

The Radio Hotel – The Donut Hole

(BVARC Tech Pages version)

Explaining the Propagation during the Rag Chew Net

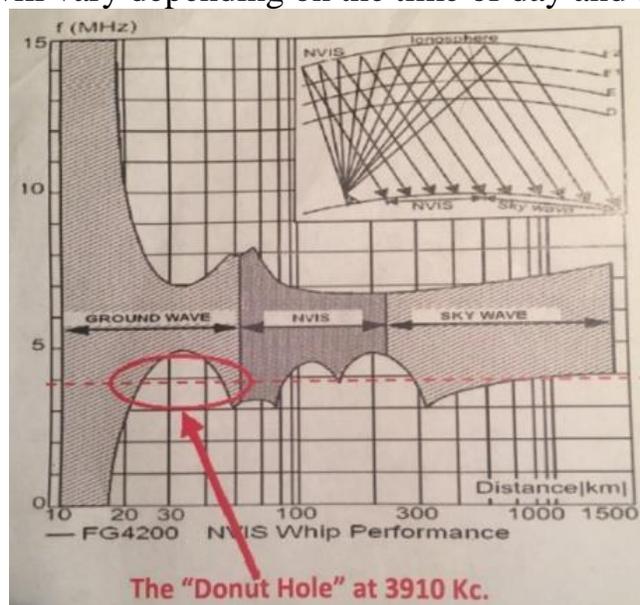
by Rick – W5RH

Those of us that have participated in the Wednesday night BVARC Rag Chew Net (7PM 3910 KHZ) have experienced the infamous “Donut Hole”. That is the portion of the RF geographical coverage, radiating out from the NCS’s QTH, which is a “no man’s land” when it comes to checking in or just being heard.

We all know that 80 meter propagation changes season to season. In winter, we interfere with the W7 Traffic Net in the NW of the country. And, in summer we experience the noise of atmospherics and thunder/lightning storms, etc. Now, I don’t mean to scare you off of trying to join us, please do, but it is what it is. We have these inherent propagation and noise problems, but we know that they will eventually go away with the change of season and become those nights in Spring and Fall were the band is quiet and all can be heard. Well, all except those within the Donut Hole.

You see, propagation has 3 modes on HF – Ground/Direct Wave, NVIS and Sky Wave. Depending on the frequency, time of year and time of day, one or more of these modes will take precedence. Changing from one mode to another happens daily, thus QSB occurs, etc. These changes take place when the sun goes down and Grey Line happens (although this is a DX mode). On 80 we can go from Ground Wave/NVIS to Ground Wave/ Sky Wave all during the short 1 hour course of the net. You see, though, that Ground Wave is always there, but the distance it covers varies. There is a hole between where Ground Wave ends and NVIS starts or where Sky Wave starts.

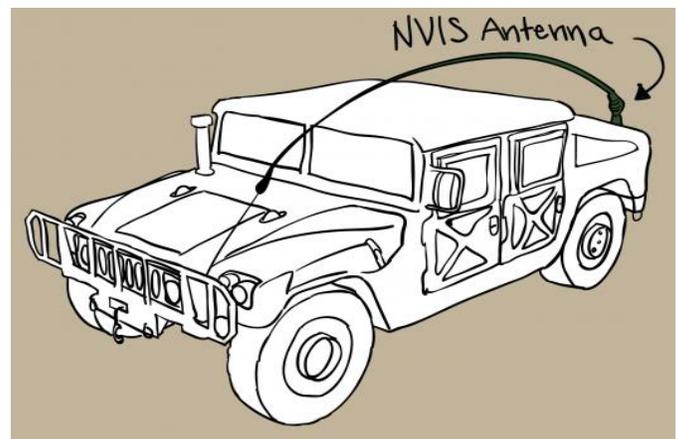
Have a look at this chart below -- Frequency (MHz) on the vertical scale and Distance (KM) on the horizontal scale. The grey’d solid portions of the graph show where the coverage/mode is typically working. You can see that Ground Wave provides minimal coverage at (the dotted red line) 3910 KHZ for 23 KM to about 45 KM (about 15 miles to 28 miles). These coverage distances will vary depending on the time of day and time of year.



One local example of this is that I live in SW Houston. Larry, K5LJ, is in Richmond and as the crow flies about 14 miles. Sometimes Larry is in the Donut Hole and other times not. I can usually always hear him but, at times he is loud and other times barely perceptible. Increasing his power level out does help him in the low signal times. Alternatively, John, K5IZO, 130 miles away, in East Jesus on Sam Rayburn Reservoir in east Texas is banging in here loud and clear on a weekly basis (when he is up there). Just a perfect example of NVIS – Near Vertical Incidence Skywave.

The best demonstration is to listen to the Rag Chew Net on a year round basis and hear the seasonal changes that I am talking about . Another way is to do what Rick, WD5L, does. He gets onto the various Web SDR's in Waller (local), in Dallas, over in Alabama and even distant SDR's in Utah etc. *[You can do the same. Google Web SDR, a listing can be found on their web site. It will take you a little bit to figure the controls.]* For me it is best to use FireFox. Apparently there is an audio issue with Chrome. While the net is in session, go around to the various Web SDR receivers and see how the net sounds. Sometimes yes, sometimes no. I have been doing this for quite some time and it is amazing how strong all the net's signals are at 250 to 400 or even 500 miles away. Even all of the “donut hole” stations for me that evening are loud and clear when all other stations are too. Very cool to see theory in operation.

Ground wave can be generated by almost any antenna, even verticals. However, the pattern and field strength dwindle rather quickly as you move away from the source antenna. NVIS antennas are a better way to go, but they require some specific deployments. Close to the ground and horizontal. Have a look at the drawing of the vehicle below. Notice the whip is bent toward the horizontal. You will notice in the pictures of many US Army HumVees that their antennas are a lot of the time in the horizontal plane.



You can learn a bit more about the Rag Chew Net and 80 meter propagation by reading K5LJ's article on the BVARC Tech articles web page:

-- <http://bvarc.org/Tech/ShortenedDipole.pdf> It is a full length article entitled a “Shortened Dipole Study for Conditions On BVARC's Rag Chew Net” It does go into propagation modes too.

Additionally, more can be found about NVIS from the folks that use it most – U.S. Military. The Army has produced a book all about NVIS:

Near Vertical Incidence Skywave Communications – Fiedler and Farmer 1996
Google it and download a PDF copy. Excellent information on NVIS propagation and equipment deployment.

Also Google:

Radio communication via Near Vertical Incidence Skywave Propagation: an overview

and

NVIS ANTENNA THEORY AND DESIGN AAR6UK 20 FEB 2017

And.....if you have a copy of the **ARRL Antenna Handbook** – More recent editions year 2000 and later. Look up NVIS.

All this variation makes 80 meters and low band HF fun. It is what it is, on the evening that you turn on your radio. You can't do anything about it, except to go with the flow and adapt your set-up to work well within the restrictions defined by Mother Nature. Join us on the net and have some fun. 73...Rick W5RH