://bit.ly/cnetsreport2016>.

This deliverable is devoted to build a homogeneous mapping of the Community Networks net Commons is working (or intends to work) with in Europe, plus a general overview of the many facets of the Community Network concept around the world, with the goal of providing a sort of taxonomy plus a rough global quantification of the phenomenon. For the development of the analysis framework we have worked in close collaboration with a few of the Community Networks (CNs) that are most representative and more relevant, one way or another, to the netCommons project. This report builds on and extends D1.1 (M6) with further elements of commons theory, more details and coverage of additional CNs, a mapping of CN web sites to show the inter-relations among them, a typology of international CNs, and a expanded taxonomy for comparison and typology. The report first of all reviews and partially re-define the concept of commons in the context of modern society and technologies. Next a description of the general framework for the comparative analysis of different CN instances is given trying to set a "reference conceptual architecture" that can help understanding different organizational models and different implementations of CNs. After this general and theoretical analysis, the deliverable reports a detailed analysis of a selection of CNs: guifi.net, FFDN, Ninux, AWMN, Sarantaporo.gr, Freifunk, and CNs from INCA, that are representative of European initiatives. These CN have inspired the development of the general framework; An extensive list of many self-proclaimed CNs around the world and further details collected from a few of them closes this descriptive part of the Deliverable as an Appendix. This report concludes task T1.1: "Mapping of CNs" and contributes to achieve objective O1.1 "Mapping CNs providing a description of relevant CNs structure and organization to other WPs".

Table of contents

- eXO association
- History and Principles
- Stakeholders
- Implementation of the governance
- Services provided
- Implementation of the infrastructure and impact
- AWMN
- History and principles
- Stakeholders
- Implementation of the governance
- Services provided
- Implementation of the infrastructure and impact
- FFDN
- History and Principles
- Stakeholders
- Implementation of the governance
- Services provided
- Implementation of the infrastructure and impact
- Ninux
- History and Principles
- Stakeholders
- Implementation of governance
- Services provided
- Implementation of the infrastructure and impact
- Sarantaporo.gr
- History and principles
- Stakeholders
- Implementation of the governance
- Services provided

- Implementation of the infrastructure and impact
- Freifunk
- History and principles
- Stakeholders
- Implementation of the governance
- Services provided
- Implementation of the infrastructure and impact
- Independent Networks Co-operative Association (INCA)
- History and Principles
- Stakeholders
- Implementation of the governance
- Services provided
- Implementation of the infrastructure and impact

Comparative Analysis and Discussion

- Mapping European Community Networks and their online presence
- Methodology
- Analysis
- A (de)centralisation-based typology of CNs
- Discussion

Conclusions

Community Networks around the World

3.2 Fundamental rights

C. Baca, L. Belli, E. Huerta, K. Velasco. (2018) Community Networks in Latin America: Challenges, Regulations and Solutions. Internet Society.
<http://bit.ly/cnetslatam>.

Over the past decade, numerous discussions have highlighted the essential role that internet connectivity plays in driving fundamental changes in economic and social development. The purpose of this study is not only to highlight the potential

of community networks in terms of expanding connectivity and its positive social, cultural and economic externalities, but also to point out the regulatory elements that might optimise their development and highlight the regulatory experiences that have allowed removing obstacles to the full operation of community networks in Latin America.

One of the most important aspects of this study is the use of descriptive elements in its different sections in order to adopt a proactive attitude and offer specific instructions and recommendations. These elements seek to clarify how community networks might be categorized from a legal point of view, which rules should be considered when regulating community networks, and what policies should be adopted to promote and strengthen the expansion of community networks in Latin America.

Table of contents

- When Does a Community Network Require a License?
- Obligations Deriving from Community Networks

International Legal Framework for Community Networks

- Rights Related to Universal Access to ICT
- Rights Related to the Free Development of the Personality
- The Rights of Indigenous Peoples
- Network Self-Determination
- International Recommendations and Commitments
- An Overview of the Regulatory Landscape in the Americas.

Conclusions

- Declaration of the First Latin American Summit of Community Networks
- Recommendations for Community Networks in Latin America

Annex: Results Summary | Regulations by Country

- Argentina
- Bahamas
- Bolivia
- Brazil
- Canada
- Chile
- Colombia
- Costa Rica
- Ecuador
- United States
- El Salvador
- Honduras
- Mexico
- Nicaragua
- Paraguay
- Peru
- Dominican Republic
- Uruguay

Luca Belli (2017). Network Self-Determination and the Positive Externalities of Community Networks. In: Community Networks: the Internet by the People, for the People.
<http://bit.ly/belli2017>.

