



FlexRadio

S02R with FlexRadio and N1MM+

Setup Guide

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Chapter 1

Introduction

Note

Requires SmartSDR v4.x and N1MM+ v1.0.9429+

Interfacing your FlexRadio dual-SCU radio to N1MM+ requires setup in 4 applications: SmartSDR-Win, DAX, SmartSDR CAT, and N1MM+. The details for each of these is below.

1.1 Supported Radios

SO2R requires a radio with **dual SCUs (Spectral Capture Units)**. Each SCU digitizes one antenna's RF spectrum independently. Without two SCUs, transmitting on one slice mutes or overwhelms the other, making true SO2R impossible.

Model	SCUs	SO2R	Status
FLEX-6600/6600M	2	Yes	Limited stock
FLEX-6700	2	Yes	Discontinued (June 2023)
FLEX-8600/8600M	2	Yes	Current flagship
Aurora AU-520/520M	2	Yes	Shipping late 2025

Models with a single SCU (FLEX-6400/6400M, FLEX-8400/8400M, Aurora AU-510/510M) support SO2V (two VFOs on one SCU) but **cannot** do true SO2R.

Note

N1MM+ uses the radio type **"FLEX-6000 Series"** for all FlexRadio models, including the 8000 series and Aurora. SmartSDR CAT provides the abstraction layer.

1.2 SmartSDR Licensing

SmartSDR v4.0 introduced a tiered licensing model:

- **SmartSDR Basic** (free) – includes bug fixes and core functionality including CW Auto Tune.
- **SmartSDR+** (\$199/year) – unlocks premium features including the Digital Voice Keyer (DVK) with 12 voice message slots, Enhanced Signal Clarity (ESC), and SmartLink for remote operation.

Radios licensed for SmartSDR v3 retain all prior features (including SmartLink and MultiFlex) under v4 Basic. Radios licensed only for v1 lose SmartLink and MultiFlex unless SmartSDR+ is purchased.

1.3 Windows 11 Compatibility

Warning

Windows 11 Memory Integrity blocks DAX drivers. The SmartSDR DAX audio drivers are incompatible with Windows 11's Memory Integrity (Core Isolation / HVCI) feature. DAX devices fail to appear in Windows Sound settings, producing Code 39 errors. The workaround is disabling Memory Integrity in **Windows Security -> Device Security -> Core Isolation**. Since DAX is essential for SO2R audio routing, this must be resolved before proceeding with setup.

Windows 10 support ended October 14, 2025. SmartSDR v4.x targets Windows 11 as the supported platform.

Chapter 2

SmartSDR

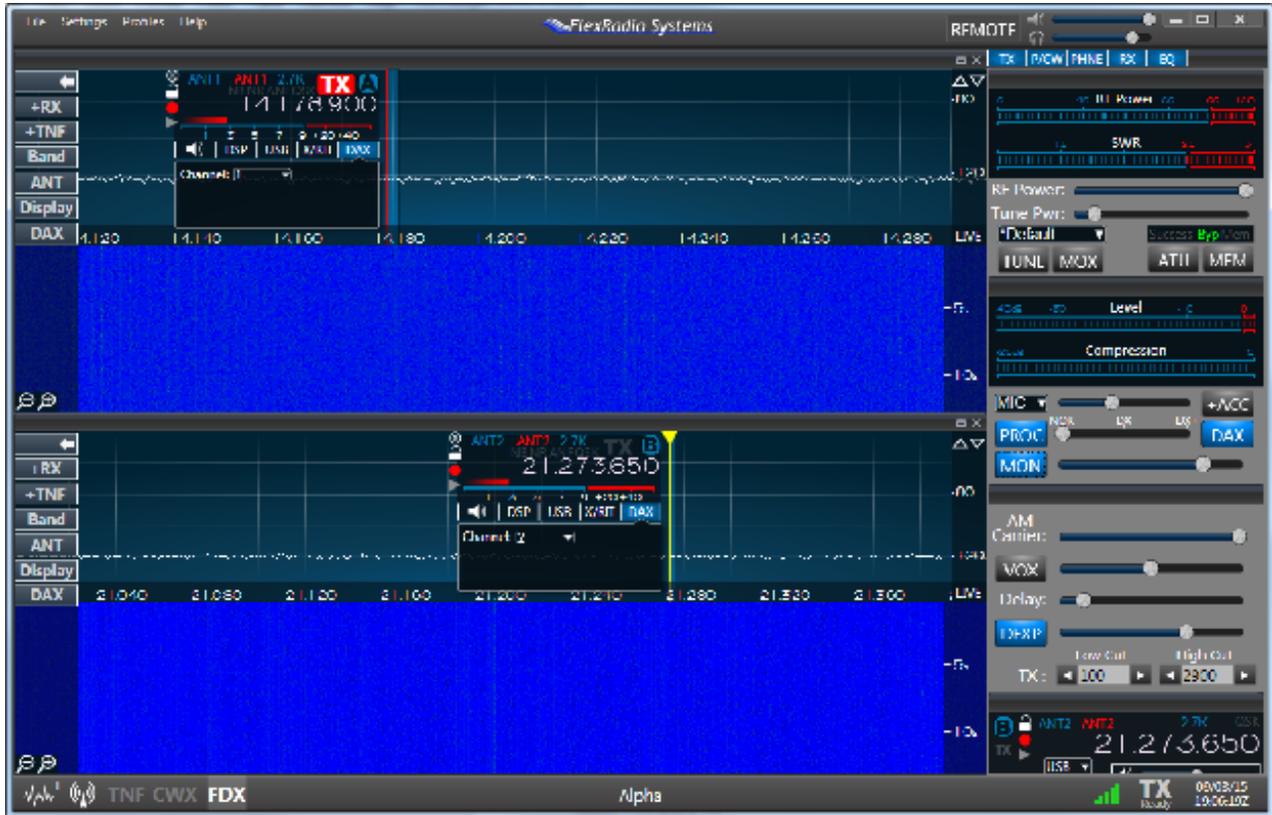


Figure 2.1: SmartSDR main window configured for SO2R

Open SmartSDR and set it up like the screenshot above.

From a fresh factory reset of the radio, this will require doing the following:

1. Add a Panadapter and put it on a different band than the first Panadapter (15m is shown here).
2. Set each slice to SSB.
3. Set Slice A's DAX Channel to 1.
4. Set Slice C's DAX Channel to 2.
5. Enable DAX on the Transmit Panel (right side, middle).
6. Enable FDX (bottom left).
7. Optionally enable the monitor function (MON) if hearing the voice keyer transmissions locally is desired.
8. Open the Radio Setup Form using the menu options as shown below.

! Important

Use Slice A and Slice C (not A and B) for SO2R. Using Slices A and B puts the radio into SPLIT mode, which conflicts with OTRSP-controlled TX switching. With Slices A and C, TX toggling works correctly.

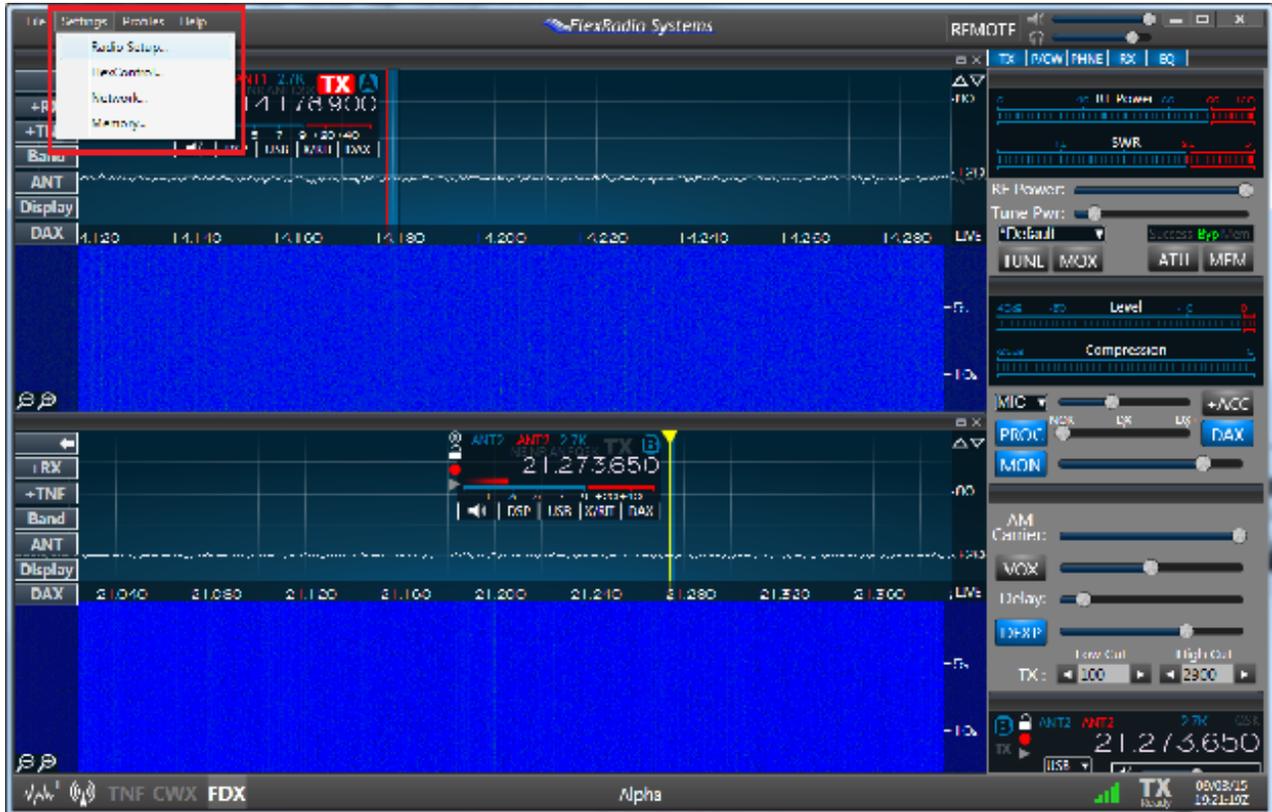


Figure 2.2: SmartSDR menu options for Radio Setup

Click on the Radio Tab.

