The Long Cross Delta

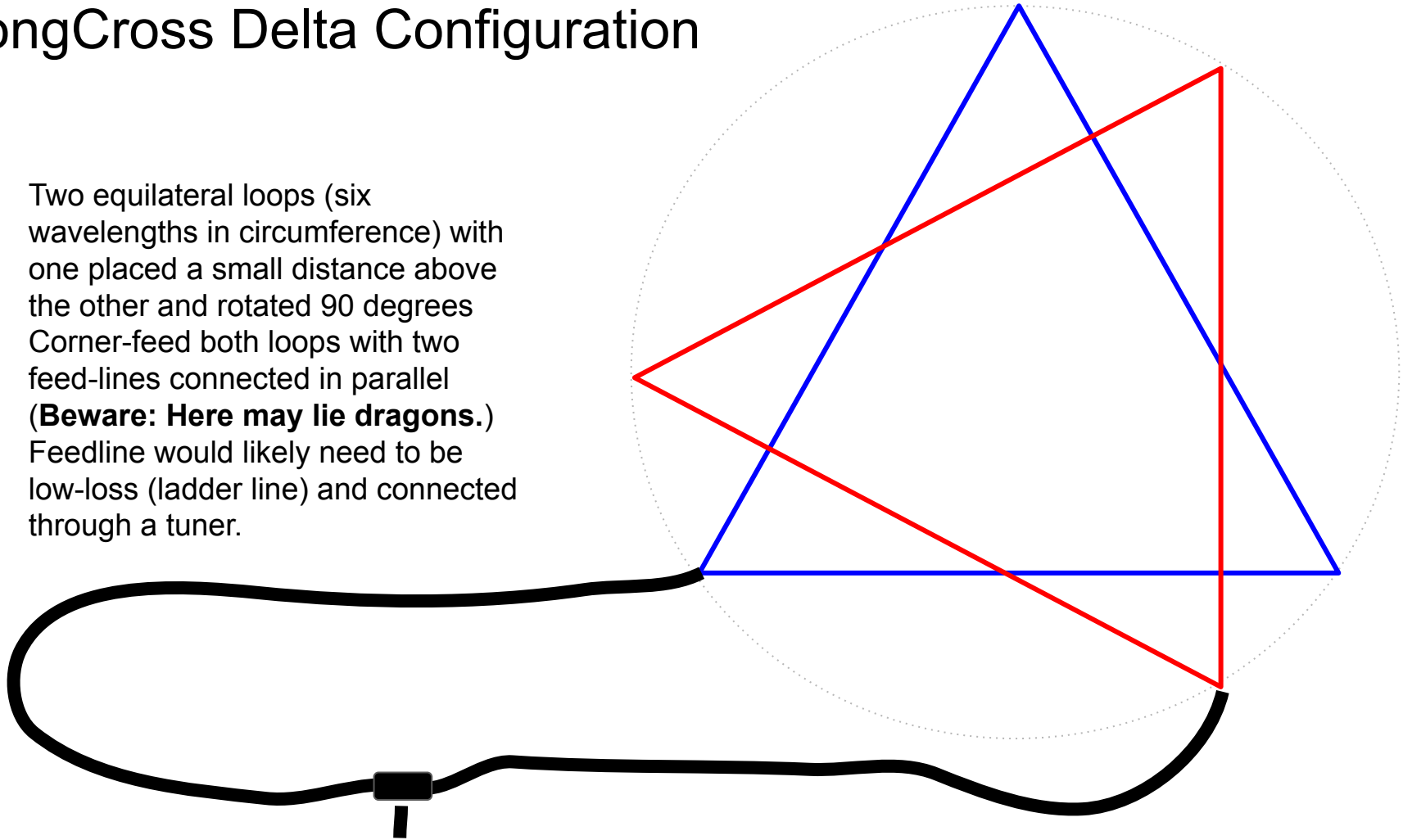
A high-gain monstrosity

Inspiration

- I modeled and built a horizontal delta loop for my backyard.
- Experimenting with modeling showed an equal-sided 6-wavelength delta loop has massive gain in six different directions.
    - My goal for delta-loop was to get as even a azimuthal pattern as possible, so dismissed this design
    - Built my loop antenna, love it, but then watched an Episode of DX Commander on YouTube in which Callum mentions seeing similar sharp-peaked patterns of a loop. Made we want to play with design some more
- I came up with a configuration that is monstrous, but shows some pretty good gain at the horizon on a single band.

