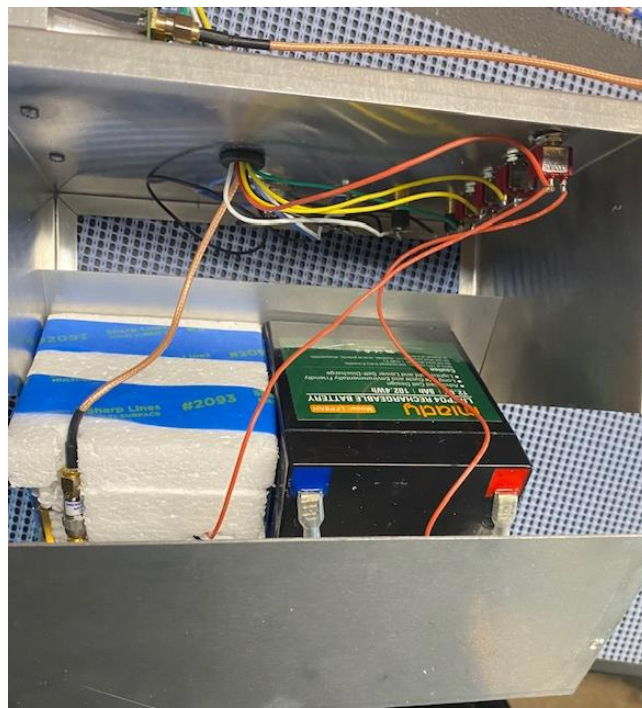
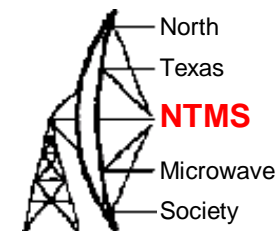


122 GHz Field tests

January 30, 2022

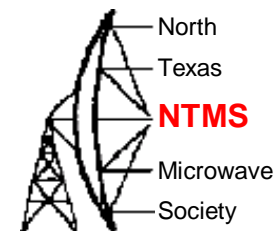
KM5PO – KI5EMN

Equipment - Beacon

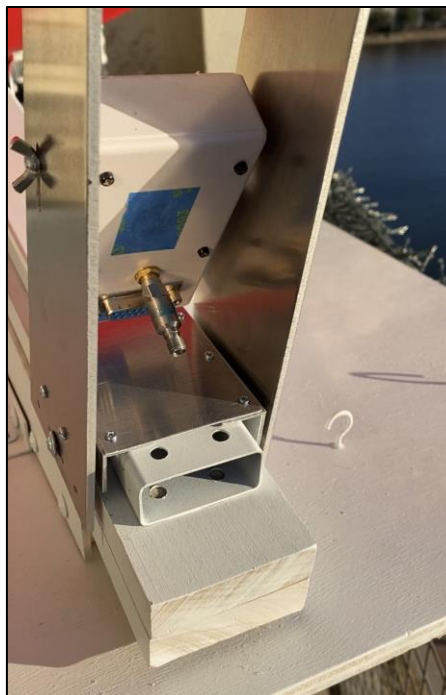


- VK3CV transverter board
- External 10 MHz reference
- Internal LIPO battery
- Conical Horn 24.4 dBi
- RS-232 diag. & programming
- Key, sidetone, Mic ports
- Beacon/Rx Tx modes
- 2 channels selectable

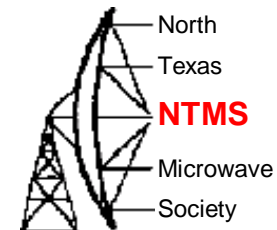
Equipment - Dish



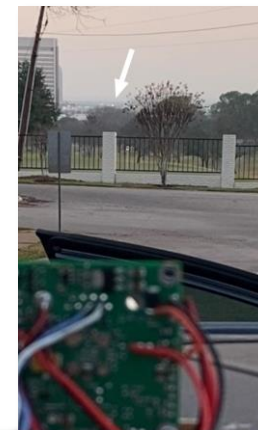
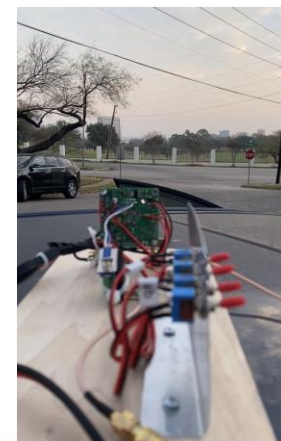
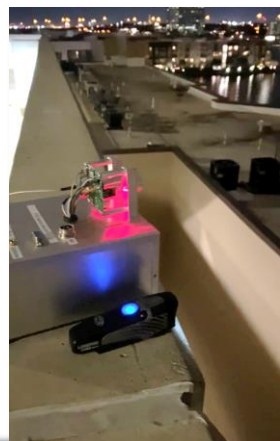
- GPS 10 MHz ref
- Chapparral feed
- 20" dish ~50 dB gain
- SDR/FT-290 IF rigs



