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Slowing Down to Infrastructures is a durational, generative web radio project developed by Radio Otherwise that reconfigures buildings (the architectural materiality as well as the various energetic flows moving within and through them) as both studios and sonic instruments, attuning to the everyday infrastructures that sustain them. Using streamboxes (open microphones transmitting live audio), we install air and contact microphones, hydrophones, and electromagnetic antennas throughout a building to access its inner life and workings. Airflow through ventilation systems, electromagnetic signals from routers, water circulating through pipes, and vibrations from the street are streamed live alongside machine hums and distant traces of human and environmental presence, foregrounding the often-unnoticed infrastructures as protagonists. These live streams are processed in SuperCollider to form a continuously evolving, generative radio composition. Modulating frequency, rhythm, periodicity, and temporal cycles, the system unfolds over time with a subtle dramaturgy, alternating between moments of intensity and quiet reflection, allowing noise to gradually emerge as information. By listening to infrastructures as environmental sound, the project engages the material and invisible systems that shape collective human and more-than-human life. The soundscapes, rather than representing “nature,” reveal systems, foregrounding positionality and the conditions of listening itself. The project asks how listening to structural, coded, and invisible processes can make audible the politics of perception, access, and power embedded in infrastructural environments.

Introduction

Radio Otherwise is an experimental, artistic, and ecological radio collective focusing beyond purely anthropogenic transmissions, recognizing relationality within the spectrum of more-than-human radio ecologies. We move across free and community radio, knowledge-making, and artistic settings. For example, we create durational live transmissions that favor listening and reception over transmission in informal outdoor studios; in 2021, we offered the seminar *Radio Otherwise: Listening, Ecologies, Cybernetics* at the University of Potsdam and have continued with academic participations in the following years; we have also led MicroFM transmitter workshops in various contexts and have been commissioned to develop artistic transmissions for festivals and exhibitions. These instances mark only a few moments within a broader and continuously evolving practice that unfolds through collaborations, environment-specific interventions, and research formats, extending beyond the examples mentioned here.

Beginning in 2022, we initiated a sequence of four projects united by the conceptual framework of *infrastructures of flow*.¹ Together, they give concrete form to *Radio Otherwise*'s ecological radio practice, transforming theoretical concerns into situated and durational modes of listening, reception, and transmission. Each project highlights the interrelation of human, technological, and more-than-human agents, employing live, generative, and participatory formats to make perceptible the dynamic exchanges of energy, matter, and information that constitute environments.

These projects are *Circling Thresholds* (2022), commissioned by *Forests of Antenna, Oceans of Waves*,² a series of interventions in Berlin dealing with awareness about electromagnetism in public space; the *Spree~Channelsea Radio Group* (2023)³ with Soundcamp, in collaboration with Surge Cooperative and Blanc Sceol, from London; *Infrastructural Eddies* (2024)⁴ continuing the previous collaboration with Soundcamp as part of their project *SAM FM. Experiments in Ecological Radio* in Basel; and *Slowing Down to Infrastructures* (2025)⁵ commissioned by the Copenhagen Architecture Forum (CAF) for the Copenhagen Architecture Biennial as part of the LINA Fellowship⁶ awarded to us in 2024.

The Copenhagen Architecture Biennial took place between September 18 and October 19, 2025, under the theme *Slow Down*, investigating “architecture as matters of time and means of slowing down overheated sites, cities, and societies”.⁷ By inviting Radio Otherwise, CAF expressed

1. More about the projects and the conceptual framework in our article *Listening to Soundscapes Otherwise: Infrastructures as Environmental Sound* (de Paula Antunes, Donovan, and de Paula Lefort 2025). Attention to the sonic essay accompanying the publication available at:

<https://www.highpitchmagazine.com/issues/issue-02/listening-to-soundscapes-otherwise-infrastructures-as-environmental-sound-radio-otherwise>

2. <https://antennenozeane.de/>

3. <https://acousticcommons.net/~/>

4. <https://www.sam-basel.org/en/events/s-am-fm-experiments-ecological-radio>

5. <https://www.cafx.dk/biennial/media/slowng-down-to-infrastructure>

6. <https://lina.community/projects/3b3b1684-470e-4b67-b472-a95434c0f551/>

7. <https://www.cafx.dk/biennial/biennial-home>

interest in a radio format that would gradually build toward the Biennial, beginning in May 2025 and culminating during the month of the event.

What was initially envisioned by CAF as a series of conventional on-demand listening formats focused on conversational content, namely podcasts with guest specialists exploring the interface between slowness and architecture, was rethought by us as a durational, generative live web radio format. In this proposal, loose conversations (often with non-experts) and snippets of them would play a supporting role, while the central listening experience would become a collective attunement to the inner life of the Copenhagen Architecture Forum space at Halmtorvet 27. This collective attunement meant listening to live transmissions from five streamboxes installed throughout the building, transforming it into both studio and instrument. Airflow through vents, electromagnetic activity around routers, the pulse of water pipes, and vibrations from the street were streamed alongside the hum of machines and muffled traces of voices and activity, foregrounding the subtle, often unnoticed infrastructures themselves as protagonists.

