¨ *Narrowcast* ¨

By the Varia BroadCats team (aka Broadcats ˚◞⸜(　˚◟˚)⸝◟˚)´

About

Narrowcast is a streaming space under the *Varia Broadcasts* label, broadcasting events that are happening in Varia starting from 2021. The *Narrowcast* is now one of the main digital public interfaces of Varia. Here we present our events online to the public through different streaming possibilities. It is called 'narrowcast' because its purpose is not to reach as many people as possible but to 'speak' meaningfully to different audiences and contributors.

Screenshot of Narrowcast

The station has since unfolded as an orbiting broadcasting channel for the physical public events in the space. The broadcasting programme is a way to further engage with ground-breaking modes of broadcasting events and inviting audiences to participate from a distance. We use free/ libre software tools, which are made and maintained by communities part of the free/ libre software movement. *Varia*'s server is hosting the streaming platform *Narrowcast*.

Varia BroadCats first connection

By following a heuristic approach, the making of this infrastructure is also an opportunity to experiment with the possibilities of remote connectivity. We will be working through the technical challenges of online streaming maintenance (weight of video connections, compression, storage space), configurations (parallel streams, limitations) and extensions (interface design,

chat and writing features).

By understanding these aspects of streaming techniques better, we aim towards making a station that fits our needs, triggers streaming imaginations, and feeds back to streaming as an artistic medium.

The *BroadCats*, the core team involved in the making of the *Narrowcast* includes: Angeliki Diakrousi, Luke Murphy, Joana Chicau and Danny van der Kleij. We are thankful to all Varia member's feedback and support as well as the engagement of various communities and audience members so far.

More in the about page of *Narrowcast*.

Genealogy

Varia's early experiments

✧ radio.homebrewserver.club (2015-2017): homebrew server at Crunk's house. icecast2, liquidsoap, nginx, timebased playlist.

✧ Streaming meetings: random meetings with Crunk, Angeliki, Cristina, Luke and others during the pandemic in order to figure out how to stream. Notes taken here: https://pad.vvvvvvaria.org/streaming

✧ Temporary Riparian Zone (2020): a streaming workshop at Hackers & Designers during Summer Academy 2020

Pandemic transmissions (2020-2022)

✧ Radio on the radio - Online Stream - 14 March 2020: Angeliki sets up a homebrew streaming server in her rpi at home to host a first lockdown event for Varia. The server 'moved' to Varia's server later.

✧ We hope this email finds you well* - a radio drama series - 18 April 2020: a hybrid online stream between 5 people, 3 houses, 2 recorders, 1 mobile phone, and 4 laptops.

✧ Wireless radio marathon in Radioee - 27 August 2020 : discussions on debugging and self-organising.

✧ WGBS (Archipelagic) Radio - 14 October 2020: ''(…) what an archipelagic construction could mean, in terms of organization, belonging, and self.''

✧ FHM #1 - Feminist Servers: Backups, migrations,

and other painful stories - 13 March 2021: first attempt to stream an event using multiple media and chanelling video stream through the platform.

✧ Wire Magazine Issue 449 (July 2021) On Air: Radio Activity: the issue, that became a reference for us, includes a collection of online radio initiatives that bloomed during lockdown and the shift of the online radio to a tool of resistance, self-organising and new forms of making music public.
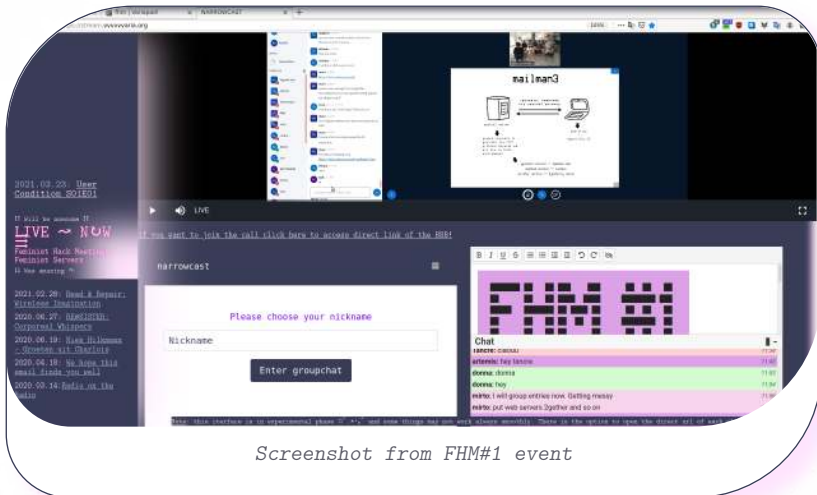
Screenshot from FHM#1 event

Poster for WGBS (Archipelagic) Radio

Sharing knowledge

While building the interface and experimenting with streaming, we exchanged knowledge with peers and collectives from our networks. By hosting different workshops this collective knowledge became stronger.