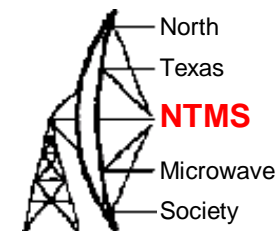
Initial tests



- 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



```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: HDL_3B4

Focal length = 327.4 mm.

This offset reflector is a section of a full parabola with a diameter
of 1040.8 mm. whose vertex is at the bottom edge of the offset reflector.
The full parabola has an f/D = 0.31, which determines criticality of focal
length.

The focal point of the dish is 327.35 mm. from the bottom edge of the
reflector and 534.18 mm. from the top edge of the reflector.

For operation with the main beam on the horizon with the feed at the bottom,
the dish must be tilted forward so that the large axis is 68.3 degrees
above horizontal.

Illumination angle for feed = 77 degrees on the large axis and 77.8 degrees
on the small axis. A feedhorn with a 3 dB beamwidth of 45 degrees is
needed, equivalent to the feed for a conventional dish with f/D = 0.71

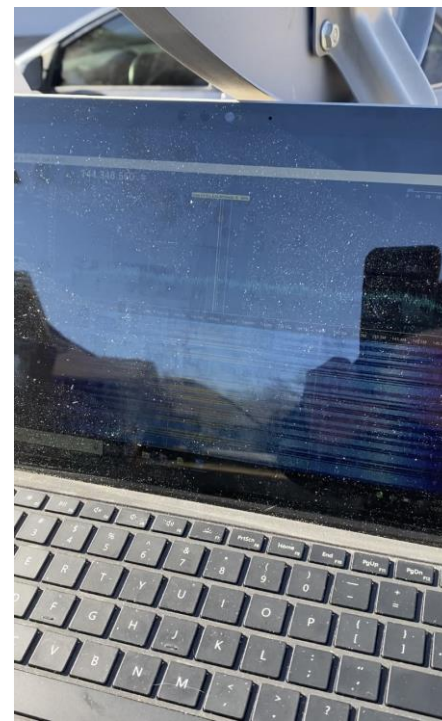
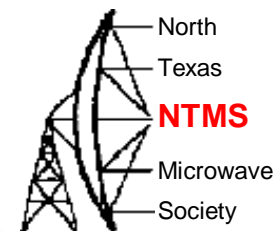
Gain at 50% efficiency = 113 dBi
If you do really well, you might get 60% efficiency for a gain = 114 dBi

To design a feedhorn, use f/D = 0.71 in Menu option F

Enter C to continue: _
```