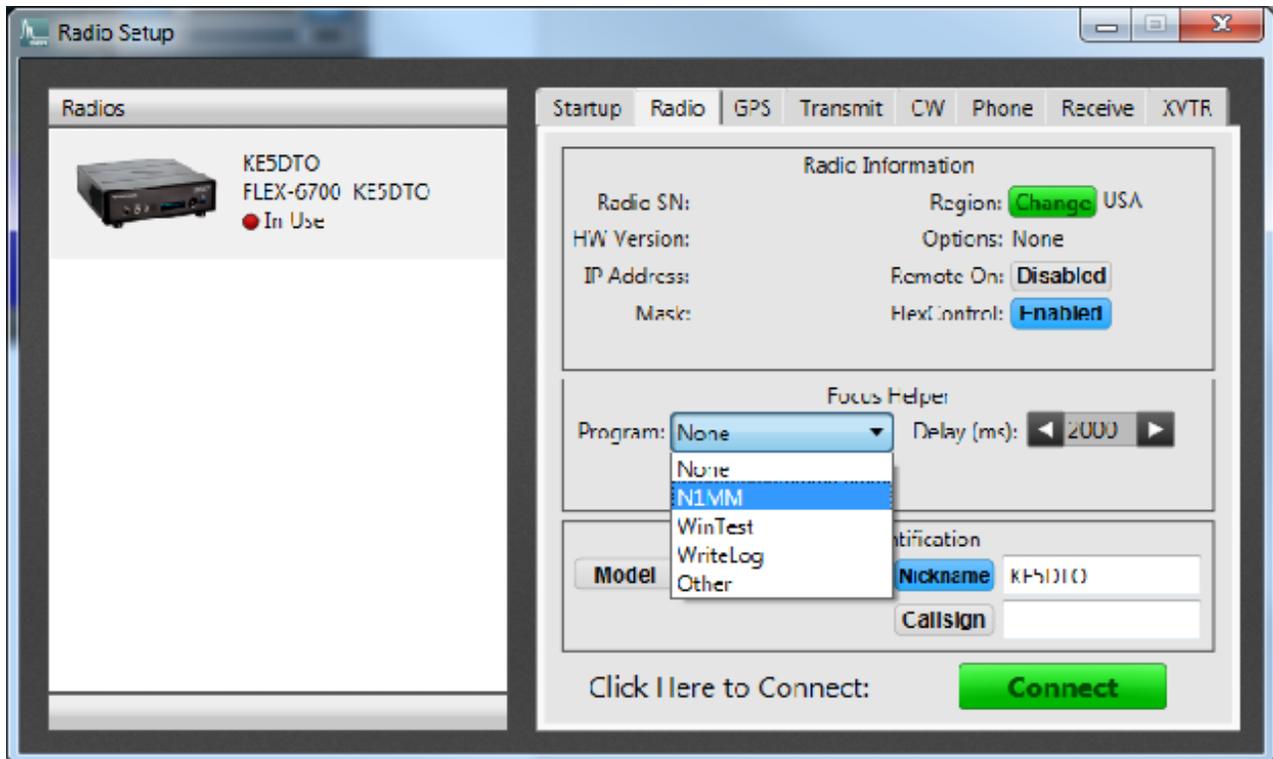


Figure 2.3: Radio Setup – Focus Helper section

In the Focus Helper section, select N1MM. Choose an appropriate Delay setting. This is the time to wait after an interaction within SmartSDR (mouse click, entering text in a field, etc) to return the Windows Focus to N1MM.

Note

Focus Helper does not properly handle popped-out panadapter windows in MDI mode. Keep panadapters docked when using SO2R with N1MM+.

Once everything is setup, open the Profile Manager by clicking the **Profiles -> Profile Manager...** menu option as shown below.

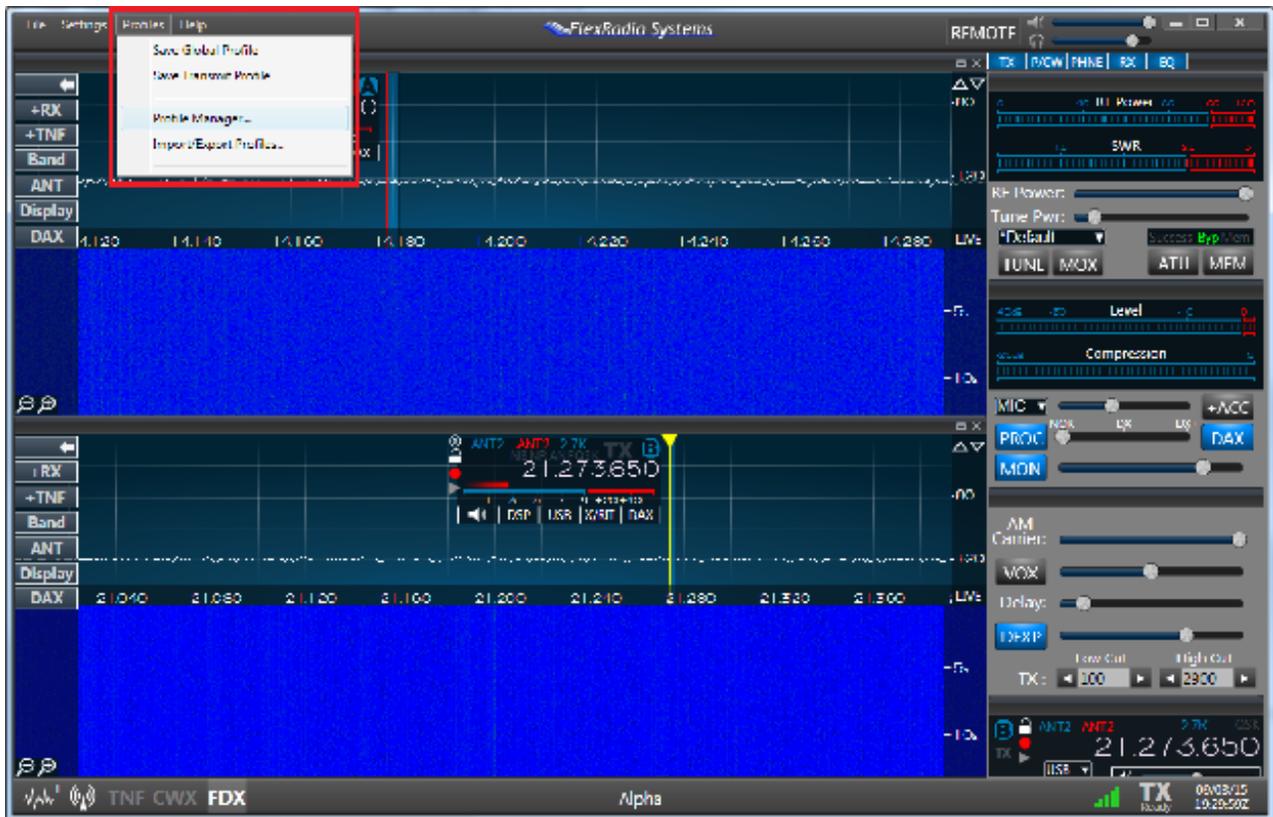


Figure 2.4: Profiles menu – Profile Manager option

Ensure that the Global Tab is selected. Change the name to “SO2R SSB” and click the **Save** button to save the profile.

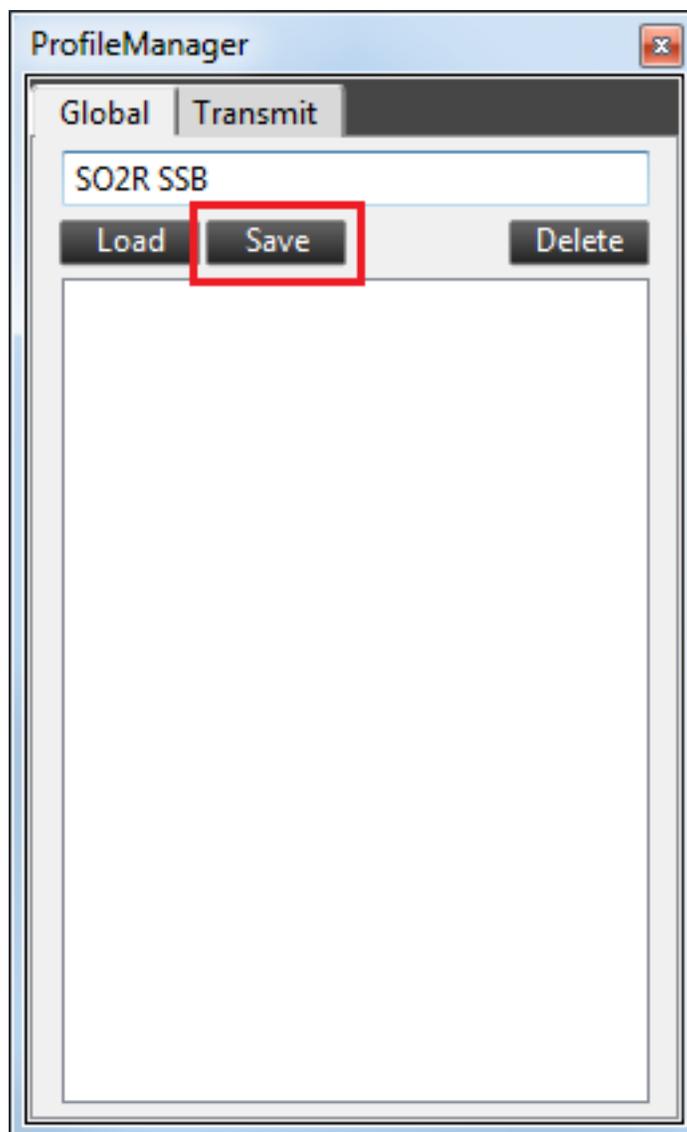


Figure 2.5: Profile Manager – saving SO2R SSB profile

Warning

The SmartSDR v4.x profile database is **not backward compatible**. Downgrading SmartSDR versions requires a factory reset. Always export profiles before upgrading using the SmartSDR Settings File Manager.

Chapter 3

DAX

Open the DAX Control Panel by double clicking on the icon in the System Tray.

