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Plus:

2024 Air Shows in Review

2025 T-Birds/Blue Angels Schedule

Tuning in to the Air Band

The U-2 Spy Plane: Still Spying

Review: SDRplay nRSP-ST



Front panel and rear panel of SDRplay nRSP-ST all-in-one, plug-and-play networked 1 kHz - 2 GHz Receiver \$450. (Photos courtesy: Ham Radio Outlet)

The SDRplay nRSP-ST: Remote-ability – Reliability – Performance

By Georg Wiessala

The nRSP-ST is the new Software-Defined Receiver (SDR) from SDR market leaders SDRplay in the UK. Its emergence in the fast-changing SDR market follows in the footsteps of the release of, first the RSP1B and second, the RSPdx R2, both of which have received excellent appraisals. As far as I know, the nRSP-ST is the first networked receiver that SDRplay has built. Following some tantalizing glimpses at the unit during the 2024 UK National Hamfest in Newark, the new receiver was officially launched in November 2024.

A few days earlier, Jon Hudson at SDRplay was kind enough to send me a review unit. In what follows, I would like to share my general findings and thoughts on this latest addition to the ever-growing SDRplay range. However, I admit that this can only scratch the surface here of what this receiver can do. More generally, I am writing this review from the point of view of a typical broadcast DX hobbyist who enjoys occasional forays into utility signals on HF and VHF, amateur radio and more specialized fields.

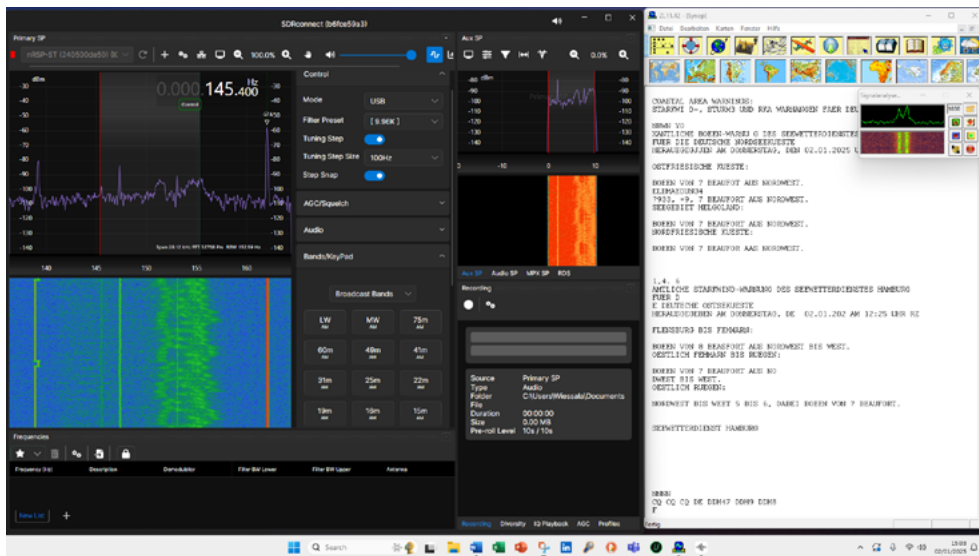
By the time you are reading this, some reviews will have been published online, and across several radio traders' websites and radio hobbyists' fora. Stay updated by visiting the SDRplay homepage, the associated SDRplay FB Groups

and general SDR blogs, to gauge initial reactions by others. But, as I keep saying, be careful in taking any online reviews at face value, unless you are dealing with a reputable blogger or source, such as the ICQ Amateur/ Ham Radio Podcast, the Oxford Short Wave Blog or Techminds.

Why Should You Buy?

As far as I can see, the issues on most potential users' minds at the time of writing this are threefold. First, many will ask why they should invest around £ 450 (\$450 at Ham Radio Outlet) in the nRSP-ST, when 'the same' networking and sharing functions can be achieved with simpler and cheaper equipment, such as a Raspberry Pi, a Web-888 or the Kiwi SDR. The question is: is it the same?

Second, some may ponder whether the electronic effort that has gone into the networking capabilities inside the nRSP-ST has a detrimental effect on its actual radio performance, especially on HF. And third, a few users may be concerned about electricity bills, cybersecurity and vulnerability to hacking, if they leave the unit on (-line) all the time – as, indeed, you have to, if you wish to exploit its full possibilities.



