

GLOBAL INFORMATION SOCIETY WATCH 2018

Community Networks



ASSOCIATION FOR PROGRESSIVE COMMUNICATIONS (APC)
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This edition of GISWatch came into being alongside a brand new baby boy. Welcome to the world, Ronan Diga!

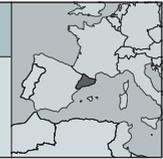
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guifi.net community

Roger Baig, Leandro Navarro, Ramon Roca
and Felix Freitag
<https://guifi.net>

Introduction

Citizen-driven access initiatives such as community networks are often considered as the last and least “serious” option to bring connectivity to regions or sectors of the population unattended by the “serious” options – that is, private sector and publicly funded deployments (which in many cases are carried out by the same companies doing the market-driven deployments).

guifi.net is a community network with tens of thousands of working nodes, and hundreds of volunteers, professionals and public administrations involved. It proves that community networks not only can deliver “serious” services to unattended areas (e.g. fibre to rural areas), but that this can be done in a very efficient way, converting almost all investment in deployment into profitable deployments, socially and economically. This in turn refutes another globally accepted assumption imposed by “the establishment”: that some regions as well as some sectors of the population will always need to be subsidised.

guifi.net is a bottom-up, citizenship-driven technological, social and economic project with the objective of creating a free, open and neutral telecommunications network based on a commons model. The development of this common-pool infrastructure eases the access to quality, fair-priced telecommunications in general and broadband internet connections in particular, for everybody. Moreover, it generates a model for collaborative economic activity based on proximity and sustainability.²

guifi.net started in 2004 as a telecommunications technological project in the county of Osona (Catalonia) to solve the broadband internet access difficulties in rural areas, given the lack of traditional operators to provide services there. By means of radio links built with commodity Wi-Fi routers, the neighbours deployed their own network to interconnect different locations (the so-called nodes) such as houses, offices, farms, public buildings, etc. to be able to access telecommunications and the internet wherever they needed to. A foundation was created in 2008 by the guifi.net community to give a legal identity to the guifi.net project.³

The guifi.net community has five main stakeholder groups according to their roles in the ecosystem and their motivations for participating in it: the volunteers, the governing bodies, the professionals, the customers, and the public administrations. These are non-profit, for-profit, and public interest groups.

As of August 2018, guifi.net accounted for more than 35,000 operating nodes. The majority of these nodes are located in Catalonia and the Valencian Community in Spain, but the network is growing in other parts of the world. The network is self-organised and operated by the users, using unlicensed wireless links and open optical fibre links.

This report shares the key factors that have enabled the scalability and the positive socioeconomic impact of guifi.net. It is based on our experience of over a decade of involvement in guifi.net, each of us in several different roles (volunteers, users, scholars, professionals). We hope this helps to establish the next steps for guifi.net, as well as to provide input to other initiatives interested in scaling up their efforts.

Policy, economic and political background

guifi.net has developed under the regulatory framework of the European Union (EU),⁴ that is, a legislative body that has created a set of European guidelines that member states must fulfil, complemented by regional and local rules. As a result of the European policy, the telecommunications sector

1 Although the country names used in Global Information Society Watch are normally based on the United Nations' list of member states (https://en.wikipedia.org/wiki/List_of_sovereign_states#List_of_states), APC has adopted the decision to use the name “Catalonia” for the guifi.net report. The use of Catalonia as a country name best represents the authors and the content of the report and is consistent with values that are important to APC: community self-determination and freedom of expression.

2 https://guifi.net/en/what_is_guifinet

3 https://fundacio.guifi.net/en_US/page/aboutus

4 <https://ec.europa.eu/digital-single-market/en/national-regulatory-authorities-member-states>

across the region is fully liberalised, and everybody, including those running citizen initiatives, is entitled to participate in the delivery of electronic communication services.

Despite this, frequently at the state, regional and sometimes local level, guifi.net has had to deal with actors defending very particular vested interests. This has translated into lost opportunities that have damaged the project and the citizens too.

