

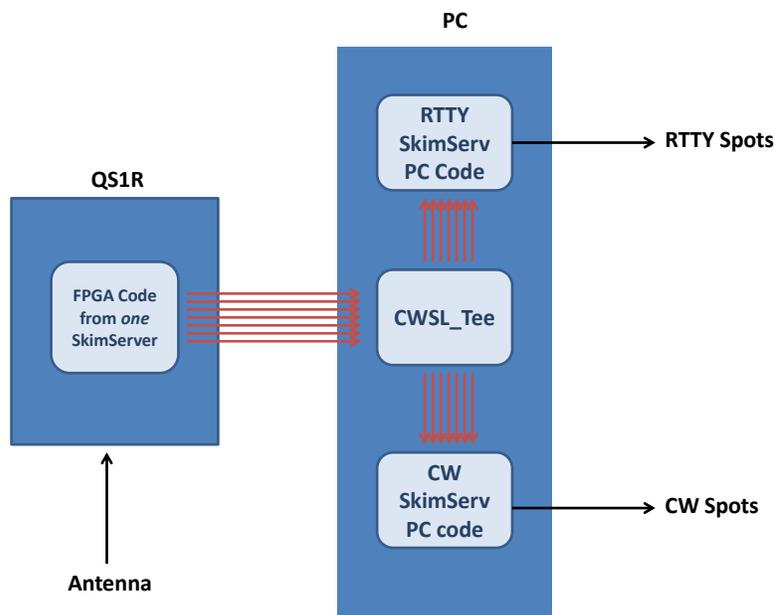
Running RTTY Skimmer Server and CW Skimmer Server at the same time on the RBN

There are two parts to making this work – understanding how to run both CW and RTTY SkimSers simultaneously on the same QS1R receiver, and how to use the latest RBN Aggregator by W3OA to manage the combination and send data from both programs to the RBN.

Introduction – One Receiver, Two SkimSers

VE3NEA's CW Skimmer Server works by loading software into the FPGA (Field Programmable Gate Array) of the QS1R software-defined receiver, creating up to 7 virtual receivers, each covering up to 192 KHz of HF spectrum. Data from these receivers is transferred via USB to the PC, where it is displayed, decoded and processed by Skimmer Server.

Recently, Petr Paryzek developed CWSL_Tee.dll, which allows other SDR applications to tap the data stream while CW Skimmer Server continues to skim the CW bands. When the RTTY Skimmer Server was first being tested, Petr modified his code to allow CWSL_Tee to feed data to both CW Skimmer Server and RTTY Skimmer Server simultaneously, from a single QS1R.



The figure makes it easy to understand one key limitation. Only one Skimmer Server can load the FPGA at a time. The center frequency and the total bandwidth of each of the bands in use must be the same for Skimmer Servers. Since CW and RTTY

frequency bandplans differ, this can waste computing power. Fortunately, you can limit decoding for each of the two different modes to different portions of the received bandwidth. We'll discuss how to do this later.

It is also important to remember that RTTY Skimmer Server is quite compute-intensive. A computer that was adequate for CW Skimmer Server will probably be overwhelmed running both applications if the decoded bandwidth is too wide, particularly on RTTY. You will want to experiment once you understand how to do so, to find the combination of .ini file settings that produce the best results for you.

Step by Step

As an example let us select conditions that will not be too demanding for many recent computers - during non-contest casual operating days. Our strategy will be to receive a wide bandwidth of 192 kHz on each band in the QS1R so we have flexibility to cover frequencies that both modes habitually occupy, but we will decode relatively narrow portions of these bands, especially on RTTY, since this is the parameter that most impacts computer performance. Also, instead of covering 7 amateur bands, we will receive only 5. After you gain some experience with your hardware and the new software, you will almost certainly want to modify your configuration to fit.

