# N4II Dalmatian Plantation AFOP

(Antenna Farm On Paper)

Ed Callaway, N4II

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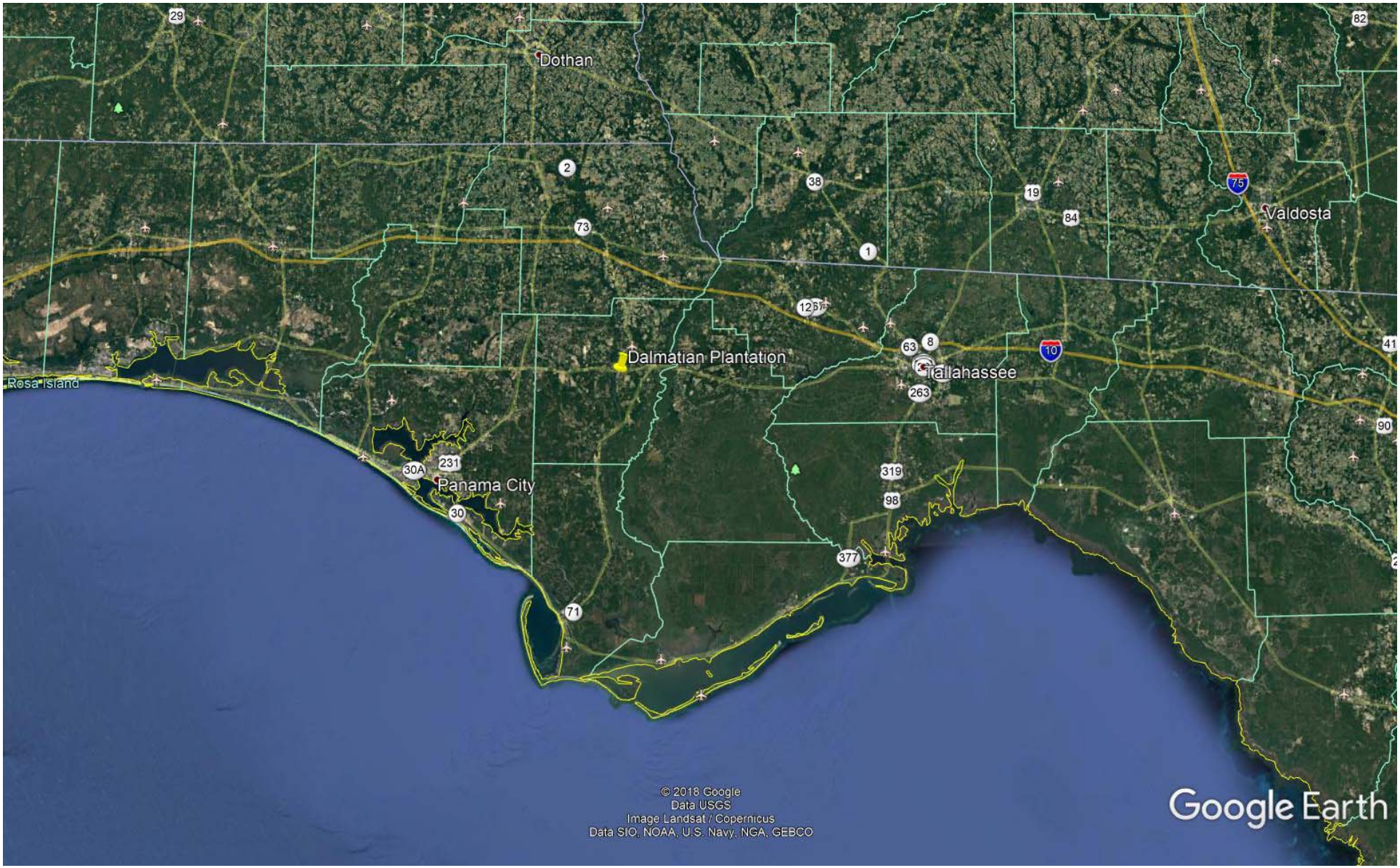
# The Dalmatian Plantation