The guifi.net response to access at the local level has been about a positive and creative attitude and persistent work. The achievements include a proposal for a municipal ordinance, based on the legal and regulatory framework in Catalonia, to share telecommunications infrastructure. This ordinance has already been adopted by several municipalities and a highly successful county-level practice aimed at deploying optical fibre to all households in Garrotxa (see below).

From the socioeconomic viewpoint, guifi.net carries out its activities in a European country (where the average population has their basic needs covered) under the principles of solidarity (nobody can be excluded for social or economic reasons) and social economy (its activities are non-speculative and non-extractive). Several pre-existing community networks have merged with guifi.net and currently operate jointly.

From the tens to the tens of thousands

What are the key factors that led a local initiative to scale up to tens of thousands of nodes?

Precise definition of objectives and scope and full commitment to them

There are many initiatives and objectives that can be seen as fully aligned with the guifi.net project (e.g. those that defend freedom of speech, or promote local content). As a result, it makes sense to integrate or involve these initiatives in guifi.net. Nevertheless, a clear definition of the goals of a project, the precise delimitation of its reach and the strict observance of these goals and limits, at least (i) helps to focus the efforts, as it is clear what the project is about and is not about; (ii) broadens the community, as not necessarily everybody must share the same opinion on all issues – they must just share the common objectives; and (iii) increases certainty and reduces the likelihood of misunderstanding and conflict.

In guifi.net the objective is to build and operate a computer network that is fully inclusive (open) in terms of access and use as well as in terms of construction, operation and governance. The guifi.net leitmotif is *ferent xarxa oberta, lliure i neutral* (doing

an open, free and neutral network). Whichever solution is adopted or action taken at any time must be entirely compatible with these values and promote them.

The example of local content is illustrative. Obviously, a sympathy for open and local content and services can be presumed among most of the participants. Nonetheless, the rule on openness is imposed only on the content and services that are strictly necessary to run the project. Access to any other content or service is left to the criteria of the providers. (Strictly speaking, the only reason to impose a rule on openness on content and services is because openness is the only option possible when implementing an open network infrastructure, and not because of any personal choice).

The network infrastructure as an open common-pool resource

The commons is a resource management principle by which a resource is shared within a community.⁵ In guifi.net the network infrastructure is held as an open common-pool resource (CPR). CPRs typically consist of a core resource which provides a limited quantity of extractable fringe units. In our case, the core resource is the network, which is created and maintained by the network segments that the participants deploy to reach the network or to improve it, and the fringe unit is the connectivity they obtain.⁶ The participants can keep the ownership of the fraction of the assets they have contributed or they can donate it to the project (among other options).

The governance system

The management of CPRs is challenging because usually they are made of rivalrous and limited resources, so they are congestion prone. This is the case of computer networks, as connectivity is subtractable – it gets used – and the capacity of the links is limited.⁷ The challenges are even greater when the resources are non-excludable, as in the case of guifi.net, where the non-excludability is intentionally imposed. Non-excludability in this context simply means that people cannot be excluded arbitrarily from an open network.

After in-depth studies of several CPRs, Elinor Ostrom identified a set of principles for their successful

5 Frischmann, B. M. (2012). *Infrastructure: The Social Value of Shared Resources*. Oxford University Press.

6 Baig, R., Roca, R., Freitag, F., & Navarro, L. (2015). guifi.net, a crowdsourced network infrastructure held in common. *Computer Networks*, 90, 150-165.

7 Well-managed fibre links have virtually unlimited capacity. The governing rules must be adapted to this circumstance.

management.⁸ Ostrom's works remained unknown to the guifi.net community for quite some time. Nonetheless, the evolution of most of the concepts and governance tools developed by the guifi.net community perfectly match Ostrom's findings.

The key components (the so-called "systems") of the self-developed governance tools of the guifi.net community are:

- An investment declaration system that allows the recognition of the investments made by the participants.
- A resource monitoring system that allows the accounting of resource consumption.
- A cost compensation system that balances contribution⁹ and consumption.
- A conflict resolution system with defined procedures (conciliation, mediation, arbitration).
- A gradual sanctioning system as the last resource to settle disputes. It includes temporary or permanent expulsion.

