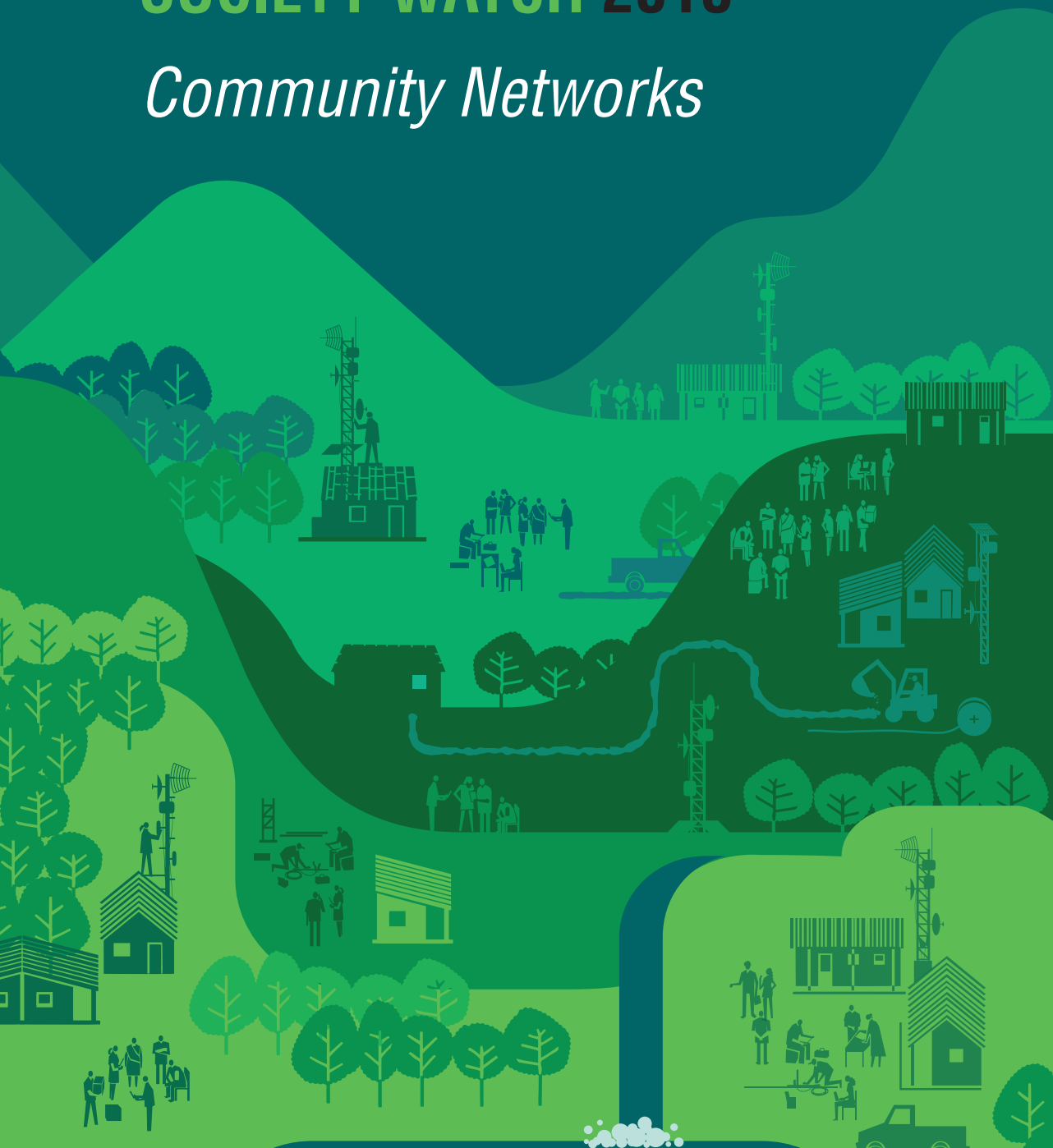
GLOBAL INFORMATION SOCIETY WATCH 2018

Community Networks



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Introduction
The rise and fall and rise of community networks

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Community networks[1] pre-date the commercial internet. They have their roots in the early email and electronic bulletin board systems (BBSes) that emerged in the mid-1980s. These systems grew into networks, which were adopted by enthusiasts as technologies that could be easily built with dial-up modems and the newly emerging, low-cost personal computers. These networks were also adopted by social activists who immediately saw their potential for improved organising, knowledge sharing, and awareness raising.

