CW and RTTY Skimmer
and the Reverse Beacon Network

Presented by N6TV
n6tv@arrl.net
Overview

- What is CW Skimmer and RTTY Skimmer?
- What is the Reverse Beacon Network?
- How does it work?
- What can the RBN do for me?
- How can I use it?
- How can I help?
- What’s new?
It all starts with one developer

- Alex Shovkopylas, VE3NEA
  (b. 1965, ex-UR5EMI, in Canada since 1998)
What is CW Skimmer?

1. Hardware: PC + Software Defined Radio (SDR)
2. Wideband RX Antenna, 1.8-30 MHz

InLogis
(formerly Pixel Loop)
RF Pro-1B:

DX Engineering
Active Horizontal:
ARAH3-1P:
Software

3. CW (or RTTY) Skimmer or Skimmer Server
CW Skimmer by VE3NEA

- Works with many SDRs
- Decodes *multiple* CW signals in real time
- Can monitor *entire* CW band
- Waterfall Display
- Band Scope
- Uses MASTER.DTA
- Telnet Server (emulates a DX Cluster)

Dayton 2015
Skimmer Server by VE3NEA

- Natively supports *only* the QS1R SDR
- Decodes multiple CW signals in real time
- Monitors *multiple bands* with single SDR
- *No* Waterfall Display
- *No* Band Scope
- *No* MASTER.DTA
- Telnet Server

Dayton 2015
RTTY Skimmer Server (new)

- Natively supports only the QS1R SDR
- Decodes multiple RTTY signals in real time
- Monitors *multiple bands* with single SDR
- Limited Band Scope
- Can use MASTER.DTA
- Telnet Server
Telnet server
(localhost port 7300)

- Emulates a DX Cluster Node

Reports Signal to Noise ratio, CW Speed, CQers
What is the Reverse Beacon Network (RBN)?

- Uses *any* CW or RTTY signal as a beacon
- Multiple Skimmers world-wide record signal strength (S/N ratio in dB) and CW speed (WPM)
- A free “Aggregator” program forwards Skimmer spots to a central server
- Central server distributes spots via web page and public telnet servers
- You don’t need to have an SDR to use it
How do spots get to you?

Antenna
• Pixel RF Pro-1A

SDR
• QS1R

PC
• Skimmer Server
• Aggregator

RBN
• Via Internet

“Retail” DX clusters

You
Acknowledgements

- RBN web site and first aggregator originated by PY1NB (similar to his other web site, www.dxwatch.com). Felipe pays all the bills.
- Lots of code by W3OA (aggregator), F5VIH (Spots analysis tool)
- CW Skimmer evangelized and tested by N4ZR (also publishes RBN blog) – “RBN Chief Evangelist”
- Telnet server support by K5TR, W2QO, KM3T
Felipe Ceglia, PY1NB

- Created and maintains the Reverse Beacon Network
- Hosts dxwatch.com and reversebeacon.net
Dick Williams, W3OA

- Created the newest RBN Aggregator software; now adding enhancements.
Nick Sinanis, F5VIH

- Wrote the RBN Spots Analysis Tool

F5VIH @ TM6M CQ WW CW 2011
Pete Smith, N4ZR

- RBN Chief Evangelist
- Yahoo Group: RBN-OPS [https://groups.yahoo.com/neo/groups/RBN-OPS/info](https://groups.yahoo.com/neo/groups/RBN-OPS/info) (130+ members)
What can the RBN do for me?

- It can improve your score
  - Fills spots in band map (SOA, Multi-op)
  - Spots *you* (very often, *if* you call CQ *properly*)

- Entering a contest?
  - Before: Check antenna F/B, signal strength
  - During: See where you are being heard, view skimmer-generated propagation maps
  - After: Compare signal strength with the competition
How can I use RBN to improve my score?

