RESEARCH ARTICLE

Nomadic Transmitter: Public Sphere and Aesthetics in Brazilian Media Activism

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During the early 2000s a group of free radio activists in São Paulo, Brazil, commissioned the construction of an FM radio transmitter with multiple frequencies to offer radio workshops to communities interested in learning about radio language and practice. The transmitter was used by groups across Brazil and several South American countries. This article aims to describe and analyse over ten years of radio activism, taking as the object of reflection the agencies provided by a transmitter built in a computer case and adjustable in four frequencies in each locality in which it was activated. Considering the parameters of the Brazilian law on low-power radio that permits, under federal concession, 30 meters of antennae with 1km of radius and 25w of power, the objective was to present an experience of direct appropriation of radio spectrum for freedom of speech. Here we intend to discuss the construction of social media through which people meet to maintain shared infrastructures and to create radio language, transforming aesthetic mobilisation into an effective alternative to the control of the mainstream media over the use of the radio spectrum. Beyond subjective criticism about its ephemeral and often innocuous role when compared to constituted media powers, this paper aims to demonstrate that handling radio-frequency equipment can be a useful pedagogical tool to support the collective maintenance and repair of household autonomous communication equipment and infrastructure, in order to criticise and propose alternatives to media consumerist behaviours in different technological environments and situations.

Introduction

'Unrealisable in this social system, realisable in another, these proposals, which are, after all, only the natural consequences of technical development, help towards the propagation and shaping of that other system.'
Bertold Brecht
Theory of Radio (1932).

'There's no scarcity of spectrum any more than there's a scarcity of the colour green'
David Reed
The Myth of Interference (Weinberger, 2003).

In the beginning, there was radio. In the last decade of the nineteenth century different experiences in Europe, Brazil and the United States led to the invention of the radio, a long distance communication system available through a public spectrum. To avoid interference between radio transmissions, governments decided to assign radio licenses, which resulted in a bureaucratic process to gain access to the spectrum. In order to confront the extent to which these licenses limited spectrum access, different initiatives across the world have evolved, including pirate, free and community radio stations.

Juridically, 'spectrum' is defined as a 'public good' in many countries. It means that every citizen has the right to access this resource following the current regulation maintained by the State. This article aims to explain how technical arguments have been manipulated to sustain economic oligopoly over commercial telecommunication services and to control an important part of the public communication sphere. The proposal is to contribute with a fresh perspective on how new technical conditions and educative processes could lead to a different understanding of the spectrum, redefining it as a technical common good (Wormbs, 2011).

One of the main bibliographical references of our work with media activism is undoubtedly the book *Micropolitics: Cartographies of Desire* originally published in Brazil in 1986. The book is a collection of ideas and experiences made by Suely Rolnik and Félix Guattari on their journey through Brazilian territory in the year 1982, when Suely would organize a series of events, lectures and meetings in different cities and regions of the country where the two would always find a wide public interested in joining them. According to the authors, this was the moment when: 'The silent molecular revolution was taking place within discourse and, even more, in people's gestures and attitudes: the first steps towards the disinvestment of a politics of subjectivation constructed over five hundred years of Brazilian history, since the country's foundation' (Rolnik, Guattari, 2007: 9).

Although the book's contribution is strongly marked by its dialogue with psychiatric institutions and state mental health policies, serving as a reference for rethinking clinical practice and psychiatry in general, the text has also been appropriated by various social movements engaged in struggles of emancipation. We refer here especially to the movement of Brazilian free radios. This was due not only to the critical and innovative nature of the proposals worked out by Rolnik and Guattari, but mainly because Félix Guattari brought with him an experience of activism in Free Radio in Italy, having participated actively in the construction and circulation of Free Tomato Radio amongst others. The translation of the book *Micropolitics* into English was published in 2007 and includes the interview conducted by Guattari with the then labour leader Luiz Inácio Lula da Silva, who would become president of Brazil decades later. For us, it is important to rescue these materials in order to reflect on the question that is asked of Lula about the importance of free radios in the construction of a project of creation of subjectivity parallel to the one exercised by the monopolistic media. From our perspective, Guattari's question and Lula's answer, both of a few lines, reflect different views on the importance of the media in the construction of subjectivities, while revealing the way of thinking and acting of significant portions of the left regarding the appropriation of the means of communication. Guattari insisted in the importance of building independent media alongside the democratic process and Lula refuted this idea by saying that Brazil had a different context and wasn't ready for this debate at that point. This text is therefore an attempt to present

