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CW Skimmer One Year Later

It's been more than a year since VE3NEA's *CW Skimmer* program made its debut. It's fair to say that *CW Skimmer* has caused more of a furor in the contesting community than any other innovation during the last decade. A lot has occurred in the past year involving *Skimmer*, so let's summarize what's happened and what hasn't . . . *yet*.

The Rules

At this point, major contest rules are pretty much settled. Where a contest makes a distinction between single op and single op assisted (or *unlimited*), the use of *CW Skimmer* puts you in the latter class. Typically, we think of *CW Skimmer* as something that you would run at your own station. In its recommendations, however, the ARRL Contest Advisory Committee (CAC) anticipated another possible approach — *remote* skimmers located outside the 500-meter diameter circle that defines a station. A multi-op might choose to site a skimmer off premises to avoid interference from its transmitters; a local club could decide to put a skimmer on the Internet for use by its members or a single station owner could decide to site a skimmer at his quiet mountaintop cabin. This is all right, the CAC decided, so long as a closed or dedicated communication link is not used. The skimmer must be available to anyone who wants to use it, and it must not be controlled or manipulated by a station or group of stations so as to benefit them more than others.

The objective of this latter proviso is to prevent a US competitor's use of a remote *CW Skimmer* in Europe, for example, during a 160 meter contest. Under the ARRL rule, an operator can only do this if the op publicizes its availability and allows everyone else to use it use it on an equal same basis.

Software Improvements

The first couple of *CW Skimmer* versions were DXing tools, far more suited to cracking a pileup than filling a bandmap with correct, workable spots. Accuracy was sacrificed for speed. Some analysis done with recordings made during the 2008 WPX CW contest provided a benchmark for testing improvements. Later that summer a version was released that offered four increasingly "skeptical" levels of call sign validation. The top two, called "aggressive" and "paranoid," required additional repetitions before a call sign would be spotted, and matching against either an extensive call sign pattern file or your newest master.dta file. As a result, bad spots were reduced by more than 95 percent.

In the latest version of *CW Skimmer* — available free for a 30-day trial from **www.dxatlas.com/CwSkimmer/**, telnet spots include a report of the signal-to-noise ratio. This allows for some intriguing comparison studies, particularly when combined with the Reverse Beacon Network. More on this below.

Receivers

CW Skimmer provides support for a variety of software-defined receivers (SDRs), which can be used either directly, with an antenna or to display signals derived from the IF of a station receiver. Also, just about the time *CW Skimmer* came out, N8LP introduced LP-PAN (**www.telepostinc.com**), a dedicated SDR designed to interface with the broadband IF output of the Elecraft K3 receiver. A lot of these are in use with K3s, despite some limitations. In particular, the frequency range covered at any one time in "IF mode" is limited to 24 kHz, and VE3NEA has said this limitation will remain. Moreover, if band-pass filters are being used in an SO2R or multi-op setting, *CW Skimmer* cannot be used on a band other than the one selected by the "host" transceiver. Finally, any SDR that relies on a sound card for A/D conversion is prone to images caused by phase and gain differences between the two audio channels that are used.

Consensus seems to be shifting gradually in the direction of standalone SDRs. The SDR-IQ by RFSpace (**www.rfspace.com**) offers decent receiver performance at a reasonable price, particularly when you consider that it does not require a sound card. I've reported in *NCJ* already on the add-on software developed by W2RF and W3OA that provides for unattended *CW Skimmer* operation and better integration with logging software and with your station transceiver(s).

Another SDR that's getting a lot of attention is the Perseus (**www.microtelecom.it/perseus/**), which offers excellent receiver performance, although at a considerably higher price. *CW Skimmer* does not offer direct support for the Perseus, but N6TV has developed a workaround involving two additional pieces of software. See **www.qrz.com/N6TV** for details. Expect to see a number of these in contest use this coming year.

The clever folks who developed the SoftRock series of low-cost SDRs offer single-band receiver kits for as little as $12 each. One approach would be simply to box up six of these with appropriate input and output switching, though that would have to be done manually. They have also come out with a band-switching, synthesized receiver called the SoftRock Lite V.9 for $56 postpaid, but as of this writing VE3NEA has not yet decided to support it. If and when Alex does so (easy for me to say), this receiver could be an excellent low-cost solution.

Computer Requirements

Early on, a lot of us were concerned about the amount of computer power that *CW Skimmer* might require. Happily, Godzilla is not required. You can't expect to run it during a contest on your 600 MHz Pentium 3, but virtually any modern PC will do the trick. I built a dedicated *CW Skimmer* machine around an Intel CPU (the E2200) that is slower than the slowest offered in Dell's current line. The total cost, including a copy of *Windows XP* Home, was $375. Even at the peak of the ARRL International DX Contest with 96 kHz bandwidth I never saw CPU utilization greater than 50 percent.

Station Design

Incorporating *CW Skimmer* into your station has become pretty straightforward. With a standalone SDR, you can use either a separate dedicated antenna or tap the receiving antenna loop of one of your radios. Ideally, the separate antenna would be omnidirectional, so that *CW Skimmer* could hear stations coming from unexpected directions. I am currently using a prototype active antenna from Clifton Laboratories (**www.cliftonlaboratories.com**).

