

Daphne Dragona, Dimitris Charitos

CHALLENGING INFRASTRUCTURES

Alternative networking & the role of art



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1. Introduction

The Internet is no longer what it used to be. Inquiries, studies and disclosures of the last few years have progressively changed user expectations of platforms of connectivity. The disillusionment of the so-called Post Digital period (Cramer 2014) that occurred amid revelations of networks allowing backdoor access to state surveillance was followed by discussions on the role of algorithmic regulation, of filter bubbles and data-targeting affecting one's view of the world and ultimately public opinion. Repeated signs of complicity on the part of companies such as Facebook have shown that the more technology becomes an inseparable part of everyday life, the less we can trust its opaque systems and processes. Having reached a point where "the internet does not exist" (Aranda et al. 2014) and technology feels natural and habitual (Chun 2016), we are increasingly losing control over it. As today's cloud(s) and ubiquitous systems are everywhere and nowhere to be seen at the same time, questions about digital sovereignty arise. Did "the Stack stage the death of the User," as Bratton put it (Bratton 2014)? How much agency do we have when we hardly have an understanding of the infrastructures that connectivity depends upon?

Such questions do not have a single answer. Although cloud-based applications aim to produce a singular Internet and a new form of universalism (Hu 2015, p. 86, 89), the asymmetries between networks and users greatly depend on

the interests of the technological, economic and geopolitical actors that are involved. The understanding of the Internet and access to it differs among states and territories. Despite the fact that the Internet is now considered a human right, a large part of the population still has no access to it (Sandle in Antoniadis 2018, p. 235) or is granted access only through corporate programs such as Facebook's Free Basics. In areas with undemocratic governments, the Internet might be limited, controlled or even shut down (Montagné 2018), while steps have already been taken against net neutrality in the Western world. Furthermore, losing sight of the infrastructures also means being unaware of the ecological impact of connectivity. Behind today's centralized and powerful platforms lie data centers that consume large amounts of energy. Behind the introduction of innumerable new devices supporting the latest applications and features, natural resource extraction grows and is rarely discussed.

Addressing the complex and different political, economic and ecological dimensions of today's connectivity, one realizes the returning and prevailing need for a "right to infrastructure" (Corsin Himenez 2012) and a right to network self-determination (Belli 2017). This means that networks still need to become visible, computerized systems need to become transparent and technologies need to become responsive and available (Sassen 2011). A new organic Internet (Antoniadis 2018) needs to be imagined, "one whose infrastructure is built, owned, controlled and maintained by local communities, one that satisfies our basic needs for knowledge, information and communication" (ibid). But for this to happen, a new form of ownership (de Lange & de Wall 2012) supported by a new form of literacy (Parks 2010) directly related to infrastructures is still needed. And this also means a need for translators, for "people capable of opening these occult systems, demystifying them and explaining their implications" to the others (Greenfield 2015).

During the last almost twenty years, and as a response to these growing issues, different models and prototypes of networks of communication and file sharing have emerged. Based on open hardware and software, they have constituted forms of "counter-infrastructures" (Dragona 2014) and bottom-up

initiatives. Community networks, ad-hoc offline networks, local Wi-Fi access points and other radical forms of networking are examples of infrastructures that users themselves can own, manage and control. Among their initiators and creators from the beginning have been a growing number of artists interested in offering alternatives and critical perspectives. The aim of this paper is to present and discuss certain exemplary initiatives and how they have evolved over time.

2. From organizational aesthetics to the network commons

“Don't hate the machine. Be the machine,” Pasquinelli wrote back in 2004, addressing a call for “radical machines” that would function “as places of autonomy and autopoiesis” and allow the sharing of knowledge, tools and spaces. Just when web 2.0 was about to emerge, such responses as “radical machines” could already be seen coming from the field of art. Becoming the machine, becoming an apparatus or a network could be translated as designing a set of relationships, deciding the topology and the protocols that define the organization between links and nodes and the exchange among them (Dragona 2015).

This idea of becoming the machine or even the system and the node can be traced back to previous decades of art history; Systems Art, Mail Art and the Fluxus offer such examples from the 60s and 70s. Haacke wrote in 1969 (Haacke in Graham & Cook 2010, pp. 52–53), “The working premise is to think in terms of systems: the production of systems, the interferences with and exposure of existing systems. Such an approach is concerned with the operational structure of organizations, in which transfer of information, energy and/or material occurs.” This stance is apparent in the work of artists such as Haacke, who were interested in the exposure of the organization and functioning of art institutions, but it can also be identified in the performative projects of feminist artists such as Mierle Laderman Ukeles, who aimed to make visible the invisible human infrastructures of care and maintenance in a city context. Process was primary for such works, which commented on the influence of cybernetics, on the systematization of society and lived

experience (ibid). These aspects were also tackled by the Fluxus, who followed a different, rather playful but yet radical and open approach, seeking new ways of understanding with their logging activities, their fluxkits and scores. In addition, Mail art was an early community network born and expanded as a virus by artists who used the postal system to exchange small-scale works or to send instructions for the creation of DIY products (Bazzichelli 2013, p. 73). Despite their differences, all of the above artistic interventions and projects focused on experimenting with and opening up channels of communication for free exchange.

“To analyze networking dynamics requires reflection and consciousness in the use of technology and media,” Bazzichelli argues (ibid, p. 77), and this is a process that artists building systems and networks today greatly need to engage in. Goriunova in her book about art platforms similarly remarks, “The art platform is a conceptual device that allows for a differentiation and problematization of networks... It is not only a way of looking, but also a dynamic of assembling and coming up with such a body” (2012, p. 3). In order to underline and express this dynamic of assembling that can be found in art, Goriunova uses the term “organizational aesthetics,” which is more than a way of looking. “Organizational aesthetics is a process of emergence and a mode of enquiry that gives us a way to understand a digital object, process, or body” (ibid, p. 7). Adopting this term, Fuller also notes that the aesthetic undertaking can be found “in the development, movement and transformation of a loosely, precipitously or precisely assembled system of people, technologies, words, signals, the sense of those cohering, evaporating and reshaping over time” as well as “in the ethical dimensions of relations between processes, forms of access, cultures and their carriers, whether they are people, languages or technologies” (Fuller 2010, pp. 4–9). In a similar vein, we can also recall Lovink’s code word about “distributed aesthetics,” which is in accordance with an approach that “no longer highlights technology as something revolutionary or disruptive” and which manages “to point to the social formations” that the technologies of connectivity provoke (Lovink 2008, pp. 226–227).