Weather data from the DWD (DDH47) on 147.3 (nominal) longwave (LW). (Courtesy: Georg Wiessala)

I hope to – if not fully resolve these issues in this review – then at least help you make up your mind as to whether or not you should buy or upgrade. To begin with, SDRplay has clearly anticipated some of these issues and has, consequently, issued a few ‘frequently-asked-questions-style’ press releases. It is really useful to read those, to be clear about the main advantages of the nRSP over other SDR/Web-based methods. Among the key advantages pushed by SDRplay are the following six:

- Latency: three reception modes, low level of latency versus high levels of responsiveness.
- OS-Robustness: the nRSP-ST works on different Operating Systems (OS).
- Reliability: high levels of ‘internal electronic watchdogs’; uninterrupted, unattended, operation
- Storage: the possibility to save IQ recordings on your NAS (Network-Attached Storage Device)
- Flexibility: the nRSP allows you to do more than just HF and digital amateur modes.
- Security: potential security risks of alternative ‘global network’ solutions.

My overall impression is that these assertions are generally borne out by the performance of the nRSP-ST during the test period. With this in mind, let’s now see how it all stacks up and examine the setup procedure, operation and overall performance of the nRSP-ST:

Setup and Installation

In the nRSP-ST, the ‘n’ stands for ‘networked’ and the ‘ST’ means ‘Single Tuner.’ This marks the unit out, for example, from the dual-tuner model (RSPduo). If you are a new owner– or have any other SDRplay receiver – SDRplay has some useful web pages for beginners (see below). These walk you through the installation procedure, the computer requirements, and so on. Remember to connect your new nRSP-ST to your router via an Ethernet cable initially – for best results when you download or update the firmware.

When your PC has ‘found’ the nRSP-ST and you have updated the firmware, you will then need to proceed with the setup, using the password for your nRSP-ST. Initially, this is the serial number, which you will find on the receiver and at the rear of the box in which it came. Change it to something more memorable. To

summarize, the key processes you will need to go through to get your nRSP-ST up and running are as follows – bearing in mind the specific piece(s) of software required:

1. Downloading the latest version of SDRconnect (V. 1.0.6 as of 30 December 2024)

2. Updating the firmware on the nRSP-ST (nRSP-ST Updater)

3. Setting up your nRSP-ST (nRSP Administrator)

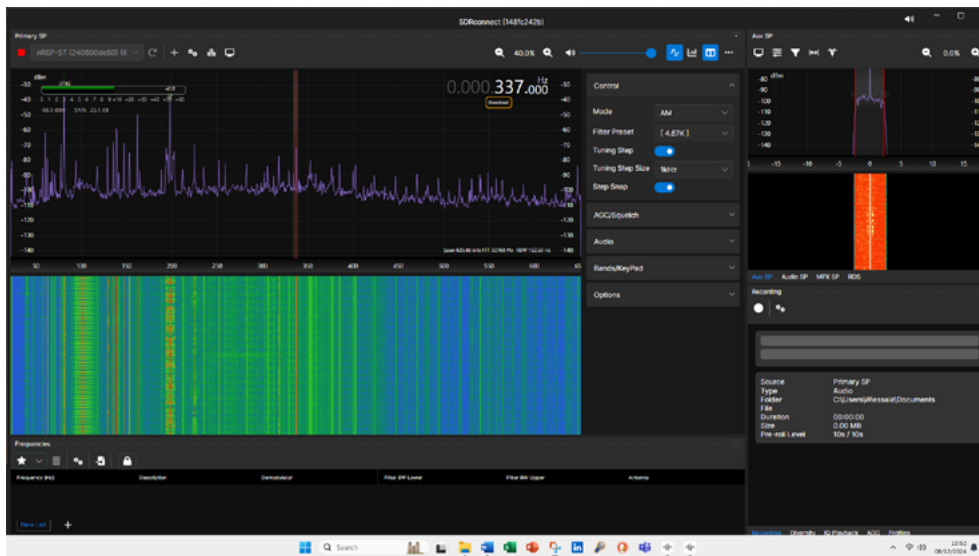
4. Setting up a new, secure, nRSP-ST password for your device (nRSP Administrator)

5. Linking your nRSP-ST to your router with your router password (nRSP Administrator)

There are a few possible pitfalls here, so do follow the on-screen instructions very carefully, especially regarding the connection of cables to the nRSP-ST, use of passwords and initial setup. Make sure you know the difference between your nRSP-ST-password, your (home) router password and the URL needed to operate the nRSP-ST remotely. There are some very useful videos being issued by both SDRplay and third parties (e.g. Techminds) which are likely to help you with the initial setup. Just follow the links shown on the nRSP-ST start page.

