

Visalia Contest Academy  
19 April 2013

**Using the  
Reverse Beacon Network  
As a Contesting **Advantage****

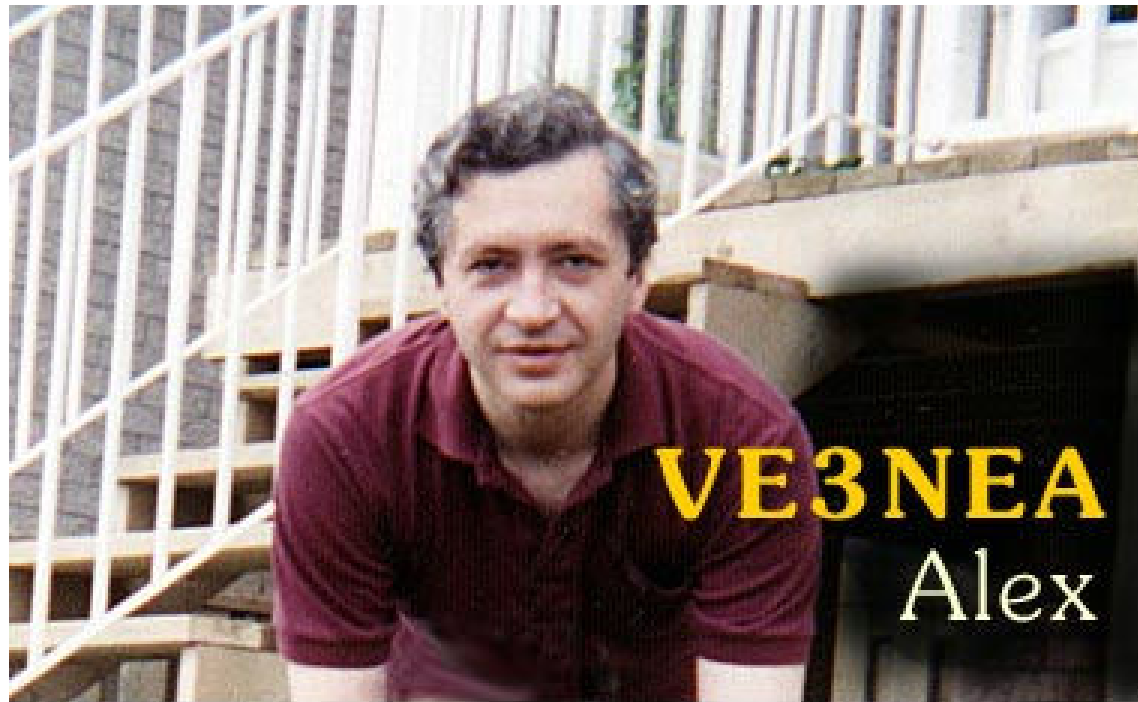
by N6TV  
[n6tv@arri.net](mailto:n6tv@arri.net)

# Overview

- What is CW Skimmer?
- What is the Reverse Beacon Network (RBN)?
- How can I use the RBN to **improve my score?**
- How can I use the RBN to **check my antennas?**
- Skimmer Accuracy
- What's next?

# It all starts with one developer

- Alex Shovkoplyas, [VE3NEA](#)  
(b. 1965, ex-UR5EMI, in Canada since 1998)



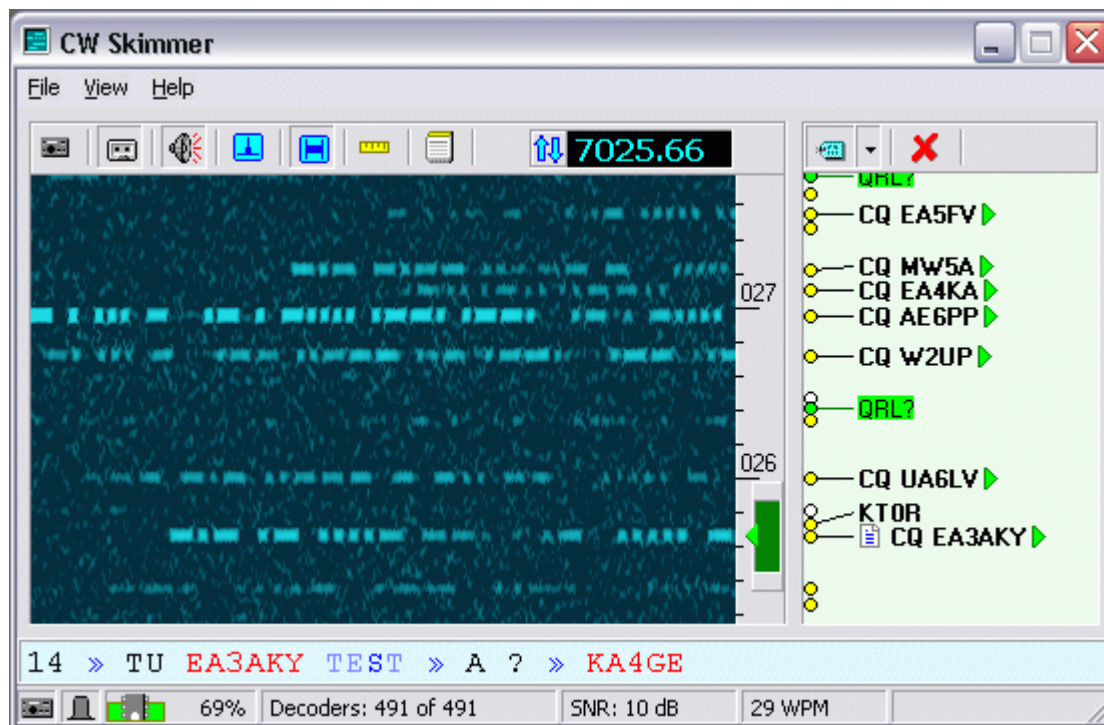
# What is CW Skimmer?

