The Reverse Beacon Network as an Antenna Performance Tool

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Prepared for the SEMDXA members meeting of November 9, 2012
The RBN as an Antenna Tool

Agenda

- What Sparked This Project?
- The Reverse Beacon Network
  - A Very Brief RBN History
  - Current Uses for the RBN
- Our Testing Protocol
- A Specific Test – 30 Meter Antennas
  - EZNEC Models
  - RBN Results and Observations
- RBN How-To Instructions
- Advice to Others
- Next Steps
- Other Antennas We Tested (time permitting)
What Sparked This Project?

30 Meter Antenna Comparison

- K8UT’s 2 element, directional shortened Quad at 65 feet
- W8NN’s stationary full wave horizontal Loop @ 18-42 feet

VS

- The Quad looked great as an EZNEC model
- The Quad sucked as a real antenna
Cliff’s Notes History of the RBN

- VE3NEA wrote the CW Skimmer program
  - Highly accurate CW interpreter software
  - Simultaneous multiple stream CW decoding
  - Connects to wideband Software Defined Radios (SDR)
  - Decodes CW signals from 160 – 2 meters
The Reverse Beacon Network

Cliff’s Notes History of the RBN

- Results published on a network similar to packet spots
  - Added details of CW speed and S/N ratios (signal strength)
- Aggregator software to collect results from multiple sites
- Integration into the AR-Cluster v6 protocol and VE7CC sites
- Visible in packet windows of desktop logging programs

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The Reverse Beacon Network

Current RBN Uses

- DX spotting and chasing
- Band openings
- Contest assist mode
- Post-contest analysis
- Packet history searches
- Propagation reports
- Signal strength plots
- Antenna comparisons (which is why we’re here tonight)
Our Testing Protocol

Consistency Yields Reliable Results
- Same band
  - Close, but not identical, frequencies
- Same time
- Same CW speed
- Same power output
- Same transmit string
  - “TEST TEST de <call> <call> TEST”
A Specific Test – 30 Meters

Conducted on October 2, 2012 @ 23:38z

- K8UT, W8NN, K8YTO
- 30 meter antennas
  - K8UT - Full wave inverted delta loop, vertically polarized
  - W8NN - Full wave inverted delta loop, horizontally polarized
  - K8YTO - Half wave dipole, rotatable (SteppIR)

- EZNEC elevation plot for each antenna
- Far field polarization is not a factor with ionosphere propagation
K8UT Inverted Delta Loop

Vertically Polarized
K8UT Inverted Delta Loop

Total Field

10.125 MHz

- Azimuth Angle: 90.0 deg.
- Outer Ring: 2.14 dBi
- Sidelobe Gain: 2.14 dBi @ Elev Angle = 150.0 deg.
- Front/Sidelobe: 0.0 dB
- Beamwidth: 47.4 deg; -3dB @ 8.8, 58.0 deg.
- Gain: 2.14 dBi
- Censor Elev: 23.0 deg
- dBmax: 0.0 dB
W8NN Inverted Delta Loop

Horizontally Polarized
W8NN Inverted Delta

Total Field

10.125 MHz

Elevation Plot
Azimuth Angle 90.0 deg.
Outer Ring 6.23 dBi
Slice Max Gain 6.23 dBi @ Elev Angle = 33.0 deg.
Beamwidth 44.6 deg. @ -50 dB @ 16.3, 59.9 deg.
Sidelobe Gain 6.23 dBi @ Elev Angle = 146.0 deg.
Front/Sidelobe 0.0 dB

Cursor Elev 33.0 deg.
Gain 6.23 dBi
0.0 dBmax
K8YTO Rotatable Dipole

Horizontally Polarized
30 Meter Data

Observations

- **K8UT** – vertical loop
  - Least DX
  - Lowest scores

- **W8NN** – horizontal loop
  - Most hits, most DX
  - Better scores

- **K8YTO** – rotary dipole
  -Fewest hits
  - Highest scores
  - All but 1 are DX

*Red* numbers indicate highest score from that skimmer
*Blue* numbers indicate tied scores
RBN *How-To* Instructions

www.reversebeacon.net/main.php

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RBN *How-To* Instructions

Filter Options

**FILTER OPTIONS**

- **no filter selected**
  - **search spot by**
  - **spots analysis tool**

**CREATE YOUR FILTER!**

**FILTER OPTIONS**

- **rows to show:** 50
- **show/hide**

**FILTER OPTIONS**

- **options:**
  - **show/hide**

**FILTER OPTIONS**

- **news**
  - **RBN blog: stay tuned!**
  - **we have 85 skimmers online**
  - **we have 196 visitors online**