This paper argues that existing examples of Community Networks (CNs) provide a solid evidence-base on which a right to "network self-determination" can be constructed. Network selfdetermination should be seen as the right to freely associate in order to define, in a democratic fashion, the design, development and management of network infrastructure as a common good, so that all individuals can freely seek, impart and receive information and innovation. The first section of this paper argues that the right to network self-determination finds its basis in the fundamental right to selfdetermination of peoples as well as in the right to "informational self-determination" that, since the 1980s, has been consecrated as an expression of the right to free development of the personality. The paper emphasises that, network self-determination plays a pivotal role allowing individuals to associate and join efforts to bridge digital divides in a bottom-up fashion, freely developing common infrastructure. In this perspective, the second section of this paper examines a selection of CNs, highlighting the positive externalities triggered by such initiatives, with regard to the establishment of new governance structures as well as the development of new content, applications and services that cater for the needs of the local communities, empowering previously unconnected individuals. The paper offers evidence that the development of CNs can prompt several positive external-effects that considerably enhance the standards of living of individuals, creating learning opportunities, stimulating local entrepreneurship, fostering the creation of entirely new jobs, reviving social bounds amongst community members and fostering multistakeholder partnerships. For these reasons, policymakers should design national and international policy frameworks that recognise the importance of network self-determination and facilitate the establishment of CNs rather than hindering their development.

Table of contents

Human Rights Council. (2011) Report of the Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression, Frank La Rue. A/HRC/17/27. <http://bit.ly/larue2012>.

This report explores key trends and challenges to the right of all individuals to seek, receive and impart information and ideas of all kinds through the Internet. The Special Rapporteur underscores the unique and transformative nature of the Internet not only to enable individuals to exercise their right to freedom of opinion and expression, but also a range of other human rights, and to promote the progress of society as a whole. Chapter III of the report underlines the applicability of international human rights norms and standards on the right to freedom of opinion and expression to the Internet as a communication medium, and sets out the exceptional circumstances under which the dissemination of certain types of information may be restricted. Chapters IV and V address two dimensions of Internet access respectively: (a) access to content; and (b) access to the physical and technical infrastructure required to access the Internet in the first place.

More specifically, chapter IV outlines some of the ways in which States are increasingly censoring information online, namely through: arbitrary blocking or filtering of content; criminalization of legitimate expression; imposition of intermediary liability; disconnecting users from Internet access, including on the basis of intellectual property rights law; cyberattacks; and inadequate protection of the right to privacy and data protection. Chapter V addresses the issue of universal access to the Internet. The Special Rapporteur intends to explore this topic further in his future report to the General Assembly. Chapter VI contains the Special Rapporteur's conclusions and recommendations concerning the main subjects of the report.

Table of contents

Human Rights Council. (05 June 2012). Promotion and protection of all human rights, civil, political, economic, social and cultural rights, including the right to development. A/HRC/20/L.13.
<http://bit.ly/hchr2012>.

This HRC Resolution affirms the fundamental role that freedom of opinion and expression plays in the ability of human to interact with society at large, calls upon all States (a) to promote, respect and ensure women's exercise of freedom of opinion and expression, both online and off-line, including as members of nongovernmental organisations and other associations [and] (d) to facilitate equal participation in, access to and use of information and Communications technology, such as the Internet, applying a gender perspective and to encourage international cooperation aimed at development of media and information and communication facilities in all countries.

Silvia Täbuscã, 2010. "The Internet Access as a Fundamental Right," Romanian Economic Business Review, Romanian-American University, vol. 4(2).
<http://bit.ly/internet-access-right>.

Since its creation, the Internet has been an important platform of information and communication, growing and becoming, in the same time, an indispensably part of our lives. The World Wide Web could not stay apart of many problems the society tries to cope with, such as the protection of fundamental rights. New context of technoglobalization and techno-capitalism means that there are new situations in which fundamental rights have to be defined, limited, ensured, and protected. In the very last years, there was started an international controversial debate on the issue of the Internet access as a fundamental right. It should not be conceived as a new and independent right, but rather as part of the freedom of expression. Key elements of the right to Internet access includes access to online media, equitable access to the means of online communication, the right to freely access online information, the right to be free of undue restrictions on content and privacy rights. However, even if we are in the era of promoting the Internet access as a fundamental right, there are many countries around the World which are not willing to recognize, respect and implement such

a right, or they have no necessary infrastructure and financial resources to implement it

Table of contents

Stephen Tully. (June 2014). A Human Right to Access the Internet? Problems and Prospects, *Human Rights Law Review*, Volume 14, Issue 2.
<http://bit.ly/tully2014>.