The Association for Progressive Communications (APC), a global network of social activist organisations, has its roots in connecting community groups around the world with email and news[2] at a time when email was limited to a tiny fraction of society using standalone BBSes or computers in academic departments. When it became possible to network these systems together – using FidoNet[3] or UUCP,[4] for example – their affordability and accessibility helped to spread their use to social and political movements in communities around the world, particularly among those who did not have other reliable ways of communicating internationally.[5]

In this early "pre-internet" phase, APC facilitated the use of email and maintained hundreds of private discussion forums by and for non-governmental organisations, United Nations agencies, trade unions, universities, journalists and activists. These forums were batch-replicated among APC member or partner organisations around the world and made available locally, initially through dial-up modems and later also through public networks.[6] APC was, as a result, a global computer communications and information network maintained by many local member "networks" – organisations offering local access to this global resource network, often run as self-sustaining cooperatives or collectives.

With the growth of the commercial internet in the 1990s and the birth of the World Wide Web,[7] FidoNet and UUCP began to give way to commercial internet service providers (ISPs) who offered the entire internet as opposed to just email and newsgroups.[8] The users of these early internet services mainly relied on dial-up modems operating over copper phone lines. Unlike the store-and-forward nature of FidoNet/UUCP, dial-up internet required continuous use of a phone line. While this service spread rapidly around the world, it was limited to those who had their own phone lines with stable connections, and who could afford the monthly subscription fee (and, outside of North America which had free local calls, large phone bills). Not surprisingly, people in developing countries and the poor

1 Communication networks that are built, owned, operated and used by citizens in a participatory and open manner.

2 News at the time was exchanged through "newsgroups", primarily through "Usenet newsgroups" which allowed users to share news articles as well as discuss the content with others. Some newsgroups were used purely for debate and discussion. Usenet was developed over a decade before the public internet and the World Wide Web. APC provided access to both the public Usenet newsgroup, as well as to APC-run newsgroups. https://en.wikipedia.org/wiki/Usenet

3 https://en.wikipedia.org/wiki/FidoNet and, for a good introduction by Randy Bush, see https://www.fidonet.org/inet92_Randy_Bush.txt

4 https://en.wikipedia.org/wiki/UUCP

5 Murphy, B. (2001). Mike Jensen and the code that stitched together the APC: The pre-internet days and early efforts at linking APC nodes. *APC Annual Report 2000*. https://www.apc.org/about/history/mike-jensen-pre-internet-days

6 APC nodes were themselves interconnected by a wide range of technologies, from LEO satellites, to international X.25 packet lines, as well as local university links and international dial-up connections using the latest high-powered modems (such as the Trailblazers).

7 The first APC website in the internet archive: https://web.archive.org/web/19961028120226/http://www.apc.org:80

8 Surman, M. (2001). Where do we go from here? APC after the internet explosion. *APC Annual Report 2000*. https://www.apc.org/about/history/apc-after-internet-explosion

everywhere were the most constrained in their ability to access the internet. A solution that emerged around that time to directly address affordability, particularly in Europe and North America, which had good telecommunications infrastructure, was a type of community network called a Free-net.[9] Free-nets offered no-charge dial-up access and public terminals which allowed ordinary citizens to participate in discussion forums about local city topics and problems. Many of these Free-nets evolved into community ISPs.

But it was another low-cost, commodity technology that really enabled the independent growth of community networks. In 2003, it was discovered that Linksys, a manufacturer of Wi-Fi access points, had used software licensed under the GNU General Public License on the firmware of their access points.[10] Under such a licence, anyone using or changing the software must release it into the public domain on the same terms as the freely available original source. Linksys was compelled to release the source code for its flagship Wi-Fi access point, the WRT54G, to the community. This triggered a wave of tinkering and innovation with these devices, which in turn led to several important innovations.

Wi-Fi hackers discovered that the access points could be connected as peers to create a mesh network, allowing them to extend connectivity by placing them in proximity to each other. They further discovered that the antennas could be replaced with homemade directional "can-tennas" which could direct connectivity over several kilometres. The source code evolved into open-source operating systems for network devices, such as OpenWrt.[11] This gave birth to the community wireless movement which thrived in cities and universities around the world.

