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Community Networks: Towards Sustainable Funding Models

Official Outcome of the UN IGF Dynamic Coalition on Community Connectivity

Preface by
ANRIETTE ESTERHUYSEN

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PREFACE

Community Networks: Read, Learn and Be Inspired

by Anriette Esterhuysen

For the last two years, people all over the world, including those with privilege and power, have had their plans, expectations and assumptions scrambled by the impact of the COVID 19 pandemic. In a sea of uncertainty, one thing was clear: affordable, reliable access to the internet was a lifeline. "Digital inequality", the global challenge frequently discussed in hyperconnected rooms by hyperconnected people in somewhat abstract terms, became much more real and relatable.

For the people who build community networks and work in them, lack of access has never been abstract. They understand what it means not to have access, and, most importantly, they understand how to create access in a way that is meaningful to the people who use it, and that builds communities by strengthening collaboration and generating opportunities that ultimately help achieve sustainable development.

Evidence matters, and there are two sets of evidence that have helped increase awareness of the power of community networks. The first: growth of connectivity through traditional models, such as mobile networks, is slowing down, in spite of increased coverage. According to the GMSA the percentage of the world population using mobile internet jumped from 32% in 2014 to 46% in 2018, an increase of 14% (or 1.15 bn people). But from 2019 to 2020 this increase slowed down to 2% (or 0.2 bn people).[1] Data also suggest that even when people live in areas with mobile data coverage, they often do not make use of it because it is too expensive, or because they do not have the needed devices, or they are not sure how they would benefit from using the internet. The second: community networks work! And they work well, achieving more than just providing access to the internet. They build skills, partnerships, leadership, and local ownership. They give people a sense of agency and control by approaching access to the internet and telephony in a way that responds to local needs and opportunities.

1 Page 10, "The State of Mobile Internet Connectivity report 2021", GSMA – <https://www.gsma.com/r/wp-content/uploads/2021/09/The-State-of-Mobile-Internet-Connectivity-Report-2021.pdf>.

Community networks are finally getting the recognition they deserve from policymakers, regulators, and investors. The pioneering work that has been done by the IGF Dynamic Coalition on Community Connectivity (DC3), the Internet Society and the Association for Progressive Communications and its members – and by community networks themselves – has taken root and is growing from strength to strength. The Argentinian National Communications Agency (ENACOM) has allocated 3 million USD from their Universal Service Fund to community networks. The Communications Authority of Kenya (CA) has created a new license specifically for community networks with the application fee being only $10 USD, and, if successful, the cost of a 10-year license is only 50 USD. The Brazilian regulator, ANATEL, recently approved the use of Television White Spaces (TVWS) by, among others, community networks to provide local connectivity[2] and utilises an IGF outcome, "The Community Network Manual"[3] developed by DC3, to provide guidance on how to build these community networks in Brazil. These innovative responses from regulators build on the much earlier initiative by the Mexican communications regulator, Instituto Federal de Telecomunicaciones (IFT), who in 2015 introduced a social-purpose license for networks that would service indigenous communities or other communities of 2,500 people or less.[4]

Recognition from the International Telecommunications Union has been forthcoming on multiple fronts, including in study group reports and good practice guidelines for regulators. In its final report, the ITU-D Study Group charged with the "Global survey on telecommunications / ICTs for rural and remote areas" includes under "lessons learned" from 2018 to 2021 cycle that "Community networks are an important part of connectivity ecosystems, and they help bridge the digital divide".[5] The 2021 Global Symposium for Regulators 2021 best practice guidelines encourages regulators to "Promote local innovation ecosystems and provide incentives for the participation of small and community

2 See <https://developingtelecoms.com/telecom-business/telecom-regulation/12067-brazilian-regulator-anatel-approves-use-of-tvws.html>.

3 See <https://www.gov.br/anatel/pt-br/regulado/universalizacao/redes-comunitarias>.

4 See <https://www.internetsociety.org/resources/2018/unleashing-community-networks-innovative-licensing-approaches/>.

5 See <https://www.itu.int/en/myitu/Publications/2021/07/22/13/20/Telecommunications-ICTs--for-rural-and-remote-area>.

operators in deploying low-cost rural networks, including specific licensing measures, access to key infrastructure and funding, and social coverage promotion programs."[6]

But, many challenges remain and have to be overcome for community networks to fulfil their potential and be sustainable, both at the level of individual networks, and as a solution for bridging the access gap at scale. Locally driven and managed development initiatives are complex and finding the best ways of working inclusively, harnessing the power of the collective, and also achieving results and producing value for everyone in the community is never easy. It requires learning, adaptation and innovation at the level of governance, technology, business models, financing and service, applications and support. This volume brings together stories, analyses and recommendations from many different parts of the world. It explores different funding models, partnerships, and looks at how community networks can achieve sustainability over time. These papers are written by people, most of whom are not just academics, or researchers; most of the authors are practitioners, people who have built community networks and who have lived through the challenges and solutions they describe.

Read, learn, and be inspired.

6 See <https://www.itu.int/en/ITU-D/Conferences/GSR/2021/Documents/BPG%20Adopted/GSR-21_Best-Practice-Guidelines_FINAL_E.pdf>.

1 Sustainable Funding for Community Networks to Unleash Network Self-Determination

Luca Belli,[7] Senka Hadzic[8] and Walter B. Gaspar[9]

1.1 Abstract

As the world enters a phase of recovery from the hardest part of the pandemic, one thing seems clear to everyone: connectivity has become vital to every side of our lives. This paper argues that almost 40 percent of the world population still does not have access to what is increasingly touted as a fundamental right. To solve this pressing problem, it is essential to explore alternative solutions, aiming at a more sustainable internet ecosystem. In this perspective, this paper presents the key elements of this volume, dedicated to "Community Networks: Towards Sustainable Funding Models." The aim of this publication is to provide a missing, yet essential perspective to the community network debate: how to fund these initiatives sustainably.

1.2 Introduction

As the world enters a phase of recovery from the hardest part of the pandemic, one thing seems clear to everyone: connectivity has become vital to every side of our lives. From our education to our economy, from our democracy to our health, our lives increasingly rely on Internet connectivity. Yet, almost 40 percent of the world population still does not have access to what is increasingly touted as a fundamental right and, even more worryingly, most of the individuals considered as connected by official statistics are only formally connected and very far from being meaningfully connected (A4AI, 2020; Belli, Manzar & Farooqui, 2020).

It is time to think out of the box and consider alternative solutions to expand connectivity, as those we traditionally use have clear limits. If we keep on using the same strategies we have been using over the

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past decades, there is no reason why we should achieve any result that is different from what we achieved so far. In this perspective, this book is dedicated to "Community Networks: Towards Sustainable Funding Models" to provide a missing, yet essential perspective to the community network debate: how to fund these initiatives sustainably.

This book is the Official 2021 Outcome of the Dynamic Coalition on Community Connectivity (DC3) of the United Nations Internet Governance Forum (IGF). DC3 is a multistakeholder group, fostering a collaborative analysis of community networks (CNs), exploring how such initiatives can improve and expand connectivity while empowering Internet users. It is useful to remind all readers, including those who might be hearing about community networks for the first time, that 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. Hence, CNs are connectivity initiatives managed according to the governance models established by their community members, in a democratic fashion, and may be operated by groups of self-organised individuals or entities such as non-governmental organisations (NGOs), local businesses or public administrations.

Importantly, at the centre of CNs there are the communities that establish them and their members, who are essential to initiate, maintain and guarantee the success of these connectivity efforts. Hence, community networks represent a different and innovative paradigm, where connectivity is considered and is managed as a common good, developed and managed by the local communities and for the local communities (Belli, 2017a). These experiences tellingly demonstrate that, when the unconnected have basic information on how to build their network infrastructure and the freedom to choose this option, they do so. This book argues that, despite many challenges, CNs may also self-organise themselves in remarkably sustainable ways. By doing so, they demonstrate that empowered and connected individuals can be a driving force of openness, sustainability and self-determination.

Critically, CNs should not be considered as a competing or antagonistic model either to the state or to the market. On the contrary, they

should be seen as a particularly interesting complementary solution to fill the obvious gaps that – as the almost 40 percent of disconnected individuals can witness – both public and private-led strategies have. In such a perspective, CNs represent an alternative community-centred paradigm of connectivity and governance, which becomes even more interesting in the current historical context. Indeed, the Covid19 pandemic has not only put our communities under unprecedented strain, but also brought to light many of the dysfunctional elements of our societies, which desperately need to be correct.

The current recovery efforts offer a unique opportunity to rethink the ways we organise our societies and how we relate to technology. Connectivity challenges are still widespread, even in the most developed countries, but we now have a once-in-a-generation opportunity to reshape connectivity in a way that is more fair, more inclusive, and more empowering. In this perspective, we cannot solely rely on the traditional policy options we have been using so far.

1.3 Achieving sustainability by leveraging existing resources

Many groups of individuals around the world have already been leading the path, providing excellent examples of why CNs are relevant and why "disconnected" individuals are not condemned to be digital outcasts for ever. Hundreds of communities around the world have decided to become protagonists of their digital futures and established their own CNs. From Argentina to Zambia, local communities, NGOs, small businesses and administrations have started building their own networks, to overcome the lack of Internet coverage, developing new services and contents in local languages, that cater for the needs of the local populations. Critically, these initiatives create new opportunities for education, trade, employment for the locals, in an open and decentralized fashion.

CNs do not merely provide Internet access. These initiatives deserve attention and are particularly valuable as they give rise to an ample range of positive externalities (Belli 2017; Bidwell and Jensen 2019). These positive external effects include reviving the local socio-economic ecosystem, engaging local communities and stakeholders in the development of new self-governance models, while fostering

new opportunities of access to knowledge and information, trading, doing business and creating employment.

Hence, we can argue that CNs are drivers of sustainability as they enable sustainable local economies, sustainable governance models, and sustainable connectivity (Belli, Echániz & Iribarren, 2016; Navarro et al. 2016). In this perspective, as noted by Belli (2017), 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."

This concept, referred to as "Network Self-determination" is based on the consideration that by freely developing connectivity infrastructure, individuals and communities quintessentially enjoy their fundamental right to self-determine, i.e., 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.

It is important to remind that, in accordance with these binding instruments of international law, the UN member states agreed that "all people 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."

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 consumer and producer of new content, applications, and services. Therefore, CN members, in their quality of "prosumer", i.e., potential producers and consumers of innovation – can contribute to decentralization of 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 decentralized knowledge and innovation can positively contribute to reverse the current tendency to concentration of the Internet ecosystem, by stimulating inclusion and creativity of newly empowered Internet users, rather than merely passive consumers. As such, CNs offer concrete examples of the existence of alternative and valuable approaches to expand connectivity, while simultaneously fulfilling the United Nations Sustainable Development Goals (SDGs) through bottom-up and human-centred strategies.

Lastly, as highlighted in previous publications (Belli 2019), CNs offer a long-awaited solution for members 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 "[business] models which can achieve financial and operational sustainability can be operated by local entrepreneurs supported by a variety of initiatives [...] including Universal Service Funds [...]."

In this spirit, this book aims at analysing the challenges that CNs face, with regard to a particular aspect of sustainability, i.e., the sustainability of their funding models. This critical dimension has been often underappreciated or not duly explored by previous research, but we believe its careful analyse may be enormously beneficial for CN developers and policymakers alike. In this spirit, the contributions featured in this volume offering some valuable insights on how to overcome such challenges, while analysing some concrete case studies.

1.4 Understanding the sustainable funding challenge

This first part of the volume is opened by Mariano Suárez and Natalia Vinelli, and their chapter on "Connectivity as a Right: Public Policies for Popular Neighborhoods and Community Networks." The authors discuss the development of public connectivity policies for popular neighborhoods, rural communities and indigenous peoples, which is still in its infancy. Importantly, this article assumes the premises of research/action/reflection to raise questions and attempts to interpret the existing public information in order to provide an answer and thus collaborate with the improvement of public policy related to connectivity.

Subsequently, in their paper on "Funding Bottom-up Connectivity: Approaches and Challenges of Community Networks to Sustain Themselves" the LocNet Team, composed by Carlos Rey Moreno, Peter Bloom, Kathleen Diga, Mike Jensen, Karla Velasco Ramos, Nils Brock, Carlos Baca, Sarbani Banerjee Belur, explores the role of social purpose communications infrastructure, often supported by civil society and non-profit organizations. The authors argue that such role is increasingly being recognized by multilateral institutions such as the ITU, the Organisation for Economic Co-operation and Development (OECD) and the Inter-American Development Bank (IADB).

In their paper on "Community Network and Democratising Access – Addressing the Question of Sustainability", Osama Manzar and Sana Alam explore the potential of public funding for sustainable connectivity. Using the example of the Indian initiative Prime Minister – Wi-Fi Access Network Interface (PM-WANI), launched by the Department of Telecommunications in December 2020, the authors show how this scheme aligns with the CN philosophy of decentralization, but also highlight some of the risks involved and provide recommendations on how to implement it accordingly.

The subsequent paper by Senka Hadzic, David Johnson and Will Ruddick, with the title "Rewards, Incentives, Tokenisation: Community Networks Meet Community Currencies", explores the potential of community inclusion currencies and their use to incentivize expansion of community networks. Users who help install routers, maintain infrastructure, or provide offline content get monetary rewards. This is achieved by adding a blockchain-based token reward in the

mesh routing protocol. In addition, tokenisation makes it possible for funders and investors to support local economies in a portfolio of multiple CNs making use of a community inclusion currency.

The paper "Community Networks: Sustainable Growth for Internet Infrastructure" by Juan Peirano and João Paulo de Vasconcelos Aguiar from the Internet Society outlines examples of communities that have successfully deployed and sustained their networks, in different parts of the world. The paper points out the importance of partnerships: in several cases, partnerships with the local regulatory bodies, other government agencies and ministries, private telecommunications operators, and civil society organizations were a key factor to enabling community networks.

1.5 Case studies and success stories

The second part of this volume focuses on case studies and stories from the field. It is opened by Nic Bidwell's essay "Keeping the World Alive: An Alternative Story for Funding Community Networks". It is a reflection on the author's prior studies of rural CNs in the Global South and international advocacy for CNs to consider the question "what do sustainable funding models really encourage CNs to sustain?" Tensions often emerge between local practices that sustain the commons and the market logics that shape how the technologies used by CNs are valued, located, and scaled. Yet, CNs also offer an opportunity to reimagine how funding models might support collectively keeping the world alive – such as by combining CNs with financial technologies in radically different ways.

The subsequent piece by Mariela Baladron on "Universal Service Funds for Urban and Rural Community Networks: The Barrios Populares and Roberto Arias programs in Argentina" addresses the incorporation of community networks as beneficiaries of Universal Service Funds in Argentina through two programs. The first one, called Barrios Populares, is aimed at shanty towns and for the first time allowed providers with community network licenses to have access to Universal Service Funds. The second one – Roberto Arias program – was created specifically for community networks in rural areas of up to 5000 inhabitants in 2021. In addition to highlighting the main characteristics of both programs, an overview of the advocacy actions that promoted

these measures is presented. These actions are an important precedent for other countries, both in the region and globally.

Bruna Zanolli's essay on "Reflections on Sustainability from a Quilombola Women-led Community Network" looks at a Brazilian community network that has been operating mostly during the pandemic, and thus had its sustainability tested during the many adversities the Covid-19 pandemic has imposed. This essay shares some reflections about how family agriculture and traditional ways of living, local economy, feminist organizations and a CN can feedback on each other. This specific CN is analysed as a part of the local economy, therefore facing similar difficulties and successes as the community, instead of being something unattached to it. The essay also shares reflections on how a CN can help increase the local economy and at the same time – mutually – be economically sustainable.

A case study from India, written by Sarbani Banerjee Belur, Abhishek Raj and Ritu Srivastava: "Gram Panchayat Development Plan (GPDP): An Opportunity for Funding Rural Internet Connectivity in India", discusses alternative bottom-up connectivity models for rural India that actively involve the village communities and councils, as well as the funding mechanisms for such a model. The authors emphasize the importance of community involvement in solving their connectivity problems, and provide an alternative, sustainable economic model based on the 'Public Private Panchayat Partnership (4-P) model' and its viability for financing rural connectivity.

The last piece in this volume is "Fostering Global and Local Community Radio Partnerships for Community Network Development: A Case-Study from India" written by Ritu Srivastava. It looks at the role that community-led entities – community radio stations and community networks – have played in providing the last mile access to information services in India during the COVID-19 pandemic. The essay identifies synergies between these two entities and how they can leverage each other's resources. It also brings a case study from Bhadrak district of Orissa, India where the Internet Society (ISOC) has partnered with community radio stations and local organizations to foster community networks in rural areas. It also presents financial sustainability solutions for CNs and community radios while leveraging each other's resources.

1.6 Conclusion

CN are engines of sustainability as they operate with the purpose of making the Internet a more human-centered environment, where local economies, local governance and local societies are the real center of a truly distributed network. CNs aim at individual empowerment, transforming local communities into the decision-makers of connectivity, the real responsible entities for the operation of "last-mile" networks, which can be more appropriately considered as "first mile" networks (Echaniz, 2015).

Over the past decade, CNs have been acknowledged as powerful initiatives with a largely untapped potential to promote sustainable development and expand connectivity, especially in low-income and remote areas. These initiatives are different from state or commercial projects in the sense that there is no dynamics of "provider and consumer" of Internet access, but rather a logic of shared development and operation of connectivity. In this context, users become empowered members of the network and as it is well-known, "with great power comes great responsibility." The financial sustainability of CNs is probably the most interesting area of community networking studies at the moment, as it provides insight on how such responsibility can be fulfilled, based on the empirical study of the evolution of CNs, understanding what the causes of success or failure of such initiative are.

The chapters of this book provide a set of valuable analyses of this emerging field of community networking studies, and offer many interesting proposals that can inspire policymakers, future CN builders and researchers. While this is only an initial step, we hope that the ideas and case-studies explored in this volume will provide useful material to nurture an essential discussion on CN sustainability.

1.7 References

A4AI (Alliance for Affordable Internet) (2020), Meaningful Connectivity: Unlocking the full power of internet access. <https://a4ai.org/meaningful-connectivity>.

Luca Belli, Osama Manzar and Sarah Farooqui. (2020). "COVID-19: A Harsh Reminder that Open Internet Access and Meaningful Connectivity are Necessary." in Belli, Pahwa & Manzar (2020). The Value of Internet Openness in Times of Crisis. Official Outcome of the UN IGF Coalitions on Net Neutrality and on Community Connectivity. <https://www.intgovforum.org/en/filedepot_download/6114/2375>.

Luca Belli (Ed). (2016). Community Connectivity: Building the Internet from Scratch. Rio de Janeiro: FGV Direito Rio. <https://bibliotecadigital.fgv.br/dspace/handle/10438/17528>.

Luca Belli (Ed). (2017a). Community Networks: The Internet by the People, for the People. Official Outcome of the UN IGF Dynamic Coalition on Community Connectivity. FGV Direito Rio. <https://www.intgovforum.org/en/filedepot_download/4391/1132>.

Luca Belli (2017b). Network Self-Determination and the Positive Externalities of Community Networks. In: Community Networks: the Internet by the People, for the People. <https://bibliotecadigital.fgv.br/dspace/handle/10438/19924>.

Luca Belli (Ed). (2018) The Community Network Manual: How to Build the Internet Yourself. Rio de Janeiro: FGV Direito Rio. <https://www.intgovforum.org/en/filedepot_download/4391/2376>.

Luca Belli Community Networks: Empowering Individuals, Expanding Connectivity, Promoting Network Self-determination. in Luca Belli (Ed). Building Community Network Policies: A Collaborative Governance towards Enabling Frameworks. FGV Direito Rio. <https://www.intgovforum.org/en/filedepot_download/4391/1901>.

Luca Belli, Nicolás Echániz and Guido Iribarren (2016) Fostering Connectivity and Empowering People via Community Networks: the case of AlterMundi. in Belli (Ed.) Community Connectivity: Building the Internet from Scratch. Annual Report of the UN IGF Dynamic Coalition on Community Connectivity. FGV Direito Rio. <https://www.intgovforum.org/en/filedepot_download/4391/1163>.

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. <https://www.apc.org/en/pubs/bottom-connectivity-strategies-community-led-small-scale-telecommunication-infrastructure>.

Nicolas Echániz (2015). Community networks: Internet from the first mile. in FRIDA: 10 years contributing to development in Latin America and the Caribbean. <http://lacnic.net/frida/FRIDA-book2015-en.pdf>.

GISWatch. (2018). Global Information Society Watch 2018: Community Networks 2018. Association for Progressive Communications and International Development Research Centre. <https://www.apc.org/en/pubs/global-information-society-watch-2018-community-networks>.

ITU (2020) Measuring digital development: Facts and figures 2020. ITU Publications. <https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx>.

Leandro Navarro, Felix Freitag, Roger Baig, Ramon Roca (2016). A Commons-oriented Framework for Community Networks" in Belli (Ed.) Community Connectivity: Building the Internet from Scratch. Annual Report of the UN IGF Dynamic Coalition on Community Connectivity. FGV Direito Rio. <https://www.intgovforum.org/en/filedepot_download/4391/1163>.

Rolf Weber. (2020) "Access as a Human Right." in Belli, Pahwa & Manzar (2020). The Value of Internet Openness in Times of Crisis. Official Outcome of the UN IGF Coalitions on Net Neutrality and on Community Connectivity. <https://www.intgovforum.org/en/filedepot_download/6114/2375>.

PART 1

FRAMING THE SUSTAINABLE FUNDING CHALLENGE

2 Connectivity as a Right: Public Policies for Popular Neighborhoods and Community Networks

Mariano Suárez[10] and Natalia Vinelli[11]

2.1 Abstract

The development of public connectivity policies for popular neighborhoods, rural communities and indigenous peoples is still in its infancy. In this article, we assume the premises of research/action/reflection to raise questions and attempt to interpret the existing public information in order to provide an answer and thus collaborate with the improvement of public policy related to connectivity.

2.2 Introduction

The development of public connectivity policies for popular neighborhoods, rural communities and indigenous peoples is still in its infancy. Therefore, the provisional nature of this paper. In addition, the authors of this article are part of these national policies. However, this is not an official document. Nor is there any pretension to maintain academic distance. Rather, we assume the premises of research/action/reflection to raise questions and attempt to interpret the existing public information in order to provide an answer and thus collaborate with the improvement of public policy.

We start by recognizing the adverse effects of the Covid-19 pandemic on the quality of life and access to rights of socially vulnerable populations. In Argentina there are 4416 popular neighborhoods distributed throughout the country, with approximately 4 million people living in social emergency. Of these neighborhoods, suburbs and settlements, it is estimated that 60 percent lack connectivity, according to data obtained by the National Registry of Popular Neighborhoods (Renabap).[12]

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12 <https://www.argentina.gob.ar/desarrollosocial/renabap>.

A recent report by the Secretariat of Socio-Urban Integration (SISU, 2021), on which Renabap depends, shows that "the main form of internet access that households in poor neighborhoods have is through the use of mobile data from a cell phone". The data show the use of prepaid cell phones (29.9 percent of those surveyed), cell phones with a subscription (15.6 percent) and work without connection (15.6 percent), which represents for the 2020 school year, marked by the Preventive and Mandatory Social Isolation, an overwhelming 61.1 percent of children and adolescents with connection difficulties for the development of school work and for the maintenance of the pedagogical link with their teachers.

In other words, the absence of connectivity and access to broadband internet on equal terms is not only a problem in itself, pre-existing the pandemic, but also impedes access to other rights. On the contrary Internet access is a facilitator of other rights and, in this sense, connectivity initiatives such as community networks can trigger an ample range of positive externalities associated to these rights (Belli 2017). As we see, the right to education and information; the right to meet with loved ones, or the right of women to access reliable sources and channels of care and stable security to live a life free of violence. Social isolation brought these inequalities into focus, and the organizations and social movements presented and inserted in the neighborhoods managed to put the issue on the agenda.

In this scenario, we start from the understanding that the State plays a fundamental role in reducing the digital divide through the definition of public policies aimed at guaranteeing the provision of broadband service in optimal service conditions, which cannot be left to the discretion of supply and demand, since these are essential public services in competition (DNU 690/2020). It is the task of the National State to ensure the provision of the Universal Service to those who – due to their location or social condition – are located in marginalized or underserved areas, guaranteeing access to connectivity to all the inhabitants of the country "in conditions of quality, affordability and at fair and reasonable prices", in accordance with Law 27.078 Argentina Digital.

As we will see below, this right is ensured through the Universal Service Trust Fund (FFSU), made up of investment contributions from

telecommunications companies and administered by the National Communications Agency (Enacom). The regulations of that Fund provide for the creation of programs aimed "at groups of users who, due to their special social needs or their physical, economic, or other characteristics, have limited access to services, regardless of their geographical location" (art. 18, subsection a, Resolution Enacom 2642/2016). Also, programs aimed at ensuring connectivity in "rural areas and areas with unfavorable geographical conditions" (art. 18, subsection c).

Within this framework and as part of a more general remedial policy, Enacom implemented different programs funded through the FFSU with the aim of responding to the connectivity demands deepened with the pandemic. During 2020 and 2021, lines of subsidy were approved to address the emergency, progress was made in updating the Federal Fiber Optic Network (REFEFO) and, what is the subject of this paper, the "Program for the Development of Internet Infrastructure for slums and settlements registered in the Registry of Popular Neighborhoods in the Process of Urban Integration" and the "Program for the Development of Internet Infrastructure through Community Networks 'Roberto Arias'" were launched.

In the following pages we will report on the degree of compliance with these proposals, we will draw a preliminary mapping of profiles and results, and we will report on the limitations and challenges that arose in the formulation stages, with a view to improving the sustainability of the projects and their implementation, specifically in the cases of community internet organizations. We understand that in order for the implementation of public policy not to fail, access to connectivity should not represent a greater challenge for these sectors than the one faced by any inhabitant of formal urban neighborhoods to access the essential public service. With this logic, we sought to design the policy in dialogue with the social movement and with the actors and actresses of the community sector.

2.3 Policy framework

The map of internet coverage in Argentina clearly shows that the vast, heterogeneous and unequal national territory cannot be covered solely by market impulse: rural localities with low population density, sometimes very distant from urban centers, do not meet

the conditions for the installation of a service with a reasonable possibility of income.[13] Sometimes it is not even guaranteed even if the State were to fully subsidize the deployment of infrastructure. This is recognized by the providers themselves.

As mentioned in the introduction, our country has tried to ensure access through the obligation of the State to guarantee the provision of the Universal Service, whose purpose is to enable access to all inhabitants of the country "in conditions of quality, affordability and fair and reasonable prices" (art. 18 Law 27.078). The instrument (of a restorative nature) to support this clause is the FFSU which, as State assets made up of contributions from ICT licensees imposed by law, is administered by Enacom (idem, arts. 18 and 19).[14] Enacom, as the enforcement authority of Law 27,078, is in charge of issuing the general regulations for the allocation of FFSU funds and designing programs to guarantee access to all the country's inhabitants. That is, it is expressly empowered to design specific instruments to ensure the connectivity that private providers do not reach. The law itself enables it to establish "categories" of beneficiaries (art. 24 of Law 27.078).

The General Regulations of the Universal Service establish that the programs must be directed "to groups of users who, due to their special social needs or their physical, economic or other characteristics, have limited access to the services, regardless of their geographical location" (art. 19, subsection a, Resolution Enacom 721/2020); to ensure connectivity in "rural areas and with unfavorable geographical conditions" (art. 19, subsection c), and to guarantee "access and provision of ICT services for neighborhoods registered in the National Registry of Popular Neighborhoods (Renabap),

13 See Exposition Ing. Edmundo Poggio. Asociación Argentina de Derecho de las Telecomunicaciones, 6/8/2020.

14 According to Mariela Baladrón, in an article prior to the development of the public policies discussed here, "in relation to the role of the State and the implementation of public policies to comply with the universalization of Internet access, since the end of the first decade of the 21st century there has been a change in the telecommunications sector, through government initiatives and public investment in the deployment of network infrastructure, mainly with the implementation of broadband plans at global and regional level (in the Argentine case we can identify the National Telecommunications Plan Argentina Conectada -2010-2015-, reformulated since 2016 by the following government under the name of Federal Internet Plan). This approach contradicts the predominant paradigm in previous years, which posed governments limited to regulate private activity and develop universal service funds to compensate for market failures (Fontanals, 2015; Galperin, Mariscal and Viecens, 2013). However, these investments and plans -still in process- have not solved issues linked to 'last mile' access and affordability" (Baladrón, 2018: 71).

created by Decree 358/2017, which exceptionally require an urgent solution, within the framework of a national health emergency" (art. 19, subsection g).

These criteria follow the recommendation of the International Communications Union (ITU), which urges States to consider "small community and non-profit players", through "appropriate regulatory measures" that "allow access to basic infrastructure at fair prices" (recommendation ITU-D 19). Although many of the aforementioned legal obligations have been in force for years (the Argentina Digital law is from 2014 and the first regulation of the Universal Service Fund, from 2016), their conversion into public policy in relation to the deployment of infrastructure in popular neighborhoods and community internet networks only found resonance in January 2020 with the statement contained in minute 56 of Enacom's Board of Directors, which defined new management guidelines, among them that of

> prioritizing the reduction of the Digital Divide through the promotion of connectivity programs and projects in the Argentine Republic that enable equitable, affordable and quality access to ICTs for all its inhabitants, with special emphasis on underserved areas (Enacom, 2020).

This paved the way for the implementation of specific programs aimed at meeting the demand for connectivity that the pandemic has increased. Among them, the "Program for the Development of Internet Infrastructure for slums and settlements registered in the National Registry of Popular Neighborhoods in the Process of Urban Integration" (res. 726/2020), and the "Program for the Development of Internet Infrastructure through Community Networks 'Roberto Arias'" (res. 799/2021), as specific instruments of the Universal Service aimed at responding to the most affected sectors of the population.[15]

15 Although RRAs are the predominant tool in Argentine government practice, it should not be overlooked that this is not the only possible way to address connectivity in rural or underserved areas. Another classic regulatory strategy may be the granting of licenses under "roll out" conditions for investment in remote areas; that is, the awarding of the enabling title to provide the service with the condition of deploying infrastructure and service in some unprofitable area, a conditioning absent in the Licensing Regulation for Information and Communications Technology Services (Res. 697/2017). In addition, of course, the same result can be pursued through tax benefits, public-private work agreements or direct subsidies, among other modalities.

Although the deployment of these programs aimed at working class neighborhoods and rural areas did not require, as a prior regulatory instance, the declaration of ICT services as "essential and strategic public services in competition", established by DNU 690/2020, its enactment – subsequent to the Public Neighborhoods Program and prior to the Roberto Arias Program – enhanced the possibility of state intervention and the implementation of a "social fee", which operated a necessary complementarity so that the infrastructure deployed in the public neighborhoods did not become "unaffordable", in the terms of the law, for a good part of their populations.