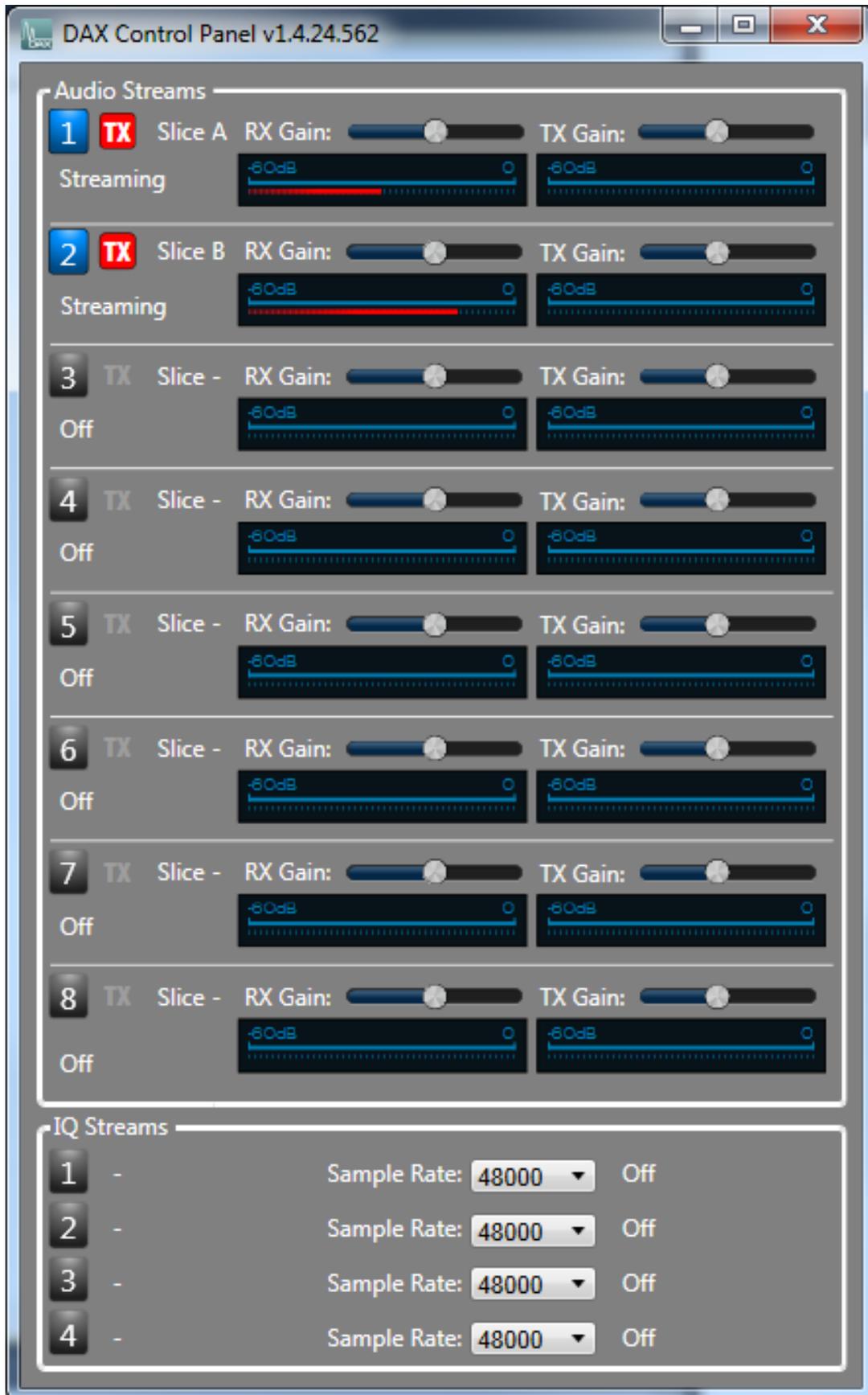


Figure 3.1: DAX Control Panel

Enable Channel 1 and 2 as shown. Toggle the TX on for both channels as shown.

 **Warning**

On Windows 11, if DAX channels do not appear, disable Memory Integrity in **Windows Security -> Device Security -> Core Isolation** and reboot. See Windows 11 Compatibility for details.

Chapter 4

SmartSDR CAT

Open the SmartSDR CAT Control Panel by double clicking on the icon on the desktop (or clicking on the icon in the Task Bar if it is already running).

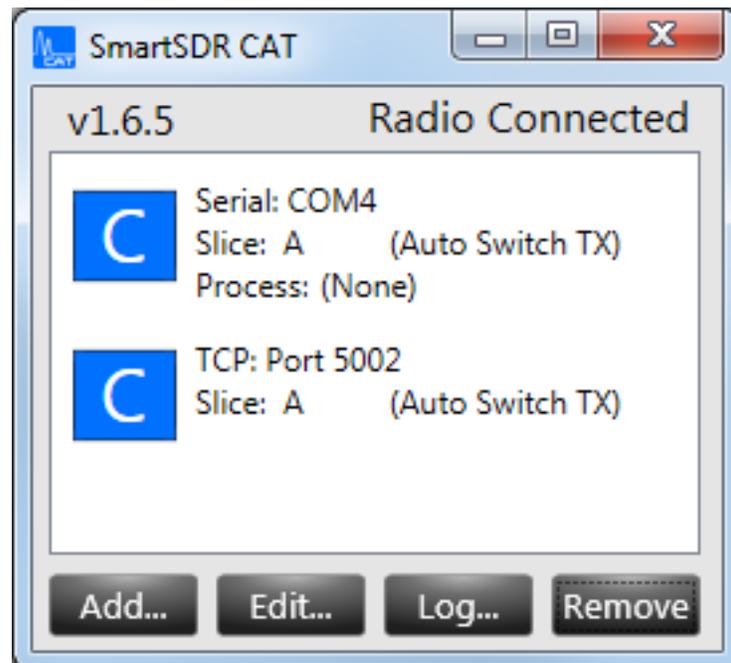


Figure 4.1: SmartSDR CAT Control Panel

In addition to the default CAT Port, you will want to create several more ports for full N1MM support including another CAT Port (for the 2nd logical Radio), an OTRSP Port for audio switching and control, and a Winkeyer Port for Winkeyer emulation. Click the **Add...** button.

Tip

TCP Ports (Recommended)

SmartSDR CAT v4.x supports **TCP port connections** as an alternative to FlexVSP virtual COM ports. When adding a port, set Port Type to **TCP** instead of Serial. TCP connections are more stable than FlexVSP, work across the LAN (not just localhost), and avoid COM port management and driver issues entirely. This is the **recommended approach for new setups**. If using TCP, you can skip FlexVSP installation. The instructions below show the FlexVSP (Serial) method; substitute TCP ports where applicable.

Note

SmartSDR CAT v3.9+ also includes a **Serial Passthrough** protocol option for controlling RS-232 devices (rotators, amplifiers) through the radio over SmartLink.

4.1 Adding the Second CAT Port

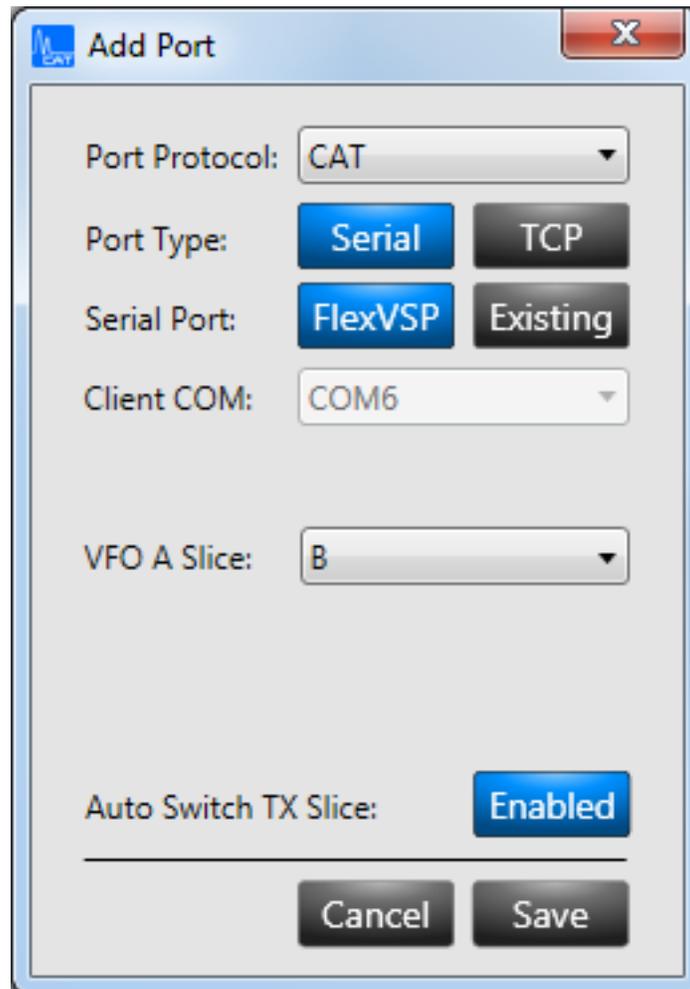


Figure 4.2: Add Port – second CAT port configuration

Setup the Port details as shown in the screenshot above to create a CAT port for the “2nd Radio” (will actually use Slice C). Click the **Save** button and wait for the FlexVSP port to be created (3–4 sec) and the Add Port Window will close.

Note

If using TCP ports, set Port Type to **TCP** and note the IP address and port number instead of the COM port number.

4.2 Adding the OTRSP Port

Click the **Add** button again to add the OTRSP Port.

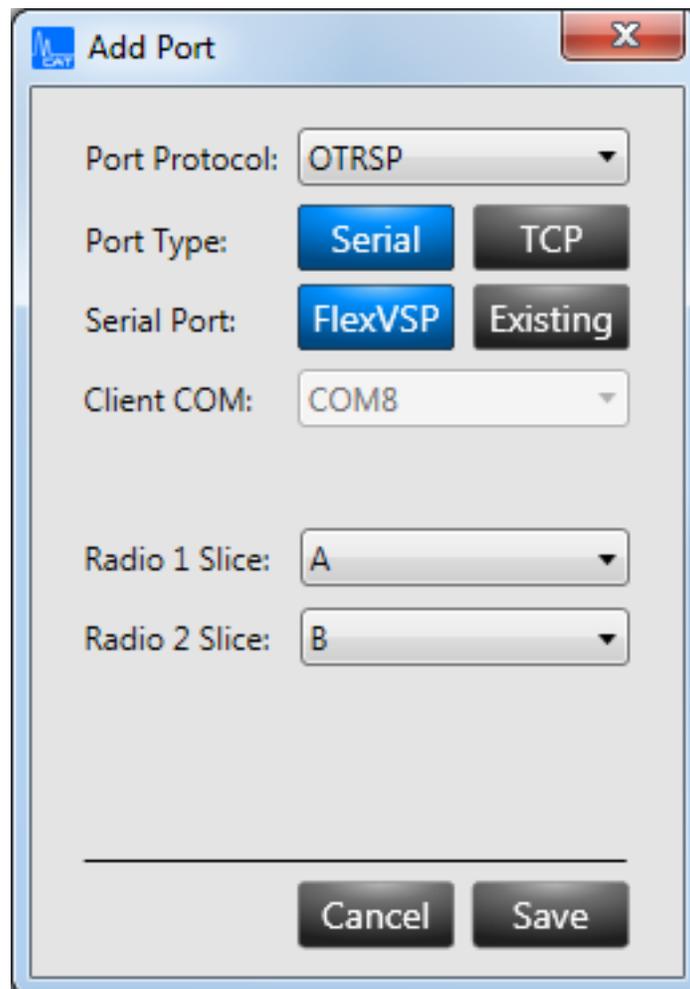


Figure 4.3: Add Port – OTRSP port configuration

Setup the OTRSP Port as shown in the screenshot above. Note that the COM port may be different and the Port will be used later to setup N1MM, so take note of which COM Port is used for each Port Type. Click the **Save** button and wait for the FlexVSP port to be created and for the Add Port Window to close.

4.3 Adding the Winkeyer Port

Click the **Add** button one more time to add a Winkeyer Port.