This article considers a proposed human right of Internet access. Internet access, with its range of political, economic, social and cultural uses, is essential for contemporary living. States are also committed to ensuring the Internet's universality, integrity and openness. General international law and international human rights law are examined for the existence and scope of a possible right. Internet access is currently a feature of several pre-existing rights, particularly the right to freedom of expression. Does Internet access warrant separate recognition? This article considers whether content should be restricted, and consent a prerequisite; whether payment is necessary; and whether certain individuals should be denied access. A right of Internet access must be balanced against other rights and competing interests including privacy, intellectual property protection and ensuring public order. Limitations or restrictions on access are permissible and disconnection is allowed for specific users provided prior procedural safeguards are met.

Table of contents

Some Implications Of A Right Of Internet Access

- The Internet as an Area of Public Accommodation or Global Commons
- The Roles and Responsibilities of ISPs
- Permissible Content Restrictions
- Intellectual Property Rights
- A Qualified Right of Internet Access

Conclusions

3.3 Access to infrastructure including spectrum

Alliance for Affordable Internet (2018). *The 2018 Affordability Report*. Washington DC: Web Foundation.
<http://bit.ly/affordabilityreport2018>.

Despite this progress, the past five years have also seen a serious slowdown in the rate at which people are coming online. Based on trends using ITU internet use data, last year's Affordability Report predicted that we would achieve 50% global internet penetration by the end of 2017; a downturn in the growth of internet access and use means that we now don't expect to reach that milestone until mid-2019. Inability to afford a basic internet connection remains one of the most significant — and solvable — barriers to access. Around the world, over two billion people live in a country where just 1GB of mobile data is unaffordable. This issue is particularly acute in low- and middle-income countries, where 1GB of data costs over 5% of what people earn in a month — a price that is well over the affordable threshold of 1GB of data priced at 2% or less of average income. The 2018 Affordability Report examines how the policies to accelerate access to affordable internet have progressed these past five years across 61 lowand middle-income countries, and where they stand today. Our research finds that while policies continue to improve on the whole, the pace of policy change remains far too sluggish and incremental to effect the change needed to enable affordable access for the billions still offline.

Table of contents

Ofcom. (2019). Enabling wireless innovation through local licensing. Shared access to spectrum supporting mobile technology.
<http://bit.ly/wirelessinnovation>.

Radio frequencies are of significant importance to the UK economy and society because they allow all wireless communications devices, including mobile phones and wireless broadband, to operate. We want to support innovation and enable new uses of spectrum, and we recognise there is growing interest in the use of mobile technology, including 5G, to develop solutions to meet local wireless connectivity needs. To ensure that lack of access to the radio spectrum does not prevent innovation, we are introducing a new licensing approach to provide localised access to spectrum bands that can support mobile technology. This statement explains how we will allow more people and businesses to use spectrum from a choice of frequency bands. Local access to these bands could support growth and innovation across a range of sectors, such as manufacturing, enterprise, logistics, agriculture, mining and health. It could enable organisations to set up their own local networks with greater control over security, resilience and reliability than they may have currently. For example, manufacturers connecting machinery wirelessly, farmers connecting agricultural devices such as irrigation systems and smart tractors wirelessly, enterprise users setting up secure private voice and data networks within a site, as well as rural wireless broadband connectivity using fixed wireless access (FWA).

Table of contents

Open Telecom Data (s.d.)
<http://bit.ly/open-telecom-data>.

Open Telecom Data is a resource providing country profiles with information useful for anyone wishing to establishing a community network, cooperative, or commercial operator of telecommunications services with a broad understanding of the rules that govern the establishment and operation of these networks as well as what opportunities and obstacles exist.

Open Telecom Data is organised according to the categories that are expected within each country profile. In each category you will find key questions you should be seeking answers to, suggestions of where to find information, and examples of good practice in the various categories from around the world.The Open Telecom Data wiki is also designed to capture some of the information as fields in a database that will allow for some comparative analysis across countries. These fields are entered below the wiki in the form fields and are displayed in the wiki page as a variable. Items captured in the database are displayed in a table. Database fields can be exported to spreadsheet, CSV, or JSON format.

Table of contents

Steve Song, Carlos Rey-Moreno, Mike Jensen. (2019). Innovations in Spectrum Management: Enabling community networks and small operators to connect the unconnected. Internet Society. <http://bit.ly/spectrum-management>.

