# 9. The Obsessive Utopia of Mesh Networks

‘The sleeping beauty of mesh has been kissed into life by the community’, explains Elektra in her book. The community has made it possible to have decentralized wireless networks which connect small local cells, automatically by intelligent software (Aichele 2007, p. 15). In this chapter, a closer look at developments around mesh networks is taken, based on a study trip to Barcelona, supplemented by further research. This chapter also asks the difficult question, how the mystifications of technology might be overcome. Are better mesh routing protocols really the answer to all problems?

In one of the previous chapters I stated that there is a significant difference between town and countryside. In many rural areas, it is virtually impossible go get affordable broadband internet. This problem has actually furthered the growth of wireless community networks in the countryside. A widely shared view is that it is much more difficult to mobilize people for wireless community networks in urban areas where a variety of possibilities for network access exists and where the urban topology makes networking difficult. This, however, while broadly true, may not always be the case. In some areas in Barcelona, wireless community networks are growing, and they are developing and using the latest mesh network technologies.

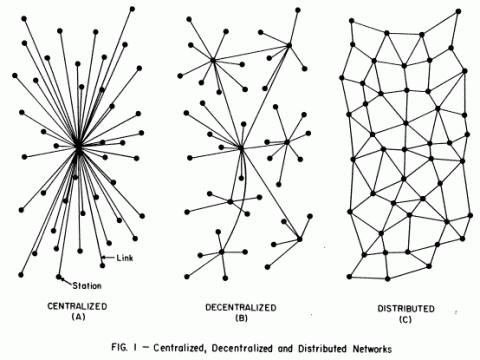
Routing is generally a very interesting area. Dijkstra’s algorithm is one of the earliest path finding algorithms, written by computer scientist Edsger W. Dijkstra in 1956 and published in 1959.  
The Dijkstra algorithm is something as basic for the current political and cultural system as cars – or traffic lights – were for the previous one, but nobody knows it, except for experts, computer scientists, techies. It would not surprise me if it was included in the *Evil Media* book,[[1]](#footnote-2) since this is something that has become part of the technological unconscious. It has an agency of its own, as a repressed force. This is definitely the case with the information infrastructure.

The process of forwarding *packets* from one node to the next on the Net is called routing. The politics thereby deployed concern fundamental freedoms and rights. Until now, the neutrality of these protocols has been maintained, because they are jointly developed by the IETF and IEEE. The commonality of the Net depends on neutrality on some layer. And even in the turbo-capitalist world we live in this is still safeguarded. Mesh routing protocols are improvements of *normal* routing protocols.

Pau Escrich is one among a team of researchers working on the Confine project and he is also a Guifi activist:

I realized that in my district, a Barcelona neighborhood which is called Sants, there was not any node of the Guifi.net project. So, following the approach – think globally, act locally – I started contacting people from the neighborhood. We built a nice group of folks interested in building a free network, and after having some meetings we started deploying nodes. Now, four years after this, we have around 50 nodes in this area.

Pau and colleagues started using new technology based on mesh routing protocols. Most of Guifi.net does not use mesh protocols, but standard routing technology such as the Border Gateway Protocol (BGP). In such a network, a group of routers under a single administrative policy – an Autonomous System (AS) – is managed using BGP for interior and exterior routing. If you compare an AS with a country, the router controls entrance and exit to that country. The benefit is that for nodes inside this *country* it is not necessary to know the route to each and any other node on the net, it only needs to know the nearest gateway router.

Fig. 29. Paul Baran, Network Topology.

The resulting network topology is one that could be described as decentralized, according to the classification of Paul Baran’s seminal study from the early 1960s (see image above). A decentralized topology is a mixture between a hierarchical, star-shaped network and a completely distributed or mesh network, without any nodes taking on a notion of a center.

In Catalonia, Guifi.net has a decentralized topology with SuperNodes which are connected with each other and to which are connected many Nodes, which are only connected to the SuperNode, but not to each other. This works reasonably well but does not fulfill the criteria of the wireless community network dispositif which demands a more egalitarian topology. Pau Escrich:

The SuperNode network creates what we call the Backbone, and this Backbone network is decentralized, but the level below (the Nodes layer) is very centralized, and it represents more than 80% of the network devices. So this is an actual control point; the groups, individuals or companies controlling these SuperNodes are the actual managers of the network. This is what we are trying to skip by developing and using QMP.