Varia TV transmission

✦ IRC chat on freenode; zoom calls (zoom has better video compression, its servers are all over the world, selfhosted jitsi instances are mostly in Europe to far away from some of the *Archipelagic* nodes)

✦ Read & Repair - Wireless Imagination feat. Danny van der Kleij: in this online edition of Read & Repair participants were invited to pick and mix from different texts ranging from pirate radio zines, media theory on the ephemerality of radio, and accounts of community radio politics. This event ended in a communal radio broadcast using icecast2, etherpump and palanggana.

✧ Read & Repair - Wireless Imagination feat.
Agustina Woodgate and Dennis de Bel: online
performative streaming through a simultaneous stream
with the use of voice messages; the computers of the
hosters could stream simultaneously through one server
(use of Icecast and Liquidsoap) with a slight delay
that could be managed through an external communication
channel.

✧ Sharing knowledge with Constant (Wendy) in
Brussels and ESC (Reni) in Graz to stream video.
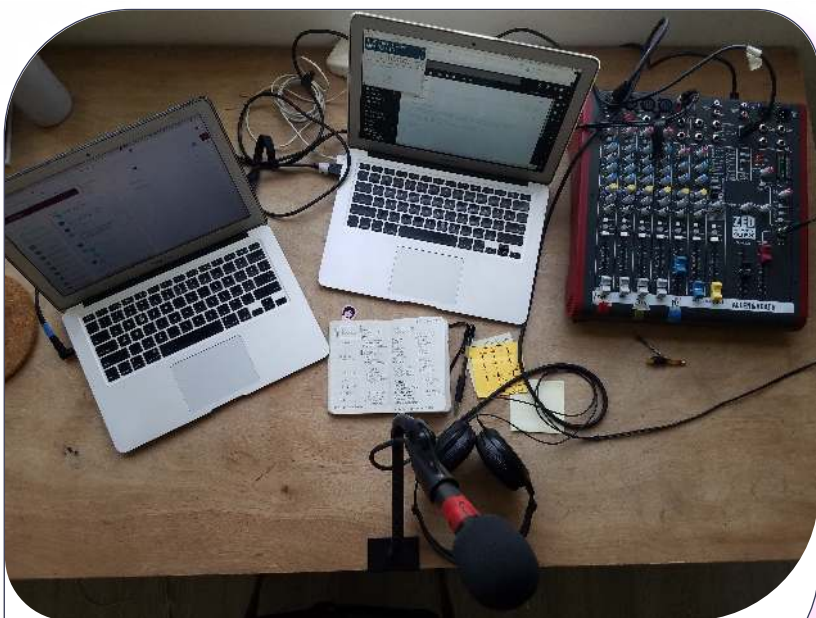
One of the set ups of the second Wireless Imagination

During the pandemic there was a massive interest from cultural workers and teachers who worked on resources and infrastructures of care. During this time finding alternative ways for online connection and streaming was crucial.

✧ Beyond Social Teaching Resources: Software Review
✧ Streaming platforms in Digital Solidarity Networks:
   line 383: Non-extractive* software initatives and use examples
   line 406: Radio/Streaming
✧ Selection of BroadCats references:
https://pad.vvvvvvaria.org/varia.broadcast-references

''Cultural institutions have become very dependent on donor economy and proposal writing,'' says Khalili. ''They have lost their ability to be authentic, both in their programming and towards the communities they work with.'' This applies to online spaces, too: ''Social media has become a space that is controlled and exploited by the companies that own it. Many digital platforms are corporate and algorithm-led.''
(Dazed, 2021)

Tentacular bridging

The importance of the trope of the archipelago is exactly this; that it shifts attention away from compartmentalised island space and redirects our gaze towards the relational space of the sea. In this sense, the archipelago, as I conceive of it here, is not reducible to a mere aggregate of scattered territorial surfaces or a collection of individual islands. Instead, what is significant about the archipelago is the sea between - a site of a multiple series of relationships that are never fixed, but constantly influx.
(Cuevas-Hewitt, 2007)

A series of internal conversations around streaming imaginations lead to concepts of bridging and multicasting.

With the idea of multichannels and multi-access-points, bridging different types and levels of technologies provides different levels of access to participants, listeners, hosters, broadcasters. This extends on allowing multiple ways of understanding and producing knowledge.

