New E band 3.7mm distance world record

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2013
How I started...

- Feed, dish and mixer from Nori JR3JZM
- Tested on short distance with KF6KVG, AD6FP and K6GZA
- Test sites: Alviso, Canada collage, Mt Hamilton
- KF6KVG beacon at 79GHz - never heard with this radio
77-81GHz AD6IW Transverter

- TX 3-4 mW
- RX NF, 12 - 15dB who knows ?
- CW and FM, YiG locked to 10MHz
Early tests...

• Some improvements on both radios, more power but RX NF still high, low power..

• First 70km two way contact 10-15dB S/N
Canada collage to Grizzly peak, new test site 51.5Km

- S/N up to 30dB, easy 2 way QSO over Bay
Performance of the radio

- RX 12-15 dB NF
- TX 3-5 mW
- 0.4M Cass grain dish
- Programmable YIG oscillator, operating at entire 77-81GHz band, CW and FM only

Goal distance > 250km?
No way, with existing setup!
Need to improve my Radio for min. 30dB.
Path loss calculations

Free space Path loss:
\[ 32.45 + 20 \log(d) + 20 \log(f) \]
250km = 178.5dB

Atmospherics absorption @ 45 deg.
\[ 0.38 \text{dB/Km} = 95 \text{dB} \]

Total path loss 273.5dB
Same as 23cm EME!

In best case S/N would be \(-29\text{dB}\)

Time for new radio
New approach

- UMC LNA, WG Switch, diode mixer, Hittite and Triquint power amplifiers, wire bonding...
Some commercial parts

- Surplus high speed 71-81GHz point to point links
  Bob finds nice surplus units, and modified them
  Simple Mixer replaced with downconverter
KF6KVG new radio
KF6KVG

- High power 19dBm
- 5-6dB NF
- DRO very stable
- 1 ft dish
- More tests and large S/N improvements
AD6IW new radio-after a while

- High power 21dBm
- 2 ft Dish 51dB gain, 0.3 deg. Beam width
- 3dB of Sun Noise
Sun Noise Measurements

- 3dB at 80843MHz
- SF at E band?
Terrain profile for new record

- Waiting for low Dew point...
- Poor conditions during Summer
- Kings Canyon National Park to Mt. Hamilton
- 252km
Kings Canyon
Finally, we did it, at June 13th 2013.
How does it sound?

- FM
- SSB
- SSB

AD6IW 2013