- Make sure the Skimmers find and spot you
- Access RBN via your favorite DX Cluster, for CW and RTTY contests (when allowed)
- RBN will post far more spots than DXers
  - With smaller pileups, less competition
- RBN quickly fills the band map in your logging software
- RBN helps locate clear spots to call CQ (between stations that you may not hear)
How can I use RBN to improve my score (cont’d):

- The RBN reveals band openings, shows where *you* are being heard
  - At K3LR, sunrise on 15m: “Spotted by S50ARX-#”
  - First EU answered our 15m CQs 25 minutes later
How do I CQ “properly”?

- Send everything at the same consistent speed
  - Never use >/_< or +++/--- to change speed in messages
- Call CQ or TEST and send your call twice
  - CQ N6TV N6TV
  - TEST N6TV N6TV
  - CQ N6TV N6TV TEST
- Use proper spacing (let computer send)
  - Don’t send with paddles and rush everything together
- Change your freq. slightly to get spotted again
What counts as “CQ”?

- Originally just: “CQ”, “TEST”, and “QRZ”
- VE3NEA Added: “FD”, “SS”, “NA” and “UP”
- Examples:
  - P5DX P5DX UP
  - SS N6TV N6TV
  - NA N6TV N6TV
  - FD N6TV N6TV FD
- Short calls like “W1F” should always be sent twice to help Skimmer identify it quickly
How to improve your chances in a Skimmer-generated pileup

- Use XIT or the “randomize TX” feature of your logging program to call a bit off frequency.
How do I use the RBN to Check My Antennas?

- To test performance, just call CQ on CW, check RBN web site (turn beam, repeat)
- Use RBN web site’s “Spots Analysis Tool” to compare your signal to the competition
- Download raw data files for deeper analysis
  - Every RBN spot posted since February, 2009 is archived on the RBN web site
Accessing the RBN (SOA, Multi)

1. Many DX clusters combine RBN and human spots using AR-Cluster V6 (see www.dxcluster.info for address listing).
   - Some ARC V6 clusters offer CT1BOH spot quality filters (flags busts, uniques)

2. dxc.ve7cc.net port 23
   CC Cluster software – removes many bad spots (uniques) and dupes
Filtering Spots (old way)

- DXSpider
  - accept/spots by_zone 1,3,4,6,7,31 and not by WZ7I or call N6TV
  - [http://www.dxcluster.org/main/filtering_en.html#toc1](http://www.dxcluster.org/main/filtering_en.html#toc1)

- ARCluster V6
  - set dx filter call=N6TV or (unique>1 and (spotterstate=CA or spotterstate=NV or spotterstate=UT))
  - [http://www.n8noe.us/ARC.html](http://www.n8noe.us/ARC.html)
Filtering Spots (new way)

- Use **CC User** software by VE7CC to log in to dxc.ve7cc.net port 23
- CC User sets filters with a full-feature, Graphical User Interface (GUI)
- CC Cluster nodes *automatically* reject “unique” (busted) spots, eliminates dupes
- New **AR-Cluster Client** by AB5K
- Updated Tutorial:
  - [http://reversebeacon.blogspot.com/2013/12/a-new-tutorial-on-using-rbn.html](http://reversebeacon.blogspot.com/2013/12/a-new-tutorial-on-using-rbn.html)
CC User Filter Dialogs

Dayton 2015
AR-Cluster Client by AB5K

www.n8noe.us/ARC.html

<table>
<thead>
<tr>
<th>Name</th>
<th>Filter</th>
<th>Default</th>
<th>Multimedia</th>
<th>Edit</th>
<th>Delete</th>
<th>Apply</th>
<th>Apply</th>
<th>Edit</th>
<th>Delete</th>
</tr>
</thead>
<tbody>
<tr>
<td>MyFilt</td>
<td>(((Not Skimmer) or (Skimmer and Unique &gt; 1)) and (SpotterCqZone in (3,4)) and (Freq &gt;= 1800 AND Freq &lt;= 2900))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Skimmer</td>
<td>Not Skimmer</td>
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<td>SpotterCont=NA</td>
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<td></td>
<td></td>
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<tr>
<td>USA Originating Spots</td>
<td>SpotterCty=K</td>
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<tr>
<td>WW High Quality Skimmer</td>
<td>Not Skimmer or (Skimmer AND Unique&gt;2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>WW Med. Quality Skimmer</td>
<td>Not Skimmer or (Skimmer AND Unique&gt;1)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**DX Filter Wizard**

Pick the range of frequencies that you want to receive using the drop list.