Key Notes on Remote Operation

The main reason people will want to buy this receiver is that it connects to a computer network, via either an Ethernet port or a Wi-Fi connection. In other words, using the web interface you can receive signals from your SDR anywhere in the world with internet services. Thus “remoted,” users can operate the device in a number of data connectivity modes with various data speeds and transmission qualities. There is an ‘IQ-Light’ mode – next to the ‘Full IQ’ and ‘Compact’ ones – which places far fewer demands on your system



A look through the Beacon Band, centered on Warton BAE on 337 kHz. (Courtesy: Georg Wiessala)

Therefore, you may adjust the system to your shack PC setup at home or access it remotely from anywhere that is convenient, on a laptop, tablet or even your smartphone. You might wish to, for example:

- Operate the nRSP-ST in a quiet location, away from domestic ‘interference fog.’
- Access someone else’s nRSP-ST, for comparative reception purposes.
- Share your nRSP-ST with members of your (amateur) radio club, class or another group.
- Share DX with others across the internet (via SDRconnect or a web browser).
- Access the nRSP from a phone or tablet computer.

On a web browser, you can access your nRSP-ST by entering ‘nRSP[serial number]:9001’. For instance, if your 10-figure serial number is 2305123450, then you would insert that and type: ‘nRSP2305123450:9001’.

While the new remote capability is, of course, one of the most exciting new features of the nRSP-ST – and obviously its unique selling point – it is, naturally, also important that this new SDR delivers excellent general and DX reception results we are used to from SDRplay, and that it truly excels in terms of frequency coverage, selectivity, sensitivity, frequency stability, and a number of the other principal HF technology parameters. Therefore, this is what I will be mainly focusing on in this review.

General Description and Installation

In the pre-launch and subsequent SDRplay press releases and general brochures, the nRSP-ST is described as an “all-in-one, plug-and-play, networked, SDR receiver.” This is largely correct, but you will need some basic understanding of technical PC issues; in my view, this is not a beginner’s radio. The unit still contains a 14-bit ADC (Analogue-to-Digital-Converter) receiver, covering 1 kHz (!) to 2 GHz, without gaps. It offers three antenna inputs and shows 10 MHz of spectrum at a time – not unlike the other SDRplay models.

Out of the box, the nRSP-ST is about twice the size of, say, an RSPdx, and approximately the same depth. It is surprisingly heavy, at 200 g short of 1 kg. It comes with an international 5.1 VDC 3 amp Pi4 PSU/ switching adapter in white, a ca. 9-cm long, stubby SMA-terminated Wi-Fi antenna, connected at the rear. There are two front LEDs, for power and status. SDRplay also includes a short

multilingual manual. This contains hints as to how you might want to use the nRSP-ST once you have connected it to your home network, via a LAN or wireless setup. No antenna patch cables, or Ethernet cables, are included.

