Monitoring Encrypted Law Enforcement Comms

Omaha Metro started encrypting Dispatch channels ~2023

Some channels (talkgroups) were already encrypted (Narcotics)

Some channels not encrypted (ambulance, UNO, utilities, bus)

30 min delay

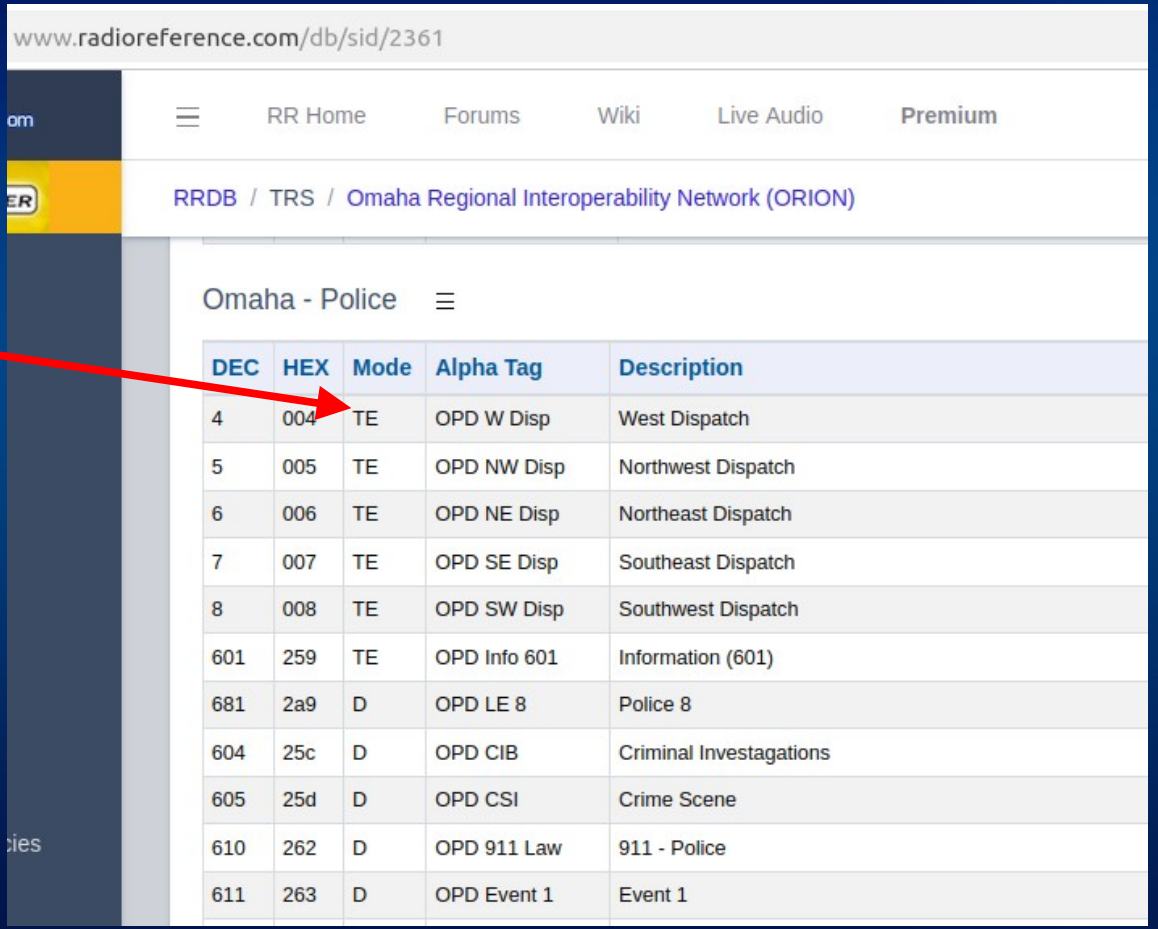
ORION Network

Douglas & Sarpy LE, ambulances, utilities, buses, etc. use the same radio network (trunking)

TalkGroup List

"E" indicates encrypted talkgroup

"A" = Analog
"D" = Digital
"T" = TDMA capable

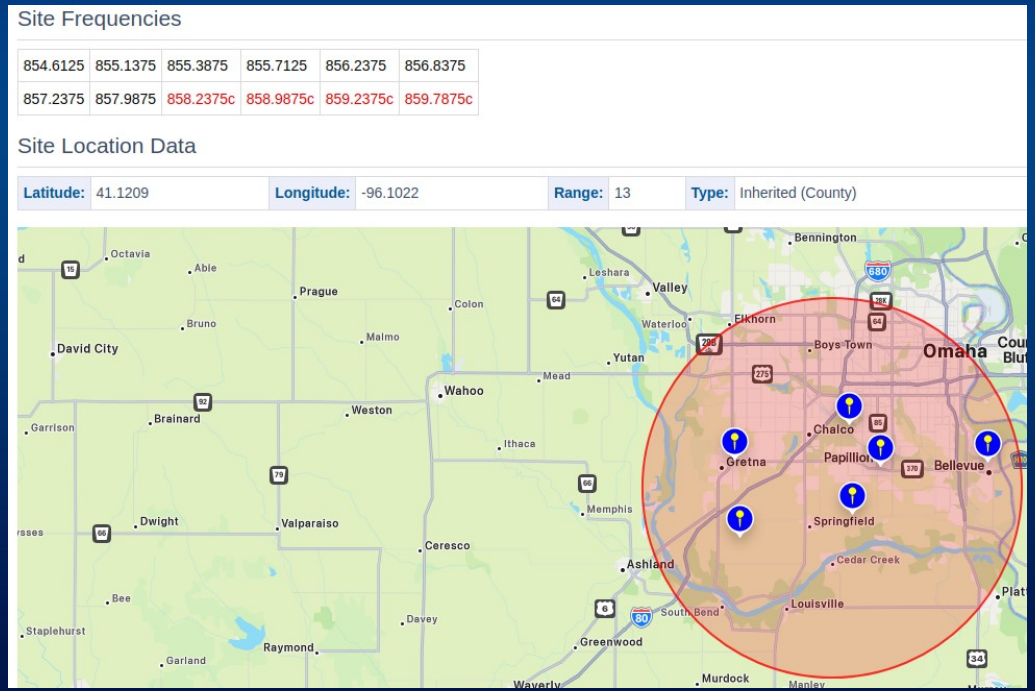


DEC	HEX	Mode	Alpha Tag	Description
4	004	TE	OPD W Disp	West Dispatch
5	005	TE	OPD NW Disp	Northwest Dispatch
6	006	TE	OPD NE Disp	Northeast Dispatch
7	007	TE	OPD SE Disp	Southeast Dispatch
8	008	TE	OPD SW Disp	Southwest Dispatch
601	259	TE	OPD Info 601	Information (601)
681	2a9	D	OPD LE 8	Police 8
604	25c	D	OPD CIB	Criminal Investagations
605	25d	D	OPD CSI	Crime Scene
610	262	D	OPD 911 Law	911 - Police
611	263	D	OPD Event 1	Event 1

ORION Network

Trunked digital radio system

- 11 Counties use the ORION network (Douglas, Sarpy, Pottawattamie, Cass, Washington, Nemaha, Otoe, Pawnee, Richardson, Saunders, Dodge)
- Some antennas are simulcast (Sarpy's antenna also broadcasts Douglas transmissions)
- Radios can change talkgroups within the system. Papillion police can talk to Omaha police



Antenna at
Sarpy Courthouse

Trunking System Basics

- Systems have single control channel/frequency and multiple “voice” channels
- Uses P25 protocol (designed for public safety systems)
- Radios are synced to the control channel (downlink frequency)
- Control channel tells the radio which “voice” channel to use when broadcasting and listening on their TalkGroup
- Control channel also has an uplink frequency.
  When a radio is about to broadcast, it sends a request on the uplink frequency
  The control tells the radio which voice channel to use via the downlink frequency

Site Frequencies

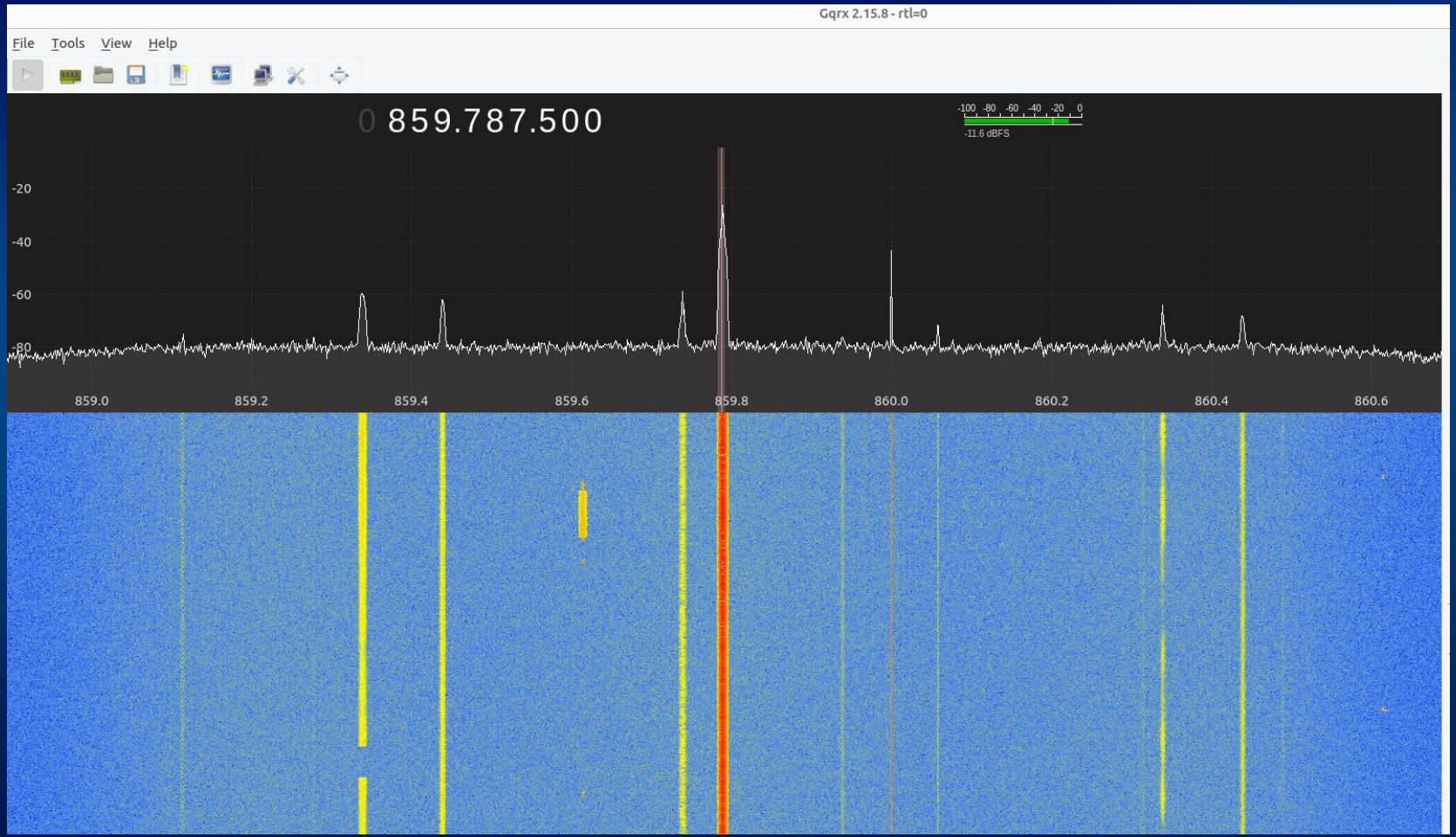
854.6125	855.1375	855.3875	855.7125	856.2375	856.8375
857.2375	857.9875	858.2375c	858.9875c	859.2375c	859.7875c

Red is control channel (and alternates), others are “voice” channels
Uplink channel is not listed (derived from downlink channel -45 MHz)

https://www.taitradioacademy.com/topic/introduction-to-p25-trunking-1/

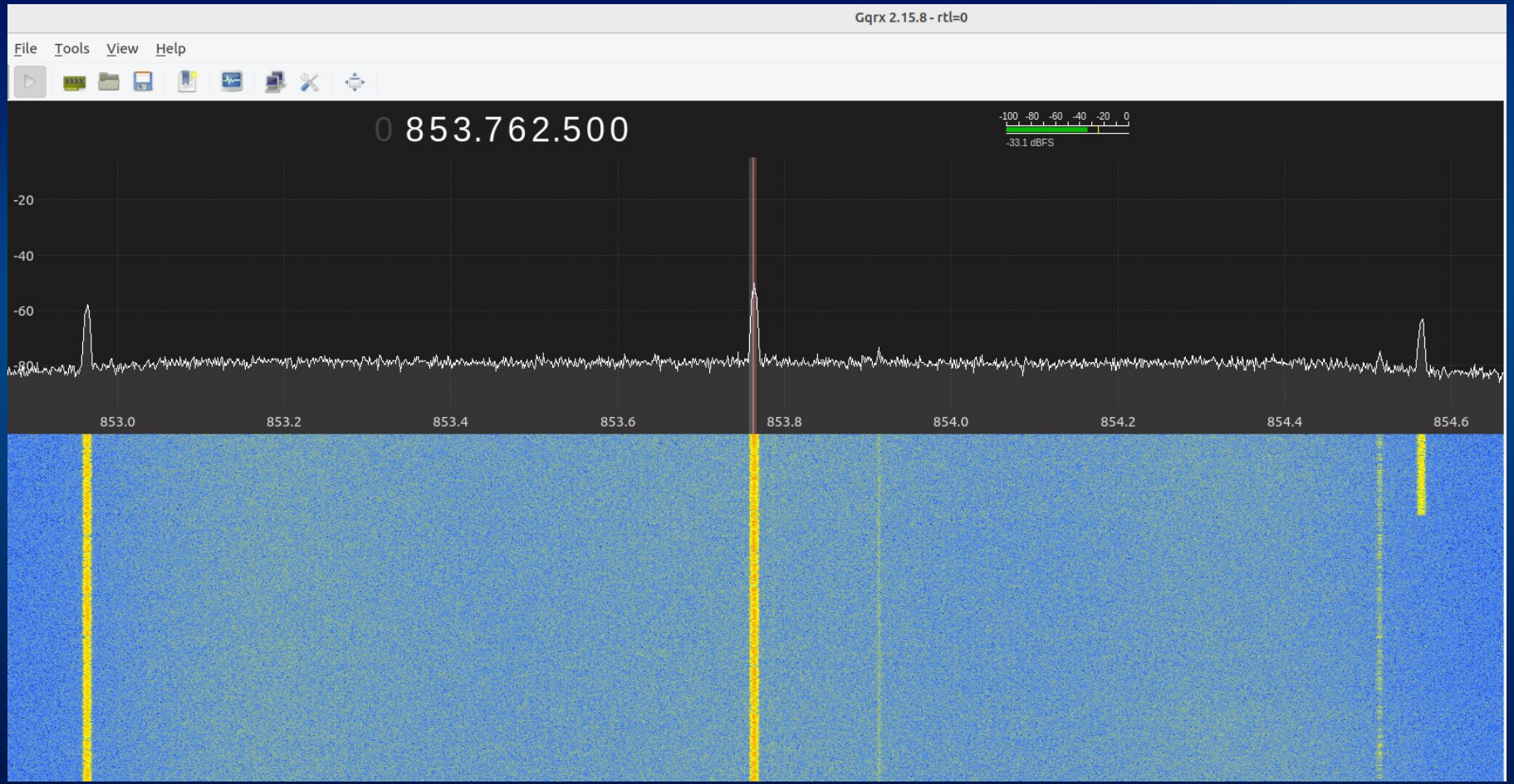
P25 Trunking System (GQRX waterfall)

Sarpy Control Channel. 0.5 mile away



P25 Trunking System (GQRX waterfall)

Douglas Control Channel. 6-7 miles away



Monitoring Techniques

Dispatch transmissions are uploaded & archived to Broadcastify (30 min delay)

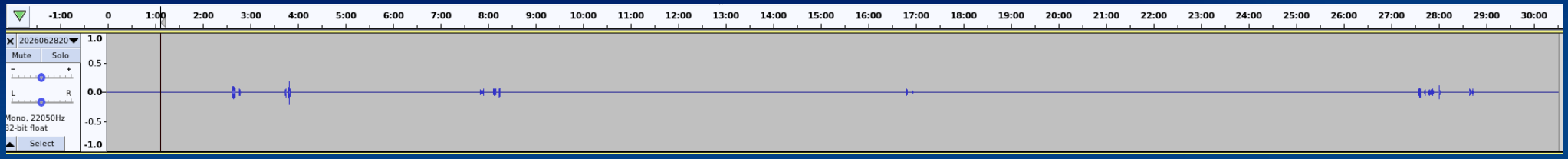
Live (delayed) feed is free, but accessing archives requires subscription (~$35/year)