On that point, these programs postulate a strategy of their own – independent (although convergent) of the conjunctural negotiation of the State with the large ICT operators -, and which consists of the promotion of new licensees among civil associations, cooperatives and pre-existing territorial organizations in popular neighborhoods, non-profit, regularized through the figure of "licensees of Value Added Services – Internet Access for holders of Community Internet Networks" (res. 4958/2018).[16] The legal figure was created during the administration of Mauricio Macri but its beneficiaries were denied, until 2020, access to Universal Service funds which, ironically, were not allocated to the sector expressing the greatest connectivity needs.

By their nature, this kind of licensees – by providing the service with no expectation of income or with a lower income than that projected by the traditional licensees with Value Added Registration (SVA) -, offer a cheaper rate for the user without the need for it to be the result of State regulation. In the same way, the programs through which the FFSU is implemented call for an integral and articulated policy with the development of Arsat (the public telecommunications company, which is not under the orbit of Enacom), which also recovered in 2020, through the Fund, financing for the strengthening of the Federal Fiber Optic Network (Res. 867/2020). There is still an unfinished matter: the planning of its harmonic articulation with Enacom's subsidy policy to guarantee "the last mile".

16 Community networks are understood as "those composed of infrastructure managed by their own users or by the non-profit entities that group them, allowing and promoting their expansion through the incorporation of new users or connecting with neighboring Community Networks; in populations of no more than FIVE THOUSAND (5,000) inhabitants". (Res. 4958/2018, article 2)

2.4 Public Neighborhoods: Connectivity from the perspective of social and urban integration

Public policies are effective when the State's approach operates in an integrated manner from its different bodies and levels. How to think about the solution of connectivity in populations that also do not have access to other fundamental public services? How to implement a connectivity program when the presence of the State is particularly weak? How to project these programs in a country that shows an unstable path in terms of regulation of ICT services and that usually transfers the definition of public policies to the judicial sphere?

Between these crossroads, in the heat of the demand of social movements, perhaps more anchored in the popular neighborhoods than the State itself, and in the context of the health emergency derived from Covid-19, Enacom revised the structure of execution of the Universal Service and created a specific area in June 2020, the Sub-Directorate of Special Projects, under the orbit of the National Directorate of Promotion and Development, the latter in charge of Pablo Urquiza. More than the creation of the area itself, we are interested in highlighting the decision to implement it in dialogue with the existing social actors in the territory, in those neighborhoods and rural populations where the specific programs projected were going to have to be executed. This decision operates as a recognition of the absence of adequate tools, so far, to respond to the demand for connectivity in the neighborhoods with the greatest needs; and at the same time as a merit of the political strength gained by social movements and organizations, which allowed thinking connectivity as a public policy from the perspective of social and urban integration.

Shortly after its creation, in September 2020 the call was opened for the submission of projects under the "Internet Infrastructure Program for slums and settlements registered in the National Registry of Popular Neighborhoods in the Process of Urban Integration" (Renabap) created by decree no. 358/2017, financed through Non-Refundable Contributions and regulated by Enacom resolutions 726/2020, 950/2020 and 159/2021.

The program allocates 1 billion pesos (almost ten million dollars) for the sector, an amount that was extended with another 1 billion at

the Board of Directors' meeting number 73 of September 4, 2021. Since its opening and in its first year of execution, the program received close to 90 projects for the deployment of connectivity works in popular neighborhoods throughout the country (at a rate of 7.5 projects entered per month), which are in different stages of analysis. To date, 14 of these projects have been approved and have already started the execution of the works, with a duration of 18 months, and another eight are awaiting early approval.

This level of demand – which quickly exceeded the 1 billion pesos initially allocated – is not unrelated to the decision to think of the program in relation to the pre-existing work of the SISU of the National Ministry of Social Development, the application authority of Renabap, the registry created by Law 27. 453 and which gathers the data of those neighborhoods made up of eight or more families in which half of the population does not have title to the land or regular access to two or more basic services: running water network, electric power network with domiciliary meter or sewage network. Of these neighborhoods, as we pointed out at the beginning, 65 percent lack connectivity or it is deficient.

According to Renabap, the 4,416 working class neighborhoods

> together occupy more than 440 km2 (similar to the area of twice the size of the City of Buenos Aires). Of these, 16 percent have a high population density and a "labyrinth" type urban fabric (commonly referred to as a "villa"), while the other 84 percent have a low population density and a defined fabric (usually referred to as a "settlement"). In national terms, considering an average of 4.4 people per family, there are 4,072,680 people living in slums: approximately 10 percent of the country's total population (Programas de Buen Gobierno, 2019, p. 27).

The registry, whose current information is a snapshot of 2017, is in the process of being updated, which includes the expansion of the perimeters of the neighborhoods in localities with more than 2,000 inhabitants (the previous one was made in localities from 10 thousand); so it is easy to imagine the expansion that will result from

the recognition of the present reality. As it is obvious, Renabap is not limited to connectivity (it was not even its primary focus); but its objective is the socio-urban integration of neighborhoods. In this sense, the intelligence of the program of res. Enacom 726/2020 lay in articulating this policy with the FFSU to emphasize its restorative purpose, in the terms of the Argentina Digital Law, with the ambition of closing a period of clear under-execution of said Fund and placing connectivity in the perspective of the integration of neighborhoods and the empowerment of capacities in the territory.

The Public Neighborhoods Program, as a condition for its success, had to adapt its subsidy instruments (the so-called Non-Refundable Contributions – NRC) to the singularity of new actors: community internet organizations and networks. These were added to service cooperatives, Sapem and SMEs, which were recipients of the so-called NRCs executed until 2020. The first change was conceptual, as the beneficiaries were those who live in the neighborhoods, instead of focusing on the figure of the proposing licensee.

The program's Terms and Conditions were innovative in establishing certain conditions: (a) the financing of 100 percent of the infrastructure (until then Enacom's programs financed up to 80 percent); (b) the admission of civil associations, work cooperatives and other non-profit entities with no previous experience in ICT services or forming community networks; (c) the obtaining of the license in parallel to the substantiation of the NRC; (d) the reduction of guarantees and administrative requirements with respect to other NRC calls for proposals; e) the obligation to present a proposal for the impact and social use of the network, with subsidized spaces and technological stations with free public access; f) the commitment to offer a social tariff; g) the execution of the civil works with at least 25 percent of workers residing in the neighborhood, or through popular economy cooperatives; h) the valuation of the proponents working in collaboration with pre-existing social organizations in the territory, etc.

All these variants, in light of the results (which we will examine below), were indispensable for the provision of Universal Service to reach for the first time the millions of people living in the slums. But the implementation of a standard always provides elements to review it.

2.5 Management and balance sheet statement (one year later)

We pointed out above that, one year after the opening of the call for projects within the Connectivity Program for Popular Neighborhoods, almost 90 proposals have been submitted (from September 2020 to September 2021). This volume is five times the initially allocated budget of 1 billion pesos from the FFSU, and shows the massiveness of the demand.

Due to the fact that the 14 projects already in the first stage of execution add up to payment commitments for 992,554,477.22 pesos – that is, almost the total amount allocated to the program -, at Enacom's 73rd board meeting, held in September 2021, a new allocation of 1 billion pesos was approved in order to ensure the continuity of the program. The same meeting also approved an increase in the maximum amounts per project, from 40 to 60 million per neighborhood, and from 160 to 200 million for projects involving more than one, in recognition of their importance.

The approved proposals go through different analysis stages, which require the attention of three Enacom directorates: the National Directorate of Promotion and Development; the National Directorate of Planning and Convergence, which is in charge of the analysis of the technical file, and the National Directorate of Development of Competition in Networks and Services, which examines the economic and cash flow proposal. Once the technical folders have been technically approved (which requires long back and forth and corrections of the projects submitted), the proposals are published for 10 working days for opposition and then, if there are no opponents, they are submitted to the legal area for its opinion and from there to the Board of Directors for their treatment.[17]

17 The Board of Directors is a collegiate body made up of the Chairman, the Vice Chairman, three directors appointed by the National Executive Power and three directors proposed by the Bicameral Commission for the Promotion and Monitoring of Audiovisual Communication, Telecommunications Technologies and Digitalization, one from the majority or first minority, one from the second minority and one from the third parliamentary minority. The Board of Directors is currently formed by Claudio Ambrosini as Chairman, Gustavo López as Vice-Chairman; Gonzalo Quilodrán and María Florencia Pacheco as directors for the PEN; and Alejandro Gigena, Silvana Giudice and José Corral as directors for the Bicameral Commission proposed by the first minority, the second minority and the third minority, respectively. Ariel Martínez is the General Coordinator of Executive Affairs and Chief of Staff of the agency.

The files submitted by licensees with VARC-Community Networks registration, by virtue of their non-profit nature, go through a shorter procedure, since the analysis of the cash flow is not included since they do not commercialize the service: it is about the community self-managing its own network. In any case, the analysis is demanding, making the time between a project's entry and its final approval extend over the months; and some even fail (whether community or commercial) because they do not comply with the requirements or fail to respond to the corrections requested by the different areas of the agency.

The fact that the circuit for community networks is shorter, and that it has other benefits such as lower guarantees with respect to commercial ones, or a six-month discount on wholesale internet purchases, implies recognition of the sector and its particularities. This differentiation seeks to equalize opportunities, avoiding raising higher entry barriers for the weaker telecommunications sectors, following the ITU-D 19 recommendation on the implementation of "appropriate regulatory measures" for access to infrastructure by "small community and non-profit players".

For this reason, among the 14 projects under implementation, as shown in board minutes numbers 64 to 73 (all carried out in the period under analysis), we find three proposals submitted by community networks (La Poderosa, El Hormiguero, PPR of Mar de Ajó); plus one submitted by a commercial licensee but which in fact operates as a community network (the case of Atalaya Sur, which provides service in Villa 20 of the City of Buenos Aires); and one by a worker cooperative with a commercial license. The other nine projects include two service cooperatives, a municipal Sapem and six SMEs.

The place occupied by community networks in the total under implementation is remarkable, since until the publication of the popular neighborhoods program, in 2020, no licensee of this nature had obtained funding from Enacom since the implementation of the FFSU. Additionally, although the regulatory framework for VARC licenses was approved by Resolution 4958/2018 during Silvana Giudice's administration in the government of Mauricio Macri, they did not grow in number until the beginning of the current administration: between 2018 and 2019, barely two were approved.

With the change of management, this marginalized place for community networks was slowly acquiring a different protagonism. Although they are still few in relation to the global analysis of all the licenses, during 2020 five were approved for Community Networks (act no. 64), and another 7 were approved in 2021 (acts no. 67 and 73). All of them for civil associations, cooperatives and communities of native peoples that had not been considered as beneficiaries of the subsidies until now. In addition, in 2021 a specific program was launched for the sector: the Roberto Arias Program, exclusively for community networks and oriented to rural and indigenous communities. It includes important advances in terms of access facilities, as we will see in the following section.

Another interesting element to highlight with respect to non-profit providers has to do with their profiles. Of the first projects under implementation, five are managed by proponents that have been developing and are present in the alternative, popular and community radio and channel sector. This is evidence of the maturity of the non-profit communication actor, which, despite overcoming great difficulties to operate in the media system, has achieved levels of professionalization and territorial insertion that encourage them to venture into the field of connectivity.

El Hormiguero, which works in infrastructure to bring Internet to five neighborhoods of Soldati, in CABA, has been managing a radio station deeply linked to its community for years, and is a member of the Argentine Federation of Community Radio Stations Farco. The Civil Association La Poderosa, which publishes the magazine La Garganta Poderosa, carries out a project for 16 neighborhoods in different provinces of the country. The cooperative PPR, which works on the Internet for six neighborhoods in the Partido de la Costa, also manages Channel 4 in Mar de Ajó and is a member of the National Coordination of Alternative Television Stations CONTA. Atalaya sur, in Villa 20, is a project whose civil association also promotes a community radio station. And the Cooperativa de Trabajo Solidaridad, which has already completed the first stage of the works to connect 13 neighborhoods of Formosa, also manages a non-profit channel. Three other projects presented by legal entities linked to the community movement are under analysis or close to approval.

In total, this represents 10 percent of the projects submitted under the program for popular neighborhoods. This percentage coexists with actors of a different scale: service cooperatives, SMEs and Sapem, which are the main providers that find in this program an incentive to extend their networks to areas abandoned by the market, with the support of the State. The fact that the financing is directed to the deployment of infrastructure works and not to the service itself, is a major constraint for many grassroots organizations that find it difficult to assume the responsibility of managing and sustaining the provision of Internet service for their neighbors.

In this sense, the Subdirection of Special Projects accompanies and promotes dialogue and intelligence among the different actors, fostering the articulations between the organizations that operate in the territory and the providers that seek to grow their network by providing the service to the popular neighborhoods. These articulations help the development of projects with higher levels of commitment to the direct beneficiaries of the program, who are the people who live in the neighborhoods: from the donation of significant spaces for the community (neighborhood councils, squares, canteens, clubs, churches, cultural centers, etc.), through the installation of "technological stations" with free public access, to the hiring of labor and its training in the neighborhood itself or through popular economy cooperatives.

Taken by locality, the number of popular neighborhoods and their population shows that the city of Rosario has the largest number of inhabitants in 112 registered neighborhoods, followed by – if we disaggregate the City of Buenos Aires – the Comuna 8 of Buenos Aires, where works are currently being developed through two projects in progress for six neighborhoods (El Hormiguero and Atalaya Sur). Although there are more working-class neighborhoods in Córdoba Capital than in Rosario (123), its population is about half that of Rosario. The largest concentration of low-income neighborhoods is in the Buenos Aires metropolitan area, where projects in Merlo, Morón and La Matanza are currently in the first stage of implementation. The rest of the projects are distributed among Formosa, San Miguel de Tucumán, Salta, Chaco, Concepción del Uruguay and Posadas, all areas with numerous registered neighborhoods; while in Buenos Aires there are also projects in Mar de Ajó and Luján.

The projects under execution at the time of writing involve works in 194 popular neighborhoods. In localities such as Concepción del Uruguay, Entre Ríos, all the slums and settlements registered in Renabap, which amount to 21, will have access to the right to connectivity from these works. In other localities, Internet access requires a larger number of projects. As this is a call for the financing of on-demand networks, the map of proposals is built from the interest of the providers and communities themselves; an analysis of the number of projects submitted per region and their impact on the map built by Renabap is essential to guide public policy, ensuring both federalism and representation over the total number of neighborhoods in the different parts of the national territory.

2.6 Public policy for community networks, indigenous peoples and rural communities

Sixty percent of the population living in poor neighborhoods is located in the metropolitan region (AMBA),[18] that is, in areas with already deployed Internet backbones that are part of or close to densely populated localities. On the other hand, in rural areas or in indigenous communities, private wholesalers, REFEFO or provincial public networks are not always close and the number of potential users does not justify, from a business perspective, a commercial investment. As a result, it is more difficult to find companies, even cooperatives, that can guarantee connectivity, even if they obtain subsidies for this task. At this crossroads, the State, through Enacom, formalized – for the first time – a policy focused on community networks: the "Program for the Development of Internet Infrastructure through Community Networks 'Roberto Arias'" (Res. 799/2021), whose priority beneficiaries are, precisely, rural communities and native peoples.

This new program is the result of the articulation work with the community Internet networks operating in our country, and with other state institutions working with these communities. It is the consequence of a process and not a laboratory idea, and in this sense it is the result of the dialogue between social actors and representatives of the state (with presence in different agencies), in which the conclusion was that the financing that Enacom traditionally provided through the NRCs was oriented through requirements

18 There are 519,169 families, according to Renabap data.

(financial, administrative, logistical) that imposed a de facto exclusion to the populations (and their organizations) of these neglected areas. Although this result may seem obvious to us today, the conviction that a program of this nature can only be successfully implemented in direct relationship with its beneficiaries, understanding the specificity of their territories, required political will and years of maturation.

The legal figure chosen for the promotion of this sector was the community networks that provide Internet service; an actor that, although already recognized, was exceptional in nature: as we pointed out above, until 2020 they did not receive any kind of financing from the FFSU. These are networks formed by individuals or non-profit associations that provide the service to members of a community of less than 5,000 inhabitants. Enacom grants them a license under a special regime, and expressly imposes on them the prohibition to commercialize the service (res. 4958/2018). They have no income and are not contributors to the FFSU, precisely because of their exclusion from the commercialization regime.

Community networks are usually constituted in areas where there is no other provider (although there is no limitation in the awarding of the license for competition reasons), due to the notorious economic unfeasibility of offering service in those territories under a sustainable business model. Therefore, they have represented a solution to solve connectivity in rural areas or native communities. However, in the heat of the Public Neighborhoods Program, as we have already seen, the figure of community networks (VARC license) has expanded, capitalized by the strongest social organizations in some of the most populated neighborhoods of the Autonomous City of Buenos Aires. Originally, the community network was a figure thought for small communities, which self-manage the use of the land, community life and their own economy. This is the case, for example, but not exclusively, with the communities of native peoples, who should be subject to preferential (and effective) protection by the State.[19]

19 Article 75, paragraph 17 of the Constitution of the Nation incorporated among the powers of the Congress "to recognize the ethnic and cultural pre-existence of the Argentine indigenous peoples. To guarantee respect for their identity and the right to a bilingual and intercultural education; to recognize the legal status of their communities, and the community possession and ownership of the lands they traditionally occupy; and to regulate the delivery of other lands suitable and sufficient for human development; none of them shall be alienable, transferable or subject to encumbrances or embargoes. To ensure their participation in the management of their natural resources and other interests affecting them. The provinces may exercise these powers concurrently". In addition, Argentina has ratified, among the legal instruments with supralegal hierarchy, ▶

As was the case with the program for the deployment of Internet infrastructure in poor neighborhoods, the Roberto Arias Program is linked to other previous actions of the State, such as the creation of the National Registry of Indigenous Peoples' Organizations (RENOPI) of the National Institute of Indigenous Affairs, established by Resolution INAI 328/2010. Also used as a working basis is the recognition through legal status registered in the National Registry of Indigenous Communities (RENACI) and/or in the relevant provincial agencies. Similarly, the National Registry of Family Farming (ReNAF) and the National Registry of Family Farming Organizations (ReNOAF) converge under the scope of Law 27,118.

This normative body accounts for the fact that the incorporation of technologies takes place in a framework of pre-existing material and structural asymmetries, and in the framework of a telecommunications system marked by concentration and exclusion (Monje & Rivero, 2018: 49), which must be addressed in order to respond to social sectors that start from a subordinated position. As César Bolaño states, "digital asymmetries are structurally constitutive of the network, and guarantee the existence of a complex hierarchy in which those who hold greater economic, political or symbolic capital prevail" (Bolaño, 2013).

▶19 Convention 169 of the International Labor Organization (ILO) on Indigenous and Tribal Peoples in Independent Countries, approved by Law 24,071; the Convention on Biological Diversity, approved by Law 24,375; and the Convention Establishing the Fund for the Development of Indigenous Peoples in Latin America and the Caribbean, approved by Law 24,544. ILO Convention 169 concerning Indigenous and Tribal Peoples in Independent Countries, ratified by Argentina in 2000, introduces the criterion of self-identification (Article 1, paragraph 2): "Awareness of their indigenous or tribal identity shall be regarded as a fundamental criterion for determining the groups to which the provisions of this Convention apply". It recognizes a set of collective rights for these peoples, the core of which is the right to internal self-determination, including the right to lands, territories and their natural resources; the right to organize themselves and to have their own institutions; and the right to autonomous development and to set their own priorities, which implies that they should be consulted and be able to participate in all matters affecting their interests". The interpretative principle governing the Convention is the right to the cultural identity of peoples, which is manifested in respect for the integrity of their values, practices and institutions. In the same vein is the United Nations Declaration on the Rights of Indigenous Peoples, adopted on September 13, 2007, which recognizes their status as "peoples" and their right to "self-determination" to "determine their economic, social and cultural development in accordance with their traditional patterns" and not to be subjected to "forced assimilation" and "forced displacement from their territories". Particularly noteworthy is the place this declaration gives to the full participation of these peoples in the "political, economic, social and cultural life of the State". It also requires States Parties to consult and cooperate in good faith through representative institutions to obtain their free and informed consent before implementing any project affecting their territories or involving the exploitation of their resources (Article 32, point 2). In this line, the communities of the Indigenous Peoples have a preferential treatment under the scope of Law 26,522, which is in line with the object and purpose of Law 27,078 in relation to enabling the access of all the inhabitants of the Argentine Republic to information and communications services under equitable social and geographical conditions, with the highest quality parameters, as established in Article 1 of the law.

This asymmetry is the initial premise of the Roberto Arias Program, which proposes to respond to this barrier with a financing instrument that a) supports 100 percent of the investment in infrastructure; b) does not require guarantees or profitable business plans; c) supports the maintenance of the network and the wholesale purchase for six months until the network is consolidated, promoting self-management; e) promotes a low-cost service with free access community terminals; d) is compatible with pre-existing and eventual support from other government agencies; e) simplifies administrative requirements.

The program allocates 300 million pesos from the FFSU to licensees with VARC registration or with registration in process, for the creation of networks or the improvement of existing ones; and infrastructure works and interconnection with the backbone network. The amount to be subsidized ranges from 300 thousand to 10 million pesos, and the items to be financed include expenses in fees for training in the maintenance of community networks, which implies the recognition of the need for technological appropriation by the communities as one of the bases for the sustainable development of the projects.

Approved by Enacom on June 10, 2021, the opening of the Program opens an expectation and has the challenge of being improved based on the new difficulties expressed by the demand. It is not a finished instrument. It is the political and legal dimension of a social construction. Hence the choice of the name of Roberto Arias, renowned defender of nature, native peoples, human and social rights, who died in 2019. Arias was a promoter of the Mapuche cause, popular communicator, member of Farco, founder of a community radio station and of an intercultural neighborhood in San Martin de los Andes. In this line, his name expresses a synthesis of the role and contributions of social movements inside and outside the State.

2.7 Conclusions

It was warned early on that Internet service, like any other service, would not develop in Argentina without taking into account the structural inequalities that define our country in economic and social terms. It has been a long time since the Argentina Digital law conceived the creation of the Universal Service Fund, fed by 1 percent of the gross turnover of ICT licensees, with a view to redressing this inequality. It is not the purpose of this article to examine whether

this is the best tool or whether the percentage of the contribution is in line with the objective proposed by the law itself (of course, these are debates that also need to be held), but to draw attention to the inexcusable delay with which these funds have been allocated to social subjects with specific but undeniably relevant needs.

More than 4 million inhabitants live in poor neighborhoods. Many of them are in the main cities of the country. The invisibility of their connectivity needs could only operate, by omission, as the result of a public policy decision. Rural areas and indigenous communities had not been beneficiaries of "last mile" connectivity policies either. In these elements we find the first twist: Enacom's NRC policy, intended in previous years to promote projects in small and medium-sized towns through SMEs and cooperatives, was not enough to meet the needs of a more heterogeneous map. This recognition took place in 2020 in the heat of the end of the Cambiemos experience at the head of the State and the advent of a new administration, which marked the launching of the programs analyzed here, driven by the need to repair the inequalities that the pandemic highlighted. The first one with one year of execution, the second one with a recently opened call for applications. Both can be improved, opening up new challenges and several questions.

Obviously, no right is guaranteed by its mere declaration. At this point, it is important to examine the implementation of the Popular Neighborhoods Program (without indulgence for the difficulties of the context of the health emergency), since it allows corroborating the existence or not of concrete progress. The above-mentioned fact stands out here, as it clears up one of the most common shortcomings of public programs: the under-execution of budget allocations. Although inequality requires greater speed than that often provided by the state bureaucracy (it would certainly be possible to advance in a higher percentage than at present), the opposite is observed: 14 projects already awarded by Enacom add up to payment commitments of 992,554,477.22 pesos, almost the total budget allocated for two years of the program, which led to an increase in the allocation. The demand exceeded the forecast.

Another distinctive fact is that the main ICT operators in the market – as is also the case with the NRC lines per locality – are not interested in this kind of instrument, even when 100 percent of the infrastructure financing is contemplated (which then remains in the licensee's ownership). For

whatever reason (not opening their finances to the State, for example, nor submitting to its accountability mechanisms), this connectivity response is often provided by social and political organizations in the territory, with no experience in telecommunications, when they can count on the State's support. Other times, it is the service cooperatives or SMEs, key players in the telecommunications map of the country, which are struggling to operate in a concentrated system.

The first numbers of the calls for projects within the framework of these programs show a diverse range of civil organizations that deploy a defined and permanent policy in relation to the deployment of connectivity (as in the cases of Atalaya Sur, in Public Neighborhoods, or Altermundi, in community networks); but also organizations that, without a primary interest, assume the development of a work and the provision of the service in view of the evidence that if they do not assume the task by themselves, they will continue to be deprived of the right. And the first empirical evidence is that, under certain conditions, they are in a position to deploy, with the challenge for the State to devise instruments that guarantee their sustainability over time.

The first year of implementation of the Public Neighborhoods Program reveals that some barriers persist: the requirement of financial guarantees or the relationship between taxation and the FFSU appear as limitations that cannot always be overcome by the interested providers. In this sense, the Roberto Arias Program shows a profile that allows retaking elements to rethink the former. This is required by the understanding of connectivity from the perspective of access to rights. But it also shows the importance of a public policy planned in an articulated manner, especially when it comes to responding to the most disadvantaged social groups.

The presence of an active State that regulates, sets prices and establishes a social tariff, as decreed by DNU 690/2020, sets a horizon to which the large corporations that dominate the telecommunications market must conform. The regulation of the mega wholesale price is necessary so that the costs do not become unfeasible for the communities, when it comes to the private companies that fix values in dollars. The extension of REFEFO, the growth of Arsat's capillarity towards all the corners of our land and the promotion of programs that allow the different tools to dialogue within a common line, is another of the axes to be deepened.

Enacom finances infrastructure works, it does not provide the service. It is not a provider, but a regulatory entity. Hence the mediation of licensees for the presentation of projects, which requires different levels of agreement between State agencies to provide joint responses: from the preparation of technical files to the agreement for interconnection, including support for the rendering and training in network management and maintenance, or intervention to achieve subsidies on the costs of wholesale connection, among others, are key for projects to be sustainable over time.

If universal access to the Internet is a right in itself (and also a gateway to other rights), the efforts of the state should focus on listening to the demands, being aware of the nature of the actors, working with all the institutions that serve the sector and planning public policies that concretely resolve the demands that the social movement itself managed to put on the agenda. In this way, the policy listens to reality, and not its reverse, which is when reality must be accommodated in order to access the benefit. The road traveled so far regarding the deployment of connectivity in low-income neighborhoods, rural communities and native peoples has just begun, but it is already showing some results. It is worth taking note of them.

2.8 References

Baladron, M. (2018). *Redes comunitarias: acceso a internet desde los actores locales*. Hipertextos Magazine, Vol. 6, N° 9, Buenos Aires, January/June.

Bolaño, C. (2013). *Industria cultural, información y capitalismo*. Barcelona, Gedisa.

Enacom (January 2020 to September 2021). Actas de directorio 56 a 73.

Enacom (2020). Nuevos Lineamientos de Gestión. Available at <https://www.enacom.gob.ar/nuevos-lineamientos-de-gestion-enacom-2020_p4496>.

FPG (2019), Programas de Buen Gobierno. Buenos Aires.

Luca Belli (2017). *Network Self-Determination and the Positive Externalities of Community Networks*. In: Belli (Ed). Community Networks: The Internet by the People, for the People. FGV Direito Rio. Available at <https://www.intgovforum.org/ en/filedepot_download/4391/1132>.

Monje, D. & Rivero, E. (2018) *La televisión cooperativa y comunitaria en la Argentina frente al imperativo de la convergencia digital*. Commons, Journal of Communication and Digital Citizenship. Vol. 7 N. 1.

SISU (2021) Education and pandemic in poor neighborhoods. How was the 2020 school year during the aspo in poor neighborhoods. Ministry of Social Development, April. Available at <https://www.argentina.gob.ar/sites/default/files/2021/05/educacion_y_pandemia_en_barrio_ populares.pdf>.

3 Funding Bottom up Connectivity: Approaches and Challenges of Community Networks to Sustain Themselves

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3.1 Abstract

Growth in the number of people connected to the Internet worldwide is plateauing, and Internet connectivity at present only reaches around 50% of the world population. As highlighted by the Covid-19 pandemic, the connectivity divide between rich and poor countries and between urban and rural areas perpetuates highly unequal outcomes and contributes to recovery inequity. Fortunately, the role of social purpose communications infrastructure, often supported by civil society and non-profit organizations, is increasingly being recognized by multilateral institutions such as the ITU, the Organisation for Economic Co-operation and Development (OECD) and the Inter American Development Bank (IADB). There are many terms used to refer to these community-owned and operated networks: community networks (CNs), non-profit, social purpose, etc. By whatever name, knowledge about the funding challenges these initiatives face, the opportunities they afford, and the financing mechanisms available to them, is scarce. This paper aims to fill this gap by bringing together and updating resources produced by the LocNet team around this topic.

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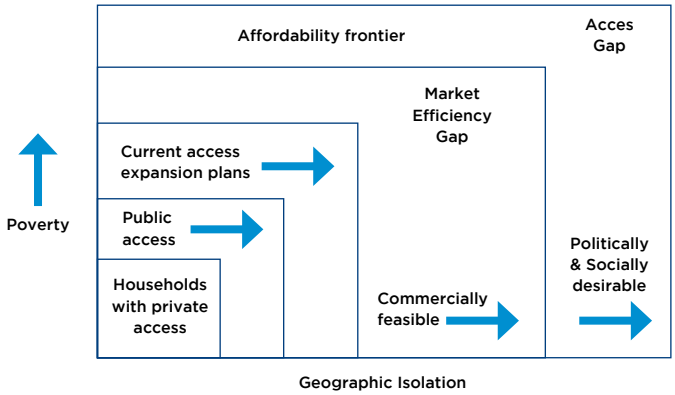
3.2 Introduction

Growth in the number of people connected to the Internet worldwide is plateauing, and Internet connectivity at present only reaches around 50% of the world population. As highlighted by the Covid-19 pandemic, the connectivity divide between rich and poor countries and between urban and rural areas perpetuates highly unequal outcomes and contributes to recovery inequity (Pathfinders for Peaceful, Just and Inclusive Societies, 2021).