In 2008, the XYL and I purchased 80 acres of mostly tree farm on the Chipola River, in Calhoun County, Florida

- An hour west of Tallahassee, in the Central Time Zone

This had two goals:

- Hers: Sit by the river, with dogs, and watch the water go by
  - On a river
- His: Finally have an amateur radio station of my very own!
  - “Significant” acreage
  - RF-quiet, i.e., away from (almost) all power lines, other homes


Dothan
Valdosta
Dalmatian Plantation
Tallahassee
Rosa Island
Panama City
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Data USGS
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google Earth


1000 ft
1994
Google Earth
Imagery Date: 10/16/2015 30°24'31.77" N 85°09'18.47" W elev 73 ft eye alt 4506 ft

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- Optimized for the DXCC Challenge, not a contest station
  - All DXCC Challenge bands, 160 through 6m
  - All directions, not just fixed on EU and JA
  - SOST (Single Operator, Single Transmitter); no multi- or multi-multi

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- High reliability
- Optimized for the DXCC Challenge, not a contest station
  - All bands, 160 through 6m
  - All directions, not just fixed on EU and JA
  - SOST (Single Operator, Single Transmitter); no multi- or multi-multi
  - Excellent low band (80, 160m) performance
    - Multiple low band receiving antennas, both polarizations
    - Spatial diversity
    - Diversity reception
    - Directive transmit antennas
  - Both EME and terrestrial capability on 6m

# How Goals Will Be Achieved-1

- High reliability:
  - Rohn 130 m.p.h. tower designs used throughout
  - $M^2$ 125 m.p.h. Yagi designs, with additional reinforcement, used throughout
  - Ruggedized large Horizontal Waller Flag (N4IS design, used at VY2TT)
  - “Backup” 40-10m log periodic, on separate tower
  - XX Towers (Matt, KC1XX) retained for installation and regular maintenance

# How Goals Will Be Achieved-2

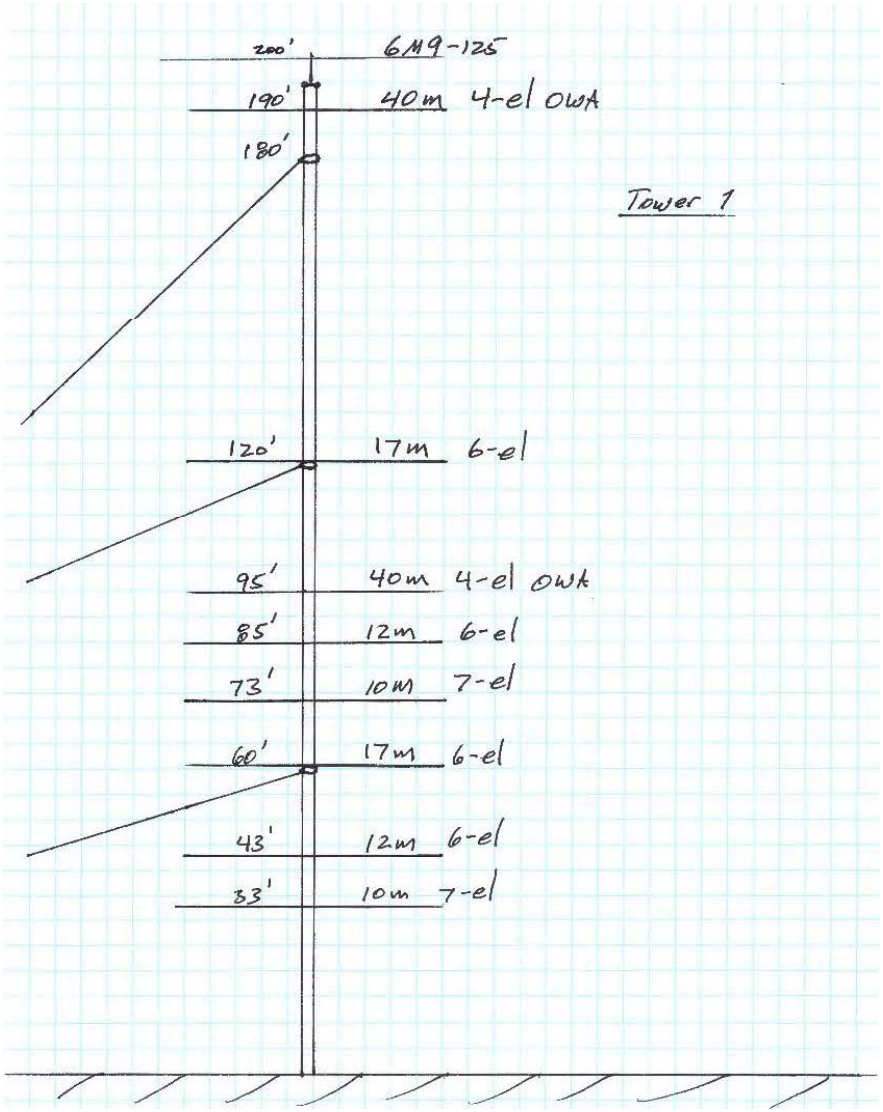
- 40-10m:  stacked Yagi pairs on 48-foot booms
  - Tradeoff between performance and complexity
- 80m, 160m: Tx 4-Squares
  - 80m Yagi evaluated, but declined due to reliability concerns
  - More complex arrays considered, but declined due to complexity
- Lowband Rx antennas
  - Horizontal Waller Flag
  - 8-circle array
  - Reversable Beverages
- 6m:
  - 7-el. on 48-foot boom
  - 4x9-el. EME array (el-az mount) in future