1. Hardware: PC + Software Defined Radio (SDR)

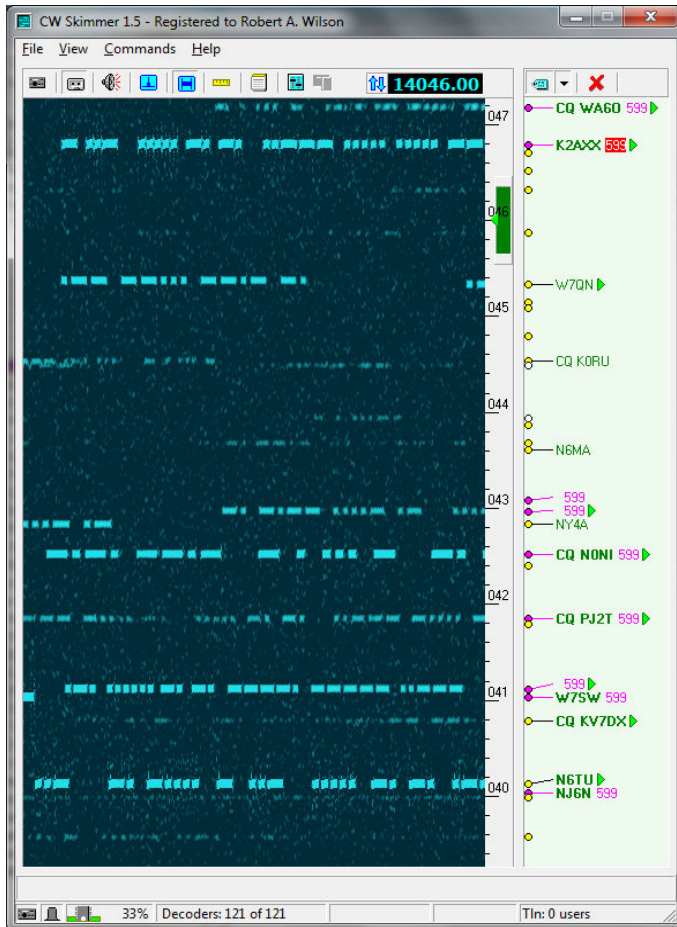


# Software

## 2. CW Skimmer *or* Skimmer Server

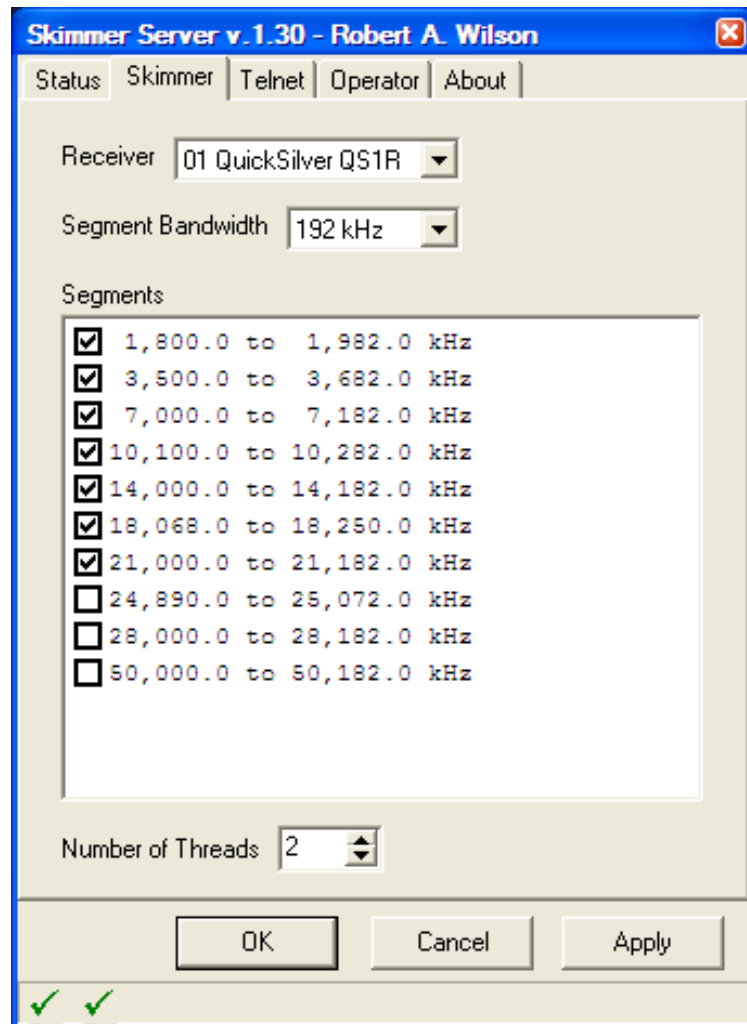


# CW Skimmer by VE3NEA



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

# Skimmer Server by VE3NEA



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

# Telnet server

- DX Cluster Emulation:

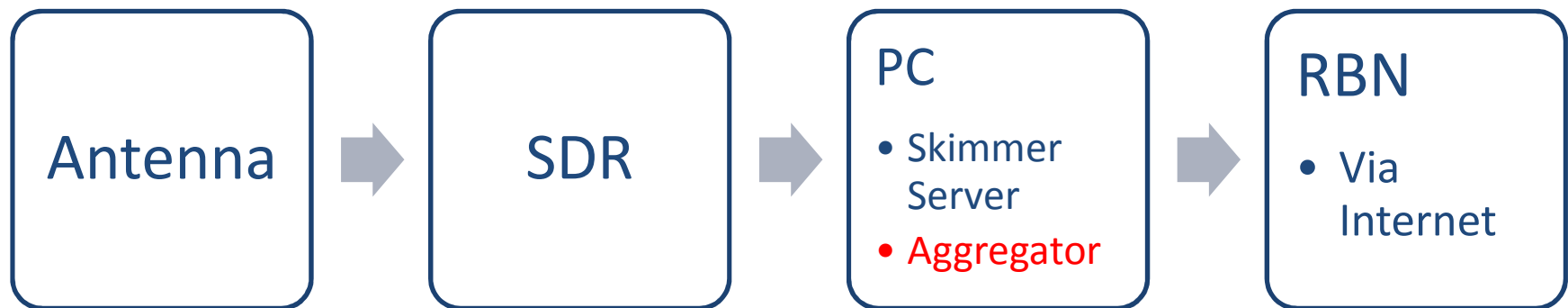
DX de N6TV-#:	14058.7	WR7HE	24 dB	31 WPM	CQ	2350
DX de N6TV-#:	14029.6	NM7D	29 dB	25 WPM	CQ	2350
DX de N6TV-#:	14059.5	YW4D	35 dB	31 WPM	CQ	2350
DX de N6TV-#:	14022.6	J39BS	11 dB	25 WPM	CQ	2350
DX de N6TV-#:	14066.8	NF6A	38 dB	30 WPM	CQ	2350
DX de N6TV-#:	14054.4	N5UM	26 dB	28 WPM	CQ	2350
DX de N6TV-#:	14021.2	NN5J	35 dB	31 WPM	CQ	2350
DX de N6TV-#:	14061.4	WX5S	12 dB	28 WPM	CQ	2350
DX de N6TV-#:	14064.2	WQ5L	15 dB	28 WPM	CQ	2350
DX de N6TV-#:	14032.2	VE7XF	18 dB	27 WPM		2350
DX de N6TV-#:	14042.9	NT5C	45 dB	31 WPM		2350
DX de N6TV-#:	14032.2	VE7XF	18 dB	27 WPM	CQ	2350
DX de N6TV-#:	14039.2	EA3FP	15 dB	31 WPM	CQ	2350
DX de N6TV-#:	14052.5	W0YR	20 dB	28 WPM	CQ	2350
DX de N6TV-#:	14022.9	AB7E	32 dB	25 WPM	CQ	2350
DX de N6TV-#:	14028.4	WH6R	7 dB	29 WPM		2350
DX de N6TV-#:	14065.6	KH7B	25 dB	29 WPM	CQ	2350
To ALL de SKIMMER <0952Z> : Clicked on "VE7XF" at 14032.2						
DX de N6TV-#:	14069.6	KF6T	13 dB	28 WPM	CQ	2350
DX de N6TV-#:	14069.1	NK0M	25 dB	28 WPM	CQ	2350
To ALL de SKIMMER <0952Z> : Clicked on "" at 14031.4						
DX de N6TV-#:	14035.5	KF8GE	12 dB	26 WPM		2350
DX de N6TV-#:	14028.4	WH6R	7 dB	29 WPM	CQ	2350
DX de N6TV-#:	14036.1	NZ1U	16 dB	28 WPM	CQ	2350
DX de N6TV-#:	14062.7	N4QS	11 dB	29 WPM	CQ	2350
DX de N6TV-#:	14045.1	YU1FM	20 dB	32 WPM	CQ	2350
DX de N6TV-#:	14059.6	YW4D	35 dB	31 WPM		2350

Reports Signal to Noise ratio, CW Speed, CQers

# What is the Reverse Beacon Network?

- Originated and operated by PY1NB
- Uses *any* decoded CW signal as a beacon
- Multiple Skimmers world-wide decode your callsign and S/N ratio
- An “Aggregator” program forwards Skimmer spots to a central server
- Central server distributes spots via web site [www.reversebeacon.net](http://www.reversebeacon.net), and public telnet servers

# How do spots get to the RBN server?



# How do I access the RBN?

- telnet.reversebeacon.net port 7000  
(DX Spider software, hosted by K5TR)
- arcluster.reversebeacon.net port 7000  
(V6 AR-Cluster software, hosted by W2QO)
- dxc.ve7cc.net port 23  
(CC Cluster, hosted by VE7CC)
- <http://www.reversebeacon.net>