QMP stands for Quick Mesh Project, a GNU/Linux distribution based on OpenWRT and specifically made for mesh networks. QMP is based on a predecessor project which was developed in the context of another community network initiative. In 2007, a small group in Gracia, a pleasant neighborhood in Barcelona, which extends from just behind Sagrada Familia into a more leafy and hilly area, started a small mesh network called GSF. Roger Baig, a key figure in Guifi.net, was involved in this. Roger Baig, according to his self-description, had been involved in free software since the 1990s and ‘installed a server in each village around my area. Initially’, he said, ‘I was not so skilled in networks, still learning, so OpenWRT was fresh air for me.’

The group looked for funding and managed to win a contest organized by a foundation named PuntCat (dot-cat are Top Level Domain managers). They received 15,000 Euros to start the project, reports Pau Escrich.

The development of QMP then started seriously after 2010, when a small group of convinced mesh networkers dedicated themselves to building a new distribution from scratch. Part of this group was the German Axel Neumann who at the time also lived in Gracia. After three years they launched the first stable release, and QMP is now used at many places around the world.[[2]](#footnote-3) Axel Neumann is key developer of BMX6,[[3]](#footnote-4) one among a number of the latest incarnations of B.A.T.M.A.N.,[[4]](#footnote-5) a mobile ad hoc mesh network protocol.

Axel Neumann is writing software for the Confine project. He is helping to run the testbed, Community Lab. He is also main developer of BMX6, one of a number of B.A.T.M.A.N. forks. Axel was fascinated with complex problems early on, problems such as how to make a map of a landscape that constantly changes; or how to have routing tables in a network where constantly nodes appear and disappear? Axel was getting interested in B.A.T.M.A.N. through Freifunk. Pau Escrich:

B.A.T.M.A.N. was born in Berlin as an alternative to OLSR. Its approach is different for a node running the routing protocol; instead of knowing all the network topology (as OLSR does), in B.A.T.M.A.N. every node only knows its new best step to reach any other node in the network. So if all the network participants are doing the same, the user data will be routed from one side to the other following always the best path. This approach is called distance vector.

B.A.T.M.A.N. is actually an acronym and stands for *better approach to mobile ad-hoc networking*. The initial idea came from Corinna *Elektra* Aichele, who also started developing it, and was soon joined by Axel Neumann in this effort. To cut a long story short, after B.A.T.M.A.N. emerged as an alternative to OLSR – the latter the first mesh protocol which became more widely used by the community – a rivalry developed which inspired the *Battle of Mesh Networks*. This is a kind of contest, where community networkers meet to test and compare different protocols.[[5]](#footnote-6) Meanwhile, a number of different flavors of B.A.T.M.A.N. exist besides BMX6.

B.A.T.M.A.N. is a distance vector protocol. OLSR is a link state routing protocol where every node has a map of the network and can make decisions about where to send packets first. Distance vector, Axel explains, is more like I send somebody on a hike without giving him a map, but telling him to look out for the signs. Distance vector is more simple, in a certain way, but has other consequences. The signs have to be put in place and they have to be kept up to date. This is done by flooding the net with messages from the target node. Axel is now working on BMX6, trying to improve the way how this flooding of messages is done. ‘Speaking in the abstract,’ Axel explains, ‘it is like compressing data.’ Pau Escrich:

We choose BMX6 because it fits our requirements: scalability, good performance, capable to run on a low-resources machine and IPv6 support. In addition Axel Neumann, its main developer, is a good friend of the Guifi.net community and he joined the QMP team, so we are really having a routing protocol which is very adapted to our needs.

Programmers such as Axel and Pau are deeply fascinated about the capacities of mesh protocols like OLSR or B.A.T.M.A.N. in terms of self-organization. In the network topology of Guifi.net as described above, a SuperNode may control 50 or 100 nodes. While the backbone is decentralized, the leafs are very centralized. For community network activists, the network topology is not just a technical issue, it also expresses a political desire. Pau Escrich:

When I was a kid, I was enthusiastic about Che Guevara, Gandhi and these people in history who changed the world and fought for the freedom of ordinary people. I also liked computers a lot. So I found the free software movement as a perfect scenario to follow my ideas.

The mesh networking community is striving to build a completely egalitarian, uncensored, free and open network. Axel Neumann believes that the future belongs to multi-policy routing. Each node decides autonomously but still everything works together. In Community networks, it would be too much asking constantly for meetings to make policy decisions. B.A.T.M.A.N. advanced, the other main B.A.T.M.A.N. fork, uses Layer 2 of the internet. The user feels like hanging on one switch, but Axel says he cannot be sure how far this can scale. Axel would propose to have a cloud using B.A.T.M.A.N. Advanced and BMX for long distance connections. Locally, the user will be able to move from cell to cell as with a mobile phone.