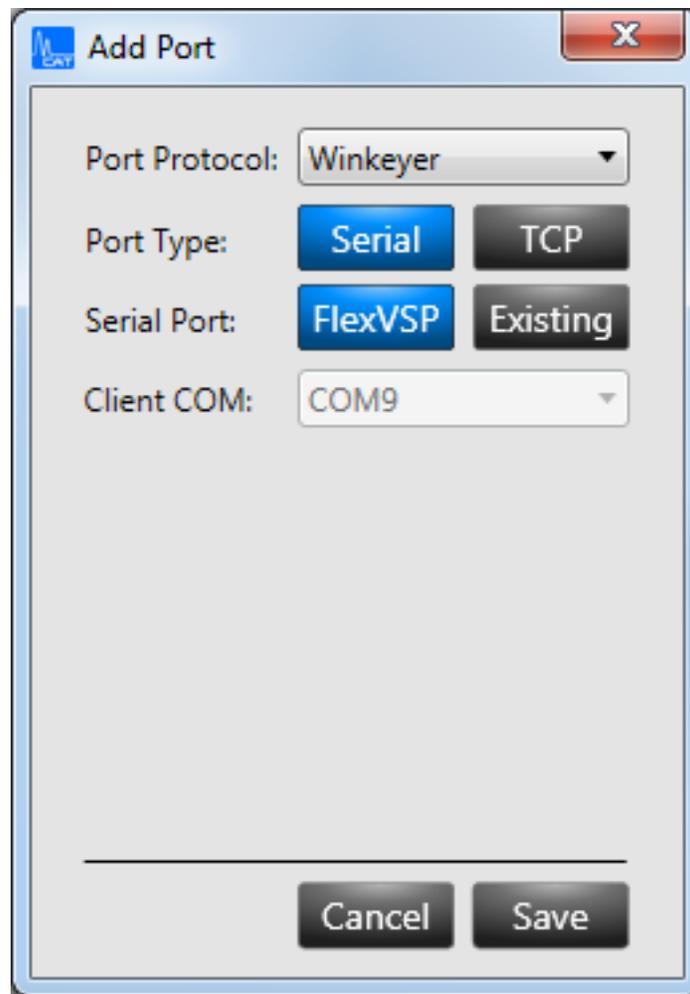


Figure 4.4: Add Port – Winkeyer port configuration

Setup the Winkeyer Port as shown and click the **Save** button to complete the Port creation process. Once these ports have been added, the SmartSDR CAT Main Window should look like this:

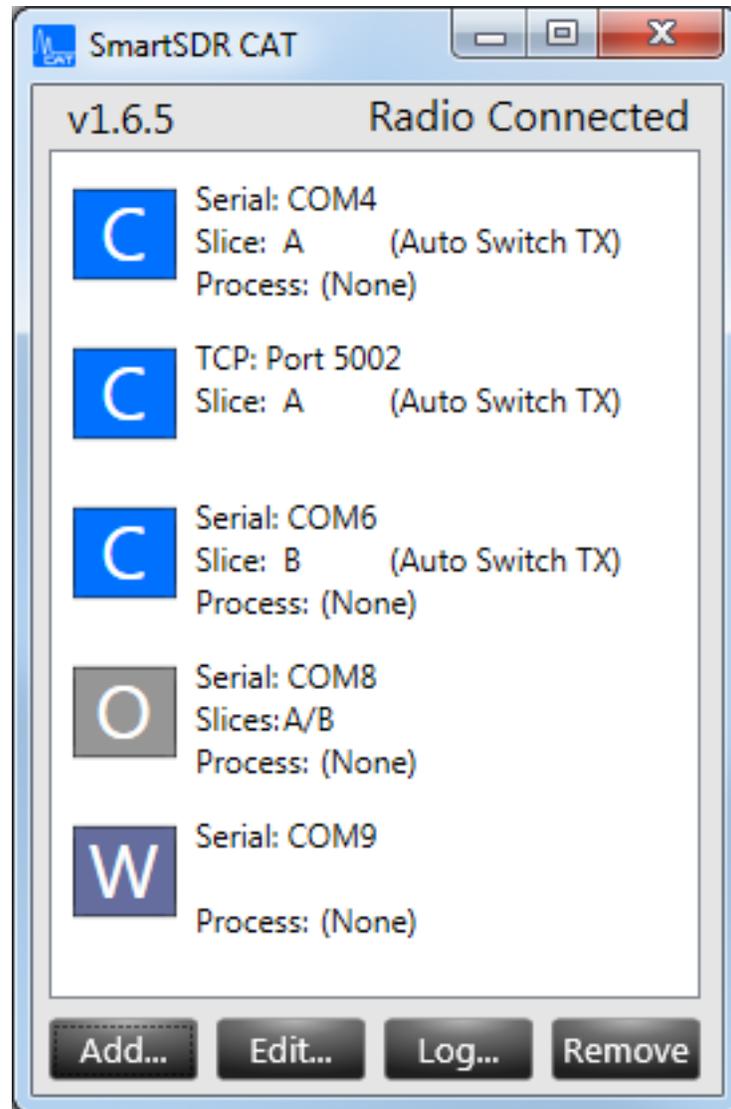


Figure 4.5: SmartSDR CAT Main Window with all ports configured

If your Main Window shows “Radio Not Connected” and “Slice Not Present” in red, this just indicates that the radio is not online and SmartSDR CAT isn’t yet talking to the radio.

Warning

FlexVSP Driver Stability

FlexVSP drivers can break after Windows 10/11 updates, requiring repair via Programs and Features or full reinstall. The CAT.settings file can also corrupt if SmartSDR CAT isn’t properly closed before shutdown, orphaning port assignments. Back up CAT.settings regularly. If you experience persistent issues, consider switching to TCP ports.

Chapter 5

N1MM+

If this is the first time to use N1MM, upon launching the program a form will be presented for entry of details such as your Callsign, QTH, ARRL section, etc. Fill this out and continue to get to the main display.

5.1 Configuring Radio Ports

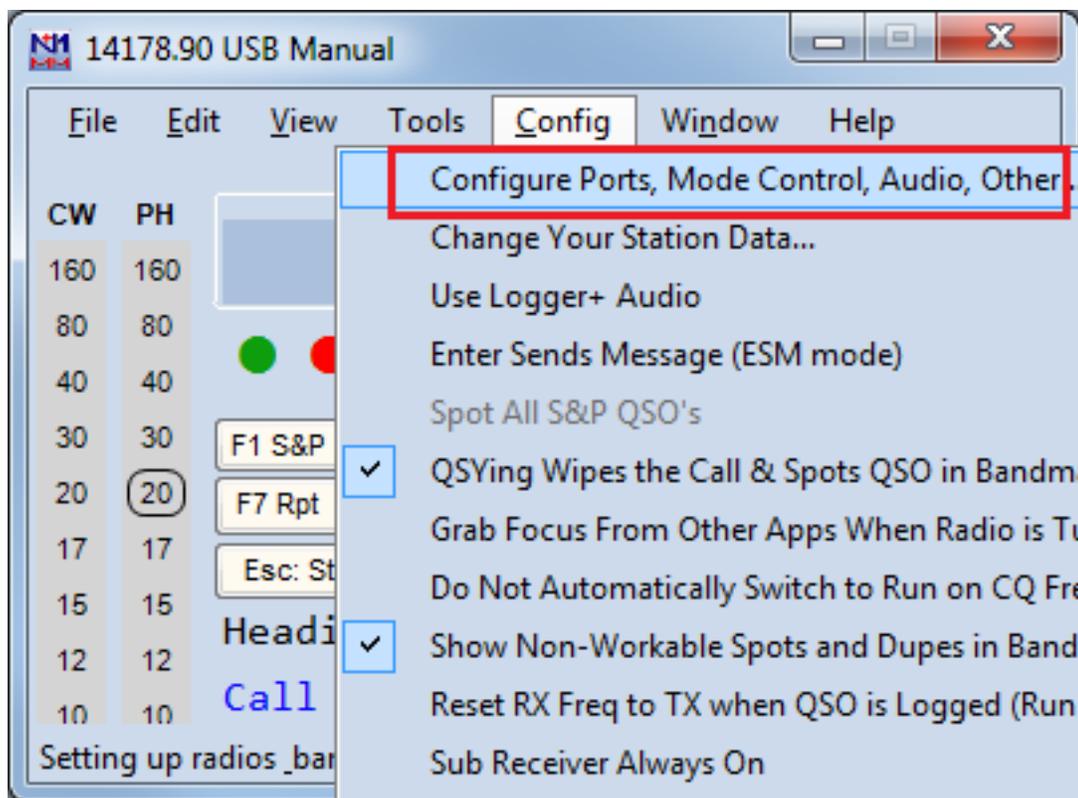


Figure 5.1: N1MM+ main display

Click the **Config -> Configure Ports, Mode Control, Audio, Other...** menu option.