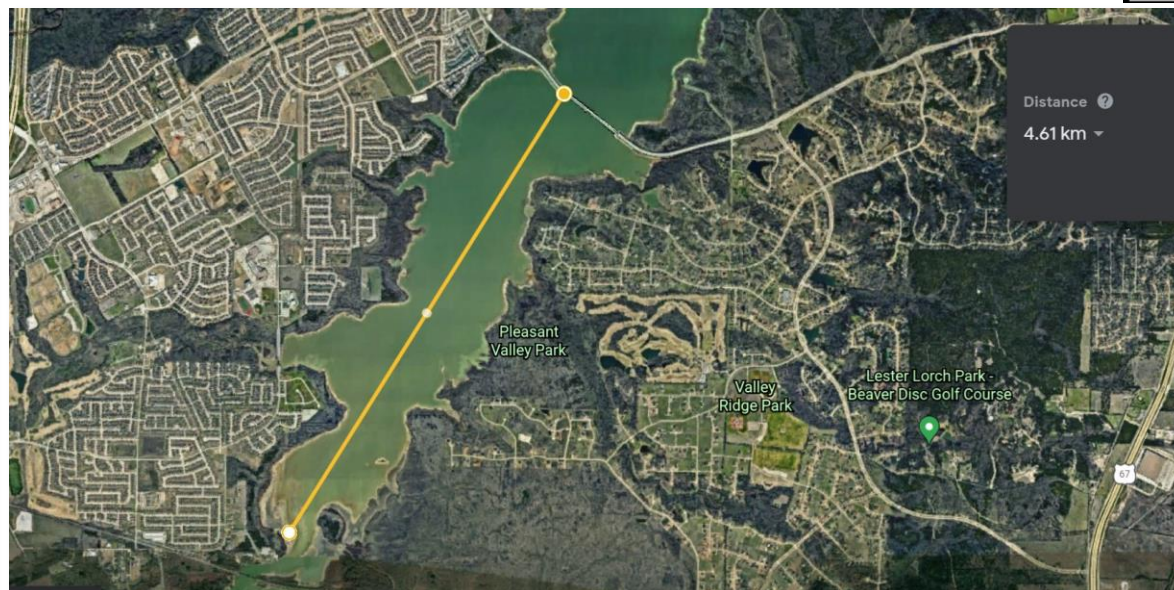
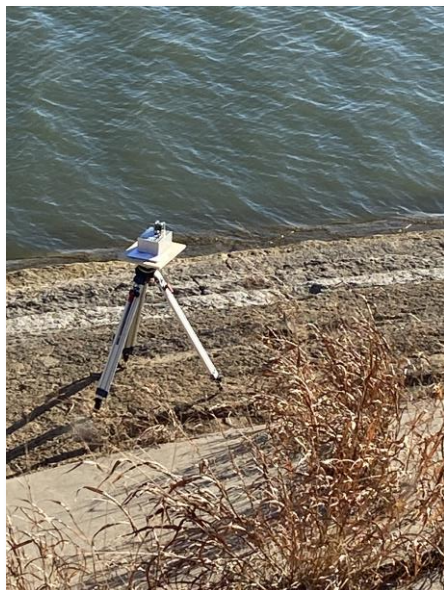
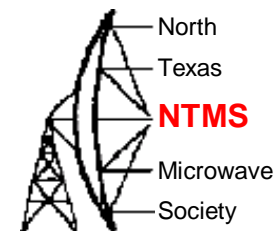
W1GHZ HDL_ANT program running in DOSbox

Operational checkout



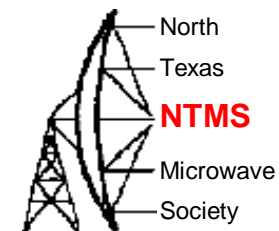
- The beacon requires about 8-10 minutes to stabilize (10 MHz ref)
- Find and document each others frequency
- Review switch settings for beacon operation and CW transmit/receive

Proving ground

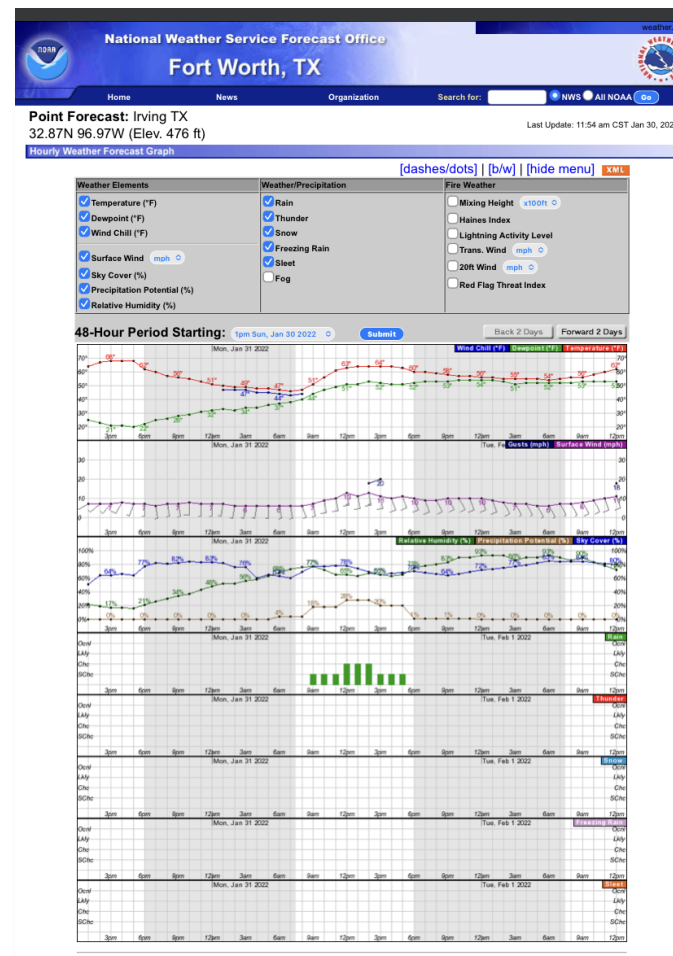


- Attempt 2.9 miles / 4.61 km from Lake Ridge Parkway bridge footing south to Britton Park (previous modulated laser success path)
- The plan was to operate the beacon at bridge and dish at Britton Park
- Logistics would require two trips by car.. leaving equipment unattended
- We deployed the beacon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

