

Building a Modern Packet Radio Network

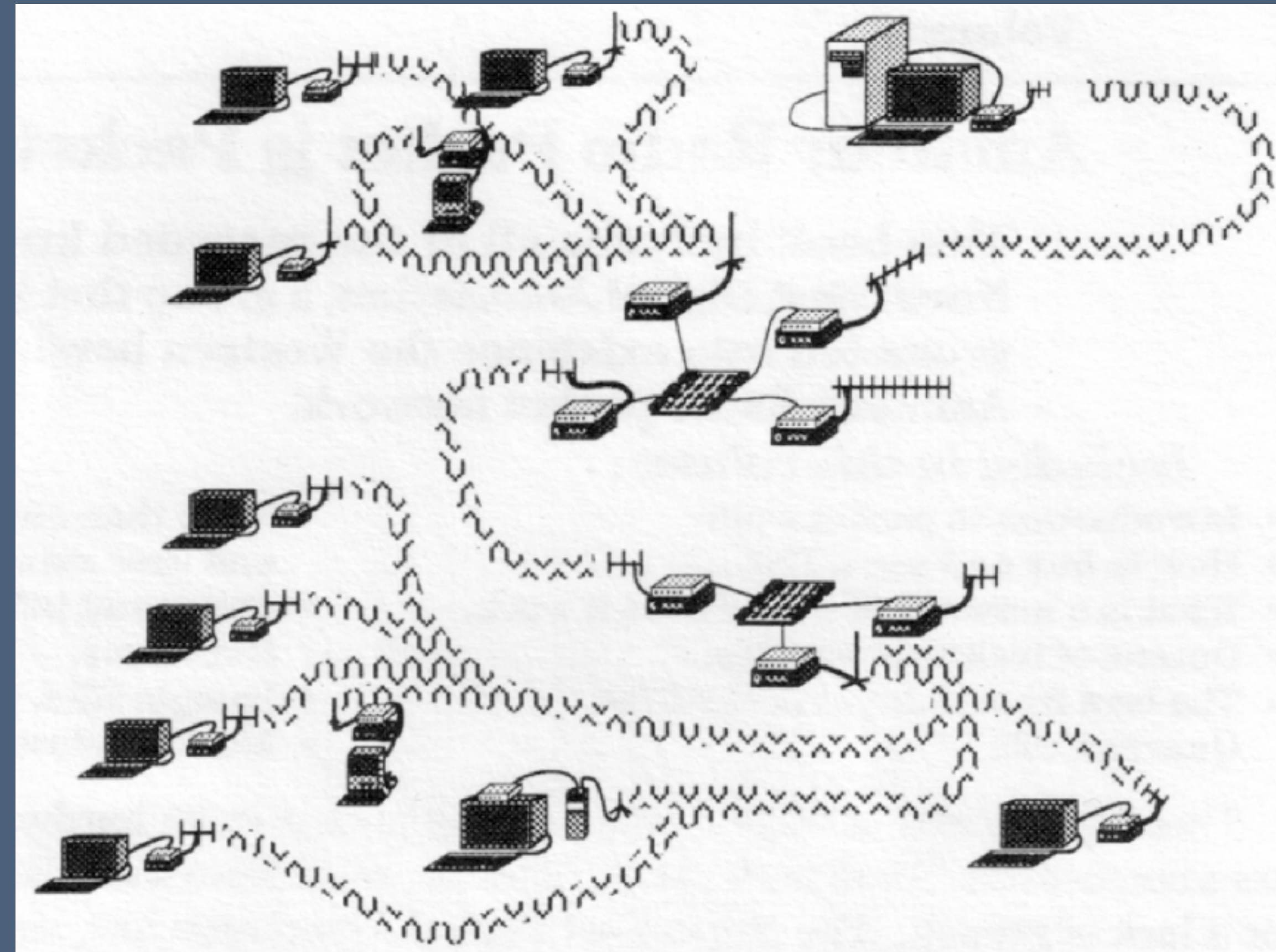
With Debian

Who am I

- Hibby, MMORFN
- Baby Debian Developer - (hibby@debian.org)
- Started in Debian fixing amateur radio ~~problems~~ bugs in 2015
 - debian-hamradio team
- Packet Radio Enthusiast
- Started in amateur radio in 2007
- Career radio engineer

Quick Summary

- Introduction to Amateur Radio
- Some helpful technical knowledge
- Introduction to the UK&I Packet Radio network
- How do I play too?
- What's Next



