TYPOLOGY OF COMMUNITY-CENTRED CONNECTIVITY INITIATIVES
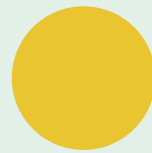
TABLE OF CONTENTS

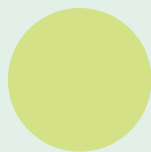Preamble

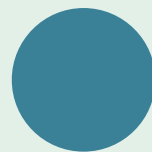Diagram

Frame of reference

Explanation

Operationalising

Appendix

TYPOLOGY OF COMMUNITY-CENTRED CONNECTIVITY INITIATIVES

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The Local Networks (LocNet) initiative is a collective effort led by APC and Rhizomatica in partnership with people and organisations in the global South to directly support community networks and to contribute to an enabling ecosystem for their emergence and growth.

1. PREAMBLE

Preamble

Diagram

Frame of reference

Explanation

Operationalising

Appendix

The term "community network" has become something of a catch-all description of a wide range of telecommunication networking activities at the community level that have emerged over the last several years. The organisational form, scale and priorities of those emerging models can vary substantially, which makes it challenging for different stakeholders to grasp the concept clearly. In addition, the various definitions of community networks[1] can be challenging to translate into concrete action, and may lead to a perception of the concept as vague and poorly formulated.

Some of these existing definitions were written before the evolution of the models for community connectivity seen in recent years, and are therefore inconsistent with practices on the ground. For instance, in 2016 these definitions[2] described a model of a telecommunications network where an individual would purchase and install a device and make its location and configuration public so "neighbours" could purchase their own device and extend the network organically, sharing the costs of a single, or multiple, upstream connection(s).

Many of these community networks, especially in Europe, grew to a considerable number of users – several thousands – using this approach. In South Africa, many "wireless user groups" appeared in different cities using this model. In most of these cases, networks extended without central planning and were maintained on a voluntary basis. It was in this context that guifi.net[3]

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1. The following definitions – one strong, the other weaker – were developed in the context of the Local Networks (LocNet) initiative: "Communication networks that are built, owned, operated and used by citizens in a participatory and open manner." (*Global Information Society Watch 2018: Community Networks*, https://giswatch.org/community-networks) and "Although there is no commonly accepted definition, these networks are usually called 'community networks' because local communities are involved in some way in deploying, owning and operating the physical infrastructure that supports voice or internet connectivity." (*Bottom-up Connectivity Strategies*, N. Bidwell and M. Jensen: https://www.apc.org/en/pubs/bottom-connectivity-strategies-community-led-small-scale-telecommunication-infrastructure)
2. https://www.rfc-editor.org/rfc/pdfrfc/rfc7962.txt.pdf and https://www.intgovforum.org/system/files/filedepot/45/declaration_on_community_connectivity_final.pdf
3. https://guifi.net/en/node/38392

developed the commons approach to govern the infrastructure. In this approach, different participants would take on the role of managing the network, sometimes by installing the necessary intermediary infrastructure that allowed for a healthy expansion of the network. In order to govern these commons, tools were created so their contributions were considered fairly and balanced against their use of the network. Many of the community networks that grew in the same period did not implement that commons approach and most are no longer operational. These early models were critical in creating the foundations for new models to emerge, but the definitions that refer to them do not capture the diversity expressed in existing practice.

Different stakeholders have not accompanied this evolution on the ground, and their understanding of community networks and how they are implemented is based on the models described in the previous paragraph, which some consider unsustainable and lacking professionalism. This has led to confusion and challenges when engaging with stakeholders in the search for partnerships and support for initiatives currently being implemented or planned.

It has become evident that any single definition of community networks would fail to do justice to the richness and diversity of the different types of community participation, organisational and service delivery models being implemented. To address this diversity of initiatives yet still provide a concrete framework for analysis, two interrelated processes have been conducted. We have developed:

1. A set of 13 principles that capture the ethos of community-centred connectivity
2. A typology of community-centred connectivity initiatives developed through a combination of research and direct experience of the Local Networks (LocNet) initiative[4] to delineate identifiable models that have emerged.

The principles and their preamble are presented in a separate publication,[5] while this document presents the typology of emerging models. The methodology followed to develop this typology is included in Appendix 1.

4. Rhizomatica and APC's LocNet initiative has supported many of these endevaours since 2017. See: https://www.apc.org/en/project/connecting-unconnected-supporting-community-networks-and-other-community-based-connectivity
5. https://www.apc.org/en/node/40458/

In both processes, we have chosen to use the term "community-centred connectivity" rather than "community network". We recognise the potential risks in proposing a new term where a growing movement exists and some regulations and policies have been enacted using the term "community network". However, we believe the benefits outweigh those risks, because this new conceptualisation is both more inclusive and more practical in its approach. Besides, it is rooted in hard-won real experiences on the ground. In this sense, the new term is not a departure from this history, and characteristics of the initial models of community connectivity have been included in the typology; they still apply and are used within different initiatives around the world. At the same time, this new conceptualisation also embraces the "complementary access networks and solutions" language that has been incorporated in different resolutions of the International Telecommunication Union,[6] complementing it by nuancing and delineating those networks and solutions. All models presented in the typology complement other efforts made by the telecommunications industry to provide meaningful connectivity, and in no way aim at replacing them.