Taking these last points into consideration, that is the assembling not only among people but also among languages and technologies and the attention paid to the issues of access, openness and inclusion when such networks are developed, this paper presents and discusses a series of appropriately selected alternative networks, platforms and initiatives that are being proposed by artists as a response to today's datafied and controlled connected world. At the same time the paper examines these organizational dynamics as the decisive factors involved in the formation of what Armin Medosch framed as the "Network Commons" (2014a). These new infrastructures may involve both social and technological topologies and may be based on the fundamental cultural commons such as languages, affects and codes. Additionally, if we follow the thinking of Hardt and Negri (2012, p. 64), it can be suggested that these infrastructures are significant, in that they are "constructed, possessed, managed and distributed by all." To return to Pasquinelli's older call, becoming the machine nowadays can be understood as commoning the machine and therefore assigning to it new properties and values.

3. Commoning networks & the contribution of art

The fundamental idea behind networks such as the ones described in this paper is that they all offer their users the possibility of owning the infrastructure as well as all digital information that they generate (Antoniadis & Apostol 2014). Being based on affordable infrastructure, open source software and hardware and topologies that are distributed or decentralized, this approach opposes today's dominant centralized control paradigm, formulating counter-proposals "for an autonomous option for communication" (Antoniadis et al. 2014) and file sharing. Local Wi-Fi networks and user-controlled distributed systems of connectivity not only offer new opportunities for a combination of virtual and physical encounters, but also allow for anonymity and protect privacy, creating feelings of ownership and independence (ibid). For this reason, such forms of networking, of different scopes and scales, can be regarded as a substantial alternative to today's opaque platforms of connectivity, overcoming the fears of surveillance and commodification, consuming less energy and escaping the empowerment of digital colonialism.

As already suggested, the aim of this paper is to discuss the role of art in the field of alternative networking. For this reason, a particular categorization of the different networks is proposed and certain examples of such interventions are presented. Taking into consideration their different services and aims as well as the different periods in which they emerged, the paper specifically looks into Community Networks, Ad-hoc Networks, Off-the-cloud Networks and Speculative Networks, arguing that these are the main fields where artistic initiatives can be located. While highlighting the role of artists for each section separately, the end the paper draws a set of common conclusions in order to define the features and aims of these initiatives.

3.1. Community Networks

“The sleeping beauty of mesh has been kissed into life by the community”
Elektra (Medosch 2015)

The need to connect offline is not new. Although mesh networking has received particular attention in recent years as a response to issues connected to state surveillance, Internet blackouts and net neutrality, its first peak was in the early 2000s. This is when the well known mesh networks such as the Spanish *Guifi*, the German *Freifunk*, the Austrian *Funkfeuer* and the Athenian *AWMN* were built, establishing their first urban mesh nodes and links. While at first their popularity grew thanks to the greater speed that these connections offered, which was important for both communication and file sharing, it soon became clear that the potentiality and the outreach of these networks could go far beyond that.

In his analysis about why it is important to build wireless free networks, written in 2006, Lenczner lists the following points (2008, pp. 228–229): they are free as in speech; they are based on network-neutrality and non interference.

- they are free as in beer; they provide free metropolitan traffic.
- they raise awareness; they make people aware of other ways of doing things.

- they bring in alternative design values for networks; they offer opportunities to have a group's priorities reflected in the infrastructure of the community.
- they invite people to think globally but act locally; they bring people together physically in order to build and sustain the network.

Or, as Navarro writes, returning to these points in 2018, community networks are “infrastructure commons, built by citizens and organizations which pool their resources and coordinate their efforts, characterized by being open, free and neutral. They are *open* because everyone has the right to know about and participate in them. They are *free* because the network access is driven by the non-discriminatory principle; thus, they are universal. And they are *neutral* because any available technical solution may be used to extend the network, and the network can be used to transmit data of any kind by any participant, for any purpose.” (Navarro 2018, p. 4)

Artists were involved in the development of mesh networks from the very beginning. Medosch explains that James Stevens, founder of Backspace, and Julian Priest, artist-designer-entrepreneur, already started designing a model of community networking back in 1999, naming it at first “Model 1” after Henry Ford’s first mass-produced car (Medosch 2014b). Being interested in this “freedom to connect,” from node to node, from user to user, they proceeded in building an actual mesh network prototype called **Consume.net** in collaboration with artist Alexei Blinov and a team of theorists, developers and admins working in relevant fields during that period (Medosch 2014c). The network was brought to different areas of the UK with workshops run by the artists between 2000 and 2002. Right after London, this same team of people went to Berlin to influence the birth and creation of **Freifunk**, Berlin’s popular mesh network in 2002 (ibid). The new “growing” infrastructure of *Consume* came to a city with no functional broadband and infrastructure at the time, and it was activated by them along with local artists, theorists and practitioners working in the fields of new technologies, radio and electronics (ibid; Petersen). Interestingly, as Medosch explains, in Austria the free network **Funkfeuer** was also built by an artist, Franz Xaver, who designed it initially

for a company, but as the plan did not come to fruition, it passed into the hands of active volunteers (Medosch 2014c). A decade later, it is interesting and important to note that mesh network pioneers such as James Stevens continued working in the field and embracing efforts connected to them. Stevens together with artist Adnan Hadzi ran a workshop in Luneburg in 2013 as part of an event of the University of Leuphana. They invited inhabitants to walk around and discover QR code stickers that were adjacent to the nodes of the network (Hadzi 2014).

