Contest Applications of CW Skimmer and the Reverse Beacon Network

Pete Smith N4ZR Dayton Hamvention Contest Forum May 21, 2011

Why A CW Skimmer?

 Originally intended mainly as a DXing tool rather than for contesting

 automatically copies all the calls in a pileup and flags the one who gets through

 click on him and move your radio to that frequency

What can *you* copy in a minute and a half?

📕 CW Skimmer 1.4 - Registered to Pete Smith		Callsigns		×
File View Commands Help		Freq Utc	Call 🛆	\top
📧 📖 🛞 💶 📄 🚥 🗐 🖪 🗐 🙀 7017.29	- 🗙	7032.7 00:00:49	5J1W	
		7035.3 23:59:58	8P5A	
and the second	o DE K1TTT ▶	7014.4 00:00:32	9A1P	
명화 수값 그는 것은 것은 것이는 것 같은 사람이 가지 것입니까? 수 있는 것 <mark>.</mark>		7014.4 00:00:54	9A1P0	
	2	7014.4 00:01:02	9A1POE	
a normality and the analysis of the second	Č—CQ ₩4RX ►	7015.0 00:00:36	9A7A	
행동가, 도망하는 전화 방송 아이들은 것이 아이들은 영국을 얻을 수 있다.	Ğ—CQ IY4₩ ▶	7033.8 23:59:56	A6IB	
전망 사람과 가신 공급 수영감 연성한 가격 관련과 가 것 같은 것 같아.		7008.6 00:00:14	AB9H	
Anne in pass - the all family many takes and passes in stand for all the same as	CQ K2QMF►	7026.9 00:00:11	AE6PP	
		7026.9 00:00:34	AE6PW	
phen (scheme). All et al. 1999 - Construction of the state of the stat	G CQ OL8R 599 ►	7003.2 00:00:27	AJ20	
a service a service services a	-CQ OM3LA	7006.8 00:00:03	CO8LY	
지만 왜 안 못 그 없다면 지지가 안 물건 바람가 제 그 것은 것을 많다. 친구		7042.0 00:00:00	CT1ILT	
a second a s	8	7033.0 00:00:03	CT3EN	
이 가 있는 것 같은 것 같은 것 같은 것 같은 것 같은 것 같이 가 바빠져 가 <mark>01</mark> 9		7032.4 00:00:19	CU2A	
	CQ K1BX	7000.6 00:00:13	DFOCG	
유리적 동맹 방법 방법 영상 등 신물을 위한 방법 전신을 즐기셨다.	CQ KIIAP	7013.3 00:00:03	DJ5MW	
이 것 같아요. 아님,	●— 599 ▶	7000.6 00:00:02	DL1IA0	
1	- 539	7029.7 00:00:16	DL3KEM	
y whet, W (a bit when) , If has been a part of an interaction and and , and has we a hand and a part is a	•— CQ WC1M •	7029.7 00:00:13	DL3YM	
5 . [1] 전문 전망 사람은 성격 것같이 있는 것이 가격을 가지 않다.	0	7031.4 00:00:26	DQ4W	
그 방법 성영 방법은 것이 없는 것이 없는 것이 없는 것이 없는 것이 없다.	DE KT3Y 599	7028.7 00:00:47	EA1KI	
	- CQ HI7/DL1JF	7025.7 00:00:08	EA3AKY	
, 이상 전 전 등 전 가 가 있는 것은 것 같은 것 같이 있는 것 같은 것 같이 <mark>017</mark> -	Ĩ	7012.3 00:00:05	EAGEER	
and the second sector as the second sector and second sector as the sect	€	7027.1 00:00:06	EA4KA	
al a seas - Alex 14 marchine - al y from hard date - seas - sea	CQ VY2TT 599	7027.5 00:00:24	EA5FV	
없는 관계자 한 건강 등 영상은 영상은 것을 하는 것을 하는 것 것을 하는 것 같아.		7004.0 00:00:29	EA5RS	
에서 10월 2월	●— CQ N2MM 599 ►	7033.8 00:00:02	EAGIB	
en ander son ander s	8	7005.0 00:00:19	EA8EW	
영상 것입니 성상 방법은 것이는 사람이 많은 것이 없는 것이라. 것이 같이 것이다.		7005.6 00:00:09	EA8PP	
·····································	P	7014.9 00:00:54	ED2JJ	
n en	O-CQ N2MF►	7003.2 00:00:37	EE5S	
· · · · · · · · · · · · · · · · · · ·	DE 9A7A 599	7028.7 00:00:39	EG4XRE	
- 동안 및 연구한 방법을 가지는 것이 가지 않는 것이 있는 것이 있는 것이 것을 해야	CQ ED2JJ	7024.6 00:00:58	EG5EEE	
이곳은 한 것은 한 것은 물건을 다 못 나면 이 것이 없는 것을 가 있는 것을 수 없다.	6	7004.5 00:00:29	EK2NG	
		7030.0 00:00:51	ER4EHK	-
L1JFI » DE HI7/DL1JFI QRZ? » KT3Y 5NN » C	:Z » I7	7007.0 00·00·42	EW1WEE	
🖬 🔔 🚮 58% Decoders: 183 of 617 SNR: 13 dB 30 WPM	Tin: 0 users	Calls	159	