Among the many factors contributing to a lack of access for so many, financing generally appears high on the list, and is one of the 6 enablers of connectivity identified by the International Telecommunication Union (ITU) (2021). But as described in the diagram below by the World Bank almost 20 years ago (Navas-Sabater, Dymond, & Juntunen, 2002), when it comes to providing universal affordable access, the traditional telecom industry model leaves market factors, such as commercial feasibility, to determine the areas where connectivity is provided and ultimately who is able to access it. This has led to heavy infrastructure investments in urban areas and in more wealthy countries, while rural areas and poorer countries do not qualify for similar financing, and therefore remain unconnected until new models are adopted.

Providing connectivity in rural and remote areas has always been more challenging and costly for national operators. The revenue potential from people with fewer economic resources in sparsely inhabited rural areas are often insufficient to justify infrastructure investment for national for-profit operators rooted in the 'market forces' approach. The GSM Association (GSMA) estimates that at least 3,000 active users are necessary to justify the cost of installing a traditional GSM base station (Internet Governance Forum, 2016). Even in areas that are covered, these large operators may not be able to offer services at an affordable price. The difficulty commercial telecommunication companies face in justifying the costly investments for providing rural infrastructure is typified by this observation from mobile operator MTN Nigeria's senior manager of Access Transmission Planning, Tolulope Williams:



> "Compared to our physical sites, of which we have over 13,000, our rural telephony network is less than 300 sites. In a lot of countries, it's actually the government that drives the broadband initiative to rural areas; operators need a lot of incentives in order to begin offering services. If you're going into a rural area, you're not going to make money." (Developing Telecoms, 2016)

Limited private-sector interest in rural areas has resulted in various national policy strategies for addressing the usage gap, often in the form of Universal Service Funds (USF) designed to incentivise investment in rural areas. However, these have met with limited success as they have centred around subsidising the capital costs for national commercial operators to set up coverage in these areas, yet usage has not proved sufficient to sustain the operating costs. For example, in Mozambique, the USF paid for construction of 103 base stations for operators in underserved regions, yet three quarters of these were non-operational as of 2018.[28]

In summary, to achieve universal telecommunications coverage, governments have usually repeated these formulas that consist of subsidizing large operators to reach rural and remote villages or making large investments in infrastructure that are later abandoned. In addition, the traditional national models have failed to provide affordable Internet to a large part of the population. Research has consistently found that offers from commercial operators are too

28 Based on conversations with the regulatory agency.

expensive for the majority of people compared to their income, and in addition, the quality (reliability and speed) of the connectivity is limited, especially in rural areas. As a result, bringing the economic and social benefits of communication and information services to all continues to be a serious digital exclusion issue faced by most countries, with connectivity in rural areas likely to continue to develop at an unacceptably slow pace, unless alternative models are considered (Association for Progressive Communications, 2019).

Fortunately, the role of social purpose communications infrastructure, often supported by civil society and non-profit organizations, is increasingly being recognized by multilateral institutions such as the ITU (2021a), the Organisation for Economic Co-operation and Development [OECD] (2004) and the Inter American Development Bank (IADB) (Zaballos et al., 2021). There are many terms used to refer to these community-owned and operated networks: community networks (CN), non-profit, social purpose, etc. Throughout the text we will use these terms and others interchangeably to refer to bottom-up, locally-controlled and socially-focussed connectivity strategies and projects.

By whatever name, knowledge about the funding challenges these initiatives face, the opportunities they afford, and the financing mechanisms available to them, is scarce. This paper aims to fill this gap by bringing together and updating resources produced by the LocNet team (Association for Progressive Communications, 2019) around this topic. In particular this paper provides:

- An alternative lense of economic analysis to include the role of civil society and non-profit actors in the connectivity sector;
- Challenges experienced by community networks to access funding;
- Financing mechanisms available to different stakeholder groups;
- Lessons learned from the LocNet team while unpacking and supporting the sustainability of community networks in the global South.

3.3 Civil society and non-profit organizations in the connectivity sector

Conventional views of the universal access challenge treat the economy as a single entity, but in reality, the economies of the

rural poor are significantly different from comparatively wealthy urban economies. One of the main reasons half the population remains unconnected is due to the fact that coverage strategies by governments and companies have not taken into account local factors, such as the type of market or economy that develops in small, remote and low-income villages. The economics that underpin dominant connectivity models are usually incompatible with the livelihoods of rural inhabitants, making these models unsustainable and unaffordable.

By the same token, local administration and collective management frameworks can be adopted in community-based connectivity initiatives which are locally driven, bottom-up responses to the current digital exclusion challenge. Using widely available low-cost networking equipment – in the countries where this is allowed – a small but growing number of communities and small-scale operators are providing increasing numbers of examples of people living in rural areas building their own affordable voice and data communications services. This engagement stimulates the life, development and resilience of the communities in many ways, as it was vividly proven during the Covid-19 pandemic (Association for Progressive Communications & REDES A.C., 2020).

We can visualise efforts to provide affordable connectivity for all as a glass jar that we are trying to fill up with stones, where the volume of the jar represents all those we would like to connect and the stones represent our efforts at connectivity.[29] Our current focus on national and multinational communications operators can be visualised as filling the jar with large uniformly shaped stones which have the virtue of each occupying a significant amount of the jar and of having a common, readily understandable shape. Yet our jar can only hold three or four of these stones and while the jar may look full at this point, these stones ultimately occupy less than half of the volume of the jar. This is analogous to the current situation in the telecommunications industry in that most countries cannot sustain more than three or four national mobile operators, while half of the world remains unconnected to the internet.

29 Idea originally conceived by Steve Song.

Imagine then, that we might use smaller stones to represent local operators providing connectivity. Even though the jar appeared to be full, there were spaces for many of them. Yet again, the jar appears to be full, but if we fill it with water, it becomes evident that there is still a significant amount of volume that can be filled by even smaller stones of varying size and shape, symbolising the diversity of types of local operators, and their capacity to adapt to the gaps left by purely market-based approaches.

Not all local operators are driven by a profit motive. There are also social-purpose and non-profit operators that have a significant role to play in filling the "underserved" spaces remaining in the jar. Examples of these are consumer cooperatives, community-owned networks, and even municipal networks, whose interest is to meet the communication needs of their communities in geographies where commercial services are either unavailable or unaffordable.

It is worth noting that smaller stones do not diminish the size of the larger stones, but rather occupy spaces additional to those of the larger operators. Furthermore, local operators, both commercial and social-purpose, increase traffic for large-scale operators through overall network effects. These points are important to highlight as there may be resistance to these emerging models based on erroneous notions that they put large investments by mobile network operators (MNOs) at risk or otherwise create unfair competition.

3.4 Finance access challenges

While community networks have provided affordable alternatives for local communities that deploy telecommunication infrastructure on their own, one of the biggest challenges for their growth and replication is access to capital, in particular from traditional investors and lenders unfamiliar with these models.

Limited access to financial capital and financing in general for community networks can also be attributed to unrealistic comparisons to traditional telecommunication investment, ignoring much of the extra value they create beyond the balance sheet of each project. The other key factors which inhibit investment are:

- CNs are seen as having higher levels of risk. This is because their distant rural locations are unfamiliar, they involve new technologies in apparently alien social contexts compared to those operating within the traditional global market and they may be run by people with limited management experience. They may also lack land or other assets to provide collateral as guarantees for loans (Bidwell & Jensen, 2019).
- Community networks are judged according to commercial measures of potential to scale and replicability. However, small networks are less attractive to traditional sources of finance or development assistance because the overheads for administering projects and funds disbursements are much the same, regardless of the size of the project. Furthermore, many of the networks focus on providing connectivity in a particular location, with little or no interest in growing and replicating in ways that would create the larger projects that attract traditional funders seeking scale and many times only willing to provide loans upwards of $US 10 million (Bidwell & Jensen, 2019).
- Community-based initiatives offer low surplus revenue. Unlike traditional telecommunications that price services for wealthier markets, many local networks do not aim to make a profit and/or try to ensure that any fees for service are as low as possible. This is a disincentive for lenders and investors looking for higher returns in the telecommunications sector, and can limit certain community networks' ability to service loans (Bidwell & Jensen, 2019).

3.5 Financial mechanisms for community networks

Local connectivity projects tend to scale in three phases: pilot, consolidation and expansion. Given the considerations above, soft loans, social bonds, grants and development funds from a diversity of stakeholders are likely to continue to be particularly important avenues of finance for "connecting the unconnected". Below we unpack the different financial mechanisms per stakeholder group that we have identified and that could support civil society and non-profit operators.

3.5.1 Resources from national government

National public entities have the capability to provide community networks with financing whether it be through program subsidies, direct support for capital infrastructure (CAPEX) or through loan repayment schemes. Based on the extensive experience of guifi.net (Baig Viñas, 2019) over the last 15 years, the two main sources of finance for new infrastructure are external resources and reinvestment. In this section of the document we focus mainly on the former, an opportunity for public policies to create tax incentives for private and public investment and donations for shared infrastructures, as well as to provide direct financial support to local operators. Public funding should ideally cover or incentivise the three different phases of scalability of these types of projects: pilot, consolidation and expansion.

External sources of potential financial support from national governments for community networks comprise the following:

- A particularly effective approach is the provision of tax benefits or deductions for donations to non-for-profit companies, as often local social-purpose operators are recognized as providing infrastructure for the public good. In the case of guifi.net, donation of infrastructure (CAPEX) to the guifi.net Foundation results in 35-75% tax deduction to the donor (Asociación Española de Fundaciones, 2015). That tax deduction and the fact that the infrastructure is shared at cost, on a non-profit basis, results in efficient infrastructure deployments. Similarly, B4RN is owned by its members through community shares (Broadband for the Rural North Ltd., n.d.) to raise the investment to cover the work and materials required for installation

in a new area. An effective fundraising strategy for helping to address digital exclusion is for administrations to offer tax breaks for contributions to the deployment of network infrastructures for underserved communities.[30]

- Non-recoverable subsidies, non-repayable contributions from USFs are recommended by the ITU as mechanisms to support CNs (ITU, 2021b). Many countries have established a USF using contributions from the licensed operators, however, many have already accumulated large amounts of unspent funds, partly because of limited capacity to evaluate or disburse funds (Thakur & Potter, 2018). In this context it is noteworthy that some countries are already restructuring their USFs to support local operators, such as Kenya's initial plans with the Universal Service Fund for CN funding exploration (Communications Authority of Kenya, 2021), and Argentina's new Roberto Arias Connectivity Programme which supports all startup costs and initial operating costs or community networks. These initiatives are a concrete example of how participatory mechanisms can create an enabling regulatory and financing environment for community network initiatives (AlterMundi, 2021), as they resulted from close dialogue with the community network movement in Argentina and Kenya. The Argentinian example also shows how organizations supporting CNs may contribute to the efficient distribution of the fund.
- Aside from simple direct grant or loan funding, another vehicle is the least cost subsidy auction (which may also be implemented by the USF) where the government calls for expressions of interest in serving a location and accepts the one with the lowest proposed subsidy.
- Most countries have programmes to develop rural enterprises as well as SMEs, although currently these usually do not yet cover the field of telecommunications. In Indonesia, there is an ongoing exploration of funding access for village-owned telecommunications through the Ministry of Village's locally

30 A comparison to the realm of community broadcasting shows how successful such a funding strategy can be in the long run. In the 1980s the French Government created the "Fund for the Support of Radio Expression" (FSER) that redistributes tax contributions of commercial radio stations between more than 600 community broadcasters. This makes France one of the most diverse community broadcasting landscapes worldwide and sustainability has been key for this. See Brock & Malerba, 2013.

administered funds.[31] The issue of lack of recognition for telecom infrastructure is exemplified by the case of Telecomunicaciones Indígenas Comunitarias (TIC AC), an Indigenous GSM network in Mexico, winners of the Innovatis Prize, the National Prize for Social Innovation Research (Infotec INNOVATIS, 2017). Apart from this recognition, the different government entities responsible for the prize were supposed to support the winners through their different programmes, but none of the programmes of the entities covered telecommunications, so no support could be provided. A similar case, although more successful, happened in South Africa, where a social innovation award to Zenzeleni Networks led to receiving support from the Department of Science & Innovation (University of the Western Cape, n.d.). Given the lack of recognition for community networks by many communications and telecommunication Departments, engaging with other ministries and departments who oversee other portfolios, such as Science and Technology, Social and Economic Development, for support has proven to be a good alternative to harness funding from the public fiscus.

- Public administrations financing initial deployments to be repaid by customers or operators at term or when reaching thresholds of usage levels to reduce risk. In the Xafogar fibre deployment project in a rural area of Spain by guifi.net,[32] the county council is contributing to the implementation of fibre in the area in an arrangement with guifi.net foundation. The foundation receives funds from the municipalities under the commitment to deliver connectivity in a commons model (open access) to the municipal buildings. The public administration contributes by lending an initial amount to be returned as new investors join, and coordinating and disseminating the initiative, but not in grant funding. In less than four years the initial amount loaned by the county's agency to create a backbone and show feasibility has been returned to the public agency, and fibre connectivity has become widespread in previously unconnected rural areas.

31 PermendesaPDTT No. 7/2021, page 21, point C, no. 3.

32 Available at: <https://fundacio.guifi.net/en_US/page/xafogar>.

3.5.2 Resources from Financial Institutions

Due to the limited return on investment in connecting peri-urban and rural areas, much of the funding required to extend access has traditionally been provided by International Financial Institutions (IFIs) – often through grants and soft loans to governments and commercial operators. As discussed in the introduction, the business models that are appropriate for this type of funding are unlikely to be aligned with community-based projects in the more rural and remote areas. Nevertheless, financial institutions could play an important role and have a major impact on the viability of innovative technical and business models for reaching the unconnected. The key needs here are:

- Ensure that finance for traditional infrastructure (roads, rails, power grids, etc.) include the small additional cost of fibre-optic ducts.[33]
- Finance for traditional infrastructure should also be contingent on inclusion of sharing clauses for rights of way and tariff caps on the cost of leasing passive infrastructure, including towers, high sites, ducts in roads, etc.
- In financial negotiations with Ministries of Finance, encourage tax and import duty breaks on ICT equipment for rural areas to facilitate affordability of services.
- Finance the extension of national fibre backbones and shared towers into rural areas to help reduce backhaul costs.
- Promote inclusion in policy-maker capacity building programmes and support for the full range of technical and business models for connectivity initiatives.

Ideally, financial institutions could also establish funding mechanisms for smaller connectivity players. As mentioned, these agencies face three challenges when their funds are to be used by small operators and community-owned networks: small scale, high real and perceived levels of risk, and low surplus revenues (Jensen, 2018) with which to repay loans. However, the inclusion of community networks in the latest report from the InterAmerican Development Bank (Zaballos et al., 2021), as well as the participation of the Asian Development bank

33 For e.g current estimates indicate that adding a duct to a road project increases the total budget by 1–2% (Mike Jensen. Unlocking broadband for all. Tech. rep. APC, 2015).

in the Asia-Pacific Regional Community Networks Summit organized by the United Nations Economic and Social Council for Asia Pacific [UNESCAP] (2021) shows there is interest to overcome these barriers.

Another source is impact investment from ethical banks and investors (Triodos Bank, n.d.). For example, B4RN carried out a successful regulated crowdfunding campaign offered in coordination with the Triodos ethical bank in the UK for GBP 3.3 million. Their experience, combined with being a community business owned by its members, offers a key competitive advantage.

3.5.3 Resources from businesses and the private sector

The private sector is uniquely equipped to support the creation and scale of sustainable community networks. Some examples through which they are already contributing include:

- Provision of in-kind services or services at cost: These resources can reduce the startup and operating costs of the network. Examples include donation of equipment, skills/training, mast sites and backhaul capacity/bandwidth,[34] and specifically sourcing tech volunteers. These resources tend to come from their corporate social responsibility or CSR programmes.
- CNs can take advantage of opportunities for private sector once-off funding schemes as well as technical support to emerging micro businesses. In some instances, experts are teamed up with the CN team to help them prepare the necessary documentation and understand the processes for applying for financing through currently available or traditional funding sources such as corporate banks. Examples include Zenzeleni's SAB award (SAB Foundation, 2021) and Rhizomatica's Cisco Global Problem Solver (Yoo, 2021). In addition, grants and awards from commercial, especially tech organisations such as Facebook, Microsoft and Mozilla, have also been used by CNs around the world.
- Specialised social ICT4D social enterprise investment oriented companies such as Connectivity Capital, Inveneo, Convergence Partners, etc. are also providing financial support.

34 For instance: <https://blog.cloudflare.com/pangea/ and TelOne collaboration with Murambinda: <https://www.internetsociety.org/issues/community-networks/success-stories/murambinda/>.

3.5.4 Resources from local operators and communities

In some places, local social-purpose operators may be able to fundraise internally to partially cover the capital costs of the network build-out, especially if there are potential businesses or other organisational users willing and able to contribute or to commit to being anchor tenants (ideally with an upfront payment for services).

Some local operators have diversified income streams to subsidise network operation costs as well. This is done by charging businesses a monthly fee, to support the costs of discounted services given to the general public. Funds for the cross-subsidy can also come from other services provided such as consultancy, marketing, digital training offerings, and small internet cafe-type services. These can also be services unrelated to the provision of connectivity to the end-user – for example in remote areas, hosting remote sensing equipment (weather, air quality, etc.) for a government or research agency.

In cases where telecom infrastructure is managed as a common-pool resource, investment can be crowdsourced by those benefiting from the infrastructure.[35] Crowdsourcing also offers significant though untested potential from the diaspora and people in developed countries who have visited the area as volunteers or tourists.

However, in most rural areas in the developing world, the larger resident population is unlikely to have the financial or human capacity to be able to provide the startup resources needed, and external fundraising from any of the stakeholders mentioned in this paper will be required (Jensen, 2018). Additionally, it is also possible that even once the network is operational it will not generate sufficient income to fully sustain itself while keeping prices affordable until reaching well into the expansion stage.

It should be noted that local operators may have other conditions under which external financial support is provided, mainly to improve the potential viability of the project, such as the presence of a technical partner that can provide capacity building for the network operators, or implementation support. These partnerships could be particularly relevant for international funders. Examples include a legal representative

35 See guifi.net, which won a European Commission Broadband Award with this approach: <https://ec.europa.eu/digital-single-market/en/news/five-projects-got-first-ever-european-broadband-award>.

or regulation expert to help guide communities around the requirements for low licence fees, the presence of infrastructure-sharing regulations, co-funding with the recipient government, etc. In addition, local intermediaries acting for many networks are likely to play a key role in this area as they may be more familiar with the landscape and can thus better evaluate potential resource mobilising initiatives, as well as aggregate needs and disburse funds received from large funding sources.

3.5.5 Resources from larger NGOs, foundations and others

In total, about 50 different organisations have been involved in supporting the community networks researched by LocNet in 2018 (Bidwell & Jensen, 2019), ranging from UN organisations and bilateral development agencies, to US and European foundations, NGOs, multinational technology companies, local authorities and academic/research organisations. The internet technical community, also known as the i* organisations (APNIC, n. d.) – in particular the Internet Society (ISOC) and the regional IP registries, LACNIC, AfriNIC and APNIC – have also supported many of the networks. Although insufficient to address the size of the problem, a number of networks have received startup or scaling funding and operational support from these sources, although some of these agencies are unable to support the cost of startup equipment, which limits the effectiveness of their interventions in other areas.

Given the local economic benefits of better connectivity, financing from rural development and agricultural or micro-finance schemes are likely to provide potential but have not yet been explored due to their lack of alignment with conventional funding mechanisms.

Below we describe in more detail the experience of the Local Networks or LocNet team in supporting an enabling environment for community network organizations in the Global South.

3.6 Connecting the Unconnected: Supporting community networks and other community-based connectivity initiatives

Local Networks (LocNet) is an initiative (Association for Progressive Communications, 2019) led by APC in partnership with Rhizomatica

that aims to directly support the work of community networks and to contribute to an enabling ecosystem for the emergence and growth of community networks and other community-based connectivity activities in developing countries. The aim of the initiative is to respond to the needs of community networks and their particular contexts. Moreover, it recognizes the varied, and often indirect, nuanced or intangible benefits of small-scale, bottom-up infrastructure building in evaluating impacts and success. It is part of a multi-year, multi-donor initiative envisaged to address the human capacity and sustainability challenges, along with the policy and regulatory obstacles, that limit the growth of community-based connectivity initiatives.

In respect to resources for community networks through the LocNet initiative, first and foremost is the importance of a bottom-up approach to digital inclusion, that decisions are based on and informed by the needs of the community.

- Over 75 funding opportunities (in the form of either grant agreement or sub-contracts and subsequent renewals) have been issued to community networks or CN partners in the last three years through pooled funding of various donors.[36]
- In addition, the LocNet initiative facilitates partnerships with foundations and funders who have also resourced additional CN projects not administered directly by the LocNet initiative (48percent, n.d.). The team also helps to support CN peers around their applications for funding opportunities. Beyond the ICT sector, some peers have also explored development sub-sectors such as village or small businesses, e-government, education and health ministries for partnerships to access further resources.
- Institutional strengthening became an essential activity with the CN peer network developed under the initiative and during a time of internal reflection due to the pandemic. As a result, the latest agreements for peer funding have revolved around activities that help to build internal structures or capacities (i.e. improve internal policies or documentation, revitalise Board governance or strengthen technical capabilities, etc).

36 Some examples appear here: <https://www.apc.org/en/node/36686; here <https://www.apc.org/en/tags/cn-stories>; and here: <https://www.apc.org/en/news/local-networks-2021-grants-meet-15-projects-selected-strengthen-community-networks-asia-africa>.

- Sustainability planning. The social business canvas which had been previously used with community networks for analysis was further explored with CN peers. Soon after, a course on the concepts of social entrepreneurship and financial management as well as ongoing financial and resource mobilisation webinars are offered to the CN peer network to distinguish social return of investment and clarity of financial sustainability. This intervention was in response to the CN peers themselves reaching out to identify fundraising and access to resources as a need within their organisations.
- In South Africa, an exploration of technical and financial assessments for the five chosen community networks was conducted along with expert input in order to better understand the needs of setting up a community network in a particular region (Association for Progressive Communications, 2020). This was a component of the pilot mentorship programme in 2019/2020, but in 2021, the concept has further developed and expanded to become five national training programmes in Indonesia, Nigeria, Kenya, Brazil and South Africa. Aside from technical capacity, early participant feedback has shown interest in training around business administration of community networks.
- In terms of policy, the LocNet team participates with local civil society organisations on public consultations around the USF and other international forums to amplify the impact of community networks to reach the unconnected. The team has also collaborated in finding and developing license-exempt or low-cost CN creation frameworks to allow for more appropriately priced license schemes for community networks.
- The business and sustainability models employed by the community networks are diverse, and the Locnet project is working with partners to better document these. Further clarity is also being built around the division of labour or institutional structures best suited for the social context.

3.7 Conclusion

In an industry that, faced with Covid and decreasing revenue growth, is reconsidering how to finance telecommunications infrastructure

capable of providing universal and meaningful connectivity, community networks should be considered. Through different innovations, CN are making inroads in accessing financial mechanisms which are appropriate to their needs and contexts. However progress is still required.

CNs in the start up phase require diversified modes of funding. As they try to offer lower-than-market-cost services, the revenues from these services are unlikely to be sufficient to fund the full capital expenditure of any initial set up. Until recently there were very few specific funding sources for community networks. Now, although there are more funding streams, there are also more community networks hoping to utilise what are ultimately limited funding streams. Additionally, the type of funding currently available is useful for starting and growing community-based networks to a certain point, but for many larger, more established CNs, available financing mechanisms have proven insufficient for them to scale and innovate.

Yet even with access to financial mechanisms, many CNs will need complementary support to improve their understanding of the administrative requirements for participating in such schemes, as well as improved understanding of their own business models and value-add.

Further development of alternative financial mechanisms to support telecom infrastructure for local operators needs to be explored. As with the advancements of micro-finance and rural development finance schemes, this emergent sector can help community networks to build upon their current structures which are reliant on grants, subsidies and prizes.

Addressing the above requires the creation of an enabling policy environment around state-operated digital inclusion programmes and subsidies at the national level that consider the support of community networks in their different phases of development. This may require that early stage CNs are supported in incremental steps, as well as to establish partnerships to move towards financing for larger projects as particular CN move along their life-cycle.

3.8 References

AlterMundi (2021, September 3). A groundbreaking government programme opens the way for community-based connectivity in Argentina. *Association for Progressive Communications.* <https://www.apc.org/en/blog/groundbreaking-government-programme-opens-way-community-based-connectivity-argentina>.

APNIC (n.d.) I* organizations. *APNIC*. <https://www.apnic.net/community/ecosystem/iorgs>.

Asociación Española de Fundaciones (2015, May). *Régimen fiscal de los donativos, donaciones y aportaciones realizadas a favor de las fundaciones a las que sea de aplicación el régimen fiscal previsto en el Título II de la Ley 49/2002*. <http://intranet.fundaciones.org/EPORTAL_DOCS/GENERAL/AEF/DOC-cw5565970265664/InformaciOnfiscalparadonantesdeduccionesnuevas.pdf>.

Association for Progressive Communications (2019, March 11) Connecting the Unconnected: Supporting community networks and other community-based connectivity initiatives. *Association for Progressive Communications.* <https://www.apc.org/en/project/connecting-unconnected-supporting-community-networks-and-other-community-based-connectivity>.

Association for Progressive Communications (2020, September 23). Strengthening community networks in South Africa: Activities, results and lessons learned from a Pilot Mentoring project. *Association for Progressive Communications.* <https://www.apc.org/en/pubs/strengthening-community-networks-south-africa-activities-results-and-lessons-learned-pilot>.

Association for Progressive Communications & REDES A.C. (2020, October 16). Community networks and COVID-19 in the Americas region. *Association for Progressive Communications*. <https://www.apc.org/en/news/community-networks-and-covid-19-americas-region>.

Baig Viñas, R. (2019). *Development and management of collective network and cloud computing infrastructures* [Doctoral dissertation, Universitat Politecnica de Catalunya]. Theses and Dissertations On-line (TDX) repository. <https://dsg.ac.upc.edu/sites/default/files/dsg/phd_roger_20190930.pdf>.

Bidwell, N., Jensen, M. (2019, June 26). Bottom-up Connectivity Strategies: Community-led small-scale telecommunication infrastructure networks in the global South. *Association for Progressive Communications.* <https://www.apc.org/en/pubs/bottom-connectivity-strategies-community-led-small-scale-telecommunication-infrastructure>.

Brief Summary of the Online Open Consultation and Virtual Meeting – Physical Open Consultation. <https://www.itu.int/md/S21-OPCWGINT8-C-0003/en>.

Broadband for the Rural North Ltd. (n.d.) Investors. *B4RN*. <https://b4rn.org.uk/community/investors/>.

Brock, N., Malerba, J. (2013). *Um ar mais livre? Uma breve abordagem comparativa da situação legal das rádios comunitárias na Europa e América do Sul*. <https://testelaje.files.wordpress.com/2013/02/umarmaislivrenilsbrockjoaomalerbaversaofinal-1.pdf>.

Communications Authority of Kenya (2021, May 11). Public Consultation On Draft Licensing And Shared Spectrum Framework For Community Networks In Kenya. *Communications Authority of Kenya*. <https://www.ca.go.ke/public-consultation-on-draft-licensing-and-shared-spectrum-framework-for-community-networks-in-kenya/>.

Developing Telecoms (2016). *Last Mile Connectivity in Emerging Markets*. <https://www.developingtelecoms.com/images/reports/last-mile-connectivity-dt-report-final.pdf>.

Infotec INNOVATIS (2017, April 10). Telecomunicaciones Indígenas Comunitarias. YouTube. <https://www.youtube.com/watch?v=VcdDlscl7qY (April 10, 2017)>.

Internet Governance Forum. (2016). *Policy Options for Connecting and Enabling the Next Billion(s): Phase II*. <https://www.intgovforum.org/multilingual/index.php?q=filedepot_download/3416/412>.

International Telecommunications Union (2021, April 28). Finance2Connect: Innovative Ways to Finance Connectivity. *ITUWTDC.* <https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC21/R2A/Pages/Finance2Connect.aspx>.

International Telecommunication Union. (2021). *Digital trends in Africa 2021: Information and communication technology trends and developments in the Africa region 2017-2020.* ITUPublications Africa. <https://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-DIG_TRENDS_AFR.01-2021-PDF-E.pdf>.

International Telecommunication Union (2021, January 26).

Jensen, M. (2018). Towards financial sustainability in community-based networks. In A. Finlay (Ed.), Global Information Society Watch 2018: Community Networks. APC and IDRC. <https://www.giswatch.org/en/infrastructure/towards-financial-sustainability-community-based-networks>.

Navas-Sabater, J., Dymond, A., & Juntunen, N. (2002). *Telecommunications and Information Services for the Poor: Toward a Strategy for Universal Access*. World Bank Discussion Paper, 432. Retrieved from <https://openknowledge.worldbank.org/bitstream/handle/10986/14007/multi0page.pdf?sequence=1&isAllowed=y>.

Organisation for Economic Co-operation and Development [OECD] (2004). *Recommendation of the Council on Broadband Connectivity.* <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0322>.

Pathfinders for Peaceful, Just and Inclusive Societies (2021) From Rhetoric to action: delivering equality and inclusion (Flagship Report – September 2021). NYU Center on International Cooperation <https://www.sdg16.plus/delivering-equality-and-inclusion>.

SAB Foundation. (2021, February 10). Winners of the SAB Foundation social innovation and disability empowerment awards 2020 announced. *SAB Foundation*. <https://sabfoundation.co.za/news-1/2021/2/10/winners-of-the-sab-foundation-social->.

Thakur, D., Potter, L. (2018). Universal Service and Access Funds: An Untapped Resource to Close the Gender Digital Divide. World Wide Web Foundation & Alliance for Affordable Internet. <http://webfoundation.org/docs/2018/03/Using-USAFs-to-Close-the-Gender-Digital-Divide-in-Africa.pdf>.

Triodos Bank (n.d.). Invest in connecting rural communities to the UK's fastest broadband: Broadband for the Rural North. *Triodos Bank.* <https://www.triodoscrowdfunding.co.uk/invest/broadband-for-the-rural-north>.

United Nations Economic and Social Council for Asia Pacific [UNESCAP] (2021, August 18). Asia-Pacific Regional Community Networks Summit 2021: innovating policymaking to connect the unconnected. *UNESCAP.* <https://unescap.org/events/2021/asia-pacific-regional-community-networks-summit-2021-innovating-policymaking-connect>.

University of the Western Cape (n.d.). Zenzeleni Project Wins Social Innovation Award For Connecting Rural Community. *University of the Western Cape.* <https://www.uwc.ac.za/news-and-announcements/news/zenzeleni-project-wins-social-innovation-award-727>.