The involvement of artists in community networks is not to be traced only in known urban mesh nets of big cities though; their role has been especially significant in cases where community networks were built for distant villages, poor areas and socially isolated populations. The efforts of activist Elektra, a member of *Freifunk*, in Valparaiso and Santiago constitute such an example. The **Valparaiso Mesh**, for instance, was a network aimed at building mesh nodes in a part of a city that was destroyed by a fire. Elektra ran workshops in a local hackerspace where she taught people the basics of wireless mesh networking and involved them in practical network building (Nieto 2015). In these cases it is important to remember that free connectivity and communication among inhabitants was meant to build not only an infrastructure after their needs but also strong links among the members of the community and a sense of shared responsibility for its maintenance. Another distinctive example is the community network of Sarantoporo village found in Northern Greece for which the artistic collective Personal Cinema undertook the production of a documentary about it named **Building Communities of Commons** (2016). These villages – the economy of which depends on agriculture and farming – did not have any Internet infrastructure until 2010. Around that time a group of young people from these villages took the initiative to design and build a network of networks that would connect the inhabitants of the wider area. What was of special interest with respect to this effort is the way the network empowers the relationships among people; the initiators of **Sarantaporo.gr** see infrastructures as a commons that can build a community around them (Kleisiaris 2015).



Some of the artists who develop mesh networks merge this commoning of infrastructures with their artistic practice. Such is the case of Christoph Wachter and Mathias Jud, who are known for their sociopolitical projects and interventions, working with different groups and populations in different countries. As Landwehr (2014, p. 137) explains, the low cost routers they use for their mesh projects are empowered by a simple hack; once a tin can is attached to the antenna of the router, the signal becomes directional from round and can travel a greater distance. One of their well known projects is **Hotel Gelem** (2011), developed in collaboration with Roma Communities living in settlements in different cities (Wachter, Jud). *Hotel Gelem* was an awareness tourism project inviting citizens and tourists to live for some days with the community. As part of it, they also built a community network to empower the Roma people living there. This was the community's greatest wish, as the French government requires an address of a permanent residence and a bank account in order to provide a SIM card and therefore mobile Internet access (Landwehr, *ibid*, p. 138). For their network they used *qaul.net*,

a platform that allows free connectivity from device to device via Wi-Fi and their low cost router antennas empowered with simple tin cans.

Christoph Wachter and Mathias Jud
Hotel Gelem, Paris, France, 2011



Activist and engineer Dhruv Mehrotra has dedicated part of his time in the last few years to the development of **Saycel**, an open source cellular community network in Nicaragua. The initiative is of great significance for a country where call rates are high and the Internet penetration rate is still very low. Connectivity for most inhabitants is unaffordable. The initiative was and is in a way “a social venture helping communities of the Autonomous Region of Nicaragua’s Caribbean Coast to own and operate their own cellular and emergency networks” (Mehrotra 2016). *Saycel* provides rural communities “a low cost, solar powered, turnkey system allowing families to communicate to each other locally and internationally” (Reed-Sanchez 2016). Solutions to possible problems are always found in collaboration with the communities. Similarly, musician Keith Whyte is someone who has also been actively involved in the communication needs of social organizations since the 90s. He is among the main team members of **Rhizomatica**, an initiative that, since 2009, has been empowering alternative communication infrastructures in areas of need

because of their remote geographical position, oppressive regimes or natural disasters. Their aim is to increase access and participation for the people still without affordable mobile coverage. Among other communities, they have helped the Rede Kalunga in Brazil and the Village Talea de Castro in Mexico.

The examples mentioned above are designed for particular communities or urban territories. In a way, these are works that perfectly respond to what Fuller wrote when discussing early forms of aesthetic organization: “The question is to make something happen: Don’t moan, organize” (2010, p. 4). The significance of these interventions can be found in the disposition and interest of the artists to use the technology in order to build social links that will allow the community to endure, while at the same time opening up prospects for an infrastructural literacy responding to the community’s needs.

3.2. Ad-hoc Networks

The use of ad-hoc networks is mostly connected to cases of emergency. In periods of insurrections or environmental disasters, when Internet blackouts might occur, ad-hoc networks can establish communication within the vicinity; the connectivity used in this case is independent of the default infrastructure that is no longer functional. Ad-hoc networks are most often dependent on mobile devices or on routers with mobile clients, formulating a distributed network being called on demand. Hu et al. explain, “An *ad-hoc network* is a collection of wireless computers (nodes), communicating among themselves over possibly multihop paths, without the help of any infrastructure such as base stations or access points” (Hu et al. 2003, p. 175). The topology of such networks is therefore dynamic and constantly changing; a node is free to connect to any other node, creating single sessions of data exchange, whereas failures or dropouts do not significantly affect the network (Damiot 2015); it is robust and flexible thanks to its independent nodes. Nodes cooperate to send packets to each other, allowing messages or files to spread like viruses. The ad-hoc networks often share the same infrastructure with community mesh networks; they differ, though, in the intention and informality that they involve. They are tactical.

Activists and artists have been turning to ad-hoc networks in the case of unexpected or emergency conditions, highlighting that for their set up, users can use the devices and technologies that they already have in their possession or may acquire at low cost. One of the oldest examples of artists experimenting with ad-hoc networks is the ***Umbrella.net*** (2004) by Katherine Moriwaki and Jonah Brucker-Cohen. The project explored how “networks of coincidence” can build collective experiences; it examined how unpredictable patterns like the ones of the weather can formulate “need networks.” In 2016 the artists revisited the project and studied the formation of informal relationships around networks.

