FT8 · FT4 · JT65 · JT9

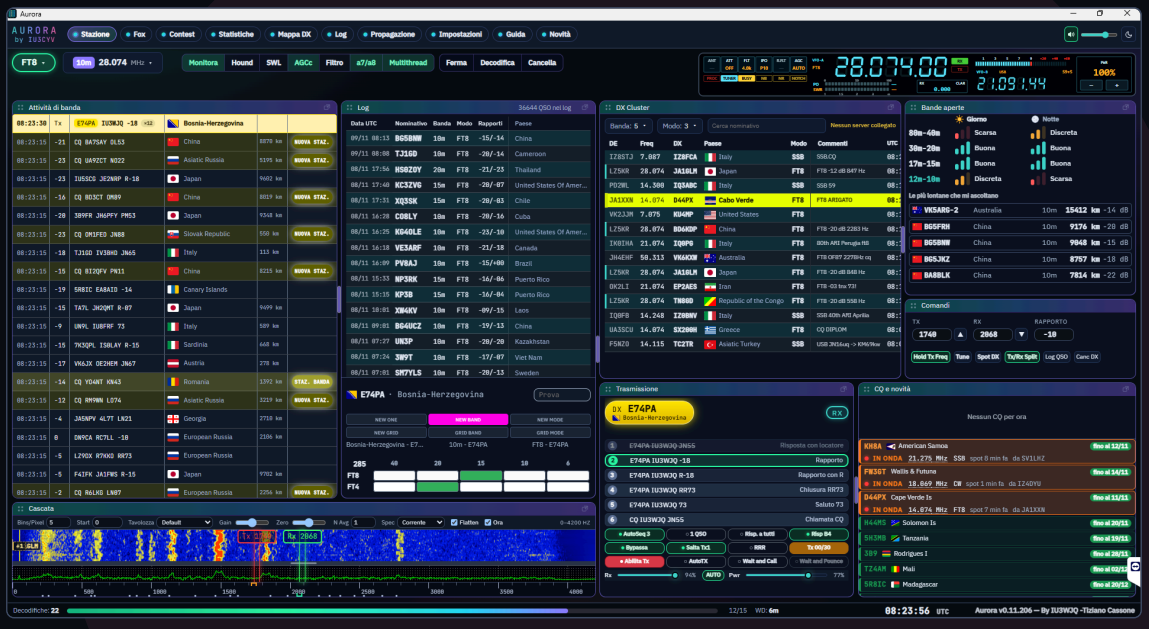
AURORA

User guide

FT8 · FT4 · JT65 · JT9 digital station

Version 0.11.232

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github.com/wifi75/Aurora · aurora.iu3wjq.com · GPL-3.0

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Introduction

Aurora decodes, transmits and runs your QSOs with its own FT8, FT4, JT65, JT9, JT4, Q65 and MSK144 engine. A live waterfall, an automatic DXCC card, Fox and UltraFOX for DXpeditions, windows you can move to a second monitor, phone remote control and CAT for 300+ radios.

For people who want a modern, readable and automatable digital-mode station.

Who it is for

- **Everyday FT8/FT4 operators** — A clear message list, colours by type, instant calling by double-click and a layout that never jumps.
- **DXers and award chasers** — DXCC card, wanted list, new-country alerts and the DX map to see who is on and who hears you.
- **DXpedition teams** — The Fox page to run a pile-up with a Hound queue, and experimental UltraFOX.
- **Remote and multi-room operators** — Phone pairing to watch or operate the station from another room of your home network.
- **Multi-monitor shacks** — Spread panels, map and radio display over several screens.
- **Windows and Linux users** — The same code on both: installer for Windows, AppImage and .deb for Linux (not tested by the author, no support).

Typical scenarios

- **Daily operating** — Open Aurora, press Monitor, double-click a CQ. The sequence runs while you watch the band.
- **Chasing a rare one** — Add the call to the wanted list: Aurora flags it and can answer its CQ automatically within the limits you set.
- **Being the Fox** — Enable Fox, let the queue fill and keep an eye on the on-air list and QSO progress.