Zaballos, A. G.; Garnett, P., Johnson, D., Ayala, H. U., Gabarró, P. P., Rodriguez, E. I. (2021). *Development of National Broadband Plans in Latin America and the Caribbean.* Inter-American Development Bank. <https://publications.iadb.org/en/development-national-broadband-plans-latin-america-and-caribbean>.

Yoo, Tae. (2021, June 29). Announcing the Cisco Global Problem Solver Challenge 2021 winners. *Cisco Blogs*. <https://blogs.cisco.com/news/announcing-the-cisco-global-problem-solver-challenge-2021-winners>.

48percent (n.d.) Equitable access to connectivity. *48percent*. <https://48percent.org/>.

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4 Community Network and Democratising Access: Addressing the Question of Sustainability

Sana Alam[37] and Osama Manzar[38]

4.1 Abstract

Community Networks (CNs) are local telecommunications infrastructures that are built, managed and used by local communities successfully delivering access to underserved areas, especially in areas for which commercial internet service providers remain a distant dream (Web Foundation, 2019; Tréguer & Rosnay, 2019). However, despite its long dated history, there has been a constant issue of public funding. In India, Digital Empowerment Foundation (DEF) has played a pivotal role in building and supporting CNs as well as advocating for self-sustaining internet models akin to CNs. A recent scheme called Prime Minister – Wi-Fi Access Network Interface (PM-WANI) has shown a way forward for the CNs and their persistent issue of lack of public funding. This paper is going to explore this scheme, its potential and its working on the ground and, most importantly, how this mirrors the CN model.

4.2 Introduction

As the world is increasingly moving towards digitalisation, it becomes imperative to connect all sections of society with Information Technology infrastructure as well as tools operated within that sphere. And, as the COVID-19 pandemic and the subsequent lockdowns coerced the world to shift its operations to the digital space, it also widened the creaks of the inequitable society that makes up the marginalized and unconnected ones.

However, there are certain models of technology that have been proven to bridge the digital divide, further fostering the socio-economic development of the community, and Community Networks (CNs) are one of such models. CNs are the local telecommunications

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38 Founder and Director at New Delhi-based Digital Empowerment Foundation which works on access, governance and digital rights.

infrastructures that are built, managed and used by local communities, successfully delivering access to underserved areas, especially in areas for where commercial internet service providers have not yet reached (Web Foundation, 2019; Tréguer & Rosnay, 2019). Experts have developed various definitions of the CN. One of them is Elkin-Koren (2006) who defined CNs as "*distributed architectures in which users implement a physically decentralised network through the decentralisation of hardware*" (Srivastava, 2017, p. 17).

History of CNs dates back to the 1990s, when the popularity of the internet had started to grow. At the time, they went by several names, like free networks, alternative telecom providers, do-it-yourself internet service providers (ISPs), etc (Tréguer & Rosnay, 2019). CNs, hence, work on the philosophy of de-monopolization of internet at the hands of private players in the free market, carrying the potential to democratise the internet (Tréguer & Rosnay, 2019). This has been true for developing nations, where wireless connectivity has emerged as an inexpensive technology connecting remote areas. In India, for instance, the tele-density in rural areas is less than 40 percent, including mobile penetration (Srivastava, 2013). Therefore, wireless connectivity is seen as a panacea resolving the issue of exorbitant cost of deploying wired infrastructure in remote areas of the country (Srivastava, 2013). Moreover, CNs bring diversity to the internet in terms of sustaining local cultures, reducing the digital divide, advocating for human rights, freedom of communication and privacy (Tréguer & Rosnay, 2019).

However, the idea and the execution of deployment of the community networks comes with certain hurdles that restrict their development, dwindling their sustainability and scale. These barriers range from the lack of awareness of potential benefits of accessing information as well as the Internet in general; the possibility of creating their own network; lack of income or funds (Rey-Moreno, 2017). But, one of the biggest hurdles is the lack of adequate funding and mobilisation of resources, which in turn hampers the inherent sustainability and long term viability of the entire CN model (United Nations Educational, Scientific and Cultural Organization [UNESCO], n.d.).

However, the Indian government's newly launched scheme – Wi-Fi Access Network Interface (PM-WANI) could be one of the potential

solutions to the issues of public funding. We will explore the overall of this scheme, its working, strengths and challenges.

4.3 Scenarios of Community Networks in India

India is struggling with a number of challenges in terms of connectivity. Despite all celebrations around digitization and connectivity, Internet penetration is still below 50 per cent (Jaffrelot & Sharma, 2021) and broadband speed is now among the slowest in the world. The digital divide is becoming clearer in terms of accessing socio-economic opportunities in a world forced online by COVID-19. Indian women are 15 percent less likely to own a mobile phone, and 33 percent less likely to use mobile internet services than men. In 2020, 25 percent of the total adult female population owned a smartphone versus 41 percent of adult men (Nikore, 2021). This stark divide underlines the importance of investing in meaningful forms of connectivity.

COVID-19 has increased this stress as the world has been increasingly shifting towards digitised services. COVID-19 propelled a 500 percent increase in tele-health consultations, a structural shift towards online shopping with e-retail reaching 95 percent of Indian districts, and digital payments touching the 100 million transactions per day mark is a reminder that if we do not invest in meaningful connectivity, half of the population will be left behind. This structural socio-economic exclusion will be more troubling in rural areas. CNs can be instrumental in terms of inclusivity in value creation offered by the digital-services industry, promising socio-economic mobility, because more connectivity will be critical in deciding greater access to knowledge, skills and commerce.

Till 2016, in India, CNs lacked a proper definition in common parlance or in government ICT policy or regulations (Srivastava, 2017). However, the 'Consultation Paper on the Proliferation of Broadband through Public Wi-Fi Networks' by the Telecom Regulatory Authority of India (TRAI) in November 2016 identified CN as "public Wi-Fi networks". While assigning a broader meaning to CN did not restrict it to merely a Wi-Fi hotspot by telecommunications service providers (TSPs)/ ISPs in public places, rather it also recognised small entrepreneurs or private entities who could sell Wi-Fi network services for public use (Srivastava, 2017).

Despite such recognition by the government itself, there are relatively fewer names that are active in the field of building and/or supporting CNs in the remote areas that mostly remain far from the traditional Internet services by the mainstream telecom providers. Digital Empowerment Foundation (DEF),[39] AirJaldi[40] and Gram Marg[41] are few of such names that are supporting CNs in India in multiple ways and approaches. By deploying Community Networks in rural areas, DEF has shown its potential in terms of bringing socio-economic changes. DEF and the Internet Society (ISOC) together launched a joint project entitled Wireless for Communities [W4C] to democratise access to the Internet. The aim has been to provide a holistic, community-empowered approach for connecting rural communities to the Internet. W4C instrumentalises the unlicensed spectrum bands — 2.4 GHz and 5.8 GHz — in order to create community-operated wireless networks by providing training to young people, with most of them not having any technical background and/or formal education.

These people go on to become barefoot or wireless engineers and often visit different parts of the country to connect the unconnected. The training and exposure at DEF yield multiple success stories, speaking volumes of economic opportunities and social change. Along with Internet connectivity, these barefoot or wireless engineers also bring in certain other aspects too: cultural and social diversity; building of the rural economy; connecting the last unconnected; and training in accessing the opportunities that the Internet has to offer. During the deployment of the CNs, one the biggest hurdles DEF has been facing is sustainability in terms of finances. This can be tackled by creating a network of micro and nano entrepreneurs who would be equipped to provide low-cost connectivity solutions in their villages and PM-WANI can be leveraged towards creating new economic opportunities for small vendors including micro and nano entrepreneurs in remote areas where connectivity has been patchy (Wireless For Communications, n.d.).

39 Available at: <https://www.defindia.org/>. See also the official website of the Wireless for Communities Initiative, available at: <https://wforc.in/>.

40 Available at: <https://airjaldi.com/>.

41 Available at: <http://grammarg.in/>.

4.4 PM-WANI – A Way Forward?

In the year 2015, Narendra Modi-led government launched 'Digital India mission' the aim of which has been to improve connectivity infrastructure, increasing Internet penetration and ultimately empowering the country digitally in various fields of technology. In continuation, in December 2020, the Department of Telecommunications (DoT) launched a scheme called PM-WANI. This scheme too is intended to operate on similar lines of increasing internet or WiFi connectivity, even in the remotest areas of the country, via a decentralised system of public access points. The framework of the PM-WANI consists of the following components that shall remain interconnected with each other for the entire scheme to work (Internet Freedom Foundation, 2021):

- **Public Data Office (PDO):** These could be any entity desirous of establishing, maintaining, and operating the PM-WANI compliant Wi-Fi Access Points in order to deliver WiFi services to the users by purchasing network services from a service provider. They must register themselves with a PDO-A who would be already registered on the app.
- **Public Data Office Aggregator (PDO-A):** These will be the aggregator of the PDOs and will also be authorising and overseeing them for authentication-related compliance, such as KYC (Know Your Customer). Moreover, potential users will have to go through a registration and authentication process, whose request will be received and approved by a PDO-A. Users will be asked to pay for their chosen tariff plans to the PDO-A. After which, the PDO-A registers them and grants access to the Wi-Fi.
- **App Provider:** There will be an application/portal where users will register and discover their nearest WANI compliant WiFi.
- **Central Registry:** DoT will be the main nodal agency of this decentralized scheme as it will be responsible for maintaining the details of the above three – App Providers, PDOAs, and PDOs.

This model, when being read along with the lines of decentralisation, de-monopolisation of private players and reaching to the nooks and corners of India, comes quite close to the aims and workings of community networks. PM-WANI too works on the anticipation of

institutionalised public Wi-Fi systems proliferating internet access, thereby reducing the digital divide in the country. Furthermore, the decentralised nature of the PM-WANI ecosystem is intended to address last mile connectivity by allowing the WiFi access points to grow organically in remote areas, deprived of internet access (Internet Freedom Foundation, 2021).

As mentioned in the previous sections of the paper, DEF has been one of the few names that have been continuously working towards bridging digital gaps, providing affordable and meaningful internet access, not just within India, but rather across the Global South (Pratap, 2021). Two such efforts have been providing training to people on the ground to become wireless engineers and advocating towards simplifying the licensing process of Public Wifi and channelling it through a single institution, making it transparent and open, akin to traditional Public Call Office (PCO) (Manzar, 2016; Pratap, 2021). In 2016, the Telecom Regulatory Authority of India (TRAI) called in to submit the suggestions on the 'Consultation Paper on Proliferation of Broadband through Public Wi-Fi Networks', to which DEF recommended a PCO-like model for such networks, which was later reflected in the 2020 PM-WANI scheme (Pratap, 2021). DEF is currently planning to train 10,000 people across the country to leverage the benefits of the scheme.

The PCO model speaks of a huge success and the PM-WANI model based on this has the potential to not only solve issues like last mile connectivity, but also of public funding and employment, which the CNs usually lack. The scheme reflects a self-sustaining idea, which would be sustainable for the near future. So, ideation, deployment and successful implementation of such schemes tend to pave the way in scaling the CNs. However, it would be prudent to assess the ground reality and a way forward of any scheme rolled out by the state. This will be explored in the next sections of the paper.

4.5 Ground Check of PM-WANI

PM-WANI seems like a fascinating idea – at least on paper – of democratising access to the Internet, but there are some of the shortcomings – as the scheme is still at its nascent stage – that needs urgent scrutiny. In order to gauge the efficacy of the scheme, it is crucial to research the perspectives of people by whom the scheme

is going to be implemented. To this end, PDO-A and Application Providers were interviewed. The list of these aggregators and application providers were accessed from the PM-WANI website by the name PM-WANI Central Registry.[42] Till 20 September 2021 a total 68 PDO-As and 34 App Providers have registered with the PM-WANI scheme. Out of this, i2e1,[43] a PM-WANI compliant WiFi company, has turned out to be a big player in registering the PDOs and deploying WiFi access hotspots in internet deprived areas.

As per the interviews conducted, it was reflected that the scheme, despite the huge numbers the website might be displaying, has not been rolled out in a fully functional manner yet. The PDO-As have only applied for the routers and other essential devices, with functions like linking with PDOs and end users still in process. But, that does not seem like an issue to the PDO-As, as for them the COVID-19 and its subsequent lockdowns have hampered the market badly, and now that the post-COVID-19 market is taking shape the scheme might work successfully, ultimately mitigating unemployment and creating micro entrepreneurship.

But, it could be inferred from the interviews that there is a lack of clarity among the PDO-As as to how the scheme will eventually be implemented when executed on the ground after all the formalities. The PDO-As (who in many cases are the Application providers too) have also expressed their apprehensions at two levels: a. There is a lack of clarity on the part of the government in terms of disseminating the entire scheme among the masses. One of the interviewees said that the office bearers at the PM-WANI website themselves lack a clear understanding of the scheme. Moreover, to recall one of the interviewees, "*the entire scheme is not easy as the PM-WANI website depicts it to be. The process is lengthy and tiresome*"; b. According to the PDO-As, the PDOs that have been approaching them do not have a clear understanding in terms of the operations as well as the investment they might be required to make.

Natraj Akella of i2e1 argues that the PM-WANI scheme paves the way for various business models and it is up to one's discretion of choosing

42 Available at: <https://pmwani.cdot.in/wani>.

43 Available at: <https://i2e1.com/>.

area(s) and planning and executing the WiFi dissemination where low cost internet would matter the most. i2e1 has successfully deployed PM-WANI compliant WiFi in slum areas of India's national capital – New Delhi. The rationale behind this has been how with everything shifting to online (work, schooling etc.), the minimum amount of internet data bought by the people there does not often suffice.

However, in terms of the role of PDOs, Akella informs that there would be a minimum investment of two to three thousands rupees (about USD 40) for basic technological infrastructure like broadband connectivity, routers etc., which might be an issue for general stores, whom the scheme is aimed at. Along with this, the regulation of prices for using this data lies upon the PDO-As. In other words, each PDO-A is free to decide the per-GB price of the data. But, once such investment is made, the community surrounded by the PDO would benefit greatly, as while the PDOs will be able to earn, the community could get low cost WiFi. This would be a self-sustaining model, where the reliance on commercial service providers decreases.

4.6 Moving Forward

The PM-WANI model, when read and understood entirely on paper, sounds like a self-funded model that carries elements of long-term sustainability. But, the scheme must be contrasted with the perceptions and realities from the ground as well as existing laws on privacy and surveillance (Internet Freedom Foundation, 2021), which reflects some scope of improvement in the entire model.

Moreover, per the interviews with the PDO-As as well as the suggestions by Akella of i2e1, a robust advocacy needs to take place by the government in order to make the scheme successful. This is because there is either misinformation or no information about the process and benefits of the scheme. Along with this advocacy, a regulation or capping on the prices of the WiFi would be required, as in the absence of any capping, end users might get exploited at the hands of PDO-As.

Since the aim(s) of the PM-WANI model mirrors the CN model in terms of decentralisation and de-monopolisation of the internet

from private players, multiple layers and complications in the decentralisation process and unregulated WiFi prices are issues that must be addressed by the government at a larger scale. A better clarity on the PM-WANI model could resolve issues of public funding for the CNs as the PM-WANI scheme runs on a self-sustaining model.

4.7 References

Internet Freedom Foundation (2021, February 10). *The PM-WANI Scheme: An Explainer*. Retrieved September 10, 2021, from <https://internetfreedom.in/pm-wani-explainer/>.

Jaffrelot, C. & Sharma, A. (2021, March 4). *India's new digital rules are bad news for democracy*. The Indian Express. Retrieved September 12, 2021, from <https://indianexpress.com/article/opinion/columns/social-media-rules-whatsapp-twitter-facebook-ott-platform-content-modi-govt-7213191/>.

Manzar, O. (2016, August 10). *Public WI-FI hotspots can be new PCO booths*. The Mint. Retrieved September 10, 2021, from <https://www.livemint.com/Opinion/Q5z7qRi9rAFGD9UWhzFulM/Public-WIFI-hotspots-can-be-new-PCO-booths.html>.

Nikore, M. (2021, August 22). *India's gendered digital divide: How the absence of digital access is leaving women behind*. Observer Research Foundation. Retrieved September 15, 2021, from <https://www.orfonline.org/expert-speak/indias-gendered-digital-divide/>.

Pratap, T. (2021). PM WANI: The PCO model of Public Wi-Fi stands to fulfill long pipe dream. Digital Empowerment Foundation. Retrieved September 10, 2021 from <https://www.defindia.org/wp-content/uploads/2021/03/PM-WANI-Report_23-March-2021.pdf>.

Rey-Moreno, C,. (2017, May 23). Supporting the Creation and Scalability of Affordable Access Solutions: Understanding Community Networks in Africa. Internet Society. Retrieved September 7, 2021, from <https://www.internetsociety.org/resources/doc/2017/supporting-the-creation-and-scalability-of-affordable-access-solutions-understanding-community-networks-in-africa/>.

Srivastava, R. (2013). *Empowering rural communities of India through unlicensed spectrum*. Digital Empowerment Foundation. Retrieved September 7, 2021, from <https://www.defindia.org/wp-content/uploads/2021/02/Wireless-A-casebook-for-communities.pdf>.

Srivastava, R. (5 October, 2017). *Community Networks: Regulatory issues and gaps – Experiences from India*. Digital Empowerment Foundation. Retrieved September 7, 2021, from <https://www.defindia.org/publication-2/>.

Tréguer, F. & Rosnay, M. D. (2019). *Telecommunications Reclaimed: A Hands-on Guide To Networking Communities*. Internet Society. Retrieved September 7, 2021, from <https://www.netcommons.eu/telecommunications-reclaimed>.

United Nations Educational, Scientific and Cultural Organization (n.d.). *Community Media Sustainability Policy Series*. Retrieved September 7, 2021, from <https://en.unesco.org/community-media-sustainability/policy-series/public-funding>.

Web Foundation (September 02, 2019). *Community networks: Internet for the people, by the people* | The Web Untangled. Retrieved September 7, 2021, from <https://webfoundation.org/2019/09/community-networks-internet-for-the-people-by-the-people-the-web-untangled/>.

Wireless For Communications (n.d.). Retrieved September, 10, 2021 from <https://wforc.in/>.

5 Rewards, Incentives, Tokenisation: Community Networks Meet Community Currencies

Senka Hadzic[44], David Johnson[45] and Will Ruddick[46]

5.1 Abstract

Financial sustainability of community networks remains a challenge, especially in low-income communities. We explore the potential of community inclusion currencies to provide monetary rewards to users who help expand community networks, by installing routers or maintaining infrastructure or by providing offline content. This is done by adding a blockchain-based token reward in the mesh routing protocol. This results in distributed, decentralised ownership of network and services infrastructure and encodes the community network philosophy in the protocols and services being used. In addition, tokenisation makes it possible for funders and investors to support local economies in a portfolio of multiple CNs making use of a community inclusion currency.

5.2 Introduction

Although many community networks have been built around the world, few have reached a point where they are sustainable from income earned from the network itself, especially in low-income communities. This is usually because of a lack of network scale to displace money spent on incumbent operators in the community – which can be as much as 20% of disposable income in some rural South African communities (Rey Moreno, 2016), lack of locally-relevant service innovation, and lack of technical skills to grow and maintain networks and services and skills in business and finance. Additionally, some community networks are simply focused on providing connectivity in a particular location, without much interest to expand – an angle somewhat conflicting with traditional funders' focus on large, or at least scalable, projects (Jensen, 2018). There are also community networks initiatives that prioritise

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ethics, digital rights, net neutrality, or opposing power of big tech and dominant telco operators (Bidwell, 2018) over their own growth and scale. One point where the community networks movement generally agrees on is the belief in the importance of community ownership over their own connectivity needs, and ideally control over the costs and potential revenue, with the income generated being used for and by the communities.

From a technical perspective, community networks and small wireless ISP efforts cannot easily create a wide enough footprint to reach an entire community in a poorly serviced area due to the limited resources of cooperatives or small local ISPs to expand access to every user, and the limited range of WiFi, which is the ultimate technology of choice for CNs. However, these networks create ideal seed points to grow micro ISP businesses using decentralised technology such as mesh networks with a blockchain-based micro-payment system to reward users who expand the network or sell services on the network. This essentially makes each router owner a micro ISP.

In terms of content, users in vulnerable communities mostly access content from monolithic service companies like Facebook, Google or Amazon and pay costly internet access fees through pay-as-you-go cellular data packages (Gillwald, 2018). Using locally hosted microservices, some of the globally generated content can be hosted locally and some locally generated content could be shared locally (Phokeer, 2016). Some of these can be available at no cost and some can be integrated with a micro-payment system to provide income for the community network.[47]

The authors of this paper received a grant from the Internet Society Foundation as part of their Research Grant Programme[48] in 2021, to research the potential of blockchain economics and community currencies to incentivise network expansion. Our ultimate goal is to achieve fully decentralised ownership of Internet infrastructure and the ability for all infrastructure owners to instantly earn blockchain-based income as traffic passes through their wireless mesh routers (or earn income from charged services that are accessed on the local edge cloud server).

47 See <https://www.inethi.org.za>.

48 See <https://www.isocfoundation.org/grant-programme/research-grant-programme/>.

5.3 Using blockchain to monetise bandwidth

Mesh networking has already been combined with blockchain to explore network expansion, among others by researchers associated with the community network guifi.net (Dimogerontakis 2020). Althea[49] has built open source firmware for a number of routers to deploy blockchain-based mesh solutions. Althea's system intrinsically allows for a cooperative model where the network is owned by the people using it. However, none of these initiatives have solved the practical aspects of introducing a blockchain based currency into a low-income community.

Althea adds an economic cost element to the mesh routing protocol. This makes it possible to select a route based on either the performance of the route, the monetary cost or a hybrid of both. Crypto Wallets are associated with routers and router owners earn tokens (using blockchain transactions) for traffic that passes through their router (this can either be transit traffic being passed from one router to another or traffic to end-user devices such as mobile phones).

By building upon Althea's model and using their open source code base, our hope is that using mesh networks with a blockchain-based community currency (Grassroot Economics, n.d.) that provides monetary rewards to users who expand the network or sell services on the network will help incentivise expansion of networks in the low-income communities we are working with in Kenya and South Africa. This is done by adding a blockchain-based token reward in the mesh routing protocol, allocating monthly tokens to network maintainers and administrators and defining token rewards for local content production; the blockchain-based token is the underlying technology of the community inclusion currency.

Distributed, decentralised ownership of network infrastructure is completely in line with the community network philosophy, as summarised in the Declaration on Community Connectivity.[50]

49 Available at: <https://althea.net/>.

50 The Declaration on Community Connectivity was developed at the Internet Governance Forum, Guadalajara, Mexico, December 2016,through a multistakeholder participatory process initiated and facilitated by the UN IGF Dynamic Coalition on Community Connectivity (DC3). See: <https://comconnectivity.org/declaration-on-community-connectivity/>.

Integrating this new ownership model of micro ISPs (individual router owners) within an ecosystem of well understood access provision models such as traditional Wireless ISP or even traditional community or cooperative networks, will be a challenge but also a novelty of this research.

As far as a community currency is concerned, communities can create ledgers that represent sharing of goods and services like providing internet on a public blockchain and enable everyone to use that ledger. Internet data is a good tangible asset that a currency can be pegged against and then expanded to other areas like purchasing food, paying your hairdresser etc. Acceptance of this concept may possibly come easily as communities already trade phone time and data as a fungible commodity – a day of 1Mbps access or 1GB of data is replaceable by an identical item.

A number of possible ownership models are envisaged with this blockchain-based mesh technology. i) At a very simple level, an internet cafe could purchase upstream bandwidth from an ISP and provide WIFi access to customers using a community currency. ii) At a more complex level, an ISP that currently exists in the community could allow mesh router owners to connect to WiFi routers in their existing network and create small cluster mesh networks that expand access to unconnected areas. These router owners would recoup their router investments by earning community currency for transit or access point traffic. iii) At the most comprehensive level, a community or cooperative network could pool resources to purchase a high-speed internet backhaul and have a set of co-owned network infrastructure that provides community currency rewards for all cooperative members or router owners as well as rewards for those that maintain the network, provide power infrastructure, and tower or building mount points.

5.4 Tokenisation as a way to invest in scaling

Tokenisation of credit obligations redeemable in goods or services and tradable as a currency is a massive problem. Blockchains themselves have been struggling with how to tokenise block validation into what they call gas tokens, hoping they would act as a currency for over a decade. At the same time community groups in Kenya are

tokenising a credit against the production on their farms – this is following a trend of producer or mutual credit systems – stretching back to the farthest reaches of human history.

Bandwidth or internet usage tokenisation is another version of the same problem. What is unique about it is that creating token redeemable in bandwidth can be guaranteed algorithmically – similar to gas tokens on a blockchain but in this case it is something everyone wants or needs (access to the web). As such, a token for bandwidth is a voucher that will automatically work to provide internet access – thus, there is a strong guarantee that this credit will be useful in the future. Such a credit for bandwidth provides a strong anchor for a community currency that is additionally accepted by many other businesses with their own goods and services.

The ability to tokenise future production also opens the door to investment in scaling that production (Ruddick & Agha, 2021). The growth of internet access in Africa for instance has been far slower than anticipated. Tokenised vouchers enable small ISPs and community networks to issue credit against their future bandwidth 'production'. They are essentially zero interest loans where the loan is given by anyone buying the voucher, and can be used for local circulation as a medium of exchange, ensuring customer loyalty and boosting investments. For instance, the tokens created by several small ISPs redeemable for their bandwidth can be part of liquidity pools that connect them out to a common network token which in turn is connected to national currency. Impact investors interested in supporting the portfolio consisting of multiple ISPs can do so by investing in the common network token.

5.5 Conclusion

The novel combination of network mesh infrastructure, localised services and blockchain economics to test incentivised expansion of network coverage and services can potentially create enough network effect and a virtuous cycle that bootstraps a sustainable locally-owned community network and builds a new localised economy.

In addition, establishing community agreed governance rules in the decentralised economic system creates a balance between the

need for free content and income generating services, and making the underlying blockchain system understandable and transparent for the community. This in turn can help make local community networks more resilient.

5.6 References

Bidwell N. (2018). Community networks: Stories and power. Global Information Society Watch (GISWatch). Community Networks. Available at: <https://www.giswatch.org/community-networks>.

Dimogerontakis E., Navarro L., Selimi M., Mosquera S., Freitag F. (2020) *Contract Networking for Crowdsourced Connectivity*. 2020 IEEE International Conference on Decentralized Applications and Infrastructures (DAPPS), pp. 126-132.

Gillwald, A., Mothobi, O., & Rademan, B. (2018). *The State of ICT in South Africa*. Policy Paper No. 5; Series 5: After Access-Assessing Digital Inequality in Africa. Research ICT Africa.

Global Information Society Watch (GISWatch) (2018). *Community Networks*. Available at: <https://www.giswatch.org/community-networks>.

Grassroot Economics (n.d.). Community Inclusion Currencies. *Grassroot Economics*. <https://www.grassrootseconomics.org/community-currencies>.

Jensen, M., (2018). *Towards financial sustainability in community-based networks*.

Phokeer, A., Densmore, M., Johnson, D., Feamster, N. (2016). *A First Look At Mobile Internet Use in Township Communities in South Africa*. ACM Symposium on Computing and Development (ACM DEV 2016), Article No.: 15, Pages 1–10.

Rey-Moreno, C., Blignaut, R., Tucker, W.D, May, J. (2016). *An in-depth study of the ICT ecosystem in a South African rural community: unveiling expenditure and communication patterns*. Information Technology for Development, 22(sup1): 101–120.

Ruddick, W., Agha, S. (2021, October 3). Tokenized voucher investments: unlocking value creation and non-equity impact investments. Grassroot Economics Whitepaper. <https://gitlab.com/grassrootseconomics/cic-docs/-/blob/master/Tokenized-Voucher-Investments-WhitePaper.pdf>.

PART 2

CASE STUDIES AND SUCCESS STORIES

6 Community Networks: Sustainable Growth for Internet Infrastructure

Juan Peirano[51] and João Paulo de Vasconcelos Aguiar[52]

6.1 Abstract

Community networks are a valuable complementary access solution to connect more people in places that are the hardest to reach by traditional services. This document outlines examples in different parts of the world of communities that have successfully deployed and sustained their networks. In several cases, partnerships with the local regulatory bodies, other government agencies and ministries, private telecommunications operators, and civil society organizations were a key factor to enabling community networks.

6.2 Introduction

Now, more than ever, it is clear how important the Internet is for those who have access. It goes without saying that living through the pandemic without it would have been a very different experience. Researchers would have faced even greater challenges in finding ways to work together to prevent the spread of COVID, and it would have been harder for people to keep working and studying from home.

The consequences of being connected are quite clear. It generates competitive and economic advantages, as it increases socio-economic development and opportunities. It provides the ability to learn, collaborate, innovate, and create. Also, real-time communication allows for immediate feedback, problem-solving, collaboration, and troubleshooting.

However, access has several dimensions and is different from country to country. For some it is as basic as access to physical infrastructure, as in a network in a person's village or community. To others, it means access to affordable services, the ability to pay for a service that already exists. It also means being able to use the technologies available, which implies access to digital literacy programs. Finally, for some it means an alternative, a more resilient choice.

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To this end, there is a sense of urgency: as the consequences of being unconnected increase, the costs of the digital divide increase as well. Connectivity provides people with immediate access to information, resources, and contacts. Farmers can plan for the weather, and watch the prices of goods in the market. Families can receive money from relatives overseas. Women and vulnerable populations often are empowered with new opportunities. On the other hand, people without access to the Internet also lack access to these opportunities and are left further behind, deepening not only the digital divide, but also social, economic, gender, and many other divides.

According to a statement by the United Nations (United Nations, 2021), roughly half of the world's population is unconnected. These people live in unserved and underserved urban, rural, and remote communities. When they do have access, they are charged prices they can't afford for services that don't serve their purpose. We have an opportunity to allow new, cheaper, and complementary ways to bring connectivity to more people.

Community networks are a valuable complementary access solution that addresses this and other issues. In the following sections we provide examples from different parts of the world where communities have successfully deployed and sustained their networks, as well as other initiatives that are supporting community networks. In several cases, partnerships with the local regulatory bodies, other government agencies and ministries, private telecommunications operators, and civil society organizations were a key factor to enabling community networks.

6.3 A community network kept people online in Argentina during the pandemic

The town of El Cuy, Argentina, was digitally isolated from the rest of the country before they set up a community network in 2019. In 2020 they improved their network and were prepared for the pandemic. The improved connectivity helped young people study from home, the elderly to have safer access to health services, and enabled everyone to stay isolated from people diagnosed with COVID-19 in nearby towns (Rodrigues, 2020).

In 2020, Nelso Rodriguez, a local nurse and Community Network champion, wrote about the positive effect with the network and how they were maintaining it: "You have no idea what it means for us to have Internet here. And it's all free. We cover any expenses that arise through community activities, like raffles and bake sales."