1) Install both CWSkimServ and RTTYSkimServ on Your PC

Make certain that both applications run separately on the QS1R as you expect. Now make archival copies of both the SkimSrv.ini (note the different spelling) and the RTTYSkimServ.ini file so you can easily restore your machine to this point if you have difficulty. These are typically found in their respective directories under C:\Users\User_name\AppData\Roaming\Afreet\Products\

2) Install CWSL Components

A. Download [IPP51.zip](#)

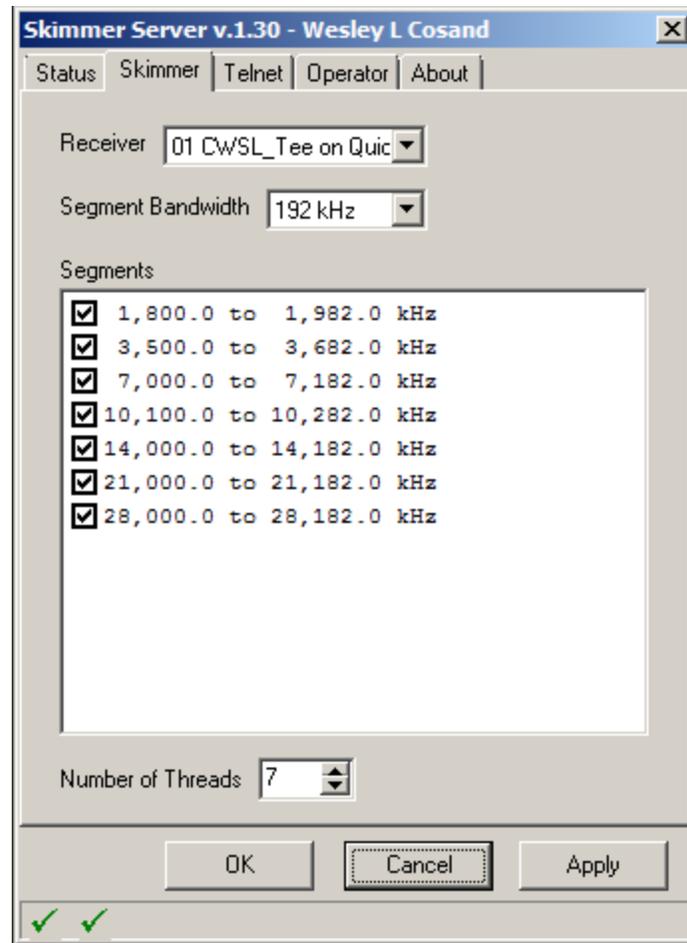
Unpack the file in a new directory and run setup.exe. This will install the Intel Integrated Primitives library redistributables.

B. Download [vcredist_x86.exe](#)

Run the program to install the correct version of C runtime libraries.

C. Download the latest version of the needed CWSL files from <https://github.com/HrochL/CWSL/raw/master/bin/CWSL.zip>. (Earlier versions of the files must be over-written, if found). Unzip it both into the directory where SkimSrv.exe resides and the directory where RTTYSkimServ.exe resides, typically C:\Program Files (x86)\Afreet\SkimSrv and C:\Program Files (x86)\Afreet\RttySkimServ.

Start CW SkimServ and go to the tab "Skimmer", change the Receiver dialog box to CWSL_Tee, and set the Segment Bandwidth to 192 kHz. Make certain it is running correctly and then close CW SkimServ, which will write the new conditions to the SkimSrv.ini file.



3) Modify SkimSrv.ini

Bring up both RTTYSkimServ.ini and SkimSrv.ini in two Notepad windows side by side. Typically you will find them at C:\Users\User_name\AppData\Roaming\Afreet\Products\SkimSrv and RTTYSkimSrv\.

In the following examples the fields you will want to modify are in blue and the **parameters that must be identical between the two configuration files are in red.** Note that comments are preceded by a semi-colon. The order of the statements inside each section of the configuration file makes no difference.

```
[Window]
MainFormLeft=567
MainFormTop=526
```

[User]
Call=WZ7I
Name=Wes
QTH=Pipersville, PA
Square=FN20KK

[Telnet]
Port=7200
PasswordRequired=0
Password=
CqOnly=1
AllowAnn=1
AnnUserOnly=0
AnnUser=
MinQuality=1