The value of being connected to a communication network is steadily rising and yet, half of the world population remains unconnected to the Internet. Traditional solutions are showing signs of having reached their limits. Attempts to address this problem, whether through universal service strategies/ funds, private sector initiatives or philanthropy, have met with limited success. This presents a conundrum for policy-makers and regulators where value continues to accrue to those with affordable access to communication infrastructure while the unconnected fall further and further behind by simply staying in the same place.

In order to address this issue, fresh thinking is required. There are changes in the telecommunication landscape that represent genuine cause for optimism that it is possible for everyone on the planet to have affordable access to communications. However, in order for that to happen, changes in access policy and regulation are required, in particular with regard to the management of radio spectrum, which is still largely rooted in 20th century analogue paradigms. This report is intended as a resource for regulators and policy makers tasked with addressing affordable access. This paper begins by providing new lenses to understand the vocabulary, the framework, and the current landscape for spectrum management. In particular, the following issues are addressed:

- The need to make the vocabulary and underlying concepts of spectrum management more approachable. By using analogies and examples, the different factors involved in communicating using radio waves are described. Similarly, new metaphors are introduced in order to deconstruct the current narrative of spectrum management based on property rights, which blinds us to innovations in wireless technology that could help connect the unserved. Taking a fresh look at spectrum using these metaphors shows that it is possible to move from the current "spectrum scarcity" debate, to one of abundance, particularly in the places where the unconnected live.

- The fact that organisations using the same frequency at the same time in the same location resulted in communication failure, leads to a complex dance among regulatory agencies, standards bodies, equipment manufacturers, and network operators, all of which influence the evolution and uptake of wireless technologies.
- The challenge that the accelerating pace of technological change presents to the traditional pace of spectrum allocation and assignment. This challenge is compounded by the increasing demand for wireless spectrum from operators in order to be able to meet growing demand for broadband services.

Next, the paper makes a detailed survey of the current status of spectrum management in frequency bands used to provide connectivity in a selection of representative countries around the world (Argentina, Brazil, Canada, India, Mexico, South Africa, and the United States) and outlines the basis for an evolving spectrum management ecosystem where complementary approaches can be used to remove the barriers and provide support to community networks and small operators. In particular, regulators and policy makers are encouraged to consider evidence of innovative spectrum management in the following topics:

- The rapid spread of license-exempt spectrum use in the form of Wi-Fi is an important lesson about the power of frictionless innovation and about the pent-up demand for affordable Internet access. It makes sense for regulators to leverage this success by expanding the range of frequencies designated for license-exempt use, particularly in the 5 GHz and 6 GHz bands, and by further reducing tax and administrative costs associated with their use. Regulators should also consider increasing the power levels allowed when using directional antennas with Wi-Fi for fixed backhaul, recognising the reduced chances of interference with highly directional communication.
- In addition to the traditional Wi-Fi license-exempt bands, there are other bands that currently can be used without a spectrum license in many countries. Of particular interest are the 24 GHz band, 60 GHz (V-band) and from 71 GHz onwards (E-band), also known as mmWave as the wavelength of these

higher frequencies is in the range of millimetres (mm). These frequencies could be used by small operators and community networks to provide "fiber-like" connectivity. Regulators and policy makers should consider enabling the use of these bands on a license-exempt basis.

- The reduced harmful interference from antennas that can focus wireless communication along very narrow beams/paths has led some regulators to expand the use of some bands, like the 11 GHz band for fixed PtP backhaul links. Regulators should consider the market availability of low-cost microwave solutions in 11 GHz and other frequencies and adapt regulation to encourage their uptake. This could take the form of a light-licensing scenario for the cooperative assignment of geo-located frequency assignments.
- Rising costs for exclusive-use, licensed spectrum stands in stark contrast to license exempt spectrum that is available at no cost. Dynamic spectrum offers the opportunity to establish a middle ground between both. While TV White Space regulation has been implemented in a few countries, its real potential may yet to be realised as an affordable access technology in developing countries where UHF spectrum is largely unoccupied. Regulators should accelerate the adoption of TVWS regulation and explore the application of these management approaches to other frequency bands.
- While demand for spectrum often exceeds its administrative availability in urban areas, large amount of licensed spectrum lies unused in sparsely-populated, economically poor regions. A variety of low-cost 2G and 4G manufacturers have emerged in recent years that offer the potential to dramatically change the cost model for sustainable rural mobile network deployment. Regulators should consider frameworks for sharing spectrum for mobile network services in rural areas that may not have value for incumbent operators, but which will have a significant impact for small operators and community networks. An economic study to understand the economic cost of unused spectrum and approaches to incentivize its use would help to make the business case for this. This could lead to set-asides of small

spectrum blocks for those providing affordable connectivity in underserviced areas. This could be a particularly effective strategy to ensure that the upcoming 5G spectrum assignments to do not lead to a deepening of the digital divide.