Every time they modify their website, a new scraper has to be written

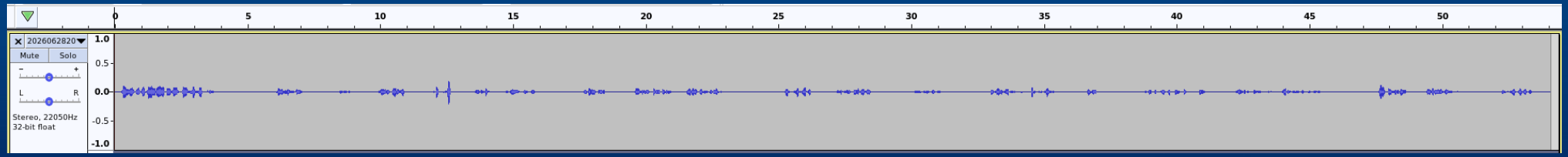
https://www.broadcastify.com/listen/feed/34786

Monitoring Techniques

Download mp3 files from Broadcastify
Remove periods of silence with linux SoX



sox infile outfile silence -l 1 0.1 0% -1 1.0 0%



Muffled audio and cop talk (e.g. phonetic alphabet) can confuse AI voice to text.
TrunkRecorder Discord has discussions about this; using chatGPT with Whisper

Current Broadcastify Scraper

Uses this API call to grab list of redirect links to MP3 files,
For feedID 34786 and archived sat June 11, 2026:
https://www.broadcastify.com/archives/api/archives.php?feedId=34786&date=06/11/2026

ChatGPT wrote user-friendly python script to download MP3 files

Even with Premium subscription, archive downloads are capped (200? downloads a day)

Audio Splitter

ChatGPT wrote python script with PyDub
to extract audio segments from MP3 file

Potential app: Transcribe relevant audio to text with WhisperAI. Extract address from text

Monitoring Live Transmissions

Requires 2 RTL-SDR dongles (2.5 MHz bandwidth)
1 dongle monitors the control channel, other dongle monitors the voice channel. Can only listen to one voice channel at a time, unless active voice channels are in the same 2.5 MHz bandwidth

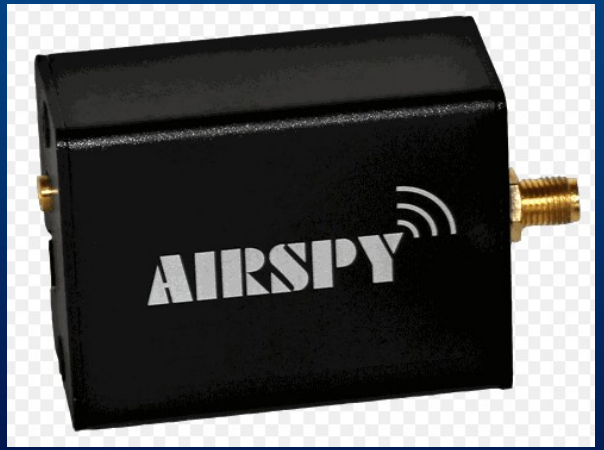
$55

https://www.rtl-sdr.com/buy-rtl-sdr-dvb-t-dongles/

Better hardware: AirSpy R2 has 10 MHz bandwidth.
If all voice channels & Control are in the same 10 MHz band, AirSpy can record it all

$170

https://itead.cc/product/airspy/

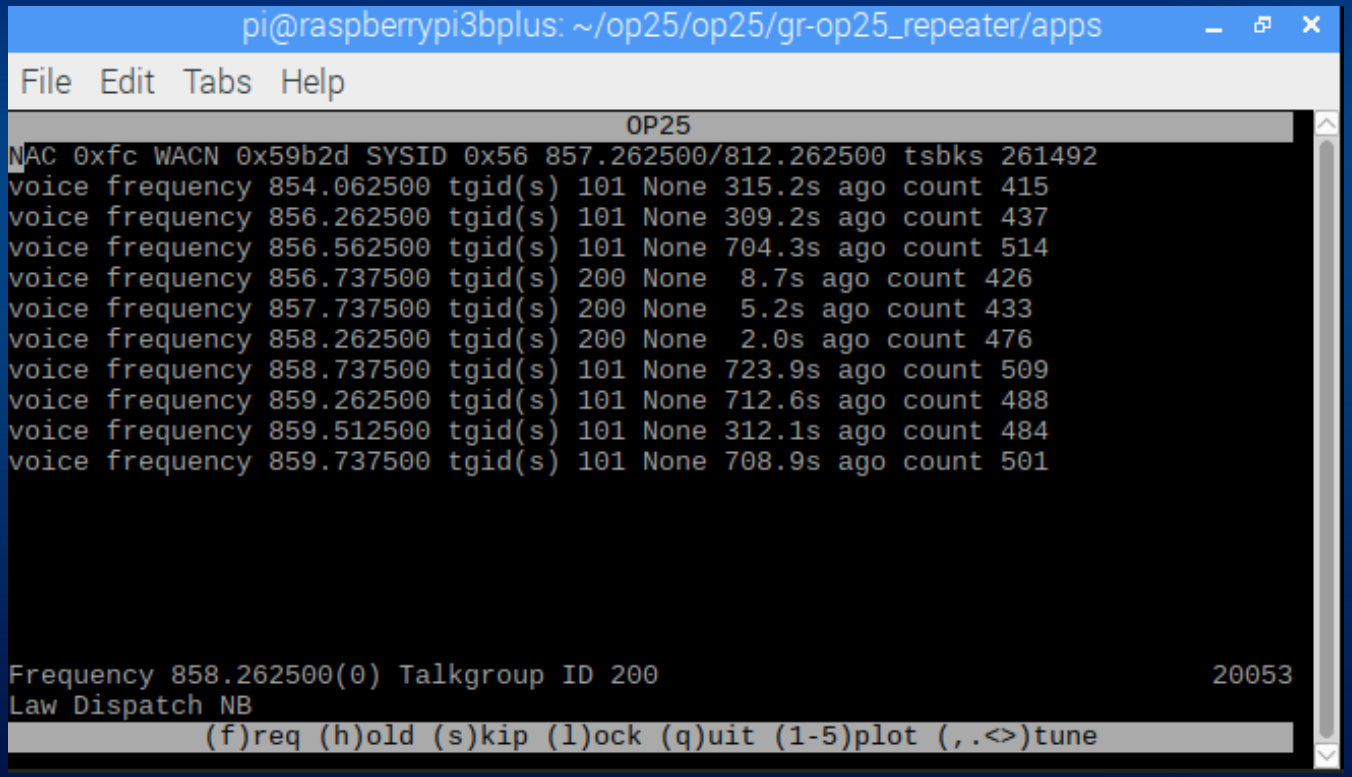


Monitoring Live Transmissions

OP25 software

https://github.com/boatbod/op25

Simple P25 trunk decoder. Linux, command line, minimal display, minimal resources, minimal metadata (no log files, no “length of call”, encrypted calls ignored)

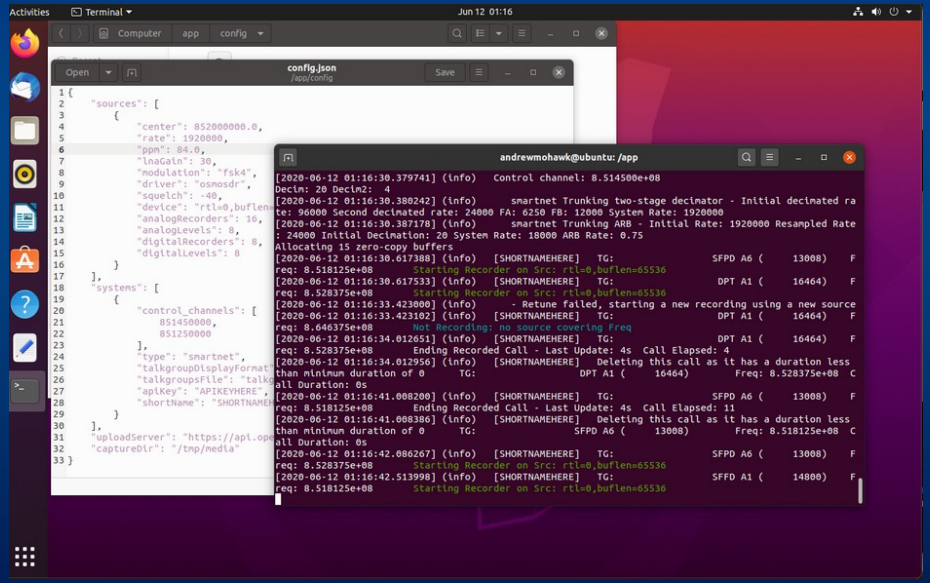


Monitoring Live Transmissions
Trunk-Recorder

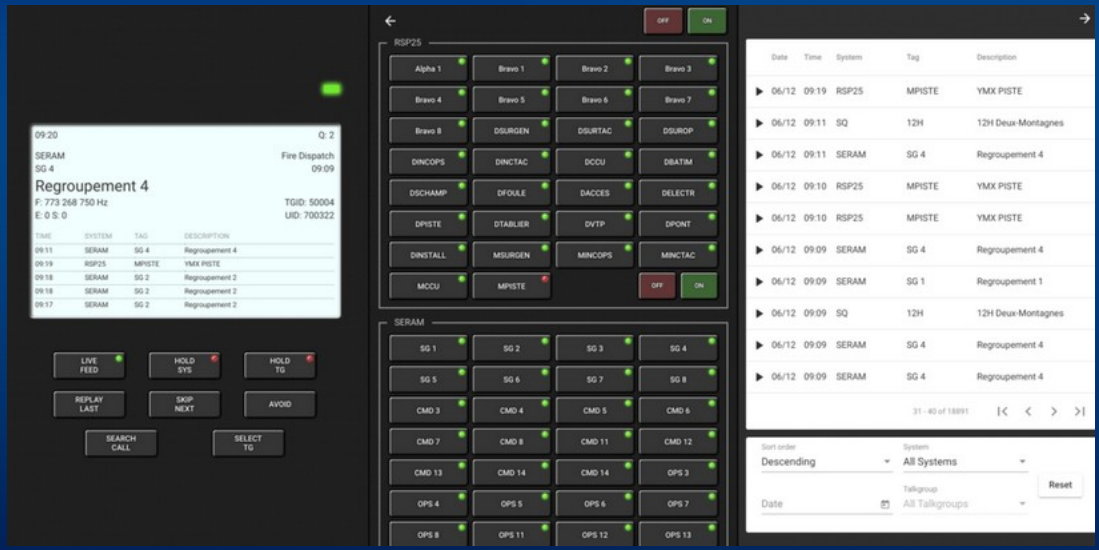
https://github.com/TrunkRecorder/trunk-recorder

Requires editing several config files. Command line linux
Text output, but GUIs available. Can record web feeds also (Broadcastify)

Most popular, most documentation, Discord channel



https://andrewmohawk.com/2020/06/12/trunked-radio-a-guide/



https://www.rtl-sdr.com/rdio-scanner-a-web-based-ui-for-trunk-recorder/

Monitoring Live Transmissions
SDRTrunk

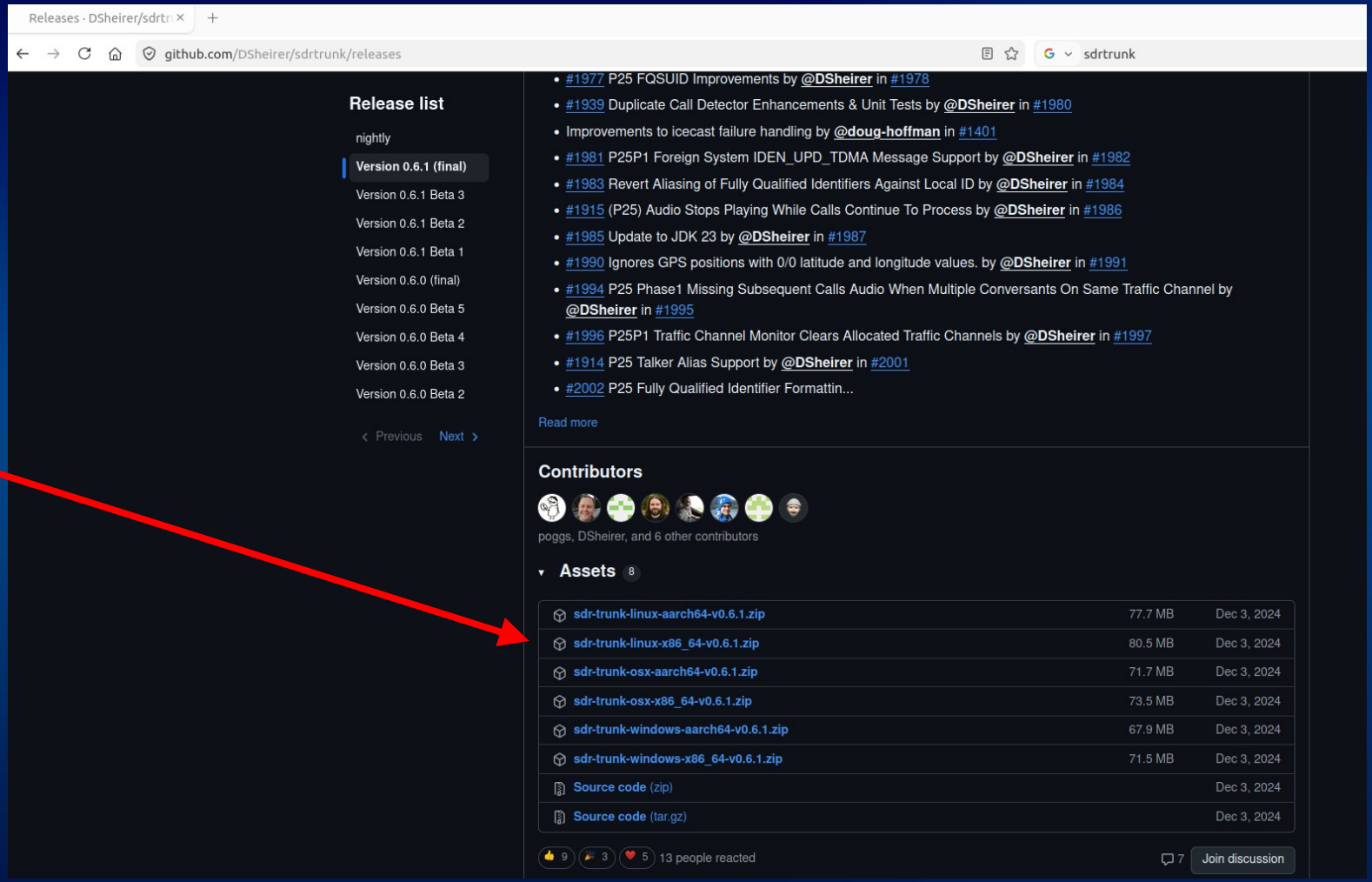
https://github.com/DSheirer/sdrtrunk

Java based GUI. Not-so-easy setup, few guides available
Lots of log files and metadata

Good install video: SignalsEverywhere channel: https://www.youtube.com/watch?v=UBrfqLc0E2U

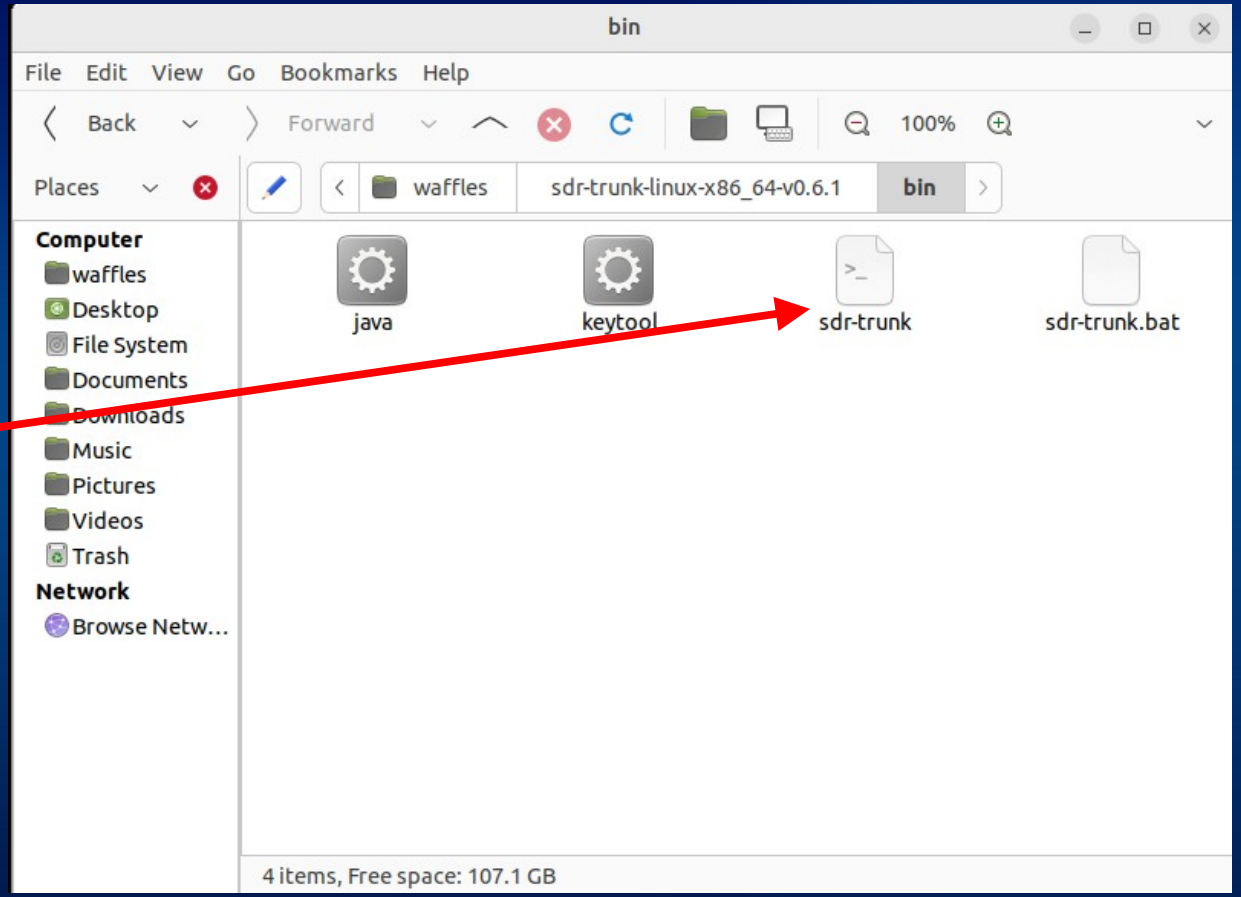
SDRTrunk setup

Download zip from Github Releases page (Assets)