Amateur Radio

An old hacker hobby

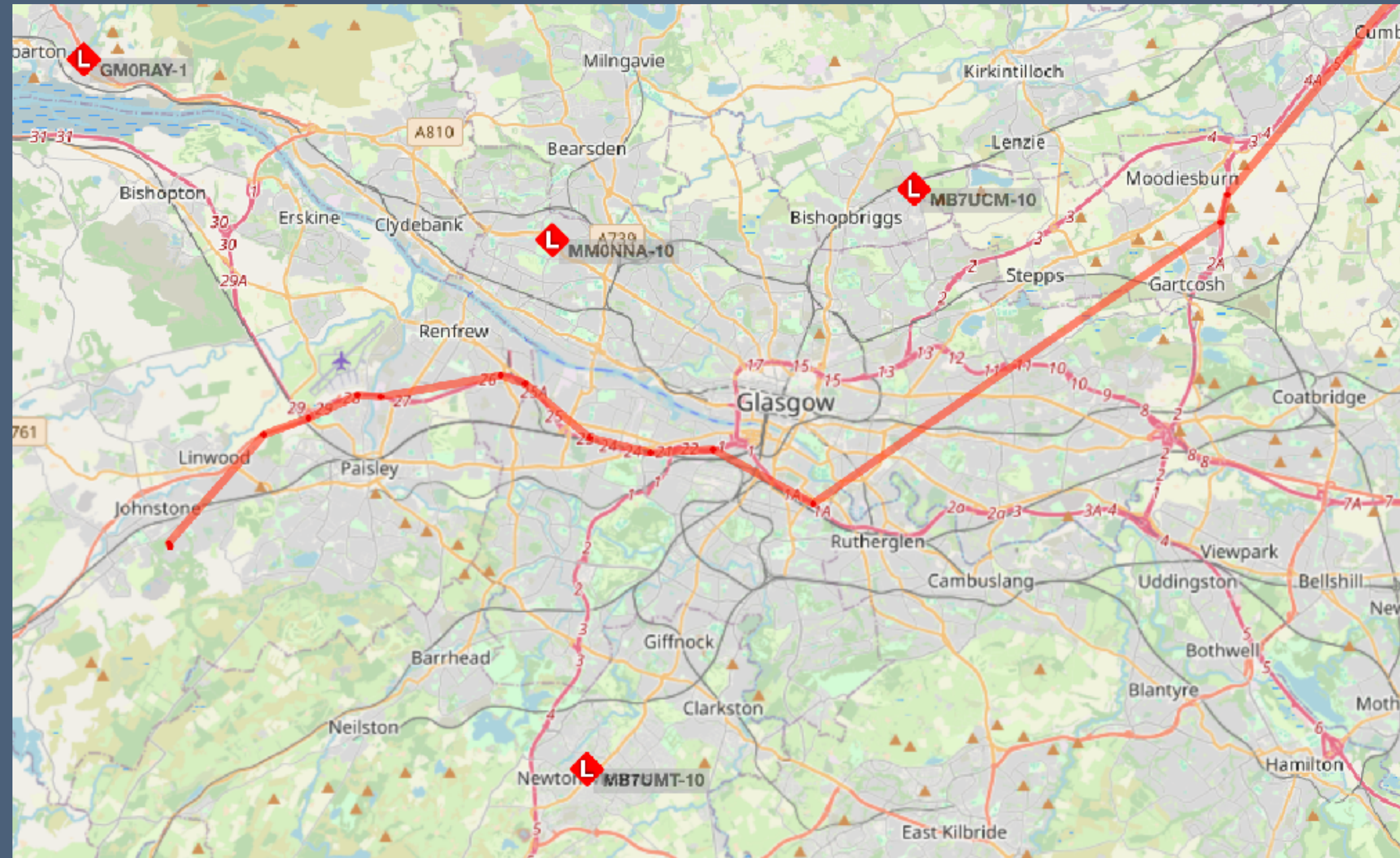
- A license to experiment on the radio frequency spectrum
- A hobby with a diverse range of sub-activities, each further sub dividing
- It can be a technical hobby, but it doesn't need to be.
- It's relatively easy to get started
- It's a bit ridiculous



Packet Radio

What is it

- Niche within Amateur Radio
- It's just WiFi, pre 802.11 wg
- Slow networking
- Callsigns are the addressing scheme
- Derived from X.25
- A limited number of applications -
 - Messaging, location tracking, BBS, file transfer.
- A dream of general data transport



Anyone interested in a copy of the program, drop me a message at G8KBB@GB7MXM.#36.GBR.EU

Also, any suggestions for change gratefully received.

