North Texas NTMS Microwave Society

47 GHz Propagation Tests

W5LUA & AA5AM

November 6, 2021

Background

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- During the last several years AA5AM and AA5C have operated from Farmersville, TX during the ARRL 10 GHz and Up contests to make contacts with W5LUA on 24, 47 and 77 GHz.
  Downside is that it takes time away from being at home to work rovers on 10GHz.

Solution

- Ultimate solution is to set up at home.
- AA5C accomplished this by setting up in an upstairs house window and we completed a contact on 47 GHz on Oct 19 swapping 559/599 reports at 8:08AM at a distance of 17km.
- Now to AA5AM….Scott concluded that he had nearly line of sight to me at 21km (13mi) if he were to set up on his garage roof

AA5AM looking toward W5LUA

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Scott set up shop on his garage rooftop at about 15 ft above ground level. DB6NT 47 GHz xvtr at about -8 dBm power output to a 10 inch diameter dish driven by a Yaesu FT-757 HF rig.

Saturday 47 GHz Tests with AA5AM

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Clear, calm and blue sky all day

				Al			Scott		
Date	Time	Sent	Rcve	Temp	DP	RH	Temp	DP	RH
10/30/2021	8:45AM	18dB/N	S9+40	51F	38F	61%	48F	32F	53%
	9:52AM	5-6dB/N	S8-9	57F	39F	51%	53F	36F	53%
	12:24PM	4-5dB/N		68F	37F	31%			
	4:16PM	M		74F	36F	25%	70F	36F	29%
	5:10PM	5dB/N		74F	39F	28%			
	7:15PM	20dB/N	S9+40	56F	45F	68%	66F	35F	32%
	7:30PM	40dB/N	S9+40	56F	45F	68%	66F	35F	32%

Next Step

- Not seeing anything conclusive about temperature, dew point and relative humidity being related to 47 GHz S/N, I decided to look at the prop map
- I also tried to correlate 47 GHz S/N from AA5AM with the AA5C 24 GHz beacon.
- Results follow….

October 30th 7:30PM

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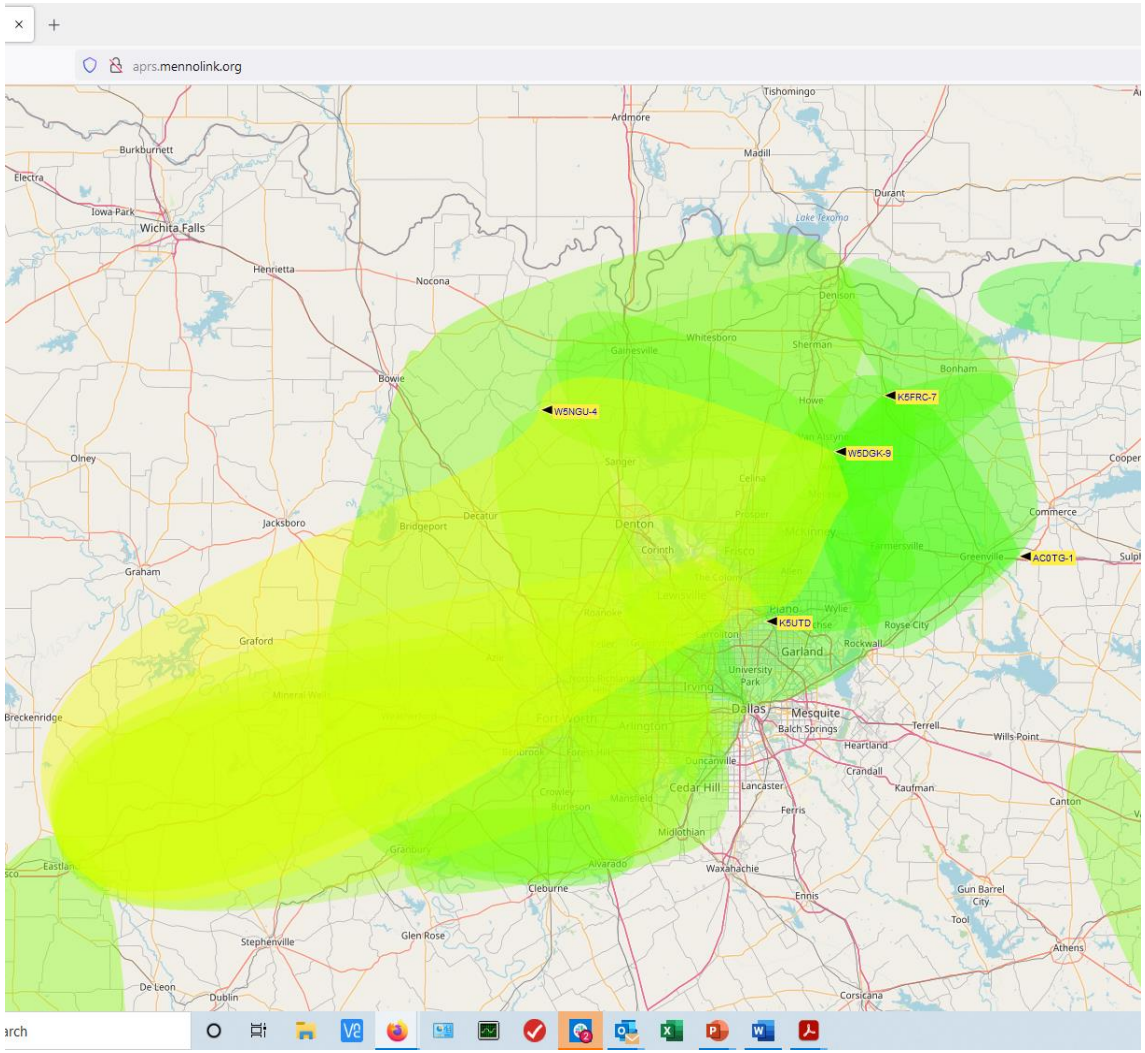