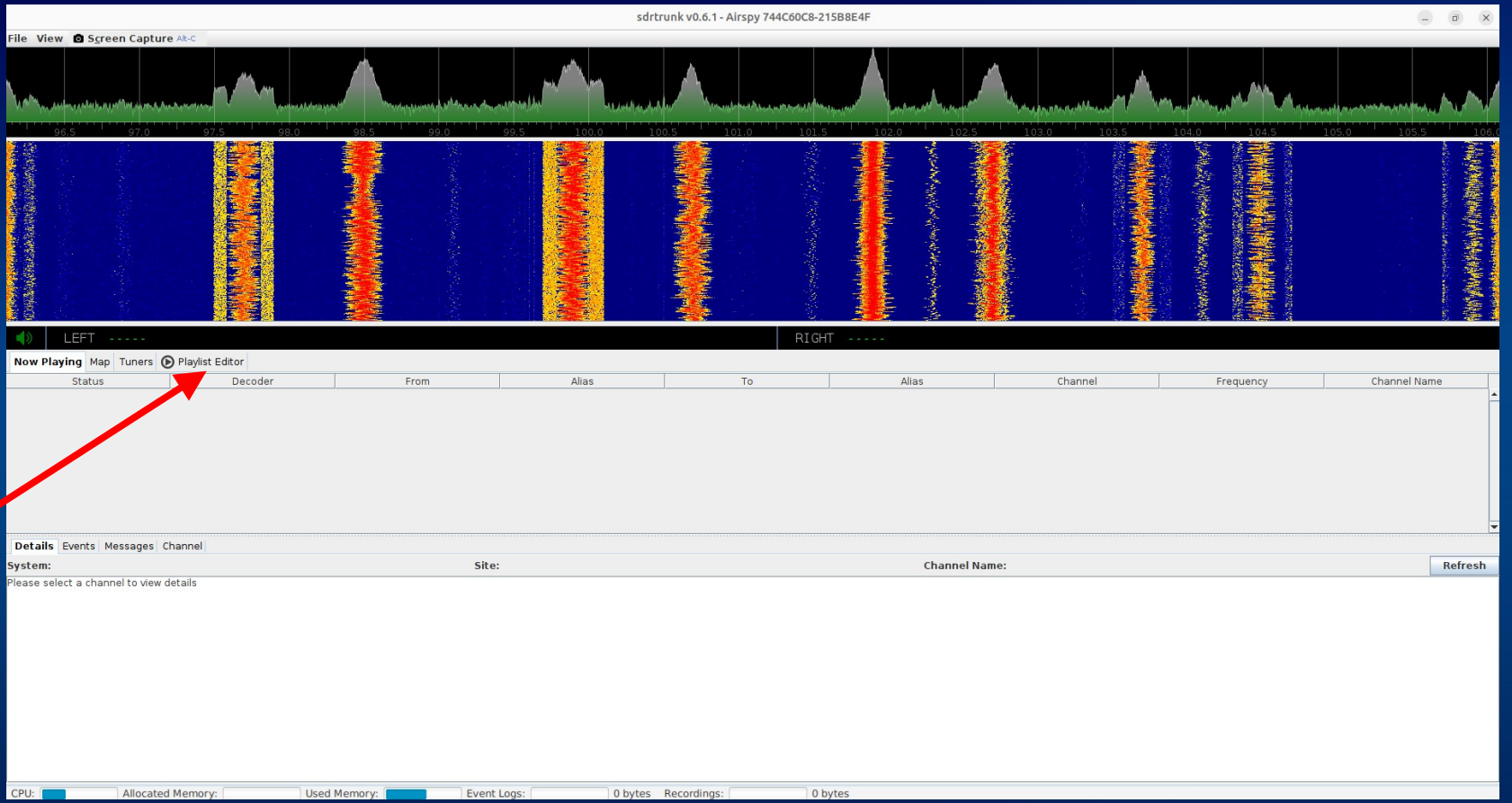
SDRTrunk Setup

Unzip. Navigate to Bin directory
Run the sdr-trunk binary



SDRTrunk Setup

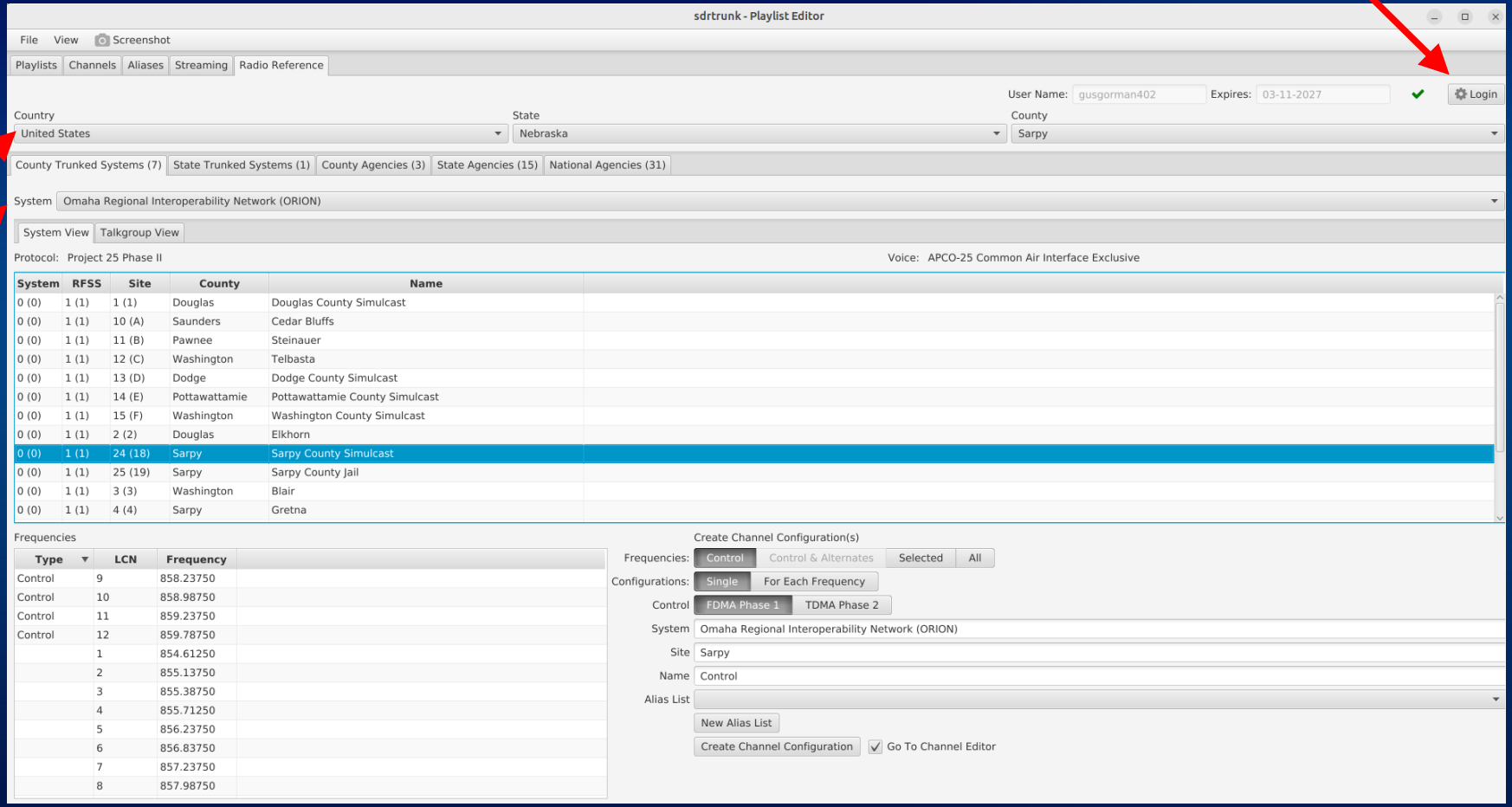
Select
Playlist Editor



SDRTrunk Setup

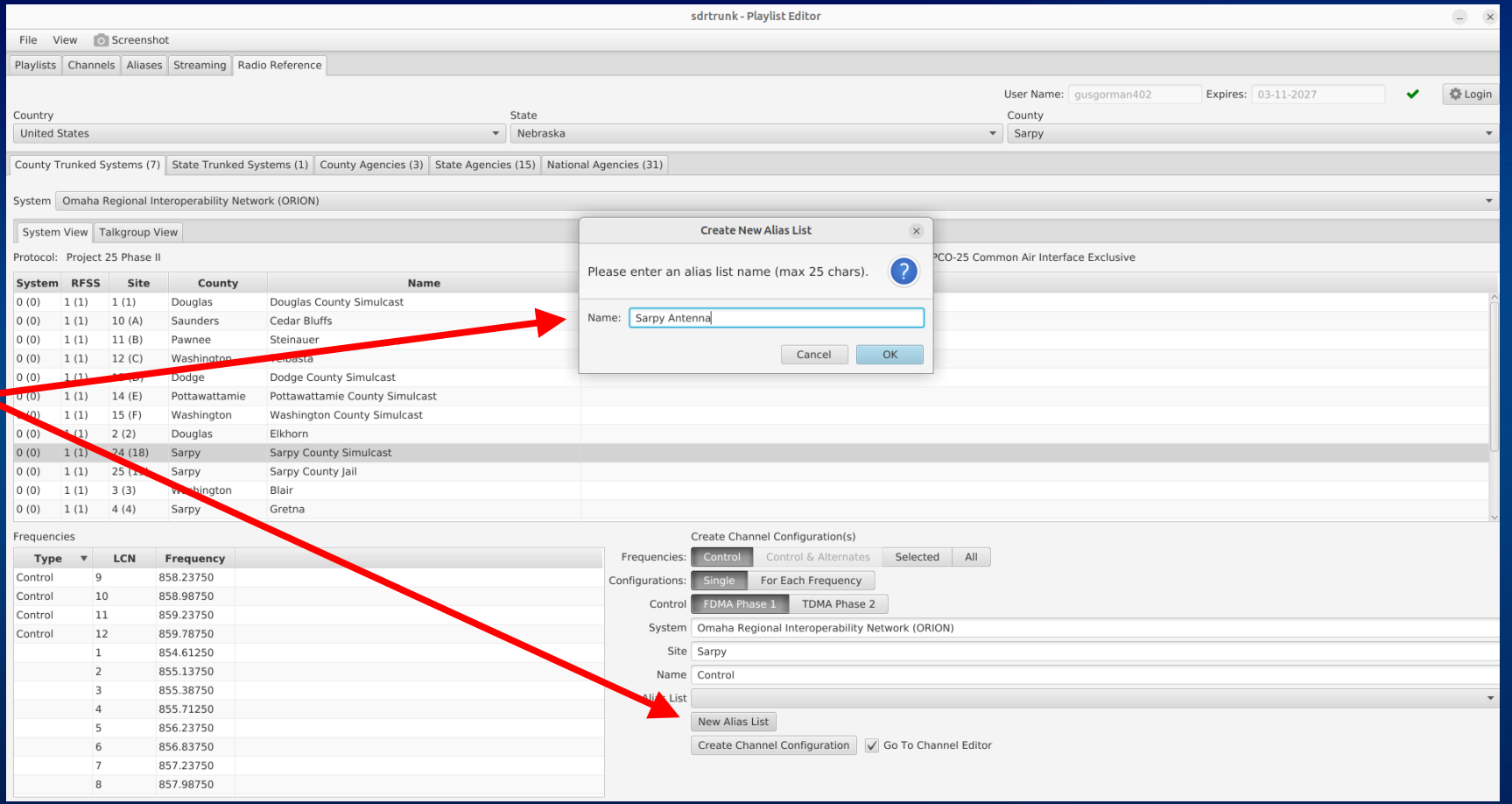
Login to Broadcastify first

Select county,
Radio system,
Antenna site



SDRTrunk Setup

Create/name
New Alias List

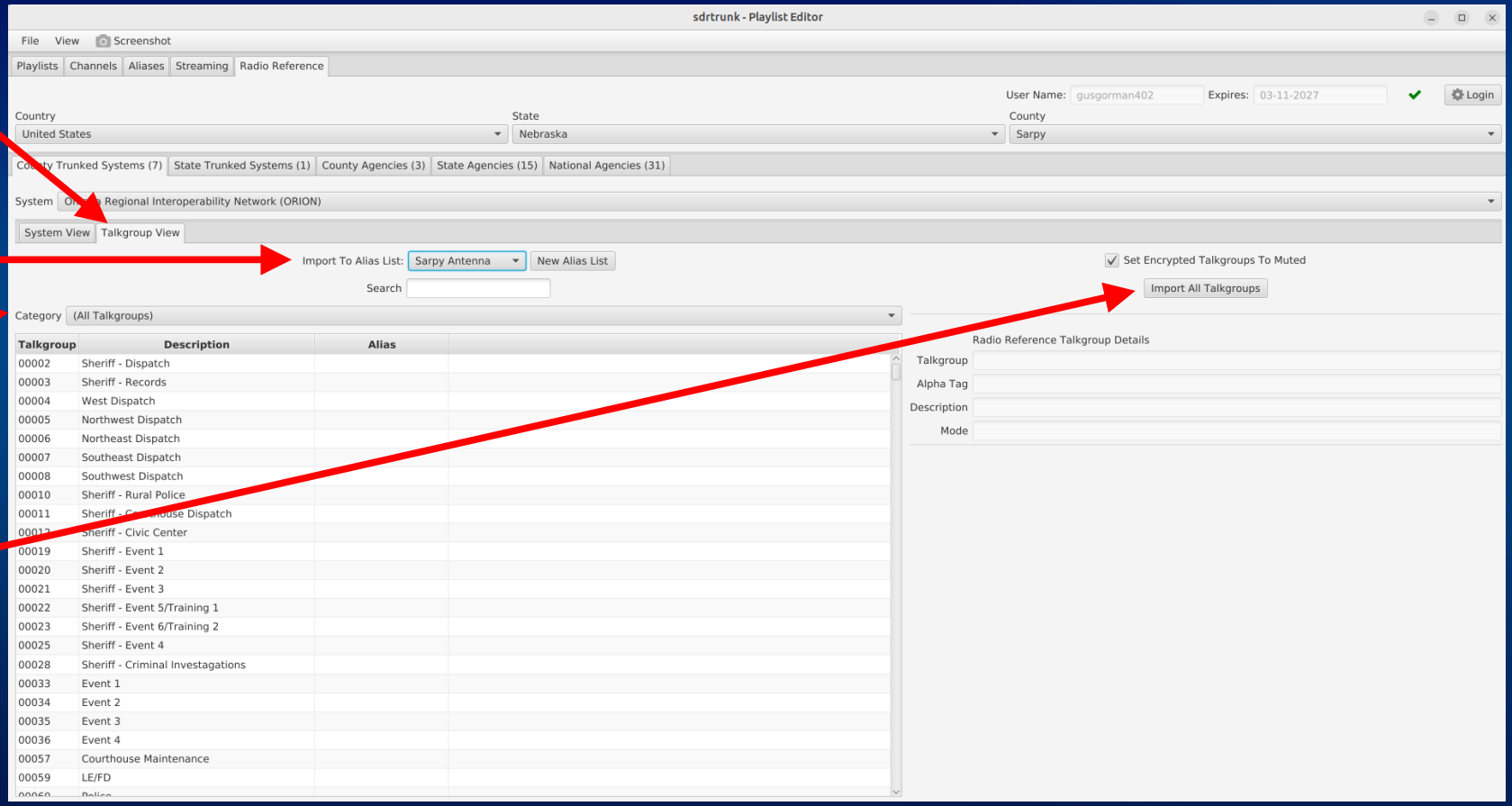


SDRTrunk Setup

Select “Talkgroup View”

Select your Alias list,
Select Talkgroups
You’re interested in
(I select All)

