# CW Skimmers, DX Cluster, and the Reverse Beacon Network

## Presented by N6TV

n6tv@arrl.net
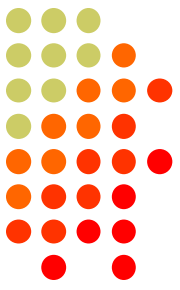
**· CTU ·**
**CONTEST UNIVERSITY**
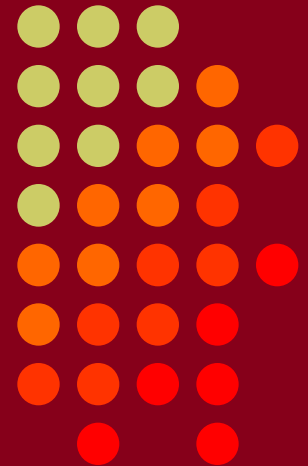
# Overview

- **What is CW Skimmer?**
- **What is the Reverse Beacon Network?**
- **How does it work?**
- **What can the RBN do for *me*?**
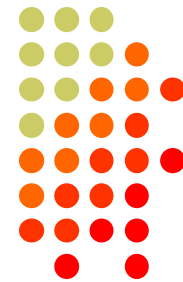- **How can I help?**
- **What's new?**

# 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)

# SDR Antenna

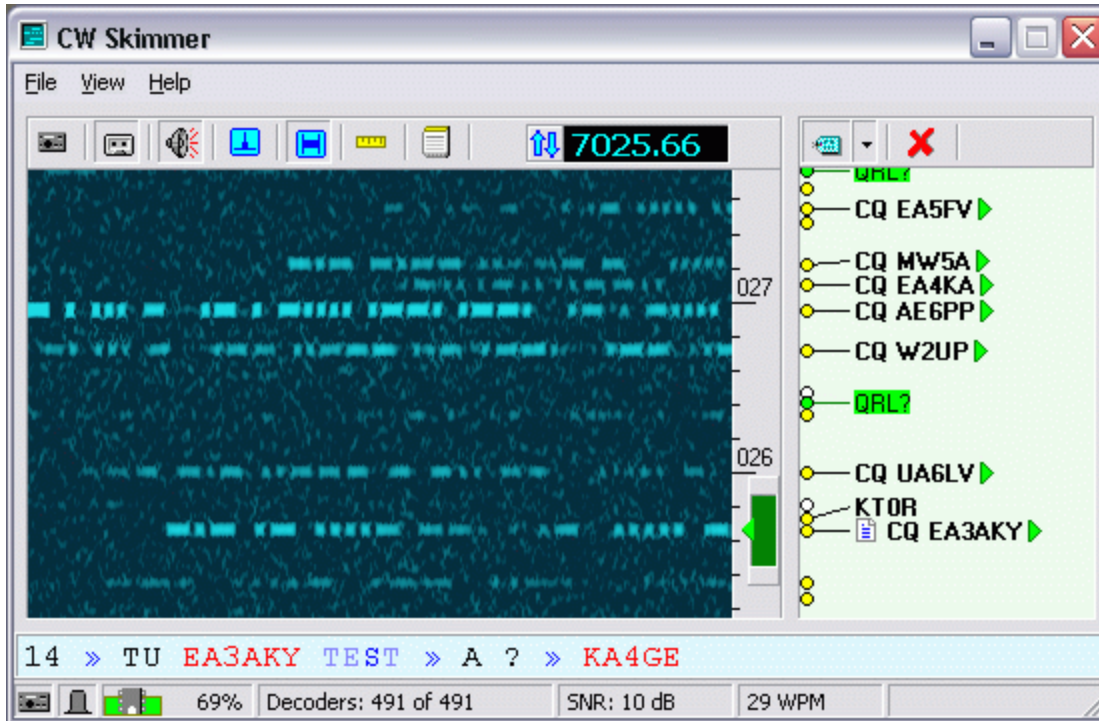2. Wideband RX Antenna, 1.8-30 MHz

Pixel Tech.
Loop
RF Pro-1B:

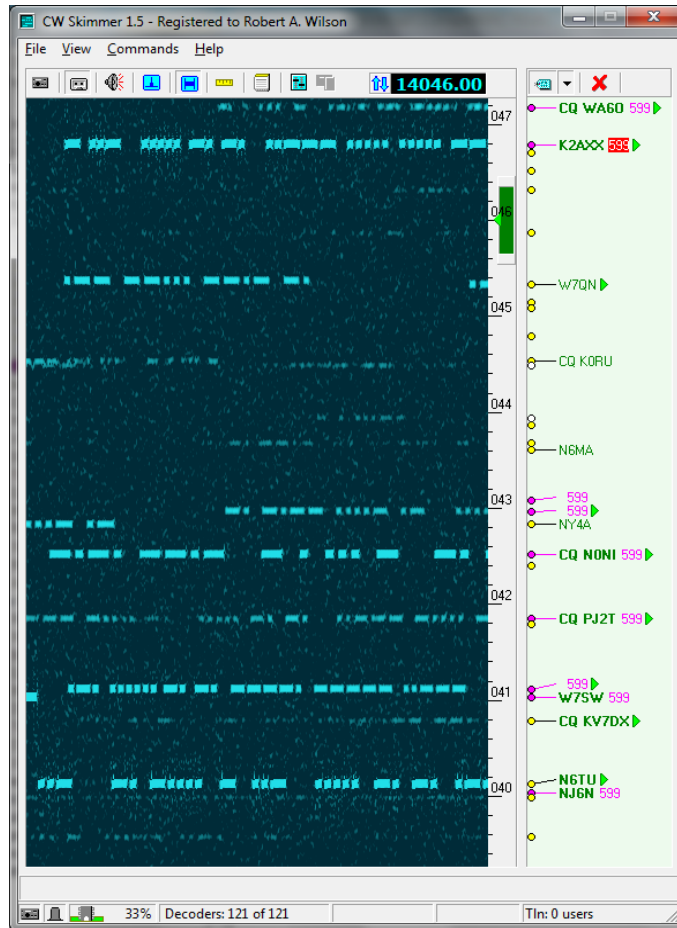DX Engineering
Active Horizontal
ARAH3-1PE:

