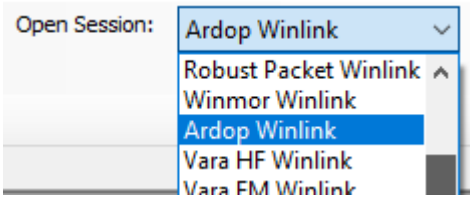
Winlink ARDOP

Winlink ARDOP is a method of sending “email” messages over HF radio via an RMS station. If you are new to Winlink, see the Winlink How-To first.



Every week, I connect to RMS stations in different locations and keep a log so I can track the most reliable ones. Here's the scenario I'm considering and how I'd use my log.

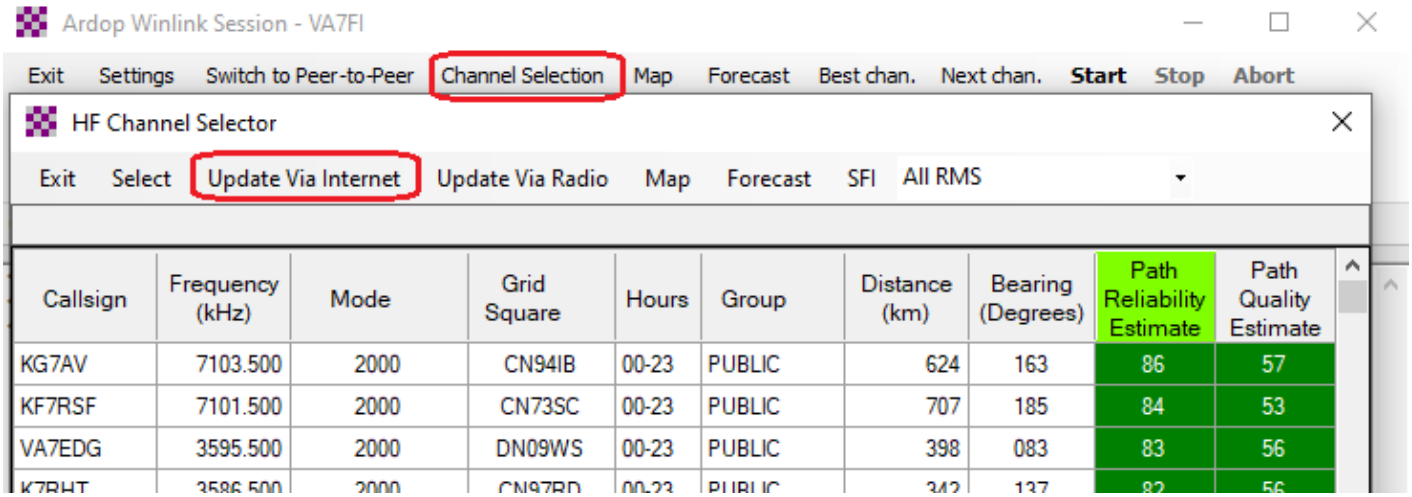
The Scenario

In the event of an emergency where the power, phone, and internet are all down, I want to be able to send my family back east a quick email to let them know that I'm ok, and offer the same service to others in my neighbourhood.

