

# Signal Territories, Infrastructures and Intermediaries: New Interfaces for Art Science and Communication Policy

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*This paper is one of the contributions to an academic panel titled: “Bio-creation of Informatics: Rethinking data ecosystems in the network economy”. The panel seeks to explore different approaches for trans-disciplinary media art and design practitioners to re-imagine data ecosystems and at the same time engage members of the general public to reflect and contribute to an inclusive discourse that may re-shape public policy surrounding data ecosystems, from the lenses of ownership, privacy, transparency, openness and choice of individuals. The panel is moderated, co-authored and edited by Catalina Alzate.*

### Abstract

This paper shifts the critical focus away from the aesthetics of fetishized interfaces of access amplified by today’s networked consumer technologies, towards invisible broadcast infrastructures and data ecosystems that exist in demarcated ‘signal’ territories that harness the natural resource of the wireless electromagnetic spectrum (Parks, 2013). At the outset it calls for the need to revisit the role of the public as an active contributor to conversations in the broadcast media sphere and how as a practicing transmission and information artist, one may contribute to this goal. It takes a closer look at the nature of media infrastructures to bring to focus new trans-disciplinary fodder that exist for rigorous art-science interventions that explore the role of broadcast archives, network intermediaries and the transnational lines that they traverse. In the first section, it presents the history of contentions that the science and practice of public transmission is embroiled in. Next, it looks at other opportunities and hooks for public engagement with broadcast media that provide various entry points to engage in public discourse. Finally, the paper makes a theoretical contribution by introducing a new transdisciplinary lens to look at network intermediaries in order to explain various dynamics that occur in the physical and social transmission and mediation of information.

### Keywords

Transmission Art, Spectrum Policy, Broadcast Media Archives, Intermediary Liability, Art-Science, Public Engagement.

### Signals, Transmission and the Public

The wireless spectrum, unlike other exhaustible and geographically specific commodities is an infinite natural resource of the commons, currently circulated as a mobile currency ‘guaranteed’ and produced by owners of communication infrastructures, who play a central role in mediating data transactions as well as media dissemination in the public sphere.

Walter Benjamin in his 1930 reflections on the medium of broadcast communication infrastructures (Benjamin, 1999) underlines the fundamental separation between the practitioner and the public that the system had perpetuated, thereby alienating individuals into passive listeners rather than active contributors to a real-time conversation - “...the public has become quite helpless, quite inexpert in its critical reactions, and has seen itself more or less reduced to sabotage (switching off). There has never been another genuine cultural institution that has failed to authenticate itself by taking advantage of its own forms of technology - using them to create in the public a new expertise.” It was in the interest of broadcast media he claimed, to empower the public to contribute to conversations in which anyone might have a say. Heavy regulated ever since its tactical use in war communication, large chunks of the wireless spectrum have been administered through various licensing mechanisms for human telephony, broadcast media, satellite communication and military systems. However, to celebrate the spirit of open science by early wireless experimenters who fostered inventions and innovations in the field of wireless communication, a number of licensed as well as de-licensed frequencies have been designated to these science and citizen communities. These include reserved bands for radio-astronomers in various Shortwave and Microwave spaces as well as bands of 1420Mhz and 1667Mhz where the Universe’s neutral Hydrogen line is transmitted. Amateur radio (HAM Radio) bands, including the de-licensed citizen

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band at 27Mhz are reserved for the community of licensed amateur practitioners where some of the most groundbreaking innovations as well artistic works continue to happen. With old technologies like analog TV and commercial FM radio being discontinued, previously allocated frequencies have been di-licensed and given for industry players for commercial and artistic exploitation. One such phenomenon is ubiquitous computing (also dubbed ‘the internet of things’) that has gained wide-spread attention creating large scale mesh networks of micro nodes that transmit information on many delicensed frequencies. The central question being asked by policy makers who prefer dynamically allocated spectrum using universal machine protocols to facilitate multiple transmitters requesting to access the spectrum when it free, rather than top-down service specific allocation by spectrum auction.

While bringing aboard the practice of working directly with the medium of broadcast to create experimental interventions in the public sphere does reduce the gap between practitioner and the public, the question is to seek ways or hooks by which members of the public play a primary active role in contributing to the larger discussion on communication policy and media. The ecosystem of Broadcast News media provides us with one such opportunity for public engagement with art, data science and policy, which has been dealt in the next section.

### **Nature of the Broadcast Medium (and of Archival Propensity):**

The journal of radio broadcasting entering the field of journalism and dissemination of News created what came to known in the 1940s as the Press Wars between radio broadcasters and print media publishers that included newspapers and magazines. Ephemerality and co-located simultaneity are central to the nature of broadcasted media (be it television or radio) -- a feature that markedly differs from the permanence of print, further underlined by the creation of such temporal hooks for public engagement such as ‘Prime Time’, ‘News Night’ and ‘Late Night Live’. As with any momentous event or fleeting occurrence is born a need for physically storing and remembering its immediacy, it can be argued that a similar need is felt by a discerning viewer or consumer to negotiate the immediacy of an eventful media broadcast (Newbold,2013). By this act of archiving, he transcends into a new role as an invested

consumer of the medium and a custodian of the stored broadcast content.