This typology and the principles should be considered documents in dialogue for thinking through setting up a community-centred connectivity initiative. Where possible, we have tried to align the language in the two documents, which were developed through different approaches, but in some instances the language here is necessarily more technical for the purposes of clarity. This typology is about mapping the complexities of different models so that communities are aware of the potential options available, while the principles offer a considered qualitative account of issues to consider when deciding which model to implement.

The principles are critical to a reading of this typology in that they articulate the social values or ethical underpinning of a community-centred connectivity initiative. There are also clear intersections between the principles and the typology. For instance, the principles on human rights, gender, local culture, environmental awareness, safety and capacity building need to be considered when deciding on the kinds of

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6. Resolution 37 (Rev. Kigali, 2022): Bridging the digital divide. https://www.itu.int/md/meetingdoc.asp?lang=en&parent=D18-WTDC21-C-0103 and Resolution 139 on Use of Telecommunications/ICTs to bridge the digital divide and build an inclusive information society. https://www.itu.int/pub/S-CONF-ACTF-2022

services offered to a community; the principle on ownership when deciding what operator or ownership model to use, or when planning the management of the initiative; or the principle on sustainability with respect to the characteristics dealing with costs and pricing.

The underlying perspective of the principles is that the more principles an initiative adheres to, the more likely it is to address digital exclusion and transform the relationship between the community and its own development.

This typology is also a reflection of the growing recognition that there are many types of initiatives that, without being developed by the community itself, can be "community-centred". These initiatives are often established in communities by what can be considered long-term "partners", and besides providing very necessary connectivity services, they have other positive social impacts such as training and hiring people from the community, procuring services from the community, and reducing access costs considerably. They have a "social mission" or, as included in the principles, are concerned with the "well-being" of the community. Besides this, it is acknowledged that there will be communities not interested or able (with a rational use of resources) to provide connectivity to themselves sustainably. This includes private businesses that were created (or evolved) to have a strong social mission and are generating benefits to the communities and who felt excluded from the community networks movement.

It is important to acknowledge that this is a first attempt at creating this typology, and it is likely to evolve and be improved in the future.

We hope that this typology will offer a sharper lens through which to see community-centred connectivity initiatives, contributing to clearer communication with potential partners and stakeholders, including donors and regulators, and presenting communities with a practical set of options. Ultimately, we hope it supports the growing movement of community-centred initiatives across the world, by incorporating many valuable lessons from those who felt previously excluded from the "community networks" definitions and models but are also contributing to closing the persistent digital and development divides that most communities are still facing.

Types of community-centred connectivity initiatives

Legend:
- Institutional model
- Legal structure of the organisation driving the initiative
- Role of community organisations in the telecommunications value chain: Operator/ownership model
- Planning and management of the initiative
- Initial investment/expansion of infrastructure (CAPEX)
- Sustainability model (OPEX)
- Pricing model for connectivity-related services
- Nature of services provided in the community
- Model for provision of transformational services

Self-provision
Purpose: Community development

- Initiated from (predominantly) inside the community by (usually) a registered organisation
- Civil society organisation (NGO, CBO, civic association, etc.)
- Integrated operator / Service provider / Reseller
- Historically decentralised, recently more centralised
- Investment from users / External and local non-returnable support (subsidy, grant or donation)
- Membership fees / Barter transactions / Dominant external and local non-returnable support (subsidy, grant or donation)
- Free of charge / Cost recovery
- Combination of transformational, transactional and social inclusion services
- Internal and external actor(s) provide(s) the transformational services

Social cooperative
Purpose: Social enterprise

- Cooperative, usually from inside the community
- Cooperative with community and/or societal objectives
- Integrated operator / Service provider
- Centralised
- Investment from members / External and local non-returnable support (subsidy, grant or donation) / Private finance / Cost of hardware recovered in the price of sales
- Market sales more than half dominant / Membership fees are important, especially in initial stages
- Below market price / Market price / Free of charge
- Combination of transformational, transactional and social inclusion services
- Core to the principles of incorporating a cooperative

Entrepreneurial non-profit
Purpose: Social enterprise

- Initiated from inside or outside the community by a registered organisation; tends to be a multi-organisational arrangement
- Non-stock/ non-profit company corporation
- Integrated operator / Service provider / Reseller
- Centralised
- External and local non-returnable support (subsidy, grant or donation) / Cost of hardware recovered in the price of sales / Rarely private finance
- Market sales significant / External and local non-returnable support (subsidy, grant or donation) still an important or dominant source
- Free of charge / Below market price / Market price
- Combination of transformational, transactional and social inclusion services
- External actor(s) usually provide(s) the transformational services

Public municipal
Purpose: Public service

- Local government
- Local government
- Integrated operator / Open access operator
- Predominantly public-private partnership
- Public budget
- Public budget and market sales
- Free of charge / Below market price / Market price
- Mainly social inclusion services with some transactional services
- Usually through parallel local government initiatives

Social business
Purpose: Social enterprise

- Company, usually from outside the community
- Limited company or corporation
- Reseller / Installation and maintenance / Advisor
- Centralised
- Private finance / Cost of hardware recovered in the price of sales / Exceptional external and local non-returnable support (subsidy, grant or donation)
- Mainly market sales / Action-based subsidies
- Market price / Below market price
- Mainly transactional services with some social inclusion and limited transformational services
- Usually with support from a third party with development experience

Community-centred connectivity initiatives

Public national/regional
Purpose: Public service

- National/regional government
- National/regional government
- End user
- Predominantly public-private partnership
- Public budget
- Public budget and market sales
- Free of charge / Below market price / Market price
- Mainly social inclusion services with some transactional services

Private business
Purpose: Profit

- Company from outside the community
- Limited company or corporation
- End user
- Centralised
- Private finance / Cost of hardware recovered in the price of sales
- Market sales
- Market price
- Transactional

Other connectivity initiatives not centred in the community

2. FRAME OF REFERENCE FOR THE TYPOLOGY

Preamble

Diagram

Frame of reference

Explanation

Operationalising

Appendix

Initiatives at the community level are the unit of analysis for the community-centred connectivity typology.