Dave G8KBB

7 Rowanhayes Close

Ipswich IP2 9SX

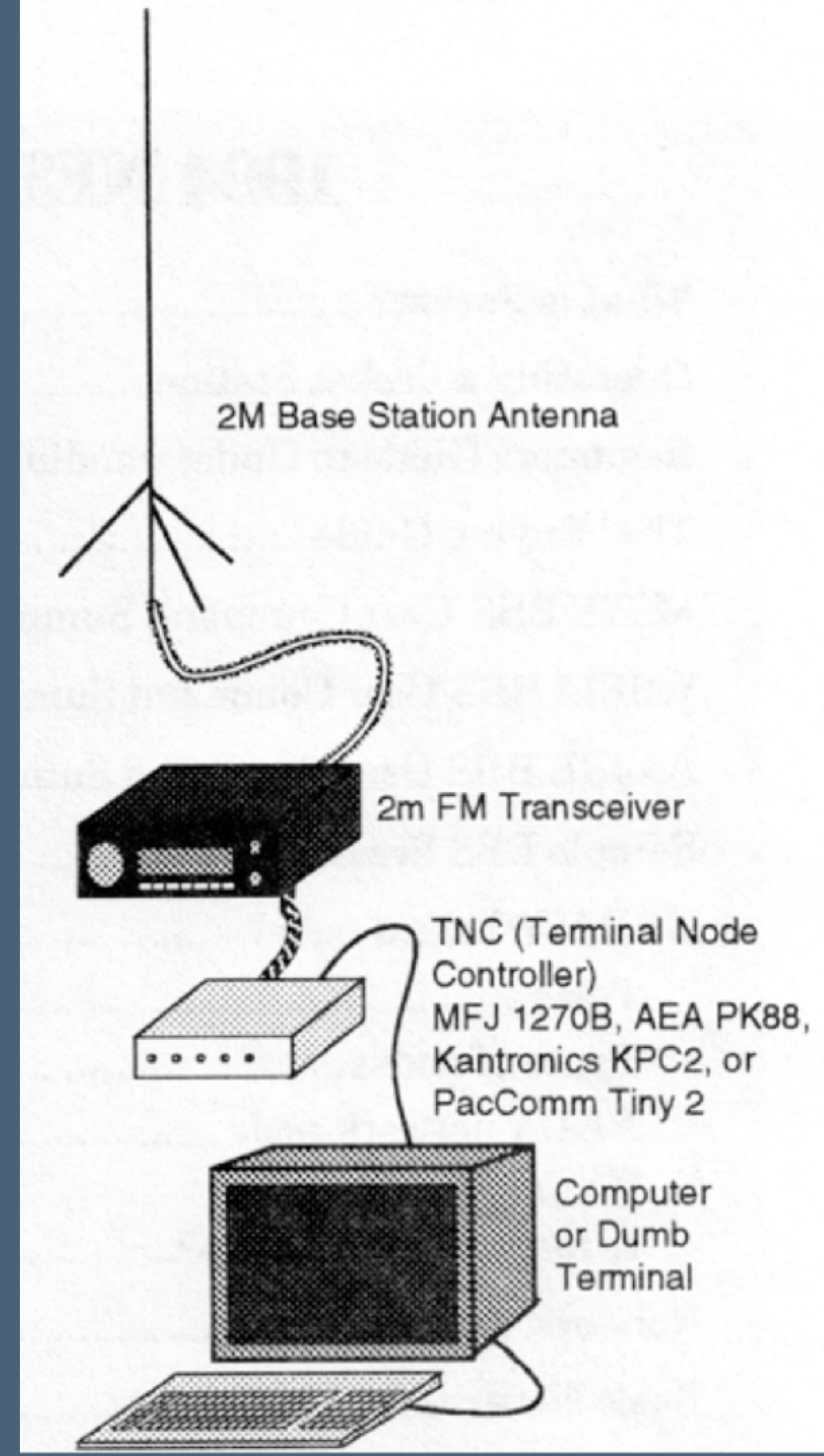
England

20-Sep	B\$	6438	ARCH	WW	LU9DCE	ARCHLINUX UPDATES 20-SEP24		
20-Sep	B\$	4966	LINUX	WW	LU9DCE	LINUX TODAY 20-SEP24		
20-Sep	B\$	6345	TECH	WW	G8MNY	Wheel Nuts		
20-Sep	B\$	5190	TECH	WW	G8MNY	BURNS's MF-UHF Wavemeter TC-101		
20-Sep	B\$	3278	TECH	WW	G8MNY	RF Field Indicator FL-30AH		
20-Sep	B\$	8982	TECH	WW	G8MNY	Piston Absorption Wavemeter		
20-Sep	B\$	3155	TECH	WW	G8MNY	AKD's VHF/UHF Wavemeter WA1		
20-Sep	B\$	2234	EQUAKE	WW	CX2SA	(M5.2) Volcano Islands, Japan region	23.4	142.5
20-Sep	B\$	6610	NEWS	WW	LU9DCE	NEW FLATHUB 20-SEP24		
20-Sep	B\$	1889	EQUAKE	WW	LU9DCE	EARTHQUAKE 20-SEP24		
19-Sep	BN	5203	DX	ARL	NC8Q	ARLD035 DX news		
19-Sep	B\$	2163	EQUAKE	WW	CX2SA	(M5.0) Solomon Islands	-7.3	156.1
19-Sep	B\$	5862	TECH	WW	G8MNY	Recording whole LF + MF bands		
06-Sep	BH	1070	ALL	GBR	G4LML	Tiny-2 Battery-charge resistor ??		
19-Sep	B\$	2323	EQUAKE	WW	CX2SA	(M5.1) South Indian Ocean	-5.6	82.6
19-Sep	B\$	1365	HUMOR	WW	LU9DCE	FORTUNE 19-SEP24		
19-Sep	B\$	4545	TECH	WW	G8MNY	Voltage Dependent Resistors		
19-Sep	B\$	4742	TECH	WW	G8MNY	VCR Triplexer to TV Input		
19-Sep	B\$	9376	DXNEWS	WW	LU9DCE	DX NEWS 19-SEP24		
19-Sep	B\$	2341	EQUAKE	WW	CX2SA	(M5.6) eastern New Guinea region, Papua New Guinea	-5.5	14
19-Sep	B\$	13640	DX	WW	LU9DCE	DX OPERATION 19-SEP24		
19-Sep	B\$	3728	TODAY	WW	KF5JRV	Today in History - Sep 19		
19-Sep	B\$	2203	EQUAKE	WW	CX2SA	(M5.2) Halmahera, Indonesia	2.2	128.7
19-Sep	B\$	3074	ALERT	WW	LU9DCE	STORM PREDICTION CENTER 19-SEP24		
19-Sep	B\$	6365	ARCH	WW	LU9DCE	ARCHLINUX UPDATES 19-SEP24		
19-Sep	B\$	4790	LINUX	WW	LU9DCE	LINUX TODAY 19-SEP24		

Packet Radio

A Full Stack

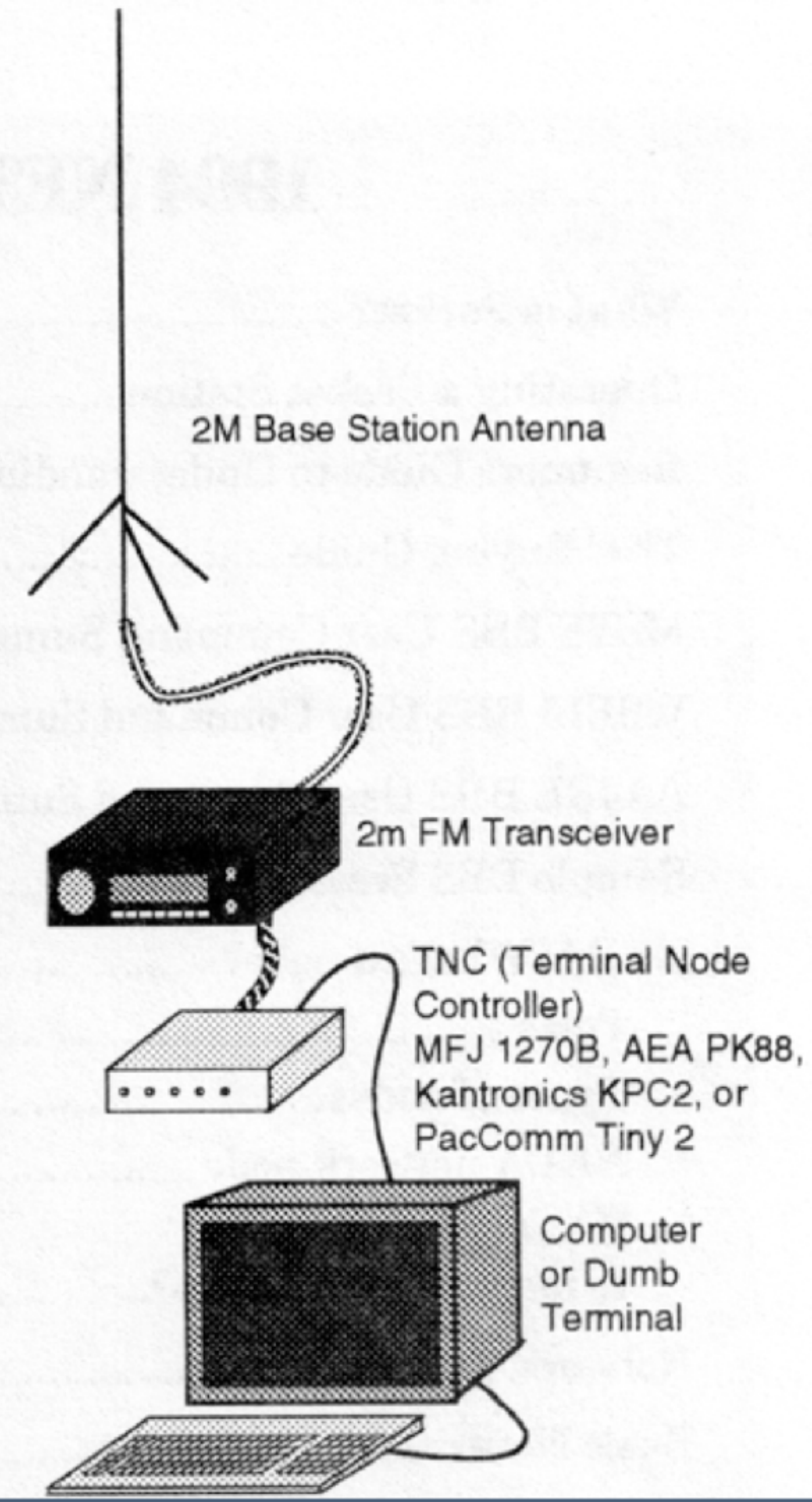
- The user controls every element of the hardware and software
- TNC is roughly equivalent to a standalone NOS Device
- Radio is interchangeable for different bands
- Antenna can be many things
- Computers have more power now!
- Not very OSI



