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122 GHz Field tests

January 30, 2022

KM5PO – KI5EMN

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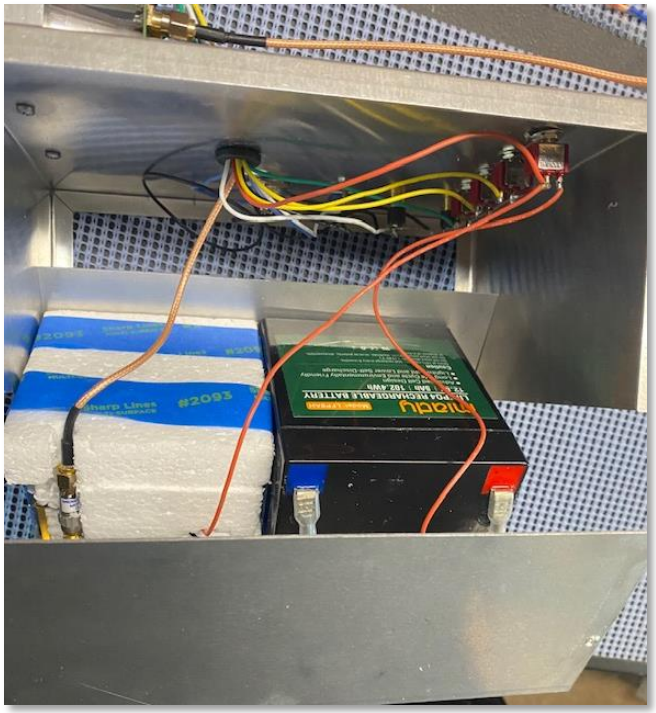
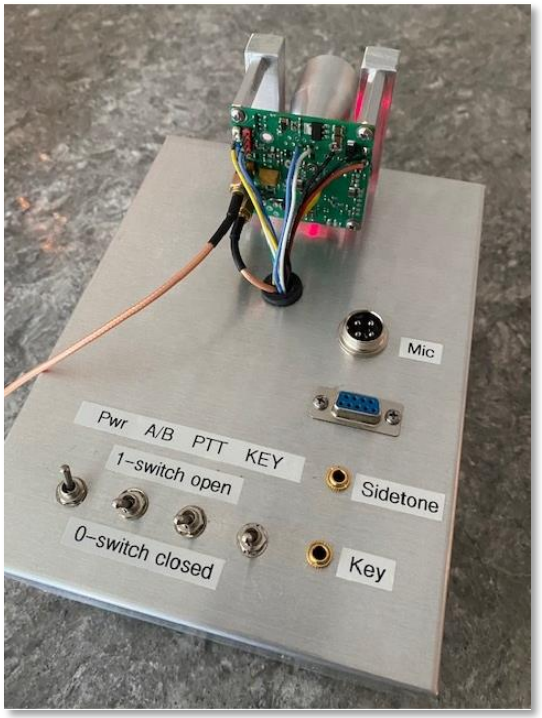
Equipment - Beacon





- VK3CV transverter board
- External 10 MHz reference
- Internal LIPO battery
- Conical Horn 24.4 dBi
- RS-232 diag. & programming
- Key, sidetone, Mic ports
- Beacon/Rx Tx modes
- 2 channels selectable