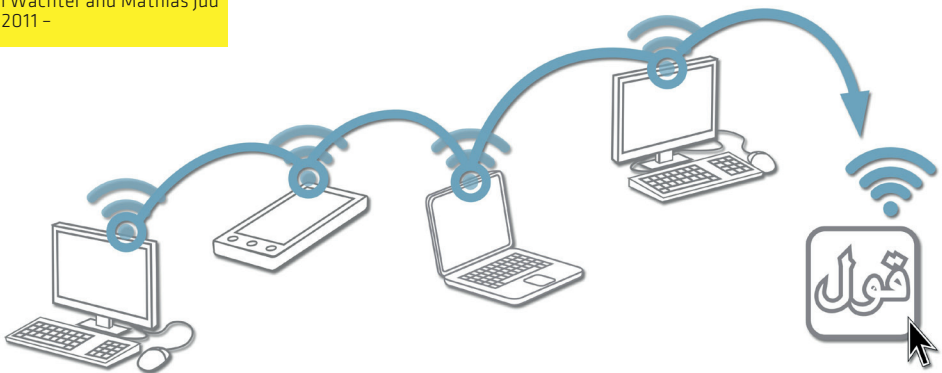


Fluid Nexus (2009) by Nicholas Knouf, for instance, is a model that in a way resembles today's *Firechat*. It is “a mobile phone application designed to enable activists and relief workers to send messages and data amongst themselves, independent of a centralized mobile phone network” (Knouf 2009). Planned for peer-to-peer, node-to-node connection, the network necessitates the physical movement and presence of people at the same location. Once the application is downloaded from the web to a phone, text, images, audio and video can be transmitted anonymously from one device to the next via Bluetooth. Messages are encrypted when stored on the device but not when

sent to the next node. Knouf's project, though, raised concerns in the US because it could also become a weapon in the hands of terrorists and thus have a negative rather than a positive impact.

qaul.net (2011 – current) by Mathias Jud and Christoph Wachter, mentioned before as part of *Hotel Gelem*, is also an ad-hoc network project that was created as a response to communication blackouts and natural disasters. The artists referred particularly to the need to connect freely and independently that arose after Internet and mobile connections shut down in Cairo in 2011 and after the catastrophic earthquake in Haiti in 2010 (Wachter & Jud 2011). The interesting aspect of *qaul.net* is that it is a software program and a mesh net at the same time. Joining the network is possible via any device. Once a *qaul.net* node is located in the area, the software can be downloaded, installed and the new node can join without the need for an Internet connection. Computers, mobile phones and tablets can all become part of the network. The only problem is the resilience and power of the network. Acknowledging this, the artists developed as part of the latest edition of the project in 2017 a mobile network unit which contains a Raspberry Pi and a powerful battery, which a citizen or user can always carry as a stable and long-running node of a local communication network.

Christoph Wachter and Mathias Jud
qaul.net, 2011 –



Ad-hoc networks therefore activate nodes and people at the same time in order to facilitate communication. As Galloway and Thacker (2007, p. 30) have suggested, they can offer opportunities for “political action in the network” that is “guided deliberately by human actors.” Compared to community mesh networks, the case here is not only about users building up and maintaining a node, but about users actually activating the nodes purposefully only when needed.



Telekommunisten, *R15N*
Aksioma | Project Space, Ljubljana, 2012

Interestingly, other examples of ad-hoc communication and file sharing introduced by artists aimed to critically and playfully challenge the architecture of such systems and their efficiency. *How easy is it for users to trust and organize their communication or file sharing through a network? Does it really work?* Telekommunisten purposefully use the provocative description “platforms of miscommunication” for their works. Their project **R15N** (2012) was a great example of such a critique. It invited people to use an ad-hoc phone network in order to try and communicate with each other when phone calls and messages come in randomly. The “revolutionization of communication,” as the artists called it, highlighted the fact that merging

the social and the technological does not necessarily lead to success. Ad-hoc organization might not be such a simple task for the citizens of the connected world. The understanding of the potentialities and difficulties connected to their topologies is of primary importance.

3.3. Off-the-cloud networks

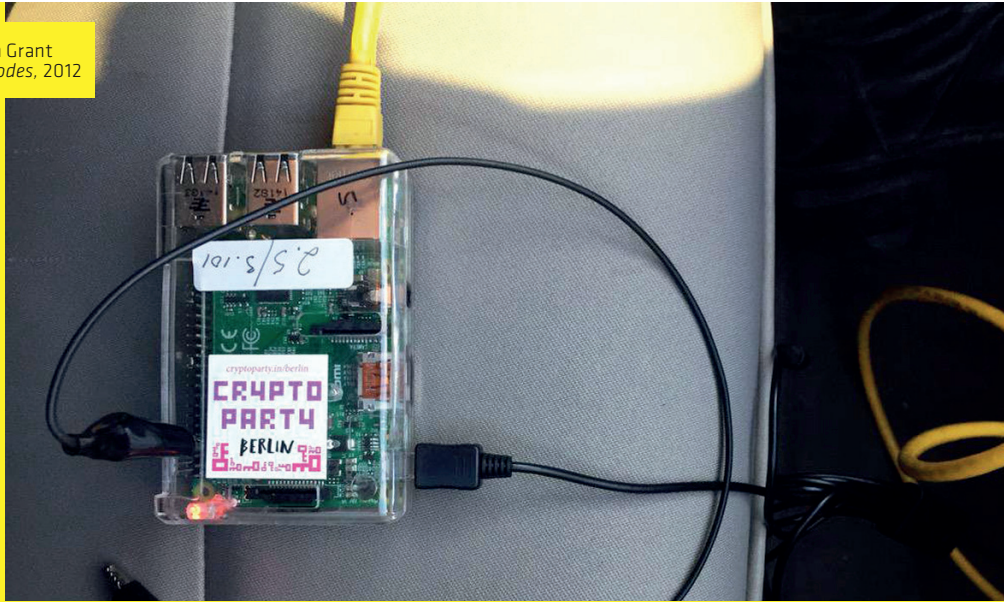
Just like community network infrastructures appeared in relation to the restrictions of early Internet connectivity, and ad-hoc topologies responded to times of emergency, various other micro-infrastructure have appeared in the last years as an attempt to escape the sovereignty of the Cloud. As Bratton writes, “An era has been reached where States evolved into Cloud Platforms and “Cloud Platforms come to take on traditional functions of States” (Bratton 2015), allowing the interests of the market and the government to meet. The Cloud, as Hu has also put it, became “a potent metaphor for the way contemporary society organizes and understands itself” (Hu pp. xiii). Within this condition, the stance that the users take is crucial and can be considered complicit, as they are “intertwined and even participate in the mechanisms of power” of the Cloud (Hu 2015, p. 127).