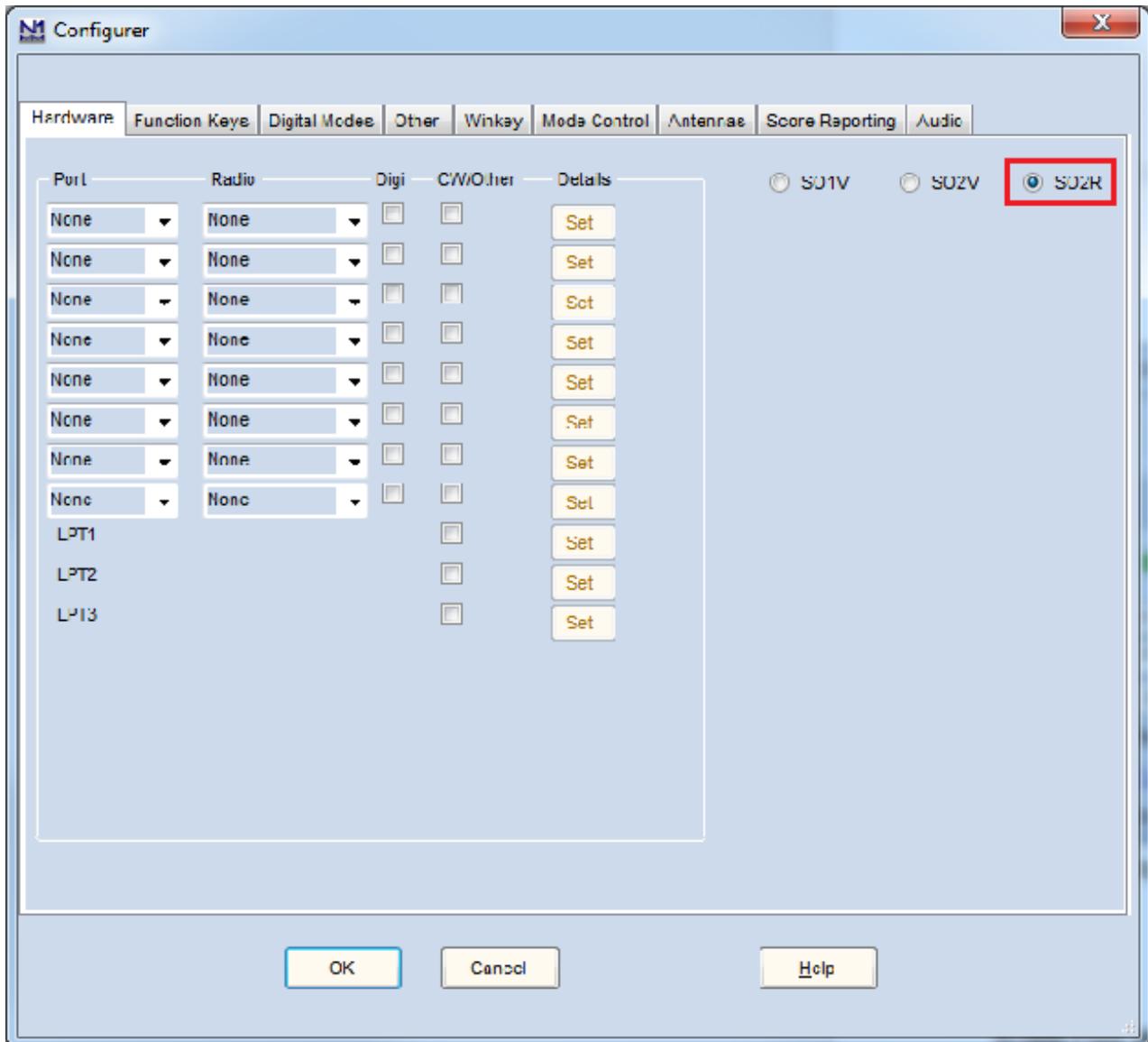


Figure 5.2: N1MM+ Configurer – Hardware Tab

Starting on the Hardware Tab, select the SO2R box on the far right.

On the top row of port definitions, select the main CAT COM port (COM4 in our example), or select **TCP** if using TCP connections. Under Radio, choose **FLEX-6000 Series** (this applies to all FlexRadio models including the 8000 series and Aurora).

Tip

When using TCP, select **TCP** from the port dropdown and enter the IP address and port number (e.g., 127.0.0.1:60000) matching the TCP port configured in SmartSDR CAT.

Click the **Set** button under Details on the first row.

Com4

Speed: 38400 | Parity: N | DataBits: 8 | Stop Bits: 1

DTR (pin 4): Always Off | RTS (pin 7): Always Off | Icom Code (hex): 0 | Radio Nr: 1

PTT Delay (msec): 30

Enable Both Hardware & Software

PTT via Radio Command Digital Mode

PTT via Radio Command SSB Mode

PTT via Radio Command CW Mode

FootSwitch (pin 6): None

Radio Polling Rate: Normal

Suggested Flex Settings:

Help OK Cancel

Left Window

Figure 5.3: Radio 1 port details

Setup the form as shown and click the **OK** button.

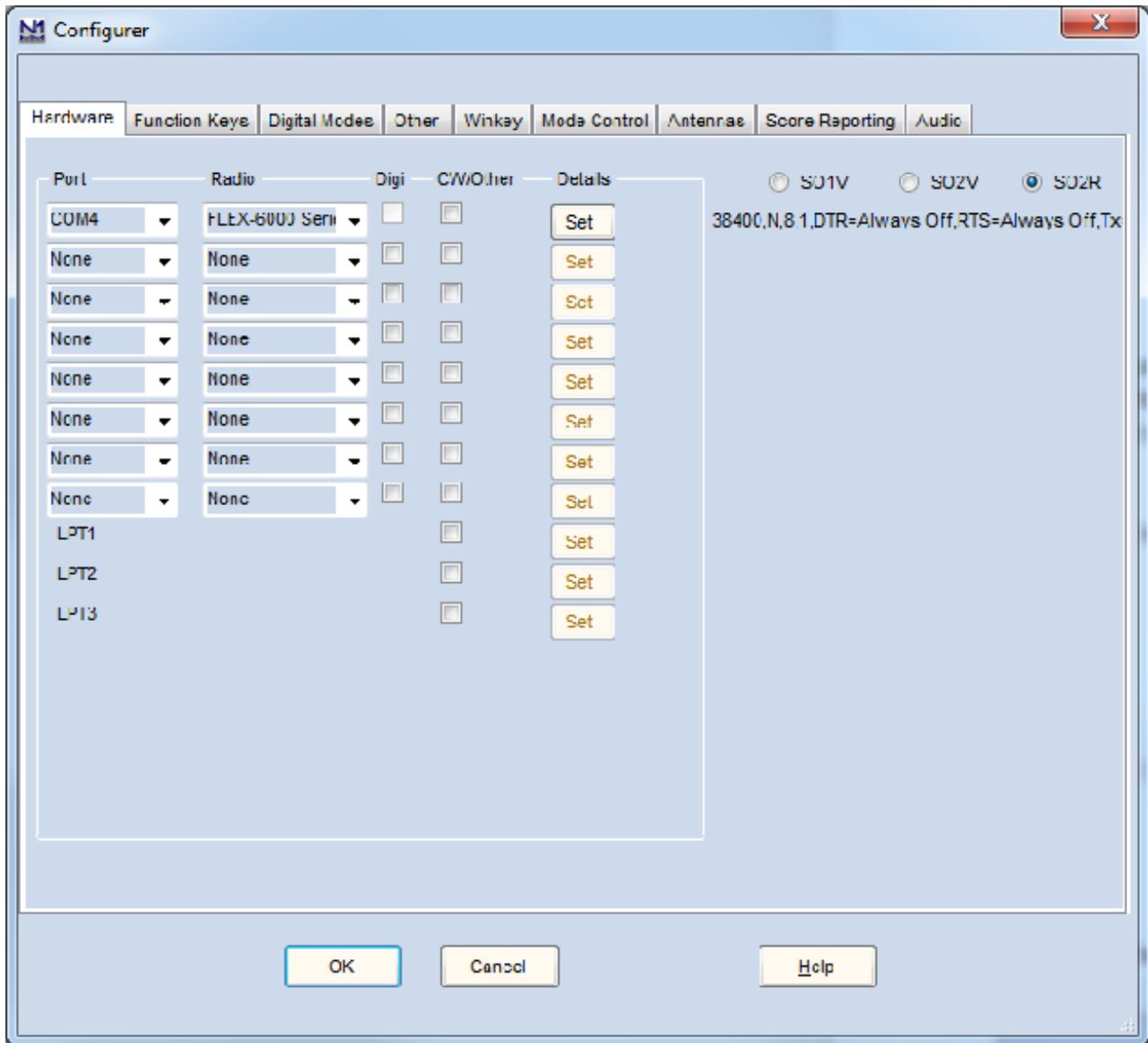


Figure 5.4: N1MM+ Configurer after Radio 1 setup

The Configurer window should now look like this. Now fill out the second row similarly for the SO2R Radio (which will use Slice C). Select the SO2R COM Port or TCP port (COM6 in our example) and **FLEX-6000 Series** under Radio. Click the **Set** button on the second row.

The screenshot shows a configuration window titled "Com6" with the following settings:

- Speed: 38400
- Parity: N
- DataBits: 8
- Stop Bits: 1
- DTR (pin 4): Always Off
- RTS (pin 7): Always Off
- Icom Code (hex): 0
- Radio Nr: 2 (highlighted with a red box and labeled "Right Window")
- PTT Delay (msec): 30
- Enable Both Hardware & Software:
- PTT via Radio Command Digital Mode:
- PTT via Radio Command SSB Mode:
- PTT via Radio Command CW Mode:
- Allow ext interrupts:
- FootSwitch (pin 6): None
- Radio Polling Rate: Normal

Suggested Flex Settings:

Buttons: Help, OK, Cancel

Figure 5.5: Radio 2 port details

Setup the form as shown. Ensure that the Radio Nr field is set to **2**. Click **OK** to close this window.

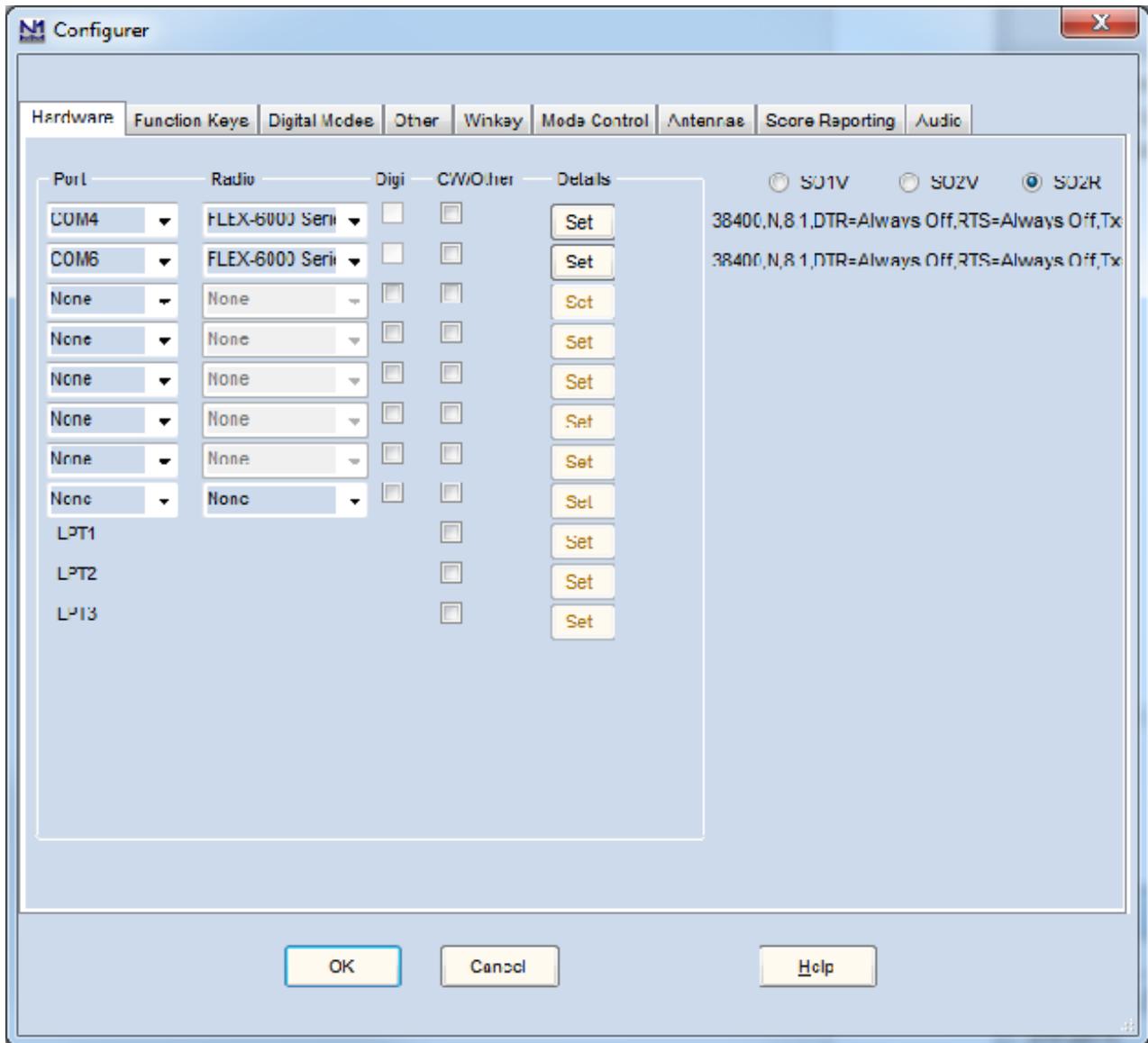


Figure 5.6: N1MM+ Configurer after Radio 2 setup

The Configurer window should now look like this.