Packet Radio

A Fully Changeable Stack

- The user controls every element of the hardware and software
- TNC is now software - Linux Native, "BPQ Node"
- Modem is now software - Direwolf, Soundmodem
- Radio is now software - USRP, FlexRadio
- Cables are now expensive
- Antenna can be many things but not software :(
- Computers can be tiny!



Packet Radio

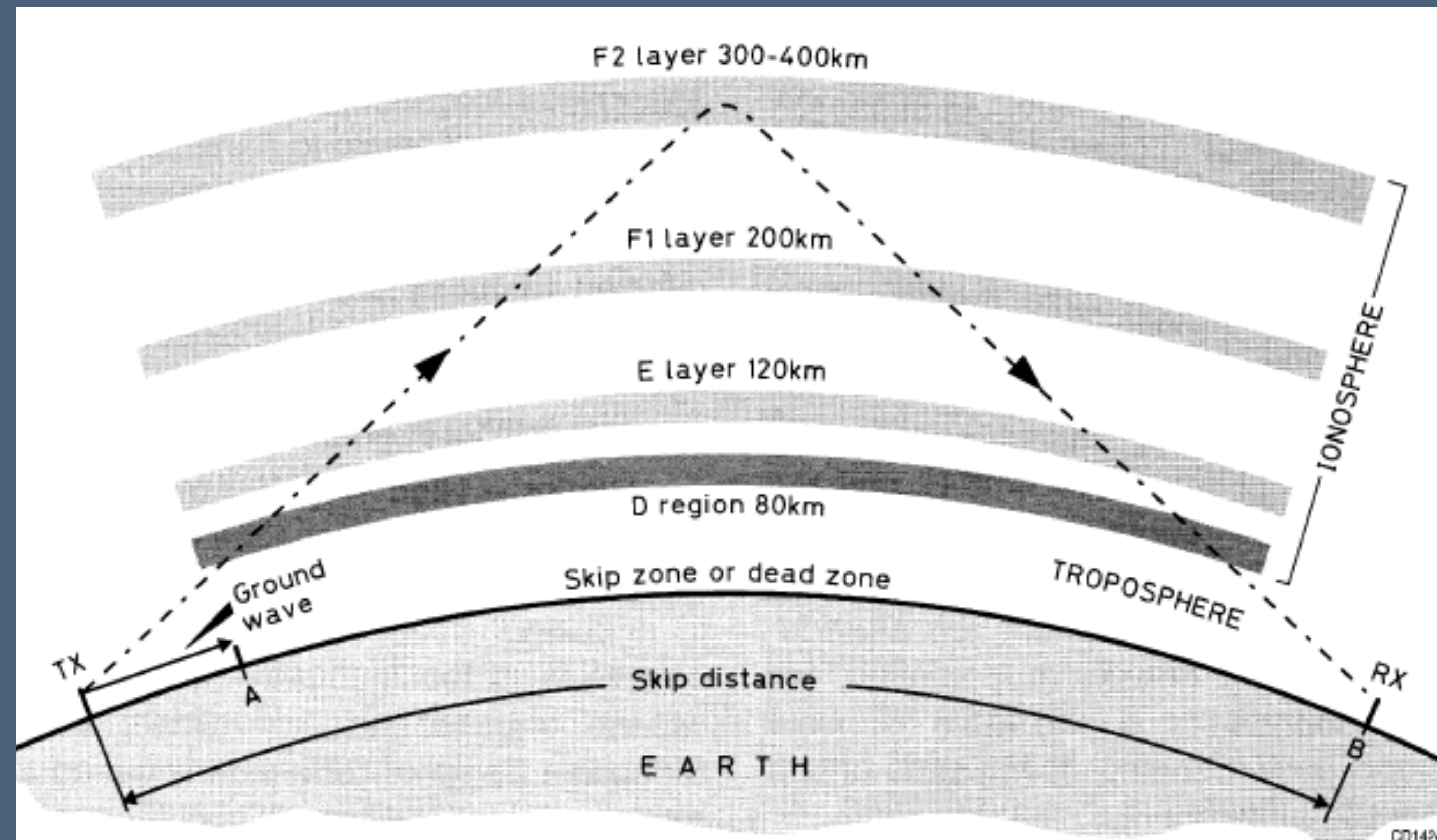
Helpful to know - bandwidth

- 3 Categories of Link
 - Low Speed - International
 - 300 bd
 - Medium Speed - Local Area
 - 1200bd
 - High Speed - Line of Sight
 - 9600bd+
- 'HF' Bands - 1-30Mhz
 - Narrow Bandwidth, Big Size Equipment
- VHF Bands - 50-145MHz
 - Mid Bandwidth, Middle Sized Equipment
- UHF+ Bands
 - High Bandwidth, Tiny Equipment