Within the live composition, parameters such as cycles, gradual change, periodicity, and rhythm functioned as central structuring elements. The five streamboxes were not treated as static background sources but as dynamic material. Background voices were muffled; sounds underwent slow fades; frequencies were cyclically processed, selected, amplified, and spatially organized within the stereo field. These processes were particularly pronounced in the input from the electromagnetic loop antenna near the data center. Occasional activity in the water pipes panned across stereo channels, while the system's own modes of listening—noise generated by the streamboxes themselves—were folded into the composition. Street vibrations rose and receded in response to patterns of urban movement.

The materials also enacted forms of natural processing: for example, ventilation ducts transformed neighboring sounds, such as music playing in the shop next door, into diffuse textures. Air microphones were used sparingly in contrast to contact microphones and antennas, as the artistic focus lay on treating infrastructural systems as environmental sound, using most microphones as transmitters of vibrations moving through materials and architectural structures. Through subtle modulation and processing, these sonic flows were layered, filtered, amplified, and occasionally reorganized in the acoustic space, allowing certain cycles to emerge clearly while others drifted in and out of focus. Periodic events such as mechanical hums, recurring surges, daily infrastructural peaks, served as temporal anchors, while gradual shifts in amplitude and density produced long arcs of change. Rather than imposing an external pulse, the composition derived its rhythm from the life in, around, and of the building itself, amplifying its micro-temporalities and slow durational transformations so that listening became an act of attunement to a living, evolving system.

Fig. 1. A contact mic is mounted on the plumbing beneath the sink in the shared kitchen at the Copenhagen Architecture Forum offices. It feeds into a streambox that broadcasts continuously, 24/7, over a six-month period. For long stretches the signal registered near-silence, punctuated only by moments of human activity or the activation of the dishwasher. Image credit: Kate Donovan.



Fig. 2. A hydrophone is installed inside the rooftop rainwater pipe of the Copenhagen Architecture Forum's office and gallery, where it is linked to a streambox. Image credit: Niko de Paula Lefort.



Fig. 3. Electromagnetic Loop Antenna (under yellow lights) plugged to a streambox (above the server rack) sensing activity in the data transmission network. Image credit: Niko de Paula Lefort.



The project also included *Conversations on Slowness*, a cycle of nine recorded encounters structured around a shared constraint: each invited participant would enter into dialogue with a guest of their choice, reflecting on slowness and temporality in one continuous, unedited recording. Rather than adhering to tight formats or predetermined outcomes, these exchanges were allowed to unfold according to their own internal timing: unhurried, digressive, at times circular – offering an alternative to the speed and urgency of most commercial media. The conversations were released over the course of six months, following a progressively intensifying release rhythm (starting monthly, moving toward bi-weekly and then weekly releases). Each episode entered a multi-phase replay cycle, timed according to real solar phases

in Copenhagen (CEST time) on each given day. Selected moments from the conversations were gradually introduced into the live broadcast environment, where they mingled with the ongoing infrastruc-

al transmissions. In this way, speech and environment, reflection and resonance, became intertwined within a continuously shifting sonic composition.

Fig. 4. Screenshot of the web radio *Slowing Down to Infrastructures* in the Copenhagen Architecture Biennial website with web player and part of the schedule.



The experience of *Slowing Down to Infrastructures*⁸ so far has revealed the richness of attuning to the subtle, persistent rhythms of buildings as living systems, highlighting how infrastructures mediate everyday life, perception, and social organization. By inhabiting a space for an extended period through listening closely to its movements, patterns, materials, flows of air, water and electricity, and the adjacent human presence, the project foregrounded temporality, engagement, patience, and the layered complexity of environments. The generative radio setup created not only a processual sonic portrait of the skeletons and pulses of Copenhagen Architecture Forum but also a framework for exploring architecture, infrastructure, and ecological relationality as intertwined processes. Looking forward, the same approach can be applied to a variety of buildings, architectural spaces and contexts, each producing unique sonic ecologies and modes of collective attunement. Through these iterations, the project envisions an expanded practice of ecological listening that foregrounds the politics, temporality, and materiality of built environments, offering audiences a deeper awareness of the living infrastructures around them.

8. A 20 minute long sonic essay mixing fragments of recordings of the 6-months-long radio broadcast can be found in the following link: https://open.substack.com/pub/monaidepaula/p/slowness-down-to-infrastructures?utm_campaign=post-expanded-share&utm_medium=web

Technicalities of Listening to Infrastructures as Ecological Radio

In the current ecological turn, media systems are understood not simply as channels of information but as planetary processes involving energy, materiality, and maintenance, which we bring together here in connection to the architectural, social and more-than-human infrastructures of built environments. This work draws on ecological radio⁹ in both theory and practice. Using diverse vibrational and audio inputs to promote plurality and relationality, our focus on transmitting the practice of listening is a way to nurture real-time collaborative listening situations—an intentional undoing of the traditional binary model of transmission-reception. We aim instead for a more circular, non-linear mode of process and exchange that emphasizes multiple entanglements in a shared presence.