During a streaming process not everything works seamlessly. Servers are material objects that need care, resources and maintenance. The infrastructures are then always fragmented and interrupted (because of diverse bandwidth, slowness of hosting servers, old computers, VPN issues, diverse geolocations, multiple clients). Embracing this incompleteness opens up other imaginations of connectivity. With Narrowcast we

explored the posibilities of bridging fragments of
infrastructures by sharing protocols, servers and
software with allies that differ for each streaming.
For example, using the chat app in Varia's server and
the Big Blue Button in Constant's server.
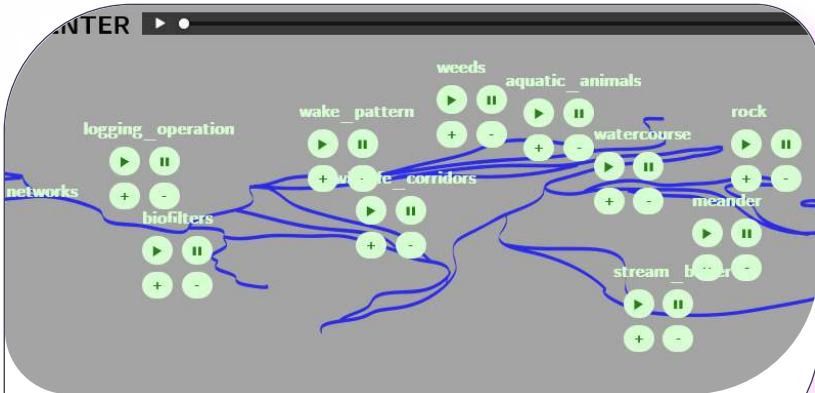
Screenshot from Temporary Riparian Zone workshop

*The tentacular are not disembodied figures; they are
cnidarians, spiders, fingery beings like humans and
raccoons, squid, jellyfish, neural extravaganzas,
fibrous entities, flagellated beings, myofibril braids,
matted and felted microbial and fungal tangles, probing
creepers, swelling roots, reaching and climbing
tendrilled ones. The tentacular are also nets and
networks, it critters, in and out of clouds.
Tentacularity is about life lived along lines-and such
a wealth of lines-not at points, not in spheres.
(Donna Haraway, 2016)*

Mirroring as resistance

Radio Alhara together with a group of sound platforms and sound artists started *The Sonic Liberation Front (SLF)* in order to create one sound for Palestine; standing with Palestinian civilians in protesting against Israel's attacks in Gaza and the repression of Palestinian communities everywhere. Through a dispersed network of friends and colleagues, using emails and social media (mainly instagram and facebook) *Radio Alhara* shared the url of the stream of SLF and invited other radio platforms to mirror it in their own infrastructures.

sharable stream link

✧ Mirroring Radio Alhara: Sonic Liberation Front
✧ All Ears for Jina

shared the link with Varia BroadCats, among other radio initiatives, who then mirrored the *SLF* in the *Narrowcast* platform in different moments in 2021. The mirroring as a practice continued with other struggles like the *Woman Life Freedom movement* in Iran with events happening in Rotterdam.

The pandemic offered Radio Alhara a unique opportunity as clued-up music lovers from across the globe rushed online in search of a digital community. Their neighbourhood became the entire world, with shows in Arabic, English, and French - and a public Dropbox folder inviting anyone from the community to upload a show and have it scheduled for broadcast. ''We were very interested in blurring the line between listeners and producers from the beginning,'' says Yousef. ''We feel that there is a family that keeps on growing, that is bringing in new forms of content and culture every day.''
(Dazed, 2021)

Sonic Liberation Front

All Ears for Jina poster

Archive of images mirroring SLF

Streaming with Infrafem (2022)

The events were realised by the *BroadCats*: Cristina Cochior, Danny van der Kleij, Amy Pickles, Angeliki Diakrousi

Streaming With Infrafem is a moment of exchange of communal strategies, infrastructural knowledge, and design choices starting by redefining the notion of streaming. This year we explored ways of ''streaming'' to each other by listening, waiting and responding, both through text (for example via collaborative editors), through audio (for example via the streaming audio/video servers), and other means.

The word ''infrafem'' is a portmanteau of feminism and infrastructure, and refers to doing infrastructure with a feminist sensibility. We believe that considering the means of communication as a means of production and questioning who is making them and under which conditions is important.

We organised two moments of exchange; a day-long research meeting for cultural organisations in the Netherlands that run and maintain a digital infrastructure as part of their cultural programmes, and a public radio online broadcast where international radio initiatives were invited to join and share their own experience.