Softrock

- Simple SDR kitted by <u>http://KB9YIG.com</u>
- Single-band and multi-band versions available - \$15-56 in kit form
- 96 KHz bandwidth, determined by sound card
- Requires gain and phase correction to avoid images – CW Skimmer provides

Typical Sound-card-based SDR

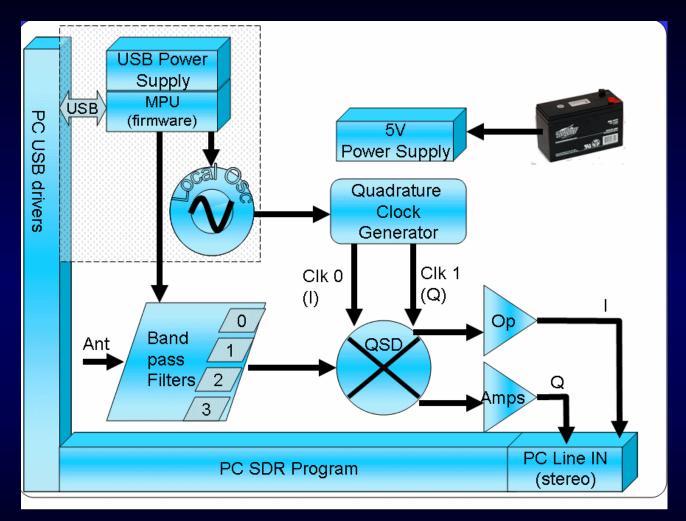


Diagram courtesy WB5RVX

Softrock RX Ensemble II 1.8-30 MHz



Softrock-IF

- Uses Softrock (or other SDR), tapping IF of station transceiver.
- Covers 24-KHz bandwidth centered on transceiver frequency
- Requires CAT; center frequency control via Telnet
- Same image issues

Stand-alone SDRs

- Mercury HPSDR Supported by CW Skimmer, but availability currently uncertain
- SDR-IQ Band-switching, up to 196 KHz/band, 500 Hz – 30 MHz; uses Spectravue or CW Skimmer
- QS1-R With SkimSrv, 7 x up to 192 KHz bands simultaneously, including 6M; uses SDRMAXII or CW Skimmer







Antennas

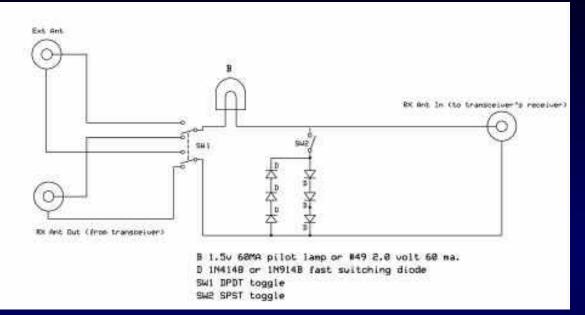
- Option 1 share RX antennas with station radios
- Option 2 dedicated antenna