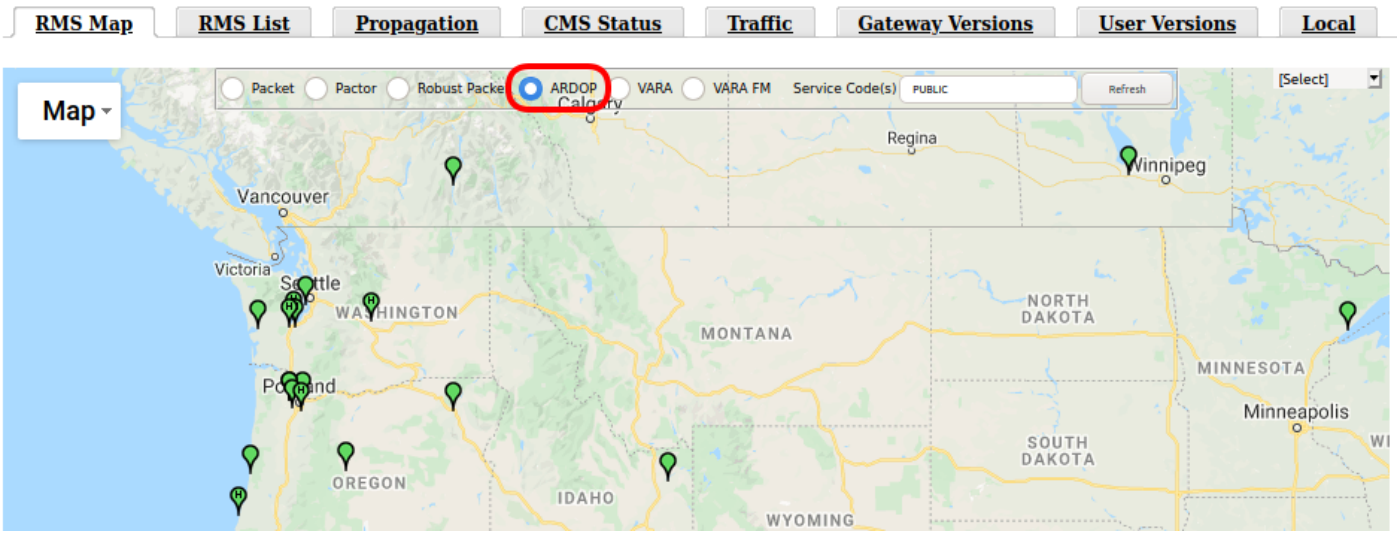
Radio Check

The first step is to select a list of stations I can connect to from my location. To do this, select:

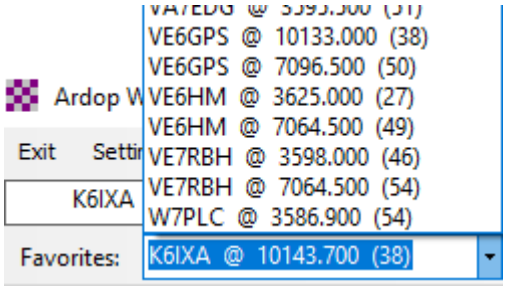
- `Channel Selection` to see a list of all available stations.
- `Update Via Internet` to update the propagation information (last two columns).
- Sort by `Path Reliability Estimate` or `Path Quality Estimate` to see the most reachable stations first.



These stations can also be visualized using the Map option or from the Winlink website.



Every week, I connect to RMS stations in different locations without actually sending or receiving messages just to see how long the "handshake" takes to see if I can connect at all.



I save the successful connections to my Winlink favourites for quick retrieval, but I also log them in a spreadsheet for further analysis.

The Spreadsheet

The Winlink favourites list is a good tool, but it's hard to "rank" the best stations. To that end, I use a

spreadsheet

to log the following information in addition to the stations' info:

- The length of the session (the shorter the better).
- The date I last connected (the most recent the better).
- The number of times I managed a connection (the more times the better), which auto calculates the percentage of time I've been able to connect to the station.

I also perform a crude approximation of the coastal distance of the RMS station. The rational here is that if an earthquake hits, there's a good chance that coastal RMS stations will be affected or overloaded so I want to be able to connect to a station further inland.

Based on all these different measures, I then create a semi-subjective ranking of the stations. Those are the stations I would try to connect to first.

Rank	Callsign	Band	Centre freq (kHz)	Dial freq (kHz)	Mode	Grid Square	Distance (km)	Bearing (Degrees)	Coastal Distance (km)	Session Time (s)	Calculation In	Calculation Out	Last Used	28	Connection Rate	Hybrid?	Daily Limit (minutes)	Notes
1	VA7EDG	80m	3595.5	3594.0	2000	DN09WS	398	83	397	38			Jun 3, 2021	26	93%		120	BC's Arrow Lake.
2	K7IF	80m	3586.8	3585.3	2000	CN87OA	276	167	14	36			Jun 3, 2021	23	82%		120	
3	N7LOB	80m	3591.0	3589.5	2000	CN86BX	274	184	-66	39			May 30, 2021	25	89%		120	
4	VA7PF	80m	3598.0	3596.5	2000	CN89CA	48	194	-20	31			May 30, 2021	22	79%		120	
5	K7HTZ	80m	3589.0	3587.5	2000	CN87OD	262	166	18	38			Jun 3, 2021	17	61%	y	120	Internet via SAT/Hybrid RMS v
6	K7ENN	80m	3597.0	3595.5	2000	CN85RM	443	169	8	63			Mar 8, 2021	10	36%		120	
7	W7PLC	80m	3586.9	3585.4	2000	CN87MA	273	169	5	62			Jun 3, 2021	12	44%		640	Trimode, Olympia, WA
8	K7EFR	80m	3596.0	3594.5	2000	DN18ID	485	105	440	71			Feb 28, 2021	3	11%		250	Trimod Northeast Washington
1	K6SDR	40m	7103.7	7102.2	2000	CM87RX	1276	176	-133	58			May 30, 2021	17	61%		1440	San Rafael, CA. Pactor 4 avail
2	VA7PF	40m	7064.5	7063.0	2000	CN89CA	48	194	-20	84			Apr 25, 2021	13	46%			
3	VE7RBH	40m	7064.5	7063.0	2000	CO64JS	640	339	100	34			Mar 19, 2021	5	18%	y	120	Smithers BC. bvars.org
4	KG7AV	40m	7103.5	7102.0	2000	CN94IB	624	163	76	30			Jun 3, 2021	7	25%			Bend, Oregon
5	KD0SFY	40m	7098.5	7097.0	500	DM78OV	1895	121	1430	124			Jun 3, 2021	5	19%		120	RMS Trimode 1.3.36.0 Colorac
1	K6SDR	30m	10146.2	10144.7	2000	CM87RX	1276	176	-133	50			Jun 3, 2021	7	25%		1440	San Rafael, CA. Pactor 4 avail