In June 2022 we did the non-public event with local radio broadcasting groups based in The Netherlands, namely *Good Times Bad Times, Radio EE, LAG leftover radio, Hackers and Designers*. Here more about the event https://vvvvvvaria.org/en/infrafem-1.html where we looked at the make up of our technical infrastructures.

In November 2022 we streamed through *Varia's Narrowcast* platform our conversation with *Pukllasunchi*, who organise a radio for Andean children in Peru together with cultural worker Clara Balaguer who co-moderated. Here more about the event https://vvvvvvaria.org/en/streaming-with-infrafem-2.html.
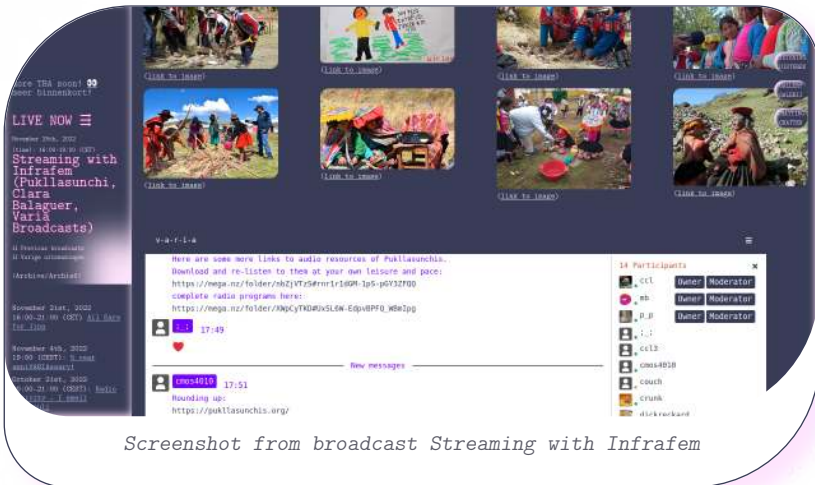
Screenshot from broadcast Streaming with Infrafem
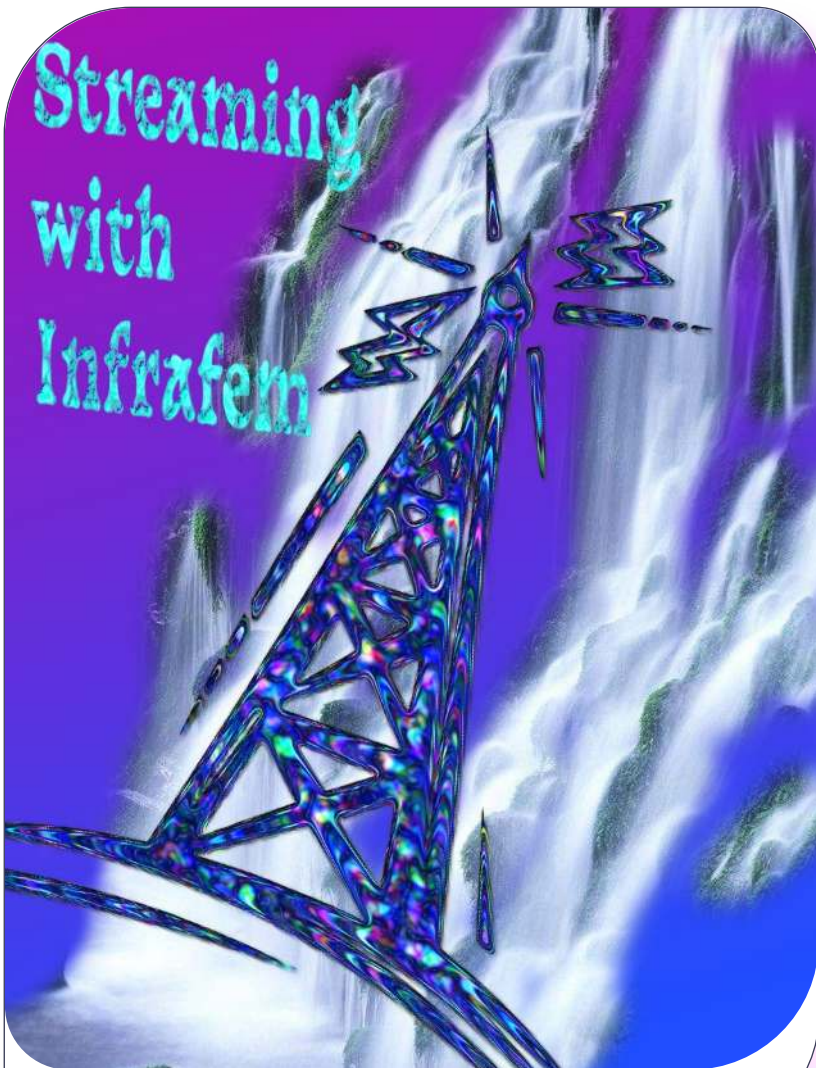
Poster for Streaming with Infrafem broadcast event

Making of a platform

from Narrowcast to Multicast

Narrowcast believes in multichannels, bridging different types and levels of technologies. The interface adjusts to each event and to the machines of the audiences. It is built following a modular approach, which means different media sections can be combined providing different levels of access to the listeners/watchers/participants.