In this context, community is defined as "people with common ties residing in a common geographic area",[7] whether in urban, rural or remote areas. The common geographic area may be governed by tribal or Indigenous authorities, or a democratically elected administration. In this sense, community members have institutions in common, and have strong social ties, and shared identities and actions tied to a particular place.

This definition of community differs from others used in the "community networks" literature, especially around those working on common pool resource models, where the community is composed of those who participate in the "network", with their different roles and interests.[8] In the case of guifi.net, with their network spanning hundreds of kilometres, their "community" is composed of numerous "geographical communities".

"Community-centred connectivity" refers to the use of the internet connectivity being focused on the needs of the community; or, as stated in the first principle, initiatives that provide "meaningful internet communications infrastructure or services to communities [...] that respond to the diverse needs and interests of communities so that they can be empowered to participate in their own development." However, of the 13 principles, the first four can be considered foundational to any initiative that wants to consider itself "community-centred".[9]

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7. Adapted from: MacQueen, K. M., et. al. (2001). What is community? An evidence-based definition for participatory public health. *American Journal of Public Health, 91*(12), 1929-1938. https://doi.org/10.2105/ajph.91.12.1929
8. Baig, R., et al. (2015). guifi.net, a crowdsourced network infrastructure held in common. *Computer Networks, 90*, 150-165. https://doi.org/10.1016/j.comnet.2015.07.009
9. 1) Addresses community needs: Provides meaningful internet communications infrastructure or services to communities in urban, rural and remote locations that respond to the diverse needs and interests of communities so that they can be empowered to participate in their own development; 2) Participatory: Enables the community to shape the infrastructure or services by participating in developing its community-centred vision and its deployment, operations and use; 3) Support: Works with different stakeholders to achieve its vision in ways that encourage the community's autonomy; 4) Well-being: Improves the personal, social, political and economic lives of people living in the community, particularly for those who are structurally marginalised, such as women, the youth and elderly, refugees, racial and ethnic minorities, and disabled people.

With respect to the remaining principles, an initiative may focus on none, any, or a mix of principles, depending on its objectives. The distinction in the typology between "transactional", "social inclusion" and "transformational" services that an initiative may provide applies here,[10] as the other nine principles can be realised through the provision of social inclusion and transformational services. At the very least, by adhering to the first four principles, the services will go beyond being merely "transactional". In this way a community-centred initiative can be distinguished from an ordinary service provider.

As suggested in the preamble, by using the word "initiatives" instead of "networks", or even terms such as "connectivity providers", we are able to consider different models of participation that have been identified in real cases. For example:

- Multi-organisational initiatives, where different organisations implement the initiative in partnership with each other.
- Organisations participating in multiple community-centred connectivity initiatives. This is the case for different support organisations.
- Organisations working on initiatives that are both community-centred and not community-centred. This can be the case of companies within the telecommunications sector engaging as partners in multi-organisational community-centred connectivity initiatives with local organisations. These companies usually fit under the small to medium-sized enterprise parameters, but there are instances of multinational companies too.

When a community-centred connectivity initiative is run by a single organisation engaged in the provision of internet services, it should be understood in similar terms as an internet service provider (ISP). As such, all models in the typology adhere to the definition in Wikipedia:

> An Internet service provider (ISP) is an organisation that provides myriad services related to accessing, using, managing, or participating in the Internet. ISPs can be organised in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.[11]

10. More about the distinction between these two services can be found in section 3.10 below
11. https://en.wikipedia.org/wiki/Internet_service_provider

The term "internet service provider" is a very well-understood and used term in the telecommunications sector. However, many stakeholders, drawing on the historical definitions of what an ISP is, still today refer to them as something totally different from community networks. In this typology, it is argued that community-centred connectivity initiatives run by a single organisation are a type of ISP that not only provides internet services but goes beyond that, insofar as they intentionally seek to have a positive social impact in a community. It could be argued that multi-organisational arrangements could be referred to in the same way, but in these cases it is more complex given that the liabilities and compliance related to telecommunication licences can only be held by one organisation.

Some of the literature consulted differentiates between the types or models depending on the technology they use to provide internet communications infrastructure or services to communities, yet there seems to be consensus that in most cases, initiatives use a toolbox of technologies. Technology choices are also based on regulatory restrictions, and those restrictions may (and should) change over time – for example, access to spectrum to deploy community cellular (mobile) networks. Because of this, the attempt was to develop a technology-neutral typology.

Finally, it is important to note that initiatives themselves evolve over time. For example, some might move from a model of community self-provision – or closer to principle 12, where the initiative "strives for community ownership of the infrastructure or services through open and inclusive participation in its governance and management" – to one that is more entrepreneurial in its outlook and involves fewer community members.