- Auctions as a strategy for spectrum assignment should be reviewed in terms of their role in increasing affordable access in underserved regions. Wholesale approaches to spectrum assignment targeted at difficult to serve regions should be explored. Similarly, more granular approaches to calculate the fees that operators need to pay to use spectrum can open opportunities for frequency reuse and provision of affordable access. The inclusion of factors like the location where the spectrum will be used and assigning smaller weights to the final fee when used in underserviced areas will incentivize the extension of the current infrastructure.
- Not all innovations in spectrum management need to come from national regulatory authorities and policy makers. Industry associations have the potential to become venues for self-regulation. They also play a key role in advocacy for spectrum regulation that is aligned with the needs of those providing complementary solutions for universal affordable access. One of the most innovative examples of self-regulation comes from managing the telecommunications infrastructure as a common-pool resource. This generates economies of scale and incentives for infrastructure sharing that contributes to the reduction of costs to the final user.
- The innovations presented in this paper should be included in an overall licensing framework that is conducive for small operators and community networks. High licensing fees as well as obligations attached to the license and compliance issues create a barrier for complementary operators to benefit from innovations in Spectrum.
- The rise of spectrum as a critical resource in the delivery of affordable access has led to the need for a more inclusive public debate. This places an obligation on regulators to increase transparency and communication with regard to spectrum management issues, licensing and telecommunication infrastructure in general.

In the last 25 years, the telecommunications landscape has changed from monolithic, state-owned operators to a complex ecosystem of operators, technologies, manufacturers, and service providers. This new environment has opened the door to community network and small operators to fill access gaps that large operators are unlikely to address. Spectrum regulation, which served well in predictable, slow- moving markets, is no longer able to keep pace with technological change and is not oriented towards new technologies and business models that can address access and affordability gaps. Innovation is required. We encourage regulators and policy makers to embrace the above recommendations that will lead to a more diverse ecosystem where smaller operators and community networks can advance the common goal of affordable access for all.

Table of contents

- Innovations in spectrum management outside the regulatory framework
- Licensing

Transparency, Open Data and Spectrum

Conclusion and Recommendations

- License-exempt Spectrum
- Light Licensing for more backhaul spectrum
- Dynamic Spectrum
- Spectrum for mobile network services
- Wholesale Approaches to Spectrum Assignment
- Transparency & Open Data
- Capacity building and collaborations

3.4 Licensing, fees and compliance

Derechos Digitales (2018) Study of the regulatory frameworks for community networks development in Latin America: Argentina, Brazil, Colombia and Mexico.
<http://bit.ly/ddregulatory>.

More and more Latin American countries are seeing a flourishing movement of communities seeking to organise and self-provide internet access in places where connection is either inexistent or unaffordable under market-driven service provision models. Through this project, Derechos Digitales aims to learn about how the different regulatory frameworks in place in Latin America for community networks, particularly in Argentina, Brazil, Colombia and Mexico, impact the actual development of those networks, and provide some reflections about spaces for regulatory improvement. The research will reflect the opportunities and barriers that exist for local access initiatives to start up and flourish, from licensing requirements and obligations, access to spectrum, to potential support from Universal Service Funds. This research will be conducted leveraging the experience and systematising the information already gathered by APC network members that have been working developing community networks in the region in recent years.

Table of contents

Mathias Kretschmer *et al.* (Eds). (2019). Connecting the Unconnected. Tackling the Challenge of Cost-effective Broadband Internet in Rural Areas. Fraunhofer-Institut für Angewandte Informationstechnik FIT.
<http://bit.ly/kretschemer>.

Global Internet penetration has increased significantly over the last decades, surpassing 50% of the world's population as widely announced at the end of 2017. This, however, also means that the other half of the world's population is still unconnected. Typical barriers to Internet adoption include lack in Ability, Appetite as well as Access and its Affordability. In other words, despite an overall increase in coverage and ever faster technologies, the slow, unreliable or often non-existent Internet connection along with often prohibitively high usage costs, lead to about 2.5 billion people that live within the reach of a broadband network but are still not using the Internet. Especially in rural areas, high costs of providing connectivity are a major obstacle as they are met by an extremely low income potential for operators. The reasons for this are manifold and range from lack of infrastructure and skilled personnel over insufficiently regulated markets and inflexible business models to funding challenges. The need to act has been recognized by industry and governments. The global community reflected the need in one of the 17 Sustainable Development Goals (SDGs) 9c: "Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020".