Concrete benefits

- **Nothing else to install** — The engine, cty.dat and Hamlib are inside the installer; Aurora does not read from JTDX or WSJT-X.
- **Safe by default** — Transmission automations start off, with caps, dead-man switch and an always-visible STOP TX.
- **Easy to learn** — A first-start guide, a «?» on every setting and built-in help in six languages.
- **Yours to keep** — Free, GPL-3.0, no account needed.

Requirements

- Windows 10/11 64-bit, or a recent 64-bit Linux, or macOS
- The radio's sound card as audio input (and output to transmit)
- CAT control via Hamlib or OmniRig

- A network connection only for online services, updates and phone access

> Linux is built from the same code but has not been tested by the author and has no support.

Aurora is free software under the GNU General Public License v3.

Installation

Windows installer

64-bit installer with tray application, start with Windows and signed updates.

1. Download the installer and, if you wish, check its SHA256 against SHA256SUMS.txt in the release.
2. Run it: Aurora installs as a tray application and can start with Windows.
3. Follow the first-start guide: callsign, locator, audio, radio.
4. Updates are downloaded and verified with a signature.

Getting started

From the installer to the first decoded message.

1. Download Aurora-Setup.exe from the Download page and run it. cty.dat and Hamlib are included.
2. At first start the guide asks for your callsign and locator; it appears until the callsign is filled in.
3. Choose the audio input of your radio's sound card in the settings.
4. In Settings › Radio, pick Hamlib or OmniRig and your radio model (see Radio and CAT).
5. Press Monitor: decoded messages appear and the waterfall starts.
6. Use Settings › Support › «Check everything» to test station, radio, audio, clock and phone.

> Settings can be backed up and restored from Settings › Support.

Linux

Aurora for Linux is built from the same code. The author has not tested it and offers no support.

1. Download the AppImage (x86_64) or the .deb (Debian, Ubuntu) from the Download page.
2. Make the AppImage executable and run it, or install the .deb with your package manager.
3. Alternatively build it with scripts/compila-linux.sh from the repository.

> Linux builds are attached to every release by GitHub Actions.

Verify the download

In PowerShell run the command below and compare the result with SHA256SUMS.txt.

```
Get-FileHash .\Aurora-Setup.exe -Algorithm SHA256
```

Configuration

Block-based page

The windows have fixed sizes: only the order and the width of neighbouring ones change.

1. To swap two neighbouring windows of the same height, drag the title bar left or right: the other one moves over.
2. Between two neighbouring windows there is a divider: drag it to narrow one window and widen the other.
3. Open bands shows day and night propagation by band group (the one you are on is highlighted) and the three farthest stations that heard you. It needs the online services (propagation and PSK Reporter), which you turn on in Settings.
4. The QSO controls (Tx, Rx, Report, Hold Tx Freq, Tx/Rx Split, Log QSO and Canc DX) are in a Controls window.

> On a wide screen only the Station page fits entirely in the window; the other pages scroll all the way down.

Radio and CAT

Aurora controls the radio through Hamlib (rigctld, the default) or OmniRig.

1. Open Settings › Radio.
2. Choose Hamlib or OmniRig and the radio model; named profiles let you keep several radios.
3. Select the CAT port and, if needed, the PTT line (for example RTS on a COM port).
4. Check the real-time status: frequency, mode and meters appear in the radio display.
5. If OmniRig does not answer, the message explains why.

> Display, meters and the extended display depend on what Hamlib reports for your model.

Phone remote

The interface is a PWA served by the Windows or Linux program.

1. Make sure PC and phone are on the same network; the check page explains «Public» network and firewall.
2. Open Settings › Smartphone/Tablet and show the pairing code and QR.
3. Scan the QR or type the 8-digit code on the phone. The code is single-use, expires after the time you set (default 10 minutes) and locks after five wrong attempts.
4. Operate the Station page in tabs with finger-sized buttons.
5. Revoke any device from the list at any time.