Similarly, within the social entrepreneurial models, there might be an evolution, at times imposed by regulations that limit for-profit services, from entrepreneurial non-profit models to social businesses. While there is a need to define and distinguish different kinds of initiatives, in practice initiatives may, at times, also use a combination of different models to achieve their community vision.

3. EXPLANATION BASED ON CHARACTERISTICS

Preamble

Diagram

Frame of reference

Explanation

Operationalising

Appendix

The diagram at the end of Section 1, which illustrates the different types of community-centred connectivity initiatives identified ("Self-provision", "Public municipal", "Entrepreneurial non-profit", "Social cooperative" and "Social business" models), encompasses 11 defining characteristics that are described below. Two well-known non community-centred types ("Private business" and "Public national/regional") are added for comparison.

3.1 Geographical focus

Main goal of this characteristic: To differentiate community-centred initiatives from those that are not community-centred.

Options for this characteristic:
- Community-centred
- Not community-centred.

Community-centred: The analysis here is based on the framing of the typology above, i.e. if the focus of the initiative is the community, and whether there is adherence to the four foundational principles.

Not community-centred: This includes initiatives whose geographical focus is at the national or regional level (for instance, government initiatives aimed at meeting the objectives of a national broadband plan).

3.2 Purpose

Main goal of this characteristic: To differentiate between social and traditional enterprises, as well as between entrepreneurial ventures and others.

Options for this characteristic:
- Community development
- Public service
- Social enterprise.

Community development: This is understood as "a process where community members come together to take collective action and generate solutions to common problems."[12]

Public service: This is understood as "any service intended to address specific needs pertaining to the aggregate members of a community."[13] Public services are available to people within a government jurisdiction as provided directly through public sector agencies or via public financing to private businesses or voluntary organisations.

Social enterprise: Social enterprises are identified by the Organisation for Economic Co-operation and Development (OECD) as "any private activity conducted in the public interest, organised with an entrepreneurial strategy, whose main purpose is not the maximisation of profit but the attainment of certain economic and social goals, and which has the capacity for bringing innovative solutions to the problems of social exclusion and unemployment."[14]

More recently, the European Commission has defined a social enterprise as being "an operator in the social economy whose main objective is to have a social impact rather than make a profit for their owners or shareholders. It operates by providing goods and services for the market in an entrepreneurial and innovative fashion and uses its profits primarily to achieve social objectives. It is managed in an open and responsible manner and, in particular, involves employees, consumers and stakeholders affected by its commercial activities."[15] This differs clearly from the foundational goal of most private businesses, which is to trade goods and services in a market primarily for private benefit (or profit).

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12. https://en.wikipedia.org/wiki/Community_development
13. https://en.wikipedia.org/wiki/Public_service
14. https://web-archive.oecd.org/temp/2023-12-11/566784-social-entrepreneurship.htm
15. Ibid.

3.3 Institutional model

Main goal of this characteristic: To differentiate between the options for the location of the organisation and level of formalisation of the group driving the initiative, as well as referring to the possibility of being a multi-organisational arrangement.

Options for this characteristic:
- Initiated from (predominantly) inside the community by (usually) a registered organisation; tends to be a multi-organisational arrangement with external actors
- Local government
- Initiated from inside or outside the community by a registered organisation; tends to be a multi-organisational arrangement
- Cooperative, usually from inside the community
- Company, usually from outside the community.

3.4 Legal structure of the organisation(s) driving the initiative

Main goal of this characteristic: To differentiate between the options for the legal nature of the organisation driving the initiative given the practical implications in the provision of services to the community.

Options for this characteristic:
- Civil society organisation (NGO, CBO, civic association, etc.)
- Local government
- Non-stock/non-profit company or corporation
- Cooperative with community and/or societal objectives
- Limited company or corporation.

Civil society organisations (CSOs) is a broad term, and here the work by the United Nations Development Programme (UNDP) is considered.[16] CSOs comprise the full range of formal and informal organisations within civil society, such as non-governmental organisations (NGOs), community-based organisations (CBOs), Indigenous peoples' organisations (IPOs), academia, journalist associations, faith-based organisations, trade unions, and trade associations. Civil society

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16. UNDP. (2006). *UNDP and Civil Society Organizations: A Toolkit For Strengthening Partnerships*. https://sustainabledevelopment.un.org/content/documents/2141UNDP%20and%20Civil%20Society%20Organizations%20a%20Toolkit%20for%20Strengthening%20Partnerships.pdf

constitutes a third sector, existing alongside and interacting with the state and market. The UNDP defines civil society organisations in its policy of engagement with CSOs (2001) as "non-state actors whose aims are neither to generate profits nor to seek governing power. CSOs unite people to advance shared goals and interests."

Local government is used as "institutional units whose fiscal, legislative, and executive authority extends over the smallest geographical areas distinguished for administrative and political purposes."[17]

The remaining three models, non-stock/non-profit company or corporation, cooperative with community and/or societal objectives and limited company or corporation, represent different ways that an initiative participates in the market, depending on its incorporation. These social enterprise options depend on the legal frameworks at the national level. For instance, in some countries, legal definitions for non-stock[18] or non-profit companies or corporations do not exist.