- **Frequency Select**: 4F Contest CW
- **Frequency Filter**: (Freq >= 1800 AND Freq <= 2900) OR (Freq >= 3500 AND Freq <= 3600) OR (Freq >= 3600 AND Freq <= 7000 AND Freq >= 7100) OR (Freq >= 14000 AND Freq <= 14143) OR (Freq >= 21000 AND Freq <= 21150) OR (Freq >= 28000 AND Freq <= 28200)
Many nodes combine RBN and “legacy” (human) spots

- dxc.ve7cc.net port 23 (CC Cluster, many filtering options, use CC User to set them)
- dxc.w9pa.net port 7373 (AR Cluster)
  set dx extension skimmerquality
- dxc.n7tr.com port 7373 (AR Cluster, but pre-filters to show only spots from Zones 3 and 4)
Real-time propagation maps

- http://www.dxmaps.com
- Click “HF” and band of interest
- Leave page open, it refreshes automatically
Using www.reversebeacon.net

- Great for post-contest analysis
- Plot signal strengths
- Raw data files can be downloaded / analyzed
  - Millions of spots archived
www.reversebeacon.net

Welcome to the reverse beacon network!
The Reverse Beacon Network is a revolutionary new idea. Instead of beacons actively transmitting signals, the RBN is a network of stations listening to the bands and reporting what stations they hear, when and how well.

If you already know all this, skip directly to the main page.

So why should you care? Well, to begin with, you can see band openings in near-real time on an animated map. You can call a quick CQ, and see which reverse beacons hear you, and how strong you are. Try it!

But the real breakthrough is in the database of past "spots". You can instantly find out what stations, from a given country or zone, have been heard, at what times and on what frequencies. You can see when you've been spotted, who spotted you, and how loud you were. Try it!

Check out our blog!

Aggregator 2.1 - new insight for Skimmer ops
The newest Aggregator, Version 2.1, is now available, after extensive beta testing. This post explains the new features of this release, tab by tab. First of all, there is an entirely new tab titled "Skimmer Traffic." Here's what it looks like...

statistics:
we have 70 skimmers online
we have 115 visitors online

skimmers online:
9V1RM - 20m,15m,17m
AB1HL - 10m,20m,30m,80m,40m,17m
DJ9IE - 40m
DK8NE - 6m
DK9IP - 30m,80m,40m
DL0LBS - DL2CC - 20m,30m,80m,40m
DL3KR - DR1A - 20m,30m,80m,40m
show/hide my last filters