The interface adjusts to each event's content and audience participation mode by hosting different media sections. At the moment we have the following media sections: chat (for chatting), etherpad (for writing), audio (for listening), jitsi or video (for watching), essay/pdf (for reading), images (which can be added gallery) and a welcome placeholder.

The *Narrowcast* has been handwritten HTML, CSS and JavaScript and the code is made publicly available through our self-hosted Git service called Gitea.

Narrowcast Rituals

< ! - comment in - - > comment out.

When preparing for the event, Varia members, collaborators and event organizers can choose the different media sections and < ! - comment - - > the ones that are not needed.

Setting up the stage! This phase includes adding content, considering translation and accessibility requirements among other tasks.

★ ☆ time of the event ♪♫ ☆ ★

Tearing down the stage! After the event, we ask organizer to tidy up the event space and link back the media sections to their respective 'placeholders'.

When there is no event we still want the *Narrowcast* to invite audiences to future events and explore the series of curated placeholders (like jingles for the audio, a public available Varia pads, etc).

Narrowcast Dual-Lingual

All structural elements of the *Narrowcast* have both English and Dutch labels, this has been done manually 🖌 🐿 .

Narrowcast Skins

The *Narrowcast* is composed of three stylesheets: * 'narrowstyle.css': the main style; * 'narrowstyle-extra.css': extra style that is added to particular events; * 'narrowskin.js': a series of scripts to quickly change the main colour pallete;

/* I was thinking to illustrate I can add this gif (https://vvvvvvaria.org/~jochicau//narrowcast.gif) or actual buttons (or input fields https://www.youtube.com

/watch?v=DP9-CVgkgDA) to change the colour pallete if
we host this essay online */

There is a lot of room to customize the interface,
although for structural changes (for eg.: adding
sections) we ask to contact the *BroadCats*.
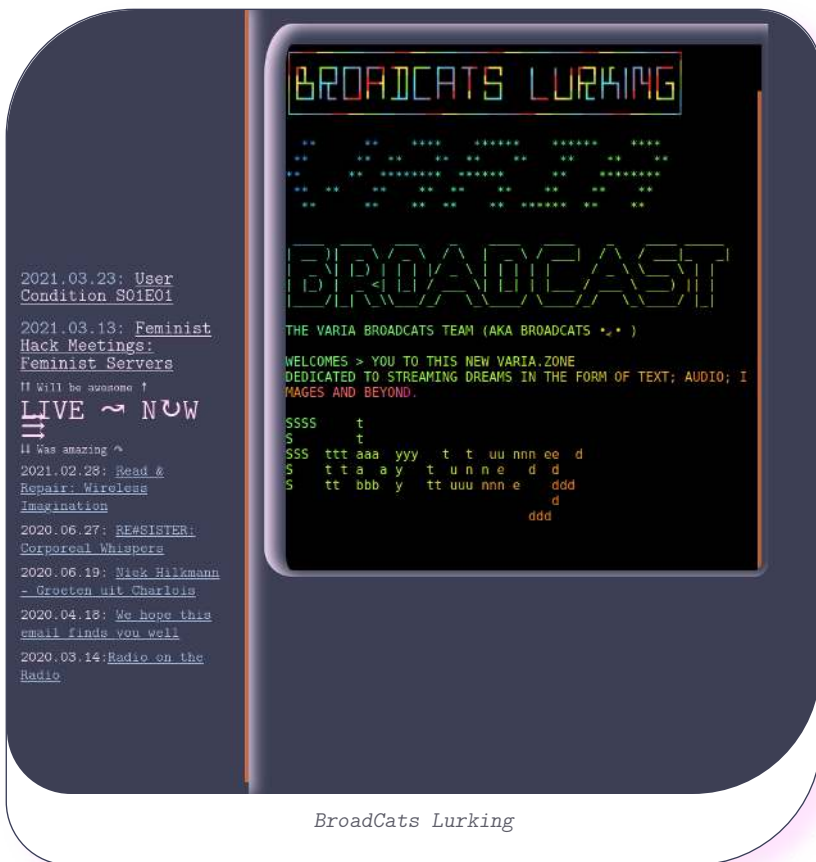
BroadCats Lurking

Glossary of possibilities: tools and methods

We give definition of tools as streaming tools.