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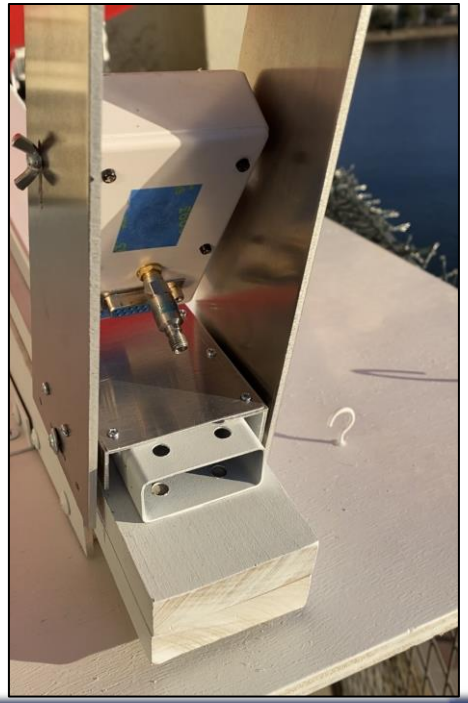
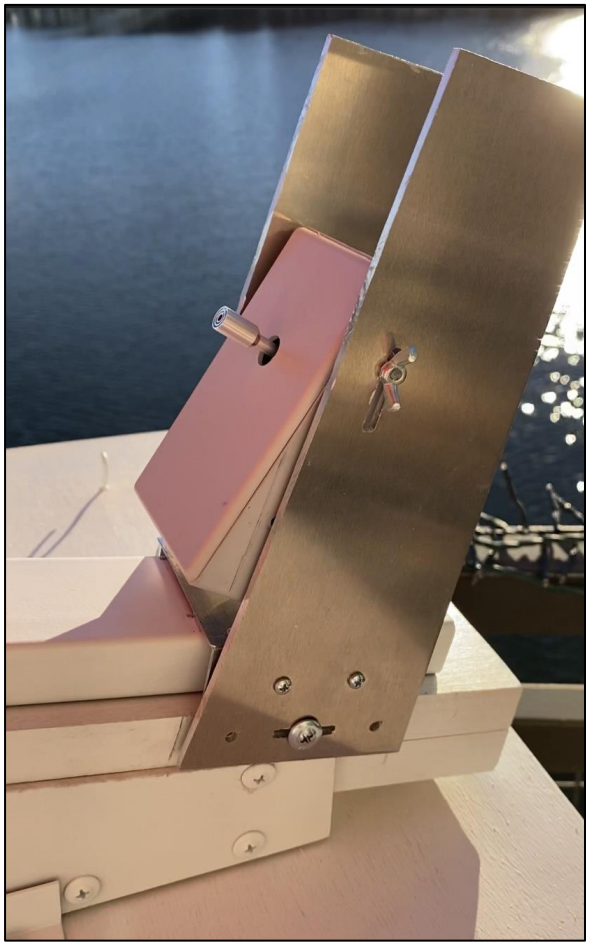
Equipment - Dish

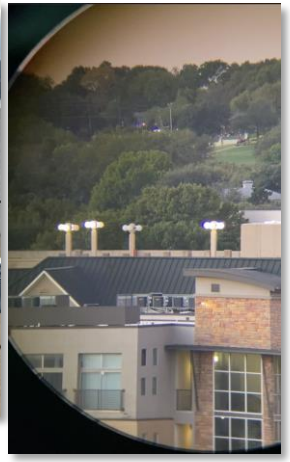
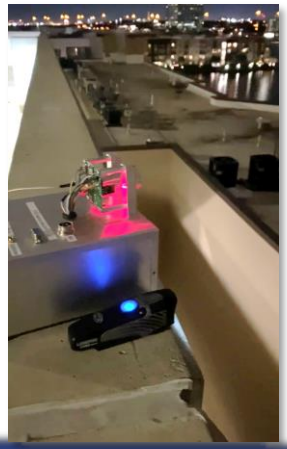
- GPS 10 MHz ref
- Chapparal feed
- 20” dish ~50 dB gain
- SDR/FT-290 IF rigs



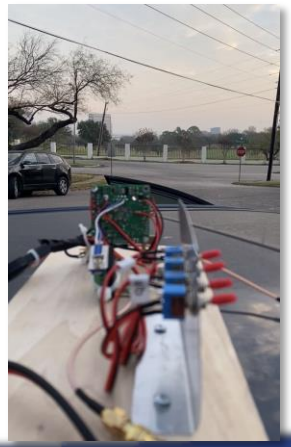
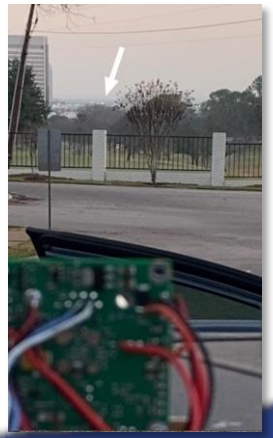