5.2 Configuring the OTRSP Port

The third row will be used to define the OTRSP setup. Select the OTRSP COM Port (COM8 in our example) under Port. Leave the Radio dropdown set to **None**. Check the **CW/Other** box and click the **Set** button under Details.

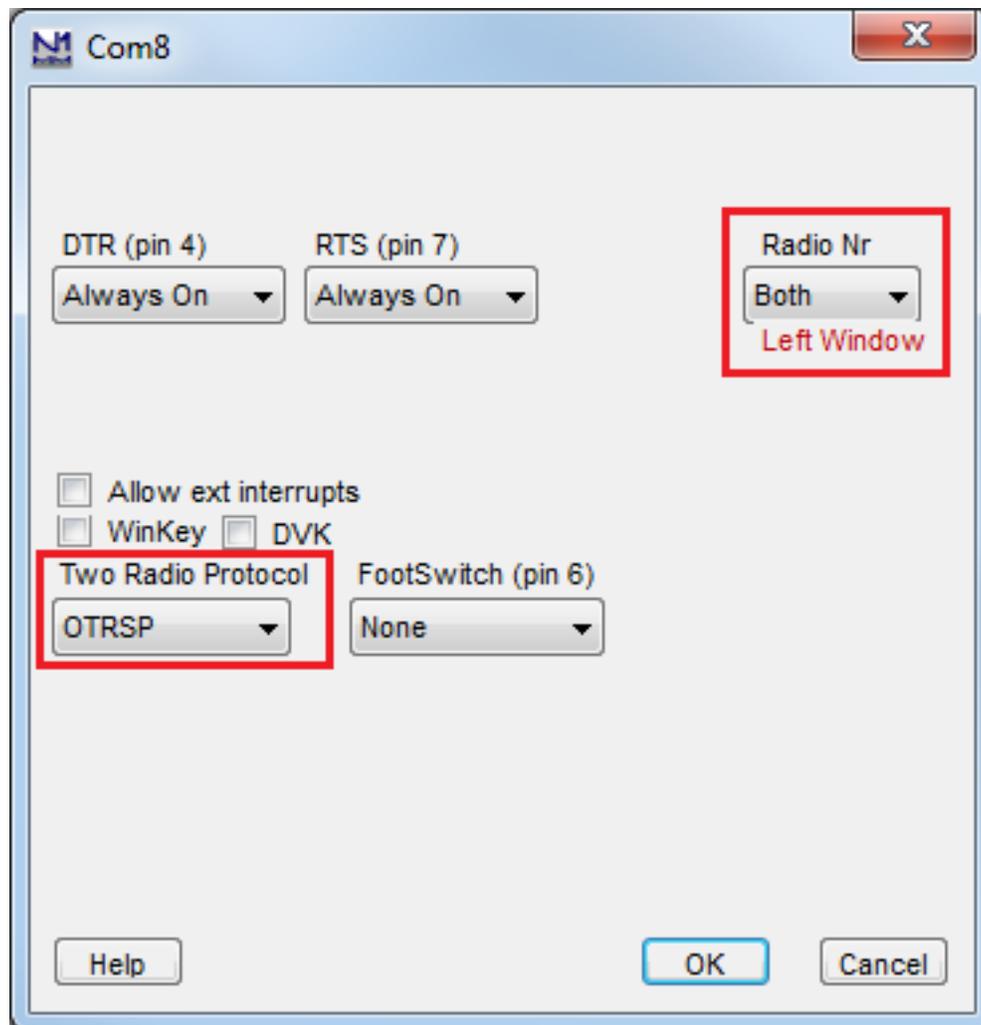


Figure 5.7: OTRSP port details

Setup the form as shown. Ensure that the Radio Nr is set to **Both** and the Two Radio Protocol is set to **OTRSP**. Click the **OK** button to close the window.

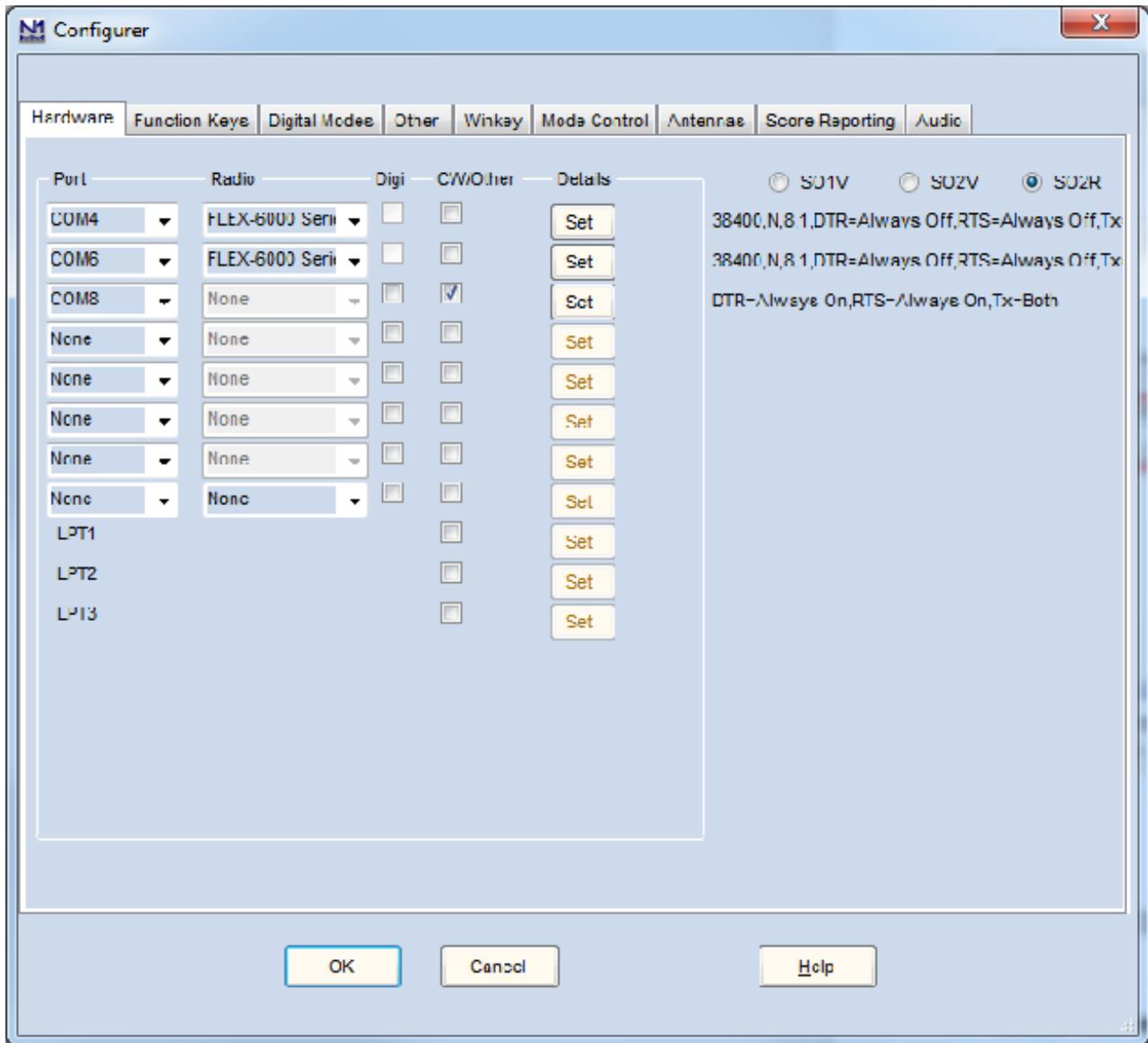


Figure 5.8: N1MM+ Configurer after OTRSP setup

The Configurer window should now look like this.

5.3 Configuring the Winkeyer Port

The 4th row will be used to configure the Winkeyer. Select the COM port under Ports and check the **CW/Other** box. Then click the **Set** button under Details.

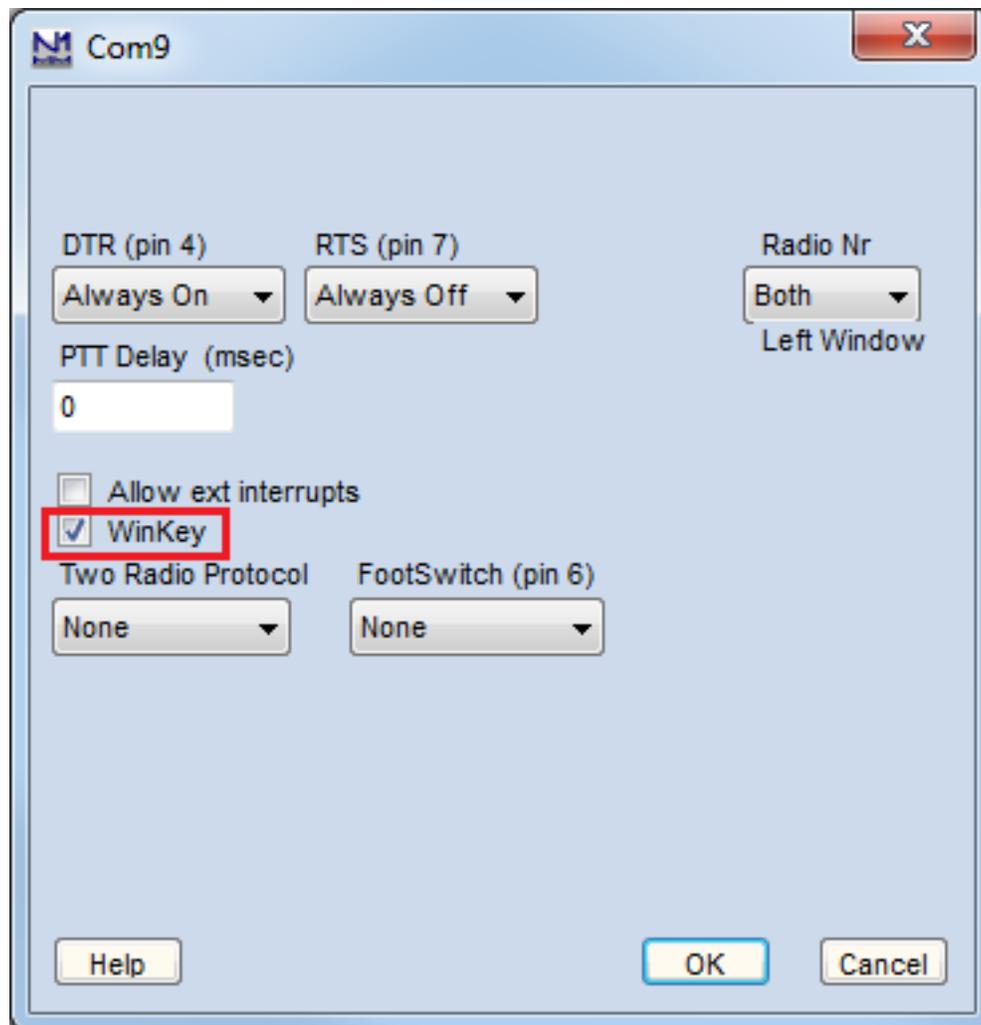


Figure 5.9: Winkeyer port details

The Winkeyer Port is on COM9 in this example. Setup the form as shown. Ensure that the **WinKey** box is checked. Click **OK** to close the form.