Icecast2: is a streaming media (audio/video) server, you need this for an online audio or video stream. There are other ways, but icecast2 is easy to install on most linux machines and can be selfhosted.

To broadcast and to be live.

Selfhosted: meaning you host something yourself, you own your own server, preferably a physical machine that you know the location of. To host for ourselves and our communities. see homebrewserver.club

To be in control and to be independent.

Nginx: a webserver, this is a piece of software that can send files to people on the internet.

To document to be found.

Nextcloud,
xmpp bots,
partyline copy/pasta from lurk.org,   backstage
publishing via xmpp,
terminal loading page as stream,
filecasting,
drag and drop,

Archive of Narrowcast streams

2020

- ✧ Radio on the Radio
- ✧ We Hope This Email Finds You Well
- ✧ Niek Hilkmann - Groeten uit Charlois
- ✧ RE#SISTER: Corporeal Whispers

2021

- ✧ Read & Repair - Wireless Imagination feat. Agustina Woodgate and Dennis de Bel
- ✧ FHM #1 - Feminist Servers: Backups, migrations, and other painful stories
- ✧ The User Condition #01
- ✧ Read & Repair - Sense-full Pedagogy feat. Supreme Connections
- ✧ The User Condition #02 - Met Brendan Howell
- ✧ Mirroring [Radio Alhara] (https://www.radioalhara.net/): Sonic Liberation Front
- ✧ Ecstatic Speech
- ✧ Mirroring Radio Alhara: Sonic Liberation Front
- ✧ Waste/d voices and infrastructures
- ✧ Feminist Hack Meetings #2 - Polyphonic Radio Ensemble
- ✧ The User Condition #03 - met Anaëlle Beignon
- ✧ Mirroring the 24hr radio marathon ROOTS
- ✧ Chºreºgraphing Cºding ᖰ tales from real-time collaborative audio-visual coding ᖰ
- ✧ Radio Activity ᖰ a Wireless Orchestra ᖰ

✧ Double publication launch: Learning How to Walk While Catwalking and Vernaculars come to matter
✧ The User Condition #04 - ‘‘Losing Your Data is Good for You’’ - with Dave Young

2022

✧ A Transversal Network of Feminist Servers
✧ Publishing Partyline, Broadcast #1: standards and work arounds, with Open Source Publishing (OSP)
✧ Publishing Partyline, Broadcast #2: dependency relations in the ecosystem, with Paged.js
✧ Sonic Liberation Front, Women Life Freedom
✧ Publishing Partyline, Broadcast #3: web-to-print in education, with Julien Bidoret & Quentin Juhel
✧ Radio Activity - I smell Patchouli
✧ 5 year anniVARIAssary!
✧ All Ears for Jina
✧ Streaming with Infrafem (Pukllasunchi, Clara Balaguer, Varia Broadcasts)

Streams of alliances

✧ Wireless in Radioee
✧ Platform Alliances in PUB
✧ Good Times Bad Times w/ Varia in GTBT

And many more spotaneous unrecorded streaming moments!

Platform Alliances stream

Configuration appendix

Screenshot from index.html of Narrowcast

Raw HTML

- ✧ index;
- ✧ narrowscripts.js;

CSS skins

- ✧ narrowstyle.css;
- ✧ narrowstyle-extra.css;
- ✧ narrowskin.js;

Using Icecast

_ user: source
_ password: ◇ ◇◇ ◇◇◇◇◇◇◇◇ ◇◇ ◇◇◇
_ server: voice.vvvvvvaria.org
_ port: 8000