an experience of human-machine relationship very different to those presented within instrumental thinking about the media, including with it both a political critique and a pedagogical-aesthetic proposal of post-mediatic sensitivity construction in the context of a passage from analogue to digital technologies. What are the possible new forms of resistance to new forms of domination that digital media brings?

Finally, this research paper intends to circumvent the construction of the significance of low-power transmitters by focussing on their pedagogical potential (Freire, 1996) through the comparison between perception and learning process (Piaget, 1970) which will led us to analyse how *primitive magic* can be experienced through transductive processes when building handmade technical objects (Simondon, 2017). We intend to develop a critique of the models of appropriation of the means of communication which maintain the separation between broadcasters and the public (Brecht, 1932) and to offer a practical pedagogical tool that can stimulate a connection between media reception and emission as theorised after the Second World War by intellectuals like Theodor Adorno (Mariotti, 2014). In an effort to deal with contemporary information-consumption relationships, the proposal is to present a rhizomatic system of media production (Deleuze and Guattari, 1987) whose purpose is not to compete with the media content officially transmitted, but rather to facilitate human-machine agencies that contribute to the collective creation of imaginary futures (Barbrook, 2007) beyond those already established for us.

The free radio legacy

The free radio movement in France as well as in Italy, which reverberated throughout Europe, has strong links with the multiple alternative practices created to confront left-wing ideologies that had been in evidence since the Russian Revolution of 1917 (Collectif Radios Libres Populaires, 1978). As advocated in the International Situationist manifesto of 1960 free radios are placed in a context of cultural change that proposes the transformation in the language of forms, which means that these experiences do not intend to dispute realities of a media audience, but rather to create new forms of expressions and post-media sensibilities (Berardi, 2005). This political *détournement* can be situated as an insurgency against capitalist societies that distribute "material misery" and are organised through a 'spectacle' (Debord, 1994): seeking to nullify its main threat of alienation; this is redefined, becoming much more than a useful category to combat the expropriation of the means of material production, being understood as a means of which life itself is replaced by passive contemplation, by the consumption of the image, of the representation, which substitutes for both realisation and experimentation.

The first book on free radios in Brazil appeared with a preface written by Félix Guattari. In his text entitled 'Free radios toward a post-media era' (Guattari, 1986: 10–13) Guattari highlights the economic differences between European countries and Latin American ones, especially Brazil, suggesting that 'the traditional struggles in the field of labour and the traditional political arena will continue to play an important role' but that 'the intervention of an alternative intelligence, of innovative social practices, as in the case of free radios, seems indispensable to the health of hundreds of millions of exploited people of that continent' (op. cit.: 10). In the middle of his text, Guattari warns that the free radio movement is not a 'leftist movement, even if it is the leftists who are the first to engage courageously in this perspective' (op cit: 11), pointing to a political originality that would influence the Brazilian movement for decades. But what might have been the foundation for such a decisive statement?

The most famous Italian free radio, Radio Alice, created in February 1976, was shut down by the police just one month after its first anniversary. Some of its participants, such as Bifo

(Franco Berardi), were forced to escape to other countries. Once in Paris, Bifo met Guattari, and together they initiated a movement to resurrect the free radio station and Radio Alice started up again in July of that year. Although the station ran until 1981, its golden years belonged to its first period of operation, between 1976 and 1977, when it was marked and supported by dozens, maybe hundreds of handmade low-power transmitters. Beyond the quality of equipment or messages, the importance of this moment can be related to the vivacity and a certain extension of the sense of protest via a technical appropriation, which was dedicated to producing new forms of communication and expression.

