

Pskreporter.info & FT8

Philip Gladstone -- N1DQ
23 Feb 2018

What is pskreporter?

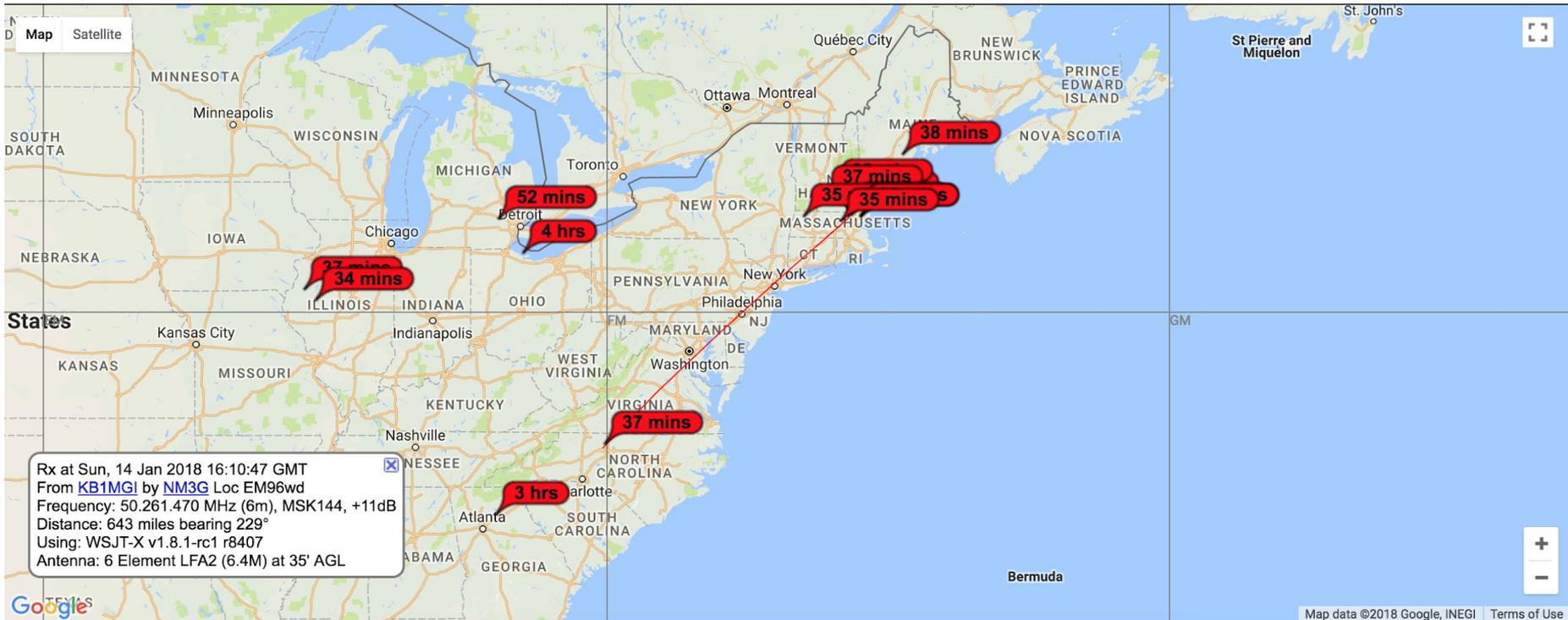
A way to see where your transmissions are being heard.

An answer to ‘does my setup work?’

On show sent by the callsign using over the last Go! [Display options](#) [Permalink](#)

Monitoring KB1MGI (last heard 34 mins ago). Automatic refresh in 5 minutes. 15 reception reports for KB1MGI are shown as times ([show logbook](#)).

There are **3501 active monitors**: **1022 on 20m**, **802 on 40m**, **388 on 17m**, **387 on 30m**, **265 on 15m**, **253 on 80m**, **88 on 6m**, **50 on 60m**, **47 on 160m**, **38 on 10m**, **32 on 12m**, **27 on 2m**, **22 on 11m**, 13 on unknown, **3 on 2200m**, **2 on 4m**, **1 on 70cm**. [Legend](#)



Why do people contribute?

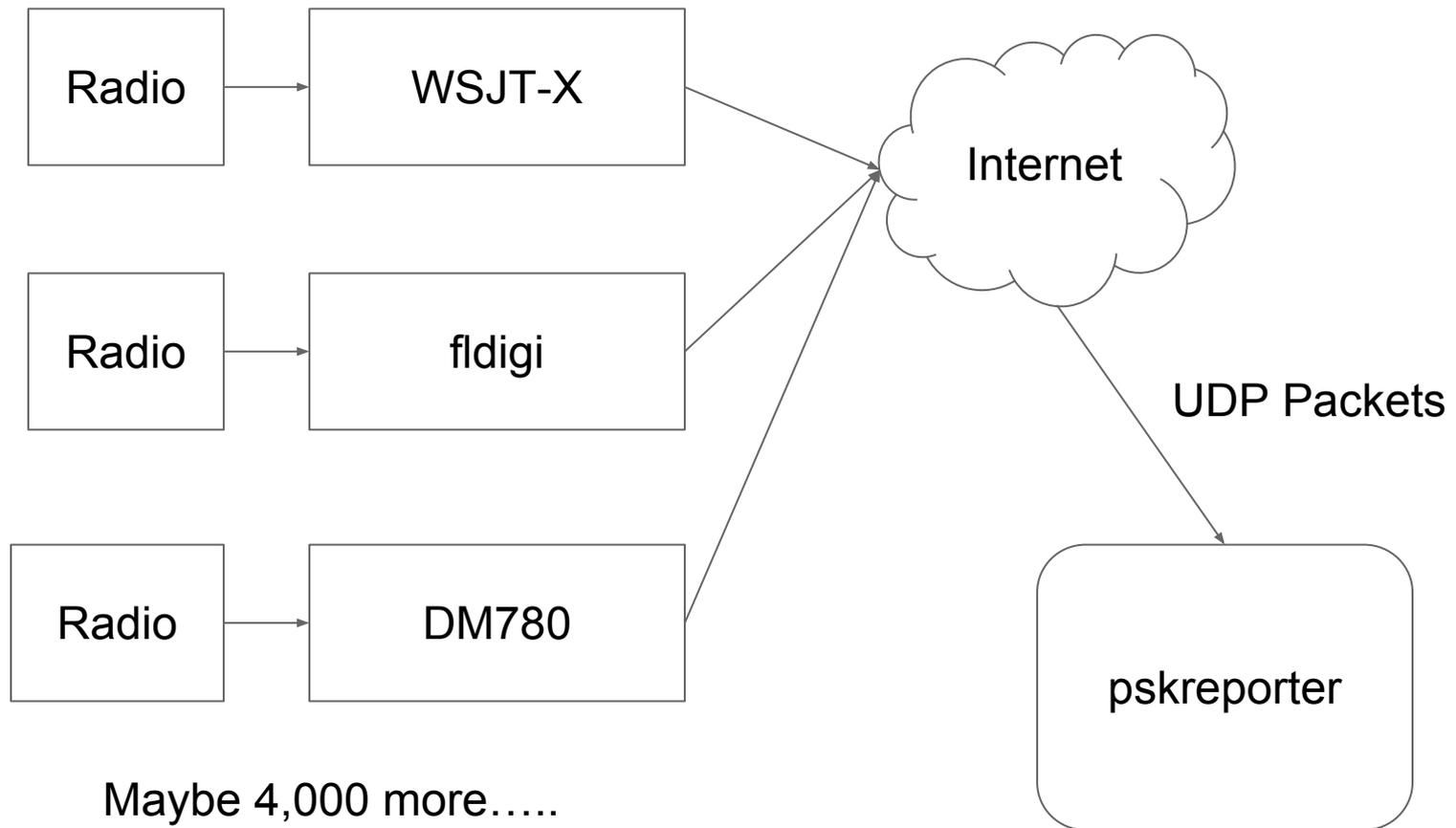
To get a good position on the leaderboard