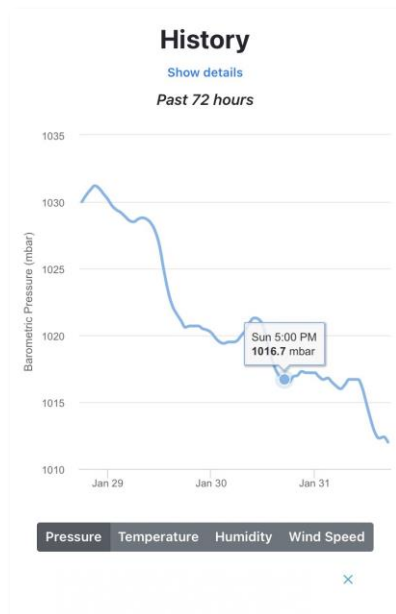
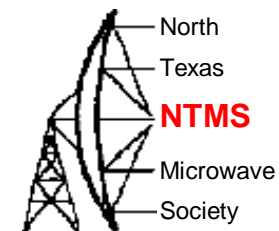
New day – new plan



- 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



Gas Loss Estimator - Liebe Model

Frequency (GHz)	122.356
Pressure (mB)	1016.7
Temperature (C)	20
Water Vapour Density (g/m ³)	7.5

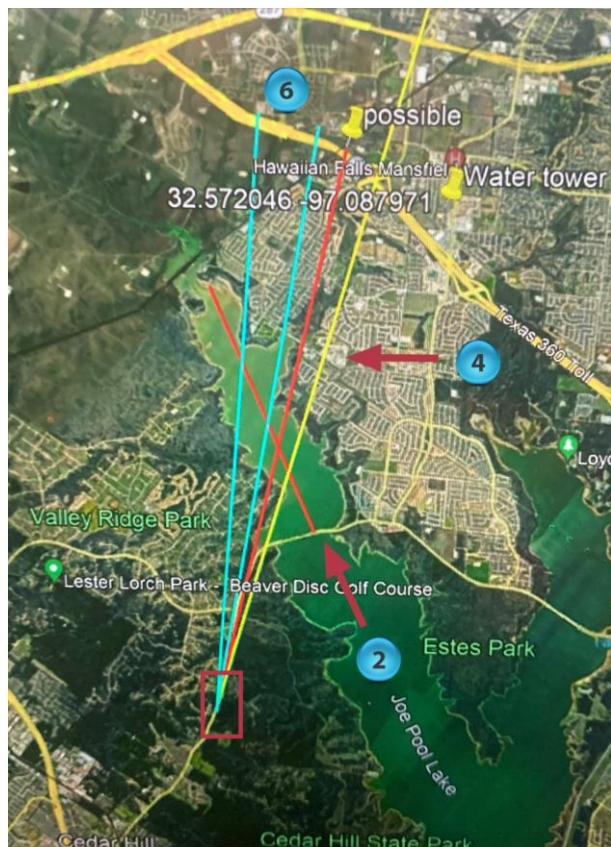
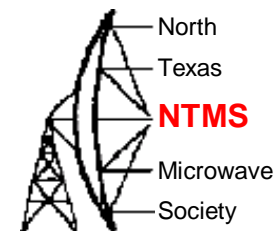
Specific Attenuation (dB/km)

Water Vapour Loss 0.706 dB/km
 Oxygen Attenuation 0.230 dB/km
 Dry air continuum Loss 0.011 dB/km