Having this contextualization as a starting point, this paper also refers to a recent family of projects introduced by artists and hacktivists and examines them as potential counter-infrastructure and “off-the-cloud” initiatives. With the term “off-the cloud,” it describes a constellation of offline Wi-Fi access points, sharing networks, autonomous mesh networks, personal servers and syncing platforms that together not only bring in alternative infrastructures but also communicate to users the essential new forms of literacies needed for using and appropriating them. In other words, it is not only about sharing and storing data safely and locally but also about knowing how to set up the system, use it, maintain it, control it and own it. The projects discussed are actually interestingly introduced by their initiators as toolkits. All information about their setup can be found online, while some have plug-n-play ready solutions that are sold by the artists almost at the cost of the equipment used. Instructions, fora and public talks and workshops are often planned in order

to support them. As will also be shown, off-the-cloud toolkits are by their nature open, gaining the life and features that their owners want them to gain.

One of the predecessors of today's projects addressing the need for a critical perspective to centralized infrastructures was ***Hive Networks***, a project initiated by Alexei Blinov, Vladimir Grafoc and Ciron Edwards of Raylab in 2006. Described by their creators as networks that could “watch, listen, sense and touch the world around them,” *Hive Networks* was designed to “actively source, distribute and create content,” promising to “turn the world on” and to empower users with autonomous networked systems (hivenetworks nd). Nodes of the network could therefore capture data, disseminate data and store data. The project emerged in a period of “embedded capitalism” and growing discussions around the “Internet of things” and its invisible connections (Medosch 2006, p. 235). To respond to this condition, artists used a logic addressed as “creative exposure,” inviting users to learn how to build and set up their own devices (Granof & Blinov 2007). *Hive Networks* was based on open hardware, open software and open spectrum (Wi-Fi), and at the center of its philosophy was the idea that low cost, off-the-shelf technology could be repurposed to offer systems that users themselves could own and control. The creators of *Hive Networks* made clear at the time that they were proposing a new model. It was no longer “the artists asking technicians for a creative solution,” but rather the engineer-artists who were proposing “a new framework for artists and other media practitioners,” or “a hiving network of desires and artistic creations” (Blinov 2006).

This idea of providing a new cell, a tool for artists to use as a starting point for their work is also identified some years later in Sarah Grant's ***Subnodes*** project. *Subnodes* (2012) is an open source initiative proposing an offline mesh network that users can set up themselves in order to communicate, share and distribute content within an immediate geographical location. The nodes are Raspberry Pi devices configured as Wi-Fi access points, working as web servers not connected to the Internet. The selection of a Raspberry Pi, a micro-computer used to learn how to program, is not of course accidental. The artist, who has also run related workshops, is mainly interested in how



it can be used by other artists “to express ideas” and by educators to use it in their activities. “It is important to also ask people what they will do with the network, to make them think about it,” she argues (Grant 2015). A derivative of *Subnodes* was her project **Hot Probs** (2013), a Wi-Fi access point, a Raspberry Pi where users could connect to in order to chat anonymously. This also brings to one’s mind Dan Phiffer’s well known project **Occupy Here** (2011), a Wi-Fi access point built with an inexpensive router for the New Yorkers in Zucotti Park, later developed into the **You Are Here** (2016) project. For the latter, Phiffer, in collaboration with Sarah Grant, Suzan McGregor and Benjamin Walker, developed a plan for small inexpensive wireless routers to be set up in different areas of New York; when someone connected to them, stories about the culture and the history of the area were revealed.

Such toolkits can offer multiple functions and services. One of the most well known examples is the **PirateBox** (2011 – current) introduced by artist and NYU Professor, David Darts. Initially conceived as a local offline access point where users could connect to and share files, PirateBox became known as a counter-proposal to piracy laws. *PirateBox* does more than sharing though.

Built with an inexpensive router and a USB stick, and configured with firmware of the artist, it also allows users to chat and to stream videos from the device while the possibility of creating a mesh network, connecting node to node, pirate box to pirate box is also under development. It is also important to mention that different variations of *PirateBox* have been introduced by users and colleagues: such a case is for instance the *Library Box*, a portable digital file distribution tool addressing people working in education and healthcare. Similar to the *Library Box* is the **Datafield** (2013–2015), a project by Henry Warwick, a Network Attached Storage Unit that works as a Temporary Autonomous Field indexing and openly sharing files wherever it moves. And, more recently, Heidi Neilson developed the **Outernet Library Branch – Wave Farm** (2016), inviting visitors to “read, view, listen to and save library materials” transmitted through a network of satellites in space using their own devices. The system consists of a satellite dish antenna, special seating towards the needed direction and a physical reference book.