# Yagis

- 40-30-20-17-15-12-10m stacked pairs will require two, 199-foot, rotating Rohn 65G towers
  - Rotators will be on the ground, a maintenance advantage
  - Phillystran guys
- Fortunately, room will be available for the HWF and 6m antennas
- Interaction between the 40m and 15m Yagis reduced by placing them on separate towers
- Need to watch for boom resonances

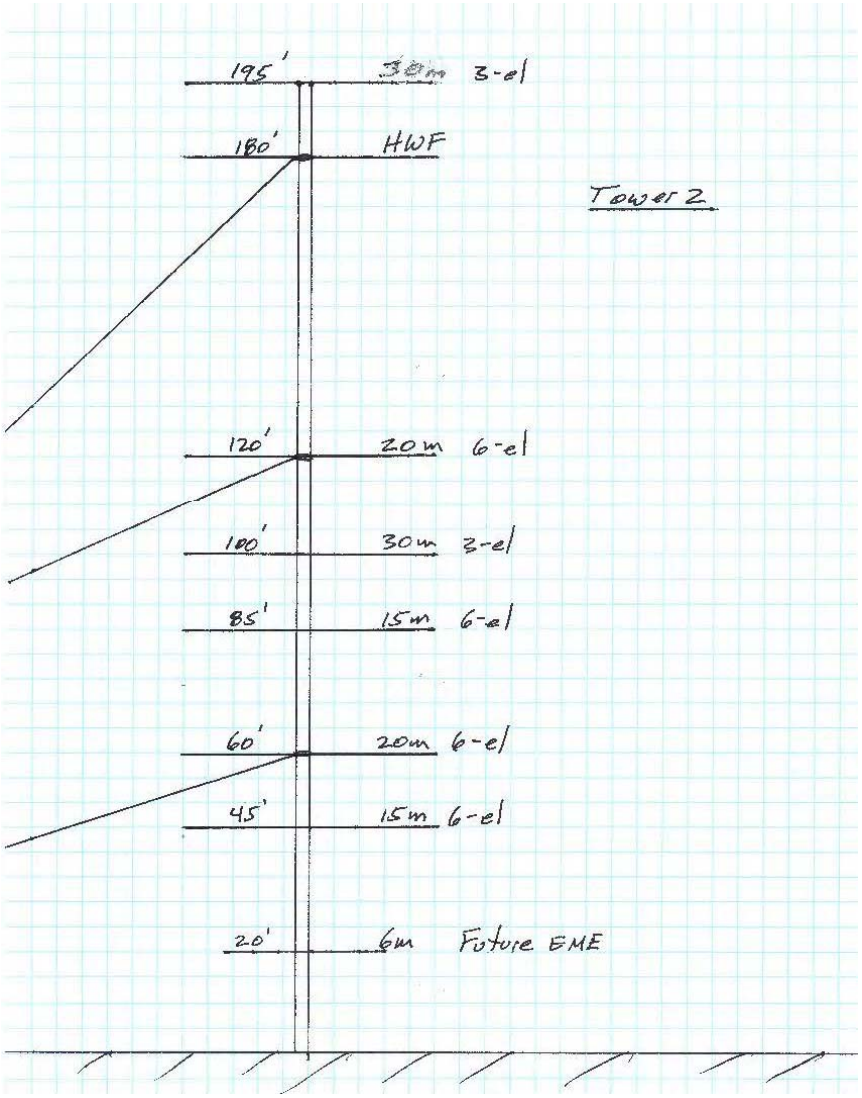
# Tower 1

- 40-17-12-10m stacked pairs
- 6m long Yagi on top for Es



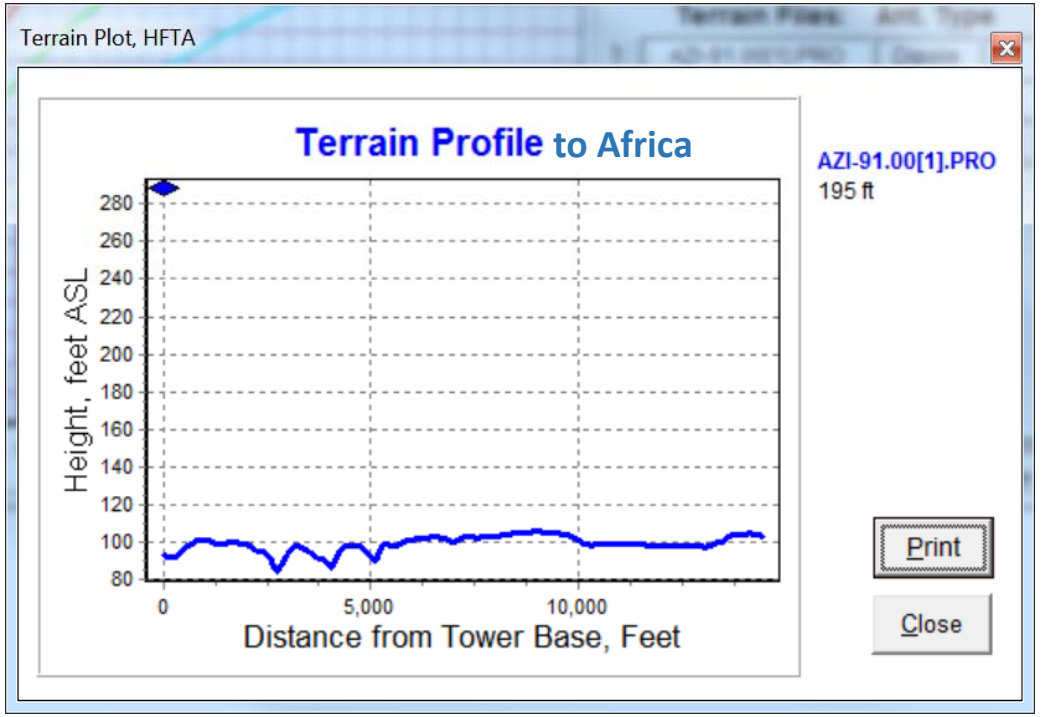
# Tower 2

- 30-20-15m stacked pairs
- HWF at 180', protected from corona noise by upper 30m Yagi
- Space below 45' available for future EME expansion