The choice of legal incorporation also has implications on the options available for the sustainability of the initiative. For instance, in some jurisdictions, CSOs are not allowed to engage in the sale of goods or services, making their sustainability reliant on donations and grants. Another example is that of non-stock companies, who are not able to engage in equity-related agreements with potential investors. In some countries, local governments may be allowed to establish their own connectivity initiatives.

In most countries, cooperatives, given that they have been around for a long time, have their own legislation, which tends to adhere to the principles that cooperatives follow internationally.[19]

3.5 Role of community organisations in the telecommunications value chain: Operator/ownership model

Main goal of this characteristic: The role of community organisations in the telecommunications value chain[20] relates to the provision of

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17. https://en.wikipedia.org/wiki/Local_government
18. https://en.wikipedia.org/wiki/Non-stock_corporation
19. International Co-operative Alliance. (2015). *Guidance Notes to the Co-operative Principles.* https://ccr.ica.coop/sites/default/files/2021-11/ICA%20Guidance%20Notes%20EN.pdf
20. https://digital-strategy.ec.europa.eu/en/policies/broadband-actors-value-chain

connectivity and takes different forms depending on the segments they operate and/or own.

Options for this characteristic:
- Integrated operator
- Open access operator
- Service provider
- Reseller
- Installation and maintenance
- Advisor
- End user.

The first four options are based on whether the community organisation operates the:
- Passive infrastructure: The physical non-electronic medium over which information can be transmitted. It typically has a lifespan of >50 years. Examples are ducts, masts, poles, network operations centre (NOC)[21] and fibre.
- Active infrastructure: Electronic equipment needed to encode information sent over the network into physical signals. It typically has a lifespan of 5-15 years. Examples are case stations, wireless access points, switches, routers and servers.
- Services: Sales, customer care, billing, internet, hosting and other services for end users.

The assumption is that in order to operate any of the infrastructure elements above, you need to own the hardware required.

Depending on which elements are owned, the following models are observed in the literature.

	Passive infrastructure	Active infrastructure	Services
Integrated operator	x	x	x
Open access operator	x	x	
Service provider		x	x
Reseller			x

21. https://en.wikipedia.org/wiki/Network_operations_center

Given the diversity in the multi-organisational arrangements for self-provision and entrepreneurial non-profits, there are examples of initiatives within these types that follow all of the models above, except open access. The open access model does not consider providing connectivity-related services to the end user (i.e. retail), but is concerned with making infrastructure available to different connectivity initiatives. While there are examples of open access models run by big municipalities, predominantly in the global North, this does not seem to be a model case in most marginalised communities.

Further, other roles identified based on experience are:
- Installation and maintenance
- Advisor
- End user.

Installation and maintenance and Advisor are added as these are particular roles that community organisations play, especially as part of the social business model, when they do not operate (or own) any of the elements above, but still play a significant role in the initiative. When any of the operator models above apply to an initiative, Installation and maintenance and Advisor are not included as they are considered redundant.

End user is included for the sake of the comparison with non-community-centred models. If that is the only role the community plays, there is no community participation.

Note that at times, community participation in any of the roles above may come from individuals from within the community who are hired for installation and maintenance, get an income from reselling or play advisory roles. They may do that informally, or as independent contractors, so the term "organisation" is not used canonically. Sometimes those individuals perform the roles or follow the models above, registering a sole proprietor enterprise/business. Note also that the fact that these private businesses are owned by people from the community does not mean they are community-centred connectivity initiatives.

3.6 Planning and management of the initiative

Main goal of this characteristic: To differentiate between the centralisation levels in planning and managing the initiative observed across types.

Options for this characteristic:
- Decentralised
- Centralised
- Public-private partnership.

The history of community networks is one of decentralised planning and management, with the Pico Peering Agreement,[22] which turned 30 years old recently, showing this clearly. Tools, such as for configurations or radio planning, were made available to help people use their own hardware and extend networks, as long as the principles of the agreement were met. Very few instances of that decentralised planning remain in the global South, where most of the planning and management is centralised in the organisations driving the initiative or in some of the more skilled partners in a multi-organisational arrangement.

In the case of government-led initiatives, most follow a public-private partnership model. There are many of these models that are used in practice,[23] but these three are the most common:

- Public design build operate (DBO): A public entity owns, constructs, deploys and operates the initiative without any input from private sector actors.
- Management contacts/lease and affermage:[24] A public entity owns or builds a network and engages private actors to manage specific functions or maintenance and operations of network infrastructure.
- Concessions and build operate transfer (BOT): A public entity awards long-term rights to use assets to a private operator, in exchange for the latter financing, designing, constructing, owning and operating a facility stated in the concession contract.

22. https://picopeer.net/
23. BCG & Giga. (2021). *Meaningful school connectivity: An assessment of sustainable business models.* https://s41713.pcdn.co/wp-content/uploads/2021/11/BCG-Giga-Meaningful-school-connectivity-1.pdf
24. https://ppp.worldbank.org/public-private-partnership/agreements/leases-and-affermage-contracts

Similarly, in some multi-organisational arrangements, the organisation driving the initiative may have an agreement with a third party, usually a service provider, who installs and monitors the performance of the telecommunications infrastructure using a centralised management platform.

3.7 Initial investment/expansion of infrastructure (CAPEX)

Main goal of this characteristic: To differentiate between the options for initial investment for capital expenditure (CAPEX) available to the different types.