In any case, you'll need protection against interference from your transmitter(s) — a set of receiving band-pass filters, for example, or a simple switching arrangement to ground the input of your SDR during transmit (for an SO1R or SO2R setup). One of the ways in which *CW Skimmer* has changed our way of thinking is its *cumulative* capability — that is, it does not need to be listening 100 percent of the time to be effective.

In a multi-op context, and particularly for multi-multis, the problem with your own transmitters is potentially more serious. Multis with in-band receiving capability (usable while transmitting on the same band) will be able to use those antennas with *CW Skimmer*, for example, by tapping the

receive antenna loop of the S&P radio.

Cluster/*CW Skimmer* Integration

One challenge that surfaced relatively early was the problem of using *Skimmer* spots along with spots from a conventional Internet DX cluster. Fortunately, K1TTT's WintelnetX (**www.k1ttt.net**) was readily adapted to the job of merging two or more telnet streams.

One thing that would be nice to have is a means to distinguish, on a logging program bandmap, which spots are from *CW Skimmer* and which are from the cluster. Since *CW Skimmer* spots are sent with, for example, "N4ZR-#" as the sender, it should be fairly easy to come up with a standard symbol that could be put on the bandmap. On the other hand, since *CW Skimmer* spots will be far more plentiful, it might make better sense to use a symbol to identify the *cluster* spots instead.

Operating Techniques

In a typical contest environment *CW Skimmer* will deliver between 10 and 100 times more spots than a DX cluster. That's logical enough, since there is no human in the loop to decide which stations are worth spotting. *CW Skimmer* spots will always be readable, because they are, by definition, local — not being reported by someone at the other end of your country or call district. You can step through your bandmap with confidence that the stations spotted all will be at approximately the same beat frequency, which makes it even easier. Truly phenomenal S&P rates are achievable, even in SO2R, because you don't have to tune the second radio manually and dedicate some part of your brain to that task. Just jump on frequency, verify the call sign and go.

The following specific tips are the result of many ops' inaugural-year experiences with *CW Skimmer*.

Keep your *Skimmer* off-screen, or you'll risk a new high in distraction. Let it feed spots to your logging program with as little fiddling as possible. If you can, use something like W3OA's *SkimScan* (**http://home.roadrunner.com/~w3oa/SkimScan/**) to move *CW Skimmer* around the bands unattended.

Keep your logging program's bandmap timeout short (that's the time after which spots are removed from the bandmap). Since *CW Skimmer* re-spots everything it hears at least once every 15 minutes, there's no payoff in using a longer timeout. You'll want to be sure to jump on any multipliers, however, since they may be cluster spots — or simply because *CW Skimmer* will have spotted them before anyone thought to post a cluster spot.

Reverse Beacon Network

The Reverse Beacon Network (**http://reversebeacon.net**) was established in April 2008 to take advantage of *CW Skimmer*'s ability to copy and report what it has heard. Initially the idea was simply to list spots and map them. Early in 2009, however, a new *CW Skimmer* release incorporated signal-to-noise ratio in the spots it sent via telnet. This enabled the Reverse Beacon Network to offer the ability to compare signals among multiple stations at any of the volunteer Reverse Beacon Network stations. Efforts are under way to recruit more volunteer "beacons" for the next contest season, particularly from among active contesters. Imagine the fun of comparing your signal with others in your class or geographical area after a contest — and the bragging rights that could result.

Skimmer and Log Checking

As soon as *CW Skimmer* became available, people began thinking about how it could be used for log checking in contests. After all, if whole-band recordings were available to log checkers, wouldn't *CW Skimmer* permit resolving a lot of issues? It would be possible, for example, to determine whether a busted call sign or exchange was really an operator error on the receiving side or whether the transmitting station sent incorrect information. Charges of rubber-clocking or violations of simultaneous signal rules could be readily and definitively dealt with too.

A first real test took place this past winter, when the CQ World Wide Contest Committee recruited three stations in North America and two in Europe to monitor and record the CQ WW 160 Meter CW Contest. Because of the large volume of data involved — on the order of 96 GB for 48 hours — it was not feasible to send it via the Internet. Instead external USB hard drives were used and then mailed to the log checkers for review. That work is now under way, along with an evaluation of whether such recordings could be useful in other contests. It is not a small undertaking to record six bands from multiple locations, but even spot-check recordings could have a positive effect on radiosport.

Now What?

What can we expect for the coming year? I'll make a couple of predictions. Some form of multi-band *CW Skimmer* installation will become essential to be competitive in the top ranks of multi-op and assisted/unlimited CW contesting. *CW Skimmer* will begin to make a decisive impact on the outcome of single op competition in those contests, such as WAE, where there is no "unassisted" single op category. Sooner or later, someone from the ARRL November Sweepstakes Top 10 will decide to jump past his competition by using *CW Skimmer* to harvest QSOs from the Sunday. I wonder who it will be.

NCJ