Distributions with several mesh protocols are already in actual use in Spain, Germany, Austria, Argentina, and Nicaragua, in Chile possibly too. A major effort for a new distribution is called LibreMesh.[[6]](#footnote-7) It is an attempt at globalizing the Freifunk firmware undertaken by several community networks across continents, including Freifunk, Ninux, and Guifi, together with people in Argentina.

The latest Freifunk distribution, Kathleen, also has B.A.T.M.A.N. and OLSR installed. It offers a lot of improvements in the direction of auto-configuration and ease of use and better management of IP spaces and DNS services.[[7]](#footnote-8) With regard to the politics of Freifunk, I was able to make interesting observations when a massive flamewar broke out between someone, who apparently wanted to use the Freifunk label for his own cause, and everybody else.

The discussion about what makes a network *free* or *open* was raging on WLAN-News, one of the main Lists for exchange on Freifunk issues. The story, which had rumbled already through local Freifunk lists, was that one wannabe entrepreneur wanted to do something *like* Freifunk and with its endorsement and under the subdomain, but with policies contradicting some rules. It seems he wanted to make his own network and use a tall building, paying someone to have a router there on his balcony.

The ensuing discussion was like a look into the collective psyche of the Free radio community. The community objected to a whole range of issues, but one of them was that the other network would not mesh. Admittedly the *entrepreneur* did not make his own case easier with a very angry tone, accusing Freifunk of acting like a closed shop. The whole idea smacked of opportunism. But what I found interesting was the emotional intensity with which mesh was argued as a political project. Only the mesh network is really a free network.

On one hand, I do believe that things such as LibreMesh can make a difference, since it creates the possibilities of a global, independent infrastructure, the network commons, reclaimed by its users.

In political terms, this could either be described as libertarian, or anarchist or grassroots, bottom-up, self-organized democracy. The desire of mesh network developers is to give the net a technical structure which makes it difficult to impose any top-down control structure.

In my ears, this sounds a bit like the initial idea behind the internet in the first place. However, as the history of the Net has shown, such a decentralized structure on the technological level does not make the Net immune from other forms of centralization and control. Capitalism knows many ways of bending and taming the liberatory potential of new technologies. Google is the best example, it can exert control without directly owning the whole of the Net, it does not need to shape the traffic flows of the Net at control points such as routers or hubs.

In my conversations with community network activists, I tried to explain that a decentralized network can also serve top-down organizations and vice versa, that a centralized network could also serve the struggle of a movement for freedom. This winter, I visited the Museum of Revolution in Havana where you can see the radio transmitters built by technicians for Fidel Castro and Che Guevara. There was nothing decentralized about this technology, but it served the purposes of the revolutionary struggle perfectly well. Whenever I try to make such an argument, it seems I am running against walls.

‘If you have a centralized network you have a weak network; distributed things are the basis for the freedom of technologies’, Pau insisted. The *freedom of technologies* is constituted by the three freedoms of Eben Moglen introduced earlier in this text: free software, free networks, free hardware. Basically, everyone from Guifi.net whom I interviewed repeated those three freedoms to me like a mantra.

Pau Escrich and Roger Baig are part of a group of community networkers and researchers, who work at Universitat Politècnica de Catalunya (UPC), Barcelona, Spain in the framework of the EU funded project Confine.[[8]](#footnote-9) This project brings together community networkers, but also academic computer scientists and telecommunications researchers, to build Community Lab, a testbed for many new WLAN applications.

One of them is Llorenç Cerdà-Alabern who is an Associate Professor at UPC. He also lives in the district of Sants and wanted to contribute something practical to this project. So he put an antenna on his roof which has now become a hub in the mesh in Sants built using QMP. Llorenç thinks that this cooperation between networking enthusiasts and academic researchers is beneficial because the community is much more oriented towards practical results whereas researchers can look further into the future.

Llorenç is using his position in the network topology to conduct some experimental measurements and to write papers about it.[[9]](#footnote-10) He has also written a topology generator, a tool that visualizes the network between Sants and UPC.[[10]](#footnote-11)

The community network provides the unique opportunity to have live field tests running, studying relatively large scale wireless networks under real conditions. Ivan Vilata-i-Balaguer is also working in the Confine project. His responsibility is to provide services for the implementation of the testbed, Community Lab.[[11]](#footnote-12)

‘We have the community device’, explains Ivan, ‘we chose to run the experiments on a separate device.’ The community lab testbed is actual hardware, a device which is put next to nodes at community networks, and on this device are running some experiments. So they had to ask a lot of questions, explains Ivan, questions such as ‘How do we manage all this hardware? We are talking about nodes on the community network which can be used to run experiments.’