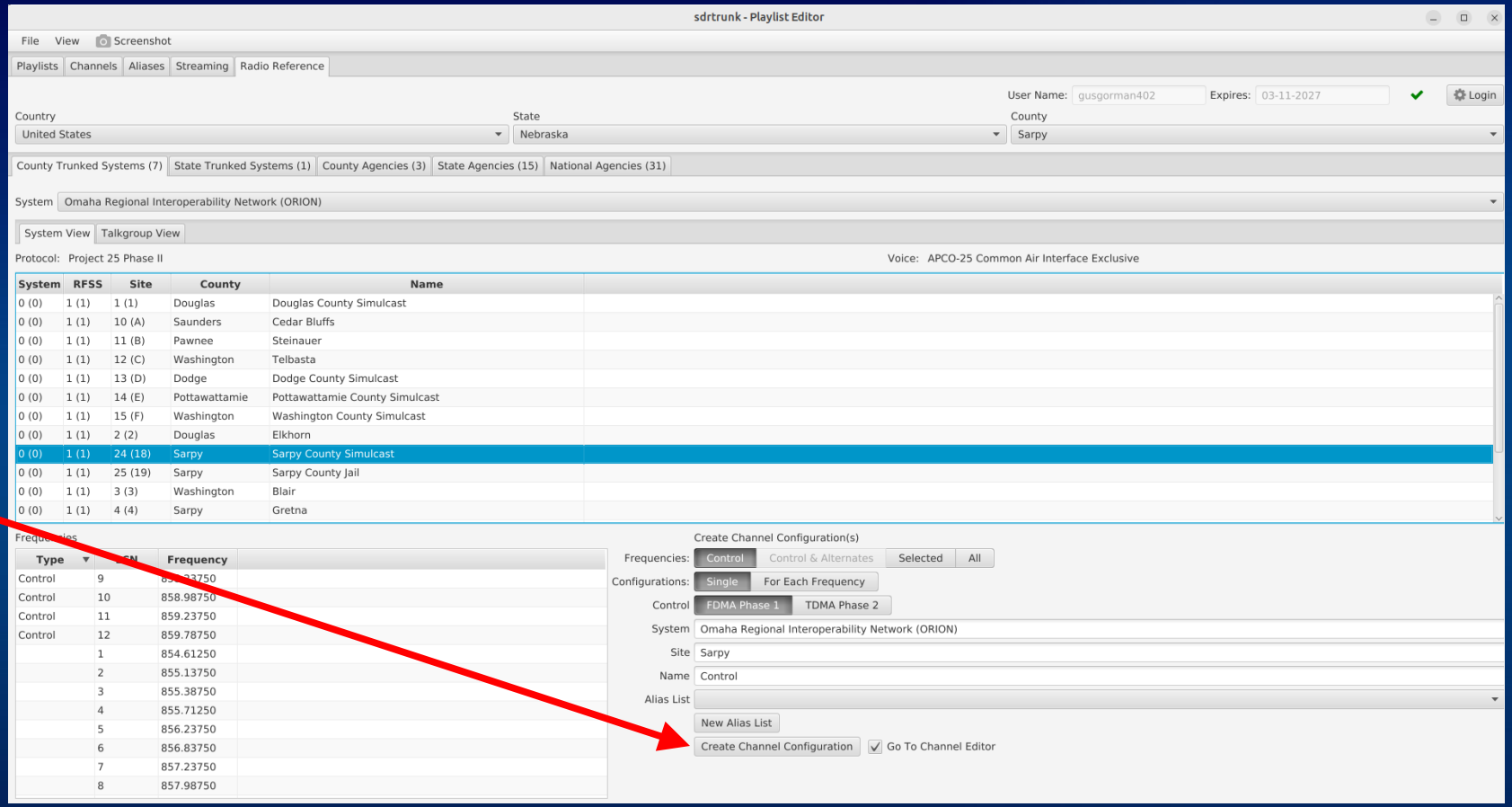
Import Talkgroups
To your Alias List



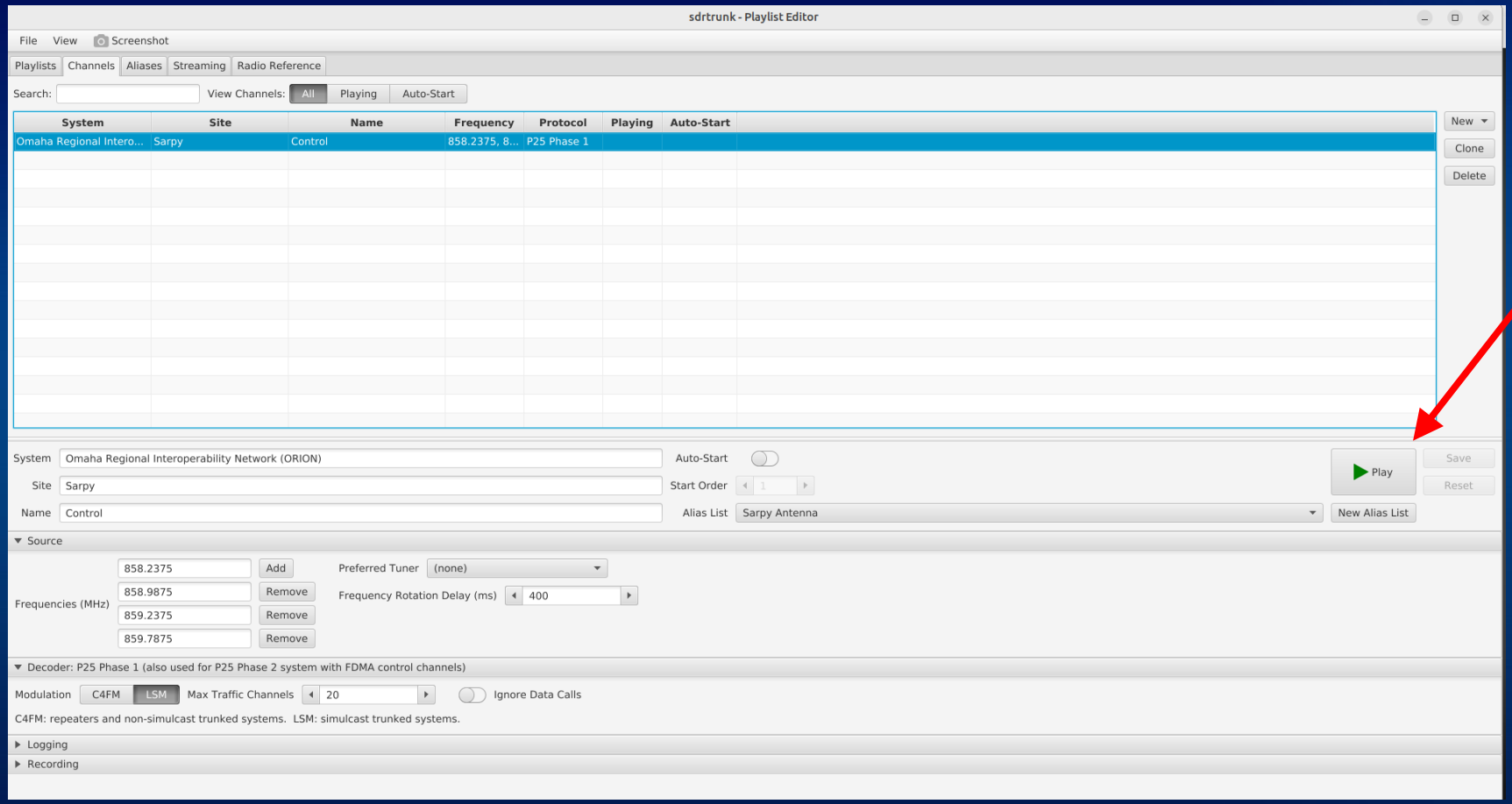
SDRTrunk Setup

After importing Talkgroups, Return to System View tab.

Create Channel Configuration



SDRTrunk Setup



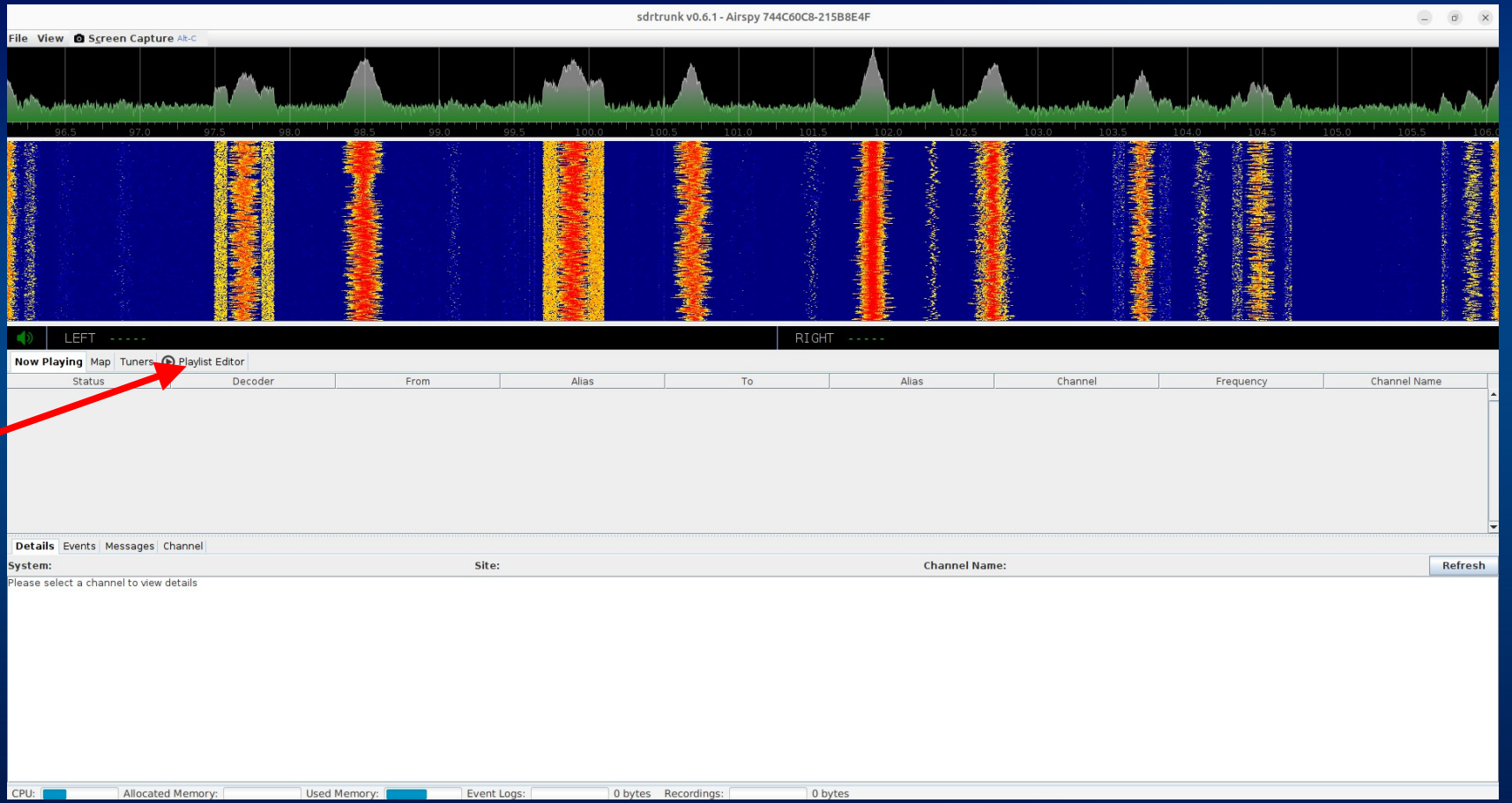
Play button
Will load channels
Into SDRTrunk
GUI

After hitting Play
Button, you can close
Playlist Editor window

SDRTrunk

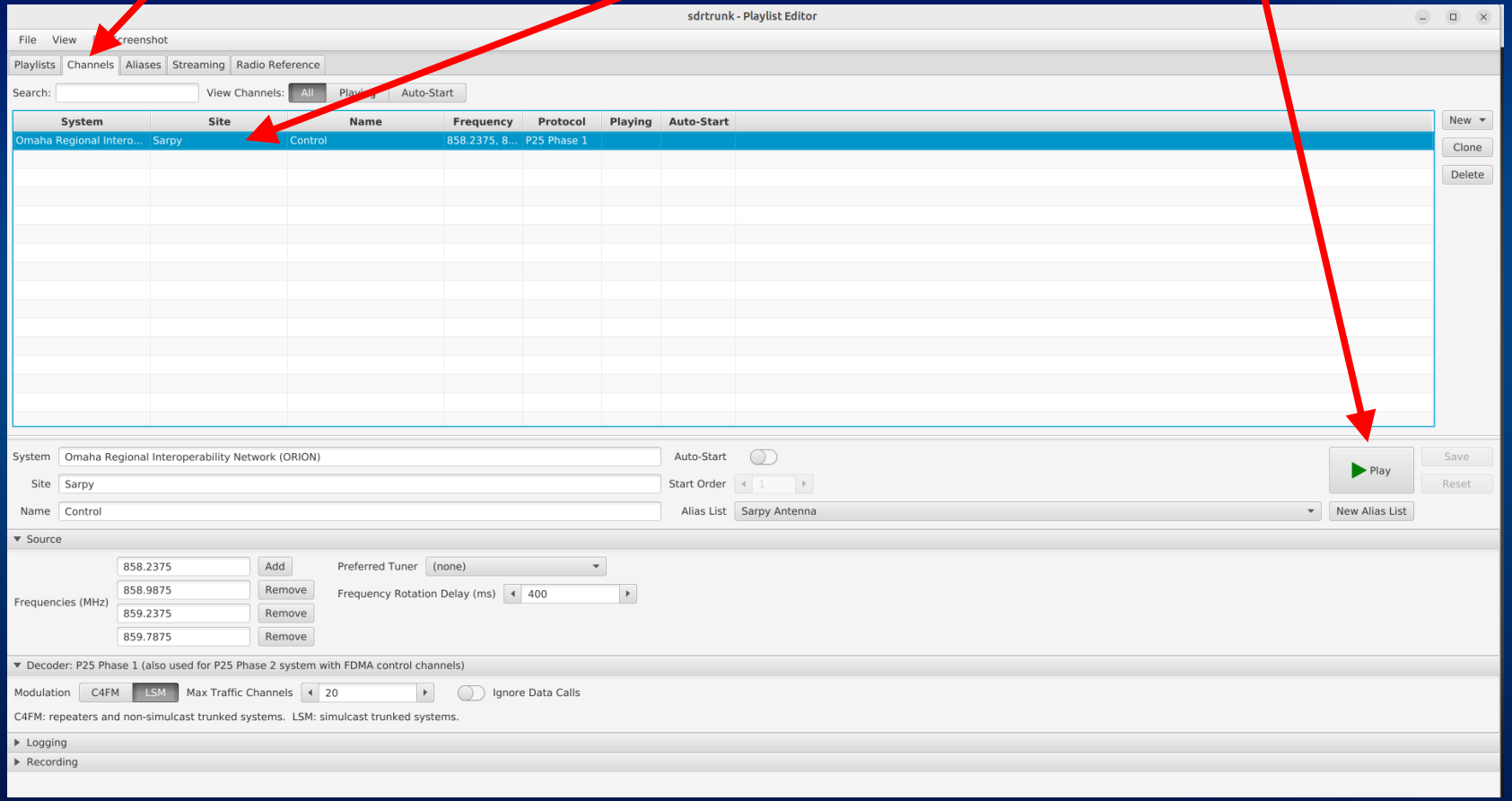
After setup, every time you run SDRTrunk

Select Playlist Editor



SDRTrunk

Select Channels Tab. Then select your imported network. Then hit Play. Then close window