AA5C 24 GHz beacon was 55 dB above noise

Scott's 47 GHz signal was 40 dB over noise

T=56F, DP= 45F, RH= 68%

View from AA5AM to W5LUA

Mysterious Lights

Saturday evening
around 7:15PM

October 30th 10:30 PM

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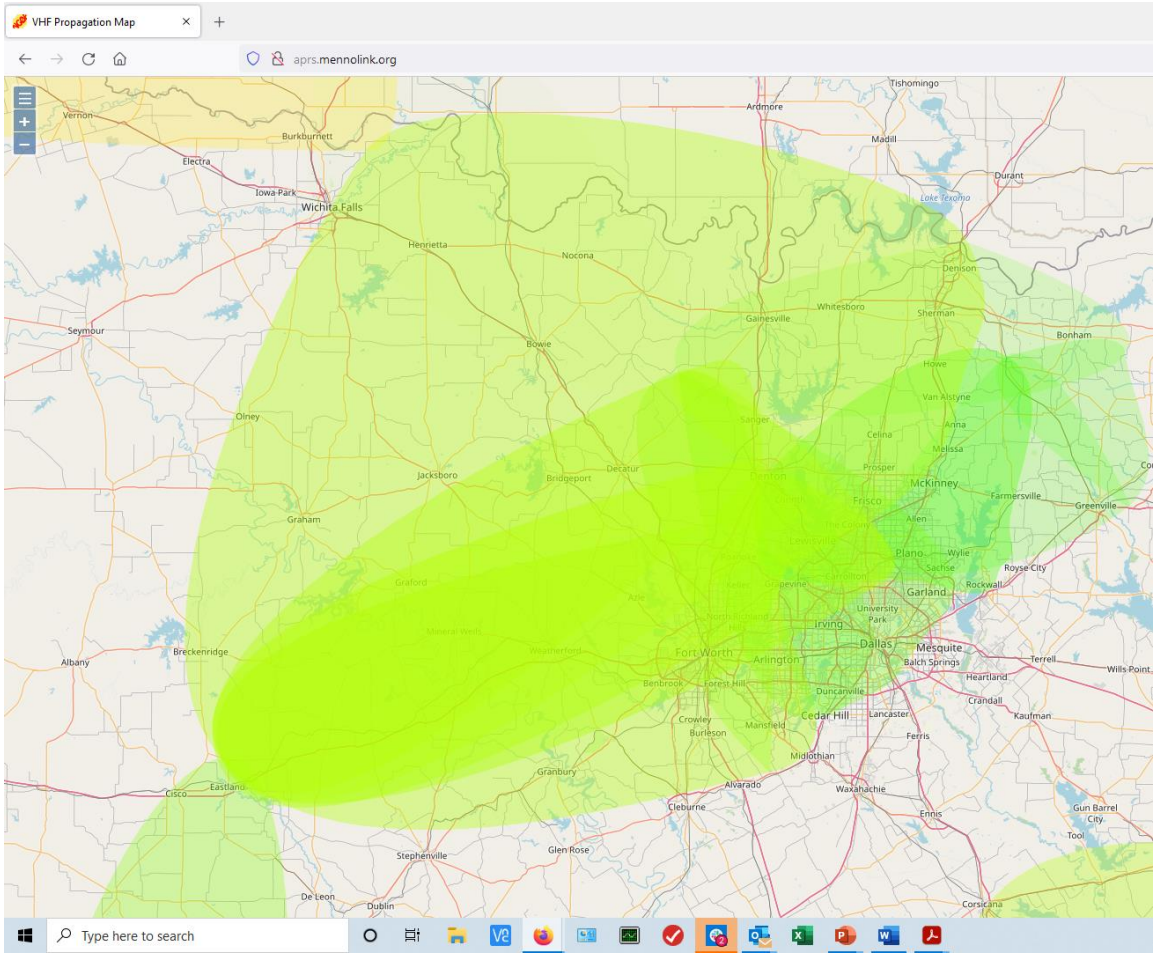