Initial tests

- Beacon placed on top of parking garage @ 80’
- Flashing 1100 lumen light
- Horn to horn
- Warm humid conditions
- Test across Lake Carolyn 1 km - strong
- Test to Point parking garage 1.5 km - strong
- Test to Northgate Dr. 2 km - weak



Build dish feed

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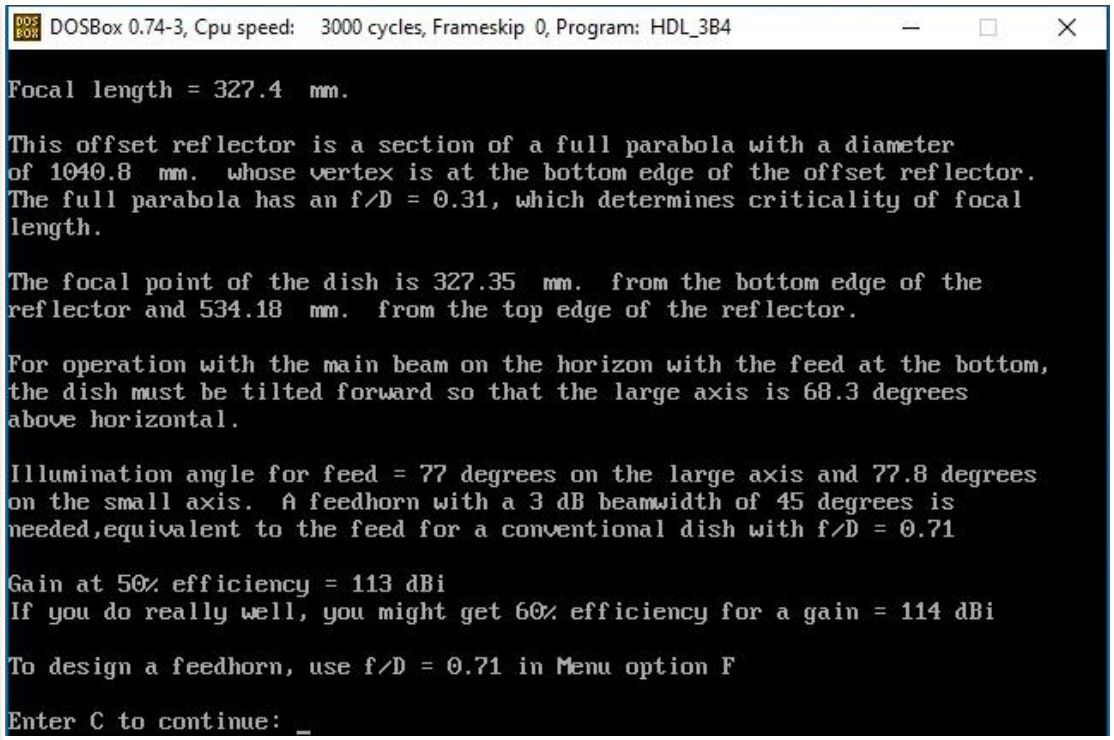