In 2021 the community shifted to a monthly payment model, where each user contributes $500 Argentinian pesos (around US$5), allowing the network to be self-sustained and affordable.

6.4 Connecting to sovereignty with the Waimanalo Community Network – Waimanalo, Hawai'i

An independent nation on the island of Oahu, Hawaii, faced connectivity challenges for years. Their kids relied on nearby fast-food chains to use Wi-Fi to do their homework and people had trouble accessing online services. They addressed these issues by building their own community network that interconnects with Hawaii Telecom's submarine cable for a viable connectivity model sustained by the local community (Internet Society – Waimanalo Case Study, 2021).

While the village could take care of its own housing, healthcare, schooling and economy, connecting to the Internet requires technical skills and political finesse—resources that a partnership with the Internet Society was able to provide and support the local population to maintain themselves.

Their path to sustainability was paved by the development of local skills. As John Garcia, a member of the community says: "It involves teaching the community how to operate routers and basic Internet use. We must rise up to these opportunities. There are a lot of entrepreneurs here who can now connect and work from home. We moved from no connectivity, to being connected, to being able to control that connection and expand it." (Internet Society – Waimanalo Case Study, 2021).

The deployment was a joint effort that involved the community and their hosting of and participation in the fourth Indigenous Connectivity Summit (Internet Society – ICS, 2021), as well as partnerships with multiple stakeholders, including the State of Hawaii Government, the operator Hawaiian Telecom, and the manufacturer Baicells.

6.5 Murambinda, Zimbabwe

In the town of Murambinda, Zimbabwe, a local entrepreneur started a cyber café with dial up Internet in 2001 to bring connectivity to his community (Internet Society – Murambinda Case Study, 2021). Since then, it has grown into a community network with the support from organizations such as APC (Association for Progressive Communications, 2021) and the Internet Society.

Through a partnership with the local regulator, POTRAZ, and the Ministry of ICT and Courier Services, the Murambinda Works Network now connects 80 schools and reaches a 40 kilometers radius. Operating initially on a pilot license, their model supported the introduction of new licensing for the use of the 2.4GHz and 5GHz spectrum in the country, providing new opportunities to other community networks.

From the beginning, Murambinda Works has received much-needed political commitment: "Collective efforts are critical to sustain the value of Internet connectedness now more than ever" said the Minister of Information Communications and Technology (ICT) and Courier Services, Honorable Jenfan Muswere at the official commission of the Murambinda Works community network in May 2021.

To partially sustain itself, Murambinda Works generates revenue by providing ICT-related services such as the use of the cybercafé's facilities for Internet access, photocopying, binding, training for government agencies, and computer repairs and maintenance. Despite these notable strides, when the COVID-19 pandemic struck it threatened to reverse health and education gains made in the community.

The community is not stopping there, and the following innovative activities are in the pipeline to expand and sustain Murambinda Works:

- Install hotspots at the local market, bus station, restaurants, and other public places.
- Provide fixed access to commercial businesses in the area, including the mining sector.
- Resell hotspot access to mobile operators, offering the mobile operators such as Econet Wi-Fi hotspots on the CN infrastructure in Murambinda and other locations.

- Provide schools with the opportunity to adopt the aquaponics Internet of Things (IoT) initiative that has been successfully piloted by the Internet Society's Zimbabwe Chapter (Internet Society Zimbabwe Chapter, 2019) to generate income to meet connectivity costs.
- Offer schools connectivity at affordable rates.
- Develop revenue-generating fish ponds and gardens monitored by internet devices.
- Offer voucher purchasing and private home and business connections.
- Provide incentives for young people to stay in the community.

The Internet shows a sustainable way to empower community ecosystems. According to Nelson Magwede, a Ministry of Education inspector in the district, "The Internet has put us on the map … and has brought a host of advantages for our learners". He also adds that through a community network "it becomes a homegrown initiative, having a real sense of community ownership, whilst protecting all our endeavours as we move forward" (Internet Society – Murambinda Case Study, 2021).

6.6 Libraries and Community Networks are closing the digital divide

When the COVID-19 pandemic hit in early 2020, libraries across the world shut down their buildings to limit transmission of the virus. Since then, they are playing a key role in getting local communities online (Williams & Muller, 2021). This has happened in multiple creative ways, from turning bookmobile vans into roaming hotspots delivering Wi-Fi throughout the community, to extending library Wi-Fi access into the parking lot and beyond. Libraries are also proving to be good partners for community networks in providing local content, being a good source of funding and sustainability, and other aspects.

6.7 Community networks undertake capacity building to navigate regulatory processes

In Brazil, many communities are faced with a bureaucratic challenge after building their own networks: at that time, mainly, compliance

with Anatel, the local telecommunications regulator. Processes can be complex, and misunderstandings or attempts to dodge it have left many community networks operating irregularly or even illegally. Without the proper permits and licenses, community networks are vulnerable and potentially subject to administrative sanctions that can shut them down. Learning how to navigate through the legislation is key for sustainability (Internet Society Foundation, 2021).

To address this issue the Internet Society Brazil Chapter joined forces with Instituto Bem Estar Brasil (IBEB) to develop a course that trains community members on how to navigate Anatel's processes. As a result, 6 community networks have registered in the country, and the process has provided key learnings that will help Anatel in dealing with community networks in the future.

6.8 Reimagining the Summit on Community Networks in Africa during the COVID-19 Pandemic

Since 2016, community network operators, allies, partners, policymakers, and regulators in Africa have gathered for an annual summit with common goals: to learn, network, and share knowledge and experiences about connecting communities to affordable and sustainable Internet (Internet Society – Africa Summit, Event Summary, 2021).

In 2020, the summit gathered the experiences of several community networks and stakeholders to discuss enabling policies for these networks, community engagement strategies, and financing and sustainability models. It also shared first-hand experience on how two community networks – BOSCO Uganda and Pamoja Net – are operating.

Both BOSCO Uganda and Pamoja Net shared information on their business models. BOSCO Uganda stated that they adopted solar power for their entire network because they found the model sustainable. They also have a Memorandum of Understanding (MOU) and a joint bank account managed by both the school management and the community network, which is signed by directors from both institutions.

Solar power also helps with financial sustainability: funds saved from what would have been paid for the national electrical grid go into a joint account and are directed towards replacing equipment, supporting the maintenance of the network, and paying salaries for the technical staff who oversee the equipment, solar-powered

system, and their computer lab. BOSCO Uganda uses part of the saved funds to support other new energy projects (Internet Society – Africa Summit, Event Summary, 2021).

Pamoja Net operations are based on local people who volunteer to offer services. Financial contributions from local businesses such as hotels and coffee farms on Idjwi island help to meet the financial costs linked to running the network. Other community members are able to have free access to the Internet in the late afternoon. The community network also uses solar energy because it is more affordable.

6.9 Conclusion

The above examples show that community networks create impact in several different areas and catalyze change. These networks take many forms. They are communities connecting on their own terms, to meet their own needs. The most successful and sustainable community networks involve partnerships between different stakeholders from governments, the private and non-profit sectors, and people in the community.

These networks are sustainable solutions that are proving to be successful in growing the Internet and providing new opportunities for people who need it the most. To truly address the digital divide and its many implications, we need to foster the conditions for these networks to exist and thrive. Multistakeholder partnerships are a proven way of doing so, and we encourage collaborative efforts such as the ones highlighted here to support community networks.

6.10 References

Association for Progressive Communications (2021). Home Page. Retrieve 11, 2021, from <https://www.apc.org/>.

Internet Society – ICS (2021). Indigenous Connectivity Summit 2020. Retrieved 11, 2021, from <https://www.internetsociety.org/events/indigenous-connectivity-summit/2020/>.

Internet Society – Murambinda Case Study(2021). Scaling Opportunity with Murambinda Works. Retrieved 11, 2021, from <https://www.internetsociety.org/issues/community-networks/success-stories/murambinda/>.

Internet Society – Africa Summit, Event Summary (2021). Reimagining the Summit on Community Networks in Africa during the COVID-19 Pandemic. Retrieved 11, 2021, from <https://www.internetsociety.org/events/summit-community-networks-africa/2020/event-5/event-summary/>.

Internet Society – Waimanalo Case Study (2021). Connecting to sovereignty with the Waimanalo Community Network. Retrieved 11, 2021 , from <https://www.internetsociety.org/issues/community-networks/success-stories/waimanalo/>.

Internet Society Foundation (2021). Course guides Brazilian community networks on how to get legal recognition. Retrieved 11, 2021, from <https://www.isocfoundation.org/story/course-guides-brazilian-community-networks-on-how-to-get-legal-recognition/>.

Internet Society Zimbabwe Chapter (2019). Planting the seeds of The Internet of Things in Africa. Retrieve 11, 2021, from <https://isoc.org.zw/wp/planting-the-seeds-of-the-internet-of-things-in-africa/>.

Rodrigues, Nelso (2020). From Isolation to Preparedness and Empowerment in Rural Argentina. Retrieved 11, 2021 , from <https://www.internetsociety.org/blog/2020/04/from-isolation-to-preparedness-and-empowerment-in-rural-argentina/>.

United Nations (2021). Press Release With Almost Half of World's Population Still Offline, Digital Divide Risks Becoming 'New Face of Inequality', Deputy Secretary-General Warns General Assembly. Retrieved 11, 2021 from <https://www.un.org/press/en/2021/dsgsm1579.doc.htm>.

Williams, Audra & Muller, Charlie (2021). Libraries Are Bridging the Digital Divide:. Retrieved 11, 2021, from <https://www.internetsociety.org/blog/2021/03/libraries-are-bridging-the-digital-divide/>.

7 Keeping the World Alive: An Alternative Story for Funding Community Networks

Nicola J. Bidwell[53]

7.1 Abstract

In this essay I reflect on my prior studies of rural Community Networks (CNs) in the global souths and international advocacy for CNs to consider the question "what do sustainable funding models really encourage CNs to sustain?" I suggest that current financial models bind CNs in a story that contributes to anthropogenic climate crisis because it does not value, what Stefania Barca calls, the "forces of reproduction". Tensions emerge between local practices that sustain the commons and the market logics that shape how CNs value, locate and scale the technologies they use and the work done in maintaining them. Yet, CNs also offer an opportunity to reimagine how funding models might support collectively keeping the world alive; such as by combining CNs with financial technologies in radically different ways.

7.2 Introduction

"…linking connectivity to certain economic enterprises distracted from our original need, which was about defending the forest to sustain life", he sighed. In the decade since that downriver trip to a South East Asian village, I've heard various people in the Global Souths speak about the difficulties in reconciling socio-environmental sustainability with resourcing Community Networks (CNs). Sobered by the IPCC report for 2021, I am left asking "what do sustainable funding models really encourage us to sustain?" In this essay I suggest that CNs are bound in a master story that contributes to anthropogenic climate crisis because they emphasise the forces of production, and not what Stefania Barca calls the "forces of reproduction". I suggest, however, that CNs offer an important opportunity to reimagine funding models in ways that contribute to keeping the world alive. To do so I reflect on my prior studies of rural CNs and international advocacy for CNs and my hands-on

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engagements with CNs and with indigenous peoples in other ICT projects (e.g. Bidwell et al., 2008).

My engagement with CNs began in 2008 in rural South Africa, when my insights and relationships whilst living in a village inspired installing long-distance Wi-Fi between three headmen along the wild coast. I was, however, unaware of the term 'community network' until later, when my action research in nearby villages (Bidwell et al., 2014) fed into the emergence of a CN (Bidwell et al., 2013). Since then I mentored a student who started a CN in his village, near my home in Namibia (Louwe et al., 2018), worked with Ju|'hoan people in the Kalahari (Bidwell et al., 2021b) and undertook multi-sited qualitative research on rural CNs in India, Indonesia, Argentina, Mexico, Uganda and South Africa and on international advocacy for CNs (Bidwell, 2021a). Local practices at all the rural sites of the CNs that I've encountered have sustained their local commons, managing land-use for dwelling, gardening and grazing, and access to water; preventing agricultural monopolies; and sharing skills to recycle and repair (e.g. Bidwell, 2020; Bidwell, 2021b). Equally, however, all the rural sites of the CNs are affected by extractive relationships. Participants spoke of mining and of privatising or diverting water for hydroelectricity in nearby areas, of producing charcoal and selling agricultural produce and tourist experiences into urban markets. Indeed, as I suggest next, at these rural sites tensions emerge between practices that sustain common life and the market logics that shape the technologies and technological work involved in CNs.

7.3 Framing in the Forces of Reproduction not Production

We often say that CNs are all about people's local relations. Yet funding strategies are firmly situated in a politico-economic framework that transforms capital into products by objectifying relations and commodifying raw materials and labour. Market logics are assumed inevitable throughout development discourse and in the context of the high returns in the technology and telecommunications sectors in general, CNs are often framed as "humanitarian goods" (Collier et al. 2017) or things that enable financial gain while doing good. To advocate for improved regulatory environments activists

argue for open markets and the contribution of CNs to growth in the telecommunications industry and regional commerce (see: Bidwell, 2021). Meanwhile, funders assess the feasibility of proposed projects in relation to financial returns or risks, which promotes modelling CNs as business enterprises, with categories such as customer segments, cost structure and revenue streams (see: Bidwell, 2021).

Market logics shape the ways that the technologies and technological work involved in CNs have value in production: a way to transform funding into products. CN revenue models involve charging fees to local businesses or selling services, such as printing and online bill payment, while users of village ICT centres and wi-fi hotspots trade or access information about market prices for their agricultural products. Not only does this framing of entrepreneurial citizenship treat poverty as a dormant source of value, it is not inclusive (Irani, 2019). While the work involved in creating and sustaining a CN comprises many different activities and relations, CNs usually align with a market logic that monetarises only technological labour. Many tasks that directly contribute to installing, maintaining and managing a CN remain invisible in modelling the economics of CNs, such as cooking meals or childcare during meetings or coordinating the distribution of parts during technical installation. That is, the value chain articulated in funding models excludes the practices that reproduce the community and the communality that keeps a CN alive.

The materialist framing of CNs, replicated by funding models, is in tension with taking care of the biophysical conditions for sustaining life. In her feminist ecological critique of the Anthropocene, Barca explains that women's predominance in work that keeps the world alive is not a result of an innate nature, but of local and global sexual divisions of labour. Reproductive labour includes daily practices, such as subsistence farming, fishing and gathering, gardening, domestic work, nursing, healthcare, teaching, waste collecting and recycling, and grassroots eco/peace activism such as protesting mining or logging. However, funding models promote activities that are apart from the sites of reproduction and the technologies chosen by CNs rehearse their role as instruments for production. Thus, CNs frequently chose technologies, such as Wi-Fi, that cannot provide access while doing domestic and subsistence work, such as moving

between kitchens, streams, forests and gardens. Market capitalism has, historically, eroded the commons and while several CNs have enabled local communities to defend interspecies relations, such as forests and water, it appears that to date only one call for proposals explicitly imagines CNs in earthcare.

7.4 Resistance through Plurality not Scale

Like those seeking to protect the earth's commons, a struggle of rural CNs is finding ways to utilise and influence macro-scale structures, such as financial and regulatory mechanisms, to enable local control. A "the-bigger-the-better", quantitative logic of market economic systems tends to shape institutionalised meanings of impact. Thus, paradoxically, the pathways for CNs to influence institutions often become oriented towards scalability rather than towards the multiplicity that aligns with the way CNs serve small geographical communities. Activists working on behalf of many geographically distributed CNs fly between cities around the world in an attempt to influence policy and regulation. They traverse spatial scales that contrast with, and make invisible, the everyday movements of reproduction within CNs. Local nuances of reproduction are similarly obscured when engineers harness the efficiencies of scale for network components and local CNs seek to make their endeavours financially resilient. In the context of telecommunications, the trope of scale demands particular interrogation, given the ICT sector currently constitutes over 2% of global emissions, (Jones, 2018) and if trends continue within the next eight years that figure, which is similar to emissions in the aviation industry, will be attributable to telecommunications companies alone (Vodafone Sustainable Business Report 2018, 2018). Meanwhile, the valorisation of financial and ecological resilience rehearses a view of the immutability of current economic systems and removes expectations of citizens resisting the forces of production in causing ecological crises.

Some civil society organisations act as intermediaries between CNs that need small-scale financial support and funders that focus on large-scale initiatives. As Jensen (2018) explains, CNs are unattractive to traditional development funders, not only because they lack profit orientations, large customer bases or low per-user overhead costs but

also because disbursement is relatively more costly for small projects. Thus, intermediaries can aggregate the needs of many CNs and manage disbursements from large funding sources. The calls for proposals in recent initiatives providing grants to CNs, such as the APC, illustrate how such disbursement can potentially support "multiplication" rather than scale, by accounting for CNs with diverse goals, operations and difficult to measure impacts. Nonetheless, certain approaches are promoted, such as business models or particular equipment, because intermediaries' funding activities often lie alongside other goals, such as advocacy or exchanging knowledge between CNs.

Building a movement for CNs by facilitating connections between them is, of course, vital. However, a materialist framing of funding and technology, that marginalises the forces of reproduction, makes invisible the territorial differences that sustain life. The forces of reproduction described by Barca are inherently created and embedded within specific relations between humans and other living and non-living beings in those places. Scale, rather than multiplicity, neglects that ways of knowing, being and doing to sustain life are situated in ontologies and epistemologies that deeply connect to those places, or pluriversal perspectives (Escobar, 2018).

7.5 Funding Community Networks to Keep the World Alive

The power of contemporary economic systems certainly makes reframing CNs in an alternative to the master story of production a challenge. Yet, contesting economic determinism and assumptions about the inevitability of market logics and tropes about scale and resilience is not new. The sustainable degrowth movement, for instance, has increased recognition of the value of local, reciprocal services, beyond the market and downscaling production and consumption to enhance ecological conditions. Meanwhile, there are increasing proposals for using modern technologies as "convivial tools" (Esteva, 2014) that put life at the centre and locally and autonomously limit the economic sphere and the power of industrial technologies. Thus, I conclude this essay by imagining how CNs, untapped opportunities for funding and new financial technologies might help liberate the forces of reproduction through pluriversal perspectives.

Crowdsourcing from outside a community and corporate social responsibility programmes offer untapped opportunities for funding CNs (Jensen, 2019). Meanwhile, traceable, transparent and irreversible self-executing contracts that run on blockchains offer potential for accessible, automated incentive systems that can directly "reward" sustainable practices, such as regenerative agriculture, carbon offsets or crop insurance (e.g. Adelyn, 2021). Discussion of these concepts has not yet accounted for prioritising the forces of reproduction, however, our experience in designing and trialling a blockchain-based platform, Smart Donations, offers some insight into how they might. Smart Donations enables users to program automated donations in response to data about real-world events, for instance, users could automatically donate to disaster response based on real-time data about cyclones forming in different regions of the world or to a climate action campaign whenever the temperature in their city exceeded the average on record (Bidwell, 2021c). People who used the platform experienced senses of agency and connection to events and beings far away and, thus, I propose that combining financial technologies with CNs might enable collective support for activities that reproduce life. Critical to this model of funding is explicitly and deliberatively framing financial and telecommunication technologies used as instruments of reproduction. This requires prioritising the forces of reproduction in connectivity and funding models and orienting technologies by the relations that sustain local life; for instance, by ensuring decisions about access are shaped by the needs of the work of conservation, subsistence provisioning, gardening or reforesting, and caregiving in homes.

7.6 References

Bidwell, N.J., Standley, P., George, T., Steffensen, V. (2008). The Landscape's Apprentice: Lessons for Design from Grounding Documentary. In Proceedings of Designing Interactive Systems. ACM. (pp 88 – 98).

Bidwell, N.J., Reitmaier, T., Rey-Moreno, C., Roro, Z., Siya, M., Dlutu, D. (2013) Timely relations in rural Africa. In Proceedings of the 12th International Conference on Social Implications of Computers in Developing Countries. The International Federation for In-formation Processing (IFIP) WG 9.4: 92 -106. Springer.

Bidwell, N.J. Robinson, S., Vartiainen, E., Jones, M., Siya, M., Reitmaier, T., Marsden, G., Lalmas, M. (2014) Designing social media for community information sharing in rural South Africa. In Proceedings of the Southern African Institute for Computer Scientist and Information Technologists Annual Conference (SAICSIT). ACM.

Bidwell, N.J. (2020) Wireless in the Weather-world and Community Networks Made to Last. In Proceedings of the Biennial Participatory Design Conference. Colombia. ACM.

Bidwell, N.J. (2021a) Rural Uncommoning: Women, Community Networks and the Enclosure of Life. In Transactions on Computer-Human Interaction 28 (3). ACM (pp 1-50).

Bidwell, N.J. (2021b) Decolonising in the gaps: Community Networks and the identity of African innovation. In Media, Culture and Technology in the Global South: Reimagining Communication and Identity in Africa and the Caribbean. Ed: Hopeton Dunn. Palgrave.

Bidwell, N. J., Elsden, C., Trotter, L., Hallwright, J., Moore, S., Jeite-Delbridge, K., ... & Vines, J. (2021c). A Right Time to Give: Beyond Saving Time in Automated Conditional Donations. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems. ACM. (pp. 1-20).

Bidwell N.J., Arnold, H., Blackwell, A., Nqeisji, C., Kunta, /K., Ujakpa, M. (2022) AI Design and Everyday Logics in the Kalahari. In The Routledge Companion to Media Anthropology; (Ed) E. Costa, P. Lange, N. Haynes, J. Sinanan. Routledge. In Press.

Collier, S. J., Cross, J., Redfield, P., & Street, A. (2017). Preface: Little Development Devices / Humanitarian Goods. Limn(9). <https://limn.it/articles/precis-little-development-devices-humanitarian-goods>.

Escobar, A. Designs for the pluriverse: Radical interdependence, autonomy, and the making of worlds. Duke University Press, Durham, 2018.

Esteva, G. (2014). Commoning in the new society. Community Development Journal, 49(1) (pp144-159).

Hasan S., Barela M.C., Johnson M., Brewer E., Heimerl K. (2019) Scaling community cellular networks with community cellular manager. In Proceedings 16th {USENIX} Symposium on Networked Systems Design and Implementation ({NSDI} 19) (pp. 735-750).

Irani, L. (2019) Chasing Innovation. Making Entrepreneurial Citizens in Modern India Princeton University Press.

Jensen, M. (2018) Towards financial sustainability in community-based networks. In Global Information Society Watch: Community Networks. APC.

Jones, N. (2018) How to stop data centres from gobbling up the world's electricity. Nature NEWS FEATURE 12 September. <https://www.nature.com/articles/d41586-018-06610-y>.

Louw, Q., Coffin, J., Muller, C. (2018) The seed of a community network. In Global Information Society Watch: Community Networks. APC.

Schneider, F., Kallis, G., Martinez-Alier. J (2010) Crisis or opportunity? Economic degrowth for social equity and ecological sustainability. Introduction to this special issue. Journal of cleaner production 18(6) (pp 511-518).

Zhou, Adelyn (2021) Blockchain can help us beat climate change. Here's how. World Economic Forum <https://www.weforum.org/agenda/2021/06/blockchain-can-help-us-beat-climate-change-heres-how/>.

8 Universal Service Funds for Urban and Rural Community Networks: The Barrios Populares and Roberto Arias Programs in Argentina

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8.1 Abstract

This article addresses the incorporation of community networks as beneficiaries of Universal Service Funds in Argentina through two programs. The first one is aimed at shanty towns and incorporated community networks among the ICT licensees eligible to apply in 2020. On the other hand, the Roberto Arias program was created specifically for community networks in rural areas of up to 5000 inhabitants in 2021. In addition to highlighting the main characteristics of both programs, an overview of the advocacy actions that promoted these measures is presented, which are an important precedent for other countries in the region and the world.

8.2 Presentation

Policies aimed at implementing Universal Service are important to reduce the so-called 'digital divide', that is to say, the exclusion of sectors of the population from access to ICT services, with serious effects on their social and economic development. Among the regulatory proposals to promote it to small operators and, in particular, community networks as key players in bringing connectivity to these underserved populations and communities, support through the Universal Service Fund (USF) is among the available tools, along with access to basic infrastructure resources, spectrum, equipment and backhaul, and others (APC, Redes A.C. & UPC, 2020).

This article analyzes two pioneering USF programs in Argentina with respect to the incorporation of community networks as beneficiaries of this type of funding. The following pages are organized as follows: first, a brief historical overview of the implementation of the USF in

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Argentina is proposed. Then, the advocacy strategies developed by community networks to access this type of financing are discussed. Thirdly, the historical and political conditions that generated the framework that made these measures possible are contextualized. Fourth, the Barrios Populares program is analyzed, which for the first time incorporated community networks among the possible applicants to the call for proposals. Fifth, the main points of the Roberto Arias program, created specifically for community networks operating in towns of up to 5,000 inhabitants, are reviewed. Finally, some final words are proposed to put forward some readings of this auspicious and incipient process, as a contribution on the lessons learned from these programs that contemplate rural and urban community networks.

8.3 The path of the Universal Service Fund in Argentina

With the privatization and liberalization of telecommunications since the 1980s and 1990s, in addition to the emergence of new regulatory authorities, the creation of Universal Service Funds (USF) was promoted to extend telephony services to less densely populated areas, less attractive to the telecommunications market. The USF is made up of contributions from a percentage of the revenues of the sector's operators, close to 1% of their turnover, which, given the volume of the business, reaches considerable sums. Universal Service is a dynamic concept since it is updated as new technologies and services are developed, in order to adapt its objectives from a rights perspective.

A widespread shortcoming in Latin America was the delay in the creation and application of these Funds and Argentina was no exception: the Universal Service was created in 2000 through Decree 764, in other words, 10 years after the privatization of the National Telecommunications Company [Empresa Nacional de Telecomunicaciones, ENTel]. Then it took almost another decade to achieve the effective creation of the Universal Service Trust Fund and its implementation was restricted. In 2014, with the enactment of the Argentina Digital Law 27078, it was sought to enhance its use: the regulation redefined issues related to the source of financing of the Universal Service and made its implementation process more

flexible through specific programs in charge of the national regulatory authority (Maule, 2019). From 2016 onwards, new programs began to be implemented, which initially aimed mainly at localities of up to 2,500 inhabitants (a number that was later expanded), but their requirements were oriented to ICT licensees and were exclusive for community networks.

Between 2016 and 2019, the USF in Argentina was implemented for the development of broadband infrastructure in areas of up to 10,000 inhabitants mainly, through Non-Refundable Contributions that can be accessed by ICT licensees that meet the requirements of each call, in an open window system and on a first-come, first-served basis. The continuity of the state-run Federal Fiber Optic Network [Red Federal de Fibra Óptica] was also financed (Baladron, 2019), the delivery of devices such as tablets to senior citizens and women in rural areas (Baladron and Fontanals, 2019).

8.4 The advocacy work of community networks

The collective work of community networks and the exchange of experiences in the Latin American region has a long history. However, it is worth mentioning among its recent milestones the organization of the Latin American Summit of Community Networks, which had its first edition in Argentina in 2018, promoted by the organization AlterMundi. Then, a document was produced that provided a definition of community network and a diagnosis of the main challenges in terms of financing and regulatory framework, among others. Recommendations were also detailed, including the development of "clear and agile policies and mechanisms for the allocation of Universal Service Funds to community networks." (Cumbre Latinoamericana de Redes Comunitárias, 2018)

At the national level, one of the achieved advances that same year was the recognition of community networks as non-profit providers through Resolution 4958 of the national regulatory authority of Argentina [Ente Nacional de Comunicaciones, ENACOM]. Article 2 defines Community Networks as "those composed of infrastructure managed by their own users or by the non-profit entities that group them together, allowing and promoting their expansion through the incorporation of new users or connecting with neighboring

Community Networks; in towns of no more than five thousand (5,000) inhabitants". The application for the license is exempted from the fee paid by commercial licenses and is established under registry denomination "Value Added Service – Internet Access, Community Network Holders", with the acronym VARC.

Regarding the demand for access to the USF, the organizations AlterMundi – based in Córdoba and which promotes the creation of community networks – and Proyecto Comunidad – which develops the Atalaya Sur network in Villa 20, a shanty town in the City of Buenos Aires – agreed to prioritize this issue in their agendas. Among the arguments put forward for the State to finance the deployment of this type of networks with Universal Service Funds, they mentioned the historical postponement of its execution and that it is a source of financing that does not depend on the national budget, but is constantly renewed by the telecommunications industry itself. In addition, the USF aims to bring connectivity to the most underdeveloped areas and the two organizations were already carrying out this task (Baladron, 2021). Therefore, through various strategies – which included meetings with the regulatory body, participation in forums, awareness raising through press releases, among others – they made their experience known in terms of technological, management and organizational model, less costly and more effective for rural areas and shanty towns.

Although there was a channel of dialogue with ENACOM, the agency that implements the USF, no further progress was made until the end of 2019. After obtaining the non-profit license in 2018, AlterMundi presented a project to a call for commercial providers in agreement with one of the directors of the agency, to identify barriers as non-profit providers. However, the file did not move forward and AlterMundi did not get a clear answer as to the reason for the denial. On the other hand, Atalaya Sur applied for an ICT license with an Internet Value Added Service in force (commercial) but also failed to access the USF because the population of the shanty town where they operate is 30,000 inhabitants and exceeded the limits of the current programs. In addition, there were other barriers: the licensee had to contribute 20% of the project's capital – a very high amount for non-profit social organizations – and the items

that could be financed only covered technical equipment and did not contemplate other expenses such as training, maintenance, etc. These difficulties were raised with several officials and the response received was that a specific line was going to be created, but in the end it did not materialize.

8.5 The momentum of the Argentine Summit of Community Networks (CARC)

At the end of 2019, the first Argentine Summit of Community Networks [Cumbre Argentina de Redes Comunitarias, CARC] was held in La Serranita, Córdoba, promoted by AlterMundi and in continuity with the Latin American experience. The objective was to promote the strengthening of ties, organization and gathering between the experiences of community networks at the national level, both those in operation and others in the process of development. Other related institutions and university research groups also participated in this space.

The Summit concluded with a document (CARC, 2019) that identified a series of proposals for public policy advocacy, linked to the work done at the regional level, but with some specific aspects of the local context. In this sense, in addition to setting out the demands of the group, it included concrete measures that could be taken to satisfy them. For example, it detailed the specific barriers faced by community networks in accessing Universal Service Funds, as these programs were being implemented.

At the beginning of 2020, before the social isolation was decreed due to the COVID-19 pandemic, CARC organized a face-to-face meeting in Buenos Aires with the participation of representatives of the organizations and some officials from agencies related to telecommunications, cooperatives and family farming who were starting a new administration, after President Alberto Fernández took office in December 2019 (Flor, 2020). There, the document prepared by CARC was presented and it was proposed to create a working table between the different state agencies in order to address the identified demands. Shortly after, the new directors of ENACOM called a meeting to know the demands of the community sector linked to community media and community networks, which was also attended by representatives of CARC.