# **Software**
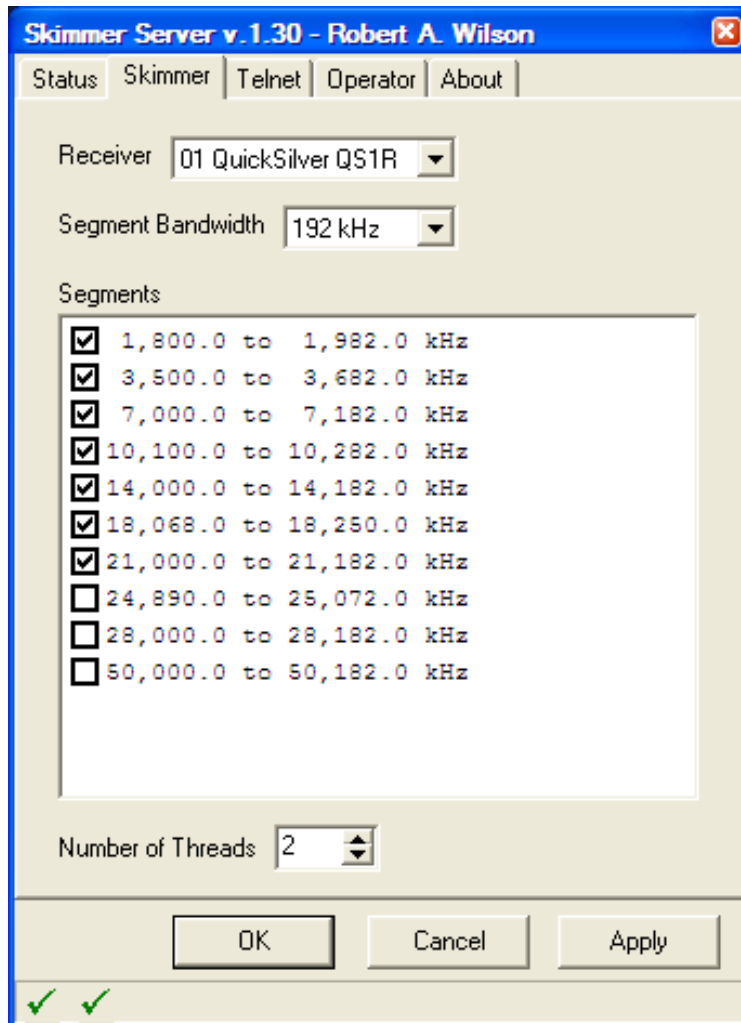
3. CW Skimmer *or* Skimmer Server

# 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)

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# Skimmer Server by VE3NEA

Skimmer Server v.1.30 – Robert A. Wilson

Status | **Skimmer** | Telnet | Operator | About

Receiver: 01 QuickSilver QS1R

Segment Bandwidth: 192 kHz

Segments

☑ 1,800.0 to 1,982.0 kHz
☑ 3,500.0 to 3,682.0 kHz
☑ 7,000.0 to 7,182.0 kHz
☑ 10,100.0 to 10,282.0 kHz
☑ 14,000.0 to 14,182.0 kHz
☑ 18,068.0 to 18,250.0 kHz
☑ 21,000.0 to 21,182.0 kHz
☐ 24,890.0 to 25,072.0 kHz
☐ 28,000.0 to 28,182.0 kHz
☐ 50,000.0 to 50,182.0 kHz

Number of Threads: 2

OK | Cancel | Apply

✓ ✓

- *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

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# Telnet server (localhost port 7300)

- Emulates a DX Cluster Node

```
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
```
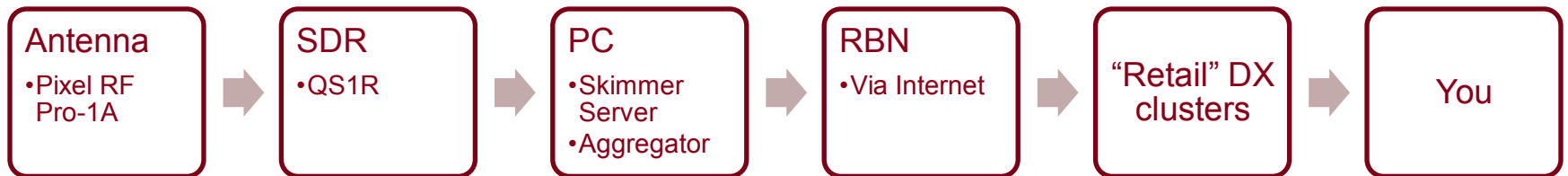
Reports Signal to Noise ratio, CW Speed, CQers

# What is the Reverse Beacon Network (RBN)?

- Uses *any* CW signal as a beacon
- Multiple CW Skimmers world-wide record signal strength (S/N ratio in dB) and CW speed (WPM)
- A free "Aggregator" program forwards CW 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

iCOM

# Felipe Ceglia, PY1NB

- Created and maintains the Reverse Beacon Network

- Hosts dxwatch.com and reversebeacon.net

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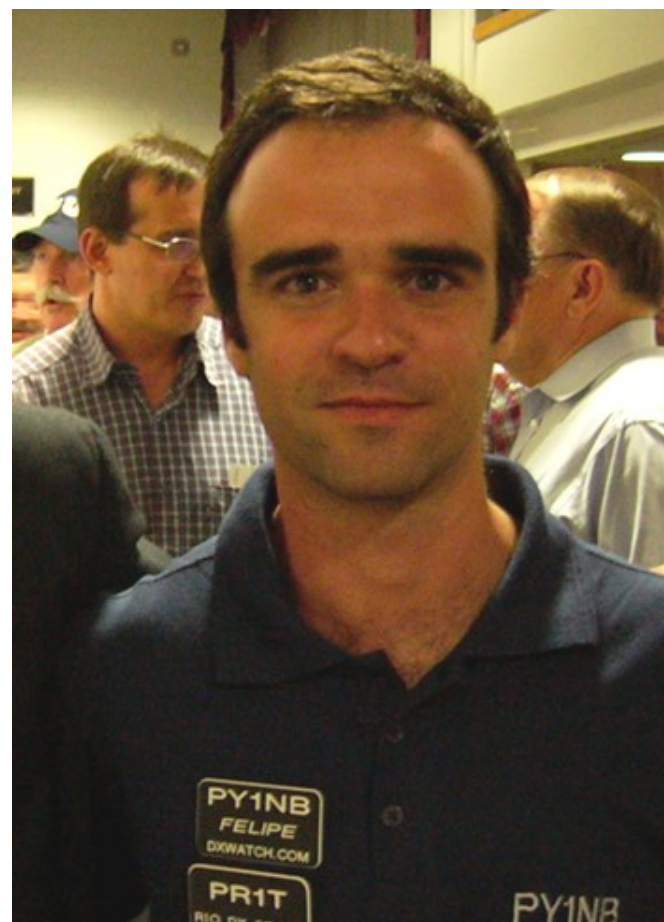
# Dick Williams, W3OA
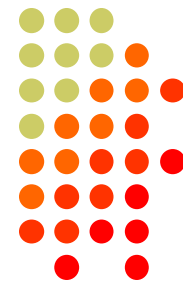
- Created the newest RBN Aggregator software