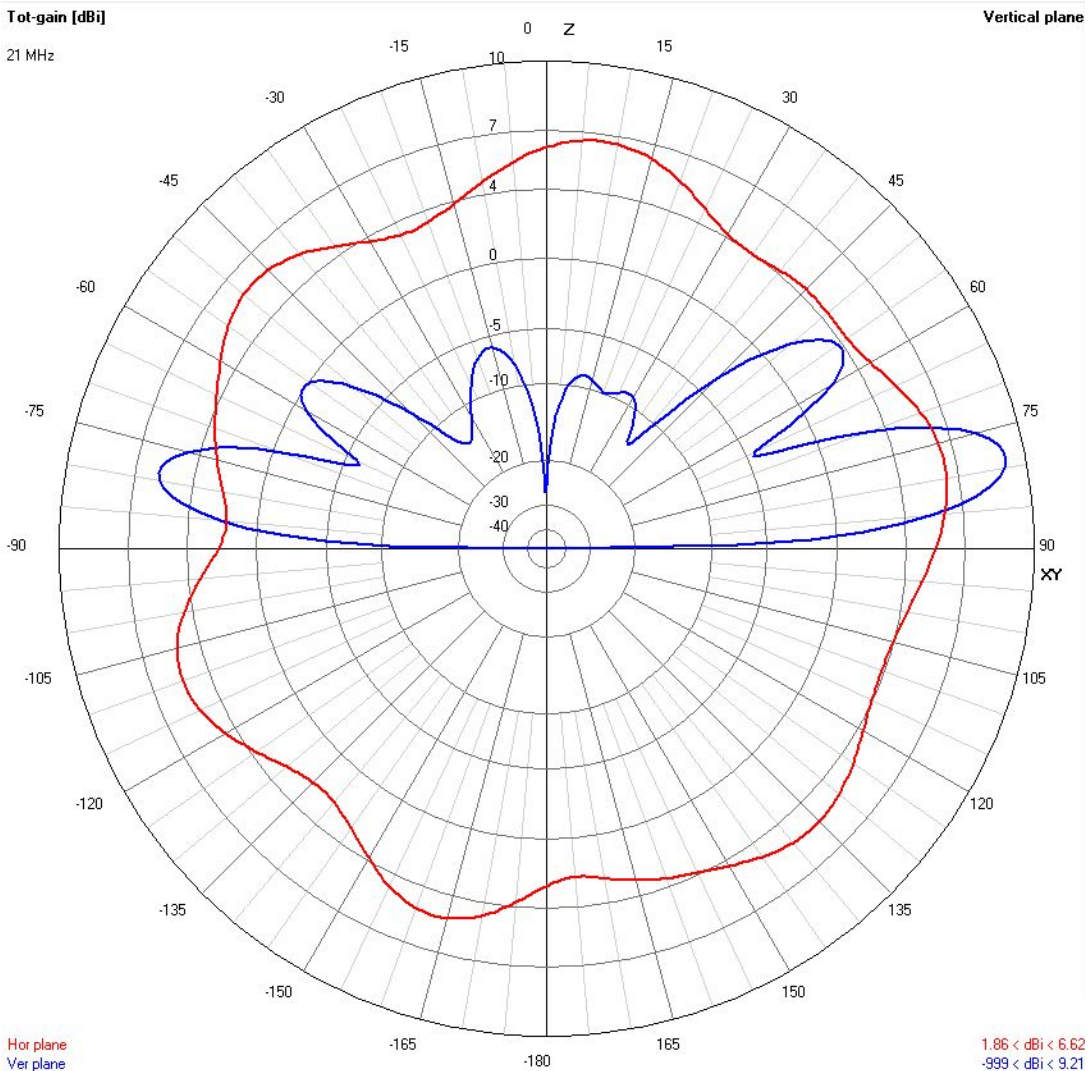
LongCross Delta Configuration

- Two equilateral loops (six wavelengths in circumference) with one placed a small distance above the other and rotated 90 degrees
- Corner-feed both loops with two feed-lines connected in parallel (**Beware: Here may lie dragons.**)
- Feedline would likely need to be low-loss (ladder line) and connected through a tuner.