## How can I use RBN to improve my score?

- Make sure the Skimmers find *you*
- When permitted, use RBN as primary **DX Cluster** for CW contests
  - Far more spots, smaller pileups
  - Fills up your **band map** *fast*
  - Helps you find **clear spots** (between stations you can't hear)
  - Shows where *you* are being heard
    - E.g. at K3LR on 15m: “**Spotted by S50ARX-#**”
    - First EU answered our 15m CQs 25 minutes later

# RBN Most Spotted 2011 CQ WW CW

## USA (SO HP)

K0DQ	6724
K1RX	6681
K3CR	6439
K5ZD	5684
K4ZW	5606
NN1N	5543
N2NT	5052
N9RV	4829
K1DG	4400
K1TO	4218

## DX (SO HP)

VY2TT	3639
VY2ZM	3541
P40W	2695
P40F	2249
A45XR	2162
<b>PZ5T</b>	<b>1864</b>
8P5A	1647
NH2T	1439
<b>CR3E</b>	<b>1430</b>
CR6K	1253
4O3A	447

# José Nunes, CT1BOH

- “PZ5T was lucky”
- “I think I had +++TEST--- CR3E.  
Next year I will have TEST CR3E.”

# How to be easily spotted by a CW Skimmer

- Send *everything* at the *same consistent speed*
  - Do *not* use +++/--- or >/< to speed up/slow down
- Call CQ or TEST and send your call twice
  - CQ N6TV N6TV
  - TEST N6TV N6TV
- Use proper spacing (let computer send)
  - Don't send by hand and rusheverythingtogether
- Change freq. slightly to get spotted again

# Use as Main DX Cluster

## But **Filter The Spots**

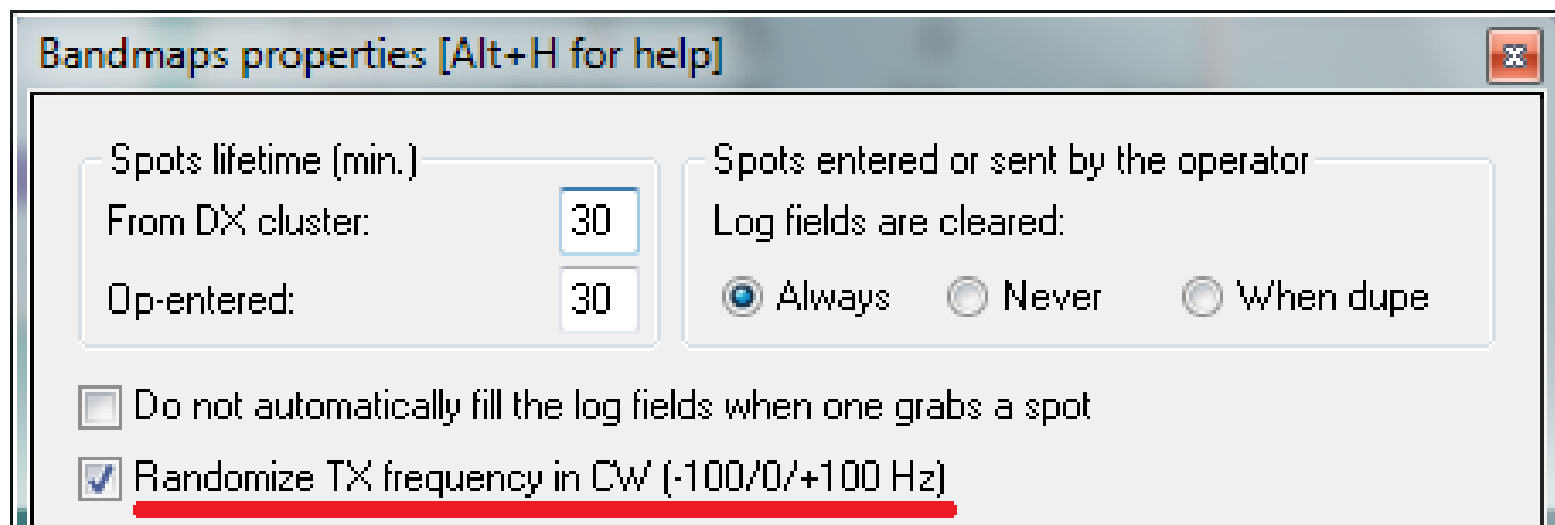
- telnet.reversebeacon.net port 7000  
accept/spots by\_zone 1,3,4,6,7,31 and not  
by WZ7I or call N6TV  
[http://www.dxcluster.org/main/filtering\\_en.html#toc1](http://www.dxcluster.org/main/filtering_en.html#toc1)
- arcluster.reversebeacon.net port 7000  
set dx filter call=N6TV or (**unique>1** and  
(spotterstate=CA or spotterstate=NV or  
spotterstate=UT))  
<http://www.ab5k.net/ArcDocsVer6/UserManual/ArcDx.htm>
- Or try the free “CC User” Software by VE7CC  
<http://www.ve7cc.net/>

## Some servers combine RBN with “legacy” (human) spots

- dxc.w9zrx.net port 7373
- dxc.n7tr.com port 7373
  - Pre-filters to show only spots from Zones 3 and 4
- dxc.k1ttt.net port 7373