Practical Hardware Issues

- RX gain and in/out of band strong signal handling
- TX RF leads to busted spots
- Expensive silicon needs protection
 - Receiver protectors 1.4 volts or less
 - The best solution Disconnect/ground SDR antenna when transmitting

An Example of a Protector



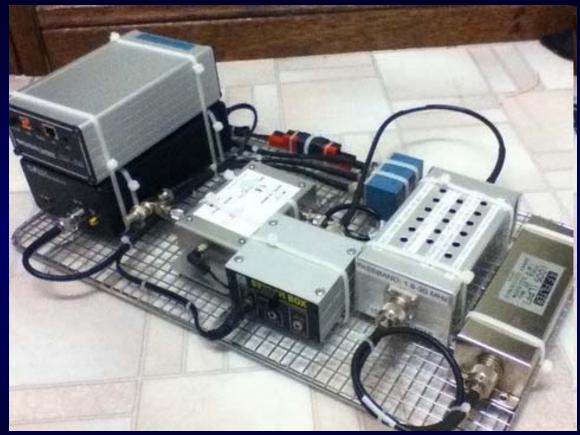
Diodes can cause intermodulation

•Basic problem with SDRs is voltage, not power, so bulb as fuse may not act quickly enough

Receiver Protector Options

- "Fuse" #47/49 bulb
- Back to back diode strings shunting the antenna to ground – 2 x 1N914s each way
- Series capacitor(s) to block DC
- Gas tube lightning only

VK1LW's QS1-R "beacon"



Telnet

- Added to CW Skimmer in early 2008
- DX Cluster format accepted by all logging programs – typically Skimmer spots flagged with - #
- Simple server, accepts a few commands
- Adjustable callsign validation level

Callsign validation

- 4 levels minimal, normal, aggressive and "paranoid."
- Applies multiple criteria and "tell me again ... and again."
- "Paranoid" uses standard master.dta file

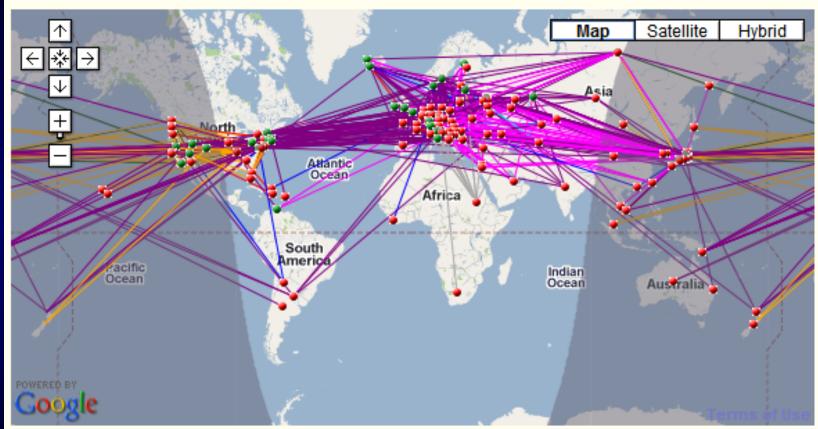
Local Skimmer in Contests

- Even with SO2R will generate many, many spots
- Multi-ops have a problem
- The off-site solution, and how to keep it legal

The Reverse Beacon Network

- Original idea by Felipe, PY1NB in March 2008
- He wrote "aggregator" software to transfer spots from individual CW Skimmer/SkimSrv "beacons" to a central database
- Combined spot stream archived and displayed at <u>http://reversebeacon.net</u>

Propagation at a glance



160m / 80m / 40m / 30m / 20m / 17m / 15m / 12m / 10m / 6m / 2m / world wide / zoom to US / zoom to Europe / zoom to North Atlantic