Superglue (2014) is a project that opened up to a different direction. This particular toolkit, using the same infrastructure as *PirateBox* – off-the-shelf technology, a USB stick and modified firmware – offers users a web authoring

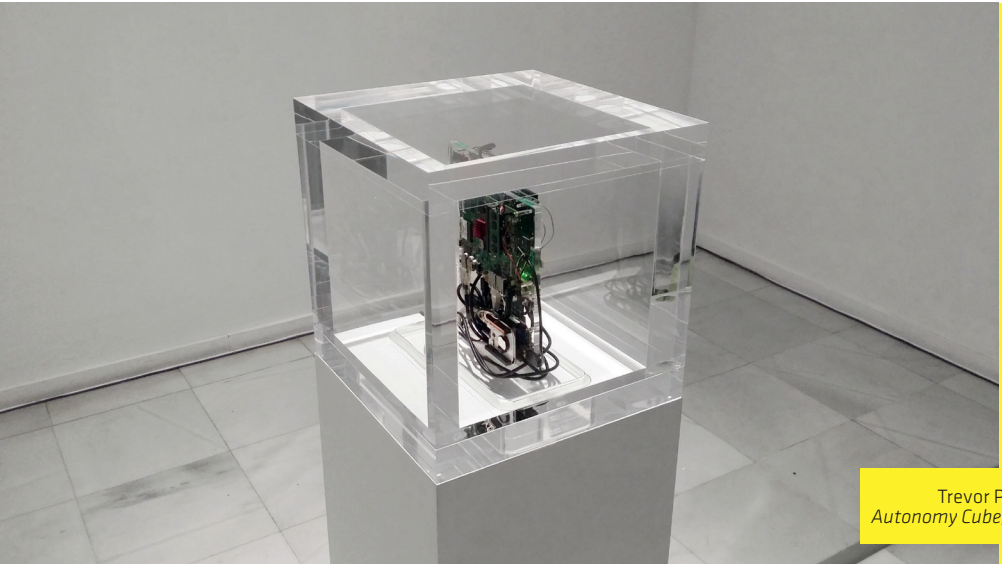
tool and a small personal server in the size of a plug where their data is stored. This shift towards off-the-cloud initiatives is also embraced and empowered by artists developing systems in relation to today's existing infrastructures. Such an example is **Dowse** (2013 – current), a project by Denis Roio (Jaromil) and the team of Dyne.org that aims to counterbalance the asymmetry of the Internet of things and the automation that happens beyond users' control. *Dowse* is a “transparent” proxy for home network privacy that aims to connect objects and people in a new, friendly, conscious and responsible manner. It enables users to become aware of when new devices connect to their network by notifying them with a light signal and a noise and to decide what kind of access is granted to them, which “flows of data comes in and which goes out.” At the same time it filters web traffic, removing undesired content and advertisements. It is also important to note that Denis Roio is one of the actors behind **DECODE** (2017–2019), a European funded project created with the aim of providing to citizens tools for digital sovereignty, using decentralized technologies such as the blockchain.

Off-the-cloud projects are initiatives in progress. Artists keep working on them while offering them to users for further exploration and use. The “right to infrastructure” signals the rise of the prototype Jimenez writes about, while interestingly agreeing with Fuller and Haque (Corsin Himenez, *ibid*, p. 12); prototypes, according to them, are always “pre-broken,” open to deconstruction and re-assembling. They are actually released as such, so that they can be re-used and re-purposed. As Vasiliev (2015) says, the point is to use the “existing topologies and infrastructures but separate them from the topology of the Internet. Maybe there is no way for an individual to own infrastructure. Maybe we should identify new ways to use what we are provided with. This would be much more pragmatic.”

3.4. Speculative Networks

Apart from the tools and prototypes that the artists contribute with to a wealth of user-owned and controlled infrastructures, imaginary or future scenarios for networks and the sharing of information are also being proposed

through works presented as artworks. Often with a speculative character, but yet again functional, these projects discuss issues of surveillance and the possibilities for users' empowerment over networked infrastructures. Sharing features with what has been addressed as "critical design" (Dunne 2005, Dunne & Raby 2001) or "design fiction" (Sterling 2012), they tell stories about optimal and playful future worlds of connectivity and sharing.



Trevor Paglen
Autonomy Cube, 2014

Trevor Paglen, known for the way he exposes infrastructures and materializes surveillance, introduced in 2014 the ***Autonomy Cube***, a project for exhibition spaces with a double mission. Having the appearance of a minimalist sculpture, the cube is a Wi-Fi access point that routes all traffic through Tor, through a network of distributed computers that anonymize users' data. The sculpture was meant to be seen and used by the visitors and the staff. It is both an artwork and a tool, a functional alternative that in a way takes advantage of the art context in order to communicate and empower the need for awareness about data surveillance.

A different use of a Wi-Fi local access point is made by Nicholas Knouf for the ***Sylloge of Codes*** (2014), an installation project based on an offline sharing

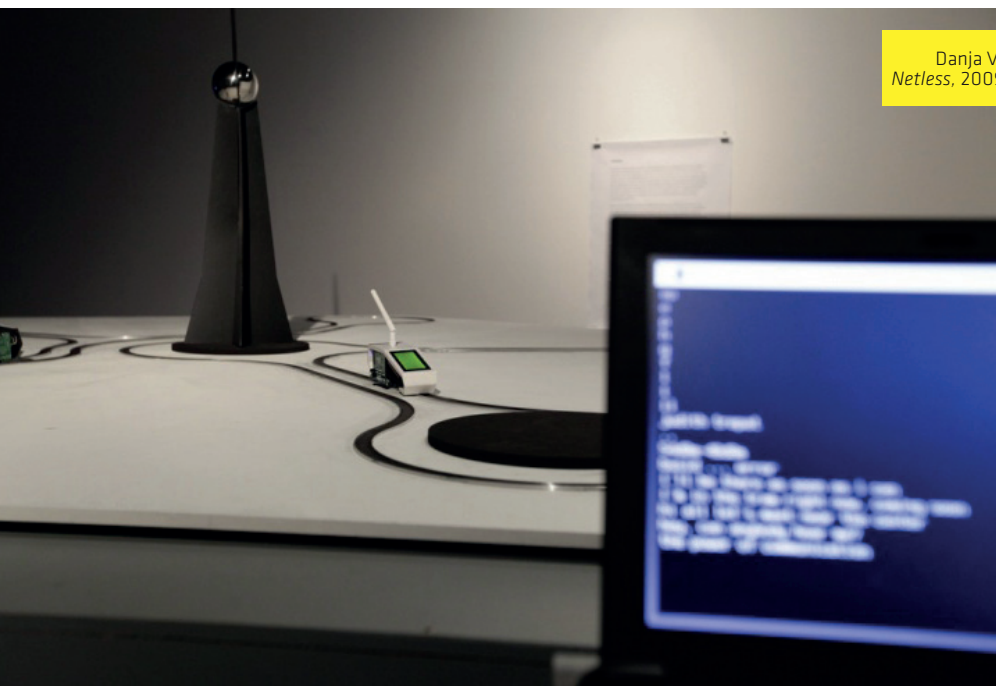
network. Visitors in this case were invited to connect with their devices and contribute to a resource of ideas for the future of surveillance-free communication. Starting from the fact that encryption algorithms are less and less trustworthy, Knouf turned to imagination and asked visitors to come up with ideas for languages and ways of communication that the algorithms cannot read. Having the appearance of a box of secrets or a box of wishes, with a router hidden within it and a projector showing the different submitted ideas, the work challenged the opacity of today's technology with a collection of ideas proposed by users for users. "Maybe you had a secret language as a child. Or you communicate the most amazing insights through a poem. All of these methods are potential ways to resist the NSA or the GCHQ" (Knouf 2014a). Knouf proposed a collection of "possibilities for resistance" that aimed to re-activate language and go beyond encryption in the "we-are-all-too-aware" condition (Knouf 2014b).