Most research is usually done in controlled environments, by research groups, but there are no users. In a community network with real users, explains Ivan Vilata-i-Balaguer,

‘the experiments must not overwhelm the community network with traffic, must not crash it, when experiments crash, and it also should not affect node ownership, so we cannot expect total control from the testbed operator; we had a lot of open topics to think about and we had to find an architecture that meets all these requirements.

The research devices can be used for different experiments, remotely controlled from servers hosted at an organization called Pangea. According to Ivan Vilata-i-Balaguer, in July 2014 there were 120 to 130 research nodes, of which about 90 were in perfect working condition, ‘but we are expanding the testbed and developing the software.’

The maintenance of the research devices is an issue, because most of the nodes belong to individual node owners, so updating of the software and keeping the nodes in working-order is precarious. As a result, now most of the nodes which are connected to a research device ‘are operated by people who work for CONFINE, so the communication overhead is not so big’, explains Ivan. Confine merges community network and academia in the same project. It enables, for example, advanced monitoring capacities which can be used by Guifi.net to have a transparent network and enforce the rules and principles of the network commons. It also enables more experimental topology generators such as the one by Llorenç Cerdà-Alabern; but this is just a fraction of what is going on.

The project is also providing data sets from those measurements for other researchers.[[12]](#footnote-13) This page gives an overview of all the partners and activities, such as Athens Wireless. Ninux in Italy, Funkfeuer and many more.[[13]](#footnote-14) As part of the project, a whole range of social projects have been added through an open call.[[14]](#footnote-15) One of those projects is CONFLATE, which uses ‘the new Research Devices of Ninux.org to deploy a simple (but practical) OpenFlow based DASH Live Video Streaming service for real users of Ninux.org,’ informs the website. This and other projects will be topics of future articles.

However, at the risk of being seen as a party popper, I feel the need to also share an observation which stems from rather long-term engagement in the field. It seems that many participants in this movement display facets of what Joseph Weizenbaum called the obsessive-compulsive programmer.  
In his 1976 book *Computer Power and Human Reason*,[[15]](#footnote-16) Weizenbaum, as a big critic of computer science from within, wrote this famous passage about the

bright, young men of disheveled appearance, often with sunken glowing eyes, [who] can be seen sitting at computer consoles, their arms tensed and waiting to fire their fingers, already poised to strike, at the buttons and keys on which their attention seems to be as riveted as a gambler’s on the rolling dice.

The real issue here is not about appearances and also not about finger-pointing at computer enthusiasts or techies, as I prefer to call them. We should not make techies culpable for what are actually the contradictions of this society. In the knowledge economy, almost everyone is quite compulsive about their work, and in the 21st century many people have become *hackers* according to McKenzie Wark’s definition.[[16]](#footnote-17) In *Fun and Software*, a recent book edited by Olga Goriunova, one of the pioneers of Software Studies, the authors treat this subject in a more even-handed way.[[17]](#footnote-18) Wendy Hui Kyong Chun and Andrew Lison argue that there is a dialectic at work between fun and exploitation.[[18]](#footnote-19) Techies such as Linus Torvalds write software *just for fun* but their political naivety makes them also subject to exploitation. For some, the fascination with technology, which itself is not the real problem, can turn into a compulsive obsessive disorder.

The real problem seems to be not the obsession, which is actually driving innovation, but the one-sided belief that there is a technological fix for each and any social ill. The bigger question rumbling throughout this book is whether community networks can alter the course of technology and whether a different relation between technology and society can emerge which could help to make society more democratic. The simple answer to the first part of the question is almost certainly a bold Yes!, of course. Community Lab certainly helps to generate a lot of data to improve mesh protocols and develop new methods and services. Yet the second part of the question is much more complex and demands further explanations.

In capitalist societies a heightened division of labor develops which drives people into increasing specialization. As a result, information and communication technology (ICT) is for most people a black-box. They use it, but have no idea how it works. This allows to create what Critical Theory used to call the *mystifications of technology*. Societies get ever more fragmented, whereby small elites command a lot of power by using money and technology. To ordinary people then it looks like they are controlled by technologies, mistaking social relations for relations between things. As technology becomes *mystified* in this way, the solution to the problem appears to be to create even better technology.