diagram from Wireless Orhestra stream
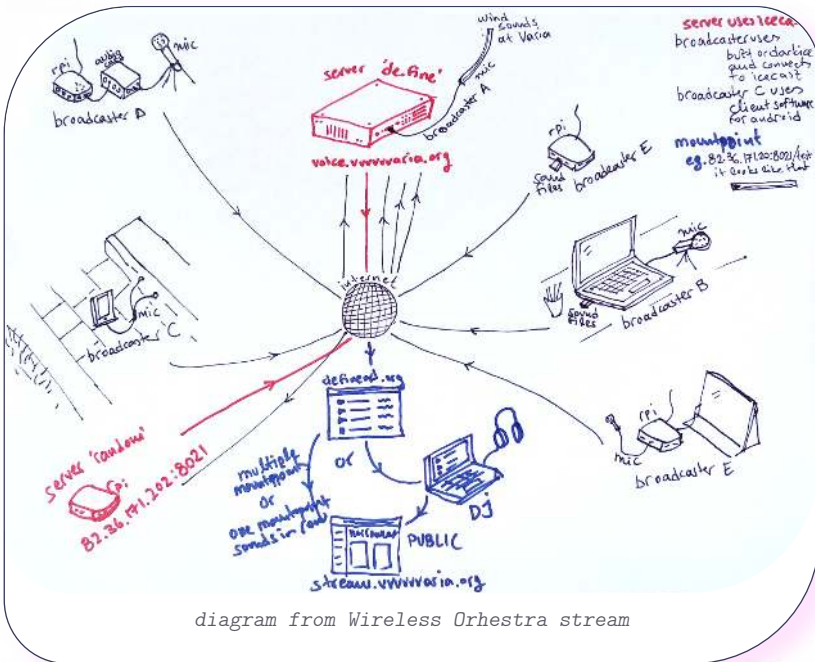
Installing Icecast2

✦ The usual train to paradise

```
apt install icecast2
```

Firewall

✦ Make sure you listen on 8000, adjust your iptables:

```
-A INPUT -p tcp -m tcp -dport 8000 -j ACCEPT -A
INPUT -p tcp -m tcp -dport 999 -j ACCEPT This of
course needs to changed to reflect your own port
setup
```

HTTPS for your stream

To make certs it's easiest to have your webserver off
```
service nginx stop
```
Because icecast is secretly also a plain webserver with
the admin and mount point pages turn that off too
```
service icecast2 stop
```
Make a cert with certbot
```
certbot certonly -webroot-path="/usr/share
/icecast2/web" -d 'your.website'
```
Icecast doesn't work with two .pem files but with a
bundle so combine those certs.
```
cat /etc/letsencrypt/live/your.website
/fullchain.pem /etc/letsencrypt/live/your.website
/privkey.pem > bundle.pem
```

move this to your icecast config folder and it needs to be accessed by other services.

```
mv bundle.pem /etc/icecast2 chmod 666
/etc/icecast2/bundle.pem
```

after making the certificate you can turn the webserver back on.

```
service nginx start
```

✦ Adjust `icecast.xml` config file with and :

```
/usr/local/share/icecast /log /web /admin
/usr/local/share/icecast/bundle.pem
ECDH+AESGCM:DH+AESGCM:ECDH+AES256:DH+AES256:ECDH+
AES128:DH+AES:ECDH+3DES:DH+3DES:RSA+AESGCM:
RSA+AES:RSA+3DES:!aNULL:!MD5:!DSS
```

✦ Also adjust `icecast.xml` config file to set a new port for the ssl stream.

```
< listen-socket >
< port > 999 < /port >
< ssl > 1 < /ssl >
< /listen-socket >
```

After all these changes you can turn icecast back on.

```
service icecast2 start
```

Streaming with Infrafem broadcast

Icecast2 clients (BUTT, DarkIce, Liquidsoap)

Install and configure BUTT

Instructions for BUTT client taken from
[https://pad.vvvvvvaria.org
/temporary_riparian_zone_instructions Temporary
Riparian Zone]:

For Linux users

✧ Download butt from here: https://sourceforge.net
/projects/butt/files/butt/butt-0.1.22/butt-
0.1.22.tar.gz/download and go to the directory that you

downloaded it through the terminal:

```
cd Downloads/
```

✦ The following libraries have to be installed on your system before installing butt:

sudo apt-get install libfltk1.3-dev portaudio19-dev libopus-dev libmp3lame-dev libvorbis-dev libogg-dev libflac-dev libfdk-aac-dev libdbus-1-dev libsamplerate0-dev libssl-dev

✦ After installing the above libraries you can install butt from source:

```
tar -xzf butt-0.1.22.tar.gz
cd butt-0.1.22
./configure
make
sudo make install
```

✦ Open butt:

```
butt
```

Audio settings

✦ Click on Settings on the right top of the butt interface
✦ Go to the tab Main, under Server Settings, the section on Server.
✦ Click ADD Server

```
Name: varia
Type: IceCast
```

```
SSL/TLS: unclicked
Address: voice.vvvvvvaria.org
Port: 8021
Password: ✧ ✧✧ ✧✧✧✧✧✧✧ ✧✧ ✧✧✧
Mountpoint: live
IceCast user: source
```

✧ Click ADD

✧ When the window closes, click Save again in the Configuration section

✧ You can add more info about your stream during the workshop

✧ You should now be able to stream if you click the Play button in the main interface! Go to the interface again, to the mount point you chose and click Play again. You should be able to hear yourself. Or click on the green play button on the right top corner of the butt interface. The amount of MB sent will appear on the screen, which means that you are connected to our server.