They turned it on once, and forgot about it

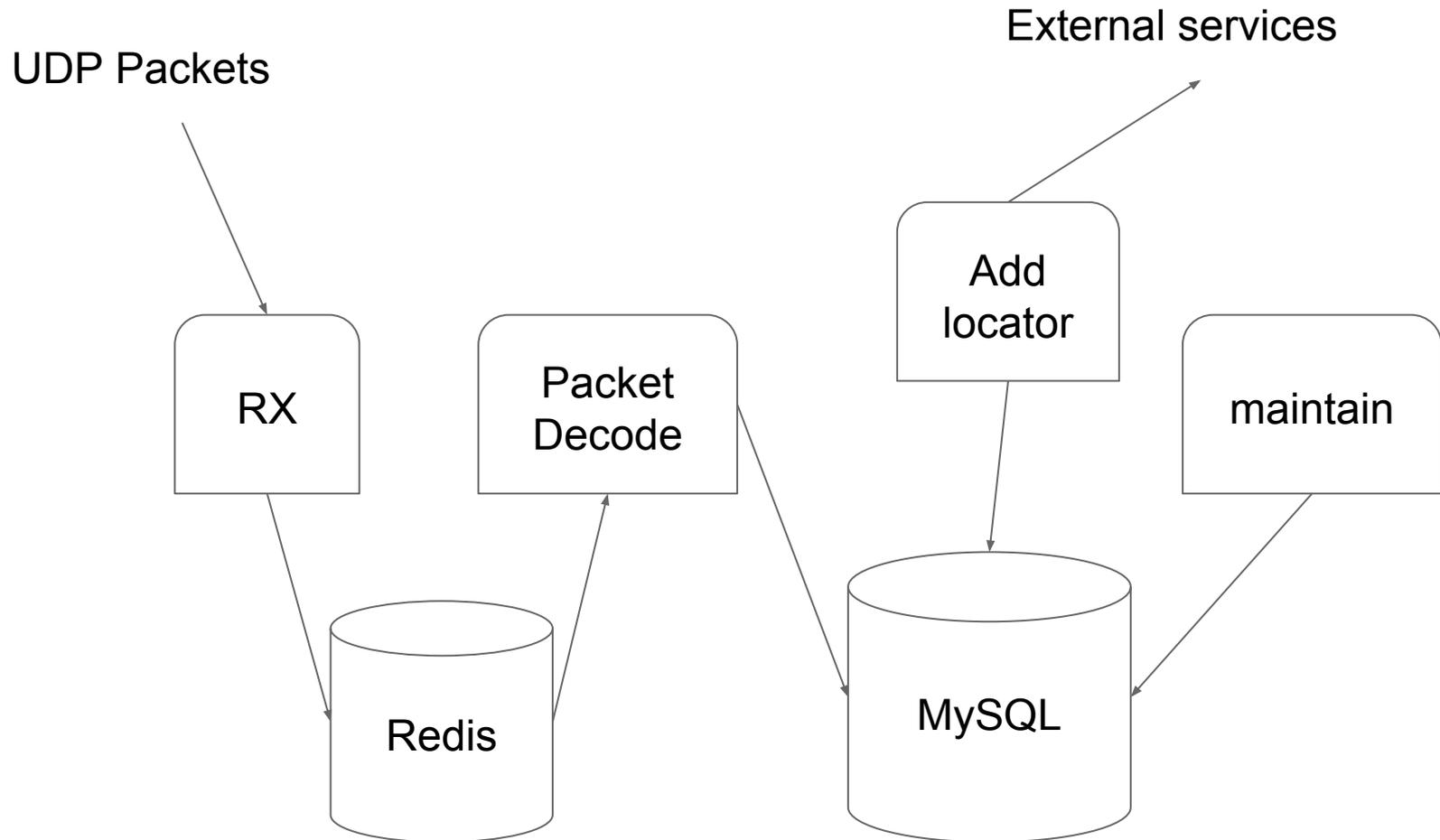
To be a good citizen

????

Architecture - Submission



Architecture - Insert



Packet Format

Use UDP so easy to implement (both send and receive)

Standard binary protocol for efficiency.

Custom registered attributes for ham use. Easily extensible to carry new data fields.

Decodable with Wireshark

▼ Set 4 [id=20707] (29 flows)

FlowSet Id: (Data) (20707)

FlowSet Length: 715

[\[Template Frame: 7297\]](#)

▼ Flow 1

▶ Enterprise Private entry: (Philip Gladstone) Type 1: Value (hex bytes): 41 45 38 53

Enterprise Private entry: (Philip Gladstone) Type 5: Value (hex bytes): 00 6b f5 01

Enterprise Private entry: (Philip Gladstone) Type 6: Value (hex bytes): ff

▶ Enterprise Private entry: (Philip Gladstone) Type 10: Value (hex bytes): 46 54 38

▶ Enterprise Private entry: (Philip Gladstone) Type 3: Value (hex bytes): 45 4d 37 39

Enterprise Private entry: (Philip Gladstone) Type 11: Value (hex bytes): 01

StartTime: Jan 13, 2018 17:42:59.000000000 EST

▼ Flow 2

Architecture - Database

stationInfo - 8M records - callsign, locator, software, antenna, dxcc entity. Most of them are false decodes with one report.