While techies, as individuals and citizens, might actually disagree with the political status quo and desire a free and egalitarian society, the course of technology as such – driven by their own free labor, produced out of their obsession with creative computing – exacerbates those divisions between powerful elites and ordinary user-citizens. Techies passionately belief that Free and Open Source Software (FLOSS) will help to counter such developments. But while those technologies are transparent to experts, for ordinary people they are as opaque as a brick wall. Social mechanisms intrinsic to the techie community actually make matters worse.

The idealistic techie communities who produce FLOSS tend to have a missionary zeal about them and are very tightly knit *communities of practice* who have created their own rules and codes, literally and metaphorically. This world, as highly complex as it has become, of practices and ethics, has few connections with the rest of society – it works well within the community, where everybody carries the same rules and values, but is completely impregnable for non-members.

Just to give an example, it is completely beyond me why the testing of different mesh protocols has to be called *battle mesh*. People who are otherwise really nice and sensible are using, without further questioning it, a militarized language. This is a put-off for many people who may otherwise be interested in joining those communities. The problem goes even further. Mobile ad-hoc networks have initially been developed by the US military. The new and improved mesh network protocols are almost certainly used by the military again. Mesh protocols can be used for creating swarms of semi- or fully automated weapons in a battle field. These are issues that most people involved would want to avoid. When directly asked, they give evasive answers.

The *mystifications of technology* could be reversed by a two-way process which I tentatively call the socialization of technology. If more people learn about how ICT works, it will become much less easy to use and abuse those technologies by the powers that be. The socialization of technologies would also imply that there are closer links between the people who develop technology and those who use it. This was the idea behind participatory design which was pioneered in Sweden in the 1970s. Community networks in principle carry great hopes for initiating and furthering such processes of participatory design and socialization.

In reality, however, when I tried to find empirical evidence for those claims, I mostly gathered evidence to the opposite. I wanted to find out what drove people to work on those issues and how they developed the criteria for their code. And the answer was in 90 percent of cases that the criteria were implicit, that they were following a shared tacit consensus according to which the coders developed the code. The question of a *user* of a software lies at the bottom of concerns, as the developers – or like-minded people – are the users themselves.

This self-referentiality of community network activists extends to the three *laws* of Guifi.net. When asked about the freedom in free networks, everybody was quick to come up with the answer that this freedom was based on the open, free, and neutral character of the net. The reality is that the initial utopia of self-provision of networks is not really attainable. Most networks are built and maintained by professionals and the users, by participating in such networks, learn little or next to nothing about the technology. It remains a black-box and thus mystified.

Yet for exactly that reason, *mesh* is so important in upholding the decentralized utopia. If every node can mesh, you do not need expert knowledge at each node. The dream of mesh, however, is a Promethean fantasy inherent to all such technology, it is a form of the automatic utopia. The idea is that community networks will proliferate freely once mesh software is perfectly working and available.

In the meantime however, the actual problems and possible impediments come from the social sphere, where lobby groups and continued neoliberalism lead to a difficult environment for community networks. At the time of writing, Freifunk in Germany finds itself in a renewed battle against *Störerhaftung*, the law according to which a node owner is responsible for anything that a user might do. This law seems to have been created particularly to support the interests of the copyright industry. Now, the German coalition government is drafting a new law which, if passed, would make wireless community networks next to impossible.[[19]](#footnote-20) The problem is a political one, not one of the efficiency of battling mesh networks.

# 10. Towards the Network Commons (Conclusions)

Fig. 30. Andrews Road, London, May 2005 (from Monoskop[[20]](#footnote-21)).

Based on a recent trip to Germany, where vibrant new communities have triggered discussions about what makes the essence of Freifunk, I am suggesting that the future of wireless community networks lies in the notion of the Network Commons.

In the course of this book project, I have studied wireless (and wired) community networks trying to establish the current status of this movement. Two main research questions have guided my inquiry. First, I wanted to see if and how wireless community networks connect with larger questions such as communications freedom; and second, I wanted to find out if those networks can play a role regarding the democratization of technology. This second question has two aspects. One regards the development of technology itself. Wireless community networkers are not just consumers and users of technology, they are also actively developing it. My question was, if technologies, developed by a community, are fundamentally different from technologies developed by companies and what would make such a qualitative difference. The second aspect regarding the democratization of technology concerns the role and function the respective technology plays within a community of users. In informational capitalism, technology in general and ICT in particular are key social agents. They are not just neutral tools but connected with wider social issues. Intricate knowledge of technologies, however, is restricted to narrow strata of society. The gap between high-priests of ICT and users, for whom it is a black box, goes across society and political divides. My assumption is that a lack of knowledge also furthers other inequalities, economic and political ones. If wireless community networks thus further knowledge about network technologies, because the development and application is embedded in a wider community, then it could be said that they further the *socialization of technologies*.