However, it is widely recognized that current approaches are not sufficient to reach this goal. A number of industry initiatives have appeared in recent years to address the challenge of rural

connectivity. Well-known examples are the balloons of Google Loon, Facebook's Aquila Drone, Low Orbit Satellites or the efforts to provide free implementations of cellular network technologies. These initiatives promise to allow extending the business of mobile operators and may provide the basis for entirely new actors and business models to help bridge the digital divide. However, most of such novel solutions have yet to prove their viability and applicability in general or in the context of developing countries, in particular. Often such technologies are not yet technically mature, face regulatory challenges or significant royalty fees. Numerous projects worldwide have been experimenting with such alternative concepts. Some are in active pilot or even commercial operation.

Therefore valuable information can be gathered from those and is presented here in the form of Best Practice or Lessons learned recommendations. These include technological alternatives for established telecom operators as well as completely new actors alike. Additionally, new operator models, enabled by such alternative technologies that include and are based on the local communities provide new options and new definitions of "profit" – where sustainable and affordable Access is the profit for communities instead of the financial Return of Investment (ROI). This White Paper examines such new developments and evaluates the potentials of both novel and mature technologies in the context of rural areas of the developing world.

Its main focus is to discuss different technological solutions to connect people and instruments that have so far proven their practicability. To this end, it identifies and assesses challenges and potentials for prospective stakeholders such as development cooperation actors and private donors in the application of such novel approaches and highlights possible fields of action such as regulation, piloting, scale-up, and skill development. Connecting villages and regions (Backhaul) as well as providing access to the people (Last Mile) have been identified as key areas where this White Paper discusses different technical and regulatory aspects which contribute to sustainable solutions to connect the unconnected.

Table of contents

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Table of contents

3.5 Taxation and funding

Alliance for Affordable Internet (2018). Universal Service and Access Funds: An Untapped Resource to Close the Gender Digital Divide. Washington DC: Web Foundation.
<http://bit.ly/a4ai2018>.

Achieving universal, affordable internet access is a key social and economic priority for countries around the world. The 193 member states of the United Nations agreed to work toward achieving this target by 2020 as part of the Sustainable Development Goals, and most countries have policies in place to ensure that internet access and use is a reality for all. To this end, many countries have established communal funds dedicated to expanding connectivity opportunities to unserved and underserved communities. These funds, known as Universal Service and Access Funds (USAFs), are typically financed through mandatory contributions by mobile network operators and other telecommunications providers. Making effective use of these funds is a critical step on the path to realising our shared goal of access for all. We are on track to reach 50% internet penetration in 2018 — an exciting milestone, to be sure, but one that also highlights the distance we have to go. Connecting the last four billion will not happen through market forces alone; it will require targeted efforts aimed at connecting those least likely to be connected, including those in poor, rural and hardto-reach communities. Above all, it will require efforts particularly targeted at connecting women, who comprise the majority of those offline today. And yet, USAFs remain, for the most part, an untapped resource for working toward these aims. For this research, we set out to find out more about the use of USAFs in Africa — the region with the lowest rate of internet penetration (22%) and the widest digital gender gap (25%). How many of Africa's 54 countries have operational USAFs, if they have one at all? Are USAF funds being used to close the digital divide and, specifically, the gender digital divide? What can governments and fund operators do to improve the impact of USAF-funded initiatives and accelerate efforts to connect women and close the digital divide?

Table of contents

Rey-Moreno, C. (May 2017). "Supporting the Creation and Scalability of Affordable Access Solutions: Understanding Community Networks in Africa". Internet Society.
<http://bit.ly/reymoreno>.

There is widespread recognition of the opportunities and potential benefits of expanding access to the Internet, as recognized by the Sustainable Development Goal (SDG) targets. Yet, around four billion people still lack access to it.

Community networks, communications infrastructure deployed and operated by citizens to meet their own communication needs, are being increasingly proposed as a solution to connect the unconnected. However, in Africa, where the proportion of unconnected is among the highest globally, little is known about the role community networks are playing.

Building on the map of community networks in Africa produced in 2016 that provided a snapshot of the state of this model on the continent, this report delves deeper into the topic. The study is the result of a series of interactions with representatives of ten community networks, which included individual interviews, panel discussions, and presentations at the first Summit on Community Networks in Africa. In addition, this report draws on the answers from the 30 representatives and proponents of community networks in Africa who participated in the creation of the 2016 map.