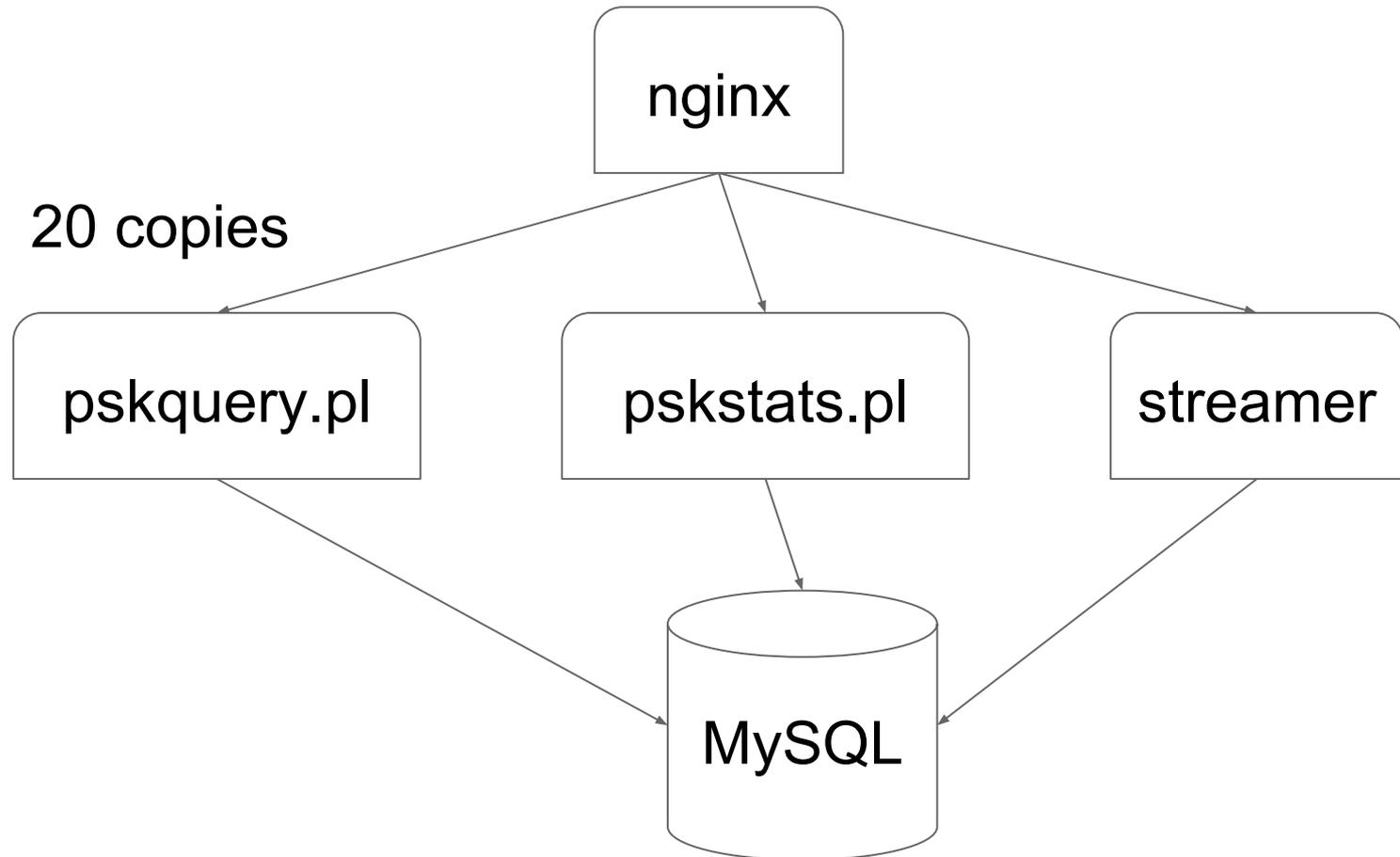
report - 2G6 records - sender, receiver, mode, timestamp, frequency, etc. Most record kept offline.

callsignProgram - 350K records - callsign to LoTW and eQSL status

dxcc - 346 records - name, lat/Ing of center, radius, match pattern

Various summary tables

Architecture - Output



Realtime Stream

Server built on node.js

URL to get almost real-time stream (possibly filtered)

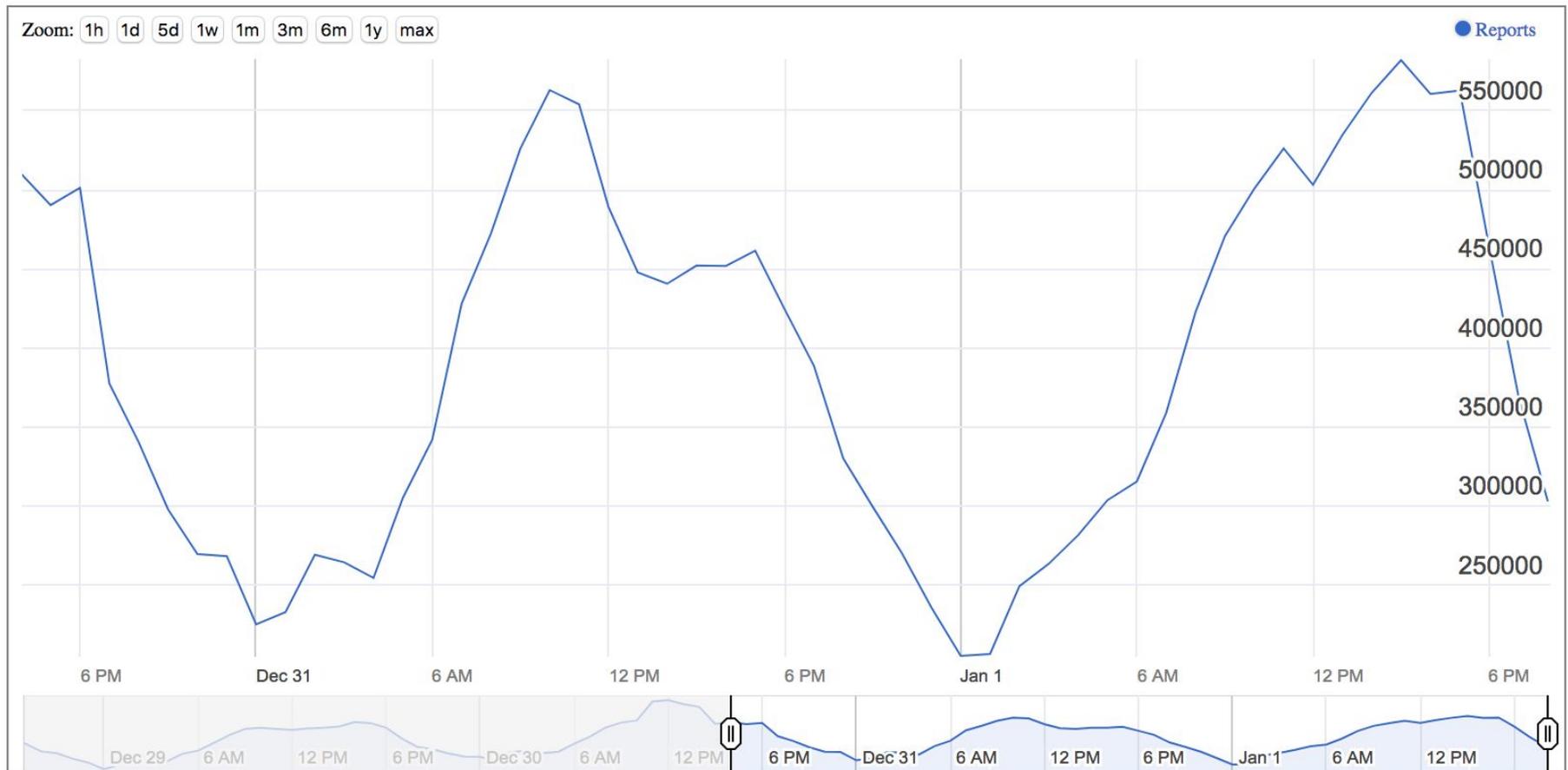
Authenticated by API key

One report per line in JSON format

```
{"sequenceNumber":2400358267,"frequency":7074294,"mode":"FT8",  
"sNR":-3,"flowStartSeconds":1515857114,"senderCallsign":"J  
K1OZS","senderLocator":"QM05GR","receiverCallsign":"JI1SZR",  
"receiverLocator":"QM06an","receiverDecoderSoftware":"WSJT-X  
v1.8.0 r8193"}
```