When starting this study, I soon became aware that any proper method applied to the research question would require vast quantities of empirical research which, due to the limitations of this project, I would be unable to conduct. It would require, for instance, to gather comprehensive empirical evidence about who participates in those networks, what their backgrounds are and which ways of participation exist. That would mean to engage in field work doing hundreds, not dozens of interviews. My work has been supported by an EU grant in the context of the CONFINE project. I was employed by Verein Funkfeuer, Vienna, on a part-time contract of less than one working day per week for 14 months. I thus soon decided that I could only do qualitative research. My main methodology used was participatory observation, conducted through interviews, research visits, websites, and mailinglists. I conducted about 20 interviews of different lengths and intensity.

By and large I think that my research questions have been validated. Those were interesting questions to ask and they merit further attention. However, the nature of my research questions does not allow for a yes or no type answer. Any answer would necessarily be a complex assessment of a complex matter. My main case studies were Freifunk, Germany, and Guifi, Spain. In both projects, people are at work who share a certain set of ethics and their goals coincide with my research questions. They are building wireless community networks with the aim of furthering communications freedom, free speech, access to knowledge and information. This answers the first main research question, whereby important qualifications are to be made.

The second question regarding the democratization of technologies yields more mixed results. The intention of the communities involved, in principle, is to further the democratization of technology, but there are different views on how this is best achieved. As I have analyzed in the previous chapter among some members of the developers’ and activists’ community, mesh network routing protocols are idealized as a technological fix to all problems of wireless community networks. There is a widely shared belief that once there exists firmware that is really easy to install which also uses mesh routing protocols, then nothing can stop wireless community networks. This type of firmware now more or less exists. The Quick Mesh Project and also the latest releases of the Freifunk Firmware meet those requirements to a large degree. However, this still leaves open the question how easy it is to install and configure such software. And even if that part becomes solved, there are other issues regarding installation of antennas, energy supply and so on and so forth – technical hurdles are bound to continue to exist. Therefore, the main question regards the nature of participation in these projects, in particular the relationship between the core of activists, those people who participate in the network and society at large. I have been trying to find out, to which degree developers consider demands arising from the community and to what kind of extent a knowledge transfer happens between techies and users. As I was lacking the means to answer those questions through a broad scientific study, which would require a different project with a significantly higher level of funding, I can only address those questions as an observer, participant and interpreter.

## 10.1 The Dispositif of the Self-Organizing Network

On 14 May 2015, I was invited to give a talk at the OpenTech Summit in Berlin. This was followed, on the 15th and 16th, by the Wireless Community Weekend at c-base, also in Berlin. At the OpenTech Summit I presented the summary of my findings. What I said, was about the following:

In my view, ideas about wireless community networks in Europe were first raised by initiatives such as Consume and Free2air.org in London, around the year 2000. While there existed other initiatives as well, nobody else made such a concerted effort, not just technologically but also ideologically, intellectually, in furthering those ideas. As I have described it in the first chapter, Consume produced a dispositif of the network commons, an idea, but also material support structures and a set of methods which enabled the building of a network commons. I am aware that I am slightly misappropriating this term by Michel Foucault. Foucault’s notion of the dispositif is largely concerned with how power is distributed in society. The dispositif of the network commons is concerned with the distribution of a type of network that is free from hierarchical power relations as far as possible. Consume’s *Model 1* was the idea of a network where each node is owned and maintained by its users. There is no centralized entity, neither technologically speaking (no supernodes which can become control points), nor organizationally. There should not be a company or other type of organization which runs the network. The network would be created through a process of social self-organization. An important aspect of self-organization would be provided by organizing workshops in regular intervals and having local meeting points which allow people to come together and share ideas, knowledge, skills, technologies.

The dispositif of the network commons traveled over the English channel and found support in Germany. In Berlin, a group of people came together and started, first, a regular meeting at c-base, called Wavelöten, and soon Freifunk (free radio), an initiative to build network commons, first in Berlin, later all over Germany.