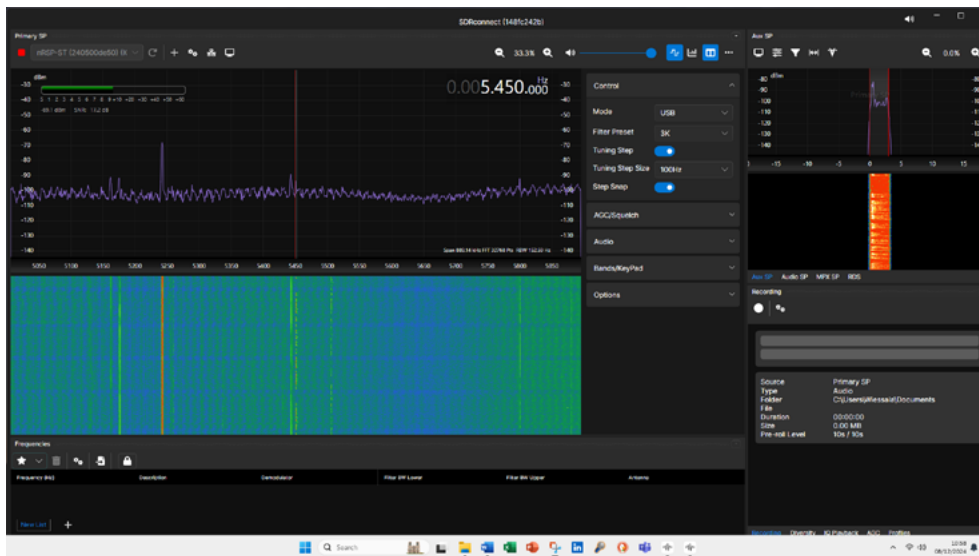
At the rear of the nRSP-ST, you will find quite a few connections. From left to right: a Wi-Fi SMA antenna input supports the 2.4 and 5.0 GHz Wi-Fi bands (802.11B/G/N/AC). The USB-C power input hosts the USB PSU and the Gigabit Ethernet socket for your home or mobile router, it is IEEE-1588-2008-compliant. Next to it sits the USB-B port which is currently not used for normal operation. The Flash USB input to the right of this is for device resets or diagnostic purposes – if you do this, be guided by SDRplay’s support team.

The REF-IN socket is for a 24 MHz (1V PK-PK MIN, 3.3V PK-PK MAX) external reference clock signal, for example from a Leo Bodnar reference clock, or a similar device. The nRSP-ST will automatically recognize it. The antenna ports A and B are for 50 Ω antennas and offer continuous coverage from 1 kHz to 2 GHz. The third (BNC) antenna input is for 1 kHz to 200 MHz. The last socket is for ground – just remember how important proper grounding is, even in the SDR era – maybe especially so.

The heart of the nRSP-ST is a 64-bit Quad Core SoC 1.5 GHz processor with 2 GB LPDDR4-3200 SDRAM capacity. Storage is of the 8 GB eMMC variety. Remember that this is a 14-bit-resolution SDR, in common with many, but not all, new SDRs, some of which now offer 16-bit. You can operate the nRSP-ST with SDRconnect, one of SDRplay’s proprietary software solutions. At the time of writing this review, the latest release was SDRconnect 1.0.1 / nRSP-ST firmware 1.0.3. (January 7, 2025). I was not able to operate the device with SDRUno or any other software package, but I feel certain this will change.

Selected Reception Results

On longwave (LW), the nRSP resolved daytime Polskie Radio on 225



A clear RAF VOLMET transmission: MVU on 5450 kHz. (Courtesy: Georg Wiessala)

kHz well on many occasions. Adding noise reduction made me think that this was a local MW station – which was remarkable. My AOR AR7030 did not hear anything from Poland, on this occasion. Daytime medium wave (MW) broadcast reception was generally good, and signals were separated cleanly. The 1368 kHz frequency for Manx Radio can be a bit tricky here, but the nRSP-ST brought the island in very well. I could see in SDRconnect that there were many other MW (and, later, SW) stations and carriers that the receiver resolved flawlessly.

As regards Non-Directional Beacons (NDB) reception, I am not a beacon-hunter, but I scanned the dedicated Beacon Band (kHz) a few times, using my local one (Warton 337 kHz) as a guide. Here, the judicious use of the SDRconnect noise reduction feature made a significant difference in “bringing home the beacon,” as it were. Concerning VOLMET broadcasts from the RAF and Shannon VOLMET, these were always clear and easily audible/ visible with the nRSP-ST.

Turning to shortwave (SW) broadcast stations, the nRSP delivered great DX results both night and day, with the sharpness of signal separation a particularly impressive result. This was evident, for instance for different, quasi-adjacent transmitter stations of China Radio International (CRI), or the “Spanish Armada,” the plethora of nighttime Iberian MW broadcasters receivable here in the UK. I homed in closely on the 16-meter band for a while and found several stations new to me, many more at night.