# How to improve your chances in a Skimmer-generated pileup

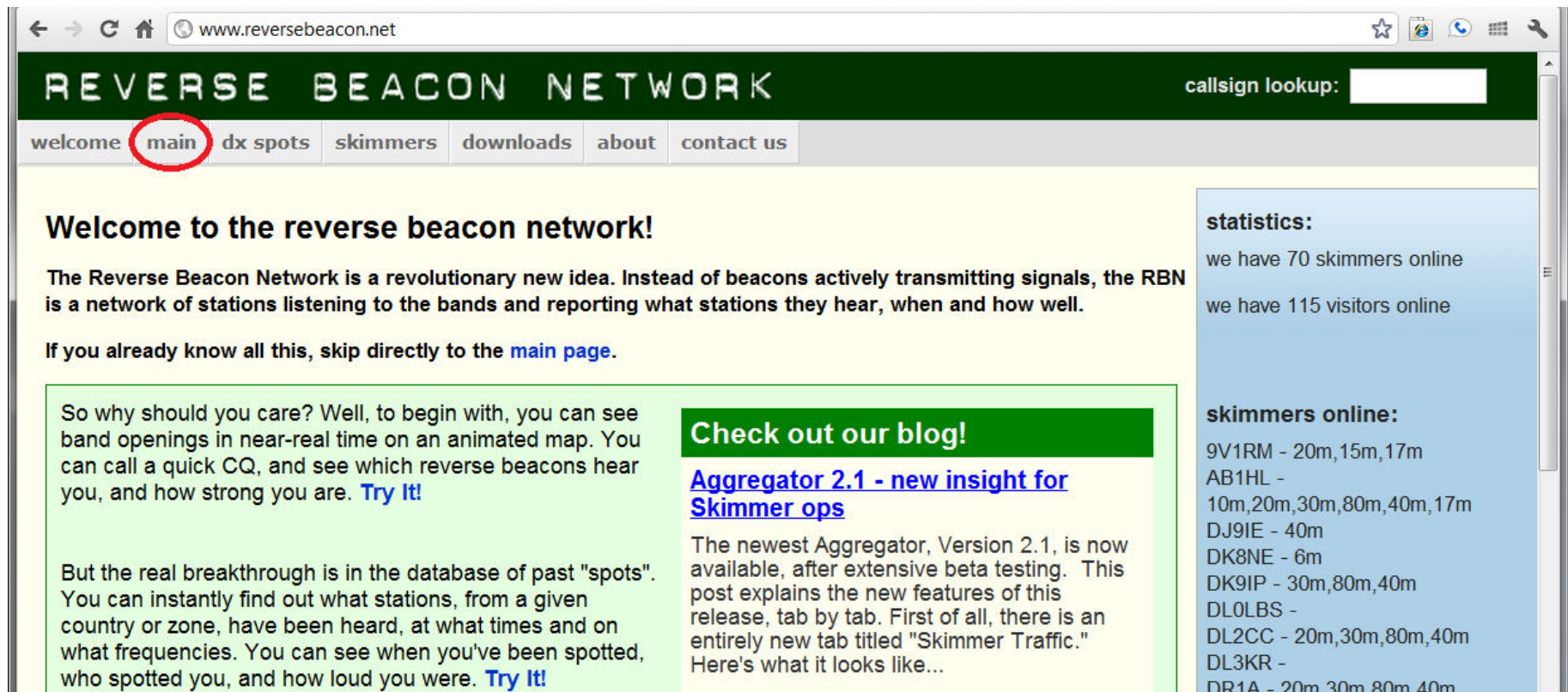
- Use XIT or the “randomize TX” feature of your logging program to **call a bit off frequency.**



## 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 site

# [www.reversebeacon.net](http://www.reversebeacon.net)



The screenshot shows the homepage of the Reverse Beacon Network. The browser's address bar displays 'www.reversebeacon.net'. The website has a dark green header with the title 'REVERSE BEACON NETWORK' in white, all-caps text. To the right of the title is a 'callsign lookup:' field with a white input box. Below the header is a light gray navigation bar with links: 'welcome', 'main' (circled in red), 'dx spots', 'skimmers', 'downloads', 'about', and 'contact us'. The main content area has a yellow background. It starts with a 'Welcome to the reverse beacon network!' section, followed by a paragraph explaining the network's purpose and a link to the 'main page'. Below this is a green box containing two columns of text: one about seeing band openings and another about the database of past 'spots'. To the right of the green box is a dark green box with a 'Check out our blog!' link. Further right is a light blue box with 'statistics' and 'skimmers online' sections. The browser's status bar at the bottom shows a vertical scrollbar on the right side.

← → ↻ 🏠 🌐 www.reversebeacon.net ☆ 📄 🔍 ⚙

## REVERSE BEACON NETWORK

callsign lookup:

welcome **main** dx spots skimmers downloads about contact us

### 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

# [www.reversebeacon.net](http://www.reversebeacon.net) main

[←](#) [→](#) [↻](#) [↑](#) [www.reversebeacon.net/main.php](#)

REVERSE BEACON NETWORK callsign











welcome | **main** | dx spots | skimmers | downloads | about | contact us

[show/hide my last filters](#)

no filter selected, showing all spots

rows to show: 50 ▾

[search spot by callsign](#)

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

**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  
DK9IP -  
20m,30m,40m,17m,12m,15m  
DL0LBS -  
DL2CC - 20m,30m,40m,17m,15m