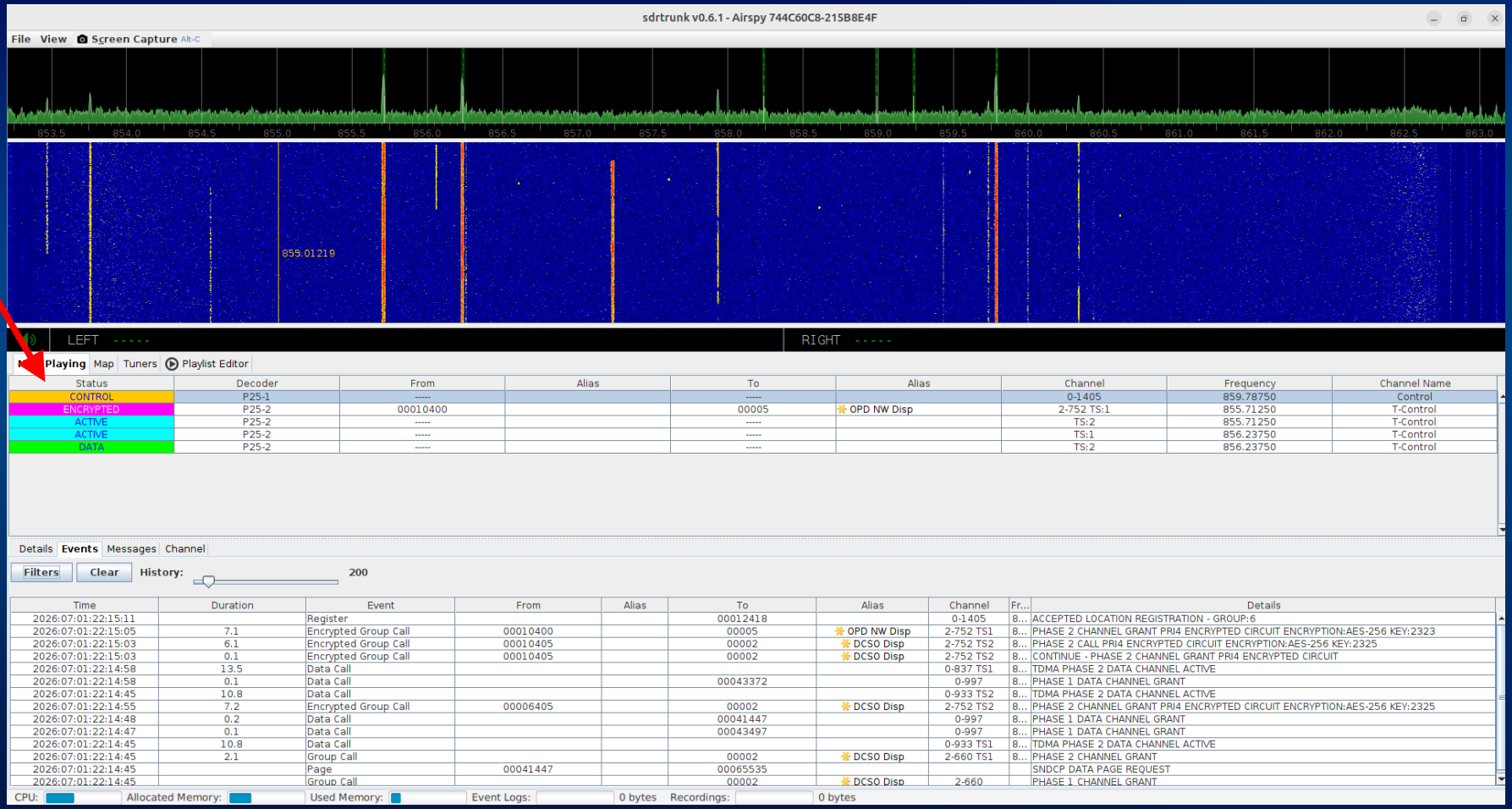
SDRTrunk

Broadcasts

I usually select Control channel

Metadata

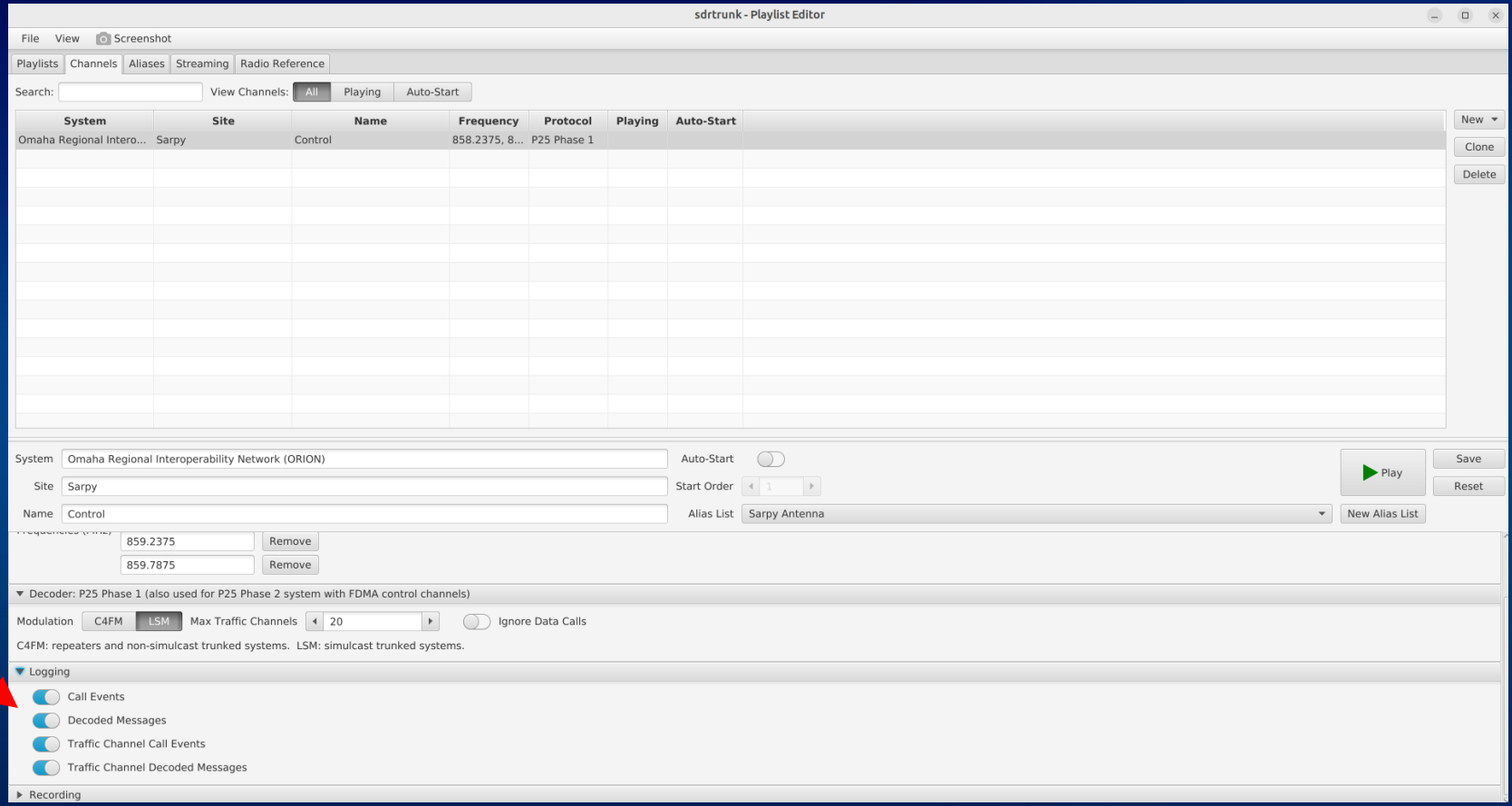
I usually select Events tab



SDRTrunk Logs

In PlayList Editor, Channels

Turn on Logging



SDRTrunk Log Files

Sometimes the Log format changes with version changes,
Have to rewrite the scraper. Default location is home dir /SDRTrunk/event_logs

Log files are created for every call event. LOTS of log files thru-out the day.

But we are only interested in Control channel log

```
waffles@junco:~/SDRTrunk/event_logs$ ls -lh
total 2.1M
-rw-rw-r-- 1 waffles waffles 362K Jul  1 22:59 20260701_225756.055_0_Hz_Control_call_events.log
-rw-rw-r-- 1 waffles waffles 452K Jul  1 22:59 20260701_225756.055_0_Hz_Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles  251 Jul  1 22:58 20260701_225758.621_855712500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles 150K Jul  1 22:58 20260701_225758.622_855712500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles   96 Jul  1 22:57 20260701_225758.678_856237500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles 518K Jul  1 22:59 20260701_225758.678_856237500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles  638 Jul  1 22:58 20260701_225807.962_857237500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles  45K Jul  1 22:58 20260701_225807.963_857237500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles   96 Jul  1 22:58 20260701_225808.379_855137500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles  92K Jul  1 22:58 20260701_225808.379_855137500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles   96 Jul  1 22:58 20260701_225836.175_855387500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles 148K Jul  1 22:58 20260701_225836.175_855387500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles  346 Jul  1 22:58 20260701_225838.061_857987500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles 9.7K Jul  1 22:58 20260701_225838.061_857987500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles   96 Jul  1 22:58 20260701_225838.473_855712500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles  27K Jul  1 22:58 20260701_225838.473_855712500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles  214 Jul  1 22:58 20260701_225843.110_857237500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles  87K Jul  1 22:59 20260701_225843.110_857237500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles   96 Jul  1 22:58 20260701_225843.725_855137500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles 111K Jul  1 22:59 20260701_225843.725_855137500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles   96 Jul  1 22:59 20260701_225908.175_855712500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles  23K Jul  1 22:59 20260701_225908.175_855712500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles  251 Jul  1 22:59 20260701_225912.320_855387500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles  48K Jul  1 22:59 20260701_225912.320_855387500_Hz_T-Control_decoded_messages.log
-rw-rw-r-- 1 waffles waffles   96 Jul  1 22:59 20260701_225916.610_857237500_Hz_T-Control_call_events.log
-rw-rw-r-- 1 waffles waffles 2.2K Jul  1 22:59 20260701_225916.610_857237500_Hz_T-Control_decoded_messages.log
waffles@junco:~/SDRTrunk/event_logs$
```

SDRTrunk Control Channel Log

Time of call. Length of Call. Talkgroup. RadioID, etc.

```
TIMESTAMP,DURATION_MS,PROTOCOL,EVENT,FROM,TO,CHANNEL_NUMBER,FREQUENCY,TIMESLOT,DETAILS,EVENT_ID
"2026:07:01:22:57:58","","APCO-25","Group Call","","[OPD SE Disp] (7)","2-753","0.000000","","PHASE 1 CHANNEL GRANT ","1412640812"
"2026:07:01:22:57:58","","APCO-25","Group Call","","[SarpyCo LE EastE] (4202)","2-752","0.000000","","PHASE 1 CHANNEL GRANT ","602983270"
"2026:07:01:22:57:58","","APCO-25","Group Call","","[OPD SE Disp] (7)","2-752 TS2","855.712500","TS:2","PHASE 2 CHANNEL GRANT ","1830790883"
"2026:07:01:22:57:58","","APCO-25","Group Call","","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","","APCO-25","Data Call","","","0-837","856.237500","TS:1","TDMA PHASE 2 DATA CHANNEL ACTIVE","1219771943"
"2026:07:01:22:57:58","","APCO-25","Data Call","","","0-837","856.237500","TS:1","TDMA PHASE 2 DATA CHANNEL ACTIVE","1219771943"
"2026:07:01:22:57:58","307","APCO-25","Group Call","","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","307","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","298","APCO-25","Group Call","","[OPD SE Disp] (7)","2-752 TS2","855.712500","TS:2","PHASE 2 CHANNEL GRANT ","1830790883"
"2026:07:01:22:57:58","340","APCO-25","Data Call","","","0-837","856.237500","TS:1","TDMA PHASE 2 DATA CHANNEL ACTIVE","1219771943"
"2026:07:01:22:57:58","340","APCO-25","Data Call","","","0-837","856.237500","TS:1","TDMA PHASE 2 DATA CHANNEL ACTIVE","1219771943"
"2026:07:01:22:57:58","455","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","455","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","455","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","506","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","506","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","630","APCO-25","Group Call","","[OPD SE Disp] (7)","2-752 TS2","855.712500","TS:2","PHASE 2 CHANNEL GRANT ","1830790883"
"2026:07:01:22:57:58","655","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","655","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","755","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","755","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","755","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","677","APCO-25","Data Call","","","0-837","856.237500","TS:1","TDMA PHASE 2 DATA CHANNEL ACTIVE","1219771943"
"2026:07:01:22:57:58","677","APCO-25","Data Call","","","0-837","856.237500","TS:1","TDMA PHASE 2 DATA CHANNEL ACTIVE","1219771943"
"2026:07:01:22:57:58","905","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","905","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","979","APCO-25","Group Call","","[OPD SE Disp] (7)","2-752 TS2","855.712500","TS:2","PHASE 2 CHANNEL GRANT ","1830790883"
"2026:07:01:22:57:58","1005","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","1005","APCO-25","Group Call","41003","[SarpyCo LE EastE] (4202)","2-752 TS1","855.712500","TS:1","PHASE 2 CHANNEL GRANT ","1444830408"
"2026:07:01:22:57:58","978","APCO-25","Data Call","","","0-837","856.237500","TS:1","TDMA PHASE 2 DATA CHANNEL ACTIVE","1219771943"
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```
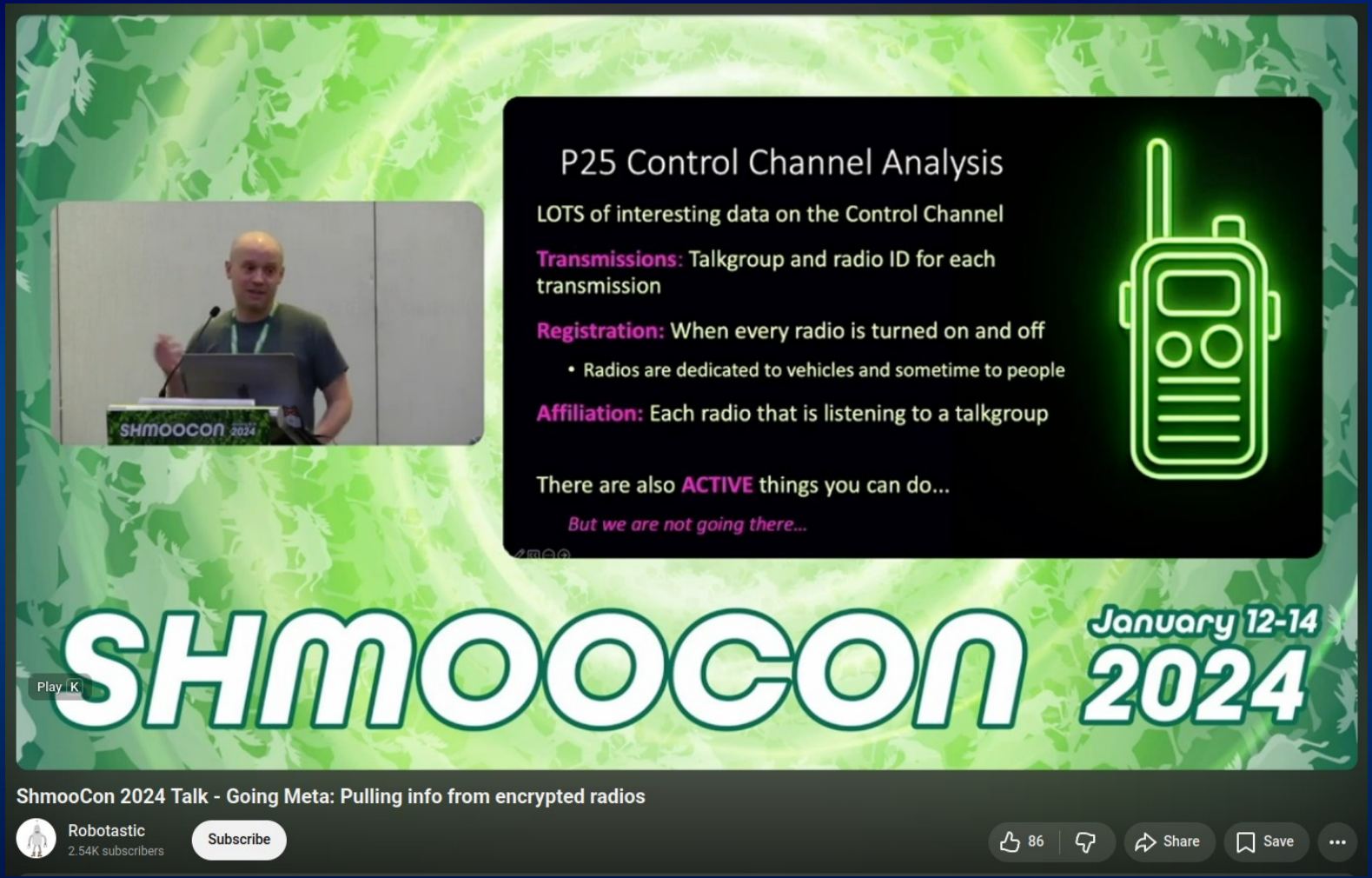

Inspired by SchmooCon 2024 Talk



Metadata Analysis

- Encryption prevents us from hearing WHAT is happening

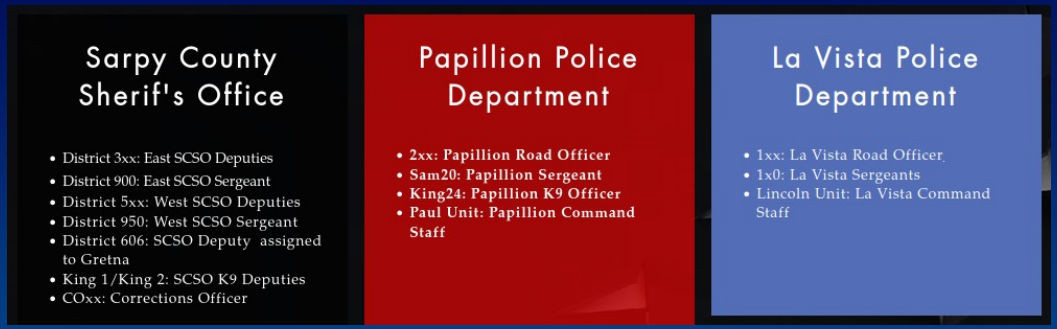
- Based on time & length of call, active Talkgroup, and active RadioID’s, We can still infer WHO and WHEN

- Using Broadcastify feeds, can we eventually associate RadioID’s to their specific radios. Dispatch, squad cars, SWAT (ERU), Helicopter, etc.

- If SWAT or the helicopter starts broadcasting, we know something exciting (news worthy) is happening. Python can send alert if TG of interest becomes active

- When Mutual Aid, Metro, or “Common” talkgroups become active, usually means multiple agencies working together (e.g. pursuit)

Voice Callsigns & Terminology help us associate RadioID to its broadcaster



Omaha Scanner
https://www.nossmedia.com/sarpy-county-police-agencies

Parse the log file for relevant info

Linux-fu: tail -fn0 logfile.log | grep or python script
to analyze live log files

I’m only interested in West Sarpy calls, Papillion (less radio traffic)

tail -fn0 control.log | grep -E ‘SarpyCO LE West|Papillion|Lavista’ | python radioID.py

Sarpy West Dispatch RadioID’s: 41004 - 41008

Alert if Sarpy West Dispatch broadcasts, Papillion and Lavista responses