Although these networks were largely limited to reasonable proximity to an existing internet connection, they had a profound effect on affordable access as a single dial-up (ADSL) internet connection could be shared with an entire community. Examples such as Free2Air[12] in Europe and others in the global North provided the basis to learn and document experiences[13] that were then shared[14] and piloted in the global South.[15] Additional momentum was gained via the International Summit for Community Wireless Networks (IS4CWN) events held from 2004 to 2013, as well as the BattleMesh,[16] an annual event organised by developers of open source, ad hoc network routing protocols.

Towards the end of the 2000s, things changed. The rise of mobile data networks, first with 3G and then LTE services, provided an alternative to community wireless networks that was reasonably affordable and was often more reliable. Also, as demand for broadband grew, community networks often struggled to keep pace with demand for capacity. As a result, many of these networks either disappeared or shifted their focus to content hosting and services. Many commercial wireless ISPs suffered as well.

Some community networks like guifi.net[17] in the Iberian peninsula evolved to embrace fibre optic infrastructure as well as Wi-Fi and developed the practice of their community network through the exploration of the principles of common pool resources as developed by Elinor Ostrom.[18] The community networks that survived often relied on the extraordinary efforts of a few talented volunteers and a commitment to build and rely on their own cooperative networking and access infrastructure.

Fast-forward to the latter half of this decade and new trends have emerged with implications for community networks. Perhaps most significantly, the value of being connected has risen to the point where access to affordable communication has begun to rival access to other basic services in terms of personal priorities. More than a decade ago, researchers established that simple proximity to a communication network was directly correlated with a reduction in the probability of dying from malaria.[19] Today, with smartphones delivering powerful generic services like group and personal messaging and more specific apps aimed at critical sectors such as education, agriculture and others, communication networks are approaching the status of essential infrastructure for people's livelihoods. Affordable access to communication has gone from luxury to necessity no matter where you live or what your income.

And yet, over half of the world's population still does not have access to the internet. Traditional solutions are showing signs of having reached their

9 https://en.wikipedia.org/wiki/Free-net

10 Miklas, A. (2003, 7 June). Linksys WRT54G and the GPL. *LKML.ORG*. https://lkml.org/lkml/2003/6/7/164

11 https://en.wikipedia.org/wiki/OpenWrt

12 https://wiki.p2pfoundation.net/Free2Air

13 wndw.net

14 https://www.apc.org/en/project/wireless-lac-tricalcar and https://www.apc.org/en/wireless

15 www.fmfi.org.za/wiki/index.php/First_Mile_First_Inch_Home_Page

16 https://battlemesh.org

17 See the Catalonia country report in this edition of GISWatch.

18 https://en.wikipedia.org/wiki/Elinor_Ostrom

19 Mozumder, P., & Marathe, A. (2007). Role of information and communication networks in malaria survival. *Malaria Journal, 6*, 136. https://malariajournal.biomedcentral.com/articles/10.1186/1475-2875-6-136

limits. Mobile subscriber growth is slowing as the current economics of mobile network operators struggle to find viability in markets with subsistence-level incomes and/or in sparsely populated regions. It is also noteworthy that the same situation is being mirrored in the number of internet users, whose annual growth has slowed from 12% in 2016 to only 7% in 2017. Varied attempts to address this problem, through universal service strategies/funds, private sector initiatives or philanthropy, have met with limited success.

This presents a conundrum for policy makers and regulators where value continues to accrue to those with affordable access to communication infrastructure while the unconnected fall further and further behind by simply staying in the same place. Those who most desperately need support are cut off from access to opportunity, to social and healthcare safety nets, to education, to information that can improve lives, and to platforms to demand change. It is ironic, or perhaps tragic, that the voices of the unconnected are not heard on this issue for the very reason that they are unconnected. And the problem extends beyond the unconnected. There are also the underserved. Lack of choice in access alternatives often results in a cost of access that is unaffordable for a significant percentage of the population (especially in rural areas) and/or in low quality or speed of service. In a context where government shutdowns are becoming a trend, and data privacy is becoming a growing concern to many, this lack of alternatives also compromises the freedom of expression of many users.