AA5C 24 GHz beacon was 65dB above noise

T=48F, DP= 44F, Hum= 84%

Sunday October 31st 5:15 AM

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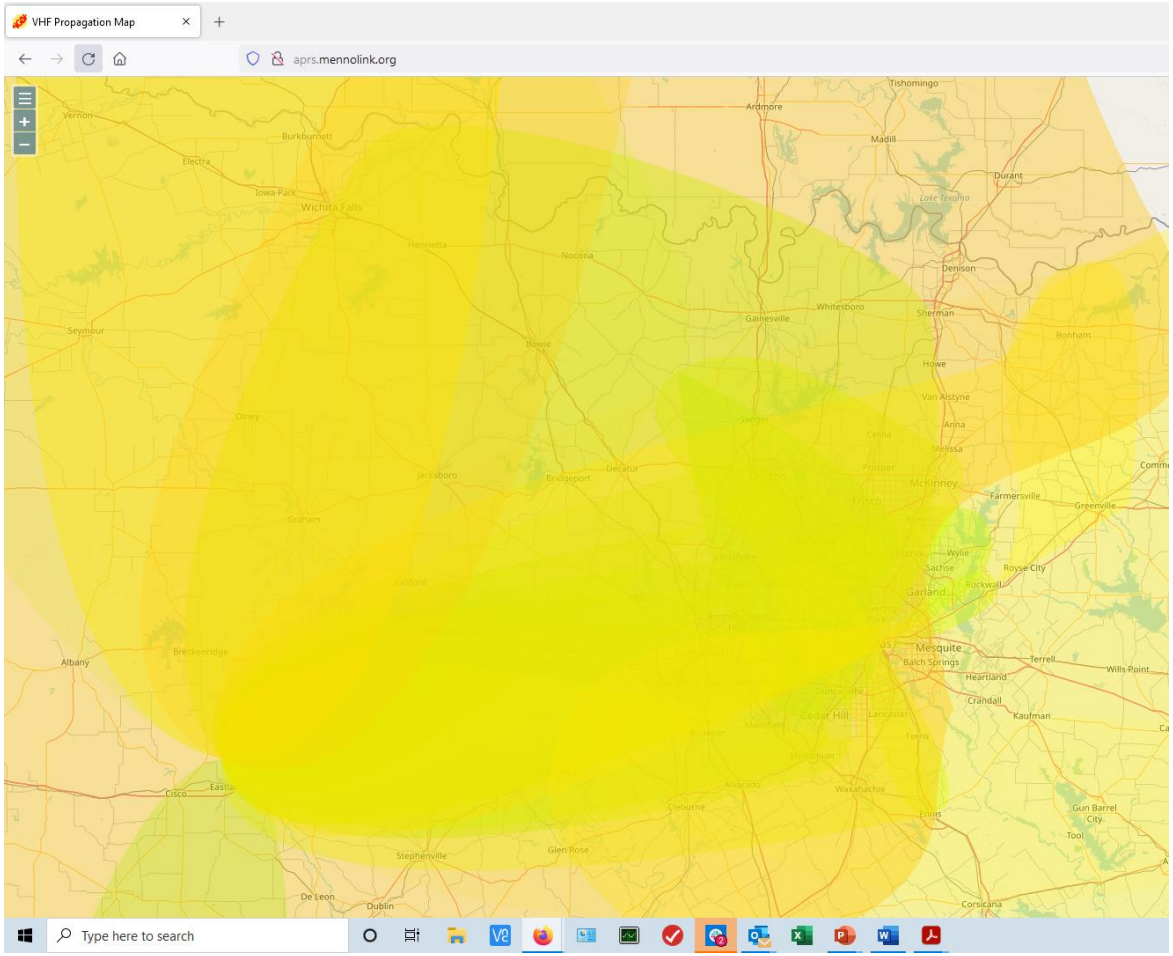