Nicholas Knouf
Sylloge of Codes, 2014

The movement and potentiality to move freely towards any node and connect to it that characterizes ad-hoc networks inspired Danja Vasiliev to imagine a parasitic ad-hoc network where the movement and the potentiality of the network is lived and experienced by users who become the nodes

themselves. Taking advantage of the city transportation system, Vasiliev envisioned **Netless** (2009–2013), a system where nodes would either be attached to carriers or carried by citizen-users. As transportation systems in most cities are well developed networks with nodes of different scales, transmitting messages through such a topology and through the movement of the inhabitants can allow messages to travel incredibly fast and efficiently. Messages are exchanged anonymously when nodes meet. No messages are logged and all messages can be encrypted, but all messages would be delivered to all. *Netless* was imagined as a network for ephemeral and anonymous communication in cases of need that concern the many and not the few (Dragona 2014). It was proposed as a network for tactical and not private communication.



Danja Vasiliev
Netless, 2009–2013

The future of community networking was discussed by James Bridle for his **Right to Flight** (2014) project during a residency in London. The project was an installation, an event series and a research program conceptualized and

led by the artist. Aiming to address issues of surveillance and especially the need for citizens to regain power over infrastructures, the artist built and hid a network within a military surveillance balloon that flew over Peckman. Bridle used the model of **Occupy Here** (2011–2013) by Dan Phiffer to create a flying darknet that enabled local inhabitants to connect to it anonymously, to communicate and share files. The balloon also carried cameras and tracking devices that connected to Raspberry Pis and transmitted captured data to the connected public. While Google was developing its high-altitude balloon network to connect rural and remote areas to the Internet, with discussions on digital colonialism on the rise, the artist took a different approach and stance. He tried to rediscover “the possibilities of contemporary technologies,” returning some of the power lost to “the surveilled” (Bridle 2014).

James Bridle
Right to Flight, 2014



The future of a community mesh network was envisioned as a flock of drones by roving security consultant Eleanor Saitta, architect and designer Oliviu Lugojan-Ghenciu and architect Liam Young along with the team of

Superflux. **Electronic Countermeasures** explored the design, functioning and manufacturing of such a drone network for an intervention performance that took place in Glow Festival in 2011. The flying drones could form their own place-specific local Wi-Fi community and pirate file-sharing network. Some years later, as part of his speculative work, Liam Young continued studying the future role of drones and created the film **In the Robot Skies** (2016). In a not-so-far-away future where drones are used for urban surveillance, we find two teenagers that succeed in communicating by using their own autonomous aerial infrastructure of drones that they have hacked, appropriated and decorated themselves.



Liam Young
In the Robot Skies, 2016

Kyriaki Goni with her work **Aegean Datahaven** (2017) commenting on the current sovereignty of the Cloud, imagined a “decentralized network of small, fully sustainable, climate-controlled data centers.” A website and a series of drawings assist in telling the story of a new form of “local traditional platform cooperativism,” where the inhabitants of the small Aegean islands manage the data center, and users have the possibility to store and share digital information without relying on corporate clouds. Goni imagines a network where the topology of data centers and the topography of the islands meet,

and the building of the new infrastructures assists the local economy, but also importantly respects the natural environment; she speculates upon the potential of new ecologies based on the co-existence of human and nonhuman elements, cultural and natural. The *Aegean Datahaven*, utopian as it might seem as a scenario, underlines how digital sovereignty and net neutrality can be achieved through the awareness and collaboration of the many, i.e. indigenous islanders, people who have abandoned urban living and former migrants.



The cube, the model of the transportation system, the balloon, the hacked drones and the floating data centers are poetic, yet critical, perspectives for the future of our networked communication. Objects are repurposed in order to serve offline connectivity, controlled by the users themselves. When asking how artworks as such can provoke change, it is important to take into consideration the stance the artists take when engaging with future scenarios. “My job as an artist is to try to see changes taking place,” Trevor Paglen (Kiss 2014) argues, whereas James Bridle proposes making network objects visible (Huffington 2014). He claims that strong metaphors are needed and that this is exactly what these projects offer: ways of understanding, seeing and using the elements of networks and questioning the possibility for a positive turn at the same

time. As is the case with the critical side of design fiction, these networks/ objects tell stories “about worlds that could or should become” (Bleecker 2012) and the future, as Young puts it, is becoming a project again (Dragona 2016).

4. Conclusions

As the paper has shown, artists have been involved in different directions of alternative networking that respectively respond to the different needs of contemporary users. Such networks not only offer a way of escaping data surveillance, but they also assist in building new bonds among a community, in connecting in times of emergency and in having control of one’s data. Despite the different features and aims mentioned, the following remarks can be made in order to draw some conclusions about the initiatives, toolkits and forms of organization coming from the field of the arts.