I also connected a VLF antenna (BAZ), a VHF/UHF discone (Moonraker) and a small satellite patch antenna (RTL-SDR Blog L Band Active Receiving Antenna 1525-1660 MHz) to explore some of these other signals, sometimes with third-party software, as in the case of satellites. I found that, with its very wide coverage, the nRSP-ST is very experimenter-friendly, and I can see it being used, for example, in schools, for purposes of overall ‘STEM’ education (Science, Technology, Engineering and Maths).

Remoted Functions

As mentioned above, you’d probably buy this receiver if you are planning to share your reception/ DXing successes with other enthusiasts, club colleagues, learners and friends. You can do this either from your home shack; or you may go a step further and place the nRSP-ST at an electrically quiet location and access it via your PC, laptop, tablet or smartphone. If you do not really know what this receiver is all about, some of the possible user scenarios are suggested very conveniently in the sensible SDRplay materials, especially in this concise leaflet:

nRSP-ST User Scenarios: <https://tinyurl.com/2skfyypn>

What’s more, SDRplay has placed video material on its Facebook (FB) page, to show users how to operate the nRSP-ST with a smartphone, using the network name format described in a previous paragraph (‘nRSP230504500A0:9001’). This will take you through to the inbuilt nRSP net server. I am not a tech expert, but I managed to use the nRSP-ST remotely, share results and access other radio enthusiasts’ receivers without the least problem. I am not sure how often I would use this myself, but it is excellent to know that, when I do want to again, everything is working flawlessly.

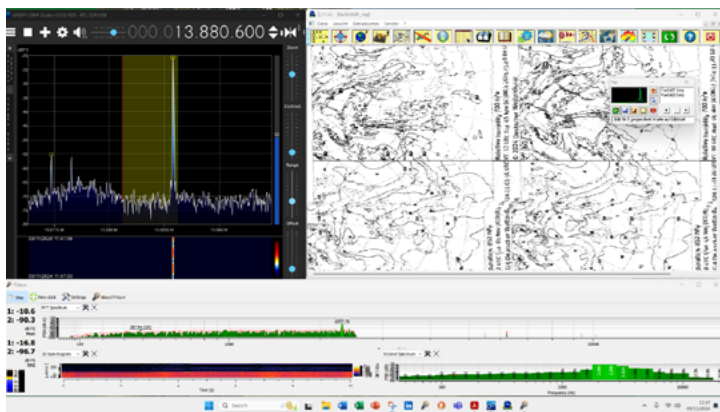
Accessing your nRSP-ST from a smartphone: <https://www.youtube.com/watch?v=424jdYWFoP0>

Summary and Conclusion

The new nRSP-ST is a game-changer, a milestone; whatever you may call it. It makes for a substantial addition to the functionality of your shack if, indeed, you wish to make use of the possibilities offered by its networking facilities and the inbuilt web server. In the context of the radio hobby more broadly conceived, this is indeed groundbreaking and a big leap forward.

Outside of this, in general, the radio part of the unit is sensitive and offers clean signal separation, stability of long-term reception and pleasing DXing. It positively invites investigation and will widen your hobby horizons considerably. I feel that the more you engage and put into this receiver, the more you’ll get out of it, like everywhere else in this life. It seems to me that the nRSP-ST is quite a “future-proof” solution, and there will be many updates and third-party developments; that’s the point of a networked radio, is it not?

When you are not using its remarkable networking capabilities, this is still a first-rate professional-level SDR in the medium-range price bracket. If you already have another RSP model,



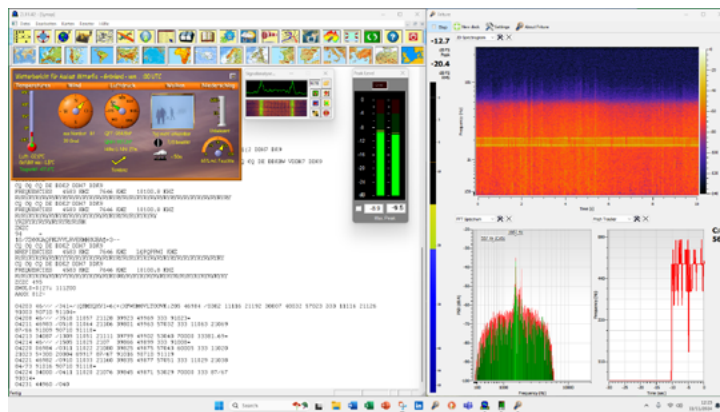
A WEFAX (weather facsimile) transmission from the German Weather Service (DWD) on one of its daytime frequencies. (Courtesy: Georg Wiessala)

you should upgrade, if the significant improvement in signal quality from, say, a remote location is important to you, if you wish to explore more signal areas or if you just enjoy accessing other nRSPs remotely and sharing your radio catches.