AA5C 24 GHz beacon was 65dB above noise

T=43.8F, DP= 43.2F, Hum= 98%

October 31st 7AM

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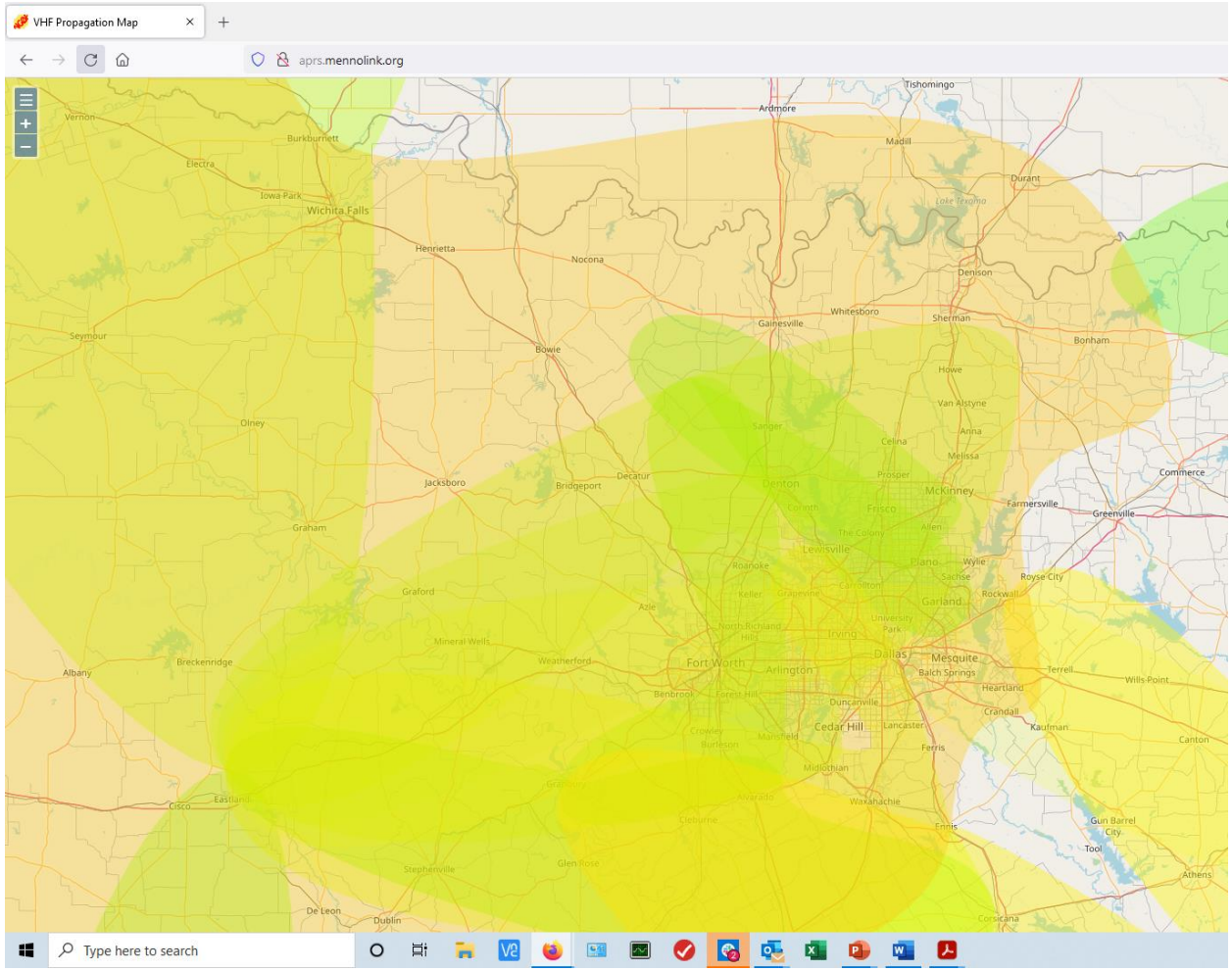