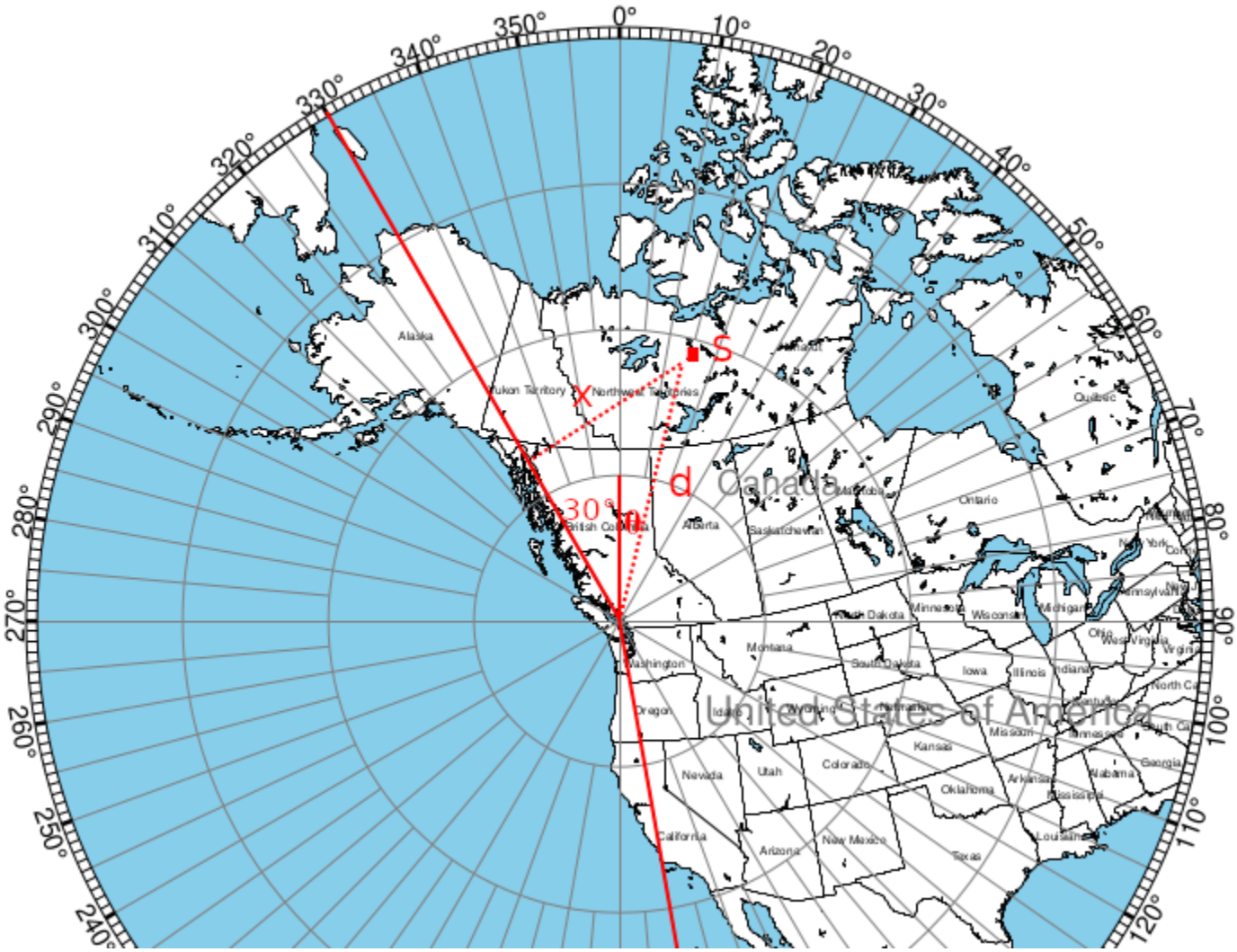
- Some stations have a daily connection time limit. This is the *total* time I can be connected to that station (combining different frequencies or bands) during a given day.
- Some stations have the ability to hold and forward messages if the station's internet goes down. This only works if the sender and recipient connect to the same RMS. These are called **hybrid** stations.