8.6 Public connectivity policies in the context of the COVID-19 pandemic

Starting March 2020, as a consequence of health measures to prevent COVID-19 infections, there was a greater demand for the use of the Internet to access fundamental rights, and inequality in access to connectivity became a socially problematic demand. Some government measures were implemented to address the emergency, as happened in many other countries, such as suspending the cut-off of essential services (including Internet access) and enabling browsing without data consumption for educational portals. The Argentine government also announced investment in state-managed infrastructure through the 'Conectar Plan' (Jefatura de Gabinete de Ministros, n.d.) and declared internet access, mobile telephony and paid TV services as essential public services and in competition with Decree 690.

Regarding the Universal Service Fund, a new regulation was issued in 2020 and programs were created that expanded its scope to public establishments, slums and industrial parks, to mention just a few[3]. Within ENACOM's Promotion and Development Directorate, which is in charge of implementing the USF, the Special Projects Sub-Directorate was created, which played a key role in the dialogue with CARC organizations and in the emergence of the Barrios Populares and Roberto Arias programs that include community networks.

8.7 The Popular Neighborhoods Program (Programa Barrios Populares)

In the context of the first health measures to prevent COVID-19 contagions, the situation of shanty towns was placed on the public and media agenda due to the health risks, given the overcrowded conditions in which their inhabitants live, and the limited access to public services, including internet, both due to lack of coverage and affordability.

Popular neighborhoods/slums[55] bring together diverse economic, political and territorial dynamics and "concentrate all inequalities and

55 A popular neighborhood is considered to be "vulnerable neighborhoods where at least 8 families live grouped or contiguous, where more than half of the population does not have title to the land or regular access to two or more of the basic services (running water network, electricity network with household meter and/or sewage network)". See <https://www.argentina.gob.ar/noticias/barrios-populares (last accessed 20/10/2021).

all social difficulties" (Dubet, 2015: 25). According to the National Registry of Popular Neighborhoods [Registro Nacional de Barrios Populares, RENABAP] there are 4,416 neighborhoods inhabited by approximately 4 million people (10% of the country's population) in Argentina. Eighty-four percent correspond to settlements and 16% to slums. Of the 706 slums surveyed, approximately 50% are located in the Buenos Aires Metropolitan Area.

In this context, on June 2020, ENACOM created the "Program for the Development of Internet infrastructure for slums and settlements registered in the National Registry of Popular Neighborhoods in the Process of Urban Integration" (RENABAP).[56] The amount allocated was 1,000,000,000 Argentine pesos (US$ 14,784,151).[57] It is very important for the State to support the development of infrastructure in shanty towns due to the aforementioned social and economic vulnerability situation and because they were not considered in previous USF programs, since many of them are located in urban areas that exceed the limit foreseen with respect to the number of inhabitants.

This program is also noteworthy because it is the first time that providers with community network licenses (VARC) have access to Universal Service Funds in Argentina[58] and because some of the measures proposed by CARC and other small operators were taken into account. Among them, 100% financing of the projects was enabled, in contrast with previous calls for proposals where only up to 80% of the investment was covered.

In addition to the usual active and passive infrastructure expenses foreseen for the deployment or expansion of broadband Internet access networks, the possibility of covering other items that were not considered until then was included: professional fees and project management expenses; labor; and equipment for up to 30% of the end users of the project (routers, modems, cabling, etc.), without the cost being passed on to the beneficiaries; and a bonus for the first 6 months of wholesale transport, once the network is in service.

56 Resolution 726/2020, available at: <https://www.boletinoficial.gob.ar/detalleAviso/primera/231697/20200703> (last accessed 20/10/2021).

57 According to the average official quotation of the U.S. dollar for the month of June 2020 according to the Central Bank of Argentina [Banco Central de la República Argentina -BCRA-].

58 Although the VARC license is limited to towns of up to 5,000 inhabitants, this type of service providers has been authorized to provide services in slums through this program.

The requirements of the program aimed at Barrios Populares include the presentation of an advance payment guarantee and a performance bond, which represent a percentage of the amounts approved for the projects that the successful bidder has to contribute with and are returned once all obligations have been fulfilled.

This requirement is usual in the implementation of Universal Service Funds in Argentina for cooperatives and SMEs and, although a lower percentage was considered for providers with VARC licenses, this represented a difficulty for social organizations. The advance payment guarantee corresponds to 30% of the amount approved for the project for ICT licensees and 15% in the case of providers with VARC licenses. The performance guarantee is 10% of the total budgeted amount for ICT licensees and 5% for VARC licensed providers.

Given the characteristics of low-income neighborhoods, the program incorporates two distinctive issues. First, the possibility of installing a technological station[59] for every 5,000 inhabitants, to be projected on pre-existing infrastructure such as establishments managed by social and community organizations. Secondly, to provide free access to libraries and other types of social management facilities. Also, at the time of evaluating the projects, priority is given to those that are rooted in the neighborhoods.

Approximately one year after the creation of the program, 16 projects submitted by different types of providers have been approved: cooperatives, civil associations, private and state-owned companies, to develop infrastructure in 224 popular neighborhoods in different parts of the country. Meanwhile, there are more than 70 projects in various stages of evaluation within ENACOM in the framework of this program.[60]

The projects coming from civil associations belong to Atalaya Sur, El Hormiguero and La Poderosa. The last two correspond to social organizations with territorial work in the neighborhoods but with no previous experience in connectivity. In the case of Atalaya Sur,

59 The program defines technology stations in this way: "Set of technology devices (desktop computers, personal computers, printers, scanners, tablets) located in an establishment managed by a public or community organization within the popular neighborhood object of the project, which has a technological floor and allows the development of tasks in a digital environment."

60 Data provided by ENACOM's Special Projects Sub-Dictatorate.

it already had a community network in operation since 2014, which included a public access network with WiFi points and a wired home network serving 50 households until mid-2020. Prior to the award of the USF project in 2021, Atalaya Sur obtained another financing granted by the National Ministry of Productive Development under a program for the COVID-19 emergency that allowed them to extend the network and reach 540 homes. With the new USF funding, the proposal presented aims to connect another 500 homes and deploy fiber optics to create a ring to connect the backbone network.[61]

8.8 A specific program for community networks: Roberto Arias[62]

In June 2021, ENACOM launched the Roberto Arias Program, specifically aimed at financing community network projects for the installation, development and/or improvement of fixed Internet service with Universal Service Funds. The beneficiaries are ICT licensees with Value Added Internet Access Service Registry, Community Network Holders (VARC), who already have a license or who are in the process of obtaining one at the time of submitting a project. As mentioned above, these providers are authorized in towns of up to 5,000 inhabitants. At the same time, priority is given to rural family farming communities and communities of indigenous peoples, in coordination with other public policies.[63]

The initial amount allocated to the program is 300,000,000 Argentine pesos (approximately 3,150,000 in U.S. dollars),[64] which is awarded through the presentation of projects. In the preliminary considerations

61 This information arises from an interview with Manuela González Ursi, coordinator of the Atalaya Sur Project, on September 27, 2021.

62 Roberto Arias was a popular communicator, founder of a community radio station in San Martín de los Andes, promoter of the Mapuche cause and promoter of an Intercultural Neighborhood, who died in 2019.

63 Argentina has recognized in its National Constitution the ethnic and cultural pre-existence of indigenous peoples and the recognition of their rights (art. 75 inc.17), while the National Institute of Indigenous Affairs implements social policies and programs that enable their access to land ownership, promotion of their production and cultural preservation. On the other hand, in 2014 family, peasant and indigenous agriculture was declared of public interest, with a specific area for the design of plans, programs and projects for the sector within the Ministry of Agriculture, Livestock and Fisheries.

64 The amount is U$S3,149,696 according to the quotation of the US dollar corresponding to the average of the month of June 2021 of the Central Bank of the Argentine Republic (date of creation of the Program).

of Resolution 799[65] which creates the Program, it is highlighted that the provision of ICT services must reach all the inhabitants of the Nation, "in conditions of quality, affordability and at fair and reasonable prices, regardless of their geographic location", as recognized by the Argentina Digital Law 27078. It also mentions that "there are areas of the national territory that have not been included within the current Universal Service programs" because they are "localities with difficulties to qualify and therefore access the corresponding subsidies".

It also refers to Recommendation ITU-D 19 of the International Telecommunication Union (ITU) for rural and remote areas, which proposes the consideration of small non-profit community operators and the implementation of appropriate regulatory measures so that they can have access to basic infrastructure on fair terms. Therefore, the universalization of access to ICTs under equitable conditions is recognized as a mandate and objective; the existence of excluded populations where the State is not responding with the current Universal Service programs; and the importance of considering community networks as providers in those places and, to that end, creating the conditions for them to have access to infrastructure.

In view of these objectives, this program presents several differences in terms of requirements and obligations in comparison with those pre-existing for the implementation of Universal Service Funds in Argentina. The particularities of the Roberto Arias program respond to the characteristics of the populations and providers it intends to reach, as proposed by the Argentine Summit of Community Networks (CARC) and taken into account by ENACOM's Special Projects Sub-Directorate, in a process of dialogue and exchanges between the State and community networks stakeholders. This aspect is fundamental, that is to say, that the specific conditions of the territories and populations to be reached have been taken into account for the design of the program and community networks as key actors, even incorporating new conditions without precedents in the field of ICTs.

65 Available at: <https://www.boletinoficial.gob.ar/detalleAviso/primera/246407/20210702> (last accessed 20/10/2021).

8.9 Program Highlights

First, the Roberto Arias program replicates some of the novel points that had been incorporated in the Barrios Populares project: the financing of up to 100% of the projects and the recognition of new items that can be included in the project framework, which was previously limited to active and passive infrastructure. These include labor, network maintenance and the cost of the wholesale transport network for a period of 6 months.

However, the Roberto Arias program introduces important changes that had not been considered in any other program until now:

- The possibility of financing the necessary equipment for the connection of end users (router, modems, cabling, etc.) to the infrastructure deployed, without passing on to them the cost of installing the service, since they are non-profit providers. In the case of the Barrios Populares program, this possibility reaches only 30% of end users.
- Among the types of technologies (wired, wireless or mixed networks) the deployment of community networks "with wireless mesh topology (called "mesh" networks implemented with open source wireless routers)" is recognized.

This point is fundamental for the recognition of LibreRouter[66], already approved in Argentina and used by many of the community networks currently in the country. On the other hand, the program mentions the possibility for ENACOM to authorize other technical specificities, as justified by difficulties in the territories due to the community nature of the projects.

- Professional services – registered engineer, accountant, etc. – for the formulation of the project (in case it is approved) and those corresponding to its management and accountability can be incorporated as an item to be included in the project, considering that in most cases the organizations do not have the resources to face these additional expenses to comply with the administrative requirements. Although this item is also included in the Barrios Populares program, the expenditure that may be computed for these services has been increased.

66 See <https://librerouter.org/es/> (last accessed 20/10/2021).

- Guarantee requirements (both advance payment and performance bonds) have been eliminated, which makes a significant difference to the viability of the projects.

Finally, each VARC licensee may submit up to 2 projects under this program and the minimum amount to be financed per project is 300,000 Argentine pesos (US$3,150) and the maximum amount is 10,000,000 Argentine pesos (US$104,897).[67] The presentation of projects requires the preparation of a technical folder, an administrative folder and an investment plan. If approved, the maximum term to carry out the proposal is 18 months. Given the recent approval of the Program, there is still no data on its implementation.

8.10 Final words

It is possible to identify a series of situations that performed as enablers for the emergence of USF programs that include community networks in Argentina. In the first place, the historical context of 2020 coincided with the change of political sign of the national government, with the new administration of the Frente de Todos, and the situation of the COVID-19 pandemic, which turned inequality in terms of Internet access into a socially problematized issue. Although some meetings between community network organizations and the new sectoral authorities had already taken place prior to the health emergency, the issue took on an unprecedented urgency.

Secondly, the previous organization and advocacy work of the community networks and the strengthening of their regional and national networks created the conditions for the possibility of the programs, with political subjects with the capacity to carry out these projects. In this way, public policy can support and promote the sustainability and scalability of this model of community connectivity provision. In turn, the recognition as a VARC licensee obtained in 2018 was an important precedent from the regulatory point of view.

Thirdly, the creation within ENACOM – the agency in charge of the implementation of the USF – of a specific area to work these programs as the Special Projects Sub-Directorate allowed a virtuous dialogue between the new work team (with previous experience

67 Figures are based on the average value of the U.S. dollar quotation of June 2021 of the Central Bank of Argentina (date of creation of the Program).

and commitment to the community sector) and the small operators, among them, the community networks. At this point, it is worth mentioning Argentina's background regarding the recognition of non-profit audiovisual media and the financing of projects for community, indigenous and frontier media with the enactment of the Audiovisual Communication Services Law in 2009.

Among the specific changes included in the new programs that eliminated the barriers for the access of community networks to the USF, we can highlight the 100% financing of the investment of the projects, not only in terms of active and passive infrastructure but also new items such as labor, professional expenses, network maintenance, installation of service to end users and wholesale network transport costs (for 6 months). In particular, in the case of the Roberto Arias Program, the requirements for the presentation of guarantees were eliminated and the mesh topology of networks with open source wireless routers, such as LibreRouter, is recognized.

Although the creation of these programs is a fundamental advance for the development of community networks, there are still pending issues to ensure the sustainability of these projects. For example, interconnection and transport costs with a wholesale provider (once the 6-month period contemplated by the programs has elapsed). Therefore, there is still a long way to go in terms of public policies and regulatory advocacy.

8.11 References

APC, Redes A.C. & UPC (2020). Expanding the telecommunications operators ecosystem: policy and regulatory guidelines to enable local operators. PDF book, available at <https://www.apc.org/sites/default/files/APC_R1_ExpandingTelecommunication_OK.pdf>. (last accessed 20/10/2021).

Baladron, M. (2021). Redes comunitarias de internet: otro modelo es posible. En D. Monje, J. Gerbaldo, E. Rivero y A. Fernández (Coords.). Otras Plataformas. Tramas de una convergencia periférica en sectores populares, comunitarios, cooperativos y alternativos. Córdoba: Lago. Available: <https://proyectoecanet.files.wordpress.com/2021/02/otras-plataformas-2021.pdf> (last accessed 20/10/2021).

Baladron, M. (2019). "El Plan Argentina Conectada: una política de Estado para las comunicaciones". Revista Ciencia, Tecnología y Política (CTyP) N° 2, Cátedra Libre Ciencia, Política y Sociedad de la Universidad Nacional de La Plata (UNLP). Available: <https://revistas.unlp.edu.ar/CTyP/article/view/7370>. (last accessed 20/10/2021).

Baladron, M. y Fontanals, G. (2019). “Los manejos de Cambiemos en las políticas de conectividad”, diario Página/12. Available: <https://www.pagina12.com.ar/229729-los-manejos-de-cambiemos-en-las-politicas-de-conectividad>. (last accessed 20/10/2021).

Cumbre Latinoamericana de Redes Comunitárias (2018). Declaración. Retrieved October 20, 2021, from <http://dercom.sociales.uba.ar/wp-content/uploads/sites/73/2019/06/Declaraci%C3%B3n_CLRC-2018_1.pdf>.

Cumbre Argentina de Redes Comunitarias [CARC] (2019). Declaración Conjunta. *CARC*. Retrieved October 20, 2021, from <https://carc.libre.org.ar/>.

Dubet, F. (2015). ¿Por qué preferimos la desigualdad? (aunque digamos lo contrario). Buenos Aires: Siglo XXI.

Flor (2020, February 18). Una semana a todo vapor. *AlterMundi.* Retrieved October 20, 2021, from <https://altermundi.net/2020/02/18/una-semana-a-todo-vapor/>.

Jefatura de Gabinete de Ministros (n.d.). Conectar: Tecnología + Inclusión + Conectividad. Argentina.gob. Retrieved October 20, 2021, from <https://www.argentina.gob.ar/jefatura/innovacion-publica/ssetic/conectar>.

Maule, M. (2019). “El Servicio Universal en la Ley Argentina Digital: Análisis de programas, c. 2014-2018” (tesis de posgrado). Buenos Aires: Universidad de San Andrés (UDESA).

9 Reflections on Sustainability from a Quilombola Women Led Community Networks

Bruna Zanolli[68]

9.1 Abstract

The community network (CN) in the Ribeirão Grande/Terra Seca quilombo has been operating since 2020, most of its time during the pandemic. Hence, its sustainability has been tested during the many adversities the Covid-19 pandemic has imposed. This essay shares some reflections about how family agriculture and traditional ways of living, local economy, feminist organizations and a CN can feedback on each other. This specific CN is analysed as a part of the local economy, therefore facing similar difficulties and successes as the community, instead of being something unattached to it. This paper also shares reflections on how a CN can help increase the local economy and at the same time – mutually – be economically sustainable.

9.2 Introduction

In the rural area of Ribeira Valley – São Paulo, Brazil – there is an Agroecological Network of Women in Agriculture (RAMA) composed by quilombola[69] women. They have been the key in articulating and sustaining a CN that started being planned in the second semester of 2019, was implemented in March 2020 and got Internet connectivity in January 2021. Thus, it has existed more in pandemic than in "normal" times, which we believe is proof of its sustainability in adversity.

The project that helped to implement this CN is a partnership between feminist organization Sempre Viva Organização Feminista (SOF, translates to "Always Alive Feminist Organization"), RAMA, quilombo residents, independent activists and FIRN (Feminist Internet Research Network), from APC (Association for Progressive Communications).

68 Activist and Community Media Consultant; Member of the Feminist Internet Research Network.

69 According to Daiane Araújo, the quilombos emerged as refuges for black people who escaped repression during the entire period of slavery in Brazil, between the 16th and 19th centuries. The inhabitants of these communities are called quilombolas. After the abolition, most of them preferred to continue in the villages they formed. With the 1988 Constitution, they gained the right to own and use the land they were on. Today Brazil has more than fifteen thousand quilombola communities. Available at: <https://www.genderit.org/feminist-talk/contribution-bell-hooks-and-paulo-freire-construction-community-networks>.

The CN fostered by the "Action-research on Feminist Autonomous Networks"[70] project came to address a lack of connectivity that imposes more barriers than the already historical ones faced by RAMA quilombola women, in a region marked by the scarcity of mobile signal, affordable broadband and other basic human rights.

RAMA is a group of women farmers living in 7 different quilombos separated by mountains. It is in the quilombo Ribeirão Grande/Terra Seca where the CN is currently operating and providing connectivity for 15 families, including RAMA members. Previously, they had to go to the highway and "fish for 3G signal" to be able to connect to the internet and enable their agroecological products sales in a cooperative way – receive the purchase orders for their agroecological products from the city, communicate with their buyers, supporters and distribution transport and also among themselves to coordinate collective sales – in order to provide a living to their families.

The CN in this quilombo has been operating for a very short time and we can't yet have conclusive observations on the sustainability of this CN to share, thus, this essay aims at sharing some reflections about how community networks, family agriculture, traditional ways of living, feminist organization and local economy can feedback on each other. It's about seeing the CN as a part of the local economy and therefore facing the same difficulties and successes as the community and how the CN can help to increase the local economy and at the same time – mutually – be economically sustainable.

Below we share some of the principles of Ribeirão Grande/Terra Seca CN that we particularly believe are important for their economic resiliency and sustainability.

9.3 Family agriculture and traditional ways of living

We have witnessed powerful and resistant ways of life from our time with quilombola people – that have been communicating, resisting and surviving despite more than 300 years of slavery and its consequences. Their logic of sustainability is much more collective than the neoliberalist status-quo of "every man for himself".

70 The project was lead by Bruna Zanolli and the research was lead by Débora Prado, with the participation of Daiane Araújo, Carla Jancz, Natália Lobo e Gláucia Marques.

For instance, the CN connectivity project came through RAMA and was shaped to benefit RAMA women farmers to help their selling of agroecological products. The only ISP that attends the region is satellite-based and only sells retail individual packages, and not wholesale internet. The project was able to provide a year of a monthly 30 gigabytes data cap package that, after exceeding the initial allotment, is reduced to a speed of only 1 Mbps, sharing it through their mesh network implemented using Libremesh.[71] The local ISP reseller was not happy with our project, but fortunately agreed to look the other way.

This internet package would already be scarce for the 6 RAMA women that live in the Ribeirão Grande/Terra Seca quilombo, but they insisted that the internet should be open to all the 15 families that live in the surrounding area.

Needless to say, it was much less than ideal and the data cap package usually ended on the first 2 days of the month. However, their communal ethics spoke louder and they prefered a low connectivity that is communal (and allows whatsapp for all) to a better connectivity that is individual. Their communal logic, which has been characteristic for centuries and already applied to the exchange of agroecological products among themselves and mutual help, was extended to network connectivity with the arrival of the internet via CN.

In adversity, communal solutions arise, so in order to derive the best out of their connectivity they have set up a creative way to be able to do their organizational meeting of the RAMA board online. Since video conferencing platforms for all participants simultaneously is not a reality yet due to their internet restrictions, they set up a day and time for all of them to be online in an whatsapp group and discuss their agenda via text and audio, being able to manage the sale of their agroecological products in a much more comfortable and secure way than trying to “fish” 3G signal on the highway.

They all agree there is a lot of space to make the CN and internet connectivity better but they want to do it in a way that benefits the whole community and are more interested in first reaching all the

71 See: <https://libremesh.org/>.

families from the quilombo so they can come together and organize themselves to buy a better internet package.

9.4 CN and the local economy feedback

When we think of sustainability in this CN context, the key question is far from "who will pay the bills?". Rather, it is "how are people – and CN – going to stay alive in the midst of an economic and health crisis?" This means that a social sustainability that can be strong enough to deal with multiple adversities and able to promote their economic resilience is what they really need to keep themselves – and CN – alive.[72]

So we're starting to think about the many ways in which CN and the local economy feedback. What first comes to mind is that the CN project came from a local economy initiative that has been working for 4 years, the RAMA women farmers group. They expressed to SOF how the internet and connectivity could improve their sales, expanding their communications with each other, the groups that market their products and their business contacts in general. Connectivity has facilitated and kept their income generation process even during the pandemic and can help them expand their sales for new buyers and local fairs – being able to communicate better through the CN and diminish intermediaries in the process. Because their economic sustainability is more stable with the presence of connectivity, a small part of it can return back to the sustainability of the CN (payment of internet bills and keeping a CN fund for improvements, already planned and soon to be implemented).

In addition, the internet makes it possible to make individual video calls or participate in lives, so that RAMA councilors and other political leaders for the defense of the land can participate in regional and national political decision-making spaces, such as the National Articulation of Agroecology, the National Meetings of the Quilombos and Environment Councils. In these meetings there are many discussions, advocacy and policies that help to maintain their

72 More about the importance of local knowledge and sovereign on building CNs in Débora Prado's article at Gender It "Community networks and feminist infrastructure: reclaiming local knowledge and technologies beyond connectivity solutions", available at: <https://genderit.org/feminist-talk/community-networks-and-feminist-infrastructure-reclaiming-local-knowledge-and>.

local economy: in order to guarantee their right to land and without invasions; fight agribusiness and the extensive use of pesticides; engage in collective agroecological sales to government and major buyers; so they can explore community-based tourism activities; and guaranteeing basic human rights – all of this has been very challenging in the current chaotic Brazilian political scenario, with constant threats to quilombolas and even a racist ultra-right conservative as director of the Brazilian federal foundation for the promotion of Afro-Brazilianity, Palmares Foundation.[73]

9.5 Feminist organization

Last but not least, we highlight how feminist approaches and practices help with the sustainability of the CN.[74] To begin with, there was a careful process of reflecting on not-to-do's[75] in order to avoid reproducing prejudices and patriarchal approaches to technology and CNs. Women have historically been the ones responsible for a house's sustainability but yet they tend to be the least heard when talking about sustainability projects.

Thinking of that, we have fostered some actions to make sure the environment was inviting for women, like shifting the focus from the technical to the human components; respecting the community time and sovereignty; working to have as much gender representativity as possible; using learning methodologies that are inclusive and inviting, such as Popular Education[76] and having all the support needed for women to be able to attend – childcare, meals for them and their cared ones, transportation and family talks to explain the project so

73 See: <https://www.reuters.com/article/us-brazil-rights-race-trfn-idUSKCN24N265>; and <https://www.bbc.com/news/world-latin-america-51501111>. (accessed October 2021)

74 More about feminist perspectives on CN on the thematic report "Feminist infrastructures and community networks", of the 2018 GisWatch, available at: <https://giswatch.org/en/infrastructure/feminist-infrastructures-and-community-networks>.

75 More about gender experiences and prejudices faced by women in the CN environments in the graphic piece"Our routes: women's node – an illustrated journey of women in community networks", available at: <https://www.genderit.org/feminist-talk/our-routes-womens-node-illustrated-journey-women-community-networks>.

76 Popular Education is a form of education very present in Latin America that values the people's prior knowledge and their cultural realities in the construction of new knowledge. Educator Paulo Freire was a great supporter of this approach, which encourages the development of a critical look at education and the participation of the community as a whole, encouraging dialogue and guided by the perspective of realizing all the rights of the people. The teaching-learning process is seen as an act of knowledge and social transformation, recognizing the importance of popular and scientific/technological knowledge.

the parents would allow the girls to participate. Also, to constantly reflect and have conversations before, during and after the process in order to create an ambiance of trust, support and respect for differences, a characteristic we believe has also contributed to the resiliency of the CN in pandemic times and to our personal growth.

So although the RAMA women were not able to participate in all implementing activities, they have the leadership of the CN and are considered the guardians of the CN, being the ones responsible for its management – giving passwords, knowing where the infrastructure is set up, doing basic troubleshooting and informing of bigger problems with accuracy – and also for its future and sustainability – looking not only to the financial aspects of it, but also to all the care work needed for the CN to exist and its importance, its care work.[77]

Along with CN, connectivity has fostered personal relations and increased their daily communications. Women do regular online check-ins among themselves and have this extra connectivity tool to look for each other; some even got more interested in the digital world after the CN. Besides, considering how the CN also feedback the RAMA group, it made them more visible to their own community. They much appreciated that a women's project brought the internet to the community, despite the distrust of some men during the process.

9.6 Final reflection

Far from reflection on closure though, a sustainable model from our perspective has been a model always open to change, not watertight – because sustainability doesn't always look the same way. The CN economic model must be resilient, adapt to reality and for that it needs a strong social organization that is inclusive, diverse, flexible and well articulated, but above all, it needs to foster and support the local economy and value the care work. To that end, each community has their own models, strategies and forms of doing it – they need to be heard and to be the structural basis for

77 Care work or labor of care is a feminist concept often associated with care giving and domestic housework roles including cleaning, cooking, child and elderly care, and the unpaid domestic labor force, it includes all tasks that directly involve care processes done in service of others. It is usually performed by women, although essential it is most of the time invisibilized and taken for granted. In the context of a CN it extends also to all the work performed in caring for the people, the space and the relations needed for a CN to exist.

its construction. So, from our perspective, to talk about a funding or economic model for a CN is not something that can be done objectively or quantitatively measured, like an easily scalable one-size-fits-all model. Instead, it needs to address specificity, work along with it and have good principles and inclusive guidelines that can support them when adversities come – and one thing we are certain of: adversities always come.[78]

78 We want to give special thanks to the inhabitants of quilombo Ribeirão Grande/Terra Seca, the women from RAMA and the women involved in our work team:
Carla Jancz is an Information Security Specialist, who works with digital security for third sector organizations and with free technologies and autonomous networks from a feminist and holistic perspective. Member of MariaLab, a feminist hacker collective that explores the intersection between gender and technology based in São Paulo, Brazil.
Débora Prado is a journalist and activist with a background in social communications, feminism and human rights. Since 2017 she has been involved in researching feminist technologies and knowledge to challenge androcentric and colonial norms.
Daiane Araujo dos Santos is a Brazilian activist in human rights and in the Information and Communication Technologies field who contributes to the implementation of community networks in Brazil, bringing discussions about critical appropriation of technology and its impact on people's social and community life. Living in the periphery of the south of São Paulo (Brazil), she graduated in Geography in 2018 and, since 2010, works in social movements.
Glaucia Marques is an agronomist and is part of the SOF (Sempreviva Feminist Organization) technical team that operates in the Vale do Ribeira region, contributing with the solidarity commercialization and with agroecological and feminist technical assistance for the Agroecological Network of Women Farmers (RAMA, in the acronym in Portuguese).
Natália Santos Lobo is an agroecologist and part of SOF's technical team in Vale do Ribeira, working with the RAMA network.

10 Gram Panchayat Development Plan (GPDP): An Opportunity for Funding Rural Internet Connectivity in India

Sarbani Banerjee Belur[79], Abhishek Raj[80] and Ritu Srivastava[81]

10.1 Abstract

Internet connectivity has become important for socio-economic development of any region, especially the rural and remote regions. However, a major population of the world including India still remains unconnected to the internet. The traditional 'top-down' approach for enabling connectivity has proved to be insufficient for rural and remote areas. In this paper, we discuss an alternative 'bottom-up' sustainable multistakeholder model for enabling connectivity in rural India which has an active involvement of the village community through 'Gram Panchayats' (also known as Village Council). We also discuss the funding mechanism for this model through 'Gram Panchayat Development Plan (GPDP)'. We suggest that 'Internet for Development' be included as one of the cross-cutting development areas in the GPDP to fund access to the internet in villages.

10.2 Introduction

The Internet is considered to be the decisive technology of the information age (Castells, 2014). No longer is access to the internet a luxury only, it has proven to be a necessity for socio-economic development in both developing and developed countries (World Bank, n.d.; Song et al., 2018, p. 8). Broadband (or high-speed) internet access is a powerful tool not only for delivering essential services such as education and healthcare but also offering increased opportunities for women empowerment and environmental sustainability, and contributing to an enhanced transparency and accountability of government (World Bank, n.d.). Research suggests that an increase of 10 percent in mobile broadband penetration yields an increase of 1.8 and 2.0 percent in GDP respectively for

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middle and lower income countries (Katz & Callorda, 2018). Stressing upon the importance of the internet, the United Nations General Assembly (UNGA) in its 2030 Agenda for Sustainable Development has listed down 'Universal and affordable access to the Internet' as a Sustainable Development Goal (SDG).[82]

However, this goal is still far from being achieved. As of January 2021, there were 4.66 billion active internet users (AIU) worldwide ~ 59.5 percent (Johnson, 2021) of the global population. The situation in India is not encouraging either. As of March 2021, there were 778.09 million (Telecom Regulatory Authority of India [TRAI], 2021) broadband subscribers in India and an internet subscriber density (total internet subscribers per 100 population) of 60.73 (TRAI, 2021). With a rural and urban internet subscriber density of around 36.24 and 107.30 (TRAI, 2021) respectively, a digital divide is clearly evident between rural and urban India. The rural connectivity solution in India is entrapped in a vicious cycle. Barriers and challenges pose difficulty for internet penetration in rural areas thus discouraging usage of internet services. Low adoption of internet services results in poor Return-on-Investment (RoI) for service providers which in turn discourages internet coverage in rural areas. Hence, even if connectivity would reach the villages in India due to technological advancement, it would be difficult to sustain itself at the village level without a sustainable funding model.