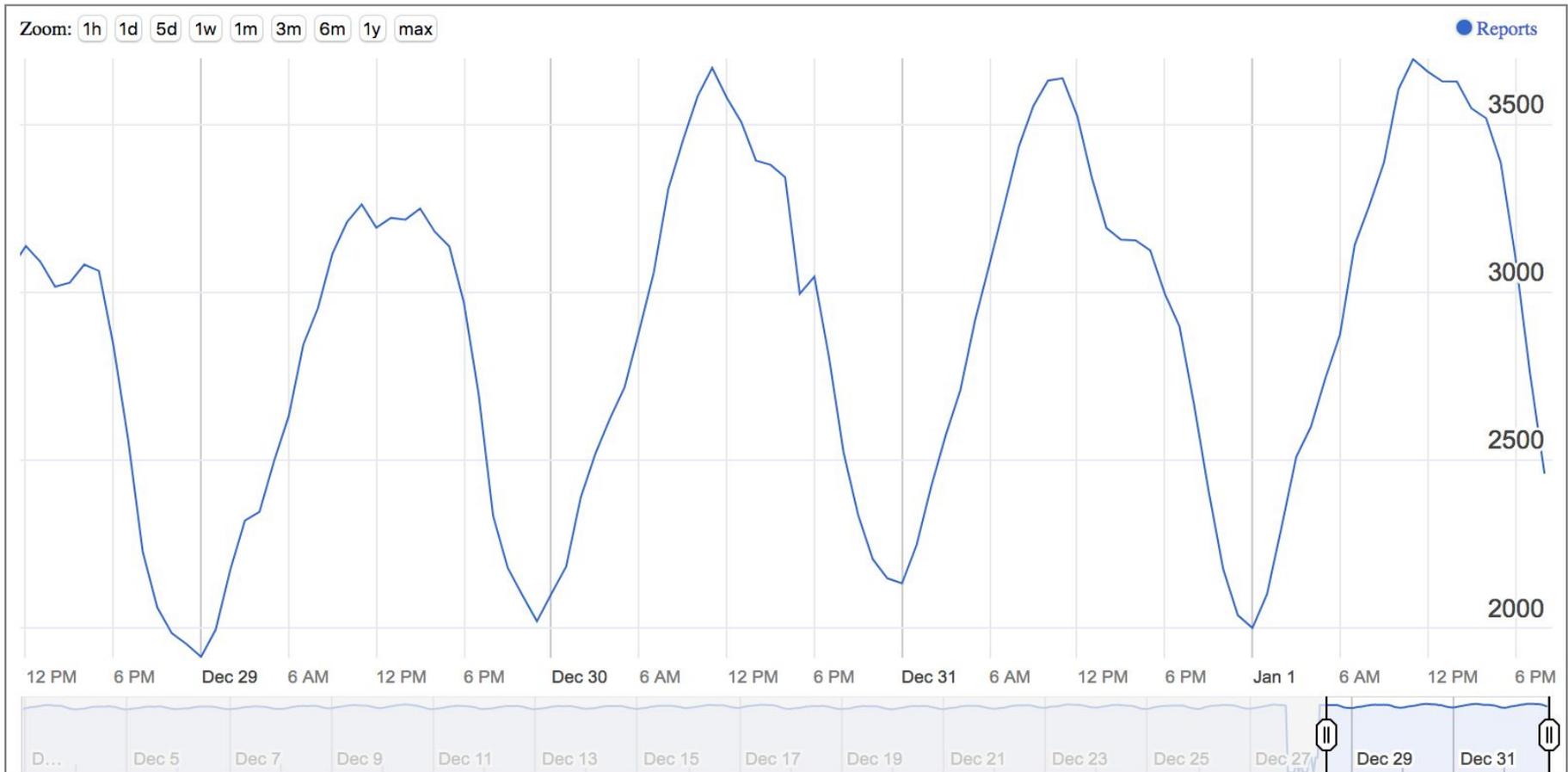
How much traffic?

Number of reports per hour received



Statistics

Number of active monitors (in any hour)



How many DX entities can you spot?

Monitor	Reports over 24 hours	Reports over 7 days
W4DJW	163	226
G0LUJ	145	186
HB9HFN	131	174
F5RRS	125	184
VU3KAZ	123	177
IW4EGP	123	161
IN3EJN	118	156
G8DJF	117	158
ANALYSIS	113	158
DG0OPK	113	156
SP7QJF	111	156
OH2BUA	111	140
SV1CDN	109	171
SP5OAB	108	140
SV3EXP	108	126
SV8RV	107	155
UA3ARC	107	147
OG5N	107	142
SM7CAD	106	145
PD2RPS	106	143