Definition of CAPEX**:** The money an organisation or corporate entity spends to buy, construct, maintain or improve its fixed assets, such as buildings, towers, vehicles, equipment or land.

Options available for this characteristic:
- Investment from users
- External and local non-returnable support: subsidy, grant or donation
- Public budget
- Cost of hardware recovered in the price of sales
- Private finance.

These are all sources to pay for the initial investment/expansion of infrastructure and are considered as follows:

Investment from users/members: As described in section 3.6, there are decentralised models in which users contribute their own hardware to extend the network. In other cases, users pool resources from the community to afford all or part of the CAPEX required to build the infrastructure. Initial investment from members is also common in cooperatives.

External and local non-returnable support: subsidy, grant or donation: This may appear self-explanatory, as there are a myriad of sources of non-returnable grants, subsidies and donations. In the case of donations, sometimes land for towers and buildings, as well as buildings, can be donated by the community or an institution located there (school, hospital, etc.). Equipment donated by vendors, or equipment that

becomes available when other providers upgrade their networks or decommission it for whatever reason, gets donated too.

Public budget: Local municipalities use their own budget, or other financial mechanisms available to local governments, to cover the capital expenses.

Private finance: This comes from private funds. Seed funding often comes from those driving the initiative and their friends, family and angel investors. As they grow, subsequent rounds of CAPEX may come from more impact investors and other commercial loans.

Cost of hardware recovered in the price of sales: When sufficient funds are available from any of the sources above for the initial round of CAPEX, the cost of subsequent rounds (or the replacement of the equipment over time) may come from recovering the initial costs as part of the price paid by the users.

Different types in the typology use all or some of the options above. And even when particular options are included for a particular type, they might be present with different intensity and focus. For instance, while social businesses will cover their CAPEX primarily from private finance, that case is rare to date in entrepreneurial non-profits. It is also important to highlight that different operator and ownership models (characteristic 3.5) are more CAPEX intensive than others, with the reseller being the least intensive and the integrated operator the most intensive.[25]

3.8 Sustainability model (OPEX)

Main goal of this characteristic: To differentiate between the options for covering the operational costs (OPEX) of the initiative for the different types.

Definition of OPEX: This refers to the ongoing expenses that are inherent to the operation of the assets and services.

25. Forster, J., Matranga, B., & Nagendra, A. (2022). *Financing mechanisms for locally owned internet infrastructure*. APC, Connect Humanity, Connectivity Capital & Internet Society. https://www.apc.org/sites/default/files/financing-mechanisms-for-locally-owned-internet-infrastructure.pdf

Options available for this characteristic:
- External and local non-returnable support: subsidy, grant or donation
- Public budget
- Market sales
- Membership fees
- Action-based subsidies
- Barter transactions.

"External and local non-returnable support: subsidy, grant or donation" and "public budget" are defined in a similar way as previously, but here they are used to cover operational costs. In the case of donations, these can range from in-kind contributions from community members (from usage of land or space on their roofs for high sites to voluntary work) or from external partners in the form of bandwidth, rack space in data centres, etc.

Example of market sales:
- Usage based (prepaid): The standard pricing system for consumer connectivity services in low- and middle-income countries. Here the consumer pays for data services through a prepaid pay-as-you-go model. This can take the form of very low-cost incremental pricing, offering users time-based packages for internet connectivity.
- Usage based (postpaid/subscription): A subscription refers to a service where a customer is billed for the service on a monthly basis at the end of each monthly billing cycle, after consuming services they are entitled to use.
- Value-added services: Operating expenses are covered by services other than data usage, such as value-added services that subsidise data provision (e.g. printing, internet cafes, training, device charging and repair, and access to information systems). In some cases the income comes from selling services to other operators (e.g. capacity in the backbone/backhaul or space on their towers).

Membership fees: In cooperatives and other civil society organisations, member fees are used to cover the cost of operating and maintaining the infrastructure. In informal arrangements in small communities, these

fees are set so they recover the monthly costs of operation (primarily the cost of bandwidth).

Action-based subsidies: Customers undertake certain actions to receive blocks of connectivity time or capacity. This may entail watching commercial adverts, which brings advertising income to the provider, i.e. the advertisement company subsidises the service. In other cases it can be the government, national or municipal, who subsidises this for those who cannot afford it.[26]

Barter transactions: This is a non-monetary transaction to pay for connectivity, but can be helpful to drive adoption outcomes. This can be for goods (i.e. agricultural products) or services (rights of way/access to land/high sites) in exchange for connectivity services.

Different types in the typology use all or some of the options above. And even when particular options are included for a particular type, they might be present with different intensity and focus. For instance, while social businesses will cover their OPEX primarily from market sales, others use a combination of sources, with market sales playing a less prominent role. It is also important to highlight that different operator and ownership models (characteristic 3.5) are more OPEX intensive than others, with the reseller being the least intensive and the integrated operator the most intensive.[27]

3.9 Pricing model

Main goal of this characteristic: To differentiate between the pricing that each type offers for their connectivity-related services.

Options available for this characteristic:
- Market price
- Below market price
- Cost recovery
- Free of charge.

26. https://www.internetforall.gov/program/affordable-connectivity-program
27. Forster, J., Matranga, B., & Nagendra, A. (2022). Op. cit.