[Skimmer]
CenterFreqs48=1822750,3522750,3568250,7022750,10122750,14022750,14068250,18090750,21022750,21068250,24912750,28022750,28068250,50022750,50068250,50113750,50159250
CenterFreqs96=1845500,3545500,7045500,10145500,14045500,18113500,21045500,24935500,28045500,28136500,50045500,50136500
CenterFreqs192=1891000,3591000,7091000,10191000,14091000,18159000,21091000,24981000,28091000,50091000

SegmentSel48=00111100101010000
SegmentSel96=001111111
SegmentSel192=0110101010

CwSegments=1800000-1840000,3500000-3570000,7000000-7035000,7045000-7070000,10100000-10130000,14000000-14060000,18068000-18095000,21000000-21060000,24890000-24920000,28000000-28060000,50000000-50100000

ThreadCount=4
DeviceName=01 CWSL_Tee on QuickSilver QS1R
;The above line may be 02 CWSL_Tee on QuickSilver QS1R
Rate=2
FreqCalibration=1.0000194
;You will need to enter your own frequency calibration number here but it must be identical in both files. In our experience, the needed correction is very small, as in this example.

4) Modify RTTYSkimSrv.ini

;This has been modified to run RTTY and CW at same time

[User]
Call=WZ7I
Name=Wes
QTH=Pipersville, PA
Square=FN20kk

[SDR]
;use SKIMMER/SDR Telnet command to list available device names
DeviceName=01 CWSL_Tee on QuickSilver QS1R
;DeviceName=02 QuickSilver QS1R
;0=40kHz 1=96kHz 2=192kHz
Rate=2
FreqCalibration=1.0000194
;You will need to enter your own frequency calibration number here but it must be identical in both files

[Telnet]
Port=7100
PasswordRequired=0
Password=
CqOnly=1
AllowAnn=1
AnnUserOnly=0
AnnUser=
;0=minimal 1=normal 2=aggressive 3=paranoid
ValidationLevel=1
TensHz=1

[Skimmer]
;must be one of the contests defined in Contests.ini
Contest=DX

CenterFreqs48=1822750,3605750,7047750,7102750,10152750,14102750,18122750,21102750,24932750,28102750,50272750,50322750
CenterFreqs96=1822750,3575000,7065000,10175500,14105000,18145500,21105000,24955500,28105000,50295500,50345500
CenterFreqs192=1891000,3591000,7091000,10191000,14091000,18159000,21091000,24981000,28091000,50091000

SegmentSel48=0101010101
SegmentSel96=011010101
SegmentSel192=0110101010

;normal

```
RttySegments=180000-182000,3583000-3600000,7035000-7050000,7080000-7080000,10130000-10150000,14080000-14100000,18100000-18110000,21080000-21100000,24910000-24930000,28080000-28100000,50250000-54000000
;contest
;RttySegments=1800000-1820000,3550000-3600000,7020000-7100000,10130000-10150000,14060000-14140000,18100000-18115000,21060000-21150000,24910000-24930000,28060000-28150000,50250000-54000000
```

```
[Debugging]
Affinity=0
HtmlOut=0
```

5) Starting the applications

When you start the first Skimmer Server, it loads the FPGA code in the QS1R, defining the frequency bands for both applications, and CWSL_Tee.dll creates the shared memory where it writes the data coming from the QS1R. When the second Skimmer Server starts, the second instance of CWSL_Tee.dll detects that the first instance is already running and accesses the data from this shared memory.

6) Suggestions for optimization

You will find that RTTY decoding requires 4-6 times more CPU resources than CW decoding, due to the nature of RTTY signals. A fast computer can handle only a few hundred RTTY decoders, a number that can be exceeded during a contest weekend with a good antenna. If data fills the RTTY Skimmer Server input buffer faster than it can be processed, then "throttling" begins and less than 100% of the signals are decoded. The Resources bar shows how much of the resources that are made available to the program are still available, and when this bar shows zero, throttling begins.

There are a several parameters that can be modified to optimize the performance of the hardware you are using.

Number of Bands

The easiest way to change the number of decoders required is to change the number of bands received and decoded. The important thing to remember is to make sure that the SegmentSel and the CenterFreq lines are identical for both Skimmer Servers. The easiest way to do this is simply to copy the relevant lines from one .ini file and replace the corresponding lines in the other.