W1GHZ HDL_ANT program running in DOSbox

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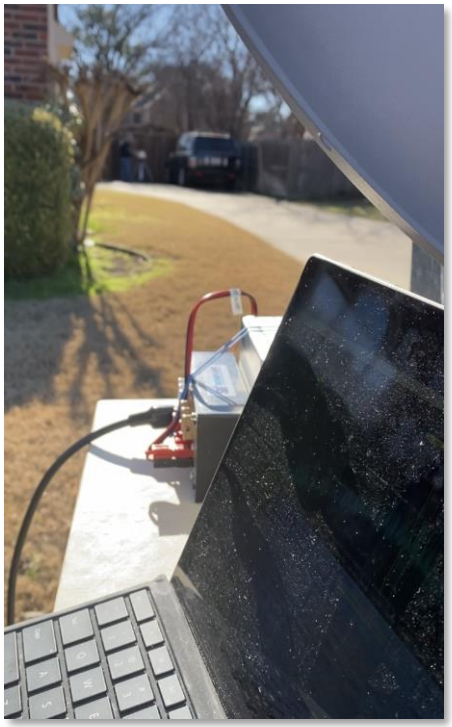
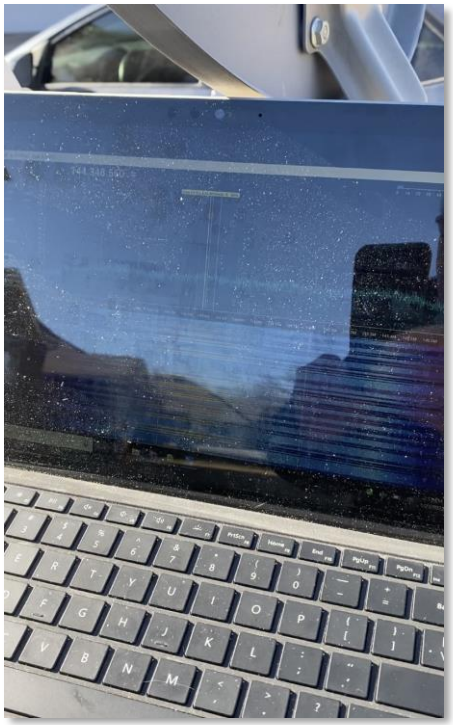
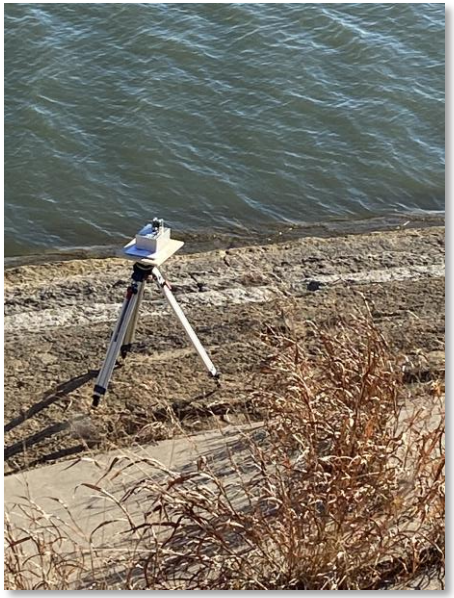
Operational checkout





- The beacon requires about 8-10 minutes to stabilize (10 MHz ref)
- Find and document each others frequency
- Review switch settings for beacon operation and CW transmit/receive

Proving ground



- Attempt 2.9 miles / 4.61 km from Lake Ridge Parkway bridge footing south to Britton Park (previous modulated laser success path)
- The plan was to operate the beacon at bridge and dish at Britton Park
- Logistics would require two trips by car.. leaving equipment unattended
- We deployed the beacon at the bridge footing
- Then found Britton Park was gated and closed until February 28th