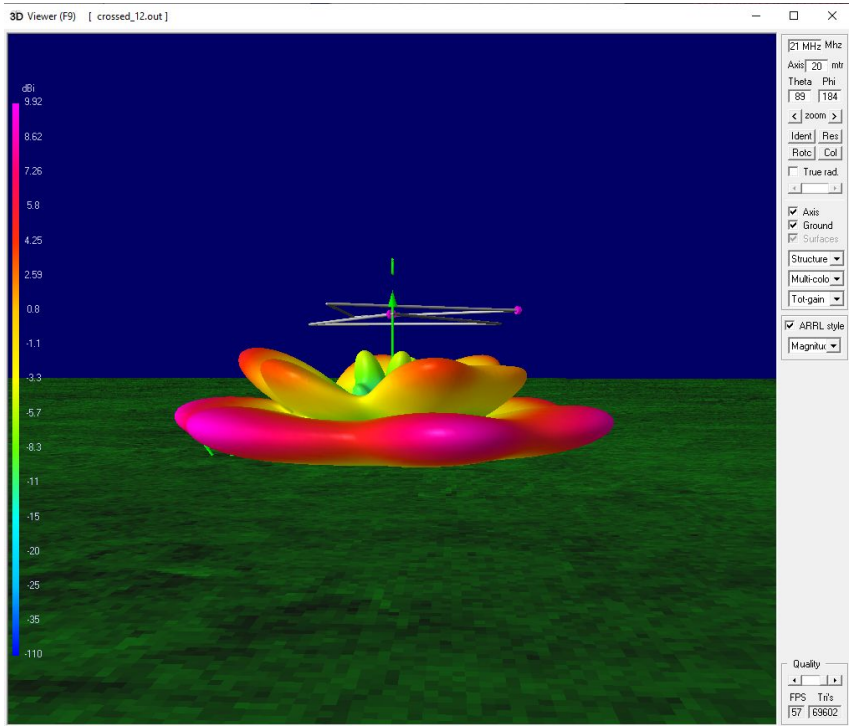
Modeling the Antenna

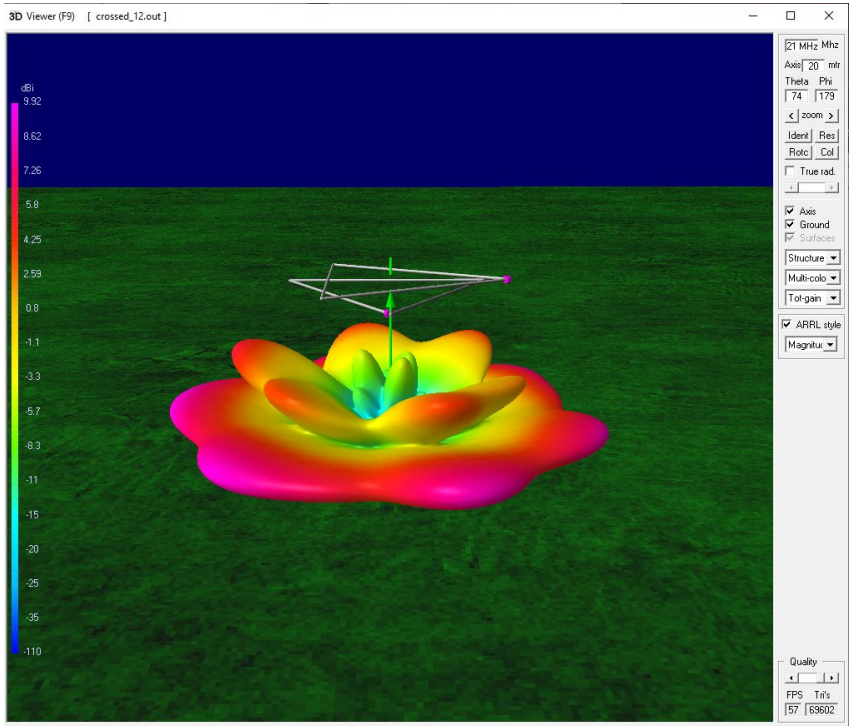
- Modeled a 15-meter single-band antenna with the lower loop 18 meters off average ground.
- See NEC file here: https://github.com/robdmc/longcross_delta/blob/main/longcross_delta.NEC



- First of all, can this be real?
- Minimum gain of 1.86 at 5 deg and peaking out almost at 7
- **7 to 12 db gain over a ground-mounted vertical at 5 degrees above horizon?**
- See a higher resolution, more easily readable version of this graph here:
  https://github.com/robdmc/longcross_delta/blob/main/longcross_delta_pattern_85.png

Three-D Pattern visualizations





https://github.com/robdmc/longcross_delta/blob/main/longcross_delta_3d_horizon.png
https://github.com/robdmc/longcross_delta/blob/main/longcross_delta_3d_bird.png

Random Thoughts

- I tried to align the height to around what you could do with the Nebula DX Commander pole.
- I’m fairly new to antenna modeling and don’t know how to interpret the impedance numbers coming out of 4nec2 when there are multiple feed points
- **Am I doing something stupid here? This seems too good to be real.**
- I don’t have enough tree-free space in my backyard to try building it. This makes me sad.