AA5C 24 GHz beacon was 55 dB above noise

Scott's 47 GHz signal was 55 dB over noise

Al T=43.2F, DP= 42.8F, RH= 99%

Scott T=51F, DP=36F, RH 59%

October 31st 8AM

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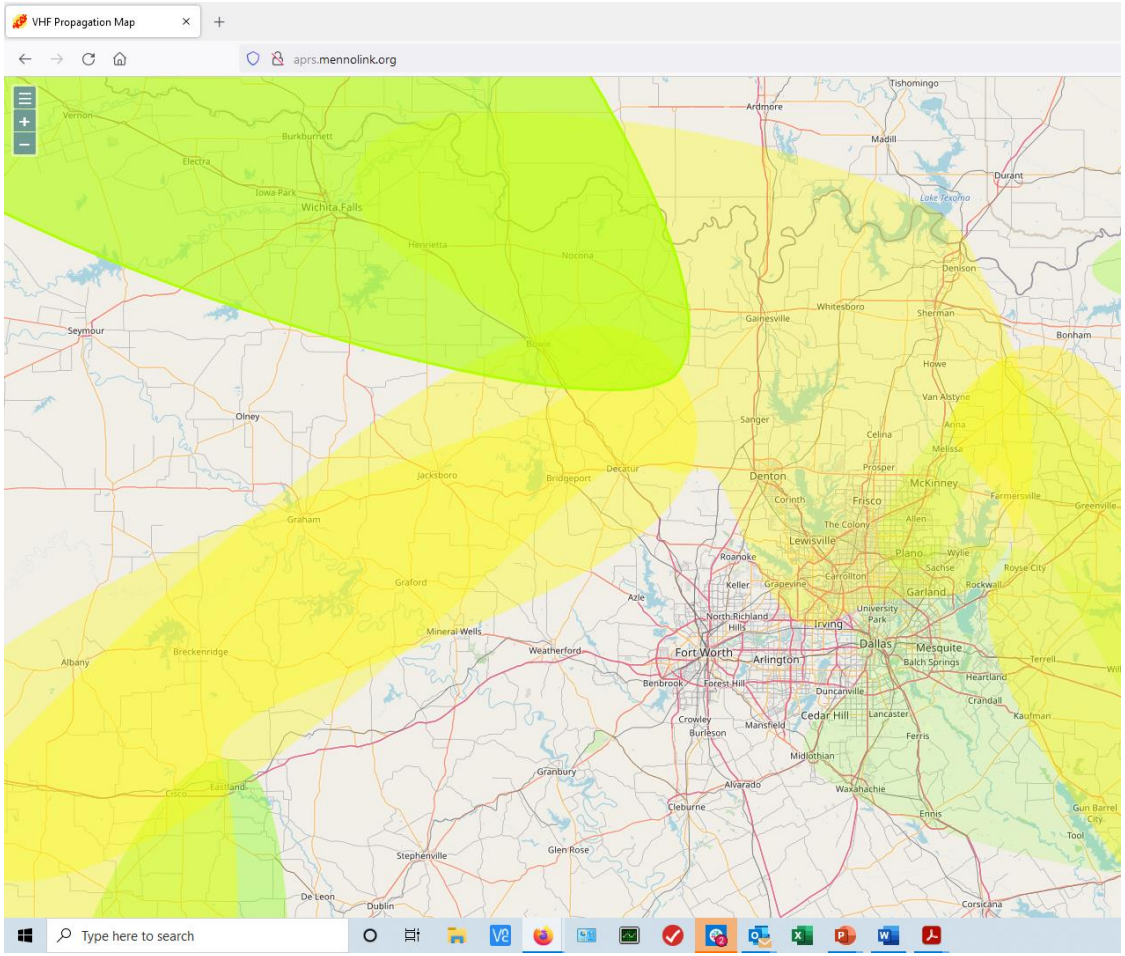

AA5C 24 GHz beacon was 45 dB above noise

Scott's 47 GHz signal was 25 dB over noise

Al T=44.2F, DP= 43.9F, RH= 99%

Scott T=51F, DP=36F, RH 58%

October 31st 9AM

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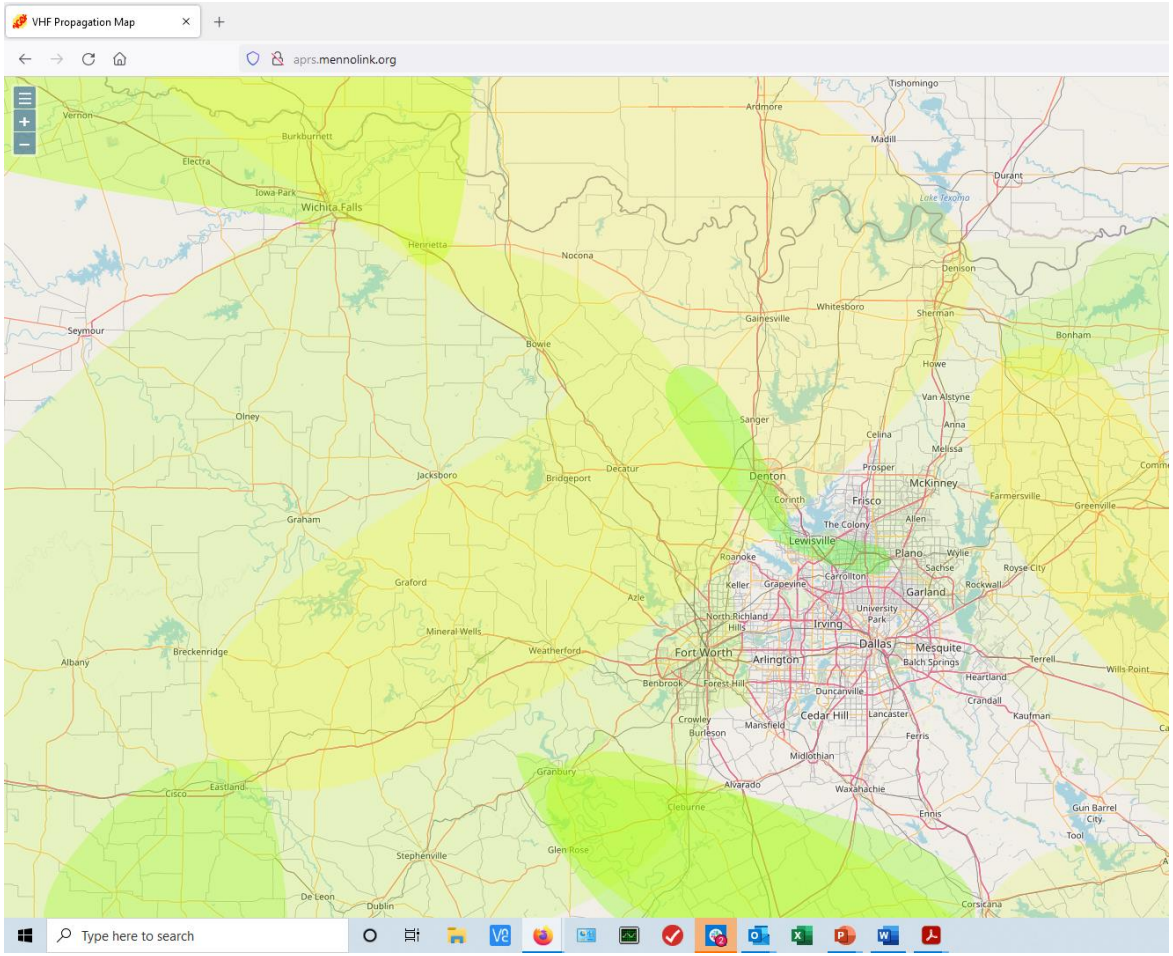