**FILTER OPTIONS**

- **skimmers online:**
  - **9V1RM - 30m**
  - **AA4VV - 20m, 30m, 17m, 15m**
  - **DH4FAJ - DJ9IE - 80m, 40m, 160m**
  - **DKBNE - 6m**
  - **DK9IP - 80m, 40m, 160m**
  - **DL1EMY - 30m, 80m, 40m, 160m**
  - **DL4RCK - DL8LAS - 30m, 80m, 40m, 160m**
  - **EA4TX - 80m, 40m, 160m**
  - **EA6VQ - E6BIZ - 30m, 80m, 40m, 160m**
  - **ES5PC - F4DXW - 40m**
  - **E4EGZ - 40m**
  - **F5MUK - 40m**
RBN *How-To* Instructions

**Filter by Callsign**

- Filter for each station participating in your test
  - Who heard me?
  - How strong was my signal?
- Transfer two columns of data to your spreadsheet
Advice to Others

You Can Perform These Same Types of Tests

- Pick times with good DX and local propagation
- Use phones or IM for real-time communications
- Adjust frequency +/- the QRM
  - Weak distant stations may prevent one of the skimmers from hearing you
  - Distant stations may hear QRM of which we are unaware
- Try to recruit stations in close proximity
  - K8UT, W8NN, NE8Z are within a 1/2 mile radius
  - K8YTO is 40 miles away – how did that affect results?
- When testing alone
  - QSY at least 1 KHz or QRX 10 minutes between tests
Advice to Others

You Can Perform These… more

- Record RBN readings in spreadsheets
  - Record the date and time-of-day
  - Keep notes about which antenna, which band
  - Calculate differences in readings
  - Highlight DX vs local stations
  - Consider distance – especially for stateside skimmers
    - Some “DX” stations may be closer than stateside stations
  - Simplify your life - create desktop shortcuts with callsign filters
    - [www.reversebeacon.net](http://www.reversebeacon.net)
    - [www.reversebeacon.net/dxsd1/dxsd1.php?f=0&c=k8ut&t=dx](http://www.reversebeacon.net/dxsd1/dxsd1.php?f=0&c=k8ut&t=dx)

- Repeat tests several times to eliminate idiosyncrasies
Next Steps

What Else Would We Like to Compare?

- *Beam –to- Beam* tests
  - Need the upper HF bands to be in better shape for DX
- Test on more bands when propagation is better

We’re available for tests with other SEMDXA members if they have interesting antennas to compare!
Other Antennas We Tested

We Tested Lots of Antennas

- Full wave loops – horizontal and vertical (30)
- Vertical inverted Vs (30 and 40)
- Rotary dipole (beam) 30
- 2 element shortened quad beam (30)
- G5RV (tested on 40)
- Windom (tested on 30)
- Dipoles (30, 40, 80, 160)
- Vertical ground planes (30, 40, 80, 160)
## Some Other Test Results

### K8UT – GP vs Dipole

**Observations**
- \( \frac{1}{2} \) Wave Dipole wins
  - More hits
  - Higher scores
- **But wait! There’s more**
  - Bad band conditions
  - No DX
    - Is that important to you?

**Bottom line**
*Don’t dismantle the GP based on these results*
Some Other Test Results

NE8Z W8NN K8UT on 30m

Observations

- W8NN Horizontal Loop
  - Most hits
  - Highest scores
  - Most DX

- NE8Z Vertical Inverted V
  - All stateside hits
  - No DX

- WW8DX (NE8Z) Windom
  - Zero Hits

Bottom line

*W8NN has some secret sauce in that horizontal loop*
Some Other Test Results

K8UT – G5RV vs Dipole

Observations

- G5RV
  - One more hit
  - Lower average score
    - But by only .4 db

Bottom line

- Antennas are essentially identical on 40m with stateside results
- But no DX in the data
- What about the G5RV on other bands?

*More Testing is Needed*
The Reverse Beacon Network
as an Antenna Performance Tool

The End

Thank You!