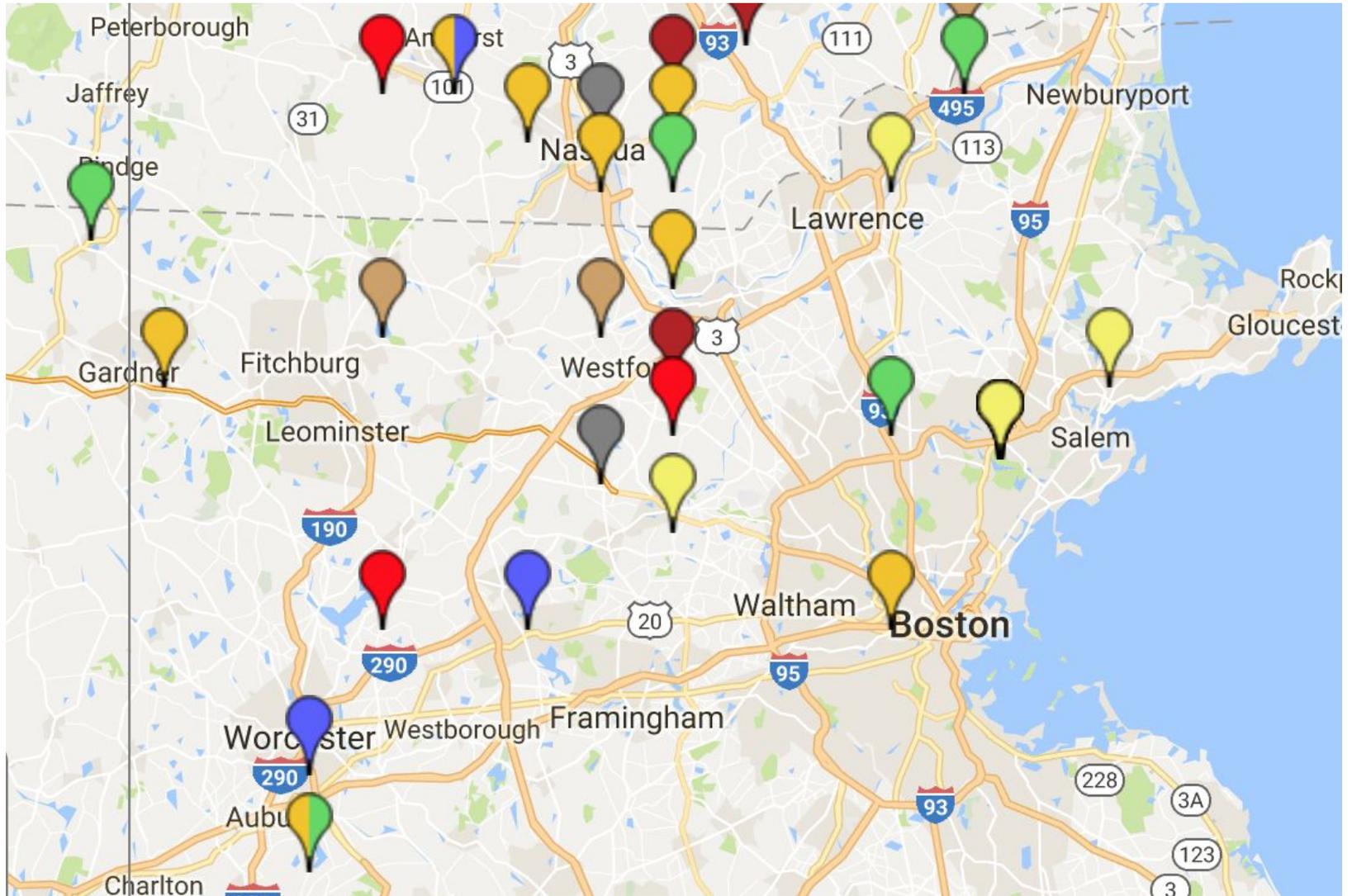
- All
- 160m
- 80m
- 60m
- 40m
- 30m
- 20m
- 17m
- 15m
- 12m
- 10m
- 6m
- 2m
- 70cm
- unknown

How many reporters?

Over a week:

WSJT-X	12973
JTDX	2999
JT65-HF	1006
UR5EQF log	823
Digital Master 780	584

Reporters near QTH



Hiccups - 1

July 2014: On vacation. Power loss at home. UPS doesn't last long enough. System down for many days. Migrated out of basement to Rackspace (provided by KF5WAY)

Feb 2017: Have to find another provider. Thanks to VA3ISP.

Summer 2017: On vacation. FT8 explodes. Performance problems. Added processing delay message

August 2017: Eclipse webgl overlay -- rendering problems

Hiccups - 2

Fall 2017: FT8 popularity explodes. Database size issues

Nov 2017: Emergency maintenance

Dec 2018: Migrate to new faster server

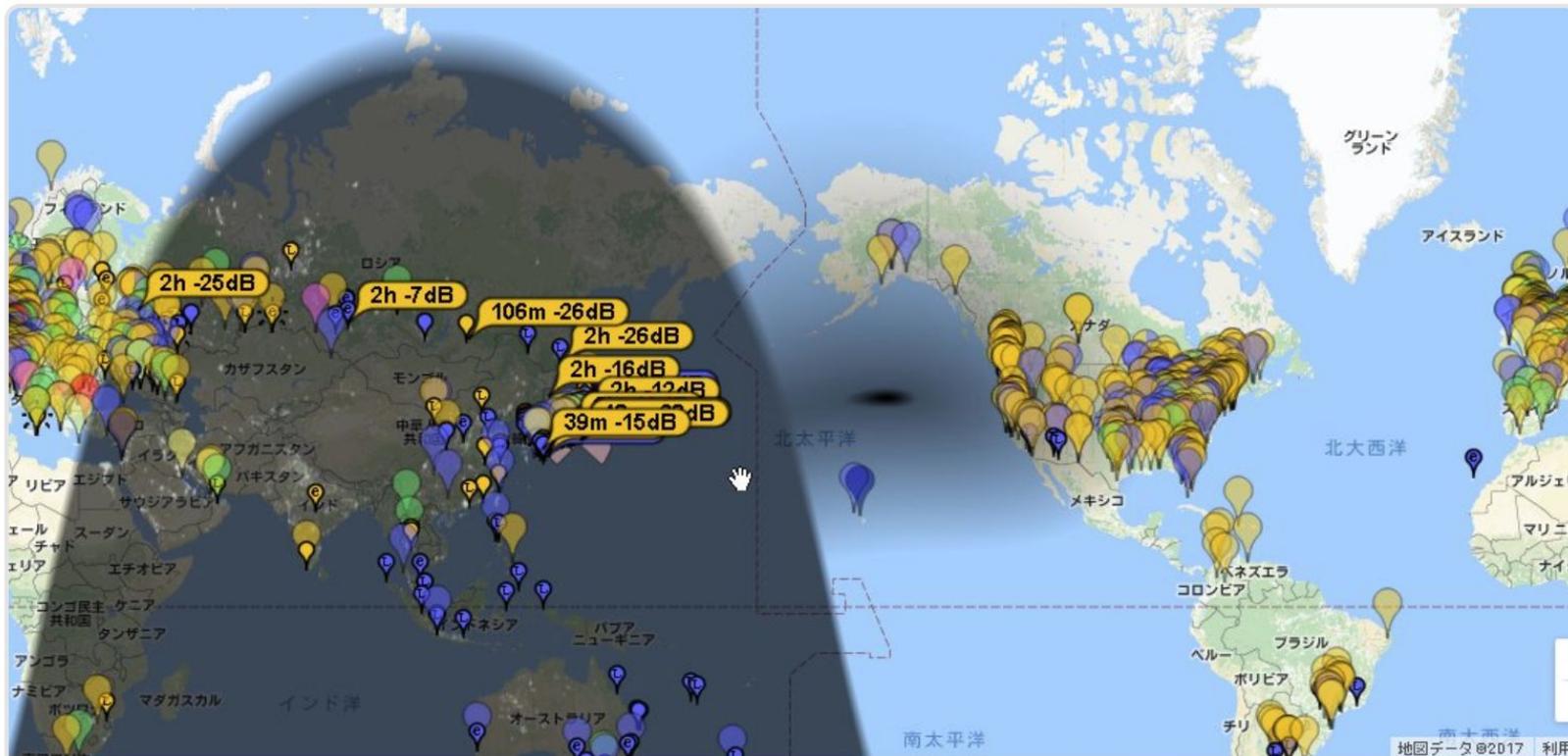
Eclipse

JF3GFH_K6QJ @JF3GFH_K6QJ · 21 Aug 2017



PSKREPORTER の太平洋の影ってひょっとして皆既日食を示している?! Solar eclipse area is shown on the pskreporter map?!