> Code-free access (Settings › Smartphone/Tablet) exists for tests only and applies to your home network.

Logs and integrations

Aurora sends QSOs to online logs and talks to other programs.

1. Open Settings › Connected programs to import an ADIF or read an external log.

2. Enable direct upload to Wavelog/Cloudlog, ClubLog, QRZ.com or LoTW (through TQSL).
3. Use UDP integrations (multicast, per-program options, N1MM XML) for other software.
4. Export your log as ADIF from the Export page.

> Online services such as PSK Reporter and hamqsl.com are on by default and can be switched off.

Features

Dual screen and multi-monitor

Aurora's windows are not locked to one screen. Detach what you need and move it wherever it is most useful.

- **Detach a panel** — Any panel, or several in a row or column, opens in its own borderless window that you drag by its grip.
- **Radio display on its own** — The radio display can live alone on another screen, with a grip for moving it and a button to send it back.
- **DX map on the second monitor** — The DX map can be detached and left open on another screen while you work on the main one.
- **Put everything back** — One ↓ button brings every detached window back into the main window.

> Available in the desktop program (Windows and Linux). The block dashboard stays a normal window.

Fox for DXpeditions

A full Fox page, compatible with WSJT-X 3.3, to run a pile-up from a single screen.

- **Fox mode** — Queue of Hounds, up to five stations in the same transmission, the combined «RR73; ...» message, CQ in the free slots and QSOs logged by themselves.
- **One-screen control** — Status, on-air list, QSO in progress with its steps, caller table with coloured SNR, received messages and a resizable waterfall.
- **Hound too** — Automatic Hound with a FOX label on DXpedition messages, frequency hops and a filter; DXpeditions highlighted in the DX cluster.
- **UltraFOX** — All stations of the period in a single wide signal (750–2260 Hz, about 13 s), compatible with WSJT-X 3.3 SuperFox. Aurora also decodes SuperFox/UltraFOX Foxes in Hound mode.
- **Fox verification** — OTP verification of the Fox, as introduced in WSJT-X 3.

> UltraFOX is in testing and the digital signature is not handled yet.

More features

- **Own engine** — FT8, FT4, JT65 and JT9 receive and transmit, with a7/a8 decoding and multithreaded FT8. Parity with JTDX is checked against the original. Plus JT4, Q65-30A and MSK144.
- **WebGPU waterfall** — WebGPU with WebGL2 fallback, Rx/Tx bars, cluster spots on the spectrum and a width that follows your radio's filter.

