Trends in Beverage and BOG Performance
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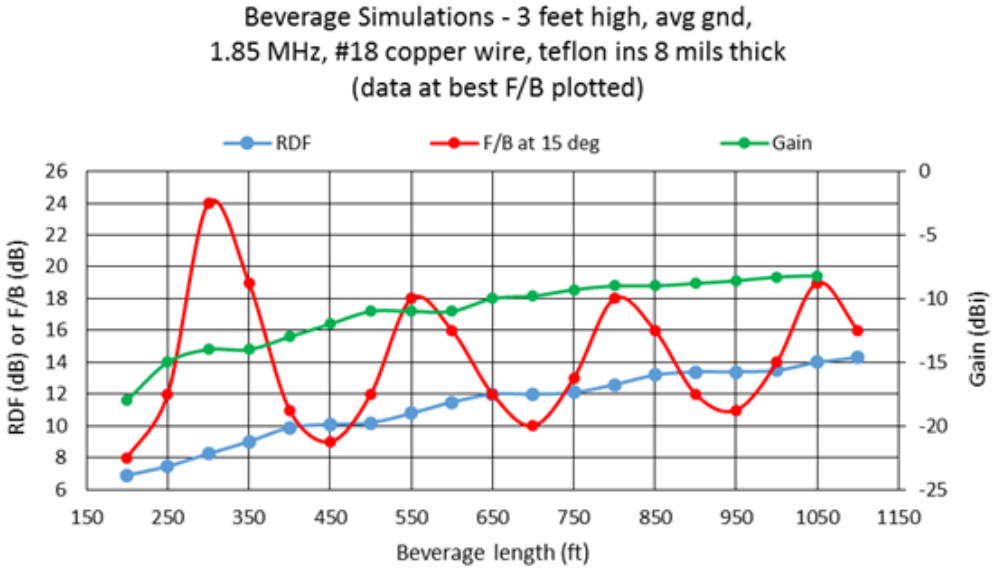
I enjoy modeling antennas. Of course you always need to apply common sense to this effort, as you can easily go off in the weeds with weird results. Just like modeling RF power amplifiers (which I did a lot of during my RF design career), you must understand the fundamentals enough to kind of know what to expect. If the results differ widely from your expectation, then something may be amiss.

Enough philosophy – let's look at the trends in performance of Beverages and BOGs (Beverages-On-Ground). We'll start with a normal Beverage at 3 foot high on 160-Meters (1.85 MHz). I'll vary the length from 200 feet to 1100 feet in 50 foot increments, and plot RDF (Receiving Directivity Factor – a value that predicts how much signal-to-noise improvement one antenna will have over another antenna), F/B at a 15 degree elevation angle and gain. All modeling is done with 4nec2 from Arie Voors using the NEC 4.1 computational engine with the GN2 ground code. The ground was 'average' ground: conductivity = .005 Siemens per meter and dielectric constant = 13. At each length, the termination resistor was optimized for F/B.

The results of this effort are as follows:



What really stands out is the cyclic nature of the F/B ratio. There are preferential lengths for optimum F/B performance. This is a well-known trend. For example, see **The Beverage Antenna Handbook** by W1WCR (1987).

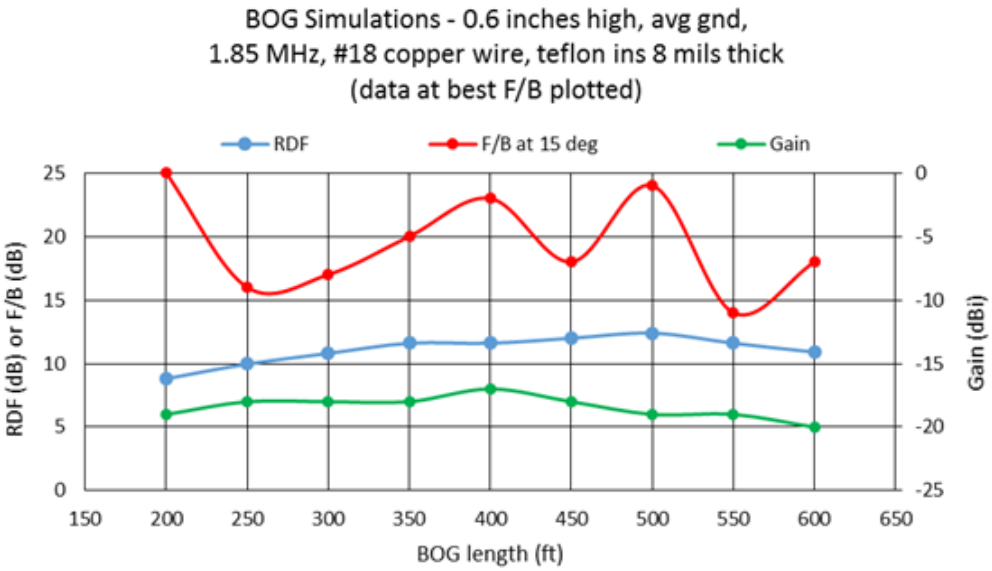
The RDF and the gain increase as the length increases – at least out to 1100 feet. It may be that these two performance parameters level off at greater lengths.

In summary, a 300 foot Beverage would give excellent F/B performance (middle twenties), with decent RDF (8 dB) and gain (-14 dBi). Making the Beverage longer (1100 feet) will increase

RDF (to a very nice 14 dB) and gain (-8 dBi) at the expense of F/B (almost 20 dB – still pretty darn good). Personally, I believe RDF trumps F/B so that the longer length is desired.

Now let's look at the trends in performance of BOGs. We'll go with a BOG at 0.6 inches high on 160-Meters (1.85 MHz). I'll vary the length from 200 feet to 600 feet in 50 foot increments, and again plot RDF, F/B at 15 degrees elevation and gain dBi. As before, all modeling is done with 4nec2 using the NEC 4.1 computational engine with the GN2 ground code. The ground was again 'average' ground. At each length, the termination resistor was optimized for F/B.

The results of this effort are as follows:



Again, what stands out is the cyclic nature of the F/B ratio. Just like the normal Beverage, there are preferential lengths of BOGs for optimum F/B performance. The first F/B peak is at a length shorter than a normal Beverage due to the velocity of propagation on the wire decreasing as it is brought closer to ground.

The RDF and the gain increase as the length increases, but only out to about 400 feet. Then RDF and gain start falling off due to the proximity to ground.

In summary, a 200 foot BOG is a decent performer in terms of F/B, RDF and gain considering how short it is for 160-Meters. I can vouch for this length, as I had a 200 foot BOG headed northeast to Europe (it was also reversible for southwest coverage) – it was an excellent performer considering its length. My results motivated Dave N9FN in Lafayette, IN to install two orthogonal and reversible 200 foot BOGs to cover NE/SW and NW/SE.

Three last comments. First, keep the BOG off the ground – or at least rake/blow away leaves and other debris and keep the grass short on a regular basis. Otherwise the BOG performance may degrade. Second, you'll likely need a preamp with the BOG due to its low gain. Third, I suggest reading N6LF's relevant work at **http://rudys.typepad.com/files/qexjul-aug-2016-bog.pdf**.