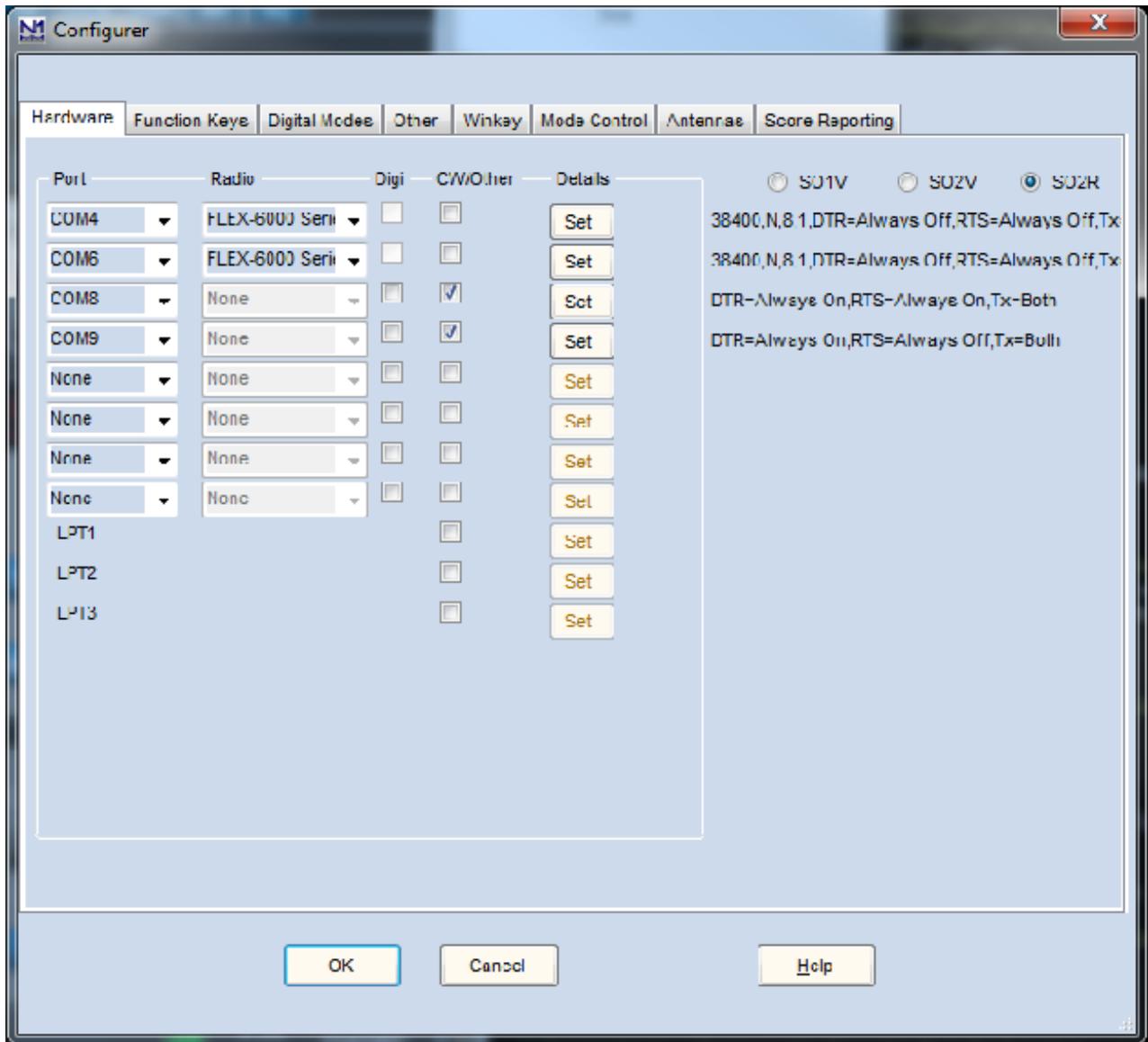


Figure 5.10: N1MM+ Configurer – final configuration

The Configurer form should now look like this. Click the **OK** button to close the form and save the configuration.

5.4 Verifying the Connection

Note that while N1MM is running with the Ports configured, the SmartSDR CAT Main Window should show N1MMLogger as the connected process for each Port. This assumes that SmartSDR is running and the Slices are setup.

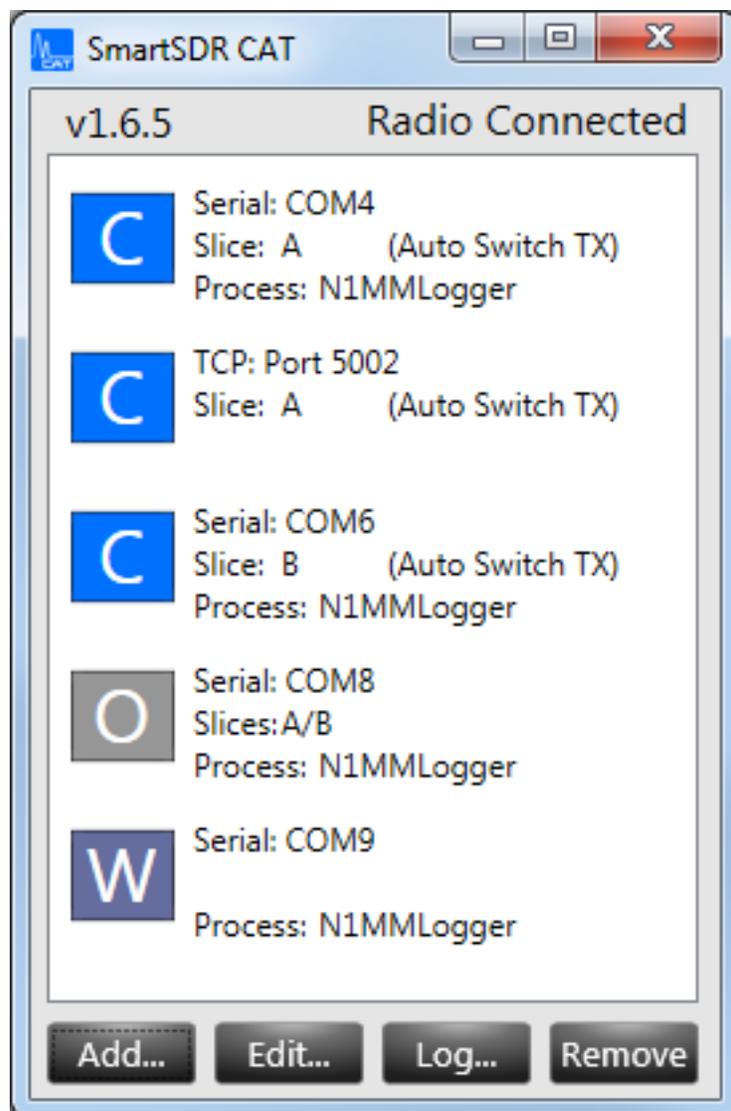


Figure 5.11: SmartSDR CAT showing N1MMLogger connected

5.5 Configuring Audio

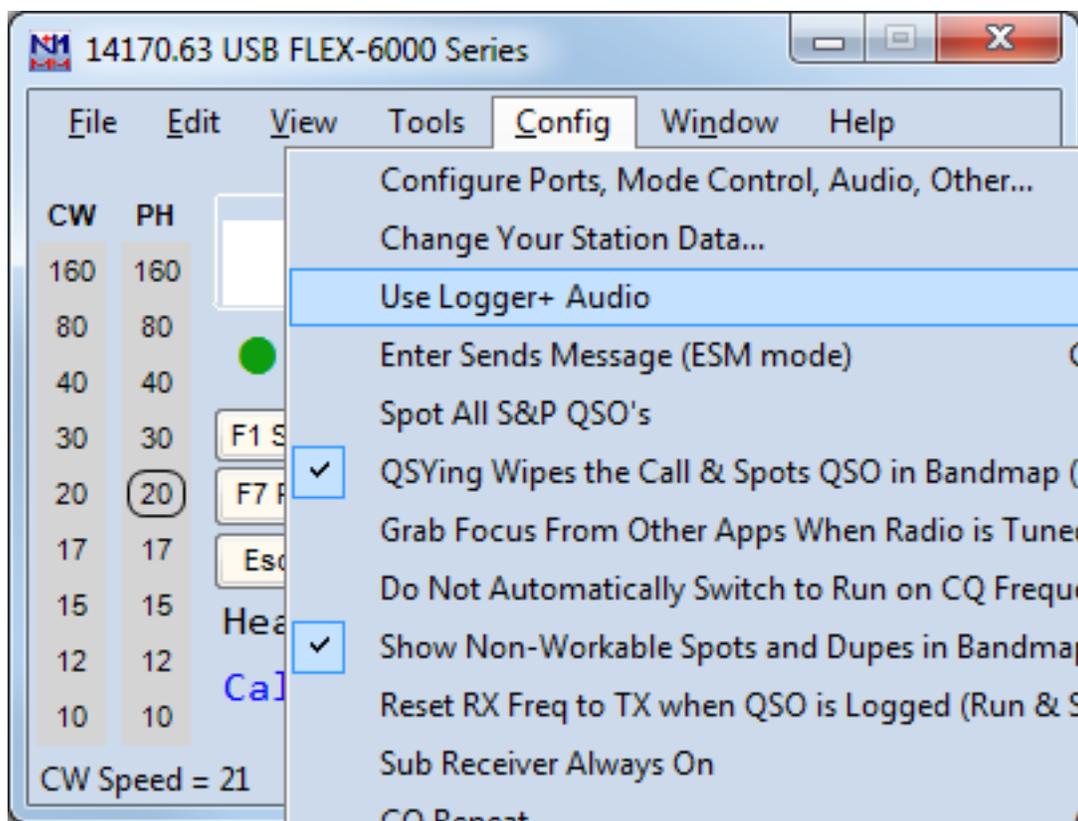


Figure 5.12: N1MM+ Config menu – Use Logger+ Audio

To configure the Audio portion of N1MM, click the **Config -> Use Logger+ Audio**. This will open a new window.