Independently of Freifunk a similar initiative had started in Austria, called Funkfeuer (radio beacon). Funkfeuer had the advantage of being able to start on the basis of an existing installation. In the late 1990s, early 2000s, the provider Sil had been one among the most innovative internet companies in Europe and worldwide. As I have written in my article *Kreative Milieus* (2012[[21]](#footnote-22)), Sil was the result of a creative milieu, of the coming together of artists, hackers, designers, and an entrepreneurial spirit. The company was among the first in Europe to offer fixed leased line broadband internet via ADSL for competitive prices through a partnership with two other small providers called Vienna Backbone Service (VBS). In the late 1990s VBS/Sil was looking into ways of consolidating its success by moving into the wireless medium. The artist-engineer Franz Xaver, while working for Sil, created Funkfeuer, a wireless network on the rooftops of Vienna, built to professional standards. But that proved too costly for Sil, which was, after all, a commercial company. Sil abandoned the effort and for a while the antenna and router installations lay silent. Then a new initiative formed around the young computer technician Aaron Kaplan to revitalize Funkfeuer. He had actually read an early draft of my first, German, book on Freie Netze which gave him the idea. Initially, Funkfeuer also operated a free WLAN hotspot in Vienna’s Museum Quarter, in cooperation with the NGO Quintessenz. The hotspot served the purpose of showing that an open public WLAN access point could be operated without submitting to regulations regarding mandatory data retention. To cut a long story short, Freifunk and Funkfeuer became resounding successes.

Both networks initially grew rapidly. Freifunk in Berlin was propelled by the lack of availability of affordable broadband in certain areas. In former East Berlin, after German reunification, German Telekom installed a fibre optic network called OPAL. The same story was replicated in towns and regions across the former GDR, in cities such as Leipzig. Because of the OPAL fibre network, those areas could not receive cheap ADSL broadband access. Freifunk has had a strong argument. By joining Freifunk, people could gain fast internet access almost free of cost. In Leipzig, Freifunk soon had 900 nodes, in Berlin at one point more than 1000. At the same time the German and Austrian free network communities were fervent developers of mesh network routing protocols. At first, OLSR was adopted, then B.A.T.M.A.N. was developed out of the heart of the community. Freifunk and Funkfeuer also developed organizational ideas of their own which went beyond what Consume had dreamed up. It can thus be generalized that they did not just adopt the dispositif of the network commons, but contributed to it significantly. One key difference was that Consume was very British in a certain sense, that it had a strong libertarian or anarchist ideology at heart, which at some point becomes impractical when it comes to organizational issues. Those ultra-liberal instincts amount almost to a fear of doing anything that may be seen as prescriptive or normative. The ideology of Consume was that the network had to grow by itself. But the reality was that the moment key protagonists of Consume withdrew from publicly advocating it, it stopped developing at all and then fell apart. Since around 2006-7 Consume stopped being a publicly recognizable entity. Freifunk and Funkfeuer, on the other hand, soon founded a *Verein* each. A Verein is a registered non-commercial association which allows doing things collectively without running a business. Freifunk Germany from the very start was adamant that *Förderverein Freie Netze* was no umbrella organization under which all other Freifunk initiatives had to be subsumed. And most importantly, the *Verein* was not to be mixed up with the function of a provider. Its role was merely to give the movement a kind of backing by doing fund raising and giving it a voice also publicly, when talking to politicians and regulators.

As I have already written in previous chapters, while Freifunk was growing rapidly throughout the 2000s, German law – or rather *legal practices* always had maintained a threat to the movement through so called *Störerhaftung*. This means that if a private person offers an open WLAN hotspot this person can be made responsible for infringements committed by users. There had been precedents in German law where people were made responsible for illegal filesharing over their open WLAN. This, however, was not even the main source of the problem for Freifunk. The real trouble is that there are law firms in Germany which make it their business model to send threatening letters to everyone suspected to have broken the law. They send out mass letters to people supposedly running open WLAN routers threatening to sue them unless they settle out of court by paying a certain sum. It is very rare that such a case actually comes before a court because this is not really the intention of those law firms. Their intention is to scare people so that they will give in and pay them money.

Such practices discomforted Freifunk activists. Therefore, the Förderverein Freie Netze created a workaround, the Freifunk Freedom Fighter Box, a WLAN router configured in such a way that it creates a VPN (a secured virtual private network) which routes internet traffic via a provider in Sweden. If no data packet hits German ground, German legislation does not apply. This created a lot of publicity but also adversity. Elements of the German press accused Freifunk of a lack of patriotism by going through a Swedish provider. Thus, Freifunk diversified the method. It also found German providers who allowed tunneling to them. When access is provided by a bona fide provider, *Störerhaftung* does not apply because providers, like telecoms, are not liable for violations of laws by their users.