Results from our research shed new light on the factors behind the establishment of community networks, highlighting the commitment of their proponents to the development of their communities, and the role that the network and its services play in it. The social context where these initiatives take place also plays a critical role. Several strategies are presented that contribute to the social cohesion that marginalized communities depend on. The services these networks provide and the way they are offered also align with their context. There is a strong emphasis on public access, intranet services that meet the local needs, and digital literacy to maximize the opportunities offered by the services. But most of the organizations analyzed have a broader vision, and the communication services are just one component of the local economy they are creating to transform their communities. This context also plays a role in the economic sustainability of the initiatives, as low-income communities require some sort of seed capital to bootstrap the initiative. Once they are established, all of them have found ways to be sustainable, and in some cases, scale them to other places. They also want to improve, and a section with further recommendations is also included in this report.

Table of contents

Methodology

Mapping Community Networks in Africa

Overview of Community Networks In Africa

- Factors behind their establishment
- Socio-cultural aspects and dynamics
- Technical aspects and services offered
- Strategies for sustainability and scaling
- Ways forward

Barriers to the Creation and Scale of Community Networks

- Social
- Economic
- Technical
- Legal

Considerations for Developing Community Networks in Africa

- Defining community networks in Africa
- The early stages of telecommunications self-provision
- Stakeholders and strategic partnerships
- Local community network champions
- Strategic communications – Creating a community networks narrative
- Considerations for funding and sustainability
- Developing local capacity for community networks
- Policy and regulatory engagements

Recommendations

POSTFACE

Community Network Policy: Towards a Collaborative Governance

Bruno Ramos
Director for the Americas Regional Office of the International Telecommunication Union

The elaboration of this Booklet on "Building Community Network Policies: A Collaborative Governance towards Enabling Frameworks", facilitated by the UN IGF Dynamic Coalition on Community Connectivity (DC3), adds to other actions by various institutions to emphasize alternative ways to offer connectivity through major telecommunications operators, especially in rural areas. In this sense, it highlights the important role of public policy makers and regulators in building an enabling environment for the development of access networks in areas where there is still no investment interest by these operators.

As discussed in the text, we arrive in 2020 with half of the global population connected to the Internet. This is a situation to be celebrated, but it also brings up the great challenge of connecting the remaining population of the world.

In September 2015, the Member States of the United Nations met at the Sustainable Development Summit and approved the 2030 Agenda. This Agenda contains 17 objectives that should govern the countries efforts to achieve a sustainable world by 2030. The Sustainable Development Goals (SDGs) are successors to the Millennium Development Goals (MDGs) and seek to expand the success achieved by them, as well as reach those goals that were not accomplished. These new objectives urge all countries to take measures to promote the prosperity of all people while protecting the planet.

Connectivity, despite not explicitly listed among the SDGs, represents a baseline for achieving them.

More and more products and services are offered over the Internet or use an Internet connection to support the use of new

technologies: education, health, safety, food and agriculture, sustainable use of natural resources and energy, improved living in urban areas. Connectivity is the first step to have access to these services. The impossibility of access leads to a wider separation between the groups that have this capacity and those that do not. The prosperity of all and the reduction of inequalities depends on the possibility of using these products and services.

Beyond connectivity, the usability of these products and services is the next step to be developed in the various areas listed above. Thus, collaborative discussion between these areas of activity is essential for aligning the medium and long-term planning of each sector, the effective use of sector resources, and the effective implementation of the SDG targets.

This Booklet covers Policy Elements on Community Networks, Regulatory Framework, Strategic Goals, Smart Use of Resources for Underserved Areas, Financing Programs supporting the Development of Connectivity, Licensing, Access to the Radio Spectrum, Access to Passive Infrastructure and Backhaul, Access to Network Information and Taxes Associated with Services Provision.

All of these are important elements in the study of different alternatives for the implementation of connectivity in rural or remote areas.

The key challenges for the provision of telecommunication services in rural areas are driven by both technological and economic considerations. Setting up backhaul connectivity remains a high-cost exercise. Erratic power supply or complete lack of energy sources is a major barrier, and photovoltaic power supply is increasingly becoming a viable alternative. The requirement to maintain enough backup systems raises operational costs substantially.

One of the mandates of the Study Group 1 of the International Telecommunications Union (ITU) Development Sector (ITU-D) on "Enabling environment for the development of telecommunications/ICTs" is to provide access to telecommunications/ICTs for rural and remote areas.

In Question 5/1 under study within this Group, it is stated that there

are still many challenges to spreading telecommunications/ICTs in such areas.