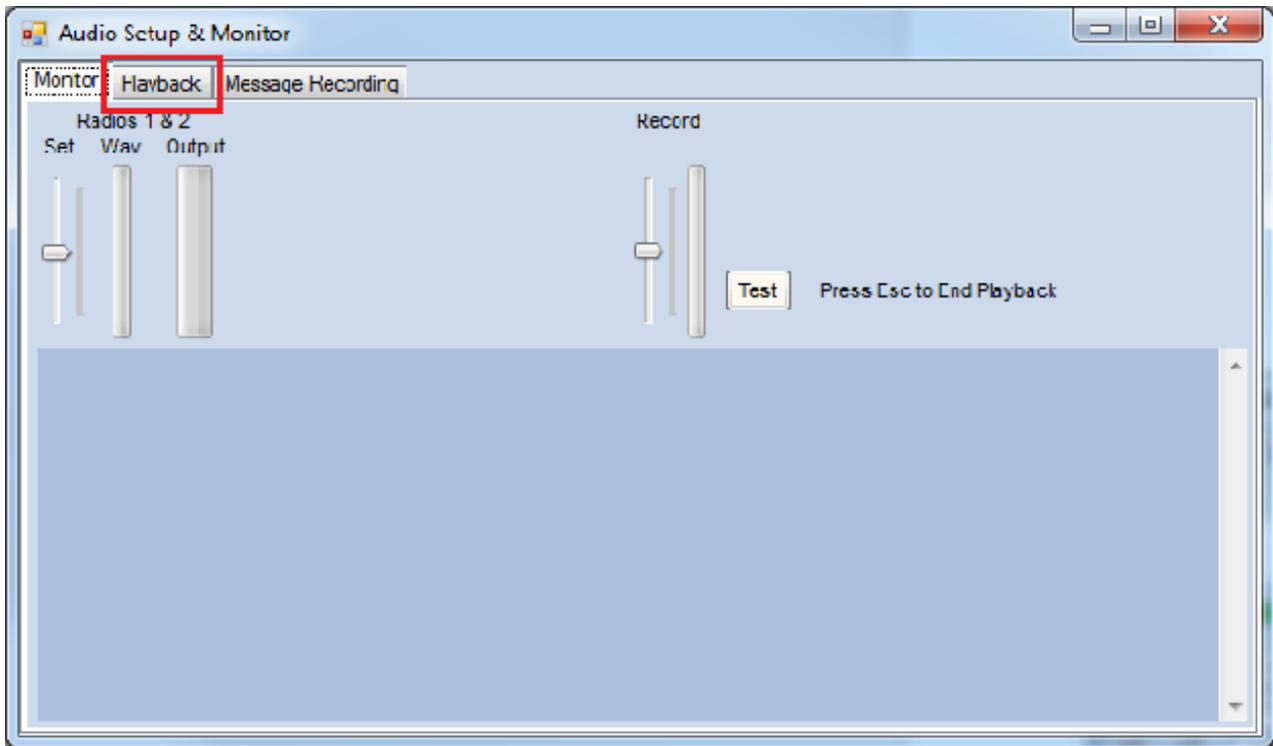


Figure 5.13: Audio configuration – Playback Tab

Click the **Playback** Tab.

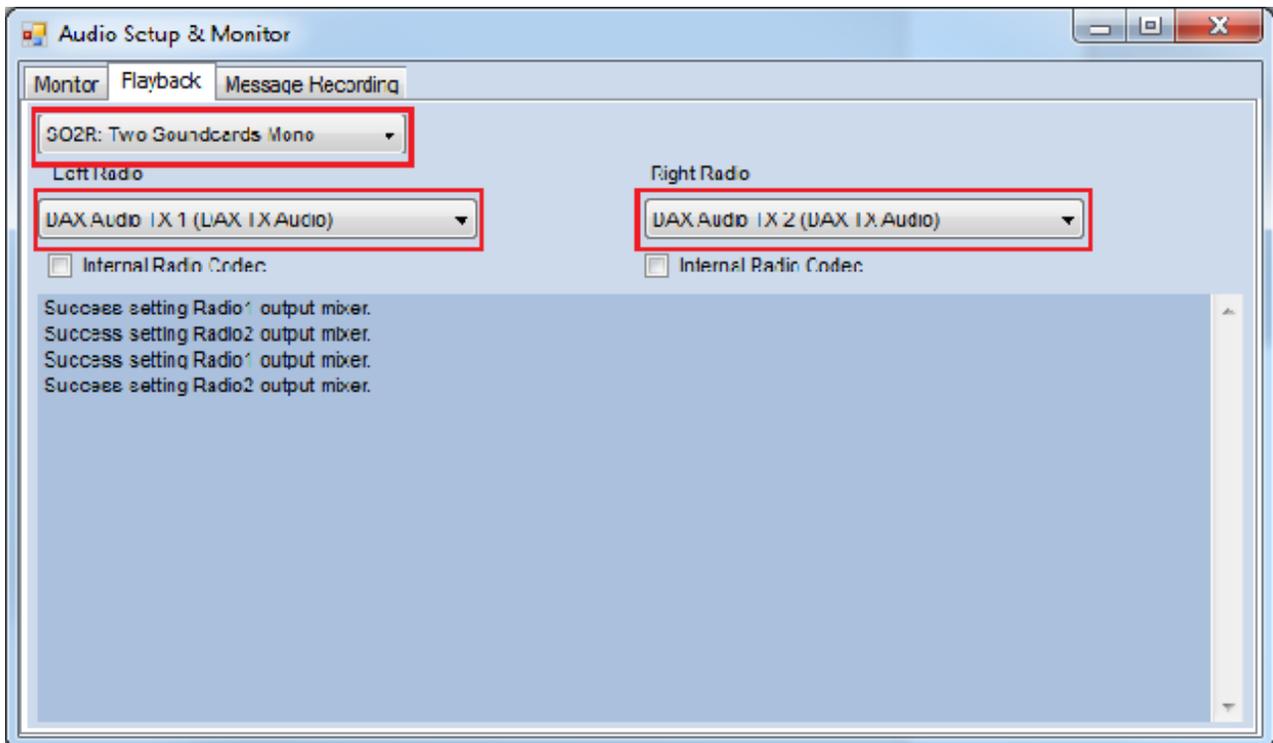


Figure 5.14: Audio Playback configuration

Configure the audio settings as follows:

- Set the mode to **“SO2R: Two Soundcards Mono”**
- Check **Internal Radio Codec** for both Radio 1 and Radio 2

! Important

Audio Configuration Correction

The correct N1MM+ Logger+ Audio setting for FlexRadio SO2R is **“SO2R: Two Soundcards Mono”** with **Internal Radio Codec** checked for both radios. Earlier versions of this guide specified **“SO2R: Single Soundcard Mono,”** which was incorrect – it only appeared to work because cached settings from a correct configuration persisted. With Internal Radio Codec selected, DAX is automatically enabled and disabled when N1MM+ voice macros fire for either slice.

5.6 Verifying SO2R Operation

Once this setup is complete, two N1MM windows should appear, each representing one radio (in this case, Slice A is Radio 1 and Slice C is Radio 2). The TitleBar of the Window should track the frequency of the Slice. Pressing the **Break** key (above Page Up) should toggle the Transmit Focus (Red dot) between the two Windows. This change should be reflected in SmartSDR as the Transmit Slice is toggled between Slice A and C.

i Note

SmartSDR v4.0.1 fixed an issue where VOX could briefly trigger transmit on the wrong slice when switching TX slices. Ensure you are running v4.0.1 or later for reliable SO2R operation.

Chapter 6

New Features for SO2R Operators

6.1 CW Auto Tune

CW Auto Tune (included in SmartSDR Basic) automatically centers the receiver on CW signals in the passband. This is particularly helpful when spinning the second radio's VFO during S&P.

6.2 Digital Voice Keyer (DVK)

The Digital Voice Keyer (requires SmartSDR+) stores 12 voice message slots directly on the radio, triggered by F1–F12. This eliminates external voice keyer hardware and wav file path management for SSB contests.

6.3 SmartLink Remote SO2R

SmartLink (v2.0+) enables secure remote SO2R over the internet without VPN. OTRSP switching, CW keying via virtual Winkeyer, and DAX audio all function remotely with typical latencies of 20–100ms. Limitations include no paddle support (except via Maestro's built-in hardware Winkeyer) and no local CW sidetone during remote operation.

Note

SmartLink requires SmartSDR+ for radios that were only licensed for SmartSDR v1. Radios licensed for v3 retain SmartLink under v4 Basic.

6.4 2BSIQ Limitations

Warning

Experienced contesters report that OTRSP audio switching on single-radio SO2R has **random delays** that make 2BSIQ (Two Band Simultaneous Interleaved QSOs) impractical. The first portion of a caller's CW is often clipped when switching slices. Standard SO2R works fine, but operators pursuing 2BSIQ may need two separate radios rather than one radio in SO2R mode.

Chapter 7

Alternative Software

While this guide focuses on N1MM+, two other programs offer FlexRadio SO2R support:

- **WriteLog** – uses the direct FlexRadio API, bypassing SmartSDR CAT and DAX entirely with its own native Flex Rig Driver.
- **DXLab Commander** – connects directly via the Flex API for comprehensive transceiver control.

Chapter 8

SO2R Setup Checklist

Use this checklist to verify your SO2R configuration:

- Use **Slice A and Slice C** (not A and B) to avoid SPLIT mode conflicts
- Configure **TCP ports** instead of FlexVSP where possible
- Select **“SO2R: Two Soundcards Mono”** with **Internal Radio Codec** checked for both radios in N1MM+ Logger+ Audio
- Disable **Windows 11 Memory Integrity** for DAX driver compatibility
- Disable **Auto-Switch** in CAT port definitions when using OTRSP
- Include `{OTRSPOTHER RX}{END}{STEREO00N}` in CQ and exchange macros
- Back up both CAT.settings and DAX settings using the SmartSDR Settings File Manager before any software update
- Verify running SmartSDR **v4.0.1 or later** for the VOX/TX slice switching fix