# Where was I heard?

← → ↻ 🏠 [www.reversebeacon.net/dxsd1/dxsd1.php?f=0&c=N6TV&t=dx](http://www.reversebeacon.net/dxsd1/dxsd1.php?f=0&c=N6TV&t=dx)

## REVERSE BEACON NETWORK

welcome main **dx spots** skimmers downloads about contact us




[show/hide my last filters](#)

showing spots for DX call: N6TV rows to show: 50 ▾

[search spot by callsign](#)

search callsign:  ☒ DX ☐ DE

wildcard \* allowed

de	dx	freq	cq/dx	snr	speed	time
WZ7I	 N6TV	28019.0	CQ [LoTW]	19 dB	25 wpm	2021z 01 Apr
K1TTT	 N6TV	28019.1	CQ [LoTW]	18 dB	24 wpm	2017z 01 Apr
S50ARX	 N6TV	28019.0	CQ [LoTW]	12 dB	25 wpm	2017z 01 Apr











# Plot spots on a map

**REVERSE BEACON NETWORK**callsign

welcome | main | dx spots | skimmers | downloads | about | contact us

[show/hide my last filters](#)  
no filter selected, showing all spots  
search spot by callsign

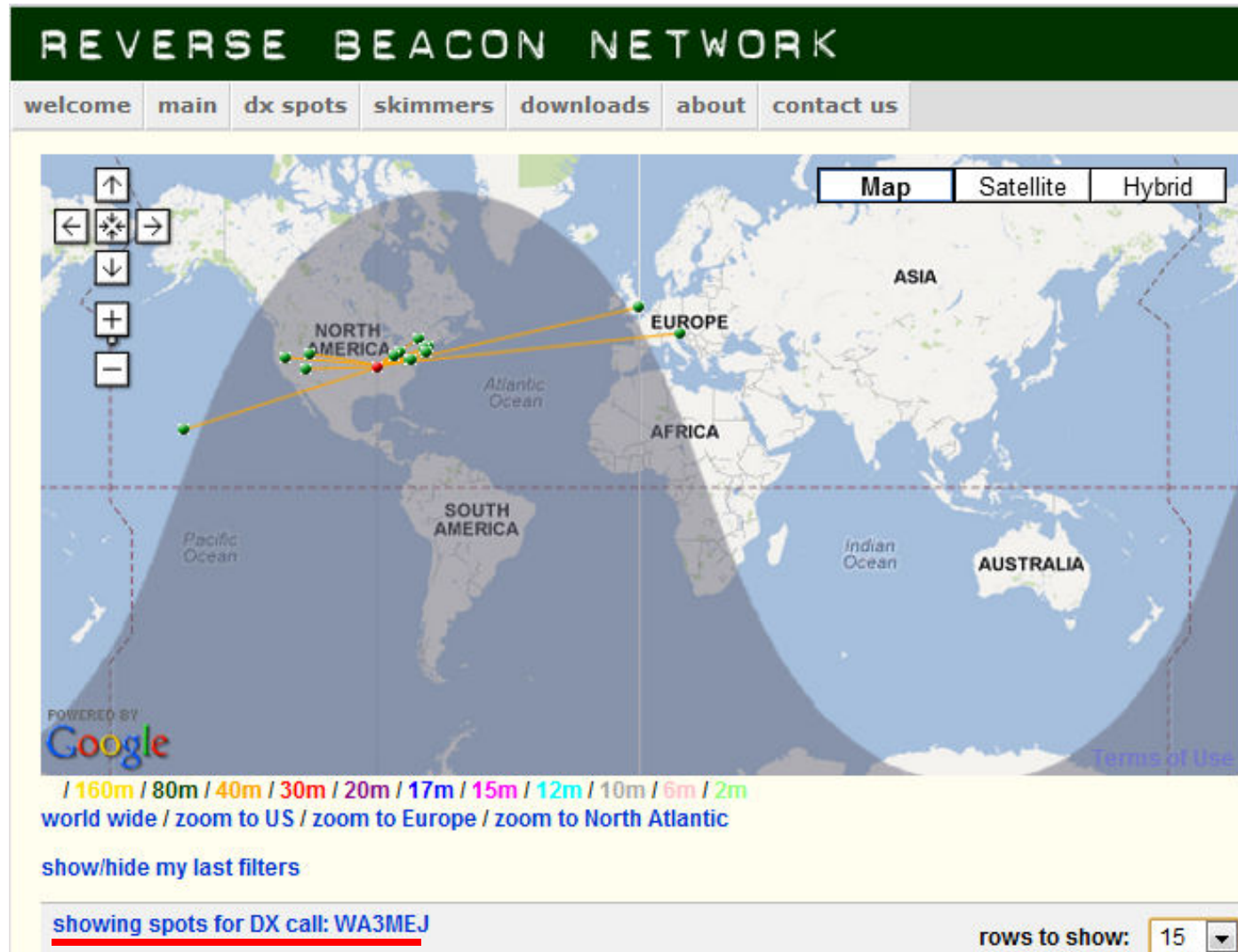
rows to show: 50

de	dx	freq	cq/dx	snr	speed	time
W4AX	 HB9TPT	10115.5	CQ	6 dB	19 wpm	<a href="#">0945z 02 Apr</a>
EA4TX	 HB9TPT	10115.5	CQ	8 dB	19 wpm	<a href="#">0945z 02 Apr</a>
IK3STG	 HB9TPT	10115.5	CQ	17 dB	20 wpm	<a href="#">0945z 02 Apr</a>
K8ND	 VE1ZZ	1823.5	CQ	28 dB	19 wpm	<a href="#">0945z 02 Apr</a>
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KB9AMG	 VE1ZZ	1823.5	CQ	14 dB	19 wpm	<a href="#">0945z 02 Apr</a>
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KH6LC	 LU9DO	14012.0	CQ [LoTW]	28 dB	14 wpm	<a href="#">0945z 02 Apr</a>