AA5C 24 GHz beacon was 55 dB above noise

Scott's 47 GHz signal was 25 dB over noise

Al's signal was S9+10dB

Al T=56F, DP= 49F, RH= 79%

Scott T=53F, DP=40F, RH 62%

October 31st 10AM

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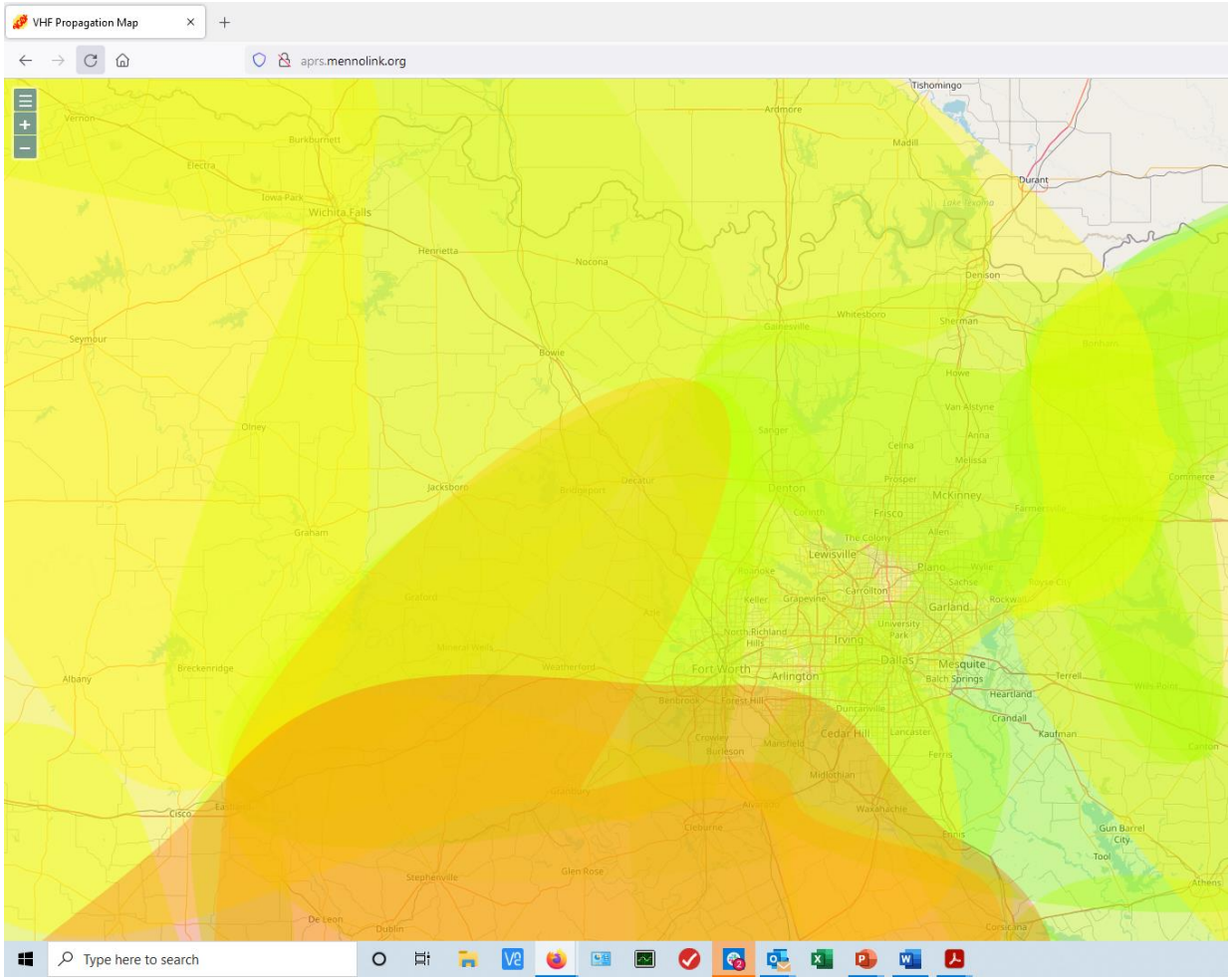