```
import sys
from datetime import datetime

callid_dict = {}
f = open("sarpy_log.txt", "w")

while(s := input()):
    #print(s)
    s = s.replace('"','')
    call_data = s.split(',')
    #print(call_data[4])
    radio = call_data[4]
    if call_data[10] not in callid_dict:
        print("\n*********************************************************************************\n")
        print("\n*********************************************************************************\n", file=f)
        callid_dict[call_data[10]] = 1
    match radio:
        case '41004' | '41001' | '41002' | '41003' | '41005' | '41006' | '41007' | '41008':
            radio = 'Dispatch'

        case '41446' | '41455' | '41476' | '41477' | '41483' | '41488' | '41491' | '42822' | '42826' | '42836'
 | '42850' | '42856' | '42876' | '42973' | '43021' | '43022' | '43024' | '43038' | '43039' | '43067' | '43068'
 | '43069' | '43094' | '42776':
            radio = 'PapioPD'

        case '42846' | '43423' | '42941' | '43031' | '41647' | '42985' | '43130' | '41673' | '41650' | '42252'
 | '41677':
            radio = 'LavistaPD'

    time_format = "%Y:%m:%d:%H:%M:%S"
    call_time = datetime.strptime(call_data[0], time_format)

    print(radio, call_data[1], call_data[5], call_time, call_data[10], sep=", ")
    print(radio, call_data[1], call_data[5], call_time, call_data[10], sep=", ", file=f)
```

Relevant (“news” worthy) Dispatch Calls

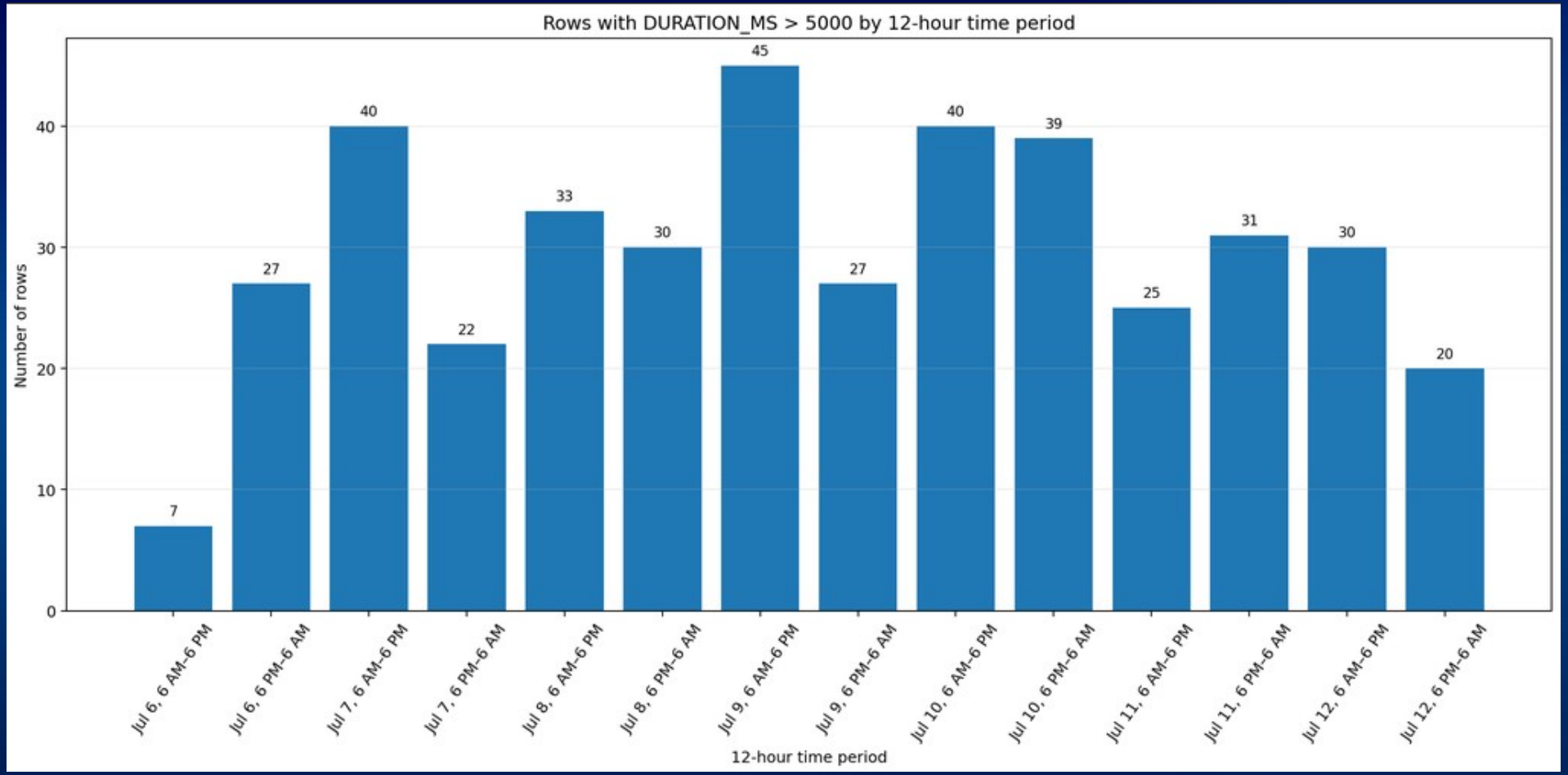
- Dispatch calls greater than 3-5 seconds are usually crime related; shorter calls are usually time announcements and ACKs (10-4)

- Python audio extractor appends length of audio to the new sound files. We can easily search for calls longer than 5 seconds

- Use WhisperAI to transcribe these to text

- This process is easier at night; less crime, less radio traffic

Dispatch “Calls” (greater than 5sec) per shift



Generated with SDRTrunk logs and ChatGPT

Physical Access Red Teaming (B&E)

- Conduct an operation during low radio traffic time-period (late nights)

- During the penetration, a few minutes after breaching the locks, if we see a live Dispatch call lasting longer than 5 seconds, and we see local police responding,
we can assume the call is for us, alarm was triggered

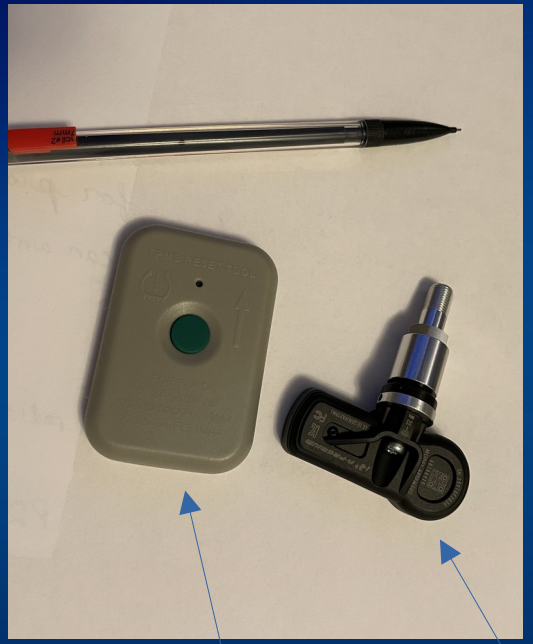
- But monitoring dispatch won’t protect us from wandering/patrolling squad cars, doing “business checks” and “special attention”

RF Proximity Detection

Tire Pressure Monitoring System

Majority of squad cars are Ford Explorers

- 315 MHz
- Only broadcasts every few minutes (2min?) when moving
- Every 6 hours when stationary
- Low signal strength, ~50 ft detection with a strong antenna
- rtl_433/src/devices/tpms_ford.c



Sensor reset tool (Needed to activate)

TPMS

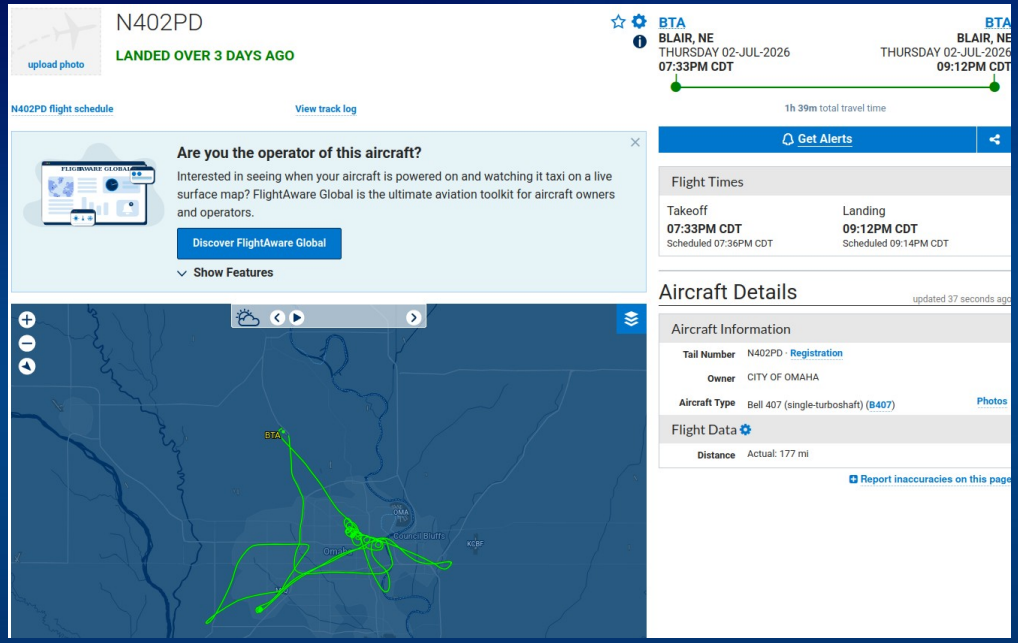
RF Proximity Detection

Helicopter

N402PD (Mode S Code: A4B558)

N240PD (A23148)

N340PD (A3BE97)



Flightaware can send alerts for departures

Live track with your own RTL-SDR & Dump1090
Or use online ADS-B trackers
https://www.adsbexchange.com/

RF Proximity Detection
Drones

- All drones in the US must broadcast OpenDroneID

- Real time telemetry; drone GPS location, operator's GPS location

- 4 different broadcast methods
Bluetooth Legacy Advertising (Bluetooth 4.x)
Bluetooth Long Range with Extended Advertising (Bluetooth 5.x)
Wi-Fi Neighbor-aware Network (Wi-Fi NaN)
Wi-Fi Beacon (vendor specific information element in the SSID beacon frame)

- Some android apps claim to scan for these signals
Specialized hardware or newer ESP32 can/could detect
- DroneTag RIDER (~$1000)

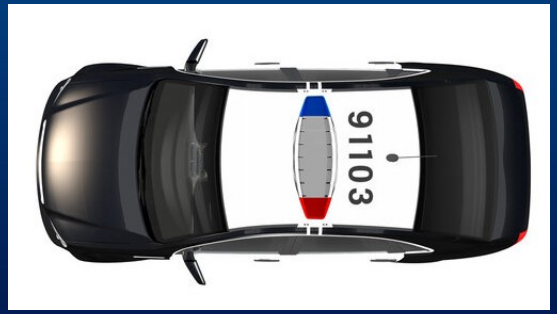
Drones & ALPR

- Use your own drones & AI for detecting squad cars in the area

"Vehicle detection in drone aerial views based on lightweight OSD-YOLOv10"
https://www.nature.com/articles/s41598-025-09825-y

- DIY (RasPi) License Plate readers at access roads

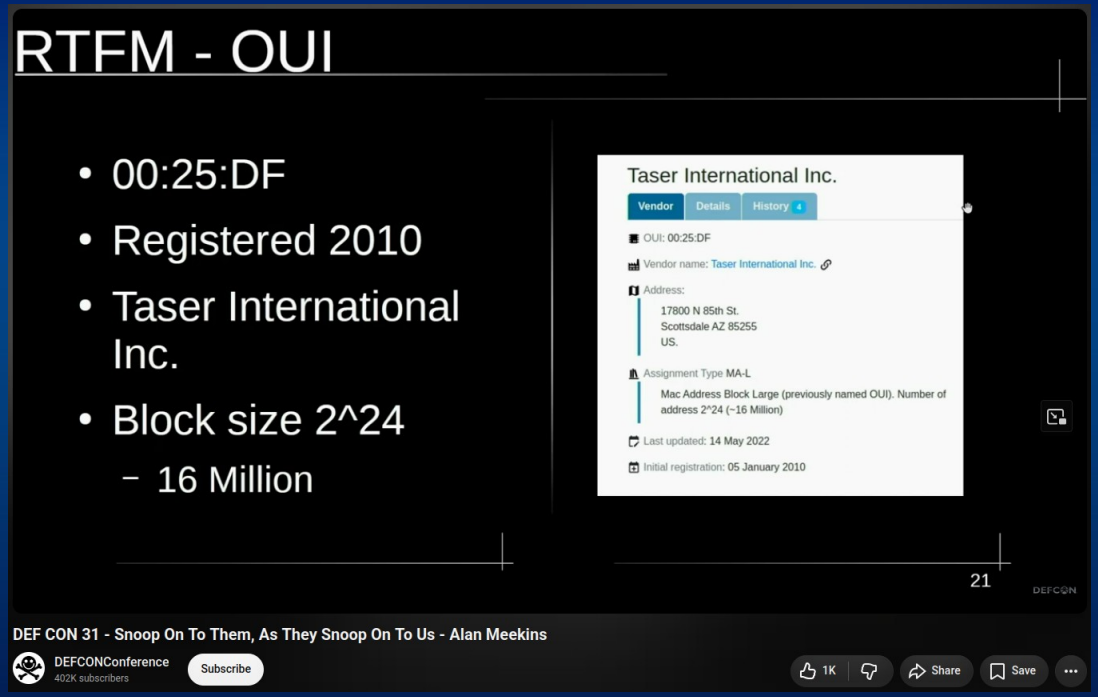
https://github.com/openalpr/openalpr
https://medium.com/@alexey.yeryomenko/automatic-number-plate-recognition-with-raspberry-pi-e1ac8a804c79



Car number usually listed on roof. Newer cars are more covert (all black)

RF Proximity Detection
Bluetooth

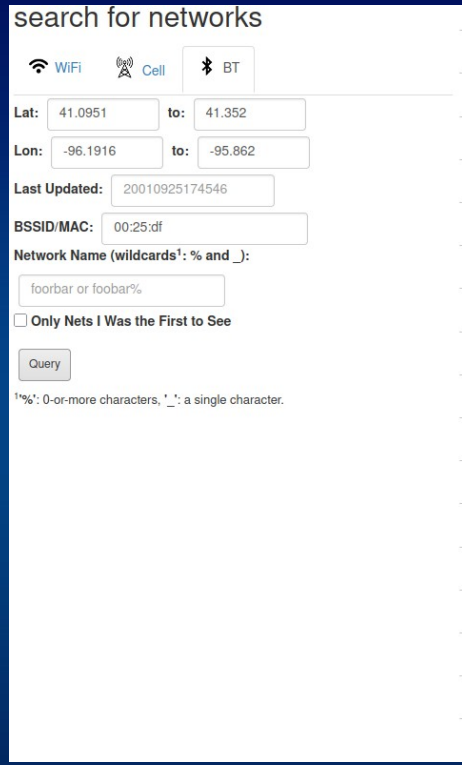
Inspired by DefCon31 talk, tracking Axon bluetooth signals
Axon cams, taser, gun holsters, etc, transmit BT signals

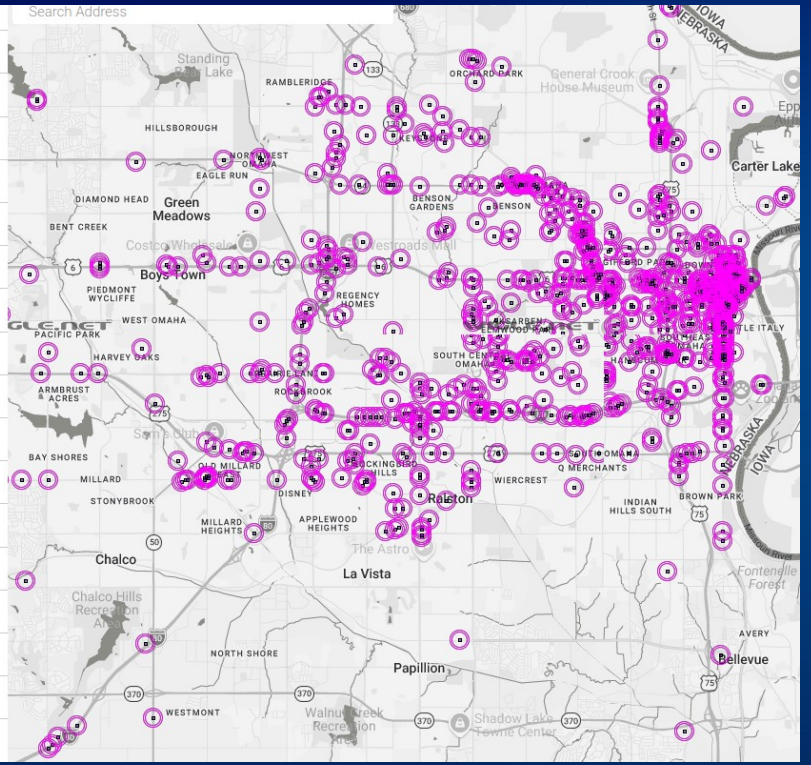


https://www.youtube.com/watch?v=cO1JSzAdPM8

RF Proximity Detection

Axon Bluetooth (OUI 00:25:DF) Wigle.net Android App





Bluetooth occasionally on. OPD uses it (detected several signals at CWS crowd)
Never detected from cruising Sarpy agencies

"Police advised to disable bluetooth on Axon body-worn cameras to avoid detection by criminals"

https://www.abc.net.au/news/2026-05-08/police-advised-turn-bodycams-to-flight-mode-over-security-flaw/106654330

RF Proximity Detection

Axon Scanning during CWS