The purpose of this spreadsheet is to do the "thinking" ahead of time so that in a real emergency, I can just look at the ranking to select the best frequency.

For more details on how I estimated the coastal distance, click on the link below:

I could manually look up the coastal distance of each station and note it, but that's a lot of tedious work. Instead, I used the distance and bearing between my station and the RMS station and performed some basic trigonometry to get an estimate.

To visualize the calculations, start with an Azimuthal Map centred at your location.



- I drew two lines to represent the coast. One going north west at a bearing of 330° and one going south at a bearing of 170°. These two lines are eye-ball approximations of where most of the coast is.
- Now imagine an RMS station \$S\$ at a distance \$d\$ with a bearing of \$\theta\$ (1000 km away at a bearing of 15° for example).
- The distance from the coast would be: \$ x = d \sin(30° + \theta) \$
  in our example: \$ x \$ = 1000km • sin(45°) = 707km
- Similarly, if the station is at a bearing south of 70°, the distance is calculated using \$ x = d \sin(170° - \theta) \$

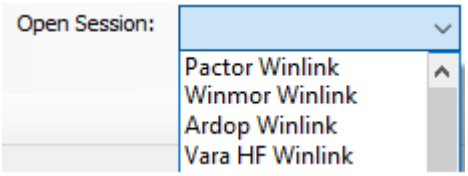
This is an approximation for two reasons:

1. Obviously, the coast isn't simply two straight lines.
2. But a more subtle point is that this simple geometry only works on a flat surface, not on the curved surface of the globe.

That being said, my purpose is not to know exactly how far the stations are from the coast, but to be able to roughly rank them so that I can identify those that are the furthest inland.

Ardop vs Vara vs Pactor

There's essentially four different methods for sending Winlink messages on HF:



- **Pactor** is the fastest / most robust method but it requires a $2100 external modem to work.
- **Winmor** has been deprecated and will probably be removed from later versions of Winlink. It has a maximum speed of 750 bps.
- **Ardop** is the method I use. It is an open protocol in active development and has a maximum speed of 1336 bps. See here for an overview.
- **Vara** is a closed protocol. The demo version has a maximum speed of 175 bps and the full version ($70 USD) has a maximum speed of 7536 bps. See here for more details.

So which is best to use? Well, it depends... For P2P, it's important that everyone uses the same method (and frequency), but for messages sent via an RMS, it doesn't matter at all.

It also depends on who's using it:

What is best for a local EOC?

Our local EOC reports to the SW PREOC in Surrey and their website says:

> The preferred method is data rather than voice. If you cannot get through peer to peer, send the message via Winlink.

It then goes on to list HF Data frequencies but doesn't say which mode to use (as if that was obvious). But our local EOC has a Pactor modem so I assume that's the industry standard. But that only matters for P2P. Winlink messages sent to an RMS will make it to their destination no matter the method.

So for EOCs, the answer seems to be the current standard: **Pactor**

What is best for individuals?

Again, unless you want to use P2P, it doesn't matter if people are using different methods. Both Ardop and the free version of Vara seem to work, although the demo version of Vara also shows an annoying popup screen every few minutes asking you to register.[1)]

Conclusion

I understand the desire for standardization within a region. It would be nice if there was only one mode (and it was free), but given all the different options, I guess it's a trade-off between cost, community by-in, and speed.

Personally, I can't justify spending $100 from my limited ham radio fund just to get a Winlink speed upgrade. If the option was between having HF Winlink for $100, or no HF Winlink at all, I would spend the money, but $100 for a mere speed upgrade is below my diminishing returns threshold. There's a lot of more I could do to improve my station with that money.

The other thing to consider is that if Vara figured out a way to increase the speed in a closed-proprietary way, it's just a matter of time before the Open Source Ardop team catches up. Personally, I tend to favour open source options to closed proprietary ones not only because it's cheaper for myself, but also because it lowers the entry bar for others in the community to join. If HF P2P is really important for our community, then we probably don't want to exclude people who can't afford the $100 entrance fee.

[1)]

Vara shows an annoying popup screen every few minutes.