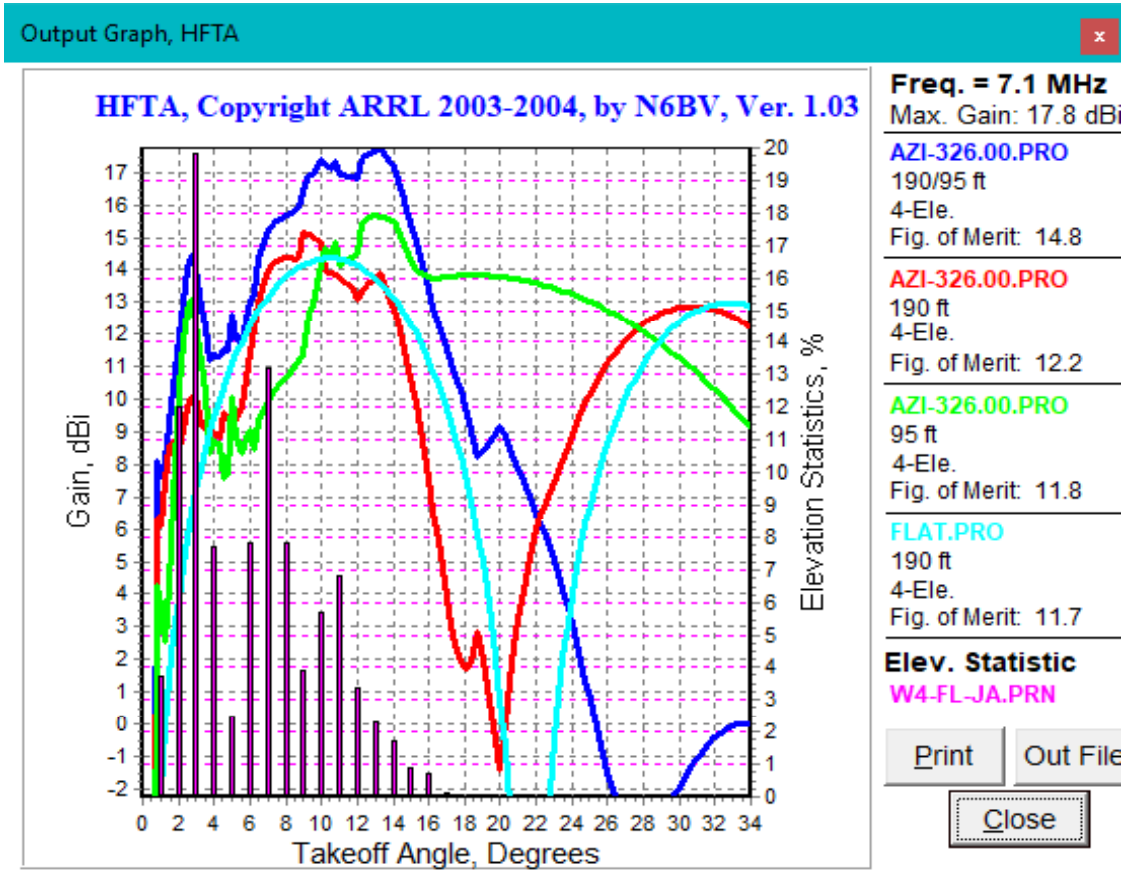
# HF Terrain Analysis

- I used HFTA to ensure that there were no bands having degraded performance due to foreground terrain
- While some terrain effects were noted, nothing seemed unacceptable