```
waffles@junco:~/Desktop$ grep -a "00:25:df" WigleWifi_20260629165034.csv
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```
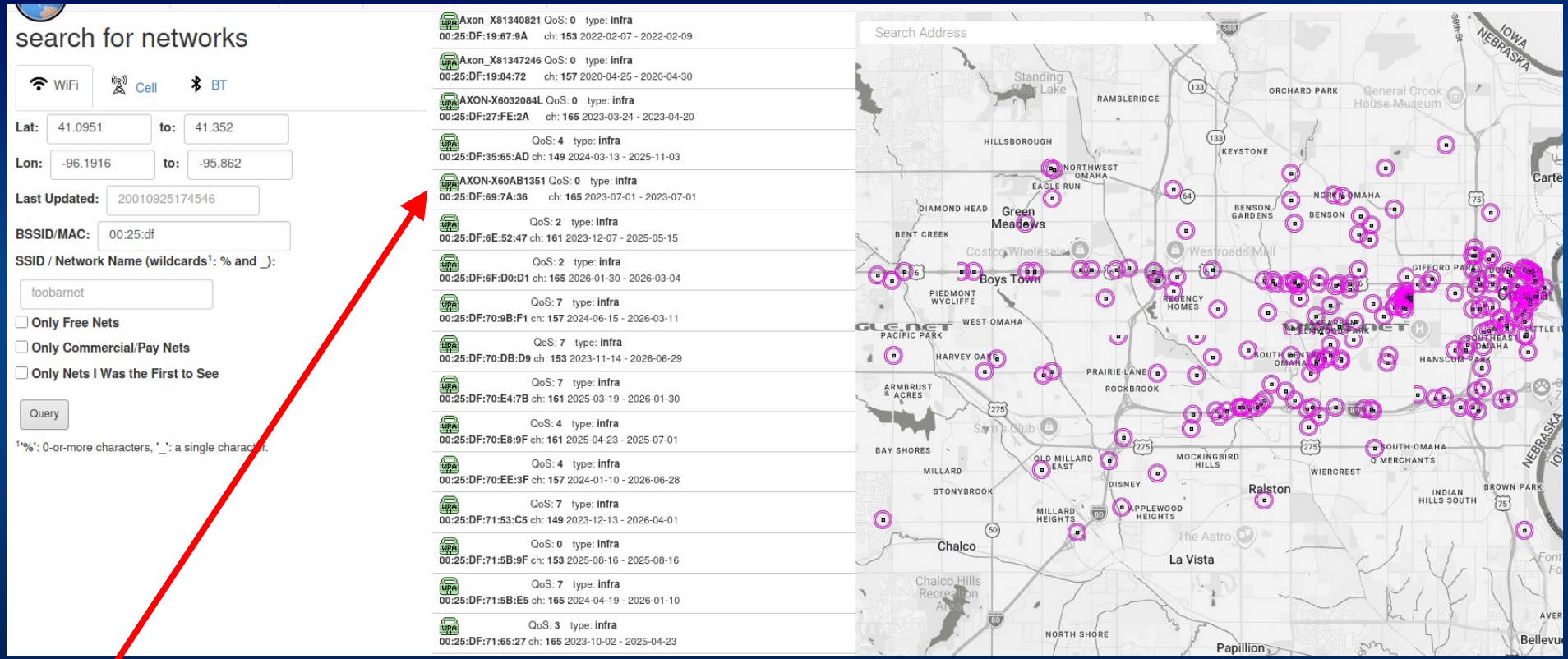

Wifi beacons with Axon OUI MAC???

RF Proximity Detection

Axon Wifi 5GHz (Broadcasting Hidden ESSID AP beacons)



Example: AXON-X60AB1351

Probably syncs to Axon mobile app for DL'ing videos

RF Proximity Detection

Wifi Signals

Build an Evil Twin AP that sends alerts when devices try to authenticate with it

- Wardrive the police department, scanning for wifi access points (ESSID beacons) emitting from the building

- Wardrive the police when they are out in public (e.g. the donut shop, crowded events) Scan for wifi probe requests emitting from their devices (especially if Dept uses Hidden ESSIDs)

- Use MDK4 to broadcast evil twin beacon list.* Second wifi adapter to sniff & alert when devices try to authenticate with evil twin AP (beacons)

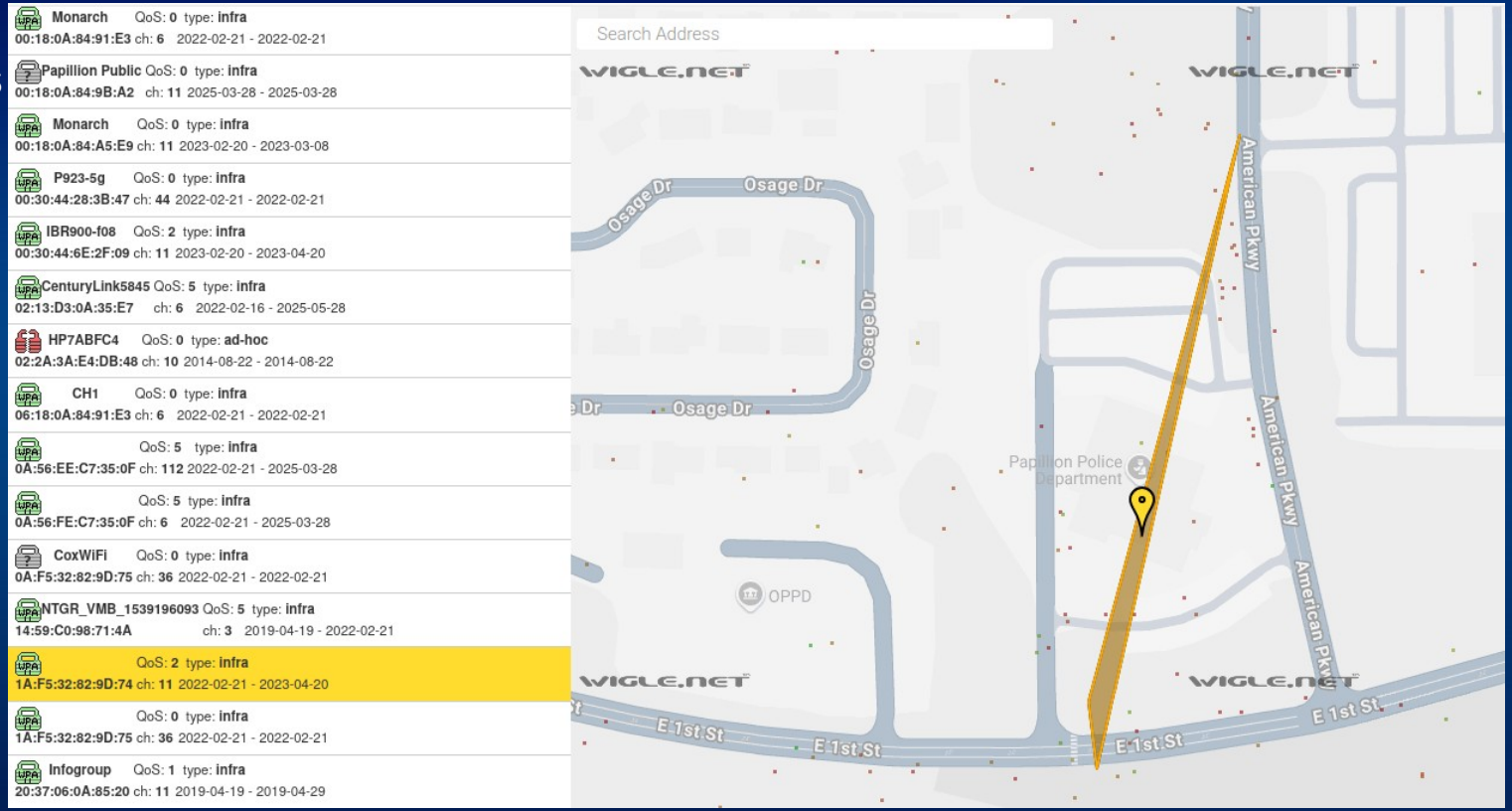
*MDK4 won’t broadcast EAP RADIUS beacons. Scapy will

RF Proximity Detection

Wifi AP Wardriving (Wigle App)

- “Monarch” EAP network
- City network for employees

Wigle will show MAC
Of hidden ESSIDs

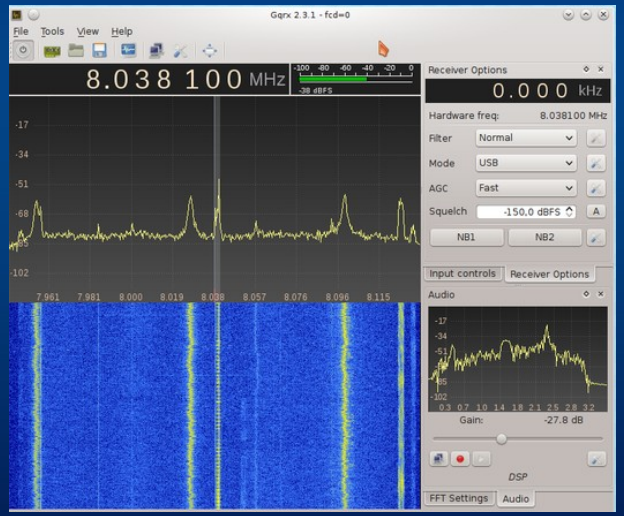


Hcxdumptool is better for resolving hidden ESSID names; will automatically deauth clients

RF Proximity Detection

Trunking Uplink Channel

- Uplink channel is usually 45 MHz below the downlink channel
- Uplink signals are broadcast from the radios (weak signal)
- If you can detect uplink signals with an average antenna, police are in the vicinity



GQRX and RTL_FM (command line) both have squelch settings.
Pipe audio into sox for alerts when sound is detected

easy way: Listen for radio packet bursts with analog radio scanner

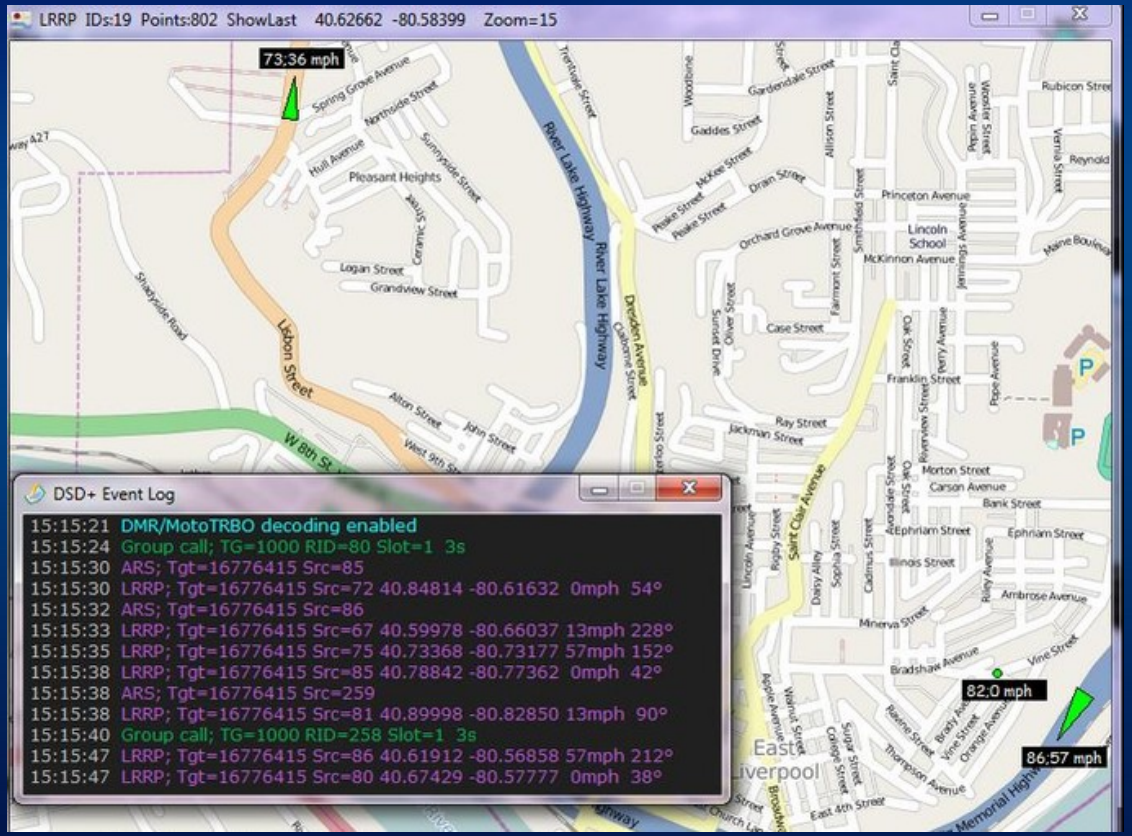
OP25 has an option to send packets to Wireshark. I was unsuccessful trying this

Holy Grail of LE Tracking

Location Request & Polling Response packets (LRRP, sometimes LPPR)

- Motorola P25 radios broadcast their location data
- Not simulcast, must in range of the radio ?
- DSDPlus can sometimes decode these packets
- OP25 with Wireshark if you want to see raw packets

Unsuccessful with DSDPlus and Sarpy, with my stock antenna, at home



Federal Frequencies

Dept Homeland Security, ICE, DEA

Radio Ref has listing for National frequencies (ICE ~163-166 MHz)

RRDB / US / Immigration and Customs Enforcement (ICE)

Immigration and Customs Enforcement (ICE) (United States)

Menu

Last Updated: July 5, 2021, 22:13 pm UTC

Frequencies

Grouped All New/Updated Show Repeater Inputs

Immigration and Customs Enforcement (ICE)

National

Frequency	License	Type	Tone	Alpha Tag	Description	Mode	Tag
165.8375		M	CSQ	ICE DHS ComA	Department of Homeland Security Common (Analog)	FMN	Federal
165.8375		M	001 NAC	ICE DHS ComD	Department of Homeland Security Common (Digital)	P25	Federal
163.725		M	169 NAC	ICE Nat Dir	National Direct	P25	Federal
163.700		M	169 NAC	ICE NatTac 1	National Tactical 1	P25	Federal
168.5875		M	169 NAC	ICE NatTac 2	National Tactical 2	P25	Federal
163.1125		M	169 NAC	ICE NatTac 3	National Tactical 3	P25	Federal
164.7875		M	169 NAC	ICE NatTac 4	National Tactical 4	P25	Federal

Federal Frequencies

Dept of Homeland Security

Also frequencies for Nebraska Federal

Department of Homeland Security

Immigration and Customs Enforcement

Frequency	License	Type	Tone	Alpha Tag	Description	Mode	Tag
163.675		RM	786 NAC	ICE-Hall Cty	ICE - Hall County	P25	Federal
163.675		RM	786 NAC	ICE-Lincoln	ICE - Lincoln County	P25	Federal
164.675		RM	786 NAC	ICE-Dawson	ICE - Dawson County	P25	Federal

Transporation Security Administration - Omaha

Operations at Eppley Airfield (OMA), Omaha

Frequency	License	Type	Tone	Alpha Tag	Description	Mode	Tag
172.150		BM		TSA Eppley	Eppley Airfield Opearations (150)	P25e	Federal
172.900		BM	001 NAC	TSA Eppley	Eppley Airfield Opearations (900)	P25	Federal

Federal Frequencies

DEA, FBI, Marshals, State Troopers

Nebraska Statewide P25 System

1 (1)	082 (52)	Lincoln (South)	Lancaster	152.780	155.0325	155.4225c	155.6325c	155.7225c
1 (1)	083 (53)	Omaha (Hummel Park)	Douglas	154.1225	154.680c	154.950c	155.8725c	156.1425c

Drug Enforcement Agency

DEC	HEX	Mode	Alpha Tag	Description
30251	762b	De	DEA Omaha 1	Omaha 1
30252	762c	De	DEA Omaha 2	Omaha 2
30253	762d	De	DEA Omaha 3	Omaha 3
30254	762e	De	DEA Omaha 4	Omaha 4
30255	762f	De	DEA Omaha 5	Omaha 5
30256	7630	De	DEA Omaha 6	Omaha 6
30257	7631	De	DEA Sioux City 1	Sioux City 1
30258	7632	De	DEA Sioux City 2	Sioux City 2
30259	7633	De	DEA Sioux City 3	Sioux City 3
30260	7634	De	DEA Sioux City 4	Sioux City 4
30261	7635	De	DEA Travel	Travel Channel