New day – new plan

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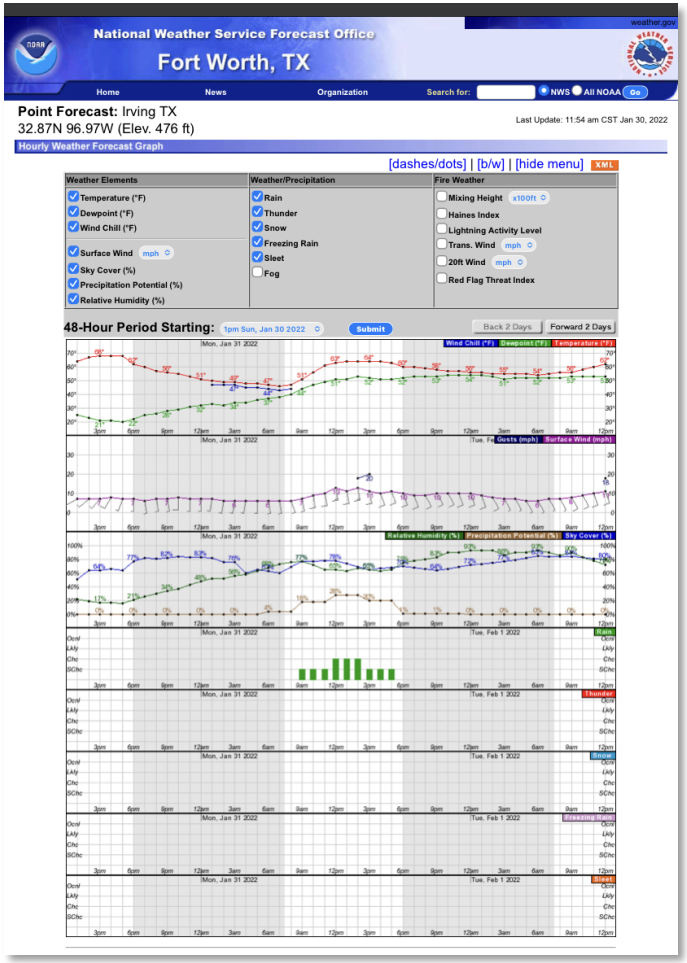
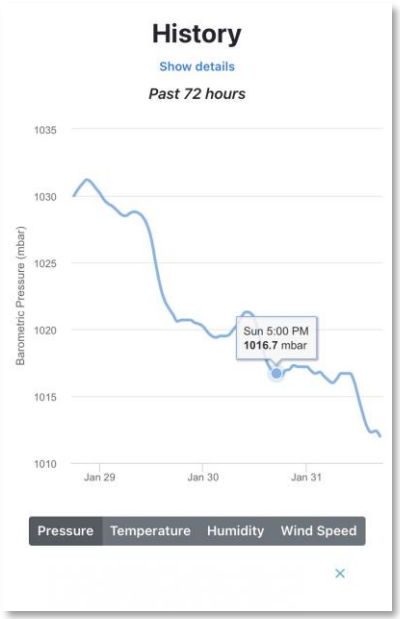
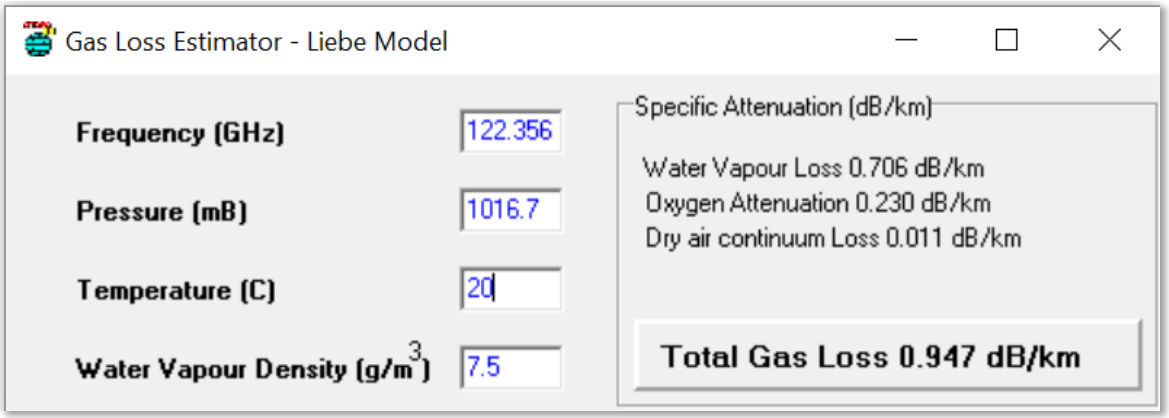
- Promising location found at Lake Ridge Hight School at 4 miles 6.5 km DX
- With a success at 2.22 km (~ 15 dB S/N) the 6.5 km DX seemed a marginal attempt
- Profile plot looked good and from Cedar Hill location we could see the tiny gap of opportunity 4 miles out.
- We decided to try the shorter 2.2 mile 3.57 km path to bridge first.
- Need to optimize feed location at the bridge following a successful contact
- Conditions looked good. Low humidity.