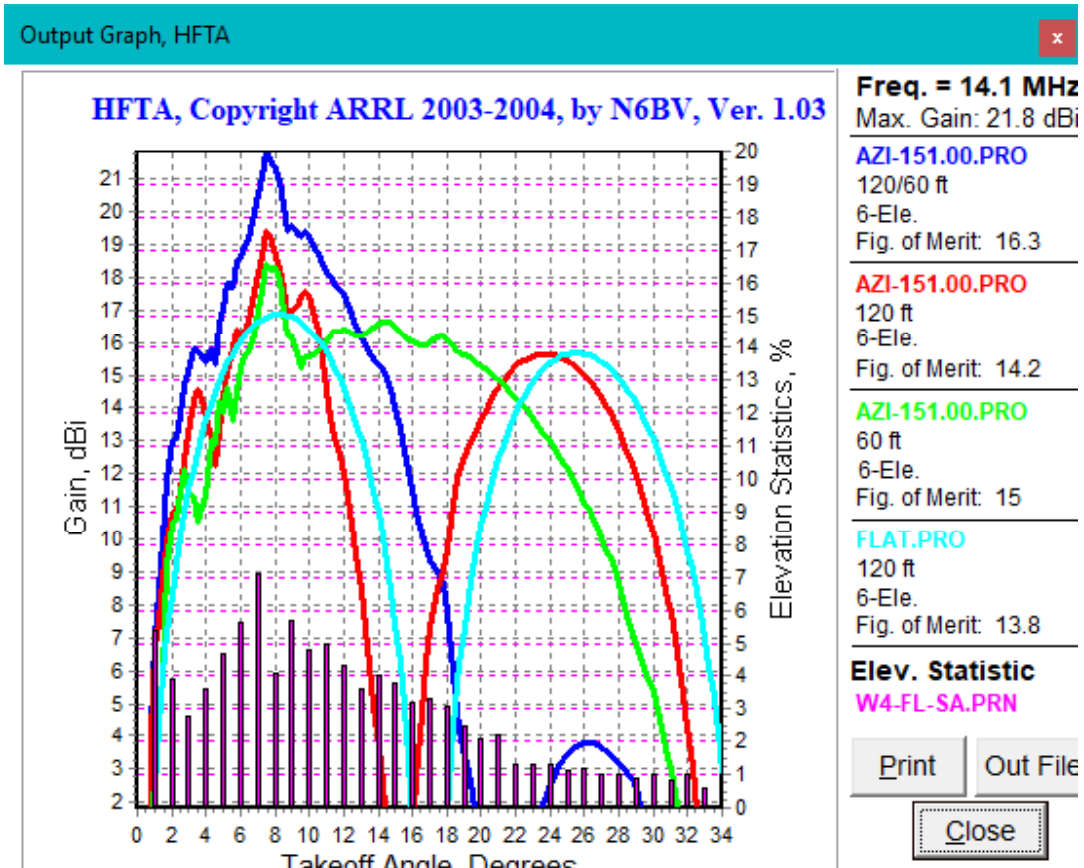
# Sample HFTA Result:  40m to JA

- 20% of 40m JA signals arrive at 3°, so low angle performance is important
- Terrain gives ~4 dB enhancement at low angles



# Another Sample HFTA Result: 20m to SA

- Signals frequently arrive from above 12°, so high angle performance is important
- Low Yagi better than the High Yagi for signals above 11°, and better than the 2-Yagi combination above 13°