In 1980, when Radio Tomato appeared in Italy, Guattari and his colleagues were participating in demonstrations, airing live from telephone booths, as well as recording interviews on cassette tapes with passers-by and representatives of the groups organising the events (Prince & Videcoq, 2005). Once they realised that the transmitter was easy to repair, they did not refrain from lending it to other groups and initiatives. The organisational model of the radio programming grid could be described as follows: without a responsible director, each day was composed of different programmes, and personnel responsible for each slot would make and present their show at a designated time. It is said that when Radio Tomato lost this character of collective construction and autonomy of the programming grid – passing the responsibility of what would be transmitted on the radio to a centralised power of management – Guattari broke with the radio station (op. cit).

Inspired by these movements, which would also emerge in Spain, especially between 1976 and 1983 (GarcíaGil et al., 2018), during the 1980s in many countries in Latin America, local radios and television stations were created and founded in order to reestablish and improve democracy (Longo et al., 2017: 39). In fact, in Argentina, this process would involve the development of an estimated number of 1,500 free radio stations (Vizer and Landesman, 1989). It was at the end of this same decade, students from the State University of Campinas, in Sao Paulo, Brazil, created Radio Muda, a free radio station installed in the centre of the campus at the base of a 50-metre-high water tank.

Free radios do not reach large territories, and in the last century, there was no internet available to connect and organise these experiences internationally. Despite so many specificities, these stations could be defined as an attempt to change traditional communication codes, not only through the content that would be emitted, but also through the invention of new forms of making radio shows (Vizer and Landesman, 1989: 56). Beyond the importance of bringing an alternative discourse to the hegemonic contents distributed on a mass scale through official media, what might have been gifted from the legacy of free radios from different contexts to the emergent Brazilian tactical movement?
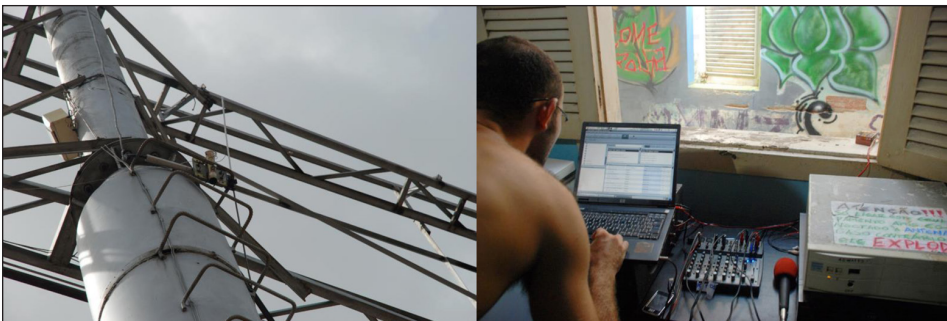
The Free Radio legacy.

Pedagogical tools and spectrum direct appropriation

At the turn of the millennium, when the internet was already envisaged on the horizon as an overwhelming promise of convergence of all forms, a group of activists was organised in parallel to the collective of Radio Muda, the free radio installed at the campus of the State University of Campinas, in Sao Paulo, Brazil. Self-nominated as submidia, the group was formed by six undergraduate students from different disciplines (Computer Science, Architecture and Social Sciences) and envisaged fostering workshops to create more and more free radios. One decade behind the European experiments that were taken as reference and inspiration, this group discussed and realised the potential of the popularisation of technical components and put forward the necessary knowledge for the construction of low-cost FM transmitters in the Brazilian context.