The Government of India, in order to increase internet penetration as well as bridge the rural-urban digital divide, has undertaken various initiatives under the umbrella of Digital India (Department of Telecom, 2019). Among such initiatives, BharatNet Optical Fibre Network[83] and Prime Minister Wireless Access Network Interface (PM- WANI) are notable. BharatNet, earlier known by the name of National Optical Fibre Network (NOFN), is a flagship project of the Government of India which aims to link 2,50,000 'Gram Panchayats (GPs)'[84] to optical fibre network (Bharat Broadband Network Limited [BBNL], n.d.). BharatNet provides a middle-mile connectivity from Block Headquarters[85] to

82 See SDG 9. Accessible at <https://www.un.org/development/desa/disabilities/envision2030.html>.

83 To know more about Bharat Net, please see <http://bbnl.nic.in/>.

84 "Gram Panchayat' is an administrative unit in the local self-government system of India. It may consist of one or more villages depending upon the population size of villages. Bharat Net provides connectivity at 'Gram Panchayat' offices. For more details on Gram Panchayats and local government system in India, see Section 3.2.

85 Blocks are the second level in rural local self-government.

GPs. To extend services at the Gram Panchayat level, any service provider or a government agency can connect to the at block optical line termination (OLT) location from where the traffic is carried to GP level on the Bharat Net middle-mile (BBNL, n.d.). However, the service provider has to build their own last-mile to extend the services to the end consumers (BBNL, n.d.). As such large-scale deployments like BharatNet involve significant cost to the governments, and hence the connectivity needs to be sustainable (Belur, 2018, p. 150). But, due to an unevenness in demand and supply (Belur, 2018, p. 150), the uptake of Bharat Net by commercial service providers has been on a lower side. Thus, despite the efforts, last-mile access is still missing in the rural and underserved region. Other than Bharat Net, PM-WANI initiative aims to elevate wireless internet connectivity in the country by setting up public models of Wi-Fi hotspots. These hotspots can then provide entrepreneurship options for people in the rural areas.

Notably, the models which have been used to provide connectivity have mostly followed a 'top-down' approach. In these models, involvement of local people who are the ultimate beneficiaries, is lacking; the sole focus has been on creating a customer base and a return on investment (Belur, 2018, p. 150). When the local and regional needs are side-lined, these models are bound to be unviable and unsustainable (Belur, 2018, p. 150). Thus, to connect rural India with the internet, a sustainable model with an active involvement of the village community is required.

In this paper, we aim to analyze how an active involvement of 'Gram Panchayat' and the village community can help build a sustainable connectivity model in rural India. More specifically, we analyze how the finances available through 'Gram Panchayat Development Plan (GPDP)' can be utilized to improve internet access in the villages. Alongside, we also present a sustainable economic model based on the 'Public Private Panchayat Partnership (4-P) model' and its viability for financing rural connectivity.[86]

This paper is structured as follows. In the first section, we introduce the problem statement, status of connectivity and the digital divide, and analyze it against the limitations of the traditional top-down model of connectivity. In the second section, we discuss an alternative partnership model for enabling connectivity in rural regions of India.

86 This model was proposed in (Belur, 2018) and (Belur et al., n.d.).

We call this model the "4-P model". This model follows a 'bottom-up' approach and involves village administration and community. In the third section, we discuss rural development and national and state-led financing mechanisms available for Gram Panchayats in India. We present a case for including 'Internet for Development (I4D)' in the Gram Panchayat Development Plan (GPDP). The paper concludes with important discussion points paving the road ahead for financing rural connectivity in India.

10.3 '4-P Model': The need for a 'bottom-up' approach with involvement of rural local government

There is no denying that access to the internet is crucial for socio-economic development of a country, and especially the development of rural areas. However, the findings of an internet needs assessment survey suggested that just enabling connectivity is not enough for the villages (Belur et al., n.d.). What is required is the ownership of the network by the village authorities so that local and regional needs get prioritised (Belur, 2018, p. 151). The involvement of the community can be helpful in maintenance of the network as well as for keeping the security of the devices (Belur, 2018, p. 151). In this section, we discuss how seeding community networks[87] to grow in the last mile can be a potential solution to the absence of a business model by coming up with a sustainable economic model for rural broadband in India. The objective is two-fold in nature. The first is to ensure that there is decent and sustainable Return-on-Investment (ROI) for the investor and at the same time, a nominal user subscription cost for the end user. As broadband subscribers are expected to increase in the future, the model needs to take into consideration the expected growth in demand and at the same time be lucrative enough for Internet Service Providers (ISPs). This can be achieved by: (a) Using economic or cost-saving technology options so that the investment cost is low. (b) Having a partnership with the government so that some part of the operating expenditure can be borne. (c) Partnering with the 'Gram Panchayats', so that we involve the local people and train them to make this model self-sustainable.

87 See <https://comconnectivity.org/>; <https://www.intgovforum.org/multilingual/content/dynamic-coalition-on-community-connectivity-dc3-0 to know more about community networks>.

10.4 Case of Gram Marg, IIT Bombay

An impact analysis of Internet usage study in three villages where Internet connectivity was provided for a duration of one year by Gram Marg,[88] an IIT Bombay project, suggested that if villagers are digitally aware and can avail Internet to use E-Governance services in their own village, they do not mind paying for the Internet. By availing services in the village itself, the villagers save time and money which they would have otherwise spent visiting the block headquarters to access the e-Governance services. Researchers in the Gram Marg project also tested the villagers' readiness to pay for the Internet. Given the situation that these villages had no Internet connectivity, the villagers calculated the total amount which they saved from not travelling to the block headquarters. They calculated a fixed amount of INR 150 (approx. 2 USD) monthly for the Internet in their village.

However, without a sustainable economic model at the village level, the Internet connectivity, even though it reached the villages, was not able to sustain itself in the village. Thus, two important players enabling connectivity were identified a) the private telecom operator who provides the bandwidth and b) a government office (Gram Panchayat office) that uses the internet to enable E-Governance services to the villagers. Two important conclusions derived from the impact study were first, the need for a sustainable funding model wherein Gram Panchayats can own the connectivity network and second, lucrative business models can be enabled influencing standard of living and entrepreneurship opportunities for growth. Further investigation of the financing options by the Gram Panchayat was also studied. The availability of funds and the discretion to spend makes the Gram Panchayat to be an equal partner who can enable connectivity and internet services in the village.

There have been several types of public-private-partnership (PPP) models, such as BOT (Build Operate Transfer) model, BTO (Build Transfer Operate) model and Joint Venture model. The Telecom Regulatory Authority of India (TRAI) has recommended a PPP model for the Bharat Net project. The project is being executed by BSNL,

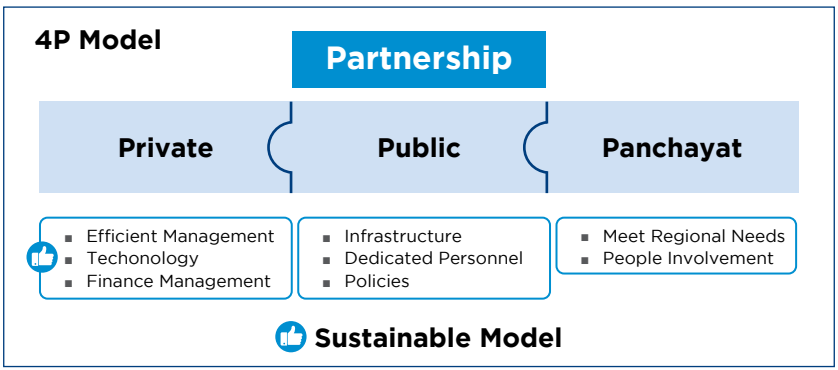
88 To know more about Gram Marg, see <http://grammarg.in/>.

RailTel and Power Grid. In the BOT model, the private service provider provides the initial capital to build, maintain and operate the service for a certain contract period. During this period, the government provides a concession, and then takes back control over the service once the contract period has expired. In the BTO model, the private service provider builds the infrastructure and then transfers the service to the public sector owner. The owner then operates the service. In the joint venture model, the investment is done by both the private service provider and the public sector. For instance, BharatNet has been operating based on the BOT model in which connectivity is provided only to the Gram Panchayat or the village council office without reaching the villages. However, in the absence of a sustainability approach this connectivity is neither extended nor explored for entrepreneurial opportunities. To solve this issue, 'Gram Panchayat' was identified as one of the stakeholders due to the following reasons:

1. It is the only local government body that can take the onus and responsibility of the connectivity in terms of operations and management.
2. They have the ability to finance.
3. They can customise the connectivity as per the needs of the people.

The model formulated after including Gram Panchayats is known as the "Public Private Panchayat Partnership (4-P) Model" for providing sustainable rural connectivity and can be figuratively shown below in Fig 1.

Figure 1. 4P Model



Source: Reproduced from (Belur et al., n.d.)

Some of the important features of this model as discussed in (Belur, 2018, 153) are:[89]

- Introduction of the Panchayat (i.e., the village administration) in the partnership model alongside the private and public partners.
- A 'bottom-up' approach which has an active involvement of villagers, and focuses on the local and regional needs with regard to connectivity.
- Participation of Panchayat adds value to the partnership model, as it is elected by the people of the village and represents village administration. Additionally, it has the backing of district administration and state government here.

Box 1: Revenue Generation as part of 4-P Model[90]

The Gram Marg Team created a test-bed in 25 villages of Palghar district. In order to test the sustainability of the 4-P model, the villages were divided into two groups with a different revenue generation method.

Group-1: Local ISP-based revenue model

In the 15 villages cluster (the first group), the revenue model is through the local ISP. The local ISP has enabled 2 Mbps bandwidth at each Gram Panchayat office and gets directly paid by the Gram Panchayat. The local ISP further sells the bandwidth inside the village as part of its marketing strategy and generates revenue from the connectivity. The Gram Panchayat office pays a fixed price of INR 1000 (USD 14) for 2 Mbps of bandwidth. This cost includes the bandwidth cost, operation and maintenance of the link and device cost if the device needs replacement due to damage. However, as the Gram Panchayat office does not use the entire bandwidth, the unused bandwidth is sold to the villagers in the form of 'pay as you use' daily coupons of a duration of one-hour each costing INR 10 (14 USD cents). This connectivity is accessed at the Gram Panchayat office. It has been observed that on an average, 5-10 people use the internet

89 The features discussed here are adapted from (Belur, 2018, 153)

90 Adapted from (Belur, 2018, 155)

at the Gram Panchayat office per day, which totals to INR 50 to INR 100 (70 USD cents to USD 1.40) per day and results in a monthly income of INR 1500 – INR 3000 (USD 21 – USD 42). This contributes to the monthly revenue of the Gram Panchayat. Out of this amount, INR 1000 is paid to the local ISP. The Gram Panchayat office further plans to use the accumulated amount for development activities within the village.

Group-2: CSC-VLE focused revenue model

The second set of 10 villages has a Village Level Entrepreneur (VLE) focused revenue model where 'CSC Wi-Fi Choupal' has acquired 30 Mbps bandwidth from a local ISP and distributes the same to different villages depending on internet use and number of customers in each village. The VLEs maintain the network in these villages and sell bandwidth to the villagers in the form of coupons based on the fixed pricing plan. The monthly customer base of the VLEs include new customers as well as returning customers. The revenue plan of the VLEs has been devised in a way that it maximises profit for the VLE, thereby providing incentive to perform. It has been observed that of the coupons sold per month, 40% of the coupons sold are of INR 10 (14 USD cents) in value, which gives 500 Mb of data for 10 days. The next popular coupon amount is INR 100 (USD 1.40) purchased by 22% of villagers, which is valid for 28 days, and which gives 12 GB of unlimited data.

Revenue information suggests that in those villages where there is a substantial use of internet data and a large customer base, the monthly revenue generated by the VLE is in the range of INR 5000 to INR 6000 (USD 70 to USD 84). In other villages, the monthly revenue generated is INR 3000 to INR 4000 (USD 42 to USD 56) on average.

10.5 Rural Development Plan and Financing Models for Connectivity in South Asia

Participation of people in the governance of the nation is the essence of democracy for any country. Decentralisation is the prime

mechanism through which democracy becomes truly representative and responsive. Decentralised rural development would succeed only with decentralised planning.

In the following sub-section, we give examples from rural development plans of South Asian countries for enabling rural Internet connectivity, and afterwards provide an overview of the village administration system in India i.e., 'Panchayati Raj' and discuss Gram Panchayat Development Plan (GPDP).

10.5.1 Initiatives by Governments in South-Asian region to enable connectivity

Governments in the South-Asian region have devised initiatives for bringing rural connectivity under rural development plans/models. The Indonesian government, through the Ministry of Communication and Informatics (MCI), endeavours to provide evenly distributed information and communications technology (ICT) infrastructure within the archipelago, including rural areas. The Palapa Ring, a broadband backbone project, was accomplished in 2019, with fibre optics covering 12,000 km, connecting the western, central, and eastern parts of Indonesia (BAKTI, 2018). As part of Bedugul Declaration inspired by Bali Bangkit movement (Lukman, 2021), an action plan has been drafted for setting up the internet infrastructure and utilization of digital platforms developed by community-based internet infrastructure. This action plan also puts its efforts to promote the cultural advancement of rural communities as well as health services and the COVID-19 pandemic mitigation. Rural resource network (RRN) is the concept in Bangladesh (Islam et al., 2006) to connect telecentres of different villages in the country. Thus, each telecentre acts as Wireless Rural Points (WRPs) which are further connected with the central Wireless Access Point (WAP). Using the existing telecommunication and IP backbone infrastructure reduced the cost of deploying new backbone in rural regions of the country. In the Republic of Nepal, the government through its Nepal Telecommunications Authority has created the Rural Telecommunication Development Fund[91] to bring internet connectivity to public institutions, including schools, public hospitals, municipalities, etc.

91 See: <http://mail.nta.gov.np/old/en/rural-telecoomunication-development.html>.

In the next section, we discuss village administration, development plans, and finances.

10.5.2 Gram Panchayat Development Plan (GPDP) in India

Gram Panchayats in India are the grassroot level institutions working for the betterment of the people living in rural areas. Over the last few decades, several initiatives have taken place for democratic decentralization and development of rural regions in India. The Gram Panchayats have been providing the institutional mechanism for such decentralized rural development.

The Gram Panchayat is an institution under the 'Panchayati Raj' system: a South-Asian political system present mainly in India, Pakistan, Bangladesh and Nepal (Ananth, 2014). 'Panchayati Raj Institutions' (PRI) are an institution of rural local self-government and form the last-tier of multi-order federalism in India (Alok, 2013). The Constitution (73rd Amendment) Act, 1992 (73rd CAA) accorded the constitutional status to PRIs in India, and envisaged a three-tiered local government i.e. at the village (Gram Panchayat), intermediate (Intermediate Panchayat[92]) and district levels (District Panchayat).[93] The 73rd CAA has accelerated the decentralization with greater devolution of powers to Panchayats.

The Central Government and state governments, in recent times, have laid stress on participatory planning-process at the grassroots level. Notably, GPs are also constitutionally mandated for the preparation of development plans for economic development and social justice utilizing the resources available to them (Ministry of Panchayati Raj, n.d.). In order to scale up the planning activities in rural local bodies across all states/UTs, the Ministry of Panchayati Raj (MoPR) launched a 'People's Plan Campaign (PPC)' to formulate a Gram Panchayat Development Plan (GPDP). MoPR issued Guidelines and manuals for preparation of GPDP taking into account the evolving scenarios of increased allocations under the Fourteenth Finance Commission (FFC)[94] and different flagship schemes for convergence

92 The nomenclature varies from state to state. e.g. Block Panchayat, Taluka Panchayat, etc.

93 See Article 243-B of Constitution of India.

94 The Finance Commission is constituted by the President of India under article 280 of the Constitution, mainly to give its recommendations on distribution of tax revenues between the Union and the States and amongst the States themselves. The terms of references of fourteenth finance commission, inter-alia, mandates the Commission to recommend "the measures needed to augment the Consolidated Fund of a State to supplement the resources of the Panchayats and Municipalities in the State based on the recommendations made by the Finance Commission of the State.

of resources (Ministry of Panchayati Raj, n.d.). The guidelines issued by the Ministry of Finance (MoF) for release and utilisation of grants recommended by FFC for local bodies stipulate that Gram Panchayats have to prepare proper plans for the functions devolved to them under the state laws, before incurring any expenditure under the FFC award.[95] Thus, Gram Panchayats across the country are expected to prepare and submit context-specific and need-based Gram Panchayat Development Plans (GPDP) (Press Information Bureau [PIB], 2020). These plans are expected to bring together both the citizens and their elected representatives in the decentralized planning processes, and are expected to reflect the development issues, perceived needs and priorities of the community, including that of the marginalized sections (Press Information Bureau [PIB], 2020).

As part of 'Intensive Participatory Planning Exercise (IPPE)', MoPR has mandated convergence of MGNREGA[96] and NRLM[97] along with FFC grants to bring out participatory planning for works and labour budgets. FFC has recommended two components – Basic Grant and Performance Grant for transfer of funds to the GPs in the ratio 90:10 respectively. The distribution of FFC grants among GPs is to be carried out as per State Finance Commission's (SFC) norms where available. Otherwise, the grant is distributed on the basis of population and geographical area (90 per cent and 10 per cent weights, respectively). The rest of the financial resource comes from Own Source and flows from other state and centrally sponsored schemes that would enlarge the Financial Resource Envelope for Panchayat. Thus, the Resource Envelope (Ministry of Panchayati Raj, 2016) at a GP includes the following financial resources:

1. Grants from the Union Government based on the recommendations of the Central Finance Commission: Basic Grant and Performance Grant.
2. Devolution from the State Government based on the recommendations of the State Finance Commission as per Article 243 I.

95 See para 4 of MoF Guidelines for Release and Utilisation of Grant recommended by FoFC for Rural and Urban Local Bodies, Issued by Ministry of Finance. Accessible at <https://panchayat.gov.in/documents/20126/0/Guidelines%2815%29.pdf/83817540-5e00-4bce-9309-852bd6699ace?t=1554109970591>.

96 See <https://nrega.nic.in/netnrega/home.aspx to know about MGNREGS>.

97 See <https://nrlm.gov.in/outerReportAction.do?methodName=showIndex#gsc.tab=0%20to%20know%20about%20NRLM>.

3. Loans / Grants from State Government.
4. Programme-specific allocation under Central and State Sponsored Schemes and Additional Central Assistance.
5. Own Source Revenues – taxes, non-tax, rents, fees for markets and ponds, user charges etc.
6. MGNREGS.[98]
7. Community contribution (Cash / Kind/Labour).
8. Corporate social responsibility funds.

10.5.3 Challenges in GPDP and rural financing model

The 73rd CAA described in Section 3.2 inserted the eleventh schedule in the Constitution of India, which lists down the functions of a Gram Panchayat. This schedule contains 29 subjects which cover issues related to 1) Poverty; 2) Education; 3) Sanitation; 4) Water Supply; 5) Public Health; 6) Local Economy 7) Natural Resource Management; 8) Issues of special groups / persons with disabilities / issues of SCs and STs / aged persons / children etc.; 9) Gender issues; 10) Migration; 11) Road Construction; 12) Rural Housing; and 13) Public distribution system, etc. Article 243 G empowers the GP by enabling the state governments to devolve powers and authority including those matters listed in the eleventh schedule for planning and implementation of schemes for economic development and social justice.

As per the Guidelines of MoPR, the GPDP planning process has to be comprehensive and based on the participatory process, which inter alia involves the full convergence with Schemes of all related Central Ministries / Line Departments related to 29 subjects enlisted in the Eleventh Schedule of the Constitution. Thus GPDP covers the development status of the GP based on the 29 subjects of panchayat listed in the Eleventh Schedule (Ministry of Panchayati Raj, 2016). The gaps in the sector of rural electrification and internet connectivity have been mitigated by taking support from various schemes of the Central Government in a comprehensive District and Block Panchayats planning.

According to the report 'Utilization and Impact Evaluation of 14th Finance Commission' (Institute of Economic Growth, 2020), a fair percentage of the Gram Panchayat offices do not have internet connections. Many

98 See: <https://nrega.nic.in/netnrega/home.aspx>.

GPs are having internet connections through broadband and under CSC programmes, but they are not functioning in many cases. Only 13% of panchayats have telephone facilities. For data entry purposes, panchayat officials need to visit block development offices. It is clear that the data entry based on 29 subjects of panchayat are directly dependent on the availability of internet services at the panchayat office, yet access to the internet services is not covered as part of Panchayat's subject.

Moreover, the availability of the internet has not been considered across development parameters but has only been considered under key parameters of banking or ATM services. Thus, the availability of internet infrastructure goes completely missing in education, public health, public distribution systems and the development of other subjects in GPDP. In addition to this, monitoring and evaluation of the development plan is instructed to geo-mapping and geo-tagging of infrastructure. Without internet connectivity, this activity is unable to be accomplished.

The various activities involved in the whole process of GPDP preparation such as conducting surveys, awareness generation/raising, holding of Gram Sabha meetings etc. may also require to be modulated according to the Covid-19 pandemic related situation by adopting online methods. All training(s), whether they are State level, District level or field level, for PPC will be conducted through online digital mode as far as possible.

When most of these activities are undertaken through online channels, the question arises that '**Why BharatNet, the national broadband project, is not leveraged as part of the village development plan, GPDP?**' BharatNet, under the vision of Digital India, initiated by Government of India (GoI) in 2017 to connect 250,000 GPs with the internet and improve digital services. Taking BharatNet's connectivity as a backbone, it is easy to adopt online activities, including data entry, village level surveys, geotagging of villages, and further conducting online training and enabling schools and public health facilities with internet.

10.5.4 Towards a sustainable funding model: The Case for Including 'Internet for Development' in GPDP

Provided the importance of the internet for development of villages and the role that Gram Panchayats can play in enabling internet

connectivity, it is unfortunate that internet connectivity does not still find a place in the development plan of Gram Panchayats. As mentioned earlier in Section 3.2., GPs are expected to formulate a GPDP. 'Internet for Development' can be included in this GPDP, which could aid in getting the finances required to enable connectivity in the villages.

A sample GDP would look like:

Table 1. Inclusion of 'Internet for Development' in GPDP: A sample

Sr. No.	Category	Amount
1	Street Lights	c1
2	Roads	c2
3	Water Taps	c3
...	...	...
n	Internet for Development	cn

(Source: By authors)

We have developed three different scenarios to implement and execute village connectivity through the sustainable '4-P' model. There are two important cost indicators which need to be analyzed properly for understanding sustainability of any model: Capital Expenditure (CAPEX) and Operational Expenditure (OPEX).

In the table below, we provide three possible implementation and execution scenarios for connectivity in a village through the 4-P Partnership model.

Table 2. Implementation and Execution scenarios of connectivity in a village

1st Scenario	2nd Scenario	3rd Scenario
1. CAPEX can be included in 5-years GPDP as 'Internet for Development' 2. OPEX includes bandwidth charges and VLE salary (if there is VLE system) 3. Local ISPs/ VLEs will generate the OPEX	1. CAPEX and OPEX investments under a 50:50 ratio between Local ISPs/VLEs and Gram Panchayats. 2. The revenue generated will be shared under a 50:50 ratio.	1. The local ISPs/ VLE invest in both CAPEX and OPEX and generate revenue from it.

(Source: By Authors)

We have modelled CAPEX and OPEX for enabling connectivity. They are presented in the form of tables (3-5) below.

In the next table, we provide monthly OPEX incurred per village in enabling connectivity.

Table 3. Monthly OPEX per village

Sr. No.	Category	Amount (INR)	Amount (USD)[99]	Quantity	Cost (INR)	Cost (USD)	Note
1	VLE Operation and Maintenance (O&M) Cost per village	1,500	20.05	1/mo.	1,500	20.05	4 Field Engineers
2	Bandwidth cost per month per village	5,833	77.98	1/mo.	5,833	77.98	3,50,000 INR per year. We can consider serving approx. 5 villages.
3	VLE O&M cost on equipment	1,000	13.37	1/mo.	1,000	13.37	Including devices, cables and solar equipment
4	Electricity Bill of GP	500	6.68	1/mo.	500	6.68	Per month

(Source: By Authors)

Table 4. Government Expenditure

Sr. No.	Category	Year 1	Year 2	Year 3	Year 4	Year 5
1	Government Expenditure	CAPEX + Bandwidth charges for 6 months	OPEX (per month)	OPEX (per month)	OPEX (per month)	OPEX (per month)
2	Cost (INR)	3,40,000-4,90,000	8,833	8,833	8,833	8,833
2a	Cost (USD)	4545.37-6550.68	118.09	118.09	118.09	118.09

(Source: By Authors)

[*Note: Per user/village cost is Rs. 140; Cost is variable according to the tower used per village. Use of defunct tower at GP premise will reduce the cost further]

99 Rate for conversion 1 USD= 74.73 INR

In the below table, we provide the CAPEX investment requirement for connectivity in the village.

Table 5. CAPEX to be proposed in GPDP

Sr. No.	Category	Amount (INR)	Amount (USD)	Quantity	Cost (INR)	Cost (USD)	Note
1	Equipment (Per Village)	2,00,000	2673.75	1	2,00,000	2673.75	4 Backhaul AP including 1 drop (50k), 6 outdoor APs for mesh inside village (40k), Power, Battery, Backups, cables, etc. (70k), firewall (20k), Miscellaneous (20k)
2	Bandwidth cost (Per month per village)	5,833	77.98	1/ mo.	5,833	77.98	3,50,000 for 20 Mbps per year which comes out to be 29,166. We can consider serving approx 5 villages. Thus, per month pr village= 29,166/5
3	Field work and installation	10,000	133.69	1	10,000	133.69	Per month
4	Tower Cost (3,6.9 meters)	50,000	668.44	1	50,000	668.44	One-time
5	Tower Cost (15 meter)	2,00,000	2673.75	1	2,00,000	2673.75	One-time
6	VLE salary (if appointed) per village	5,000-10,000	66.84-133.69	1 /mo.	5,000-10,000	66.84-133.69	

(Source: By Authors)

[Note: Either 3,6,9 meters, OR 15-meter tower can be used]

10.6 Discussion and Conclusion

Gram Panchayats (Village Council) are the main government institutions in the last mile. The members of the Gram Panchayat are nominated by the people of the villages and are answerable to the people. The advantage of including Gram Panchayats in the business model is because of their ability to focus on connectivity based on the needs of the communities they serve and their ability to finance through the GPDP. If Gram Panchayats take up the initiative to connect themselves through the GPDP funds, it will help the Government of India to enable connectivity to the unconnected villages much faster. A connected Gram Panchayat can also help in expansion of internet connectivity by various licensed stakeholders like ISPs, local ISPs and Village Level Entrepreneurs (VLE). In addition to this, different entrepreneurship models can be initiated as well as E-Governance services, banking services and ATMs can be implemented in the villages.

Further, the eleventh schedule in the Constitution of India which contains the powers and responsibilities of Panchayats can be amended to include 'Internet for Village Community Development' as a subject. This would provide more autonomy and thus enable Panchayats to solve their connectivity-related problems.

Specifically in times of COVID-19, most of the systems and processes are transforming from offline mode to online mode. This makes it imperative to see 'Availability of Internet Infrastructure' as cross-cutting or horizontal-section instead of it being taken as one of the vertical sections within the infrastructure pillar. If internet connectivity is improved, it would be possible to combine internet-related work of different schemes operating at the GPs.

To conclude, in this paper we attempted to address the issue of a sustainable funding model for connectivity in rural and remote regions. In the process, we discussed the importance of the internet for socio-economic development, especially the rural areas. We also highlighted the low connectivity in rural India, the digital divide existing between rural and urban India, and how the traditional top-down approach has not been able to improve connectivity in such areas. We emphasized the importance of the involvement of the

community in solving their connectivity problems, and provided an alternative 4-P model based on a bottom-up approach with involvement of Gram Panchayat. And finally, we analyzed how Gram Panchayat Development Plans can be utilized to fund internet connectivity in village.

10.7 References

Alok, V. N. (2013). Strengthening of Panchayats in India: Comparing Devolution Across States—Empirical Assessment 2012-13. Indian Journal of Public Administration, 59(1), 193-209.

Ananth, P. (2014). Panchayati Raj in India. Journal of Education & Social Policy, 1(1), 1-9.

BAKTI. (2018). Indonesia Signal for all 2020 [BAKTI's 2018 Annual Report]. BAKTI.

Bharat Broadband Network Limited [BBNL]. (n.d.). About NOFN. <http://bbnl.nic.in/index1.aspx?lsid=249&lev=2&lid=21&langid=1>.

Bharat Broadband Network Limited [BBNL]. (n.d.). Bharat Net Utilization Models. <http://bbnl.nic.in/index1.aspx?lsid=725&lev=2&lid=577&langid=1>.

Belur, S. B. (2018). Addressing sustainability in rural connectivity: A case study of Gram Marg Community-led networks. Global Information Society Watch (GISWatch), 150-157.

Belur, S. B., Khaturia, M., & Das, N. (n.d.). Sustainable Economic Model for Rural Broadband in India: The case study of Gram Marg. <https://www.ee.iitb.ac.in/course/~meghnak/Document/grammargDC3.pdf>.

Castells, M. (2014). The Impact of the Internet on Society: A Global Perspective. Change, 127-148. <http://aasa.ut.ee/augsburg/literature/CASTELLS_BBVA-OpenMind-book-Change-19-key-essays-on-how-internet-is-changing-our-lives-Technology-Internet-Innovation.pdf>.

Department of Telecom (DoT). (2019). Telecom at a Glance. <https://dot.gov.in/telecom-glance>.

Donnges, C., Pattnaik, P.K., & Rijn, J. v. (2004). Integrated Rural Accessibility Planning Gram Panchayat Level.

Institute of Economic Growth. (2020). UTILIZATION AND IMPACT EVALUATION OF 14TH FINANCE COMMISSION GRANTS TO GRAM PANCHAYATS IN SELECTED INDIAN STATES. <https://panchayat.gov.in/documents/20126/0/Final+Report+Utilization+and+impact+evaluation+of+FFC+grants+to+the+GPs+in+the+selected+States.pdf/187c9400-fcd0-da6a-0ea5-370f2653f068?t=1598118927052>.