no filter selected, showing all spots

search spot by callsign

<table>
<thead>
<tr>
<th>de</th>
<th>dx</th>
<th>freq</th>
<th>cq/dx</th>
<th>snr</th>
<th>speed</th>
<th>time</th>
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</thead>
<tbody>
<tr>
<td>W4AX</td>
<td>HBSTPT</td>
<td>10115.5</td>
<td>CQ</td>
<td>6 dB</td>
<td>19 wpm</td>
<td>0945z 02 Apr</td>
</tr>
<tr>
<td>EA4TX</td>
<td>HB9TPT</td>
<td>10115.5</td>
<td>CQ</td>
<td>8 dB</td>
<td>19 wpm</td>
<td>0945z 02 Apr</td>
</tr>
<tr>
<td>IK3STG</td>
<td>HBSTPT</td>
<td>10115.5</td>
<td>CQ</td>
<td>17 dB</td>
<td>20 wpm</td>
<td>0945z 02 Apr</td>
</tr>
<tr>
<td>K8ND</td>
<td>VE1ZZ</td>
<td>1823.5</td>
<td>CQ</td>
<td>28 dB</td>
<td>19 wpm</td>
<td>0945z 02 Apr</td>
</tr>
<tr>
<td>W3OA</td>
<td>VE1ZZ</td>
<td>1823.5</td>
<td>CQ</td>
<td>21 dB</td>
<td>19 wpm</td>
<td>0945z 02 Apr</td>
</tr>
<tr>
<td>K1TTT</td>
<td>VE1ZZ</td>
<td>1823.5</td>
<td>CQ</td>
<td>35 dB</td>
<td>19 wpm</td>
<td>0945z 02 Apr</td>
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<td>WZ7I</td>
<td>VE1ZZ</td>
<td>1823.5</td>
<td>CQ</td>
<td>36 dB</td>
<td>20 wpm</td>
<td>0945z 02 Apr</td>
</tr>
<tr>
<td>KB9AMG</td>
<td>VE1ZZ</td>
<td>1823.5</td>
<td>CQ</td>
<td>14 dB</td>
<td>19 wpm</td>
<td>0945z 02 Apr</td>
</tr>
<tr>
<td>RZ3DVP</td>
<td>MS5RAI</td>
<td>10117.5</td>
<td>CQ</td>
<td>12 dB</td>
<td>28 wpm</td>
<td>0945z 02 Apr</td>
</tr>
<tr>
<td>KH6LC</td>
<td>LU9DO</td>
<td>14012.0</td>
<td>CQ [LoTW]</td>
<td>28 dB</td>
<td>14 wpm</td>
<td>0945z 02 Apr</td>
</tr>
</tbody>
</table>

options: show/hide

news
RBN blog: stay tuned!
we have 67 skimmers online
we have 147 visitors online

skimmers online:
9V1RM - 10m,17m,12m,15m
AB1HL - 20m,30m,40m,17m
DJ9IE - 40m
DK1MAX -
DK8NE - 6m
DK9IF -
20m,30m,40m,17m,12m,15m
DL0LBS -
P13CD - 20m,30m,40m,17m,15m
Where was I heard?

[Image of a screenshot from the Reverse Beacon Network website, showing a search for DX call N6TV with results for WZ7I, K1TTT, and S50ARX.]
Plot spots on a map
Which bands are open at *my* QTH?
Spots analysis tool
Pick a Date, a Skimmer, add callsigns to compare

1. Select a comparison date
   - 10/01/2011

2. Select a Reverse Beacon
   - North America
     - K3MM 6926 spots
     - K8ND 3751 spots
     - KA9SWE 657 spots
     - KB9AMG 181 spots
     - KC0VKN 877 spots

3. Enter callsigns to compare
   - Africa
     - N6TV 58 spots
   - Oceania
     - K6XX 29 spots

   - Add
And the winner is ... K6XX!
Raw data downloads

Reverse Beacon Network

Welcome | Main | dx spots | skimmers | downloads | about | contact us

Download raw data

Raw data download

Data from the RBN

Spot search

Simply use the interactive tool to create the filters you want. The zipped files can be downloaded by a single click on the filename.

HF

The data files themselves can usually be viewed by opening in Excel. Note, however, that on busy days the amount of data will be too large to download. For example, on Saturday, during the 2010 ARRL DX CW contest, the RBN produced a full daily data set, containing over 1.5 billion spots.

The only thing that’s required in order to share your ideas with the RBN community is a public blog post. Please see our blog for more details.

Click on the year, and then month, to see available data. You can also use the controls below.