At the end of the twentieth century, it became really easy to set up and activate a low-power FM station. However, the passage of a law in 1998 (9.612), regulating community radio as a low-power FM service, served to prevent the operation of radios, instead of stimulating the creation of an open and democratic public sphere through local communication. Rather than guaranteeing communication as a right through low-power radio, it created a bureaucratic, complex and time-consuming process for granting licenses. It established technical standards that were questionable and proved difficult to meet and it was contaminated by the political use of the distribution of grants already established in Brazil as one of the pillars of democratic governance. The technical standards, of dubious value for proposing the determination of a maximum range for the transmissions disregarded important factors affecting the capacity of transmission, served as a reference point typifying violations of the national telecommunications system regulation. Illegal transmissions could result in real problems for local communicators since the federal police used these to follow the national Agency (Anatel) in their attempt to verify radio stations permissions: to occupy the spectrum without a license was a crime.

The national agency was as a consequence responsible for receiving and processing license applications and became soon flooded with tens of thousands of submissions, exceeding its processing capacity. Combined with the complexity of requirements for the application, written in a legal language that excluded most communities, the perfect scenario was constructed to neutralise a social demand for communication without officially opposing it. At the same time a new field for bargaining and distributing political power gained force in the already blurred borders between public and private interests.

Still under the government of the Brazilian Social Democracy Party responsible for the most intense neoliberal privatisation program of the 1990s, this way of making laws served to consolidate an oligopolistic communication system, even later under Lula and the Workers' Party government. During Lula's government, despite rhetoric in favour of the 'democratisation of communications' cause, thousands of radios operating without licenses – largely awaiting the response of the request for the license to provide community radio service – were closed and their operators criminalised by the Agency responsible for supervising radio stations.

In another direction, we also witnessed the emergence of the phenomenon of pirate radios, linked to Evangelical Churches, aimed at capturing new worshipers through religious proselytism and the accumulation of political capital. In a few years this movement would become decisive in the creation of micro-parties that would act as a bloc in the Brazilian congress to defend conservative and anti-diversity measures. They certainly represented the largest number of radios with applications for licenses and also the majority of stations closed as the result of inspection procedures. They represent a strong presence on the FM dial of any large or medium city in Brazil and have created their own particular radio language.

Free radios served then, in this period, as a refuge and laboratory of political reinvention, a characteristic to be notable among low-power radio appropriation in democratic contexts (Dunbar-Hester, 2014). Maintained largely within universities or by rooted movements, free radios flourished at the turn of the millennium amid the reflux produced by the approval of the community radio law. The term free radio itself was replaced by community radio as a strategy to get rid of the association with the idea of illegality and political contestation. And, in a broader spectrum, the left itself favoured adherence to counter-hegemonic strategies of action, founded on the premise of 'speaking to the people' to organise it – which always placed it in the contradictory and dangerous position of 'speaking for the people' – who to a certain extent considered free radios as politically innocuous and as unable to mobilise masses of citizens.

However, soon after, the internet would reconfigure the passive role of the masses and the referential privileges of whom it would be considered legitimate to call for mobilisation. In that period free radios developed actions that began to be adapted to new media relationships, assembling technological aspects and political activities as part of a discussion about the means of communication as suggested by Simondon in his analysis on the potential of broadcasting and education (1982). The idea was to not reduce their power as being able to produce broadcast content, but to focus primarily on the structures of content circulation. This political critique was transformed into infrastructure dispute and was expressed through thought and action guided by concrete experiences. This foundation provided a platform for critical internet processing as a key to what is now increasingly relevant. It was not enough to conquer access, in the sense of connectivity and the use of information services. It seemed necessary to create autonomous infrastructures that guaranteed safe use and greater margins for the agency of individual and collective invention.

The nomadic tx was conceived at that moment, resulting from the crossing of networks between activists, researchers and professionals of diverse areas engaged in media activism and connected through the internet. Mixing new concepts and methods, the initiative of the nomadic tx would express a radically free radio experience adapted to a technical education we envisage as necessary in the age of the internet. A pedagogical instrument that incorporates new conflicts and contradictions manifested by the consolidation of computerised domination at the frontier of analogue and digital, producing situated resolutions.