# Nick Sinanis, F5VIH

- Wrote the RBN Spots Analysis Tool



F5VIH @ TM6M
CQ WW CW 2011

# Pete Smith, N4ZR

- RBN Chief Evangelist
- Skimmertalk Reflector: http://dayton.contesting.com/mailman/listinfo/skimmertalk

# **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 CQ "properly"
- Entering a contest?
  - Before:  Check antenna F/B, signal strength
  - During:  See where you are being heard
  - After:  Compare signal strength with the competition

# How can I use RBN to improve my score?

- Make sure the Skimmers find *you*

- Use RBN spots on your favorite DX Cluster for CW and RTTY contests when allowed

  - Far more spots, with smaller pileups than human-posted Cluster spots

  - Quickly fills up your logging software band map

  - 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)

# 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 rusheverythingtogether
- Change your freq. *slightly* to get spotted again

# How to improve your chances in a Skimmer-generated pileup
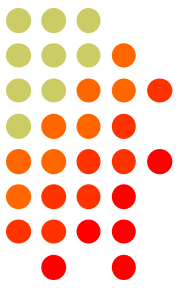
- Use XIT or the "randomize TX" feature of your logging program to call a bit off frequency.
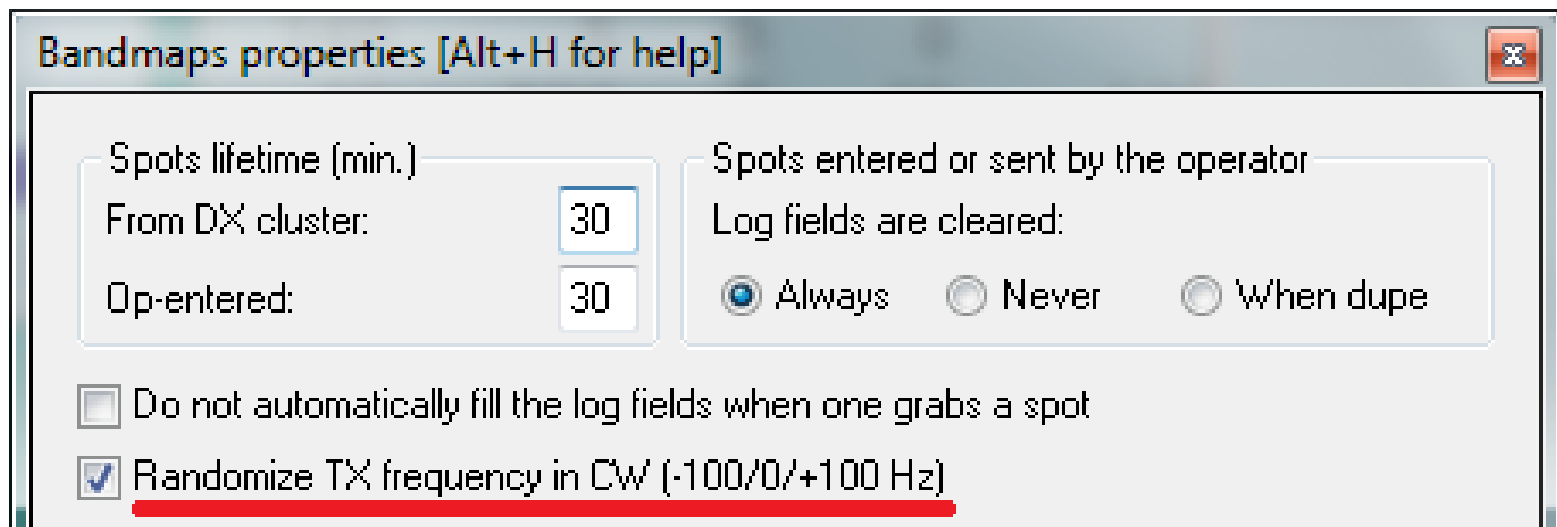
# How do I use the RBN to Check My Antennas?