Filtering

REVERSE BEACON NETWORK

SSN:83 SFI:113 A:7 K:2 callsign lookup:

ready made filters

5MHz 1.8/3.5/7MHz 7MHz 14/21/28MHz 10MHz 10/18/24MHz

VHF+ VHF+/CW 50MHz VHF+/SSB

137kHz HF/CW 1.8MHz HF/SSB 3.5MHz

last 50 HF

HF

14MHz 18MHz 21MHz 24MHz 28MHz

70MHz 144MHz 430MHz 1.2GHz

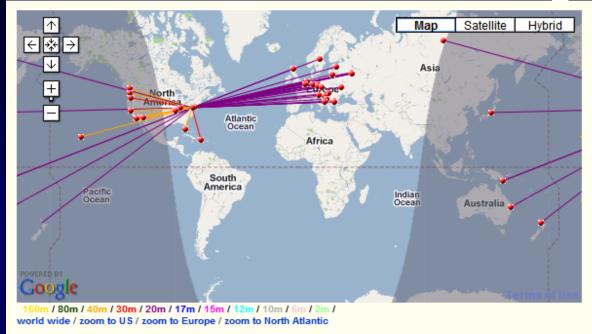
welcome main dx spots skimmers downloads about contact us

create your filter, or choose one on the list at the right side of the screen >>>

		DX station		DE station	band	mode		
dxcc:	\odot	any	\odot	any 💌	🗆 all 🔺	any 💌		
itu zone:	0	any 💌	0	any 💌	137kHz			
oq zone:	0	any	0	any	□ 160m □ 80m			
continent:	0	any 💌	0	any	□ 60m 🔽			
proceed								
the DX station column refers to the station which is being spotted.								
the DE station column refers to the station where the spot comes from.								
my last filters:								
DE cq zone: 5 - eastern zone of NA DE cq zone: 4 - central zone of NA DE continent: NA - North America DE cq zone: 14 - western zone of EU								

DE cq zone: 3 - western zone of NA DE = IK3STG

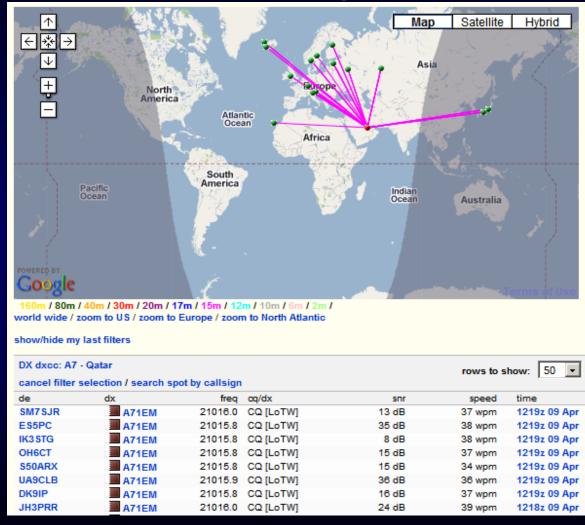
Who is W3LPL hearing?



show/hide my last filters

	showing spots for spotter call: W3LPL rows to show: 50 💌							
de	dx	freq	cq/dx	snr	speed	time		
W3LPL	🚨 403A	14023.0	CQ [LoTW]	14 dB	33 wpm	1213z 09 Apr		
W3LPL	PI4DIG	14053.0	CQ	15 dB	24 wpm	1213z 09 Apr		
W3LPL	RD3A	14035.0	CQ	22 dB	31 wpm	1213z 09 Apr		
W3LPL	К9СМ	7037.0	CQ	36 dB	27 wpm	1213z 09 Apr		
W3LPL	LZ1YE	14050.0	CQ	19 dB	29 wpm	1213z 09 Apr		
W3LPL	HI8A	10106.4	CQ	10 dB	19 wpm	1213z 09 Apr		
W3LPL	W1ESE	7007.5	CQ [LoTW]	29 dB	32 wpm	1212z 09 Apr		
M3LPI	RK3EEW	14023.6	CQ	20 dB	30 wpm	1212z 09 Apr		

Who's Hearing the A71?