Packet Radio

Helpful to know - Link Length

- 'HF' Bands - 1-30Mhz
- Controlled by the sun
- Day/Night Differences
- Annual Differences
- 11 yearly differences

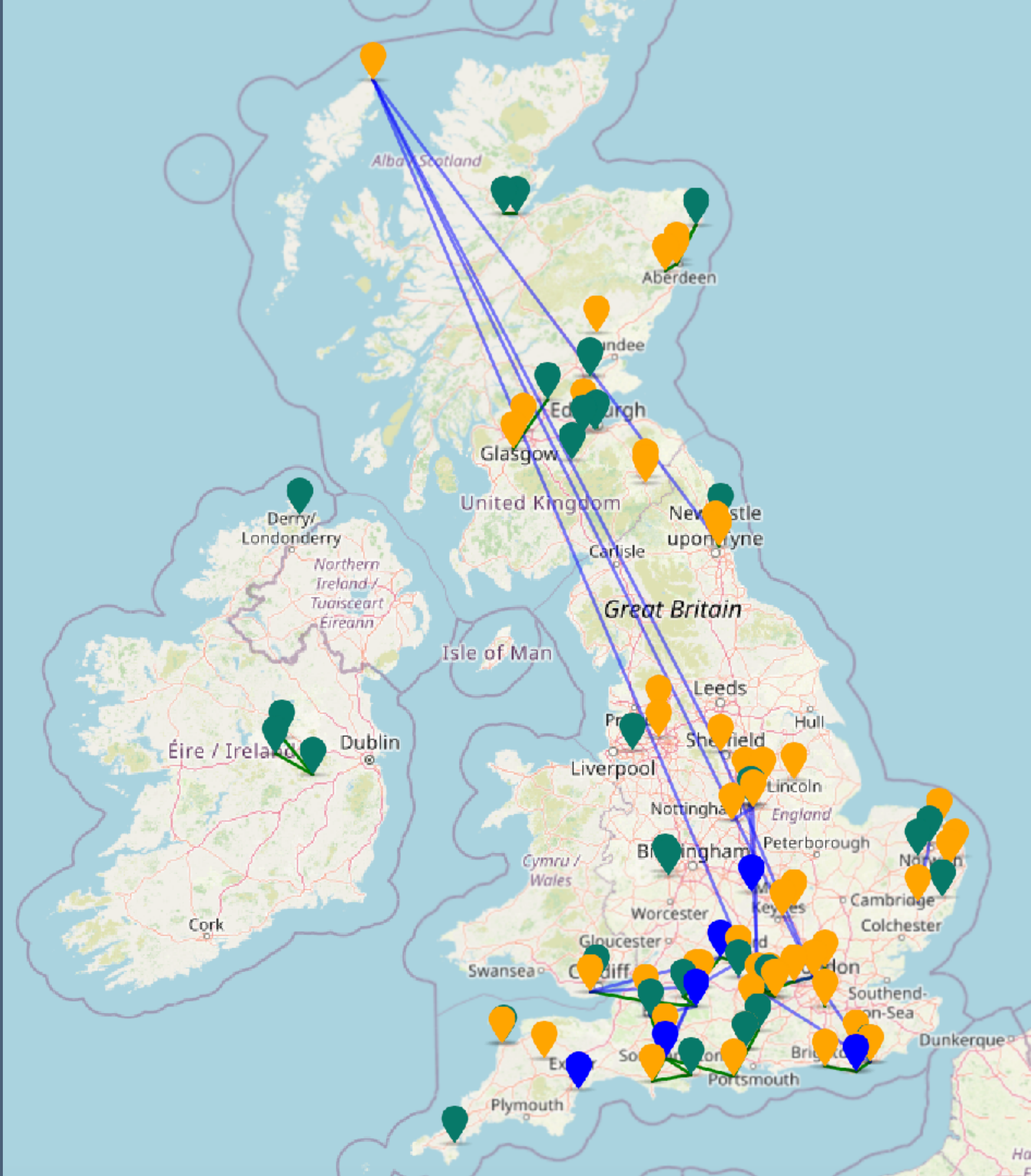




UK&I Packet Radio Network

A Slow Project

- Inherently a social network
 - Non Stop Talking
- Comprises local sections of mid-speed connected by either low speed or high speed backbones
- Mix of experienced station managers and new faces
- Mix of technical ability
- Following tradition, largely:
 - FSK/BPSK L1, ax.25/IL2P L2, NET/ROM L3



Social Challenges

- Keeping the network running depends on happy participants
- Peering agreements are 2 way and everyone manually has to set mail forwarding rules
- Rules are not set in stone and vary based on operator's preferences
- We manually route around problems

Forwarding Config for GB7AUG - 0 Messages Queued

TO	AT	TIMES	Connect Script
GM5AUG	SCOT GBR		C 5 GB7AUG-1

Hierarchical Routes (Flood Bulls) HR (Personals and Directed Bull

	#71.GBR.EURO #72.GBR.EURO #73.GBR.EURO #74.GBR.EURO #77.GBR.EURO #78.GBR.EURO
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BBS HA

Enable Forwarding Interval (Secs)

Request Reverse Interval (Secs)

Send new messages without waiting for poll timer

FBB Blocked Max Block Send Personal Mail Only

Allow Binary Use B1 Protocol Use B2 Protocol

Send ctrl/Z instead of /ex in text mode forwarding

Incoming Connect Timeout (Secs)