Market price is the economic price for which a good or a service is offered in the market. As a community is considered a new market segment, or even different groups within the community can be considered a new market segment, here, and in general in the telecommunications sector, market prices are those offered by the incumbent operators with a national footprint.

Mechanisms to sustain subsidised prices below market rates as well as free services exist thanks to options to cover the CAPEX and OPEX that are not based on sales alone. Also, because the telecommunications sector has historically been built by private investment seeking high returns, which then set (and still do) a significant component of the market prices for telecommunication services, prices can be quite high in some countries. In other contexts, particularly in those where self-provision models are used, the pricing model is cost recovery: dividing the cost of service or OPEX (usually the bandwidth) between the users. Given that community-centred connectivity initiatives are leaner and have lower OPEX than traditional operators,[28] and they can access alternative sources for CAPEX, below market prices can be offered too. If more private finance at concessional rates could be made available to these models, more communities could benefit from more affordable connectivity services.

Different types in the typology offer all or some of the options above. And even when particular options are included for a particular type, they might be present with different intensity and focus. Some initiatives use a combination, selling services at market price to commercial clients, which in turn allows them to offer below market prices or even free services to less economically resourced users.

3.10 Nature of services provided in the community

Main goal of this characteristic: To introduce transformational services as a key way of differentiating community-centred connectivity-related services from other internet services providers, or corporate social responsibility initiatives. It is also important to introduce social inclusion services as a way to differentiate community-centred operators from operators who are not community-centred.

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28. Rey-Moreno, C., Greene, L., & Jensen, M. (2024). Innovative financing mechanisms to bridge the digital divide. In A. Finlay (Ed.), *Global Information Society Watch 2024 Special Edition: WSIS+20: Reimagining horizons of dignity, equity and justice for our digital future.* https://www.giswatch.org/en/internet-governance-civil-society-participation-internet-rights/innovative-financing-mechanisms

Options available for this characteristic:
- Transactional services
- Social inclusion services
- Transformational services.

Different types in the typology provide all or some of the services above. And even when particular services are included for a particular type, they might be present with different intensity and focus. For instance, while most self-development and entrepreneurial non-profit models will have a particular focus on transformational services, very few, or none, of the social businesses and the municipal networks will provide them.

Transactional services: These relate to connectivity services that can be accessed via a payment of money or other form of agreed transaction in exchange for the service.

Social inclusion services: These are oriented towards addressing digital exclusion. They relate to services addressing meaningful connectivity,[29] or other factors behind the "usage gap".[30] Examples include:

- Affordable internet
- Services in local languages or to meet other community needs (content)
- Access to shared devices (i.e. computer labs or hubs)
- Environmental sensors and other "internet of things" networks that bring meaning to the connectivity and address communities' needs
- Training for digital skills.

Transformational services: These are oriented at enabling local people to become actors in their own development. These are services that build their capability to own, govern and manage digital resources in a way that could positively impact on their lives and the lives of their families and communities. Transformational services enable the poor and excluded to

29. Diga, K., Brock, N., & Zanolli, B. (2024). What does "meaningful connectivity" actually mean? A community-oriented perspective. In A. Finlay (Ed.), *Global Information Society Watch 2024 Special Edition: WSIS+20: Reimagining horizons of dignity, equity and justice for our digital future.* https://www.giswatch.org/en/internet-governance-civil-society-participation-internet-rights/what-does-meaningful
30. GSMA. (2022, 21 September). Addressing the Mobile 'Usage Gap' is Key to Achieving Sustainable Development Goals. https://www.gsma.com/newsroom/press-release/addressing-the-mobile-usage-gap-is-key-to-achieving-sustainable-development-goals/

be co-owners, supervisors, managers and decision makers or to become leaders and stakeholders of the social enterprises that provide digital-related services and ensure meaningful connectivity.

Note: "Transactional services" and "social inclusion services" are those that apply to the "users/customers" of the digital-related services. "Transformational services" are usually directed towards those who provide, manage and operate those services. "Social inclusion services" and "Transformational Services" have to do with the realisation of what might be called the aspirational principles (Principles 5-13).

3.11 Model for provision of transformational services

Main goal of this characteristic: To differentiate between the options for provision of transformational services.

Options available for this characteristic:
- Internal and external actor(s) provide(s) the transformational services
- Offered through parallel local government initiatives
- External actor(s) usually provide(s) the transformational services
- Core to the principles of incorporating a cooperative[31]
- Led by an initiative with input/participation from community members/stakeholders with support from a third party with development experience.

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31. International Co-operative Alliance. (2015). Op. cit.

4. OPERATIONALISING THE TYPOLOGY

Preamble

Diagram

Frame of
reference

Explanation

Operationalising

Appendix

We understand that this typology requires additional tools to make it practically useful for different stakeholders and so that a selected model can be operationalised. We have envisaged identifying and creating these tools as a next step.

For instance, for communities planning an initiative or for those organisations supporting them, it would be important to develop decision trees with the implications of the different options they can choose clearly mapped to the local context. This is particularly important when deciding on institutional models and when incorporating organisations, especially those at the community level, that may play a role in the initiative. In most cases, these decisions will have to take into consideration the national legal framework and the options available locally.