Islam, A.H.M. R., Shafik, R. A., Hassan, M. I., & Song, J. B. (2006). Next Generation Rural Wireless Connectivity Model for Developing Countries. 2006 Asia-Pacific Conference on Communications, 2006, 1-5. doi: 10.1109/APCC.2006.255919.

Johnson, J. (2021, September 10). Worldwide digital population as of January 2021. *Statista.* <https://www.statista.com/statistics/617136/digital-population-worldwide/>.

Katz, R., & Callorda, F. (2018). The economic contribution of broadband, digitization and ICT regulation. International Telecommunication Union.

Lukman, J. (2021, October 5). GoTo highlights MSMEs in 'Bangkit Bersama' movement, boosting local economy. *The Jakarta Post*. <https://www.thejakartapost.com/news/2021/10/05/goto-highlights-msmes-in-bangkit-bersama-movement-boosting-local-economy.html>.

Ministry of Panchayati Raj. (n.d.). Gram Panchayat Development Plan. <https://panchayat.gov.in/en/gpdp>.

Ministry of Panchayati Raj. (2016). Manual for Preparation of Gram Panchayat Development Plan (GPDP). <https://panchayat.gov.in/documents/20126/0/GPDP_document.pdf/93b09c73-dfac-b86b-5831-a105c4fe435c?t=1554702888943>.

Ministry of Panchayati Raj, GoI. (2016). Rural Area Development Plan Formulation and Implementation (RADPFI) Guidelines, 2016.

Ministry of Panchayati Raj & Ministry of Rural Development, GoI. (2020). People's Plan Campaign for Gram Panchayat Development Plan (GPDP) Sabki Yojana Sabki Vikas 02nd October 2020 – 31st January 2021.

Press Information Bureau (PIB). (2020, Sep). Self Help Groups across the country being geared up to prepare the Village Poverty Reduction Plan for integration with the Gram Panchayat Development Plans. <https://pib.gov.in/PressReleasePage.aspx?PRID=1652653>.

Roztocki, N., Soja, P., & Weistroffer, H. R. (2019). The role of information and communication technologies in socioeconomic development: towards a multi-dimensional framework. INFORMATION TECHNOLOGY FOR DEVELOPMENT, 25(2), 171–183. <https://doi.org/10.1080/02681102.2019.1596654>.

2nd Administrative Reforms Commission, GoI. (2007). LOCAL GOVERNANCE: An inspiring journey into the future. <https://darpg.gov.in/sites/default/files/local_governance6.pdf>.

Song, S., Moreno, C. R., Esterhuysen, A., Jensen, M., & Navarro, L. (2018). The rise and fall and rise of community networks. Global Information Society Watch.

Telecom Regulatory Authority of India [TRAI]. (2021). The Indian Telecom Services Performance Indicators (January – March, 2021). <https://www.trai.gov.in/sites/default/files/QPIR_27082021.pdf>.

World Bank. (n.d.). Connecting for Inclusion: Broadband Access for All. The World Bank. <https://www.worldbank.org/en/topic/digitaldevelopment/brief/connecting-for-inclusion-broadband-access-for-al>.

11 Fostering Global and Local Community Radio Partnerships for Community Network Development: A Case-Study from India

Ritu Srivastava[100]

11.1 Abstract

Getting online is still challenging for the 3.5 billion people in the world. Despite the success and revolution of mobile connectivity in India, providing affordable access to communication to the economically disadvantaged segments of the population is still a challenge. The COVID-19 pandemic is not only a public health crisis but also a humanitarian crisis specifically for people who are living in underserved areas. In this crisis, having reliable internet connectivity is a boon for people living in underserved areas. During this time, community-led entities – Community Radio station and Community Networks – in India have played a vital role in providing the last mile access to information services. Nonetheless, they are working in isolation despite the fact that both are working in rural and remote regions. This paper identifies synergies between community network operators and community radio stations and how they can leverage each other's resources. The paper also brings a case study from Bhadrak district of Orissa, India where global partner ISOC has partnered with CR stations and local organizations to foster community networks in rural communities. Lastly, the paper attempts to give financial sustainability solutions for CNs and CRs while leveraging each other's resources.

11.2 Introduction

The COVID-19 pandemic has reminded the world of the importance of the internet in accessing information, health services, and day-to-day work. The internet has been a lifeline, enabling millions of people to continue working and studying during staying-at-home orders and maintaining social distance. The internet has proved that it is necessary to facilitate basic services. Nearly 50 percent of the world's

100 Director, Jadeite Solutions and Chair, IEEE WG- IGSA.

population doesn't have access to the internet. For many that do have access, slow speeds and high prices characterize their internet service, preventing them from taking part in daily life. The digital divide risks depriving a generation of the opportunity to develop their potential and their ability to uplift their entire communities.

Community networks (ISOC, n. d.) are a sustainable, effective and efficient approach to connectivity that directly involves the people who face a connectivity gap. Across the globe, CNs are acting as a complementary connectivity solution in regions where traditional ISPs find it difficult to reach. Similarly, Community Radio stations supported the government for disseminating information related to public health and citizen-centric services and also helped communities to be connected. Both these models are owned and primarily managed by local people serving rural communities. On the positive note, both models inherently follow the multi-stakeholder governance framework – open-ended unleashed innovation, decentralized institutions and open and inclusive processes as defined by the ISOC (ISOC, 2016). Nonetheless, these models are independent from each other and are confined to their own workings.

The paper aims to identify the coaction between CRs and CNs in a multi-stakeholder approach to foster equitable and uniform access to information services in served locations. The first section explores the multi-stakeholder approach adopted by community networks. In the second section, the paper delves into analysing the commonalities and differences between them. The third section shares the case study from India where community radio stations have come together for setting up the network in rural Orissa of India. The paper concludes by sharing financial viability approaches that can be adopted by CRs and CNs.

11.3 Community networks' multi-stakeholder approach to foster equitable and uniform internet accessibility

Connectivity is a critical infrastructure for growth and equity in the 21st century. Basic access to broadband must now be understood as an essential utility like electricity. The COVID pandemic has exposed the existing inequalities in internet access and affordability across the

globe. Without having access to reliable connectivity and devices, billions of people risk being further cut off from vital information on health and safety, online learning, and the opportunity to voice their views and engage in commerce. Equitable access to public education and public health services cannot be delivered without having equitable broadband access services.

The COVID crisis has spurred the space of digital transformation; there is an emerging consensus that the digital divide can only be effectively addressed if it is clearly understood, defined, and measured through a commonly agreed framework. Such frameworks are the evidence-based structure that can only be created having a multi-sector al approach allowing governments and policymakers to understand the reasons behind digital exclusion. The definition of 'digital divide' has shifted its focus from physical access (ICT infrastructure) and affordability (cost of internet connection and devices) to a multifaceted understanding of the causes of the digital divide (UN, 2021), including cultural and social factors, notably the lack of digital literacy and skills and the awareness/relevance of the Internet for disadvantaged people.

Given the existing challenges to digital divide, community wireless networks (CWNs) or wireless community networks (WCNs), a combination of the telecommunication infrastructure, set up local stakeholders including public organisations, government, local technologists establish the local networks infrastructure and provide the low-cost internet connectivity and communication services but also enable local communities to have meaningful access and imparting digital literacy to have meaningful access. It includes how the network is being used for real benefits such as work, education and communication (A4AI, n.d.)

The community networks are mostly developed and built by small organisations and local members by pooling their existing resources (IFLA, 2021). These networks provide affordable access to the Internet while building community and strengthening the local economy (CNT, 2006). By definition, these networks are meant to provide the last mile internet access not only limited to village council level but also to provide connectivity and internet-related services to households. Having exceptional features like low-cost and local technological

solutions, these community-led networks operate on open IP-based networks, they are built by communities of individuals and are based on collective digital participation (OECD, 2017).

Known as 'crowd sourced', these CNs are free, open-source and neutral networks (J. Saldana, 2016) defines community networks as free networks because they are designed on the principle of non-discrimination. Across the globe, there are community networks; for example, Gufi.net[101] in Spain, Freifunk (FF)[102] in Germany, the Athens Wireless Metropolitan Network (AWMN)[103] in Attica, Greece, FunkFeuer[104] in Austria, Ninux.org in Italy, Nepal Wireless Network Project in Nepal, Common Room[105] in Indonesia, Rhizomatica[106] in Brazil and Mexico, Janastu[107] and Digital Empowerment Foundation (DEF)[108] in India and many others have proven free, neutral and open community network models.

These community networks do not only cater to large, medium, and small communities, distributed and decentralized systems comprising nodes, links, content, and a variety of services, but their governance approaches are democratic, free, and open-ended. Most of these community networks use wireless technology based on the IEEE 802.11 family of standards and unlicensed spectrum bands – 2.4 GHz and 5 GHz. On the hardware side, these networks use cost-effective technological solutions that are simple and shelf – hardware such as towers made of bamboo and solar-enabled routers, exploiting 802.11/b/g/n specification and easy-to-find radio equipment(s) to extend Wi-Fi (Flickenger, 2002). These networks use different methods such as point-to-point or mesh networks or ring networks to provide Internet connectivity where it is not available.

Technically and non-technically, these wireless community networks are deeply rooted in a multi-stakeholder approach, either directly or

101 See: <http://guifi.net/en>.

102 See: <https://www.govtech.com/dc/articles/freifunk-germanys-user-run-network-explodes-beyond.html>.

103 See: <https://wind.awmn.net/?page=nodes>.

104 See: <https://www.funkfeuer.at/>.

105 See: <https://commonroom.info/>.

106 See: <https://www.rhizomatica.org/>.

107 See: <https://janastu.org/>.

108 See: <https://www.defindia.org/>.

indirectly, as these networks are built by community members having a variety of skill sets from local technologists, network operators, local government authorities and content creators and producers.

As people having different skill sets engage and participate in establishing the wireless networks providing offline (local network set-up) or online (connecting to the world wide web) services, stakeholders drive the development of community networks based on the applications that can be grouped as follows:

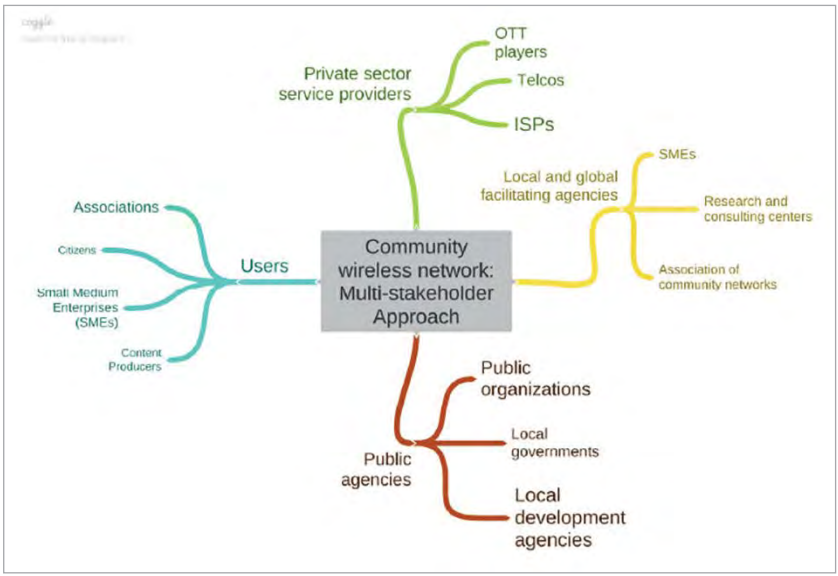
Multi-stakeholder partnerships are defined by (Hazlewood, 2015) as "*partnerships [that] range from those involving a small number of members who come together with a defined problem within a set period to those that involve many organisations of different types working on systemic problems and are long term in nature*".

Often, community networks do partnerships for knowledge sharing that are built on trust and between non-hierarchical members whose participation is voluntary (Solan, 2013). In such partnerships, local people share their local knowledge and learnings about the culture, heritage, content, etc. Sharing information is a critical aspect for the development of any community and the foundation of establishing any community network.

Another kind of partnership as defined by (OECD, n.d.) that exists is 'incentive driven', when different organisations have common goals and interests and money is offered for a certain type of activity or establishing the network. This form relies on partners' ability to share

knowledge or provide technical advancement and funding is given by another organisation for establishing the local network together.

Based on the aforementioned applications mentioned in Fig 1, CNs across the globe have adopted a multi-stakeholder partnerships approach. In the current approach, community network stakeholders follow as shown in Fig 2.



Adopting the multi-stakeholder approach, these CNs use a variety of sustainability models to operate in remote and unserved areas. These sustainable models are to be designed having a bottom-up approach from generating locally created content and producers, innovative pricing, and marketing approaches to provide digital services and solutions for uplifting local products to sustain these networks.

Community networks across the globe have adopted a variety of multi-stakeholder approaches. However, CNs must engage with stakeholders who have common interests, goals and are working towards the same objective. Community Radio stations are another set of entities that are providing last mile information services to unconnected and unserved regions but are not explored enough as the extension of the community network. The next section explores the synergies between CR stations and CN operators.

11.4 Synergies between Community Radio and Community Networks

Across the world, there are over 100 community network operators that are providing telecommunications network infrastructure in rural and unserved regions where access to information services is a bare minimum and traditional telecom providers/ISPs are not willing to connect. These CNs are established by a local group of people to meet their communication needs. (Saldana, 2016) identifies these CNs as a participatory and multi-stakeholder administration model where any participant/user can add link segments to the network in a way that one segment can support the new segments and so on further supporting the multiple network nodes.

These CNs act in a complementary bottom-up approach, based on community-driven infrastructure development to connectivity, and challenge the classic top-down operator-driven paradigm. Some of these networks are located in Latin America (Argentina, Brazil, Mexico), Africa (South Africa, Kenya, Ghana, Congo), Asia Pacific (India, Nepal, Pakistan, Indonesia, Australia, Afghanistan, etc.), North America (Canada and US) and Europe (Germany, Austria, Hungary, Spain, Greece, Sweden and Croatia).

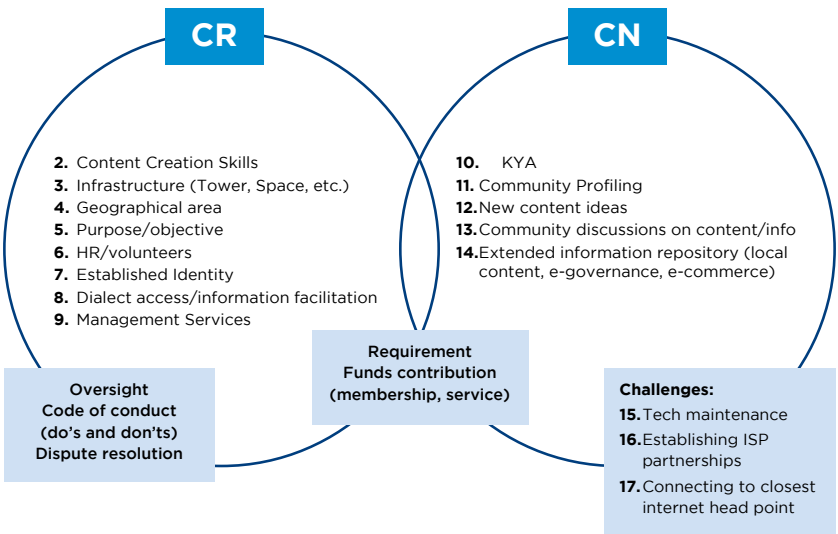
Like CNs, the community radio stations are community-centric organisations that are providing information services to most remote regions where traditional media are not available or there is no medium for citizens to voice their opinions and views. There are about 4000 community radio stations worldwide (World Association of Community Radio Broadcasters [AMARC], n.d.). The strength of these CRs lies in understanding the local community, the local language, the local dialect, the local cultural content and the local problems. This vast knowledge is also essential for community network operators so that they can contextualise the Internet for the local community to ensure maximum relevance of the technology.

Community networks in other parts of the world have partnered with community radios. For example, Mesh Bukavu Network in the Democratic Republic of Congo (DRC) has established the central server at the local CR, Radio Maendeleo (GISW, 2018). ASORCOM community Wi-Fi network in Myanmar is supporting community radio stations in the country in conducting surveys, meeting with

communities, offering radio journalism training and workshops, and drafting constitutions and bylaws for community radio stations which will contribute towards reforming the national broadcasting law.[109]

Community Radio stations in India are serving grassroots communities on broad segments of agriculture, livelihoods, education, health, social security, etc. While community radio stations bring with them knowledge of the local community, community network operators hold technical expertise in setting up towers, resources to manage the local content and services and legal knowledge on radio frequency allocation. This makes the partnership between the two essential for connecting the unconnected.

The synergies between CR stations and CN operators were identified first time in India during the Community Network Exchange (CNX)[110] Asia Pacific Summit initiated by Digital Empowerment Foundation (DEF) and the Internet Society (ISOC) in 2017. Practitioners from community radio stations and community network providers from the Asia Pacific region participated in the event. The main objective of the summit was to develop a platform for community networks (CNs) where they could work collaboratively to develop policy briefs, organize training and capacity building and share their experiences and learnings.



109 See: <https://asorcom.net/previous-project/>.

110 See: <https://cnxapac.org/>.

In the subsequent year of CNX Asia Pacific 2018, the session "Synergies Between Community Networks and Community Radios in Promoting Public Wi-Fi Access in Asia Pacific[111]" mapped out the synergies between community radios and community networks; and identified and discussed their role in creating public Wi-Fi access spaces. There are a lot of commonalities between these two community-led institutions, yet there are differences in both institutions. The commonalities and differences between CR stations and CN operators are identified in attributes of: 1) infrastructure; 2) technology; 3) licensing; 4) local content; and 5) social inclusion and sustainability.

CR in general complements the strengths of community networks as they have existing infrastructures, such as the 30-meter tower necessary for setting up the antenna and router. As these CR stations have a tower along with electricity backup, therefore, they can leverage this existing infrastructure for setting up the wireless network. Whereas the CN operator identifies tall buildings usually for setting up a 5-meter tower atop them for establishing the network or to extend the network. Except for having an ISP license, CR stations in India have broadcasting license and SACFA clearance[112] so it becomes easy for CR stations to act as an ISP franchise within their community.

Human resources working in CR stations have the capability to set up the router, broadcasting devices and other devices. Thus, both community-led entities have technologists to maintain and manage the network but also to produce and manage the local content and services and capability to engage with communities. Thus, these CR stations have great potential to be transformed into community networks to provide universal access to the internet and local content in a democratizing manner.

111 CNX Asia Pacific 2018.

112 SACFA license is given by the Department of Telecommunications, Ministry of Electronics and Communications for installing the tower. The clearance is given on the basis of tower and broadcasting equipment (s)' technical specifications, including Frequency, Radiated Power, Emission, Bandwidth, Antenna Parameters. SACFA document can be accessed at <https://dot.gov.in/sites/default/files/SACFA%20Simplification%20OM_06th%20Oct%2C%202021.pdf>.

Attributes	Community Radio	Community Network
Infrastructure	• CR stations already have space in terms of room and local server space, and spaces for engaging with community members.	• CN operators need to identify the community space for setting up the tower, local server and availability of rooms for engaging with community members.
Technology	• CR stations already have towers and broadcasting radios. • CR stations have local server space for storing content and radio programmes. • The Radio station may have an internet line which is limited to their radio stations and cannot be distributed further. • Technical assistance is still a challenge since these rural areas have a dearth of experienced technicians.	• CN operators need to set up towers for the distribution of internet connectivity. • CN operators have server space for storing the user logs. • CN operators have backhaul internet lease lines which can be distributed further in local communities.
Licensing	• CR stations are already licensed for broadcasting and have SACFA clearance. • CR stations don't have ISP licenses.	• CN operators may or may not have ISP licenses. • CN operators don't have SACFA licenses so they cannot provide services near to airports.
Local content	• CR stations have a wide range of content and services. • Since community radio works within a community, providers understand the local dialect and language, which is crucial for community network providers.	• Community network providers can seek help from community radio station audiences and create and deliver the content on the basis of their audiences. A community network could act as a repository for content in their server that radio stations already put out.
Social inclusion & Sustainability	• Community radio stations find it difficult to sustain themselves since subscription models are rare. Perhaps, community radio subscriptions could include internet access through community networks. • Community radios are already present in the most difficult and remote regions. Thus, established local manpower at community radios can be leveraged to provide internet services. • CRs can use the digital skills provided by CNs to bring sustainability.	• CN operators have skills to mobilise the community on digital skills. • CN operators provide skills to locals on wireless technology and create networks of barefoot wireless engineers that will help to create sustainability for CR stations.

11.5 Catalysing Community Radio for community network development: Case-Study from India

This section focuses on the multi-stakeholder approach and fostering community radio stations as partners for community network development in India. While community radio stations bring with them knowledge of the local community, community network operators hold technical expertise in setting up towers, resources to manage the local content and services and legal knowledge on radio frequency allocation. However, both entities work in isolation without understanding each other's importance.

The CNX Asia Pacific Summit initiated the conversation between community networks and community radio stations to understand the importance of the network and access to information, but the process of raising awareness on the benefits of CNs takes time. In 2019, Delhi-based Digital Empowerment Foundation (DEF) established the first local network at Awaz Wanaparthy Radio Station operated by Vanitha Jyoti Mahila Sangam, Wanaparthy located in Telangana. The project focused on creating a network of local engineers for sustaining the network locally by breaking down the barriers of culture and society. In this partnership DEF partnered with Awaz Wanaparthy Radio Station for setting up the network. One of the challenges that existed in this partnership is minimal support available from the community in terms of ownership, continuous support for training and capacity building and lack of regional and global partnerships to recognize this multi-stakeholder approach.

Another example emerged amidst the COVID-19 pandemic, when access to last-mile connectivity and having relevant information are key for the social and economic development of many rural and marginalized communities where having reliable and affordable internet connectivity is a challenge. During these times, community radio stations (CRs) acted as the last mile information providers where traditional media platforms are unable to reach in India. However, one of the challenges that CR stations faced in this pandemic was having reliable internet connectivity not only to share, upload or broadcast their programmes but also to reach out to a wider audience of users. In this scenario, it became a precondition for CR stations

to have reliable internet connectivity for not only broadcasting the programmes and sharing updates about the pandemic but also to keep them connected with the world while maintaining isolation.

Understanding the essence of connectivity and access to information, community radio station Radio Bulbul, located in Bhadrak district of Orissa state, along with the support from independent wireless and community network researcher, Ritu Srivastava through its social research entity, Jadeite Solutions,[113] started mobilising the community to bring internet connectivity in rural areas. Radio Bulbul's parent organisation, DISHA,[114] also runs a primary school and faced the connectivity challenges for conducting online classes for students. This became another reason to have internet connectivity in rural regions of the district. In 2020, with continuous mobilization, the two started working together towards leveraging the CR station to bring connectivity and transform the CR station into a CN operator.

Two community radio stations – Radio Bulbul and Young India[115] – came together in the first quarter of 2021 to bring connectivity to a school and local communities. Receiving funding support was one of the challenges to bring financial viability to the project. CR stations received financial support from international partner ISOC for enabling the financial viability and shaping the project, entitled 'CR and CN synergies through the Radio Bulbul project facilitated by Young India'. The project focused on leveraging the existing infrastructure, technological resources and human resources at Radio Bulbul to bring last-mile connectivity services and digitising the local knowledge in online and offline servers. The project aims to create a connectivity-based platform for Radio Bulbul enabling social and economic empowerment to the communities of the radio stations' operational areas.

To ensure a sustainable platform, the CR stations are partnering with GeoMeo Informatics[116] to provide low-cost wireless networking devices and equipment(s) and to further provide wireless network

113 See: <https://jadeite.co.in/>.

114 See: <https://dishaodisha.org/>.

115 See: <http://www.youngindia.net.in/tag/community-radio/>.

116 See: <https://www.geomeoinformatics.com/>.

training to CR staff members. As an outcome, the project tries to strengthen CR stations to also act as CN networks to provide affordable, ubiquitous and democratically controlled Internet access in rural regions of the country. In the times of Covid, this locally set-up network infrastructure will help the community radio stations to use the network for disseminating information related to the pandemic and to bring voices of the community to a wider scale.

This is the first kind of project where CR stations are themselves exploring the use of connectivity not only for their CR activities and to sustain themselves but also to establish internet connectivity in their regions. In this multi-stakeholder partnership, four local entities and a global partner are coming together to set up the Community Radio-led Community Network in India.

11.6 Financial viability for Community Radio-led Community Network

Financial viability is important for both community-led models. Both entities face sustainability and revenue challenges. Following are some of the major action points while leveraging each other's resources to achieve financial sustainability:

1. To generate revenue, the CR station needs to reach out to 100 users for the internet connection.
2. Partner with local ISP for fibre connectivity which is cost-effective and can be provided to a large number of users. Depending on the economic background (high-end) of the user, for those who want a large amount of bandwidth and are able to afford wireless devices, the cost of providing internet connectivity can be increased.
3. The CR station can also install a local server so that anyone with connectivity can also listen to the radio programmes through the app. Moreover, the radio can be used to promote internet service.
4. The CR station can put a Wi-Fi hotspot connected to a local server, where the CR station can conduct a podcast. For the feedback, the CR station can have an app, so that users can record the feedback and station operators can listen to it in real-time.

5. A parallel community network will be useful so that in disaster times, it can be utilised and in normal times, it can be used for the dissemination of general radio programmes. The CN will also help them to generate another source of revenue. CN for private communications will be helpful during the time of disaster.
6. IVR (Interactive Voice Responsive) system can be set up for a local network to make calls and get feedback in audio files, using the IVR- based system to resolve the queries raised by listeners. Even if listeners have a feature phone instead of smartphones, they can not only listen but also give feedback.
7. Community networks are needed for two-way communication to promote organic farming. There should be a reward mechanism to promote organic farming. Good practices need to be promoted through CR and CN networks.
8. CR operators can use unlicensed spectrum (2.4 GHz and 5.8 GHz) for setting up the network along with CR stations. Moreover, it will also help them to disseminate their content using the community network.
9. They can put up wireless routers in different locations to create a wireless mesh network. Since it will be a node-based network, even if one node fails, other nodes will be working. It will work for internal communication as well as external communication.

11.7 Conclusion

There is dire need of connecting people living in rural regions specifically in times COVID-19 pandemic. Community networks are successful and sustainable when the local community can see the value of digital connectivity and the opportunities it provides. Just connecting a community is not enough – there should be a focus on engaging as many community-led local entities, such as community radio stations, as possible; on what the community can do with access to the Internet; and how it can help improve local socio-economic conditions. Likewise, a Community Radio is sustainable when they are engaging with other local entities and able to strategize how best to introduce and use technology to accelerate digital transformation. A multi-sectoral approach is required and

all sectors need to work together to advocate for meaningful connectivity and focus on 'responsible connectivity', enabling stakeholders and people to benefit from digital opportunities. Having funds and capacity building are both important in order to sustain the continued operation of networks. The above section proves that CR stations can sustainably provide internet services, store their content on local servers and reduce their financial dependency on other internet service providers, whereas CN can leverage local content produced by local community members and radio staff members and broadcast it through the internet.

11.8 References

A4AI, Meaningful Connectivity, <https://a4ai.org/meaningful-connectivity/, accessed on 15th November 2021>.

Bukavu M. (2018) A Free Wireless Network In The Drc: An Answer To Internet Shutdowns And Exorbitant Access Costs, Global Information Society Watch (GISW), <https://giswatch.org/sites/default/files/gw2018_congodr_0.pdf>; accessed on 23rd September 2021.

Center for Neighborhood Technology; Community Wireless Networks: Cutting Edge Technology for Internet Access; November 2006; <https://www.cnt.org/sites/default/files/publications/CNT_CommunityWirelessNetworks.pdf>; accessed on 23rd September, 2021>.

Flickenger R. (2002). Building Wireless Community Networks. O'Reilly Editor; <https://www.oreilly.com/pub/pr/1079; accessed on 23rd September 2021.

Hazlewood, P (2015). Global Multi-stakeholder Partnerships: Scaling up public-private collective impact for the SDGs. Background Paper 4. World Resources Institute/Independent Research Forum 2015.

IFLA, Community Networks A briefing for libraries (ver. April 2020); <https://www.ifla.org/wp-content/uploads/2019/05/assets/faife/publications/community_networks_-_a_briefing_for_libraries.pdf; accessed on 7th October 2021>.

OECD, Key Issues For Digital Transformation in the G20; January 2017; <https://www.oecd.org/g20/key-issues-for-digital-transformation-in-the-g20.pdf>; accessed on 23rd September, 2021.

OECD, Successful Partnerships: A Guide; <https://www.oecd.org/cfe/leed/36279186pdf>; accessed on 15th November 2021.

Saldana, J. et al. (Eds.) (August 2016). Alternative Network Deployments: Taxonomy, Characterization, Technologies, and Architectures. Request for Comments: 7962. <https://www.rfc-editor.org/rfc/rfc7962.txt>.

Sloan, P., and Oliver, D (2013). Building Trust in Multi-stakeholder Partnerships: Critical Emotional Incidents and Practices of Engagement. In Organisational Studies 34 (12), p1835-1868.

The Internet Society (ISOC), About Community Networks; <https://www.internetsociety.org/issues/community-networks/>.

The Internet Society (ISOC), Internet Governance – Why the Multistakeholder Approach Works; <https://www.internetsociety.org/resources/doc/2016/internet-governance-why-the-multistakeholder-approach-works/ accessed on 7th October 2021>.

United Nations (UN), Department of Economic and Social Affairs, 'Leveraging digital technologies for social inclusion'; February 2021; <https://www.un.org/development/desa/dspd/2021/02/digital-technologies-for-social-inclusion/>.

World Association of Community Radio Broadcasters [AMARC] (n.d.). *About Amarc*. <https://amarc.radio/about-amarc/>.

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This book is the Official 2021 Outcome of the Dynamic Coalition on Community Connectivity (**DC3**) of the United Nations Internet Governance Forum (IGF). DC3 is a multistakeholder group, fostering a collaborative analysis of **community networks** (CNs), exploring how such initiatives can improve and expand connectivity while empowering Internet users.

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. Hence, CNs are connectivity initiatives managed according to the governance models established by their community members, in a democratic fashion, and may be operated by groups of self-organised individuals or entities such as non-governmental organisations (NGOs), local businesses or public administrations.

CNs should not be considered as a competing or antagonistic model either to the state or to the market. On the contrary, they should be seen as a particularly interesting complementary solution to fill the existing connectivity gaps. In this perspective, this volume is the latest collective effort elaborated by DC3 and is dedicated to "Community Networks: Towards Sustainable Funding Models," to provide a missing, yet essential, perspective to the community network debate: how to fund these initiatives sustainably.

All previous DC3 publications can be found at www.comconnectivity.org

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