AA5C 24 GHz beacon was 50 dB above noise

Scott's 47 GHz signal was 5-8 dB over noise

Al's signal was S8

Al T=65F, DP= 50F, RH= 58%

Scott T=58F, DP=42F, RH 56%

October 31st 11AM

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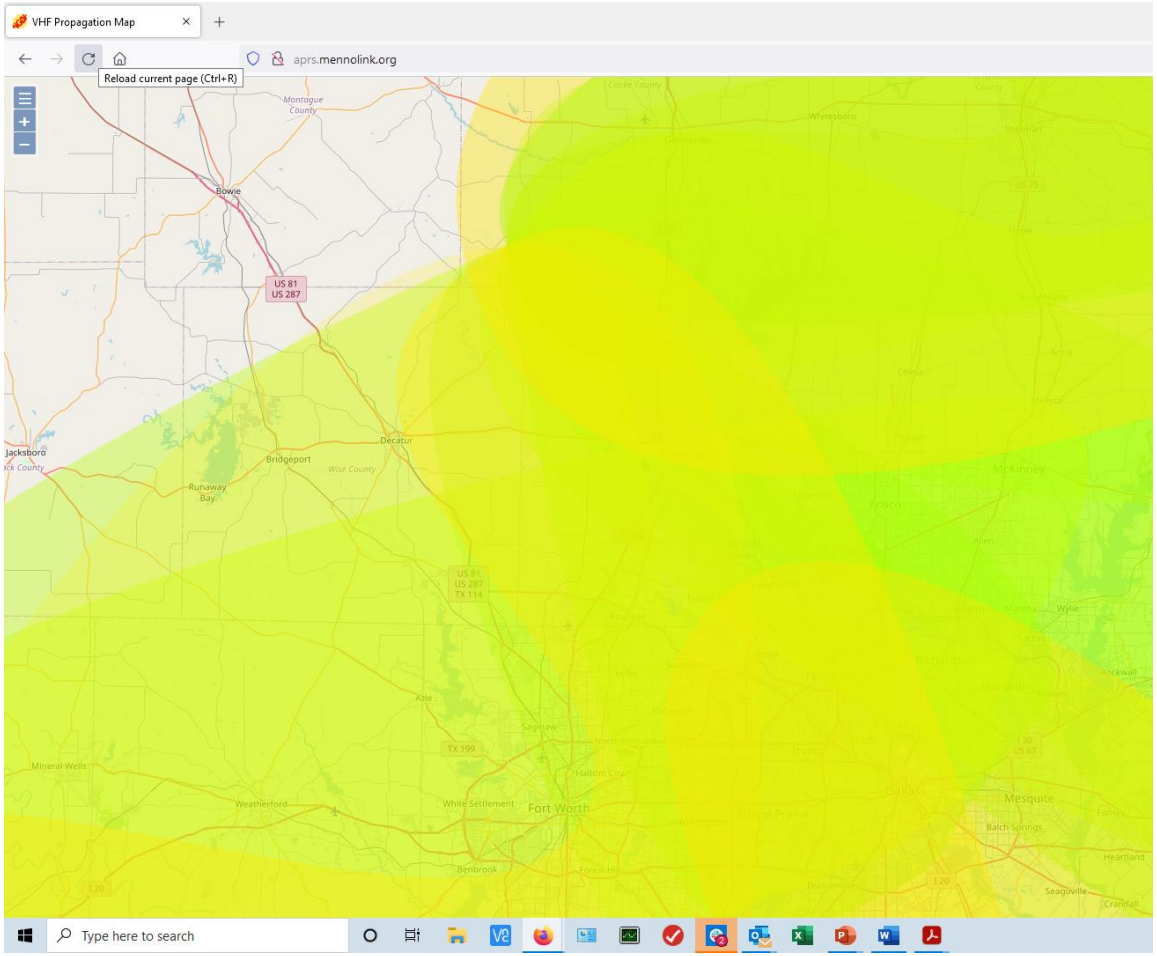