Firstly, all networks discussed aim to place the rights of the user over her data and the infrastructures in the foreground. The human and non-human elements that a network involves are balanced by always allowing users to have control of the nodes of the network, to set them up, control them and sustain them. Although Medosch (2006) was correct when he suggested that “in ubiquitous computing, it is usually the devices which get smarter and the people who remain stupid,” in the cases of the above initiatives a “new Internet of People” (Nold and van Kranenburg 2011) is emerging as opposed to the dominant Internet of things paradigm.

Secondly, the topologies of the networks discussed are exposed and understood by a merging of the social and the technological. As a user is always behind a node and in control of a node, it is easier to realize the edges and nodes, the architecture and potentiality of the network. This idea of “becoming the machine” that Pasquinelli (2004) mentioned can be understood as becoming the node and gaining control of the network.

Thirdly, all infrastructures introduced, although of different scales, are based on open software and hardware, affording users the possibility of

modifying and even repurposing them for their own needs; this way a DIY and DIWO ethos is encouraged, one that embraces the logic of thinking, sharing and working together. This is a manifestation of what Hardt and Negri (2012) stated when they argued that “being with” is no longer enough: “doing with” is necessary. Alternatives based on collaboration and sociality are introduced to spread and teach people how not only to modify and use infrastructures but also to make decisions, possibly based on criteria that are qualitative and humanistic (Bollier & Hellfrich 2013). Staying out of the market of centralized systems and platforms, a new system and theory of value is embraced. Encouraging forms of the exchange economy and providing tools and knowledge freely and openly, a significant effort is made for social value to outbalance market value, for sharing networks to surpass zones of property.

Continuing the above argument, a fourth key point is that the proposed infrastructures can be seen as part of the new “Network Commons,” as discussed by Medosch. Although Medosch referred primarily to community networks, this can stand for the wider family of offline sharing networks, as they are systems in terms of infrastructure and content that are meant to be constructed, possessed and managed by all. Through such platforms, users are invited “to speak and think, to become informed and to participate,” as Stavrides (2010) put it, for the necessity of the contemporary commons. Commoning in the case of infrastructures is therefore a process based on the potentialities, skills and affects of the users with the aim to own, control and maintain as a commons systems of connectivity, communication and sharing.

Finally, to sum up all of the above and to understand the contributory role of art, it is useful to turn again to the notion of organizational aesthetics used by Goriunova and Fuller as well as to the concept of distributed aesthetics coined by Lovink. The forms of organization artists introduce as part of an alternative networking practice capture not only social and technological topologies but also experiences, languages and codes, driven, we could say, by affect. Just like Goriunova wrote for the art platforms that she studied, one can point out that artistic offline sharing networks are not only a type of practice but also a type of network and network organization; following her

approach, these forms of organization mobilize and reinvent network systems and cultures, conditioning and co-creating new forms of life (Goriunova 2012, p. 3). To understand this, one only needs to consider how a community network might have changed the social life of the Roma, how a PirateBox toolkit facilitated a university course or how a flying mesh network in a balloon in the sky could have triggered discussions about free communication and sharing in the networked world. This is how the “cultural, the individual and the social” is constantly produced and organized (ibid). While the different networks and systems proposed by artists cannot compete with the ones introduced by the market, nor can they easily become widely used alternatives, they do constitute initiatives for a world of connectivity that respects the rights of its users. This does not mean they should be regarded merely as symbolic gestures; they should rather be seen as starting points for modes of networking and organization that are driven by affect and are based on an interest in substantial change. Artists are responding to the urge that Baravelle highlights for infrastructures that are “physical, digital, linguistic and economic” (Baravelle 2018), embracing and empowering a new net diversity (Antoniadis 2018, p. 264, 269). They are contributing to the formation of a more “organic internet,” made of smaller self-organized hybrid networks (ibid), one which is resilient and comprised of low-cost, low energy networks that oppose “technological, economic or political forms of censorship” and control (Montagné 2018).

The special role that the artists seem to acquire through these interventions is therefore the one of the facilitator, the mediator, the commoner of knowledge and experience. Artists are building the bridges needed (Vasiliev 2015), offering tools of understanding based on their will to expose and make accessible opaque systems. Just as in previous decades, this urge to render the invisible visible happens in order to empower people. Artists can be seen as the ones that invite today’s users “to a participatory journey aiming to capture the not yet described and yet visualized, going beyond poles as real, virtual, new, old, offline, online, global and local” and therefore to unite all these different elements in the experience of networking (Munster & Lovink 2005). They respond to the exact need that de Lange (2013, p. 83) also points out: “We

must shift attention from technologies that seamlessly blend in with everyday life towards technologies that move people and enable them to move others.” Art’s special contribution, therefore, is found especially in this capability; that is to build awareness, to motivate and activate people towards change, which – in the particular context – concerns systems of connectivity beyond the possibility of surveillance and control. By turning the attention again towards the user, by making the topologies and the infrastructures tangible and accessible and by allowing their further modification and use by their users and their communities, new modes of organization and responsibility are becoming apparent beyond the sovereignty of the cloud.

A prior version of this paper by the same authors can be found in the *Journal of Peer Production's* issue on “Alternative Internets.”

<http://peerproduction.net/issues/issue-9-alternative-internets/peer-reviewed-papers/going-off-the-cloud/>

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Daphne Dragona, Dimitris Charitos
CHALLENGING INFRASTRUCTURES
Alternative networking & the role of art

PostScript^{UM} #32
Series edited by Janez Janša



Publisher: Aksioma – Institute for Contemporary Art, Ljubljana
www.aksioma.org | aksioma@aksioma.org

Represented by: Marcela Okretič

Proofreading: Philip Jan Nagel

Design: Luka Umek

Layout: Sonja Grdina

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Printed and distributed by: Lulu.com | www.lulu.com

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Supported by the Creative Europe programme of the European Union, the Ministry of Culture of the Republic of Slovenia, the Municipality of Ljubljana and the Swiss Arts Council Pro Helvetia.



Co-funded by the
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This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