The most substantive instance of this, apart from the ‘selfie-archives’ of today, dates back to the early 1950s when there emerged a band of creative practitioners who engaged in what has been called armchair photography or TV video portraiture, a widespread trend overlooked by most media historians (Newbold,2013). Articles related to photographing television broadcasts appeared across many popular magazines and newspapers since



Figure 1: DIY Decametric antenna for SW news broadcast reception (Chandra, 2014)

the late 1940s, elucidating techniques to acquire the best ‘live’ image and how to display TV photographs as markers of technical excellence and sociocultural value. Around the same time, emerged a new generation of hobbyists dubbed ‘SWLs’ or ‘Short Wave Listeners’ who used inexpensive World Band Radio receivers to listen to and archive news and entertainment broadcasts.

In order to gain a well-rounded perspective of an issue, it might be necessary to be able to access and analyze connected artifacts present in a media archive over a period of time. This is partly due to the opportunistic nature of the medium in which sound bites of broadcast news are delivered in fragments and does not allow the public to comprehend the meta-history of complex issues and all the different points of view in a single instant. This fact is well elucidated by Geoffrey Baym in his seminal book that covers the evolution of the broadcast medium (Baym,2010). Baym cites media historian James Carey’s allusion of news media being ‘hot light’ and just as the same object appears different

in varied lighting conditions, so does the ‘hot light’ of different news items create varied interpretations of the same issue.



Figure 2. Digital archiving of Local Analog TV Transmissions for Media Analysis using Machine Vision (WYDSIWYG, Sharath Chandra Ram, Video Vortex XI @ Kochi Biennale 2017)

What might be the design of a broadcast archive that facilitates this sort of large-scale content analysis and opinion mapping to extract narratives from broadcast media into the contemporary information arts and society context? What other modes of interventions in virtual sphere and offline contexts using communication technologies maybe used to gather public opinion and encourage the social transmission of information within communities?

### Fuelling Maxwell’s Demons in the Networked Society

The role of intermediary induced bias in a neutral network is now the center of the net neutrality debate. The author has previously outlined (Chandra, 2013) the role of intermediaries in communications networks marked by the significant invention of the Automatic Telephone Exchange (Strowger switch) by Almond Strowger, an undertaker by profession, who came to realize that the reason he received fewer phone calls was his business competitor’s wife who was a telephone operator, preferentially routed all callers seeking Strowger’s funeral services to her undertaker husband instead. The advent of packet switching followed by the rise of the Internet started a long drawn feud between owners of services that generate packets of information and the underlying physical infrastructure that facilitates the seamless routing of information bits amongst nodes connecting users.

This paper contributes to a new lens of art-science and policy enquiry by drawing a parallel

between the dynamics of transactions occurring within intermediaries (that consist of both physical infrastructures as well as social infrastructures) and the thought experiment of Maxwell’s Demon from the literature of information, entropy and thermodynamics. There is always a ‘cost’ related to reducing entropy in a system, and in the ‘self-routing’ communication networks of today this has come to bear an ‘informational cost’ required for the temporary storing, transmission and erasure of networked data. At times when the cost of temporary storing and erasure of transactional data is not justified, an accrued value is created by mining patterns from a long-term storage of big data. Opening the potential of big-data analysis to public reduces its hoarded value in the hands of owners of network infrastructures, but on the other hand has the potential for new knowledge to be mined.

An example of this is the author’s media art project titled ‘Traffic’- Traffic Dabolim/Traffic Jogja 2015 contrasted the time synchronized nature of data transmission seen in the wireless spectrum employed by intermediaries (navigation of military acrobatic pilots at 118Mhz AM Band, and the navigation of civilian aircrafts in aerospace at 1090Mhz by human operators in the air and ground control station). This data archived over a long time, reveals statistics such as peak time of arrival and departure of aircrafts, and airspace occupancy patterns, that is useful for the future of aviation transport policy as well as optimal logistical planning of high value cargo services.

Further exploring alternative forms of information access, networked delivery of information and reappropriating communication technologies into new contexts, has the potential to disrupt established intermediary driven power imbalances. For instance, alternate low cost community owned ‘offline’ infrastructures using open spectrum devices and antennas to access and archive GIS satellite climate imagery within fishing communities (Chandra 2016), was found to compete with the subscriber based weather update and market delivery systems promoted by mobile phone operators to profiled individuals in the same community.

In conclusion, this paper calls for new approaches in Critical Making methodologies that take into account the intersection of law, technology and society to facilitate art and design interventions that expose and disrupt the

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role of intermediaries in our data driven ecosystems and also engages the public for influencing policy makers. This paper is being written at an important time when the 2017 US Senate has voted against a 'broadband privacy law' that will soon enable Internet Service Providers to sell user data to advertising companies without the permission of users, a turning point in the way bio-created data ecosystems will lead to a self-perpetuated transnational undermining of human rights and media consumption.

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## Author biography

Sharath Chandra Ram's (Sharathchandra Ramakrishnan) practice and research interests lie at the intersection of law, technology and society with a focus on Open

Education (Open Science and Open Hardware), Open Spectrum, Citizen Science and ICT4D. As a licensed amateur radio broadcaster (callsign: VU3HPA), he is actively interested in communication policy research, radio astronomy, extends his art-science practice as a transmission artist and has installed his sound and multimedia work in several national and international avenues. He is currently Faculty at the Srishti Institute of Art Design and Technology at the Centre for Experimental Media Art and the Information Arts and Information Design Practices (IAIDP) Program.

He engages actively with the local open source and policy research community at the Centre for Internet and Society and organizes the annual NASA International Open Data Challenge at Bangalore. Previously, he has worn many trans-disciplinary hats from being a cognitive neuroscientist, a Software Engineer to being a radio journalist.