Providers, however, have other obligations. It has been only relatively recently, in April 2014, that the EU data retention directive has been brought down by a decision of the European Court of Justice. Member states are keen on reinstating a similar law which forces providers to store communications data for later usage. This would be in total opposition to the values held by the free networks community, I would assume. Anyway, the issue I want to get at is that there is no ideal solution. Following the example of Förderverein Freie Netze, many local Freifunk initiatives also formed a registered association and attained the status of an internet service provider which made them exempt from liability for the actions of their users.

1. Matthew Fuller and Andrew Goffey, *Evil Media*, MIT Press 2012. [↑](#footnote-ref-2)
2. Quick Mesh Project (qMp), https://qmp.cat/. [↑](#footnote-ref-3)
3. Bmx6 in OpenWRT, n.d., archived December 2013, https://web.archive.org/web/20131220025032/http://bmx6.net/projects/bmx6. [↑](#footnote-ref-4)
4. Open-Mesh: B.A.T.M.A.N., https://www.open-mesh.org/projects/open-mesh/wiki. [↑](#footnote-ref-5)
5. The Wireless Battle Mesh is an ongoing annual convention: Wireless Battle Mesh, https://www.battlemesh.org/. [↑](#footnote-ref-6)
6. LibreMesh, https://libremesh.org/. [↑](#footnote-ref-7)
7. For a history of Freifunk firmware releases, incl. Kathleen, see Freifunk, Berlin: Firmware https://wiki.freifunk.net/Berlin:Firmware. [↑](#footnote-ref-8)
8. Confine Project (2012-2015), archived October 2015, https://web.archive.org/web/20151003180403/https://www.confine-project.eu/. [↑](#footnote-ref-9)
9. For instance: D. Vega, L. Cerda-Alabern, L. Navarro, and R. Meseguer. *Topology Patterns of a Community Network: Guifi.net*. In 2012 IEEE 8th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob), 612–19, 2012. doi:10.1109/WiMOB.2012.6379139. [↑](#footnote-ref-10)
10. The resulting page is definitely worth studying: Bmx6 Wireless Mesh, Sants-UPC, http://dsg.ac.upc.edu/qmpsu/index.php. [↑](#footnote-ref-11)
11. For those more technically interested, there are some slides here: Ivan Vilata-i-Balaguer, Community-Lab: Exploring the Future Internet on Community Networks, slides of talk at FOSDEM 2014, archived May 2016, https://web.archive.org/web/20141126225209/http://wiki.confine-project.eu/\_media/pub:community-lab-intro\_fosdem-2014.pdf. [↑](#footnote-ref-12)
12. Confine Wiki, Open Data Sets, archived November 2014, https://web.archive.org/web/20141126212934/http://wiki.confine-project.eu/experiments:datasets. [↑](#footnote-ref-13)
13. Community Lab, archived December 2014, https://web.archive.org/web/20141217005023/http://community-lab.net/. [↑](#footnote-ref-14)
14. Confine Wiki, Selected Open Call 2 experiments, archived November 2014, https://web.archive.org/web/20141126212458/http://wiki.confine-project.eu/experiments:opencall2. [↑](#footnote-ref-15)
15. Joseph Weizenbaum, *Computer Power and Human Reason: From Judgement to Calculation*. W.H. Freeman & Company, 1976. [↑](#footnote-ref-16)
16. McKenzie Wark, *A Hacker Manifesto*. Harvard University Press, 2009. [↑](#footnote-ref-17)
17. Olga Goriunova, Fun and Software: Exploring Pleasure, Paradox and Pain in Computing. Bloomsbury Publishing USA, 2014. [↑](#footnote-ref-18)
18. Wendy Hui Kyong Chun and Andrew Lison *Fun Is a Battlefield: Software between Enjoyment and Obsession*. In *Fun and Software: Exploring Pleasure, Paradox and Pain in Computing*, 175–96. London / New York / Paris: Bloomsbury Publishing USA, 2014. [↑](#footnote-ref-19)
19. To support the Freifunk campaign against the new draft law, follow this link: Christian Heise, Wir brauchen eure Hilfe – Helft mit die Störerhaftung für WLANs zu stürzen!, 10 March 2015, https://freifunkstattangst.de/2015/03/10/wir-brauchen-eure-hilfe-helft-mit-die-stoererhaftung-fuer-wlans-zu-stuerzen/. [↑](#footnote-ref-20)
20. https://monoskop.org/images/c/c3/Armin\_Medosch\_1962-2017.pdf. [↑](#footnote-ref-21)
21. Armin Medosch, *Kreative Milieus*. In *Vergessene Zukunft: Radikale Netzkulturen in Europa*, 1. Aufl., pp. 19–26. Bielefeld: Transcript, 2012. [↑](#footnote-ref-22)