# Lightning vs. RF Grounds

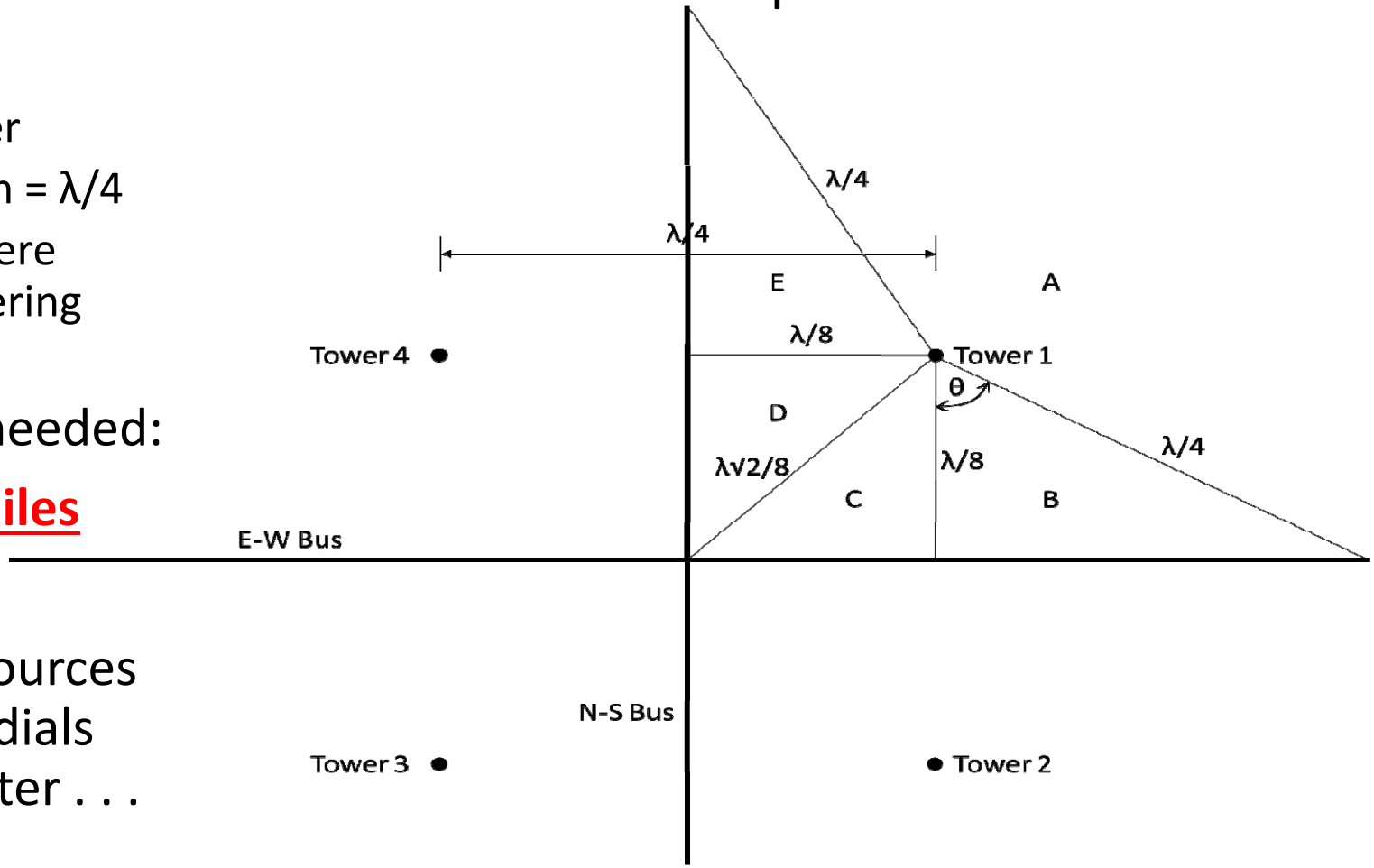
- In high lightning-probability areas, the Motorola R56 site planning manual specifies five lightning ground radials for each tower, 25-80 feet long, buried a minimum of 18 inches below grade, and preferably 30 inches below grade
  - Goal: To keep the lightning radials in moist soil
- However, NEC4 simulations show greatly reduced RF performance for radials buried below grade
- Conclusion: Both are needed, in a two-layer radial strategy.
  - Lightning ground radials bare #2 solid copper
  - RF radials almost anything conductive, size needed only for mechanical strength

# Ground Radials for 160m Tx 4-Square

- Assuming:
  - 120 radials/tower
  - Max radial length = λ/4
  - Use of buses where radials from differing towers cross
- Total radial wire needed:

**15.6 km, or 9.67 miles**

However, several sources indicate that 1 λ radials would perform better . . .

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# Post Hurricane Michael