- **DX map** — GridTracker-style map: NASA backgrounds only (Blue Marble by day, City Lights by night), automatic night map, greyline with twilight, Sun and Moon, on-air stations, animated arcs and PSK Reporter propagation.
- **QSO automation** — AutoSeq, caller queue, «reply to all», Wait and Pounce, wanted list. Automations start switched off and in dry-run, with caps, dead-man and STOP.
- **DXCC card & statistics** — New country, zone, grid or band shown on every message; awards progress, QSOs per band and missing countries.
- **CAT & radio display** — Hamlib (300+ models) or OmniRig, named profiles, Yaesu and Icom style displays with extended meters, SWR, TUNE and power.
- **Phone remote** — A PWA on the same network with finger-sized buttons; pairing by 8-digit code or QR, revocable per device.
- **Log & integrations** — Direct upload to Wavelog/Cloudlog, ClubLog, QRZ.com and LoTW; UDP integrations, N1MM XML, ADIF export and Log4OM2 read-only.
- **Alerts & diagnostics** — Sound and visual alerts, automatic diagnostics, a «Check everything» page, settings backup and signed updates.
- **DXpedition calendar** — NG3K calendar next to the CQs: on the air, heard now, upcoming and history.
- **Open source** — GPL-3.0, with its own engine written in Rust. Read it, fix it, improve it.
- **Six languages** — Italian, English, German, French, Spanish and Portuguese, with a tooltip on every control.
- **Block-based page** — Fixed-size windows that swap places when you drag the title bar; a divider narrows one window and widens its neighbour.
- **Open bands** — Day and night propagation by band group, with the one you are on highlighted, and the three farthest stations that heard you (PSK Reporter).
- **Cleaner decodes** — A priori analysis (AP) in FT4 too, a list of known callsigns and a locator check discard weak false decodes.
- **Recovers by itself** — If the radio is switched off and on again, receive and transmit restart without restarting Aurora; a freeze report says what was going on.
- **Agent next to the clock** — It stays next to the clock even when Aurora is closed: one click opens Aurora, and a sound announces new versions and the author's messages; optionally also propagation and DXpeditions.
- **DXpeditions on air** — DXpeditions just spotted rise to the top with a flashing orange row; the ones you heard show frequency, mode and signal, and a double-click calls them.
- **Instant log** — The QSO you just made shows up at once in the Log panel, with a flash, a sound and an aurora effect on the row («A LOG»). As in WSJT-X, RRR does not log: the QSO is logged at the other station’s 73 or at the last closing attempt; with RR73 it is logged at once.
- **Works without CAT too** — In Settings > Radio choose “None”: Aurora still decodes and transmits, and the band buttons set Aurora’s own frequency, remembered at restart. You tune the radio by hand.
- **Log by hand** — “Add QSO” writes a contact by hand (callsign, UTC date and time, band, mode, reports, locator) and logs it like any other; you can also delete the selected ones or clear the log, with a confirmation.
- **Bigger text** — The text size of the whole interface can be set from 90% to 160% in Settings > General, or with Ctrl +, Ctrl - and Ctrl 0; it applies to each device separately.
- **New DXCC alert** — A new DXCC entity, or a new one on the band, opens a flashing card at the top right with flag, callsign, country and the time of the last reception, with its own sound. Set it up in Settings, Notifications.

- **New modes: JT4, Q65 and MSK144** — Q65-30A for 6 m and 2 m, with the EME frequencies in the drop-down; MSK144 for meteor scatter, with short messages and real-time decoding; JT4 with sub-modes A to G, chosen next to the mode selector.
- **From 2200 m to 24 GHz** — Every band with the WSJT-X frequencies in a single band and frequency selector (right-click: Band Hopping). At start-up the radio goes to the main frequency of the band for the mode in use.
- **Update downloaded in advance** — Aurora downloads the new version in the background and checks its signature; a small bar in the header and the tray card show percentage and time, then just “Install and restart”. Now on macOS too. If GitHub is down it retries on its own.
- **CQ with country and time** — Every CQ box shows the country and the time of the last reception, and new DXCC entities flash. “R” followed by the locator counts as a confirmation, as in JTDX.
- **A clearer station** — The receive switches sit in a segmented bar (on = green); mode, frequency and switches on one row. Handles resize neighbouring windows together; the window opened from the tray comes on top of all others.
- **TCI for SDRs** — Network control and audio for SunSDR/ExpertSDR and ANAN with Thetis, as in WSJT-X: RX1 or RX2 receiver, commands confirmed by the server, audio at 48, 24, 12 or 8 kHz, power and TUNE from the display, “Power on” and “Power off” the SDR.
- **QMAP and full Q65** — Decodes up to 90 kHz at once from an SDR (I/Q over TCI or a WAV file) and “QSO” tunes the radio to the signal. Q65 with periods from 15 to 300 s and sub-modes A to E.
- **Full Fox for DXpeditions** — OTP check like WSJT-X, Hound sorting, QSO rate and caller filters, Fox log saved as ADIF and Cabrillo.
- **More sensitive, faster Q65** — Decoding follows WSJT-X: on test signals up to 1 dB better without Doppler, and 0.04–0.9 s per period instead of several seconds.
- **Yaesu FT-991/FT-991A with FT-991(A) Link** — New control system over UDP for Yaesu FT-991 and FT-991A radios connected to the FT-991(A) Link program: frequency, mode, PTT and S-meter, “Power on” and “Power off”, with automatic reconnection. VFO A only, simulated split.
- **DX Cluster spots on the waterfall** — Small, compact labels at the top of the waterfall, on at most three rows without overlapping; one click tunes reception to that frequency.
- **Contest page (beta)** — 17 rule sets ready (WW Digi, ARRL Digi, Field Day, VHF…), exchange sequence like WSJT-X’s “Special operating activity”, decodes sorted by value, dupes, points and multipliers, a separate log with Cabrillo, EDI and ADIF export.
- **More complete automations** — Dry-run / Live switch with a warning, “Enable Tx” handled for you, new country and new mode rules, hourly QSO limit, time window, excluded countries and continents, self CQ after a quiet spell. Everything is off by default; STOP and dead-man stay.