In the process of its development, the community has developed a comprehensive body of normative agreements whose components can be classified as (i) ground rules, (ii) contractual agreements, (iii) regulations, and (iv) good practices, depending on their relevance and the aspects regulated, with the licence¹⁰ for participation in the commons being the fundamental rule. These agreements establish the objectives and scope of the project and the rights and duties of the participants, and set the basis for the development of the rest of the governance tools. Their acceptance is mandatory for participation.

Legal certainty for the socioeconomic ecosystem

Undoubtedly, the fact that most of the components of the body of normative agreements are written documents has proven to be critical in establishing the legal certainty necessary to build a competitive general-purpose infrastructure that has enabled the development of a flourishing socioeconomic ecosystem.

The guifi.net Foundation is a non-profit organisation that gives a legal entity to the project and is responsible for its core governance activities, which include the maintenance and the development of the critical components of the body of normative agreements, but also their

enforcement.¹¹ However, the network allows for-profit activities (see below).

The different stakeholders can be classified based on their unique and non-transferable roles. Service providers sell their services (e.g. internet connectivity) over the network to the customers who pay for them according to service contracts. The volunteers are do-it-yourself non-profit participants that may organise around formal or informal non-profit organisations, associations or groups.

Public administrations must participate because they are responsible for regulating the interactions between the network deployment and the public interest (e.g. use of the public domain for network infrastructure).¹² In addition, they can also play more active roles like promotion of the project or participation in it, given the benefits to the public.

The social and economic relations within the guifi.net community are driven by the principles of non-speculation and non-discrimination, which means that prices are cost oriented and costs are shared according to the resources consumed, making sure that nobody is excluded for economic reasons. Cooperation among service providers is also well established.

Sustainability and growth

Enabling for-profit activity has two direct positive effects on the CPR. On one hand, it brings in income that makes the ecosystem economically sustainable and, on the other hand, it encourages the maintenance and upgrading of the infrastructure by professionals, as their income depends on it.¹³

guifi.net has developed a sophisticated system to ensure the sustainability and growth of the network infrastructure. The system is rooted in the obligation of certain participants, including the service providers and those who *make significant use of the network*, to participate in the economic compensation system and to fulfil the obligations resulting from it.

The economic compensation system¹⁴ establishes who is responsible for paying for what, based on the information from traffic monitoring,

8 Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press.

9 Contributions can be in money, labour or hardware.

10 English translation: <https://guifi.net/en/FONNC> (outdated).

11 Its roles also include offering technical advice, creating buffer funds, providing business bailouts, etc.

12 Also called public land disposition.

13 Equivalent to "traditional" commons, such as irrigation systems. Farmers share the water and the agricultural products can be directed to self-consumption or for sale in the market.

14 Baig, R., Dalmau, L., Roca, R., Navarro, L., Freitag, F., & Sathiaseelan, A. (2016). Making community networks economically sustainable: The guifi.net experience. *Proceedings of the 2016 Workshop on Global Access to the Internet for All (GAIA 16)*. ACM. <http://dsg.ac.upc.edu/sites/default/files/dsg/acm-sigcomm-gaia-guifi-econ.pdf>

the investment declaration system, and the rules of participation. The rules are applied as clearing houses for each scope with its own ledger for recording and totalling economic transactions from each participant, and each participant represented. The scopes for clearing houses are defined per services or segments of infrastructure and may vary over time.¹⁵ The clearing houses can define new rules as long as they are compatible with the rules of higher rank. The clearing houses periodically apply the calculation rules of capital expenditure (CAPEX) and operational expenses (OPEX) in the scope of the network segment or service of concern. The resulting amounts might not be settled immediately but accounted in an advanced ledger of deposits with the Foundation as intermediary. Clearing houses also have rules to decide on future investments.

XAFOGAR, a concrete success story

XAFOGAR¹⁶ is an ongoing guifi.net project aimed at deploying fibre in all of the 21 municipalities of the county of Garrotxa in Spain. All of these did not have fibre access, except the capital (Olot). It is led by a public development agency in the county and supported by the guifi.net Foundation, four local service providers and many local businesses and small investors.