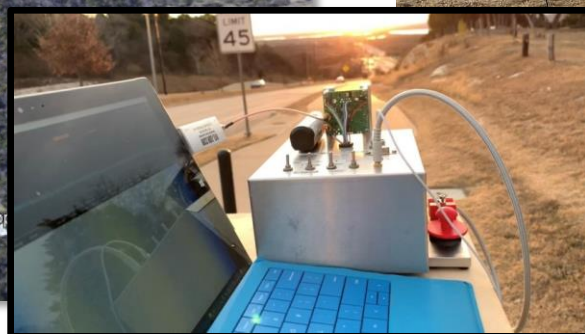
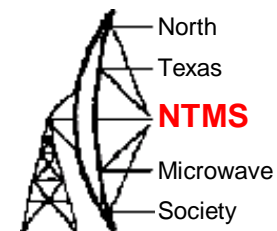
Total Gas Loss 0.947 dB/km

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

Target & Aiming

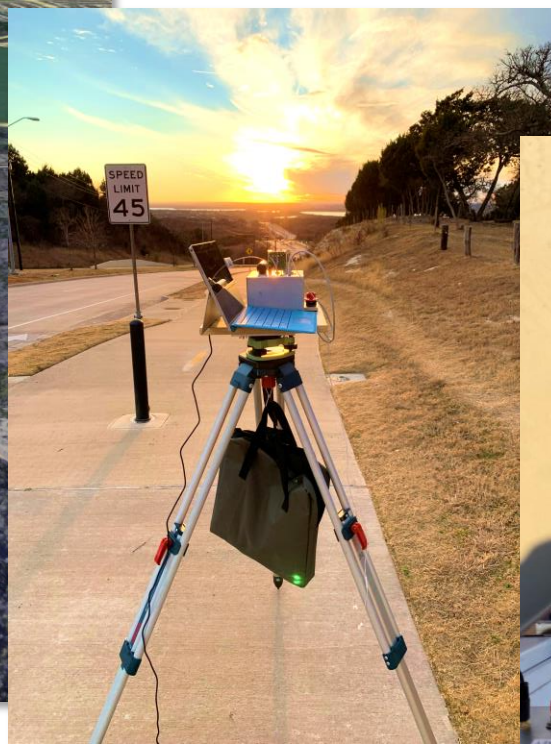
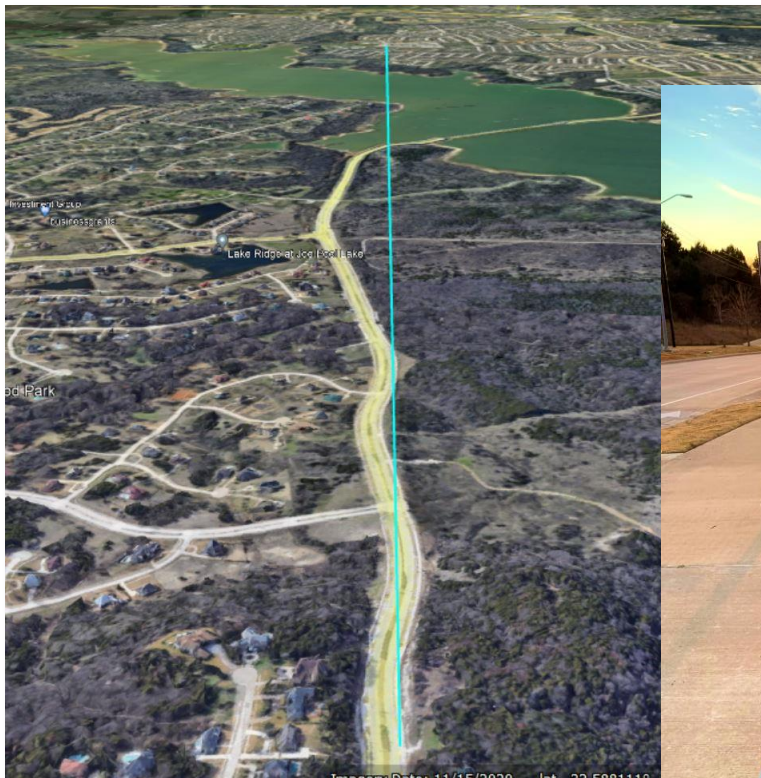
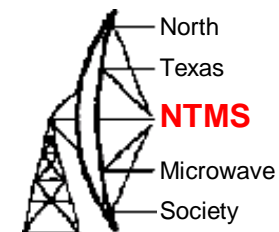


Test 1 – 2.22 km



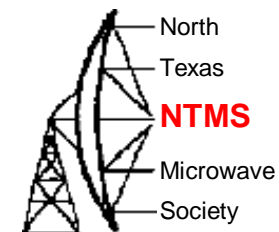
- Signals 599 loud
- Dish feed position improved

Test 2 – 6.5 km



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

Next steps



- 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



Questions?