A nomadic transmitter

On 8th of September 2010 one of the members of submidia group sent an email explaining that our nomadic transmitter had passed way: it wouldn't be able to emit any more. Since then, we have been looking for an opportunity to tell its story, adventures, which encapsulate many of our experiences as undergraduate students, as a collective of activists and media theorists. This is a summarised trajectory of our collective radio transmitter.

Our submidia baby was born at the bottom of a backyard, the firstborn of a growing offspring. With less than a year, it had already walked between states, across countries, and a thousand voices had talked through it. At the age of two, it already had the maturity of various meetings and longed for more, always more company. In Campinas, the first test interventions, being fundamental as a backup of its inspiring muse, Radio Muda. It moved to the student's collective accommodation due to a threat of invasion and apprehension that stalked the campus. In 2003, in Rio Grande do Sul, it lived a while on the top of a building in the centre of the city of Porto Alegre, and became a reference for the university entrance exam which raised a question concerning the freedom of expression. In Porto Alegre, in 2004, at the International Free Software Forum, it went by bus with undergraduate students of Computer Science, and was hosted by colleagues from the

Psychology Department of Pontifical Catholic University of Rio Grande do Sul (PUC-RS). In January 2005, it faced humidity in Manaus, where it transmitted free Amazon radio, during a pan-Amazonic social forum. In April 2005, it went to Lucas do Rio Verde, in the north of Mato Grosso, to a workshop for the rural workers' union. It grew up a little more in the family of submidia and went to Pernambuco to participate in a meeting of the recently promoted public policy 'Cultural Hotspots'. Back in Mato Grosso state, it was used by local activists of an independent media centre. During the occupation of the National Indigenous Foundation of Brazil, (FUNAI) by indigenous people, it resisted with them and enabled their voice to be heard beyond the walls. It worked as a link to Radio Muda during the occupation of the rectory. This equipment was borrowed by some groups in the Northeast, along with a handwritten operation manual. In 2008, it was used at the end of a free radio meeting during the carnival in Radio Muda. It went to the Crusp, the student accommodation of the University of Sao Paulo. Once again in the south of Brazil, it assisted with the creation of Radio Tarrafa, in Florianópolis, and collaborated, in 2009, to the founding of Radio Antena Negra in Porto Alegre: in a public text they offered thanks for the loan of our baby at that time.

Submidia equipment was conceived in a backyard laboratory equipped with tools where a skilled technician in telecommunications built a transmitter with a switch to adjust at four distinct FM frequencies: 104.1, 104.7, 105.1 and 105.7. This range of possibility, combined with a lack of precision in the antenna cut, resulted in an effective signal radiation outside the limits of bands causing interference at the beginning of its journey.

One of the first tests with the transmitter was carried out in the house of one of the members of the group responsible for the circulation of equipment in Brazil and beyond. During the final game of the Copa Libertadores de América, we turned the transmitter towards a residence in Barao Geraldo, Campinas, and we could verify that the signal caused interference in television reception. We initially envisioned that such an effect was carried out because of a combination of transmitter power – which was designed to transmit nearly 70 watts of power – and proximity to the reception of the television signal. We turned off the equipment and attempted to seek technical assistance to verify if the antenna was cut off at the correct frequency emitted. We needed a second test to go before we could engage in new workshops in the field.

The transmitter did not work perfectly when taken to a community interested in building a radio station in Campinas (Casa de Cultura Taina), resulting in continued local complaints relating to difficulty tuning into the country's second most-watched TV channel, the SBT. This situation caused a great discomfort to the submidia collective since our attempt to provide a communication tool to strengthen a community project ended up becoming a reason for criticism and disqualification of the technical work of an organisation focused on human and social rights in Brazil. Even while trying different frequencies the interference remained: we had to collect the equipment and apologise to the directors of the organisation. This was perhaps the most negative experience among all residencies promoted to circulate the nomadic transmitter.