✧ In the tab Record:

Record Directory: [add a directory where your recordings will be stored]

✧ Go to the tab Audio.

✧ Now we will enable the option to stream audio files from your computer, instead of only using the microphone.

Audio Device: check if there is another soundcard device available beside the options of Internal Microphone and Default PCM Device. You may have to activate it if it doesn't appear (check more here

https://pad.vvvvvvaria.org
/temporary_riparian_zone_instructions line 80)

♦ Click on the ''play'' button: now you are live!

Stream statistics

You can use the Varia Icecast administration page to
see the statistics of your stream.

♦ Go to https://voice.vvvvvvaria.org
♦ Click on ''administration''
♦ Log in with:

user: varia
password: ♦ ♦♦ ♦♦♦♦♦♦♦ ♦♦ ♦♦♦

♦ Check the stats of your mountpoint!

Tunnelling Jitsi into streaming

The 'hacky' way

An easy solution for that would be to make the Jitsi
call with your phone or another laptop and use your
computer as the broadcasting station. In that case the
steps are:

♦ Connect to the Jitsi call with your phone
♦ Connect to the Jitsi call with your computer and
turn off microphone and camera. Insert headphones so
the sound doesn't interfere with the jitsi call in your
phone. You don't have to wear them, only to check if
the audio 'runs'.

◈ Open BUTT or any other streaming client

◈ In the audio settings of your client choose your soundcard as audio input. In that case we don't need the microphone. The name of the soundcard differs depending on your software.

What was that? Your computer streams only the sounds coming from your headphones, which means the Jitsi call and music you play with any media player. But you also want to include your voice in the streaming. As it is complicated to have both the microphone and the soundcard you use your phone so your voice goes through the jitsi call.

The professional way

With JACK…

RMTP

RTMP video stream with OBS and Varia server:

```
ssh -L 1935:127.0.0.1:1935 variazone
```

Using a subdomain on a server that has other websites and nginx

Because icecast is a webserver on its own, you technically don't need a webserver like nginx to serve just the stream. But more often than not a server is a social space with many different ideas, and nginx is often installed. My solution was to put icecast behind a subdomain.

◈ this is my edited nginx config file for that.

✧ keep in mind that you might need to make a certificate for a different subdomain.
✧ the allowed cipher in the icecast.xml config file is also noted here under `ssl_ciphers`
✧ you proxy pass to port 8000 this must of course be the icecast2 port.

```
server { listen 80; server_name
radio.your.website; return 301
https://$server_name$request_uri; }

server { listen 443 ssl; server_name
radio.your.website;

ssl_certificate /etc/letsencrypt
/live/radio.your.website/fullchain.pem;
ssl_certificate_key /etc/letsencrypt
/live/radio.your.website/privkey.pem;

ssl_protocols TLSv1 TLSv1.1 TLSv1.2; ssl_ciphers
HIGH:!aNULL:!MD5;

error_log /var/log/nginx/radio.your.website.log;

location / { proxy_http_version 1.1;
proxy_set_header Host $host; proxy_set_header
X-Forwarded-Proto $scheme; proxy_set_header
X-Forwarded-For $proxy_add_x_forwarded_for;
proxy_set_header Upgrade $http_upgrade;
proxy_set_header Connection ''upgrade''; proxy_pass
http://127.0.0.1:8000; } }
```

And Apache config

```
sudo a2enmod proxy_http

<VirtualHost *:80> ServerName radio.domain.com
ServerAdmin hostmaster@domain.com
ProxyPreserveHost On ProxyPass /
http://localhost:8000/ ProxyPassReverse /
http://localhost:8000/
```

Excerpt from conversations in the WGBS (Archipelagic) Radio:

*They create this network through the sea, exchanging
goods, ideas. Not a clear distinction between
languages, islander identities, food. I would say that
there is a distinction between languages, but it's a
fluid dinstinction that changes slightly from island to
island. Am I from my island before I am from my
region/nation/continent? It depends on how well
connected the island is to the lands abroad, how much
it feeds off the mainland on a regular basis.*

*I was feeeling isolated and excluded on the island
because there were no networks and connections of care
between the islands. To have boats, first. Then to the
actual idea that I am not living in the middle of
nowhere in the water but I am part of an archipelago.
That is so beautiful.*

Bibliography

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Colophon