Copy from BBS

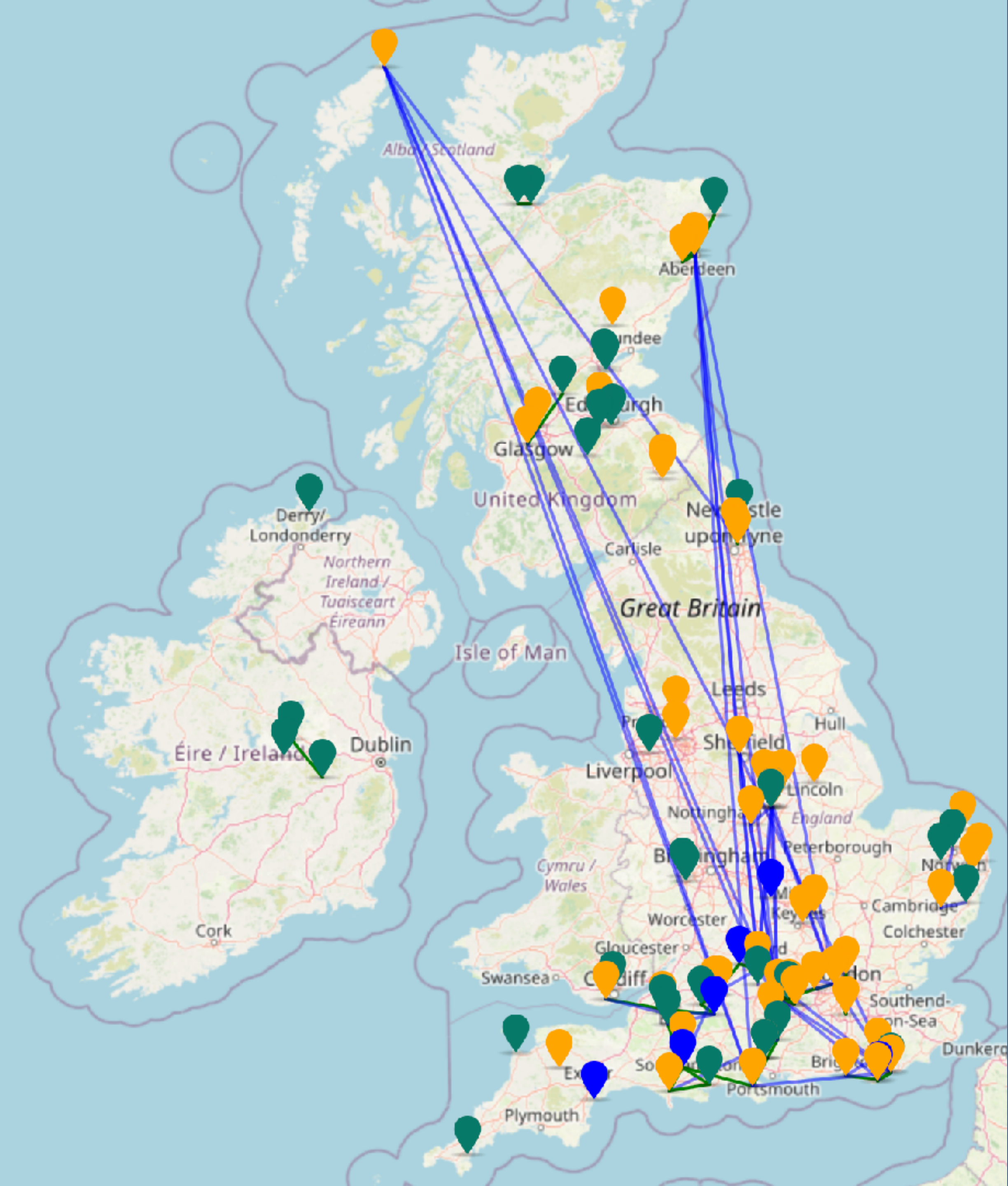
Update

Start Forwarding

UK&I Packet Radio Network

A Difficult Project

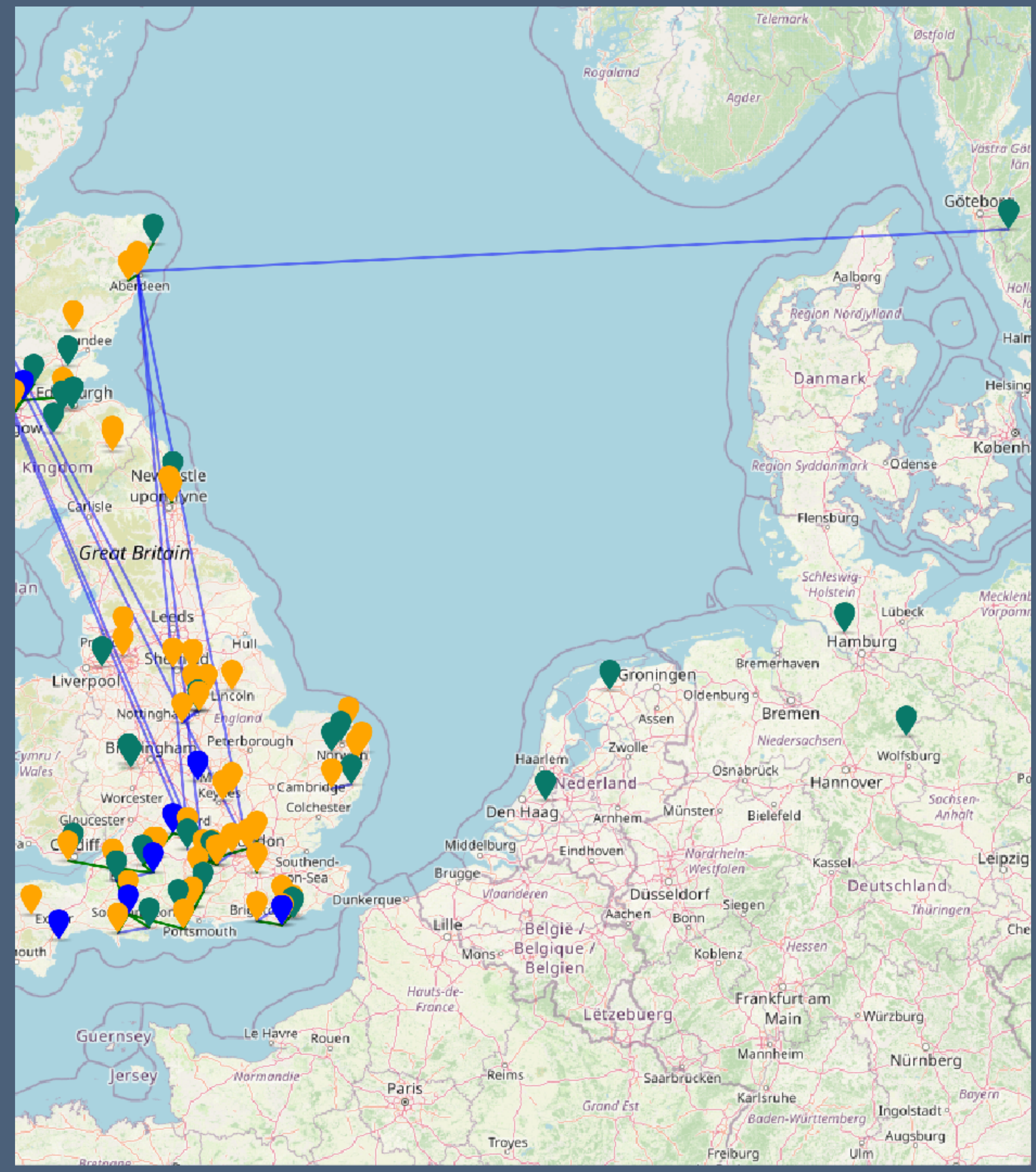
- Has its roots in supplying NinoTNC
- ‘What next?’
- Learn the state of the art
- Find local friends
- Understand the laws
- ...Change the laws