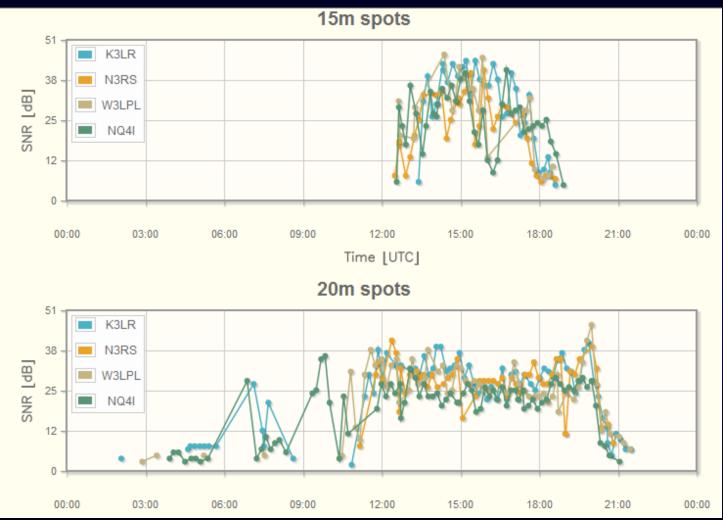
How Am I Getting Out?

- Filter for your call as the DX station
- Send sequence recognized as a "CQ"
 - Example: TEST TEST DE N4ZR N4ZR N4ZR
- Watch the screen for results. Collect all US stations heard in Europe, for example, to compare.

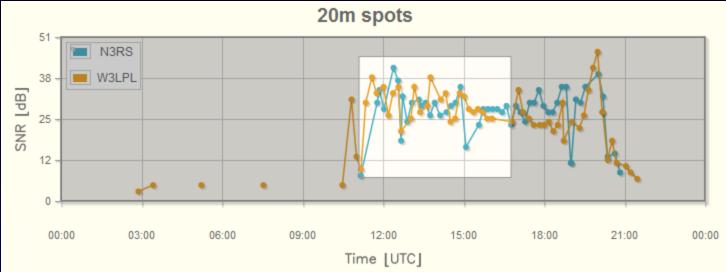
Comparing with others- the Spots Analysis Tool

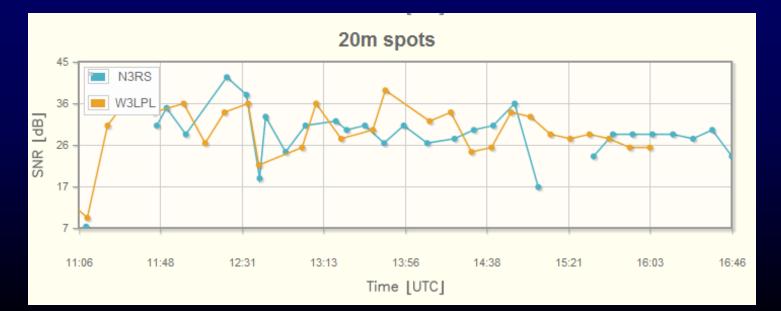
- Created by F5VIH/SV3SJ
- Select a date, a "reverse beacon" station, and calls to compare.
- The tool will produce graphs showing comparative results for up to 10 stations at a given location, over time.
- Example ARRL DX CW, first day, K3LR, W3LPL, N3RS, NQ4I

A little crowded?



Zooming in





Roll Your Own

- Download raw data a day at a time
- Open in Excel or MS Access
- Please share your analytical ideas we can all learn from each other
- Reflectors
 - <u>skimmertalk@contesting.com</u>
 - <u>RBN-OPS@yahoogroups.com</u>

What About Use During Contests?

- Because Skimmers spot everything, ideally suited for Unlimited and multi-op contesting
 - S&P rates >150/hour readily attainable when the bands are full
 - Finding odd-ball openings almost assured, with 50+ stations listening

But...