Technologies and strategies for rural and remote areas are various and diversified from country to country. Community networks are appearing as a valuable alternative and, therefore, it is important to identify and provide suitable practices to developing and developed countries, in respect of the following items:

- Community networks techniques and sustainable solutions that can impact on the provision of telecommunications/ICTs in unattended areas, with emphasis on those that employ the latest technologies designed to lower infrastructure capital and operating costs;
- Requirements to be satisfied by fixed and mobile networks for rural deployments to face typical obstacles in those areas;
- Policies, mechanisms and regulatory initiatives related to community networks aimed to reduce the digital divide by increasing broadband access;
- Quality of services provided, and cost effectiveness, degree of sustainability in different geographies and sustainability of the techniques and solutions;
- Community networks business models for sustainable deployment of networks and services;
- Maintenance and operational aspects to provide a quality and continuous service;
- Demand-side factors and practices to generate and increase in the usage of ICT devices and services;
- Efforts to build ICT skill sets for the deployment of broadband services;
- Affordability of services/devices for community users to adopt to fulfil their development needs;
- Strategies to maintain and encourage the training of technical staff in order to guarantee the reliability of the telecommunication infrastructure.

In Latin America and the Caribbean, public policy makers and regulators have been addressing connectivity in rural or

remote areas for at least a decade. As an example, following the establishment and growth of private telecommunications infrastructure, particularly communications in cost-effective urban areas, National Broadband Plans were developed in the vast majority of countries in the Americas region, which provided conditions for the development of connectivity for the inclusion of people without broadband access and thus the Internet, as well as the institution of coverage obligations in radio spectrum bidding documents.

However, these actions were insufficient for there to be access in rural and remote areas, as also financial and educational conditions for last mile access.

In light of the above and given the considerations raised by this Booklet, the organization of a high-level, multistakeholder and collaborative debate with public policy makers, regulators, operators, small providers, unassisted communities or those with difficulties using the Internet, may be a proposal of concrete action for the use of information and for the present studies.

This book was elaborated thanks to the invaluable contributions of (in alphabetical order): Carlos Baca, Roger Baig Viñas, Peter Bloom, Walter Britto, Adam Burns, Jane Coffin, Mélanie Dulong de Rosnay, Nicolás Echániz, Bob Frankston, Judith Hellerstein, Kurtis Heimerl, Erik Huerta, Sonia Jorge, Laila Lorenzon, Osama Manzar, Glenn McKnight, Sivasubramanian Muthusamy, Leandro Navarro, Michael Oghia, Bruno Ramos, Ritu Srivastava, Nico Pace, and Karla Velasco.

This volume is jointly published by Fundação Getulio Vargas (**FGV**) and the Internet Society (**ISOC**) and is the result of a participatory process developed by the Dynamic Coalition on Community Connectivity (**DC3**). DC3 is a multistakeholder group of the United Nations Internet Governance Forum (**IGF**), fostering a cooperative analysis of **community networks**, exploring how such initiative may be used to improve connectivity while empowering Internet users.

Community networks are crowdsourced initiatives relying on the active participation of local communities in the design, development and management of network infrastructure as a common resource. This book provides concrete suggestions regarding the policy elements that should be considered by regulators and other stakeholders alike in order to develop enabling frameworks for community networks. This work complements the previous DC3 publications dedicated to "Community Connectivity: Building the Internet from Scratch" (2016); "Community Networks: the Internet by the People, for the People" (2017); and "The Community Network Manual: How to Build the Internet Yourself" (2018). All publications are freely available online.

"Community networks represent a valuable alternative model that deserves to be explored to improve access to Information and Communication Technologies to underserved communities worldwide. ITU is committed to connecting the entire world's people and this book and the work of the UN IGF Dynamic Coalition on Community Connectivity offer inspiring and transparent guidance to foster digital inclusion."

Bruno Ramos,
Director for the Americas Regional Office of the International Telecommunication Union

"Community networks are a vital element in the expansion of affordable and meaningful connectivity. This book marks an important contribution in the advancement of a much needed debate on community network policy; a must read for anyone committed to universal access."

Sonia Jorge,
Executive Director, Alliance for Affordable Internet

"Community networks are a key option to foster the expansion of the connectivity reflecting the Internet way of networking. This book is an extremely meaningful work to advance the discussions related to community network development."

Andrew Sullivan,
President and Chief Executive Officer of the Internet Society

This book was published thanks to the generous support of the Internet Society

Agência Brasileira do ISBN
ISBN 978-85-9597-037-3
9 788595 970373