These unattended needs represent a challenge and an opportunity for community networks. If community networks were able to thrive and provide services effectively in the pre-internet era, might it be possible that they can do so again? There are a number of factors that suggest that the telecommunications infrastructure landscape has shifted yet again.

The spread of fibre optic infrastructure, both undersea and terrestrial, is changing the access market. Fibre optic networks are the deep water ports of the internet. While there is no question that fibre optic networks are increasing the ability of existing operators to deliver broadband, those same networks are opening up possibilities for new players who can now deliver more targeted, localised, affordable solutions to unserved and underserved populations. Where open access[20] policies exist, the spread of undersea and terrestrial fibre optic networks has democratised access to broadband.

Changes in last-mile technology are also opening up new possibilities. The spread of Wi-Fi as an access technology is empowering commercial, government and community access initiatives to offer local services. Dynamic spectrum technologies such as television white space (TVWS) also show promise as alternative access technologies.

Finally, the meteoric growth of access combined with mass manufacturing has brought down the cost and complexity of access technologies to the point where they are within the reach of small-scale operators. For example, low-cost solar-powered open source GSM base stations can be deployed for a fraction of the cost compared to the proprietary equipment used by existing mobile network operators.

All of these changes in the infrastructure and the technologies available are now being exploited in many imaginative forms by communities around the world to meet their communication needs. Those needs vary, and relate to issues such as a lack of services, the affordability or quality of access to voice and data services, or the lack of locally relevant content and services, often ignored by mainstream providers. But a community's communication needs go beyond just technical issues. In places where both commercial and community providers exist, users may choose to access communications via a community network because of trust, because of its commitment to local development, because it is customer friendly, or it preserves and defends their privacy better than other options available.

Yet while there are many good examples of community network success stories across the world, community networks are not yet the norm that they might become.

There are several reasons for this.

First there is a lack of awareness of opportunity. The more advanced community networks like B4RN[21] in the United Kingdom and guifi.net in the Iberian peninsula are offering broadband services that the incumbents cannot match on either speed or price, yet neither their performance nor the innovative commons-based business models they operate on are well known. Similarly, in the state of Oaxaca in Mexico, a non-profit, Rhizomatica,[22] is helping communities build their own GSM base stations and services. But their similarly remarkable achievement is also not as well known as it should be. More needs to be done to spread the word on

20 ITU. (2011). Open access regulation in the digital economy. https://www.itu.int/net/itunews/issues/2011/07/43.aspx

21 https://b4rn.org.uk

22 See the Mexico country report in this edition of GISWatch.

how these organisations are taking community networks from proven feasibility to proven scalability.

A second limiting factor is the current state of policy and regulation for community networks. Community networks have largely succeeded in spite of existing regulation rather than because of it. Regulatory frameworks were designed with large, relatively slow-moving, monolithic operators in mind. Changes in access policy and regulation are required, in particular with regard to spectrum management, in order to encourage communities to address their own access challenges. As the International Telecommunication Union (ITU) has recommended, it is "important that administrations, in their radio-spectrum planning and licensing activities, consider mechanisms to facilitate the deployment of broadband services in rural and remote areas by small and non-profit community operators."[23]

Another factor is related to the lack of technical and financial support to backstop those who may see the opportunities of a community network but lack either the technical expertise or the seed funding to get started. Universal, affordable access to communication will only be achieved when communities are empowered to solve their own local access challenges, instead of just waiting to be connected.

Finally, communities are composed of people, with their own background, social dynamics, and history. Community networks, like any other other collective initiative, also have to deal with the different sensitivities of everyone in the community to avoid clubs that perpetuate existing inequalities, with regard to gender, economic resources, or technical skills, amongst other areas. This is not always possible, and tensions and issues need to be resolved to enable everyone in the community to enjoy the benefits of the network.

Still, as the 43 country reports in this year's Global Information Society Watch show, many collectives around the world have managed to overcome these challenges. And, as in the pre-internet days, they are collaborating among themselves, exchanging information and learning from each other, and taking collective action at the local, national, regional and global levels to consolidate their work, and encourage more and more people to join what has become a global movement.

23 Recommendation ITU-D 19. See: International Telecommunication Union. (2017). *World Telecommunication Development Conference (WTDC-17): Final Report*, p. 634. https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC17/Documents/WTDC17_final_report_en.pdf

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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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