- RBN spot volume reached almost 10 spots per second during major contests – will continue to increase.
- The feed contains many duplicate spots

JA4ZRK	🚢 9A5MT	14005.0	CQ [LoTW]	9 dB
N7TR	DS5DNO	3512.0	CQ [LoTW]	12 dB
JA4ZRK	DS5DNO	3512.0	CQ [LoTW]	15 dB
JH3PRR	DS5DNO	3512.0	CQ [LoTW]	15 dB
NC7J	🔛 VK4 SN	14005.2	CQ	10 dB
EI6IZ	R9UT	14027.3	CQ	23 dB
N4ZR	🔛 VK4 SN	14005.3	CQ	13 dB
ES5PC	🔤 VP5/W5CW	18073.2	CQ	29 dB
JH3PRR	OH1RX	21028.3	CQ	23 dB
RN4WA	ZL3TE	14010.0	CQ [LoTW]	5 dB
DK9IP	OH1RX	21028.0	CQ	39 dB
N7TR	W9NGA	7013.5	CQ [LoTW]	51 dB
WOMU	W9NGA	7013.5	CQ [LoTW]	42 dB
NC7J	W9NGA	7013.5	CQ [LoTW]	44 dB
W3UA	W9NGA	7013.6	CQ [LoTW]	11 dB
K3MM	W9NGA	7013.6	CQ [LoTW]	22 dB

How to Use the RBN in a Contest

- Filter at the node to meet your needs
 - Spot origin (country, zone, US state, VE province)
- Filter in your logging program
 - Screen out remaining duplicates
 - Select bands, all spots or just new mults

N1MM's "Available Window" -A Unique Tool

Available - 47	Mults 31 Qs	(Basic VI	FO Contro	l) of 45 total spot	ts 🛛 🛛
	Mults			Qs	
	0	16	:O	0/0	
	0	80	D	0/0	
	7	40		6/10	
	14			10/11	
		2			
	11	15	5	6/6	
	15	10	0	9/9	
Call	Freq	Dir	Mode	TS	S/N 🔺
UA3D	7022.0	033* #	CW	04-12 115900	02 dB
WB5NUK	7034.8	248°¤ #	CW	04-12 115853	23 dB
DL1LQR	7034.5	047° #	CW	04-12 115852	13 dB
F8DGY	28012.1	055° #	CW	04-12 115838	16 dB 💻
UA3DCZ	7022.0	033° #	CW	04-12 115836	38 dB
W9QB	7044.7	287°¤!	CW	04-12 115826	18 dB
S52WD	14016.0	051° #	CW	04-12 115824	30 dB
RU4CS	14037.9	032° #	CW	04-12 115823	19 dB
DF4ZY	7025.1	047° #	CW	04-12 115820	03 dB
OH7QR	21058.0	029° #	CW	04-12 115813	20 dB
KI4×H	7022.6	220°¤ #	CW	04-12 115803	11 dB
N4S	14050.0	220°¤ #	CW	04-12 115758	23 dB 🖵
		0000	<u> </u>		

The RBN's Future

- Multiple servers and load-balancing to scale for growing demand
- Improved filtering interface for user convenience
- Better analytical tools

The W3LPL-2 Experiment

- Feeding carefully-selected Skimmer spots into the traditional cluster network through custom filtering software
 - Limited in quantity -
 - Carefully checked to ensure no busts
 - Spots limited to list of about 1000 callsigns, with most common excluded
 - Re-spotting interval adjustable by relative rarity

RBN Assets

- <u>http://reversebeacon.net</u> the RBN web site
- <u>http://reversebeacon.blogspot.com</u> the RBN blog
- DXSpider node: telnet.reversebeacon.net port 7000
- ARCluster node: arcluster.reversebeacon.net port 7000

Other Resources

- <u>Skimmertalk@contesting.com</u>
- <u>RBN-OPS@yahoogroups.com</u>