Translate from Japanese



ts, problems etc to [Philip Gladstone](#). [Online discussion](#) of problems/issues. Reception records: 1,664,519,758

Day / Night terminator

Calculated in the browser

Use WebGL if possible

- Calculates each pixel

- Uses the GPU

- Takes eclipses into account

Merges nighttime lights image tiles

Issue: Doesn't always paint the entire screen.

Issue: Maybe should take gamma into account.

Sample complaints

My tx-marker in the PSK-reporter does not contain L.

A W6 station is operating portable from VA and including the FM19 grid square in his data. PSK Reporter however shows him in California while he is fairly local to me in Va.

kb7qag should be in Tacoma not Purdy

My location is wrong please correct to DN06ah near Sunnyside Wa.

.@n1dq Hi OM Philip, CB radio spots are missing on #pskreporter when "11m" is selected.They are shown when "all bands" is selected. vy 73

Do you have a facility to donate for your services and great service?

Wrong reported Frequency (band)

Some reporters do not set the reporting frequency correctly.

No CAT connection

People complain to me....

Most FT8 signals reported multiple times -- can vote on **right** frequency

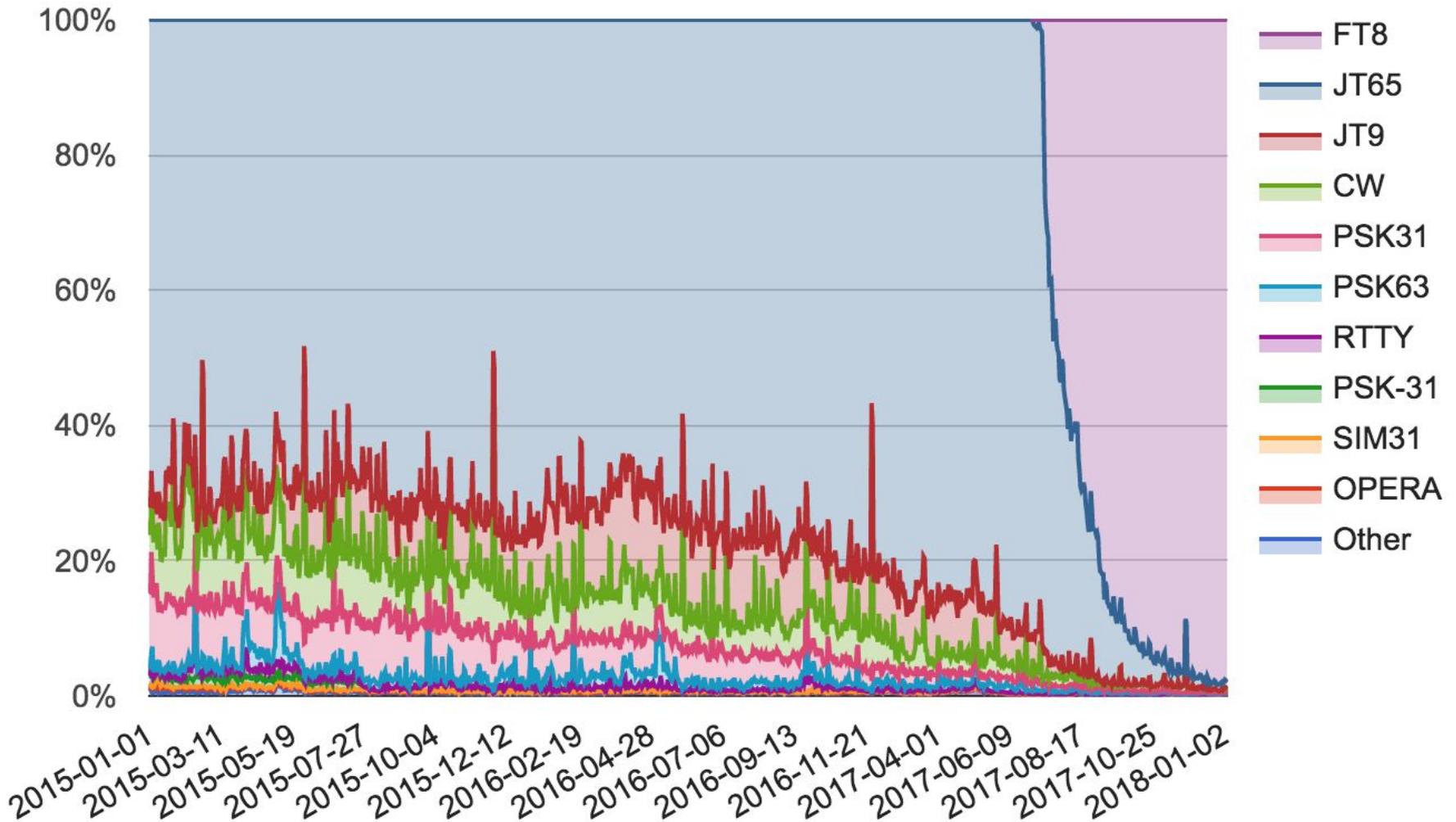
Assign goodness score to monitors based on percentage of frequency matches.

1-2% seem to report bad frequencies..

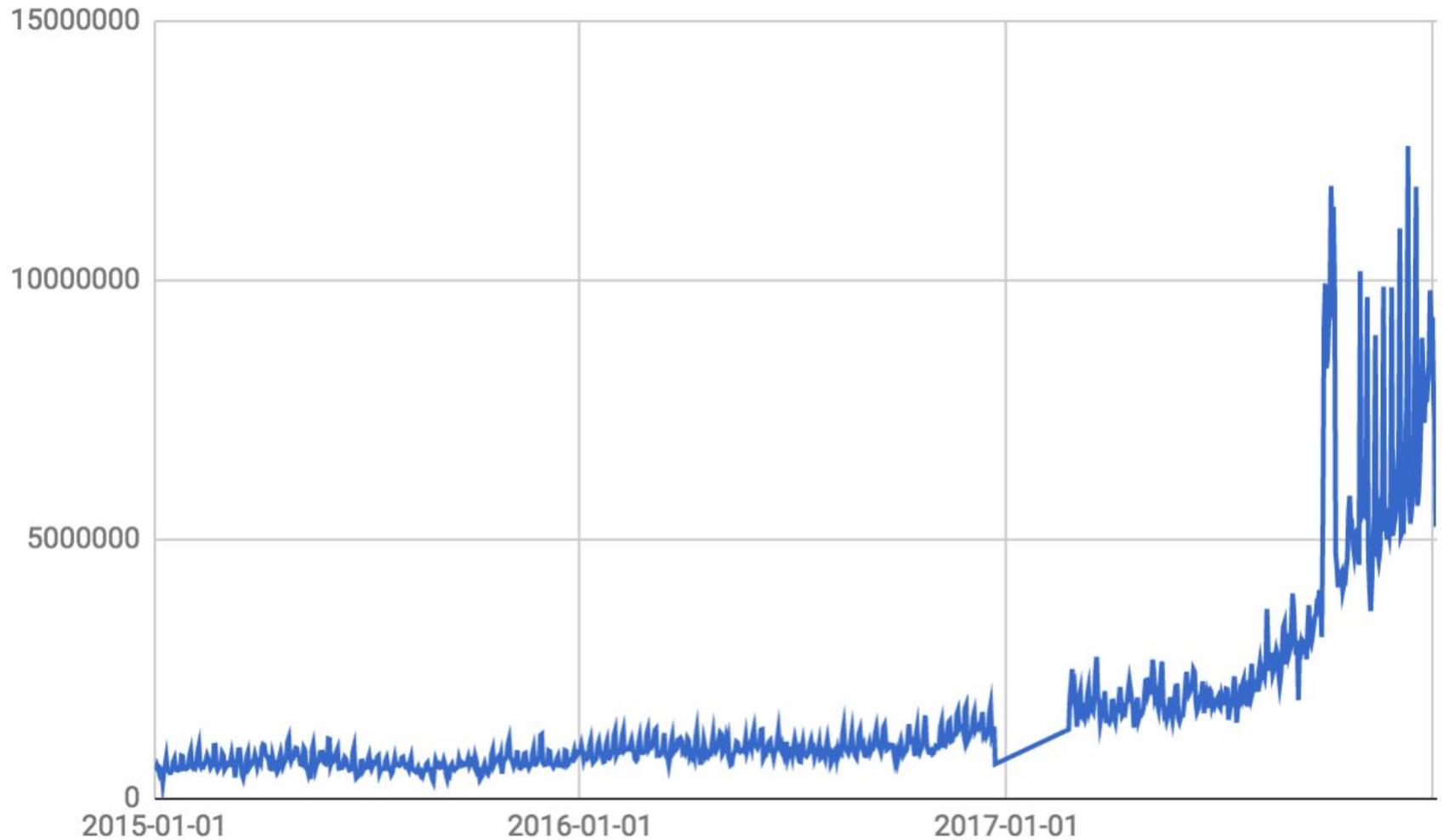
These records are now marked in the database.