**options:**  
[show/hide](#)

**news**  
**RBN blog: stay tuned!**  
we have 67 skimmers online  
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**skimmers online:**  
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DK1MAX -  
DK8NE - 6m  
DK9IP -  
20m,30m,40m,17m,12m,15m  
DL0LBS -  
DL2CC - 20m,30m,40m,17m,15m

# Typical “where heard” Google map



# Spots analysis tool

The image is a screenshot of the Reverse Beacon Network (RBN) website. The header is a dark green bar with the text "REVERSE BEACON NETWORK" in white, spaced-out capital letters. Below the header is a navigation bar with several tabs: "welcome", "main", "dx spots", "skimmers", "downloads", "about", and "contact us". The "dx spots" and "skimmers" tabs are circled in blue. Below the navigation bar, there is a vertical menu on the left side with the following items: "download raw data", "spots analysis tool" (circled in blue), "spot search", "create your filter!", "HF >", "VHF+ >", "HF", "VHF+", and "HF/CW". A tooltip with the text "analyze and compare spots" is visible over the "spot search" item. The main content area has a yellow background. It starts with a "Welcome to the RBN network!" message. Below this, there is a paragraph explaining the RBN's concept: "The Reverse Beacon Network is a network of stations that listen for and report on other stations. Instead of beacons actively transmitting signals, the RBN is a network of stations that listen for and report on other stations. The idea is to collect data on what stations are active, when and how well." This paragraph is partially obscured by the vertical menu. Below the paragraph, there is a section titled "If you already know what you want to search for, you can use the main page." followed by a list of frequency bands: "HF >", "VHF+ >", "HF", "VHF+", and "HF/CW". To the right of this list, there is a green box with the text "Check out our blog!" and a link to "Aggregator 2.1 - new insight for Skimmer ops". Below this link, there is a paragraph: "The newest Aggregator, Version 2.1, is now available after extensive beta testing. This..."

REVERSE BEACON NETWORK

welcome main **dx spots** skimmers downloads about contact us

download raw data

**Welcome to the RBN network!**

The Reverse Beacon Network is a network of stations that listen for and report on other stations. Instead of beacons actively transmitting signals, the RBN is a network of stations that listen for and report on other stations. The idea is to collect data on what stations are active, when and how well.

If you already know what you want to search for, you can use the main page.