Federal Bureau of Investigation

These are reported to be FBI talkgroups, and generally encrypted

DEC	HEX	Mode	Alpha Tag	Description
30201	75f9	De	FBI Common	Common
30202	75fa	De	FBI Air	Air Operations
30203	75fb	De	FBI North Platte	North Platte Area
30204	75fc	De	FBI Grand Island	Grand Island Area
30205	75fd	De	FBI Lincoln	Lincoln Area
30206	75fe	De	FBI Omaha	Omaha Area
30207	75ff	De	FBI Sioux City	Sioux City Area

United States Marshals Service

Talkgroups are believed to be Federal Agencies and appear to be mostly encypted. Please monitor and submit corrections to the database

Federal and Other Frequencies

Searching the FCC Database can uncover frequencies not report on Radio Ref

Site / Frequency / Market Search Results

Search Criteria: State = NE, County = DOUGLAS, Frequency Range = 163 MHz through 180 MHz, Currently Licensed and Pending Facilities

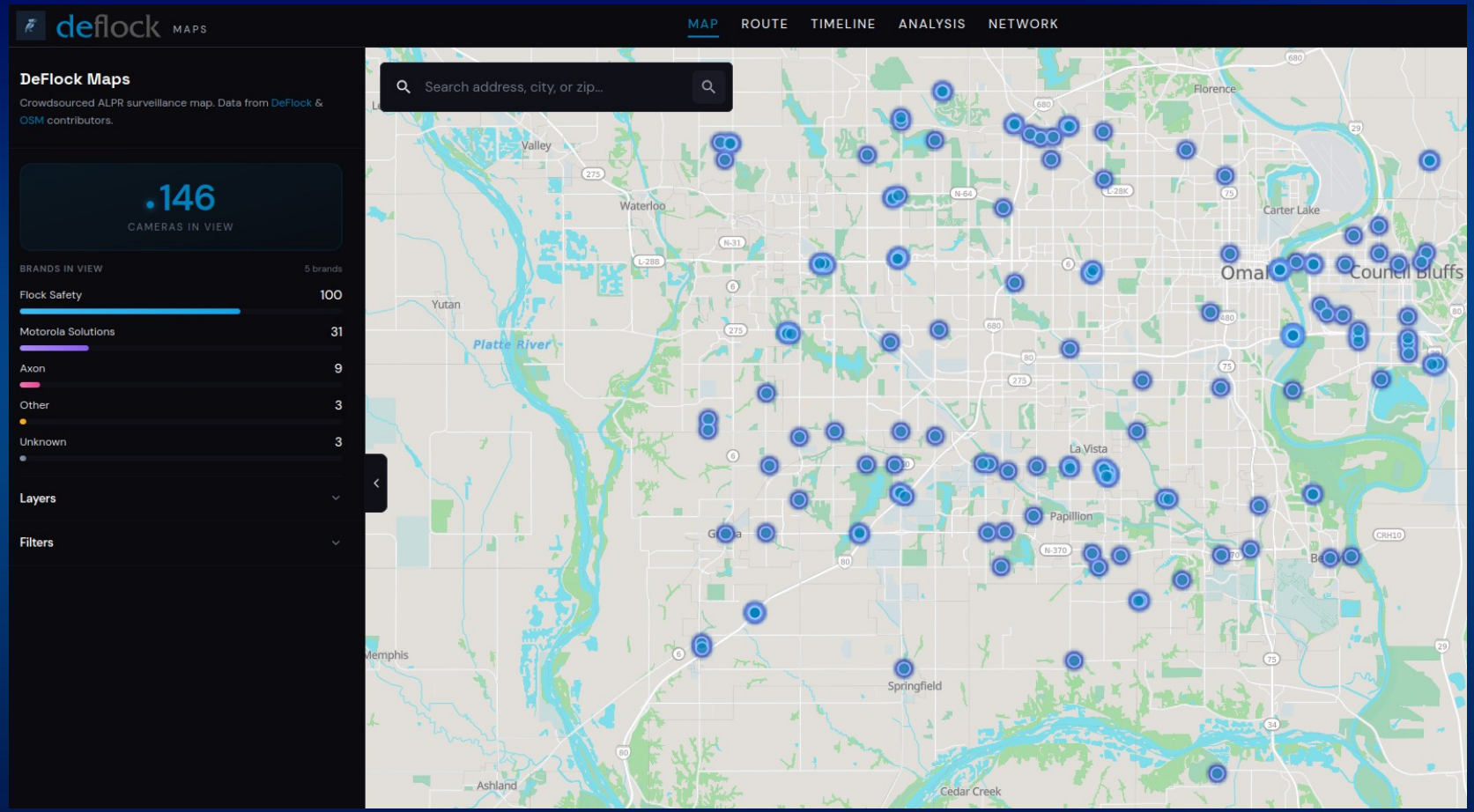
Universal Licensing System Database - Sites

Callsign: WGT713	**Licensee:** AIRPORT AUTHORITY OF THE CITY OF OMAHA	**Radio Service:** Public Safety Pool, Conventional (PW)	**City:** OMAHA, NE	**Status:** Active	**Grant Date:** 05/08/2025	**Expiration:** 05/07/2035
Site: 1	**Address:** 4501 ABBOTT DR EPPLEY AIRFIELD	**City:** OMAHA, NE	**County:** DOUGLAS	**Coordinates:** 41 17' 58.0" N, 95 53' 56.0" W		
Frequency: 173.36250000						
Site: 2	**Address:** 4501 ABBOTT DR EPPLEY AIRFIELD	**City:** OMAHA, NE	**County:** DOUGLAS	**Coordinates:** 41 18' 49.0" N, 95 53' 57.0" W		
Frequency: 173.36250000						
Site: 3	**Address:** 4501 ABBOTT DR EPPLEY AIRFIELD	**City:** OMAHA, NE	**County:** DOUGLAS	**Coordinates:** 41 17' 50.0" N, 95 53' 36.0" W		
Frequency: 173.36250000						
Callsign: BLP00963	**Licensee:** GRAY TELEVISION LICENSEE, LLC	**Radio Service:** Broadcast Auxiliary Low Power (LP)	**City:** Atlanta, GA	**Status:** Active	**Grant Date:** 09/19/1991	**Expiration:** 06/01/2030
Site: 1	**State:** NE	**County:** DOUGLAS	**Coordinates:** 41 15' 26.0" N, 95 57' 50.1" W			
Frequency: 174.00000000						
Callsign: WNJR392	**Licensee:** IMMANUEL MEDICAL CENTER DBA CATHOLIC HEALTH INITIATIVES	**Radio Service:** Public Safety Pool, Conventional (PW)	**City:** OMAHA, NE	**Status:** Active	**Grant Date:** 10/11/2022	**Expiration:** 10/05/2032
Site: 1	**Address:** 6901 N 72ND ST	**City:** OMAHA, NE	**County:** DOUGLAS	**Coordinates:** 41 20' 48.0" N, 96 1' 16.1" W		
Frequency: 163.2500000						
Callsign: WQPM982	**Licensee:** NEBRASKA, STATE OF	**Radio Service:** Public Safety Pool, Trunked (YW)	**City:** LINCOLN, NE	**Status:** Active	**Grant Date:** 04/12/2022	**Expiration:** 07/03/2032
Site: 1	**Name:** OMAHA	**Address:** 108 & I	**City:** OMAHA, NE	**County:** DOUGLAS	**Coordinates:** 41 12' 54.0" N, 96 4' 49.0" W	
Frequency: 171.43750000 V 172.28750000 V 172.60000000 V 173.76250000 V						
Site: 2	**Area of Operation:** KMRA around a Fixed Location	**City:** OMAHA, NE	**County:** DOUGLAS	**Coordinates:** 41 12' 54.0" N, 96 4' 49.0" W		
Frequency: 163.91250000 164.70000000 165.92500000 166.00000000						
Callsign: WQKR924	**Licensee:** SCRIPPS BROADCASTING HOLDINGS LLC	**Radio Service:** Broadcast Auxiliary Low Power (LP)	**City:** CINCINNATI, OH	**Status:** Active	**Grant Date:** 08/27/2009	**Expiration:** 06/01/2030
Site: 1	**City:** Omaha, NE	**County:** DOUGLAS	**Coordinates:** 41 12' 29.0" N, 96 4' 47.1" W			
Frequency: 174.00000000						

https://fjallfoss.fcc.gov/General_Menu_Reports/engineering_search.cfm?accessible=NO

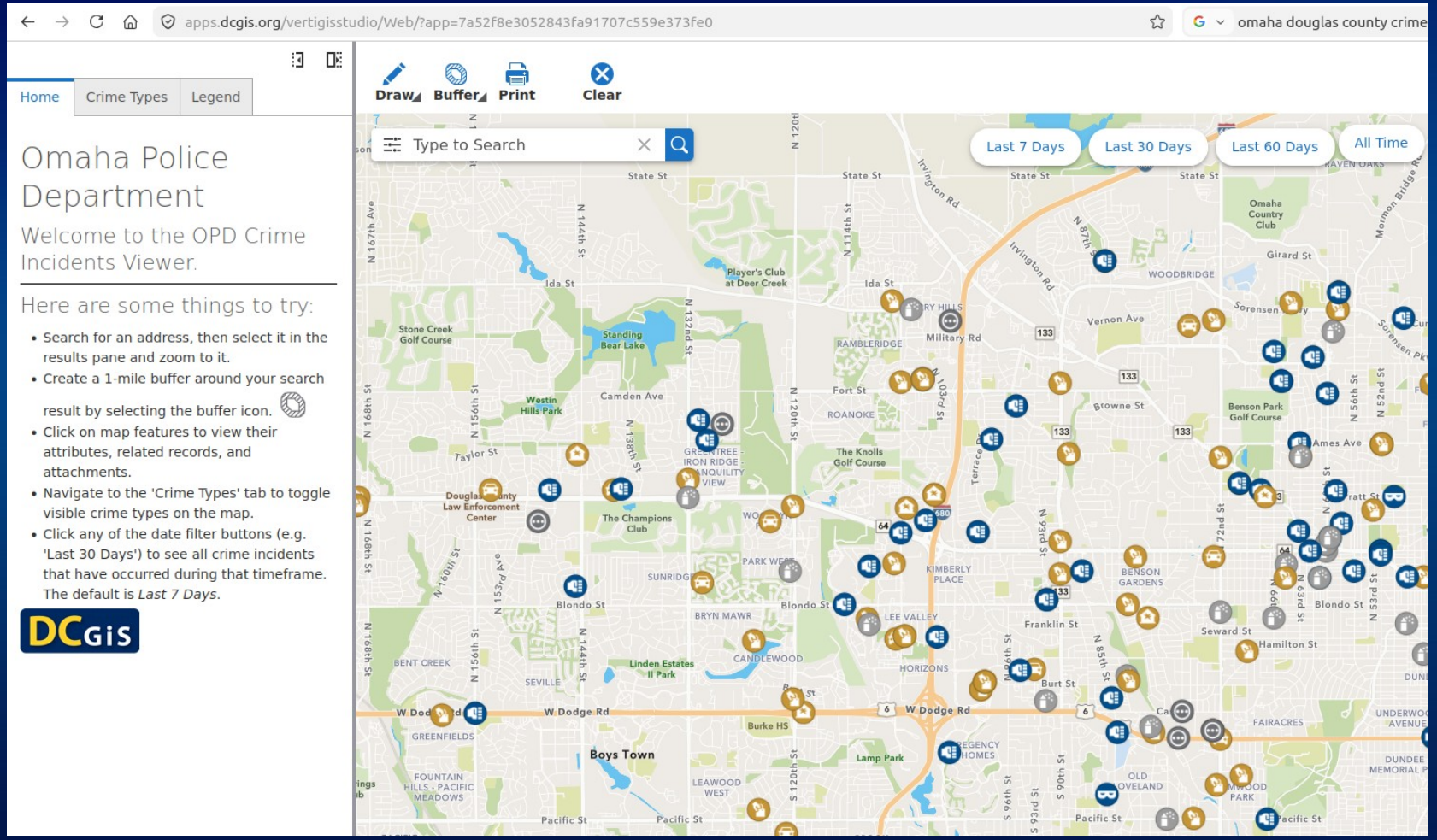
Other Resources

ALPR map (deflock.org)



Other Resources

DCGiS Crime Maps



App Idea

- Make your own crime map with Broadcastify audio (dispatch calls)
- Transcribe dispatch calls to text with WhisperAI
- Extract & verify address with AI
- Create KML and/or web interface to view and click, read, listen to dispatch calls

Questions? Comments?

https://github.com/gusgorman402/le_tracking

AI noobing

- Most of my scripts I only write for myself. Credentials directly in script (no .env), No error catching, no command line args. I’m new to vibe coding with AI

Python script to download Broadcastify mp3 from archived day

ChatGPT Prompt to make the code shareable:

can you edit this python file so that username and password are stored & retrieved from a .env file. Also, make feedID and archiveDate command-line arguments instead of hardcoded static values. Throw an error if the date is entered incorrectly (with slashes not hyphens, etc.) Also remove all commented lines in the code

AI noobing

- I was using Sox to remove long periods of silence from the mp3 files
- I wanted the audio segments in separate files, with time stamps and length of segment

ChatGPT prompt:

I have a WAV file containing audio, separated with periods of silence. I would like you to write a python script that will extract each segment of audio into a separate file (no silent periods). The original WAV file has a name describing the date and time the audio was recorded. The format is YYYYMMDDTTTT-randomID-feedID.wav where the TTTT is military time. The audio was recorded on a 30min delay, so subtract 30mins from the time in the filename, and consider this the beginning time of the recording. When you create filenames for the new audio files, try to determine the exact time the audio occurred based on the original filename timestamp and create a new filename with this timestamp and the length of the audio segment. For example, if the original filename was 202606111722-681200-34786.wav and there is a segment of audio that occurs 5 minutes and 15 seconds into the WAV, and this audio segment is 10 seconds long (roundup to the nearest whole second) the new file name for that audio segment would be YYYYMMDDTTTTSS-SSSS-randomID-feedID.wav, where TTTTSS is that start time of the audio segment and the following -SSSS is the length of that segment in seconds. So the new filename for that example would be 20260611165715-0010-681200-34786.wav (remember to subtract 30 minutes from the original military time listed in original filename)

Script works… on low traffic files. Haven’t tested on mp3 files with lots of audio

AI noobing

- Just because a program works on Ubuntu, doesn’t mean it will automatically work on RasPi

- TShark (PyShark) behaves differently on RasPi. No wlan.mgt info

- Tshark buffers its output. Won’t automatically pipe into another script

- ChatGPT struggled with this. It helped me with debugging (wifi packet info), but I had to dig through forums to find the buffering issue

- Instead of pyshark, I ran Tshark from the command line and parse the output

- Try Scapy instead of Tshark next time for raspi wifi sniffing (mgmt packets)

- ChatGPT was able to write an EAP (RADIUS) wifi AP beacon broadcaster for ESP2866

AI noobing

SDRTrunk log file parser

- SDRTrunk log file prints out a line for every packet during a dispatch call. One dispatch call may have multiple lines for a single call
- Remove redundant lines, keep the line with the final/highest “call length”

ChatGPT prompt:
Write a python script that will open a read only CSV file. The filename is provided on the command line via command line argument. The script will output lines from the CSV that fit the following criteria: if the EVENT is not an "Encrypted Group Call" or a "Group Call", do not print out the line. For lines with identical FROM fields and identical EVENT_ID, only print out the line with the highest DURATION_MS value. Multiple lines may have the same maximum DURATION_MS value, but only print out the most recent line encountered of these. You will have to examine all lines in the inputted CSV before you can start outputting relevant lines. Perhaps use a key to value hash to table to keep track of highest DURATION_MS values. Here is an example CSV file:

AI noobing

Script to associate RadioIDs to broadcastify audio segments. Helps to find dispatch calls
ChatGPT prompt:

Write a python script that will associate timestamps to a specified time period. The script will take 5 command line arguments. The first arg is an input file. This input file contains a list a mp3 files. Sometimes the the filenames will be prepended with a dir, which can be ignored; we are only interested in the filename. Each filename contains time period information. The time format for each filename is YYYYMMDDHHMMSS-SSSS-randomID-feedID.wav. The YYYYMMDDHHMMSS is the approximate initial (the user will be able to add seconds to this start time) beginning of the time period of interest. The "-SSSS" that follows in the filename is the length of audio segment in the file. Add this length of seconds to the beginning time period to get the end (intital; the user will be able to add seconds to this end time) period time. The next command line argument is to pick which filenames to analyze. The arg option will ask for a minimum time length of audio files to be analyzed. The default is 3 seconds. Only analyze filenames whose "-SSSS" is equal or greater to the inputted option.
The next 2 args will be for altering the initial time period that was extracted from the filenames of interest. There will be an option to subtract seconds from the start time (make it earlier). The default is 30 seconds. There next option is to add seconds to the end time of the time period. The default is 30 seconds.
The final command line arg is for another input file. This is a CSV file with timestamped rows. For each audio filename and the time period extracted, find rows in the CSV whose timestamp is within the audio time period. The CSV timestamp format is YYYY:MM:DD:HH:MM:SS.
The output of the program will be in CSV format. Each row will list the audio filename (first column), and then list (in the following columns) all "FROM" numbers that were in rows from the original CSV that had TIMESTAMPS in the time period of the audio file.
I have attached a sample audio file list, and CSV logile

Questions? Comments?