UK&I Packet Radio Network

A Debian Project

- Raspberry Pi is popular!
- Raspberry Pi OS packages are... outdated
- The software is old, fiddly & often just binaries
- Free Software is **really** hard for new people of many ages
- Documentation is a challenge
 - Discord is a nightmare
- Lots of users reluctant to 'play'



Hibby's Packet Radio Repo

An idea that brought a lot of work

- Abuse my hobby of building other people's software for good
- 'Oh, yeah Just wget repo.list to /etc/apt/sources.list.d/, cp hibby.asc to /etc/apt/trusted.gpg.d/'
- Ramblings of an unhinged madman
- Backporting software that's been updated to older platforms
- Ever more refined build system, building for ~7 OSes across 4 platforms takes time manually
- Became a standalone project known as 'Hibbian'
- This has brought it's own idiotic challenges - websites? mailing lists? Is it a fork? Will I have non stop forks into smaller, more stupid projects?

Hiboy's Packet Radio Repo

Reducing the workload

- mini-build based workflow
- Package containing dedicated key and source file - *reinventing the keyring*
- Backports & ports of latest debian-hams packages to other platforms
 - An audience likely to complain to me and/or file bug reports
- GPG is hard. It has not reduced my workload.
 - Maybe I am incompetent. Maybe Both.

How do I Start?

Easy in DebianLand!

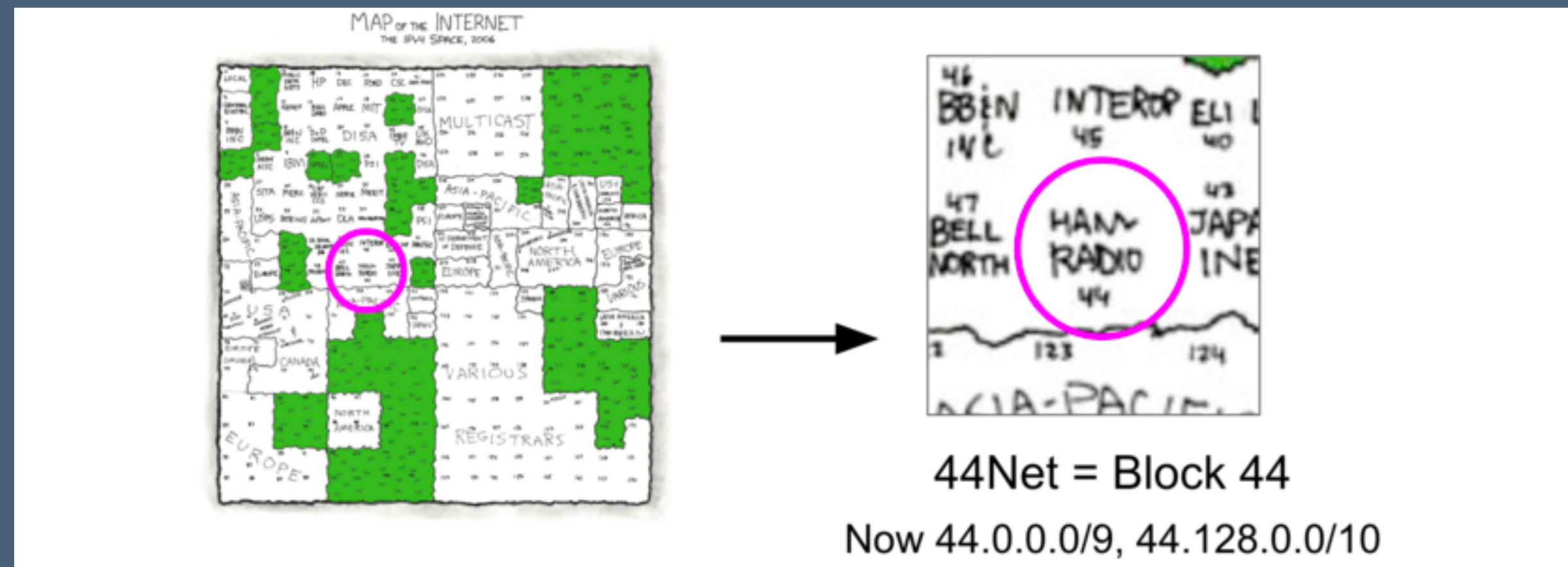
- Modem: Direwolf, NinoTNC, LoRa units*, QTSoundModem
- Terminal: axcall, lincac - Debian. QtTermTCP - binaries from author or me
- Node: Uronode, fbb & Linux stack - Debian. BPQ - binaries released by author or me.
- Computer: Pick your favourite, presumably Debian.
- Antenna: Still not software, find some wire

* Some are Bluetooth-LE only! Do not trust them



What's Next

IP!