AA5C 24 GHz beacon was 45 dB above noise

Scott's 47 GHz signal was <5 dB over noise "M" copy

Al's signal was S8

Al T=69F, DP= 46F, RH= 44%

Scott T=64F, DP=43F, RH 47%

AA5AM on 47088.1 MHz

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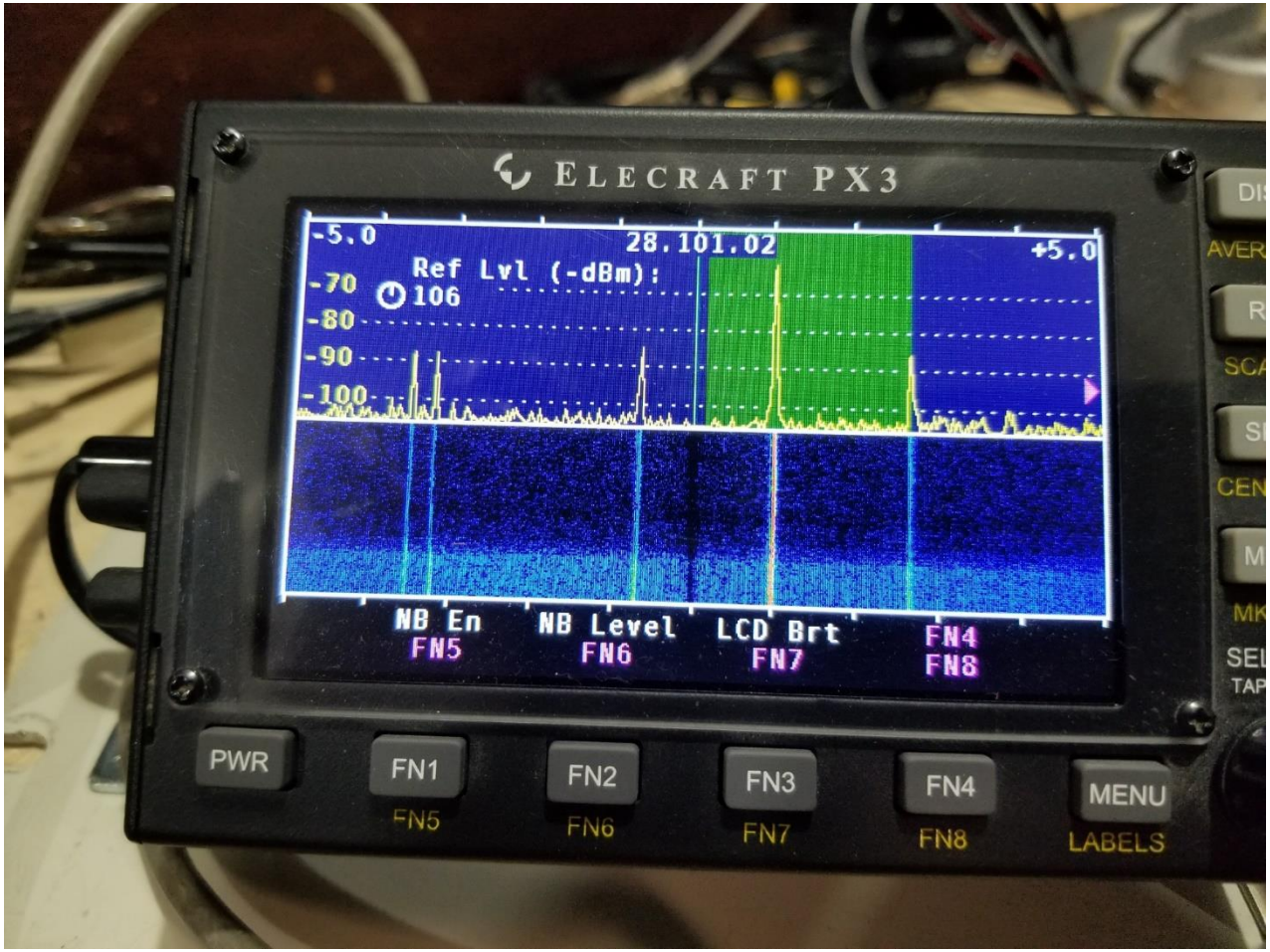

AA5AM is 45 dB over the noise on Saturday evening! Scott is running a DB6NT xvter at -8 dBm output power.

Oh by the way, don't sweat the spurs! They are over 25 dB below the carrier!

Pse QSL!

And one of the carriers below .100 is the DEMI weak signal source

All is good!

Sat PM/Sunday 47 GHz Test Summary

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						Al			Scott	
Date	Time	24G BCN	Sent	Rcve	Temp	DP	RH	Temp	DP	RH
10/30/2021	7:30PM	55dB/N	40dB/N	S9+40	56F	45F	68%	66F	35F	32%
	10:30PM	65dB/N			48F	44F	84%			
10/31/2021	5:15AM	65dB/N			44F	43F	98%			
	7:00AM	55dB/N	55dB/N		43.2F	42.8F	99%	51F	36F	59%
	8AM	45dB/N	25dB/N		44.2F	43.9F	99%	51F	36F	58%
	9AM	55dB/N	25dB/N	S9+10	56F	49F	79%	53F	40F	62%
	10AM	50dB/N	5-8dB/N	S8	65F	50F	58%	58F	42F	56%
	11AM	45dB/N	<5dB, "M"	S8	69F	46F	44%	64F	43F	47%

Conclusion

- Nearly no correlation to temperature, dew point, relative humidity, or the prop map?....
- Mostly dependent on time of day.
- Best before 9AM or after 7:30PM which correlates to best shortly after sun rise and before or near sunset.
- We did not run any 47 GHz tests through the night, as safety was biggest concern. Once Scott gets a more permanent system set up we can run tests through the night.
- Comments are appreciated.