- 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

# Accessing the RBN (SOA, Multi)

1. Many DX clusters combine RBN and human spots using AR-Cluster V6 (see [www.dxcluster.info](http://www.dxcluster.info) for listing).
   Some ARC V6 clusters offer CT1BOH spot quality filters (busts, bad frequencies)

2. dxc.ve7cc.net port 23
   (CC Cluster software – removes many bad spots, dupes)

# Filtering Spots (old way)
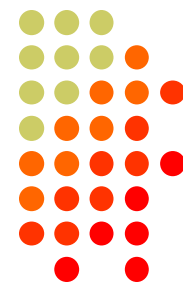
- ## DXSpider
  - `accept/spots by_zone 1,3,4,6,7,31 and not by WZ7I or call N6TV`
  - http://www.dxcluster.org/main/filtering_en.html#toc1
- ## ARCluster V6
  - `set dx filter call=N6TV or (unique>1 and (spotterstate=CA or spotterstate=NV or spotterstate=UT))`
  - http://www.ab5k.net/ArcDocsVer6/UserManual/ArcDx.htm

# Filtering Spots (new way)

- Use CC User software by VE7CC to log in to dxc.ve7cc.net and program filters with a full-feature Graphical User Interface

- CC Cluster nodes *automatically* reject "unique" (busted) spots

- Tutorial:
  - http://reversebeacon.blogspot.com/2010/11/using-rbn-telnet-server-brief-tutorial.html

- Reference:
  - http://www.bcdxc.org/ve7cc/default.htm#download

# CC User Filter Dialogs

# 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)

- dxc.n7tr.com port 7373 (AR Cluster, but pre-filters to show only spots from Zones 3 and 4)