- Radio Amateurs have **a lot** of IP addresses, even after selling some to Amazon.
- 300/1200bd does not lend itself towards IP, but 9600+ does.
- Wonky in Linux Kernel but usable - people are *actually* spending 5-10 minutes downloading webpages
- No encryption - Telnet, http, null cipher ssh...

What's Next

New Software

- All of our software stacks are aging and creaking
- ax.25 2.2 is barely implemented - published July 1998
- Much software is unmaintained
- Can be hard to trust reliability and stability when developing for ax.25
- Paradigms are old and inefficient by many standards
- We now have a critical mass of people in communication and a mechanism to push new software to them
- Why not start again?



What's Next

Alternative Technology

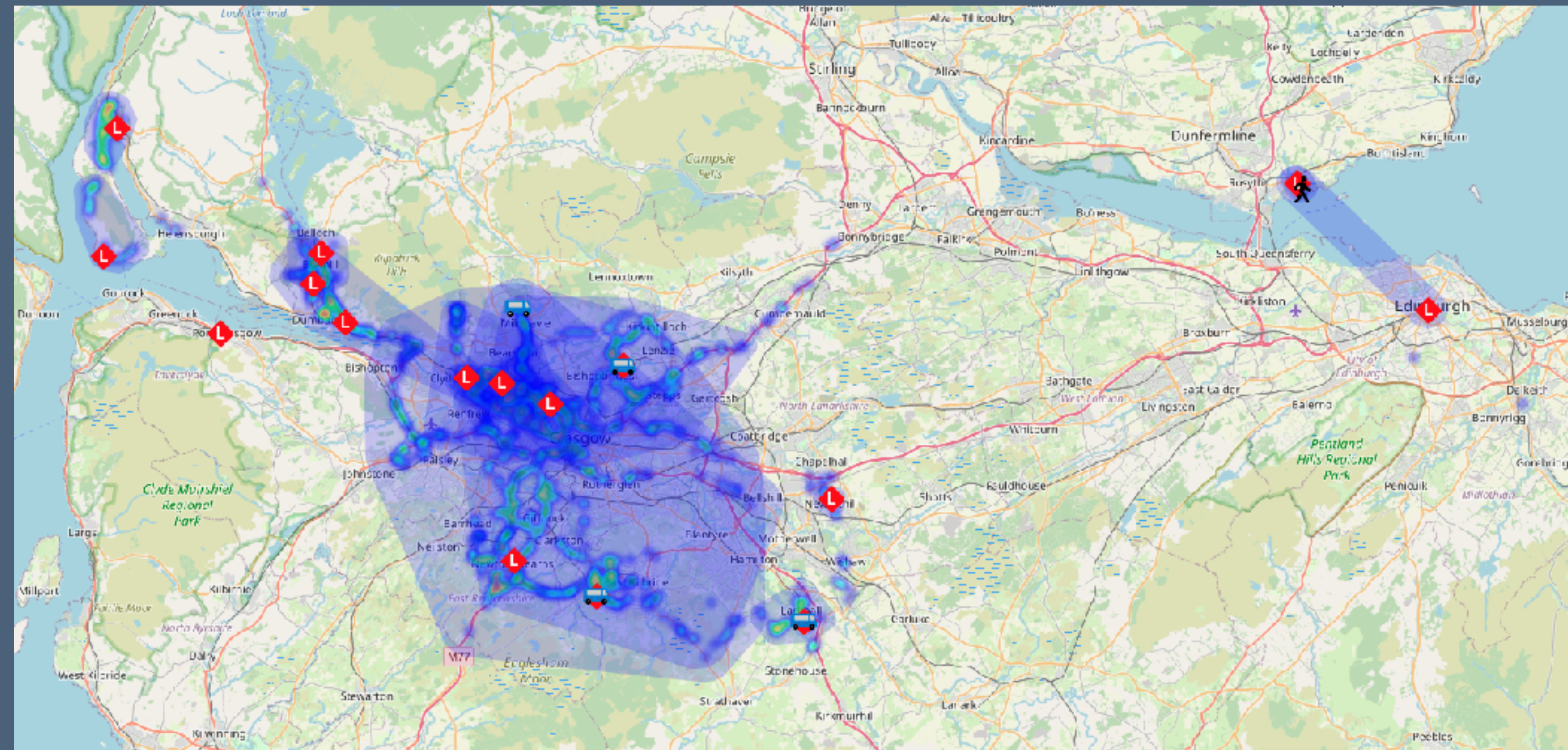
- Other people are doing the same, it's not just us.
- TARPNet are US based groups and use the same foundations
- Winlink is a global email system thought to be illegal* in the UK
- JS8Call is store & forward always on HF messaging
- Interlink with other networks such as APRS
- Meshtastic - no license required
- There will be many more things I have never even heard of available
 - Data transport over radio is not a revolutionary idea

* Getting caught doing radio crimez is hard but please don't do them

What's Next

New Technology

- NinoTNC, QTSM and MMDVM introducing higher speeds in 12.5 & 25kHz channels with v.41 firmware
- Cheaper equipment for 300bd, 9600bd+
- Appliances based on Debian
- Break compatibility
- Rapid proliferation of astonishingly cheap LoRa devices
- New modes being developed:
 - IP over DVB-S over GEO
 - 'New Packet Radio'
 - Microwave Point to Point



Helpful Links

- Get started: <https://guide.hibbian.org>
- Ask for help: hibby@debian.org
- Bpq32, QtTermTCP, QtSoundModem: <https://www.cantab.net/users/john.wiseman/Documents/>
- XROUTER: <https://groups.io/g/xrouter/topics>
- Direwolf: `apt install direwolf` // <https://github.com/wb2osz/direwolf>
- NinoTNC: UK/EU: <https://ko-fi.com/s/981d919ea3>
- NinoTNC: US/Canada: https://tarpn.net/t/nino-tnc/n9600a/n9600a_info.html