Similarly, tools for regulators will have to be created in order for these types to find a place in existing or future licensing frameworks. In many regulatory frameworks, differentiated licences exist for infrastructure and services, and it might be that in multi-organisational arrangements, organisations in the partnership hold different licences. There are countries where one single licence may exist for both and other considerations will be needed – for instance, in Kenya, a community network service licence, where the geographical area where the licensee can provide services is bigger than the "community" defined in this typology. That doesn't mean the framework needs to be modified, as the multi-organisational arrangements described in the typology would work here, with an organisation holding the licence required and working in partnership with different communities and organisations at that level. Similarly, in that and other frameworks, there seems to be an embedded assumption that non-profit models are only of the CSO type, and this has an impact on the sustainability of the initiatives when they are not allowed to sell services. We believe the tools to be created for regulators will contribute to clarifying this. In many jurisdictions, there are already asymmetries with incentives for "small" commercial ISPs (traditionally private businesses). We

believe that these tools will contribute to creating additional incentives for those social businesses, which are not a common case in the telecommunications industry, but by being (or becoming) community-centred have a higher development impact.

Finally, financiers and external donors will appreciate understanding the different roles played by partners in multi-organisational settings while having clarity about who is responsible for the management of the funds and accounting.

APPENDIX 1: METHODOLOGY FOLLOWED IN THE DEVELOPMENT OF THE TYPOLOGY

Preamble

Diagram

Frame of reference

Explanation

Operationalizing

Appendix

The draft typology was developed through extensive background research on papers (please see list below) and other resources where attempts to define community initiatives have been made, as well as through consultations with individuals and small groups where the evolving typology was presented:

- Meetings were held with stakeholders to get their input into the typology.[32]
- An online meeting was held with stakeholders who were invited using the same email lists as above to get their input into the typology. Two meetings were held to accommodate the different time zones. The meetings were held on Wednesday 10 July 2024 at 8-9 UTC (Asia, Africa and Europe), and 15-16 UTC (LAC, North America).

In order to identify emerging models, this typology builds on research produced over the past decade that contains elements of modelling community networks or other complementary and alternative models to provide last-mile connectivity. This includes:

- Internet Research Task Force (IRTF). (2016). Request for Comments 7962 – Alternative Network Deployments: Taxonomy, Characterization, Technologies, and Architectures. https://www.rfc-editor.org/rfc/pdfrfc/rfc7962.txt.pdf
- IGF Dynamic Coalition on Community Connectivity. (2017). "Declaration on Community Connectivity", in *Community Networks: the Internet by the People, for the People*. https://www.intgovforum.org/system/files/filedepot/45/declaration_on_community_connectivity_final.pdf

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32. This included Marie Lisa Dacanay from the Institute for Social Entrepreneurship in Asia (ISEA), Erick Huerta from Rhizomatica/REDES A.C., the LocNet team, and representatives of ISOC, Connect HumWWanity and the Beacon Project, as well as preliminary testing with 23 interviewees from the Asia-Pacific region involved in community-centred connectivity initiatives.

- Nicola Bidwell and Michael Jensen. (2019). *Bottom-up Connectivity Strategies: Community-led small-scale telecommunication infrastructure networks in the global South*. APC. https://www.apc.org/en/pubs/bottom-connectivity-strategies-community-led-small-scale-telecommunication-infrastructure
- Jim Forster, Ben Matranga and Anoop Nagendra. (2022). *Financing mechanisms for locally owned internet infrastructure.* APC, Connect Humanity, Connectivity Capital and the Internet Society. https://www.apc.org/en/pubs/financing-mechanisms-locally-owned-internet-infrastructure
- ITU. (2020). *The Last mile Internet Connectivity Solutions Guide: Sustainable Connectivity Options for Unconnected Sites*. https://www.itu.int/en/ITU-D/Technology/Documents/LMC/ITU%20Last-Mile%20Internet%20Connectivity%20Solutions%20Guide%20-%20Slides%20_WtPhotos.pdf
- BCG and Giga. (2021). *Meaningful school connectivity: An assessment of sustainable business models*. https://s41713.pcdn.co/wp-content/uploads/2021/11/BCG-Giga-Meaningful-school-connectivity-1.pdf
- Jonathan Brewer, Yoonee Jeong and Arndt Husar. (2022). *Last Mile Connectivity: Addressing the Affordability Frontier*. Asian Development Bank. https://www.adb.org/sites/default/files/publication/847626/sdwp-083-last-mile-connectivity-affordability-frontier.pdf
- Carlos Baca, Luca Belli, Erick Huerta and Karla Velasco. (2018). *Community Networks in Latin America: Challenges, Regulations and Solutions*. ISOC. https://www.internetsociety.org/resources/doc/2018/community-networks-in-latin-america/
- Carlos Rey-Moreno. (2017). *Supporting the Creation and Scalability of Affordable Access Solutions: Understanding Community Networks in Africa*. ISOC. https://www.internetsociety.org/resources/doc/2017/supporting-the-creation-and-scalability-of-affordable-access-solutions-understanding-community-networks-in-africa/

Additionally, the observations, findings and recommendations of internal and unpublished documents such as the report from an external evaluation that the LocNet initiative was subject to in 2022 were drawn on.

Significant effort was also made to incorporate the language of and align the typology with the analyses in social enterprise literature, in particular the work of the International Comparative Social Enterprise Models (ICSEM) Project from the International Research Network: https://emes.net/research-projects/social-enterprise/icsem-project-home/