Impact of FT8

Reports by Protocol



Impact of FT8



Custom monitoring package

Build an image for RPi 3 to monitor multiple protocols

Should be simple to setup

- Pick Radio type (inc direct sample RTL)

- Set callsign and locator

- Done!

What is performance of RTL dongle?

Lost cost package for underserved areas of world:

- Africa, Middle East, Western China, Eastern Russia

HamSCI Relevance

Large supply of receiver/transmitter/frequency datapoints that show that a path is open at that time.

Existing collection of people will to participate.

Limited software diversity (majority is WSJT-X)

Possibility to gather more data useful for ionospheric observations.

Questions?

<https://pskreporter.info>

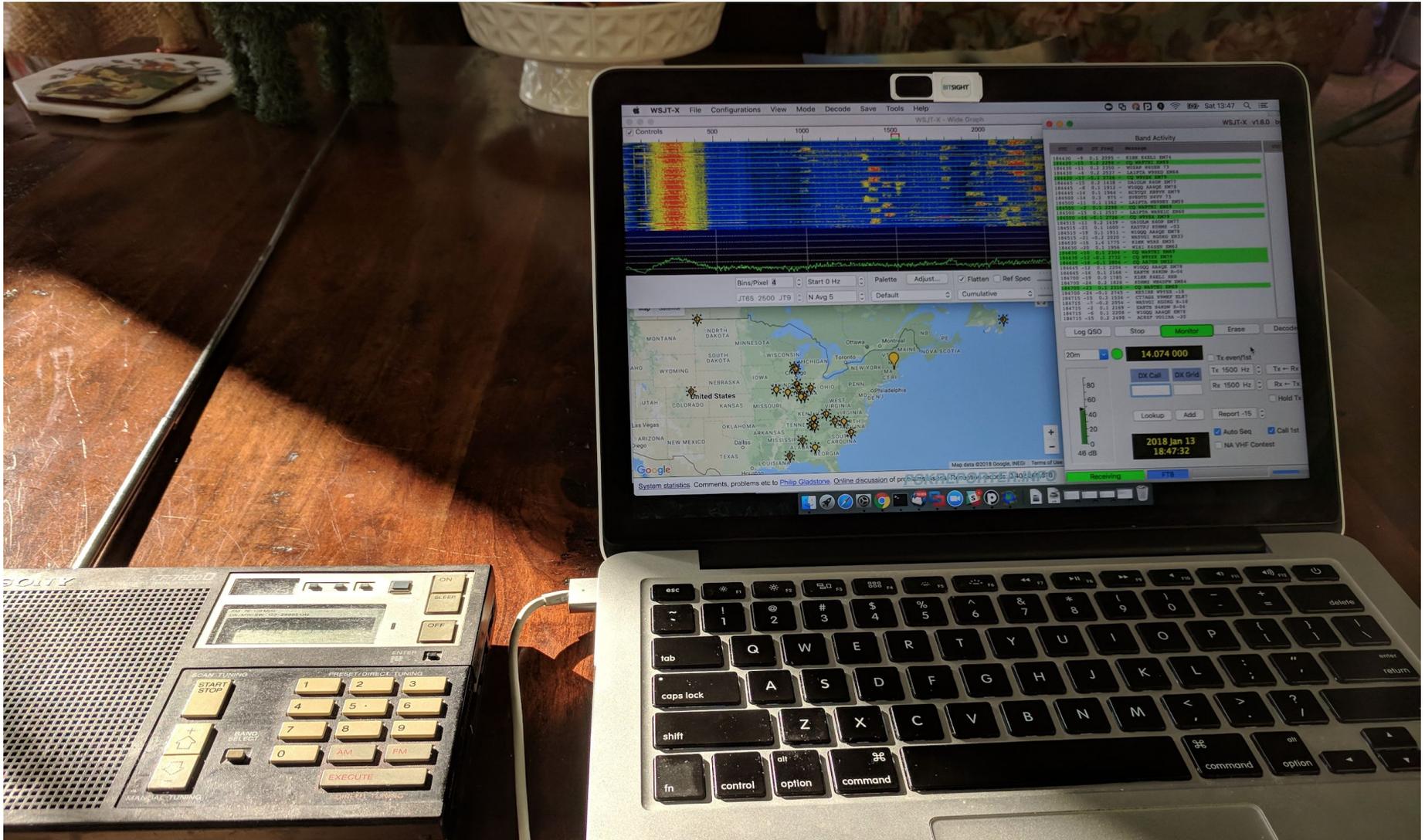
Philip Gladstone - N1DQ

philip@gladstonefamily.net

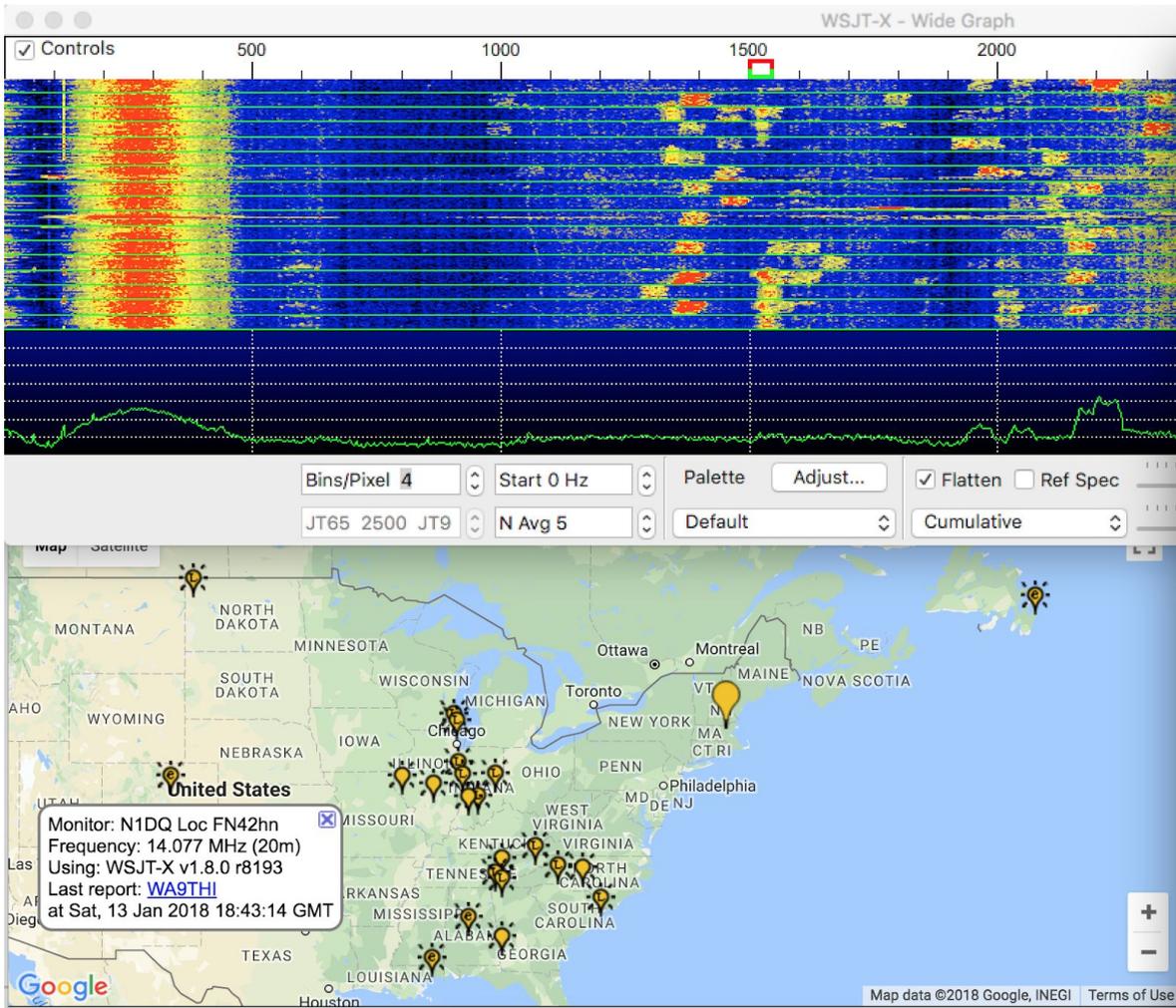
Where is PSK31?

Mode	Count
FT8	563767
JT65	4938
CW	1617
JT9	335
PSK31	218
VARA	103
RTTY	60
MSK144	44
OPERA	41
ROS	12
OLIVIA	11
PI4	11
PSK63	6

Simplest setup - no wires!



Laptop closeup



WSJT-X v1.8.0 by

Band Activity

UTC	dB	DT	Freq	Message	UTC
184245	-11	0.2	2468	- K4SHK VO1IRA -15	
184245	-12	0.1	2505	- VE3COC KE4AGN EM71	
184300	-11	0.3	1541	- VE3DVV NOAZZ 73	
184300	-11	-0.7	1594	- KOHMZ K9BR EM49	
184300	-7	0.0	2147	- LA1PTA N4KDW EM75	
184300	-10	0.1	2377	- W1QLF K4ELI 73	
184300	-14	0.2	2738	- CQ WA9THI EM69	
184300	-8	0.1	2844	- K8NU AEOAF RRR	
184315	-11	0.2	2480	- K4SHK VO1IRA R-16	
184330	-8	0.1	1367	- LA1PTA WB9NEY EM59	
184330	-22	0.1	2158	- LA1PTA N4KDW EM75	
184330	-20	0.2	2858	- K8NU AEOAF RRR	
184345	-4	0.2	1450	- CQ DX K4OP EM77	
184345	-22	0.1	2025	- CQ KB9VK EM79	