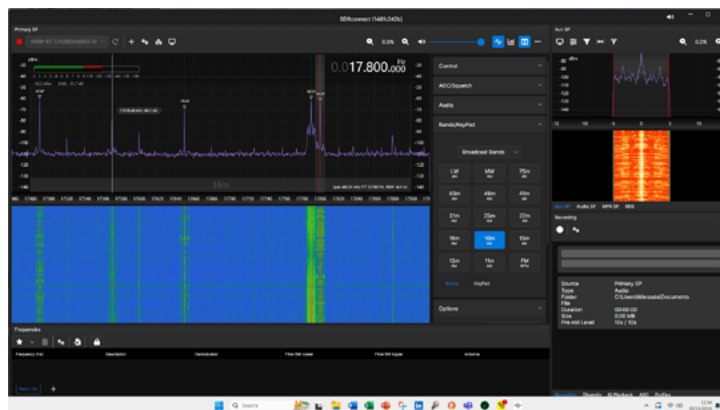
This professional aspect of the nRSP-ST truly takes the hassle out of radio listening, networking and global DXing – if DXing is still what we are doing here. Maybe we should speak of “DXing 2.0” now or “online DXing.” Regardless of how you view the changes to our hobby, the new SDRplay nRSP-ST certainly gives you a good taste of the increasingly world-spanning nature of the hobby. Against this backdrop, the nRSP-ST is a great alternative to WebSDRs or the KiwiSDR Network. In my opinion, you are just much more in control of things with the nRSP-ST, and there is more to monitor, receive, and be in control of.

During my test, the receiver’s “reception” and “networking” parts did in no way influence one another; in other words, you won’t suffer a loss in reception because of the additional electronics required for the built-in server and networking functions. In my view, this receiver beats any homebrew, web-based or Raspberry Pi related construction solution hands-down – in terms of the signal range it covers, its ease of use, shielding and construction, openness to experimentation and radio education, and the expected future developments. You will need a rudimentary understanding of PCs, the internet, routers and networks, but will not need a PhD in Computer Science to operate this radio. Highly recommended.

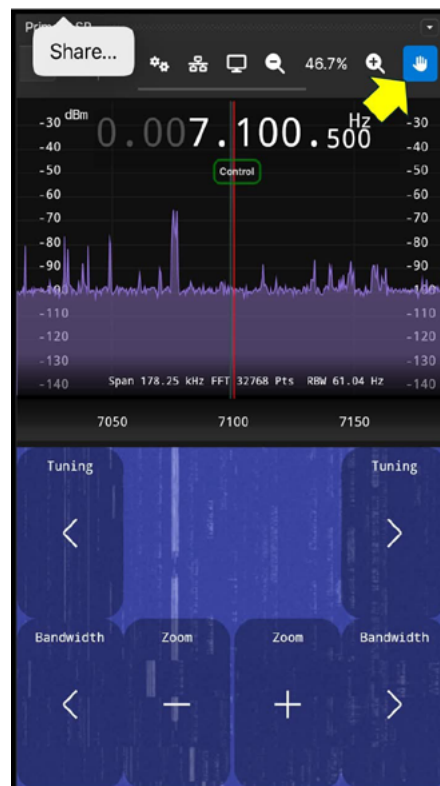
My warm thanks go to Jon Hudson, the amazing Marketing Director at SDRplay for the loan of the review unit, and for answering my follow-up questions. The nRSP-ST currently retails at £459 (\$450 at Ham Radio Outlet).



This RTTY (radio facsimile) signal from the DWD came in strongly and could be decoded. (Courtesy: Georg Wiessala)



A program from a US Religious Broadcaster evidenced this receiver’s clean and sharp signal separation. (Courtesy: Georg Wiessala)



You can access your nRSP-ST from your PC, laptop, tablet, or, as shown here, smartphone. The latter is very intuitive. (Courtesy: SDRplay)