New day – new plan





- FSPL = -32.5 - 20 log d (in km) - 20 log f (in MHz)) dB
- @ 2.2 km -32.5 -2.86 - 101.72= -137.06 dB
- @ 6.5 km -32.5 -16.25 - 101.72= -150.47 dB
- ATML = ~ 1 dB per km
- 6.5 km path should introduce about 17 dB additional loss over 2.2 km path

Target & Aiming

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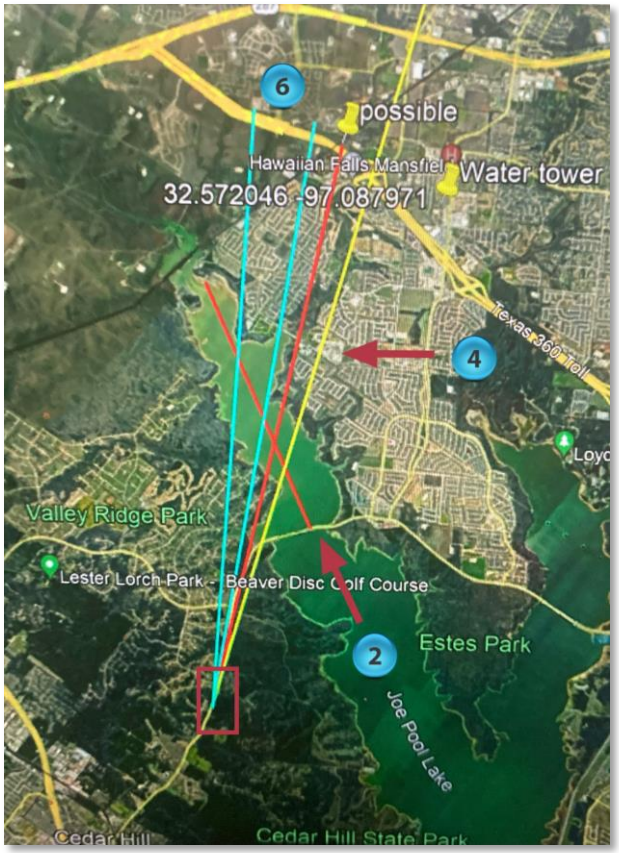

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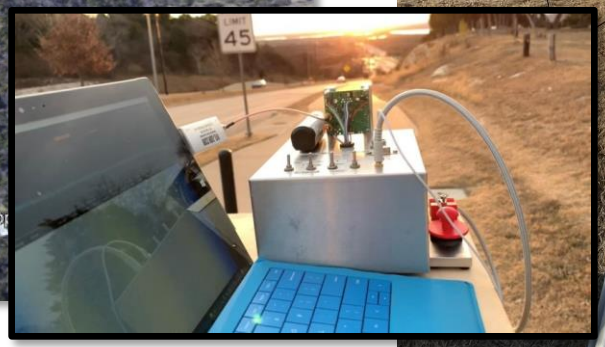
Test 1 – 2.22 km