184345	-17	0.3	2082	- VE3MNX K4MY EM74	
184430	-12	0.1	1361	- LA1PTA WB9NEY EM59	
184430	-9	0.1	2095	- K1HK K4ELI EM74	
184430	-10	0.2	2298	- CQ WA9THI EM69	
184430	-11	0.2	2350	- W0ZAP W4USH 73	
184430	-4	0.2	2537	- LA1PTA W9NED EM68	
184430	-17	-0.1	2726	- CQ W9YSX EM79	
184445	-15	0.2	1438	- UA1OLM K4OP EM77	
184445	-8	0.1	1912	- W1GQQ AA4QE EM78	
184445	-14	0.1	1964	- KC9DQY KB9VK EM79	
184500	-14	0.3	975	- SV8DD N4VV 73	
184500	-11	0.1	1362	- LA1PTA WB9NEY EM59	
184500	-2	0.1	2298	- CQ WA9THI EM69	
184500	-15	0.1	2537	- LA1PTA WA9EIC EN60	
184500	-16	-0.1	2726	- CQ W9YSX EM79	
184515	-11	0.2	1439	- UA1OLM K4OP EM77	
184515	-21	0.1	1600	- KA5TPJ KOHMZ -03	
184515	-19	0.1	1911	- W1GQQ AA4QE EM78	
184515	-21	-0.2	2020	- WA5VGI KG0RG EN33	

Log QSO Stop Monitor Erase Decode

20m ● **14.074 000** Tx even/1st

Tx 1500 Hz Tx ← Rx

Rx 1500 Hz Rx ← Tx

Hold Tx

Report -15

Auto Seq Call 1st

NA VHF Contest

2018 Jan 13 18:45:58

Receiving FT8

WebGL

Code runs on GPU

Application draws shapes such as triangles

GPU processes vertexes

GPU runs shader for every pixel inside the shape and colors pixel

```
float fLatitude = v_latlng.x * 3.1415926 / 180.0;
float fLongitude = v_latlng.y * 3.1415926 / 180.0;
// Calculate difference (in minutes) from reference longitude.
float fDifference = (((fLongitude) * 180./3.1415926) * 4.) / 60.0;
// Caculate solar time.
float fSolarTime = u_fLocalTime + u_fEquation + fDifference;
// Calculate hour angle.
float fHourAngle = (15. * (fSolarTime - 12.)) * (3.1415926/180.0);
// Calculate current altitude.
float cc = cos(u_fDeclination) * cos(fLatitude);
float t = (sin(u_fDeclination) * sin(fLatitude)) + (cc * cos(fHourAngle));
```