The story of the circulation of the nomadic tx allows us to see technological learning as a preponderant key to action, as well as a criticism of infrastructural political conditions. As directed towards a deterritorialised action, in the sense of being open to multiple reterritorialisations, it did not carry with the equipment any directive as to the language or content to be transmitted, nor about how to produce this content. Obviously, there were limits, because freedom of expression is not understood as being centred in the individual, but to reflect a collective freedom, so that discourses that violated human rights, or promoted religious and commercial proselytism were prohibited. However, the arrangement for production

and transmission would always be decided by those responsible for the operation. What was recurrent in all experiments, therefore, was the direct appropriation of the electromagnetic spectrum and the refusal to request a license to operate local communication.

A low-power transmitter, a cable, an antenna, and a small set of instructions was shared and fostered the development and implementation of more enduring communication infrastructures. The counterpart of the loan was to arrange to buy another transmitter for permanent operation, or longer duration, and consequent return of the equipment loaned. The collective that triggered the process and maintained the tx, was more involved in monitoring the process than in any kind of curation, being responsible for the technical support for operation and the sharing of theoretical and practical references that were transmitted by workshops or through the work of our network. There was also the transmission of a certain attitude towards the media, which took place through radio programs and even broadcast performances in the public space or in cultural and artistic events. Submidia was developed by six researchers and the transmitter reached more than 60 communities in ten years of distributed residency.

In the very practice instigated by the nomadic tx there is an implicit pedagogy for a relationship with technical delivery, which surpasses the alienated relation in Simondon's sense, combining a proximity to the senses with a socially designated function for a technical object. The kit consisted of a transmitter, an antenna and a cable, containing the essentials for the creation of a radio station, but also depending on the complementary devices that could improve the radio experience, such as a sound mixer, microphones, computer or vinyl player. This open format of a group of technical devices demands an active posture that requires an understanding of the specific technical abilities that each item would bring to an event if gathered there. It was not enough to have turned the transmitter on, people should project

Nomadic transmitter.

and engage in content production to experience their own radio station. In addition, it was always about solving a problem in its most practical aspect. The kit provoked a differentiated type of learning, since its political meanings were only updated when the transmitter was triggered, so that one could learn how to make radio only by making radio. This reciprocal and asymmetrical relation between actors of different types is what characterises what we are calling 'a Rhizomatic Media System'.

Paulo Freire is considered one of the main references regarding pedagogies aimed at emancipation. His writings were certainly a reference in this process, although never in a leading role. The main resonance we see between his method and the practice of using the nomadic tx is related to the learning process linked to local knowledge and local experience. Simondon, on the other hand, played a central role in some of our understandings on how to prevent technical alienation through direct contact with the elements and technical ensembles that compose a nomadic radio station and our method focused on collective invention (Simondon, 2018). As part of this transductive process, to perform a weld repair in a circuit, for example, does involve a technical solution, but also a techno-aesthetical gesture that belongs to a differentiated mode of technical progress (Simondon, 2014). Our aim is to advance this modality of progress as a pedagogical contribution to face today's computerised societies.

Another way of understanding the differentiated contribution enabled by the nomadic tx was experienced in a rural settlement where the radio station was implemented as a joint effort to migrate from site to site since its signal was not strong enough to reach the entire inhabited area: in each site a different arrangement of equipment and people resulted in a different radio, purpose, message. Or, as in another residency, such as the indigenous occupation of FUNAI's headquarters, where the federal authority concentrated its agents to deal with the indigenous population: the presence of a transmitter worked as trigger to elaborating demands and collective expressions that were not previously conceived of. Instead of looking at the medium and the message, the encounter between the indigenous and the transmitter (during the act of the occupation itself) provoked the emergence of an undissociated medium-message experience.