HF >

VHF+ >

HF

VHF+

HF/CW

analyze and compare spots

**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...

# Pick a Date, a Skimmer, add callsigns to compare

1. Select a comparison date

MM/DD/YY

2. Select a Reverse Beacon

▶ Europe

▼ North America

☐ AA4VV 354 spots

☐ K1TTT 5318 spots

☒ K3MM 6926 spots

☐ K8ND 3751 spots

☐ KA9SWE 657 spots

☐ KB9AMG 181 spots

☐ KC0VKN 877 spots

▶ Africa

▶ Oceania

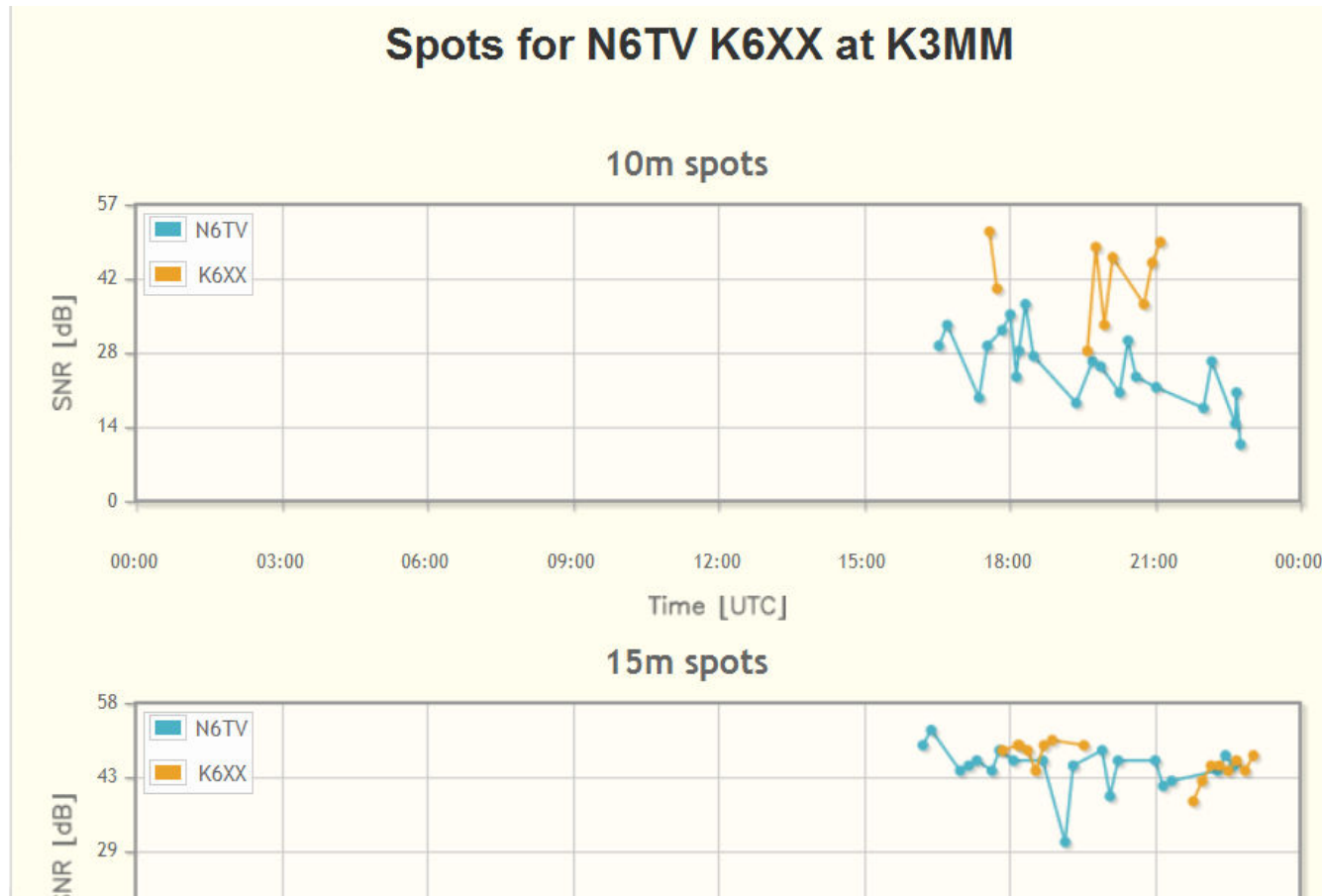
3. Enter callsigns to compare

☐ N6TV 58 spots

☐ K6XX 29 spots

Add

# And the winner is ... K6XX!



# Download raw data files

**REVERSE BEACON NETWORK**

welcome main dx spots skimmers downloads about contact us

**Raw data download**

Data from the RBN can be downloaded as raw data or as a summary analysis.

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

The data files then need to be viewed by opening in Excel. Note, however, that on busy days the amount of data will be large. For example, on Saturday, during the 2010 ARRL DX CW contest, the RBN produced over 100MB of data. You may wish to use Microsoft Access or other data tools to examine and manipulate the data.

The only thing that we ask is that you share your ideas for analyzing them, as well as any results, with the RBN community. Please post it on our RBN blog. Of course, you will retain full rights for any other publication. Please keep in touch with us.

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

**collapse all months**

**2012**

Month	Freq Range	File Name
January	1.8/3.5/7MHz	
February		
01 Wednesday	14/21/28MHz	20120201.zip
02 Thursday	10/18/24MHz	20120202.zip
03 Friday	1089KBytes	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
VK6IA,VK,OC,28028.4,10m,W6YI,K,NA,CQ,14,2011-11-26 00:00:00
ON5KQ,ON,EU,7005.5,40m,K2QMF,K,NA,CQ,40,2011-11-26 00:00:00
ON5KQ,ON,EU,7005.5,40m,K2QMF,K,NA,CQ,40,2011-11-26 00:00:00
N4ZR,K,NA,7011.7,40m,OM5NS,OM,EU,CQ,22,2011-11-26 00:00:00
N4ZR,K,NA,7020.6,40m,S50R,S5,EU,CQ,40,2011-11-26 00:00:00
N4ZR,K,NA,7023,40m,NQ4I,K,NA,CQ,56,2011-11-26 00:00:00
WA7LNW,K,NA,7051.5,40m,YR1C,YO,EU,CQ,15,2011-11-26 00:00:00
```

Total World-Wide RBN spots, 2012 CQ WW CW:

3,163,126 (18.3 spots per *second*)

2013 ARRL DX CW:

3,937,108 by all Skimmers (82,023 spots per hour)

2,013,282 by DX Skimmers outside USA

# Skimmer Accuracy

- Frequency accuracy is very good, so
  - **Call a bit off frequency!**
  - **Specify 100 Hz “Spot bandwidth” for band map**
- For an individual skimmer, >99% of calls are copied correctly (proper spacing helps)
- But 500 spots/hour = 5 “busted spots” per hour, per skimmer
- The more skimmers you monitor, the higher the total number of busted spots

# Summary of Recommendations

- Make sure the Skimmers copy *you*
- Call spots *off frequency*
- Limit monitored skimmers to those within your geographical area, plus any spots of yourself
- Use unique $>n$  filter to eliminate most busted spots

# Acknowledgements

- Web site and first aggregator originated by PY1NB (similar to his other web site, [www.dxwatch.com](http://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 Propagandist”
- Telnet server support by K5TR, W2QO, KM3T

# For more information

- <http://www.reversebeacon.net>
- <http://www.pvrc.org/n4zr/rbn.pdf>
- <http://reversebeacon.blogspot.com>
- <http://www.ve7cc.net/>
- <http://www.dxatlas.com/CwSkimmer>
- <http://www.qrz.com/db/n6tv>