- Signals 599 loud
- Dish feed position improved

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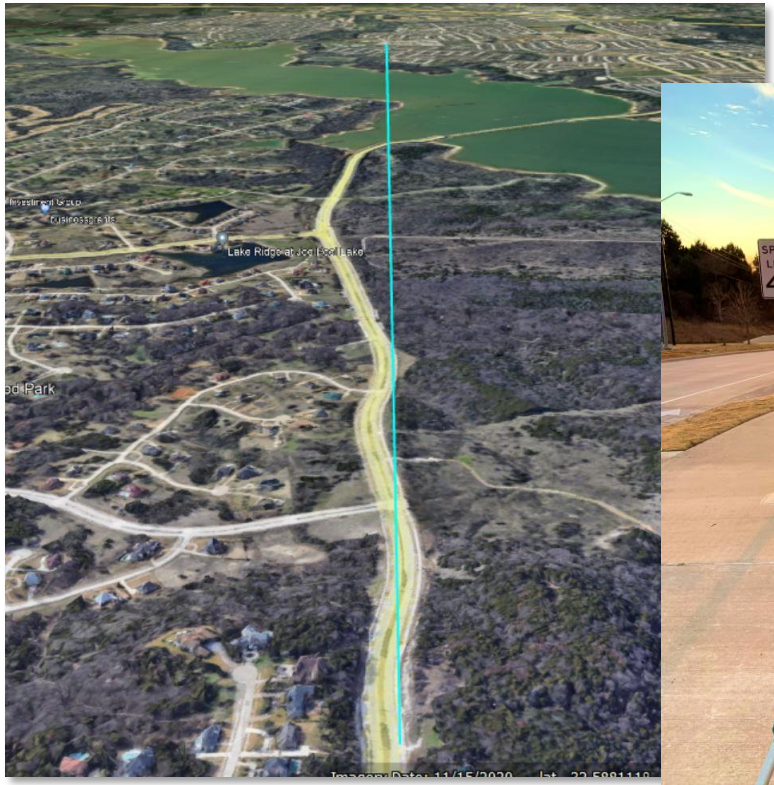
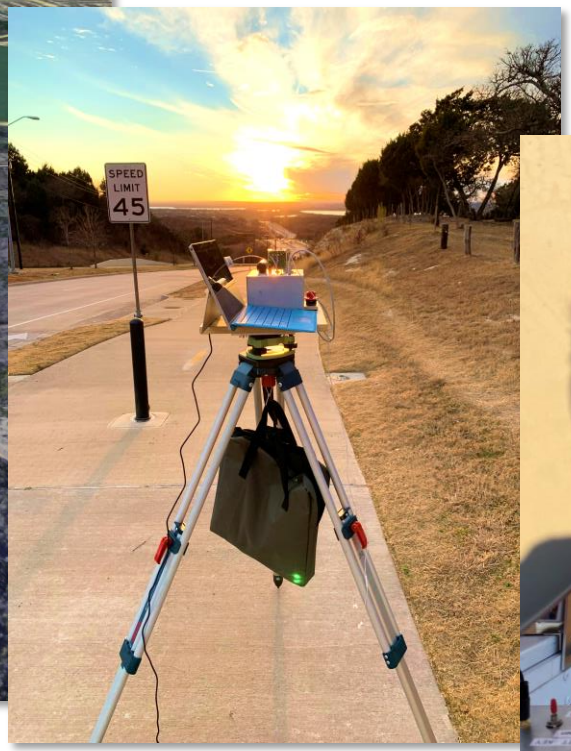
Test 2 – 6.5 km





- Signals much weaker but easily readable
- Dish feed position improved more

Next steps

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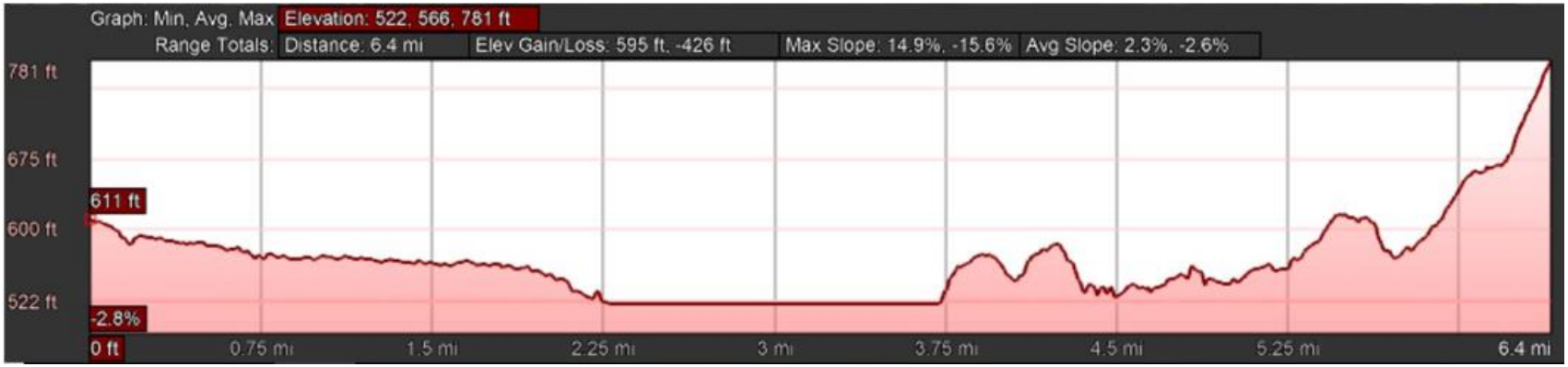
- Mount rifle scope and sight-in on 4 mi path
- Continue dish feed optimization starting on 4 mi path
- Attempt 10 km path using 1 of 3 possible locations
- Build 2nd dish unit



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Questions?