According to Hans Magnus Enzensberger (1970), the very existence of the media presupposes its manipulation. For him, in the so-called industry of consciousness, the question to be addressed is not whether the media are manipulated, but how and who manipulates them. However, his solution to this problem has become obsolete since the idea of transforming everyone into a manipulator could not predict the emergence of modulation technologies and a capitalism of platforms. What does it mean to insist on direct social control of media, when the medium is the message, when the infrastructure resides in the limitations of the transition of disciplinary societies to societies of control? Do we believe people will be more or less emancipated when interacting with connected computers, for example, in the context of surveillance capitalism (Zuboff, 2015)?

The nomadic tx resumes an increased technological appropriation, in the sense of making the potentials contained in the technicality of material objects updated through arrangement that favours local longings, small projects and ephemeral expressions. Subverting official uses that reproduce officially diffused standards linked to consumption and passive participation, the purpose of this equipment is to produce effective local resolutions; to dare criminalisation and police repression, legal persecution and the manifestation of local powers, which often operate through direct violence, especially in rural contexts. The goal is to experiment new modalities of human-machine relations through the identification of elements and technical ensembles inside technical objects, and practising civil disobedience in contemporary spectacle societies.

Besides these very interesting and inspiring experiences in different territories we believe that the great legacy of our free radio experience is to value the direct appropriation of the spectrum, through the implicit and necessary learning of how to establish local and autonomous infrastructures as a precondition for the elaboration of initiatives of autonomous public communication spheres. Direct technical appropriation points to the opportunity of creating a language capable of breaking with blind adherence to dominant ideas on technology which lead to centralised arrangements and totalising languages; experiences that currently reverberate in the emerging phenomenon of community networks that provide Wi-Fi or GSM internet connectivity. An analogue form of resistance adapted to new forms of digital domination.

Interfering in the interference

'Tomorrow, data banks and cybernetics will put in our hands means of expression and agreement for the time being unimaginable.'
Félix Guattari, 1986.

The beginning of wireless sound communications was perceived at the time as a superior magic, on the radio highlighting a particular aesthetic power over human sensitivity – something that was theorised by, among others, Rudolf Arnheim in the early 1920s (Meitsch, 2005). On the other hand, the effervescence of radio is accompanied by the phenomenon of interference between radio waves, which has always been referred to as the great limitation of the social appropriation of this media. It is argued that the spectrum is a finite space, a scarce good, and that there is a need for a centralised command to allocate the frequencies as well as to maintain permanent control over the transmitted signals, thus avoiding the risk of the messages not being received properly.

The history of the radio is controversial as to who would have been its inventor, and this article does not attempt to clarify all the components and patents that made wireless voice transmission possible. However, it is interesting to note that as early as April 1925 the International Union of Radio Broadcasters (Wormbs, 2011) was founded, when 10 broadcasters gathered in Geneva, Switzerland, and established the first organisation dedicated to radio. They were concerned with the exchange of programs, but, more fundamentally, with the creation of a mechanism of exclusive allocation of frequency bands. In July of the same year a meeting of engineers was held, establishing the limits of harmonic production, transmitter power, as well as the minimum distances between stations, using scientific criteria to guarantee the quality of the equipment. All these aspects converged in the common objective of avoiding interference between radio stations.

Many decades have passed and radio is now a telecommunication system with more than one hundred years of operation. Among the metaphors commonly used to explain the mode of operation of this technology is the idea that the spectrum is a set of roads, routes, transmission paths that are occupied by electromagnetic waves emitted from one point and received in another, varying the distances travelled. Information, in this sense, is like a package, a car or a bus, that transits from one side to another; and interference is defined as something that can divert the destiny of the message or impair its integrity: to prevent communication interference between essential services that could even cause fatalities, although there has never been a recorded case of a plane crash caused by communication interference.