# 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](www.reversebeacon.net)

# [www.reversebeacon.net](www.reversebeacon.net) main

# Where was I heard?

# Plot spots on a map

# Which bands are open at *my* QTH?

# Spots analysis tool

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

# And the winner is … K6XX!



Spots for N6TV K6XX at K3MM

10m spots

15m spots
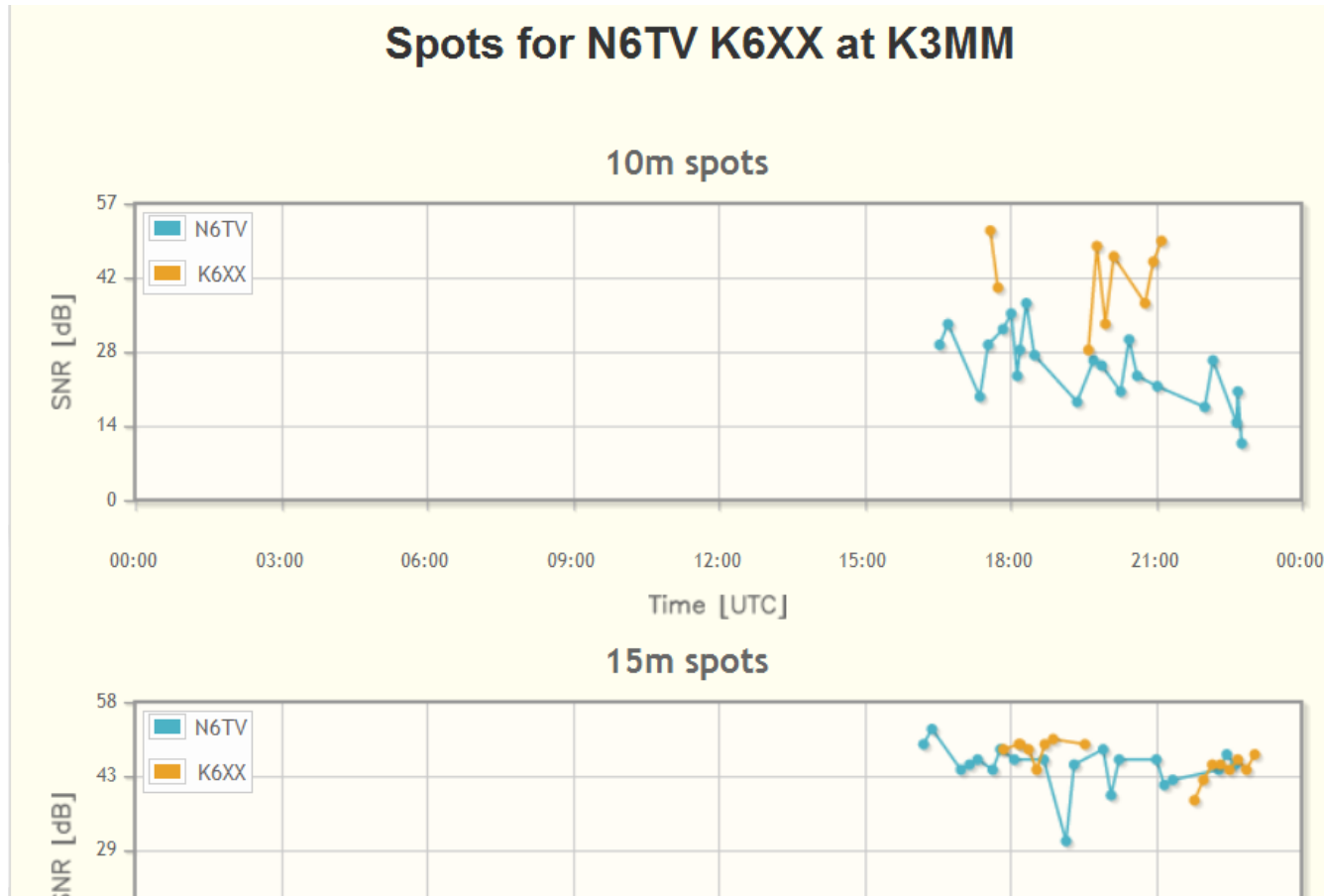
# Raw data downloads

# 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
    NC7J,K,NA,7020,40m,N0NI,K,NA,CQ,27,2014-02-15 00:00:00,27,CW
    NC7J,K,NA,7000.9,40m,W1VE,K,NA,CQ,14,2014-02-15 00:00:00,35,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%

## ARRL DX CW:

2013:  3,937,108 (82,023 spots per hour)

2014:  4,146,399 (86,383 spots per hour) – up 5.3%

# What's the Average CW Speed?

- ## 2013 CQ WW CW:        30.6 WPM
- ## 2014 ARRL DX CW:      29.6 WPM
- ## How did I calculate these statistics?
- ## Simple one line Unix/Cygwin command:

```
gawk -F, '/,CW *$/{sum+=$12} END { print "2013 CQ
    WW CW Spots = ",NR; print "Avg Speed = ",sum/NR}
    ' 2013112?.csv
```

# **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 (see RBN blog)

- CW Skimmer 1.83 Released

- Aggregator v3.0 Released

# For more information

- http://www.reversebeacon.net

- http://www.bcdxc.org/ve7cc/default.htm#download

- http://www.dxatlas.com/CwSkimmer

- http://www.dxatlas.com/SkimServer

- http://www.srl-llc.com/ (QS1R SDR)

- http://microtelecom.it/perseus/ (Perseus SDR)

- http://www.pixelsatradio.com/product/shortwave-magnetic-loop-antenna/ (RF Pro-1B loop antenna)

- http://www.dxengineering.com/parts/dxe-arah3-1pe (ARAH3-1PE horizontal antenna)

# For more information

- http://www.pvrc.org/~n4zr/rbn.pdf

- http://reversebeacon.blogspot.com

- http://www.ve7cc.net/

- http://www.qrz.com/db/n6tv

# Questions?