Streamboxes

There are several “recipes” to build a streambox¹⁰ that basically connect microphones through an audio interface to some sort of computer (i.e., smartphone or Raspberry Pi) that will run the Locuscast¹¹ software connecting, via internet, the live audio capturing to the Locus Sonus hosting server and consequently to their sound map. Streamboxes need their power and internet connection solutions that will depend on the location and the duration they will be in operation.

For the project, we used streamboxes built by Soundcamp, each containing a Raspberry Pi microcomputer with an embedded IQAudio interface, along with a protective housing. Some units were equipped for Ethernet internet and battery power connections, while others relied on Wi-Fi and standard electrical outlets. Only one streambox featured air microphones (PUI capsules); the others were fitted with DIY contact microphones, antennas, and a hydrophone (Aquabeat).

The Locustream project, including their server and software, was designed by Locus Sonus research group, hosted by the Aix-en-Provence School of Art (l'École supérieure d'art d'Aix-en-Provence Félix Ciccolini). Although free and open access, the project welcomes participation that involves ecological radio and open microphones. Projects that would use the infrastructure for conventional radio-making could potentially be removed from the server.

9. Ecological radio connects to R. Murray Schafer's concept of the soundscape (1994) and to broader traditions of acoustic ecology, which often aimed to raise environmental awareness through attentive listening as a way to support multispecies preservation or to hold threatened worlds in sonic form. Ecological radio distinguishes live transmission from traditional field recording: where recording has often implied extraction, containment, and even colonial logics of capture and possession, live streaming resists closure. It unfolds in real time, bound to the temporal and material conditions of its source, shifting listening from an act of collecting and owning sound toward one of sustained attention and relational presence.

10. https://soundtent.org/streaming_recipes.html

11. LocusCast is a mobile audio streaming application that enables users to broadcast a live mono or stereo Ogg (and MP3) stream from a portable device directly to the Locustream SoundMap, automatically geolocating the feed on the map and maintaining a persistent connection to the server.

We installed five streamboxes on the Locustream, each providing an individual audio stream URL. These streams were not published on the Sound Map but were processed and mixed in SuperCollider and outputted to a single live audio stream on our headless cloud server. The live stream was then embedded in the web player on the Copenhagen Architecture Biennale website.

SuperCollider

The live audio stream for *Slowing Down to Infrastructures* was hosted on the project cloud server and fully computed through SuperCollider. The live audio URLs from the streamboxes were routed into the server via JACK, allowing real-time audio processing in a headless cloud environment. A watchdog system monitored the streams, automatically rebooting portions of the code in case of silence or failure, ensuring continuity without restarting the entire system. Each incoming stream was compartmentalized and processed in multiple ways: segments were frequency-selected, filtered, amplified, modulated, spatialized through panning, and/or layered. The processed streams were then mixed and outputted from SuperCollider via JACK to FFmpeg, which encoded them into a continuous live stream accessible via a final dedicated, secured URL. Episodes from *Conversations on Slowness* were scheduled to override the generative composition at predetermined times, with snippets inserted randomly and at varying rates, effectively side-chaining/ducking human speech into the otherwise infrastructural sonic environment and integrating reflective dialogue into the temporal flow of the building's live soundscape.

Ecological Media Arts

By taking the opportunity to present our work at a conference on the theme of Computation, Communication and Aesthetics and what connects and affects them all, we are not looking to celebrate our technological setup for its own sake, instead we wish to position our approach to technology and media arts as process-oriented, situated and experimental.

At the core of the project is the act of listening: by attuning to infrastructures, artists and audiences alike are implicated in a process of disalienation, experiencing communication as a situated, responsive interplay with(in) living systems. In doing so, the project enacts an ecological mode of media practice, one that recognizes the interdependence of human and more-than-human actors and the flows of energy, matter, and information that circulate through technological and architectural systems. Moreover, it reforms rather than perpetuates models of communication and technological submission, as we believe is the role and responsibility of artists and the arts (Flusser 1972).

By foregrounding infrastructures as both media and collaborators, the project enacts a systemic ecological approach, emphasizing the

entanglement of human, more-than-human, and technological actors within dynamic environments. It demonstrates how ecological listening is not only a method of perceptual and social inquiry but also a form of critical intervention: by questioning dominant technological and communicative paradigms, artists assume a responsibility to reform existing models, offering alternatives to technocracy and fostering modes of engagement and responsiveness that reconnect humans to the living systems around them.

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