Bandwidth

Most of the frequencies covered in the above example could have been covered using a bandwidth of 96 kHz rather than 192 kHz. The lower sampling rate would save a modest amount of computer resources enabling one to decode more signals. So how

can you deal with RTTY signals above 28090, for example, if you were covering the bottom 90 kHz of ten meters? You might find it useful to add a band segment representing the upper portion of ten meters to the above CenterFreqs and SegmentSel96 lists above and widen the RTTYSegments for ten meters.

RTTYSegment Frequencies

The width of the RTTY segments defined in the configuration file makes a large difference in the consumption of computer resources. SSB signals on forty meters can waste a lot of resources if the software is trying to determine if they are RTTY signals. You will almost certainly want to have separate configuration files for daily use and for contest weekends when RTTY signals cover perhaps 70 kHz on each of several bands.

In major CW contests, it is quite common for CW signals to appear within and above the RTTY segments. Given this, you may find that during such contests you will want to turn off RTTY Skimmer Server or disable it by setting RTTY Segments to zero bandwidth.

Sending Data from Two SkimServs to the RBN Simultaneously

Once you have CW SkimServ and RTTY SkimServ running on the same QS1R, getting the data to the RBN is very easy.

- Get Aggregator 4.0 (download from the [RBN web site's Downloads section](#), and put it into your current Aggregator directory. If you are installing Aggregator for the first time, do not install it in Program Files or Program Files (X86), because it stores its settings in the same directory as the .exe file. Try somewhere like C:\ham radio.
- Start the Aggregator.
 - Go to the ini Files tab, click the "Stop Rotation" button and make sure the Resume Rotation Automatically check box is not checked. You will see the words "Rotation Stopped" immediately below the "Start Rotation" button.
 - Go to the Connections tab and set the Primary Skimmer Connection parameters (Callsign, Password, IP Address, and Port) for your CW Skimmer Server.
 - On the Secondary Skimmers tab set the parameters for Skimmer Number 8 (bottom slot) for your RTTY Skimmer Server.
- Now start CW Skimserv and RTTY SkimServ. Verify that both are running satisfactorily.
- Click the Primary Skimmer Connect button (on the Connections tab) and the Secondary Skimmer Number 8 Connect button (on the Secondary Skimmers tab).
- Watch the Status tab – it should reflect successful connections to both Skimmer Servers, and to the RBN server.

Rotating .ini Files

If you have already done this with a single CW Skimmer Server, you're ninety percent of the way there.

Create the CW Skimsrv.ini files that you want to be shared for your standard and contest rotations, following some of the guidelines and suggestions above. Fill in their names and locations on the .ini Files tab.

On the RTTY SkimServ tab, enter the location of the RTTYSkimServ.exe and RTTY SkimServ.ini files. Use the Browse buttons to make sure you get it right. Also check the box there saying you want Aggregator to force RTTY Skimmer Server to follow CW Skimmer Server.

Return to the .ini Files tab and click the Now button on one of the .ini lines you filled in previously.

Aggregator should shut down both Skimmer Servers, copy needed parameters from the specified CW Skimmer Server .ini file to RTTYSkimServ.ini and then start both CW and RTTY SkimSrvs.

Now complete the remaining entries on the ini Files tab to set up the rotation as you desire.

Then close Aggregator and the Skimmer Servers.

From now on, all you need to do is start the Aggregator. It will start rotation, which begins by making sure no Primary Skimmer is running. Then it selects the appropriate CW Skimmer Server .ini file, starts CW Skimmer Server (which loads the QS1R's FPGA), copies the needed changes to RTTYSkimserv.ini, and starts it as well. When you see icons in the System Tray, without any yellow or red danger signals, you will be up and running. If you do have trouble, typically an access conflict caused by differences between the ini files, stop all Skimmer Servers and the Aggregator and repeat the process of copying the relevant parts of the .ini files. Restart the Aggregator.

For further details on the Aggregator and its features, see "Using Aggregator with the Reverse Beacon Network", found at <http://www.reversebeacon.net/downloads/aggregator/Using%20Aggregator%2010.pdf>