2012

January

1.8/3.5/7MHz

February

01 Wednesday

14/21/28MHz

02 Thursday

10/18/24MHz

03 Friday

1089KBytes

20120201.zip

20120202.zip

20120203.zip
Raw data is text file, Comma Separated Values

callsign, de_pfx, de_cont, freq, band, dx, dx_pfx, dx_cont, mode, db, date, speed, tx_mode
JE1SGH, JA, AS, 28032.6, 10m, K6UW, K, NA, CQ, 29, 2014-02-15 00:00:00, 32, CW
XV4Y, 3W, AS, 14041.1, 20m, PT5T, PY, SA, CQ, 22, 2014-02-15 00:00:00, 28, CW
XV4Y, 3W, AS, 14021, 20m, PX2F, PY, SA, CQ, 23, 2014-02-15 00:00:00, 23, CW
NC7J, K, NA, 28005.5, 10m, N2IC, K, NA, CQ, 11, 2014-02-15 00:00:00, 33, CW

Total World-Wide RBN CW spots, CQ WW:
2012: 3,163,126 (18.3 spots per second)
2013: 5,743,545 (33.2 spots per second) – up 81.5%
2014: 6,200,340 (35.9 spots per second) – up 8.0%

ARRL DX CW:
2013: 3,937,108 (82,023 spots per hour)
2014: 4,146,399 (86,383 spots per hour) – up 5.3%
2015: 5,537,017 (115,354 spots per hour) – up 33.5%
What’s the Average CW Speed?

- 2013 CQ WW CW: 30.6 WPM
- 2014 CQ WW CW: 30.8 WPM
- 2014 ARRL DX CW: 29.6 WPM
- 2015 ARRL DX CW: 30.1 WPM
How can I help?

- Set up an SDR, feed Skimmer Spots to the RBN, using the Aggregator program
  - More skimmers needed in Asia/Africa/South America
- Call a bit off frequency (Win-test and N1MM both provide automatic randomization if desired)
What’s New?

- NCDXF and other HF Beacons can be spotted on RBN
  - [reversebeacon.blogspot.com/2014/02/ncdxf-beacon-spotting-redux.html](http://reversebeacon.blogspot.com/2014/02/ncdxf-beacon-spotting-redux.html)
- RTTY Skimmer Server 1.0
- CW Skimmer 1.83
- Aggregator v4.0
For more information

- [http://www.reversebeacon.net](http://www.reversebeacon.net)
- [http://www.dxmaps.com](http://www.dxmaps.com)
- [http://www.bcdxc.org/ve7cc/default.htm#download](http://www.bcdxc.org/ve7cc/default.htm#download)
- [http://www.dxatlas.com/CwSkimmer](http://www.dxatlas.com/CwSkimmer)
- [http://www.dxatlas.com/SkimServer](http://www.dxatlas.com/SkimServer)
- [http://www.srl-llc.com/](http://www.srl-llc.com/) (QS1R SDR)
- [http://microtelecom.it/perseus/](http://microtelecom.it/perseus/) (Perseus SDR)
- [http://www.dxengineering.com/parts/ins-rf-pro-1b](http://www.dxengineering.com/parts/ins-rf-pro-1b) (RF Pro-1B loop antenna)
For more information

- [http://www.dxengineering.com/parts/dxe-arah3-1p](http://www.dxengineering.com/parts/dxe-arah3-1p) (Active Broadband Dipole antenna)
- [http://www.pvrc.org/~n4zr/rbn.pdf](http://www.pvrc.org/~n4zr/rbn.pdf)
- [http://reversebeacon.blogspot.com/2013/12/a-new-tutorial-on-using-rbn.html](http://reversebeacon.blogspot.com/2013/12/a-new-tutorial-on-using-rbn.html)
- [http://reversebeacon.blogspot.com](http://reversebeacon.blogspot.com)
- [http://www.ve7cc.net/](http://www.ve7cc.net/)
- [http://www.qrz.com/db/n6tv](http://www.qrz.com/db/n6tv)
Questions?