

AMATEUR RADIO FACT SHEET / DISCUSSION POINTS

TOPIC: HF OVERVIEW – Comparison of EOC and Private Ham Stations

1. What is possible spectrum wise and why:

- a. While VHF provides for community connections, it doesn't do well for reaching BEYOND the county, state, region into unaffected areas to provide email/information. Federal DHS SHARES focuses on shortwave (HF) for this exact reason.
- b. The reason HF works is the ionospheric reflections a hundred miles above us, that provide a passive reflector -- but its effects vary by frequency and oncoming sunlight.
- c. Regional communications (Florida, southeast) work best on 3.5 and 7 MHz ham bands, with the lower frequencies unusable in the daytime and both usable at night.
- d. Nationwide communications work best on 7 MHz 10 MHz and 14 MHz ham bands, with the higher frequencies unusable at night.
- e. 7 MHz / 10 MHz have workable properties both day and night.
- f. DHS SHARES uses very similar frequencies, just not in the amateur bands.

2. Typical amateur radio HF communications:

This varies by experience level. Ham radio community has been growing in number, but many newcomers have less experience than people like me did even as teenagers in the 70s and 80s. Experienced HF operators typically have a station with 100-1000 watts output power, full size antennas that cover 3.5, 7, 10, 14, 21 MHz bands (possibly more) and may have high gain directional antennas on 14 MHz, 21 MHz. Their effective radiated power relative to a dipole (a standard) can reach 6000 watts. At my house I have the potential for 400 watts effective radiated power on multiple bands. My antennas and receivers are capable of hearing the atmospheric noise (a limiting issue) at all times.

3. What is present at the EOC:

The EOC has 125 watts of HF radio power, but due to poor positioning of the HF antenna tuner, as much as 80% can be wasted merely in the transmission line. Even worse, my estimates of the efficiency of the transformer-based vertical antenna are that it is not dissimilar to the commercial ALARIS multiband antennas and probably cuts the efficiency by anywhere from 50% to 95% further. This effect damages not only transmitted power but also received signals as well. My documentation indicates that the EOC cannot hear the majority of signals on normal amateur frequencies due to the poor antenna / transmission line efficiency, in actual comparisons with my normal amateur station at my house. The total efficiency of the station can be as poor as $0.2 \times 0.05 = 1\%$ Unfortunately, the efficiency is worst on the bands that have the most potential for Florida and regional communications (3.5 MHz, 7 MHz 10 MHz). My objective tests demonstrated that the EOC station was INCAPABLE of making connections to standardized computer gateway amateur radio stations that were easily reached by my home station in tests conducted in May, 2016.

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4. **What the difference means to EMCOMM issues:**

It means that for all practical purpose, on both amateur and DHS SHARES frequencies, you have an almost unusable HF station.

We demonstrated further proof of this at a recent training session where we simply launched fishing lines over limbs of the oak trees on your southern fence line, and pulled up simple homemade wire antennas and commenced to make successful connections to amateur stations and computerized gateway stations.

5. **Additional Issues:**

In addition to the antenna/transmission line issues at the EOC, there remain training issues among the volunteers who would staff the EOC during emergencies. With their limited experience levels, the poor functioning of the system means they are less likely to make any successful connections at certain times of the day. The experience levels however are rising. Literally over 500 man-hours of training have been conducted in the past 9 months. Several members of the group attended a 2-weekend 34-hour marathon educational session aimed at qualifying for higher and highest FCC amateur radio licenses. Our local group has developed a robust digital VHF messaging network, which now covers 4000 square miles and has further connectivity to the south and west possible. Our larger group of volunteers has demonstrated modest capabilities at transferring error-corrected automated messages and files over this system, which has automated connections to HF service gateways. Our volunteer capabilities are distinctly growing, as demonstrated by our published 2017 Full Scale Exercise Hurricane Test After Action Report/ Improvement Plan, and by our proposed digital VHF highway all the way to Steinhatchee Florida for the October 7th Simulated Emergency Test.

REF: https://www.amazon.com/Alachua-County-Hurricane-Action-Reports/dp/1548062200/ref=sr_1_4?ie=UTF8&qid=1499265929&sr=8-4&keywords=Gibby+2017