What this experience highlights is the extraordinary catalytic power of the honest involvement of a public administration. With EUR 1.5 million already invested, out of the total estimated budget of EUR 10 million, the development agency is providing irreplaceable political support and has taken the responsibility of the daily management of the project. The fact that for each euro invested by a public administration, another 12.7 have been provided by private initiatives (direct beneficiaries, service providers, investors), underlines the positive impact of these actions on the confidence of investors and the population in general.

Conclusions

guifi.net offers irrefutable evidence that large-scale competitive network infrastructures can be built and operated as an open common-pool resource. Cheaper and better quality services, higher inclusiveness, fairer salaries, local empowerment, technological sovereignty, extraordinary capacity to raise local funding, and investment coordination in a single

shared infrastructure are some of the numerous benefits of this model. To realise its vision, guifi.net has developed a comprehensive governance tool set which includes mechanisms for dispute resolution, investment recognition, cost sharing, etc., and has established a non-profit institution responsible for their improvement and enforcement.

Despite this, guifi.net is still working on improving its socioeconomic ecosystem.

Many lessons can be extracted from the guifi.net case and many of the tools have already been reused in other contexts. The conception of the network infrastructure as a common-pool resource is fully in accordance with the non-speculation principle, and the relative ease with which the network can be extended and the flexibility of the uses of its capacity allow an unprecedented level of inclusiveness. To allow and promote the utilisation of the network by local commercial service providers to deliver their services has enabled a thriving economic activity.

The inclusion of measures to ensure the necessary reinvestment of a fraction of the benefits as core components of the governance has proven to be effective to prevent the depletion of the CPR and towards the redistribution of wealth. The honest cooperation with public administrations has provided evidence that the public sector has many resources to promote the open CPR model beyond providing funding.

From the theoretical perspective, the guifi.net model seems general and flexible enough to be applicable worldwide. Nevertheless, the practical implementation requires significant effort, because most of the current solutions must be redesigned to fit different contexts. To avoid bias and ensure effective implementation, these efforts must be overseen by an international organisation.

Action steps

What does guifi.net teach us?

Taking guifi.net as a reference, any community that wants to scale up in a sustainable manner should take the following steps (in this order):

- Precisely define the scope and the aim of the commons.
- Develop a governance system (as defined by Ostrom).
- Develop a resilient and inclusive ecosystem of services around the commons (the network) with special emphasis on making it inclusive and empowering the local stakeholders.

¹⁵ An area such as a town or region sharing an infrastructure, or a resource such as a set of internet uplinks.

¹⁶ www.xafogar.cat

What does it need to do to encourage actors to support it?

- Show theoretically but also by example that its proposal is serious. To do this, commitment on the above points and an action plan to achieve them must be proven. A useful response from actors interested in supporting guifi.net could come in the form of funding, technical help, making infrastructure available, etc. Good actors to engage include public administrations, service providers and local businesses, in addition to the direct beneficiaries (the communities of users).
- On the specific case of funding, we propose micro-funding strategies; that is, many iterations of small funding made available based on immediate capacities and needs.

What is the most urgent thing it needs to do right now?

- Consolidate the documentation of good practices incorporating the accumulated experience, not only on technical issues but also socio-economic and governance issues.
- Improve communication to lower the barrier of adoption and boost collective knowledge transfer and the sharing of tools.
- Develop tools (mostly software based) to automatise the operation and assist the implementation of open governance, including using last generation technologies.
- Ensure that the community network has effective and appropriate support for developing in the real world. A key component of this support is the regulatory framework. It must effectively prevent conflicts of interest with privative models and the incumbents.

Community Networks

THE 43 COUNTRY REPORTS included in this year's Global Information Society Watch (GISWatch) capture the different experiences and approaches in setting up community networks across the globe. They show that key ideas, such as participatory governance systems, community ownership and skills transfer, as well as the "do-it-yourself" spirit that drives community networks in many different contexts, are characteristics that lend them a shared purpose and approach.

The country reports are framed by eight thematic reports that deal with critical issues such as the regulatory framework necessary to support community networks, sustainability, local content, feminist infrastructure and community networks, and the importance of being aware of "community stories" and the power structures embedded in those stories.

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2018 Report

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