The spectrum, however, could be understood in another way. For electric engineer David Reed, one of the architects of the internet, the spectrum would be better exploited if it was viewed as the colours of the rainbow, including those that the human eye can not see (Weinberger, 2003). That is to say, since broadcasting is a technical system, composed by

many elements and technical groups that allow its operation, if new elements or sets are developed, we may have new communication systems with different characteristics of spectrum use. In the analogue era, for example, radios are commonly divided between FM (modulated frequency) and AM (amplitude modulated), which are two different ways of emitting electromagnetic waves, influencing the sound quality of the medium and the territorial coverage of the signal. Short wave radio, on the other hand, has as a remarkable characteristic in its ability to send messages to territories thousands of kilometres from its emitter, using the propagation in the ionosphere, which reflects the so-called 'celestial waves', allowing communication beyond the sea and, depending on the power, being a means that can circulate, without wires, information through the whole terrestrial globe. For all these cases, however, the metaphor and spectrum management model are the same: avenues are assigned for the exclusive use of those who receive a state authorisation, becoming something like a temporary property to be renewed through new payments or new applications for granting use.

As suggested by the philosopher Gilbert Simondon, one of the main problems of our societies lies in technical alienation (2017), starting from the understanding that technical evolution is a process that envisages automatisms, ignoring technical components and the organisation of technical ensembles. On the contrary, according to Simondon we should value technical objects' openness to human intervention and invest in identifying their elements, which would offer the opportunity to adapt this or that device to new uses, based on the so-called 'margin of indeterminacy' (Simondon, op. cit.) that would lead to a differentiated technical progress. If this margin was not well developed during the analogue century, what conditions does digital offer, especially for spectrum management, imagining this differentiated model of technical progress?

Considering the fact that interference is central in contemporary spectrum management, and the need to create pedagogies to enhance technical appropriation, we would like to address the following two aspects involving home-made autonomous manufacturing of analogue broadcasting equipment: the use of the argument that interference restrains the proliferation of radio broadcasters without governmental permission; and the emergence of digital technologies that enable dynamic spectrum management, such as cognitive radio and software defined radio, which can find empty spaces in the spectrum to transmit, or modulate a different wave in order to occupy this empty frequency, respectively.

Conclusion

In this text we have tried to develop an encounter between different theories of media appropriation and the experience we had in building and sharing our FM transmitter. In one hand, we propose a modular technical appropriation that enables the development of local solutions, discourses and sensibilities. On the other hand, we intend to contribute to a differentiated way to propose mass mobilisation through a massive short circuit, running through multiple creativities that could be useful to our digital media environment. What are the tools we can build to resist alienated digital inclusion that stimulates commercial internet platforms' participation as if they were the new public sphere? Following the same path roamed in the analogical age, commercial interests are invading our public communication sphere making it appear that their interests are general interests (Marx would insist that dominant ideas are the ideas of the ruling class). To face this situation many groups around the globe currently invest in the creation of autonomous infrastructures, sharing the common understanding that it can be both a good solution to connect the next billion people to the internet, while at the same time ensuring communication rights and local empowerment for threatened communities. But if there is a difference between these two approaches: what would it be?

Big companies are offering so-called 'zero-rating' programmes to connect the unconnected. It means they are presenting the internet as a collection of a few sites, which brings them to the position of retaining a lot of personal data and control over marginalised populations. In some countries, these initiatives are illegal but in countries without these legislative safeguards in place, there is still space for this to happen and the work of community networks becomes even more important. However, if we have made our argument clear, the main role of these groups in organising workshops and building together with locals their own self-maintained infrastructure is far more educative than technical. Mesh networks can be made through low-cost equipment and enable local data communication very effectively. Open mobile phone projects have become a real alternative in regions where there is little commercial appeal for companies to invest in providing services. Also, digital radio and digital television are still to discover their full potential of broadcasting huge amounts of data without being noticed by surveillance technologies. There is a future to be imagined if we disrupt certain technological developments designed to colonise our desires and beliefs. Here lies the importance of the free radio movement within digital communication: an attempt to contribute to the knowledge that maintains infrastructure and the creative power to instigate a social 'short circuit', communication vacuoles in media content and subjectivities circulation.

Competing Interests
The authors have no competing interests to declare.

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