Operating procedures

Fox and Hound

Aurora can act as Fox (WSJT-X 3.3 compatible) or as Hound.

1. Open the Fox page from the top menu.
2. Switch Fox on and enable Tx; the status shows off, Tx off, ready or on air.
3. Hounds that call you fill the queue; up to five are answered in the same transmission.
4. QSOs are logged automatically; follow them in the on-air list and QSO progress.

5. Tick UltraFOX to send all stations in one wide signal (experimental).
6. As a Hound, double-click the Fox message; Aurora labels Foxes with FOX and can hop frequency.

> UltraFOX is in testing; the digital signature is not handled yet.

Typical scenarios

- **Daily operating** — Open Aurora, press Monitor, double-click a CQ. The sequence runs while you watch the band.
- **Chasing a rare one** — Add the call to the wanted list: Aurora flags it and can answer its CQ automatically within the limits you set.
- **Being the Fox** — Enable Fox, let the queue fill and keep an eye on the on-air list and QSO progress.

Screenshots

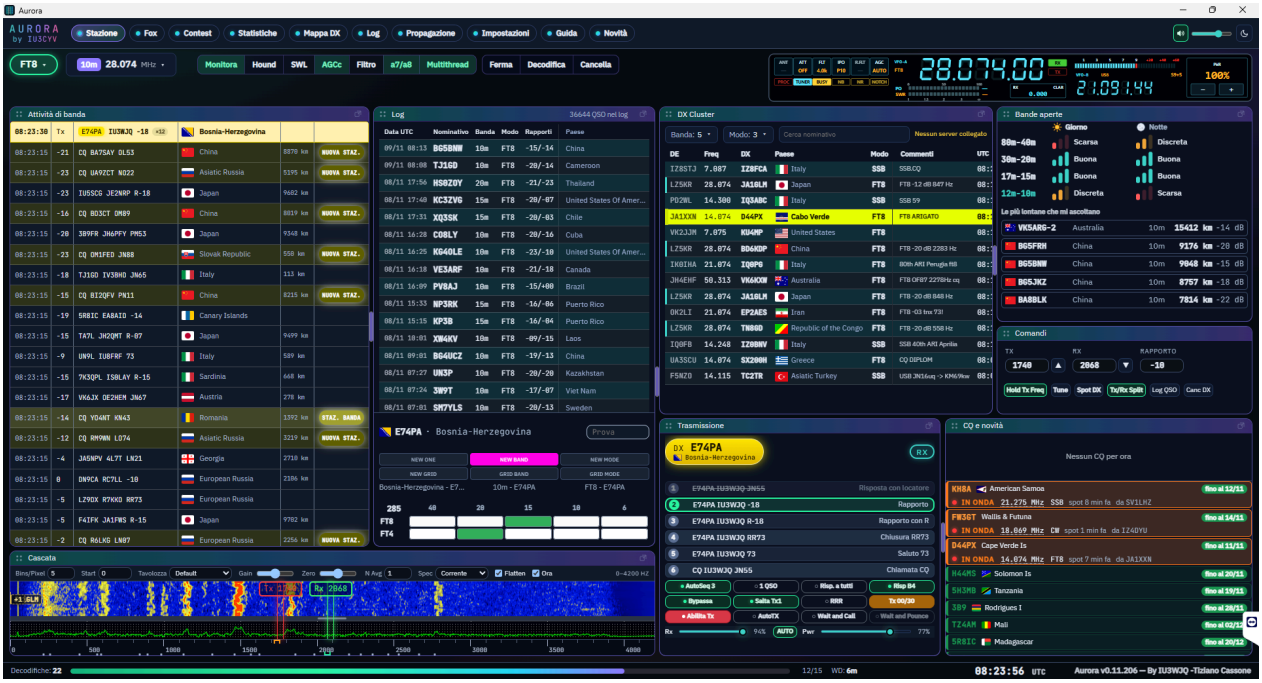


Figure 1: Station page, dark theme: message list with flags and distances, log, DX cluster, DXpeditions, transmit panel and waterfall with Rx/Tx bars.



Figure 2: Dual screen: the Station page on the main monitor and the DX Map on a second one (composite of two real screenshots).

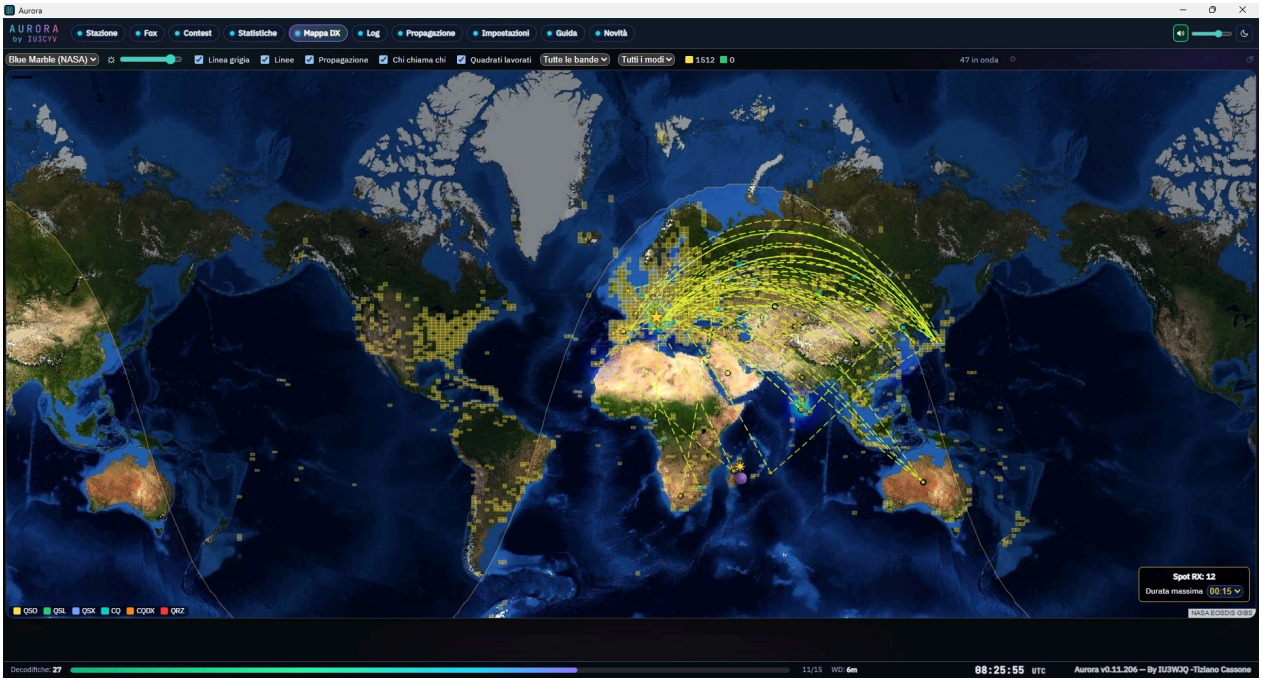


Figure 3: DX Map, dark theme: greyline and twilight over the National Geographic base map, layer switches and the legend of on-air squares.

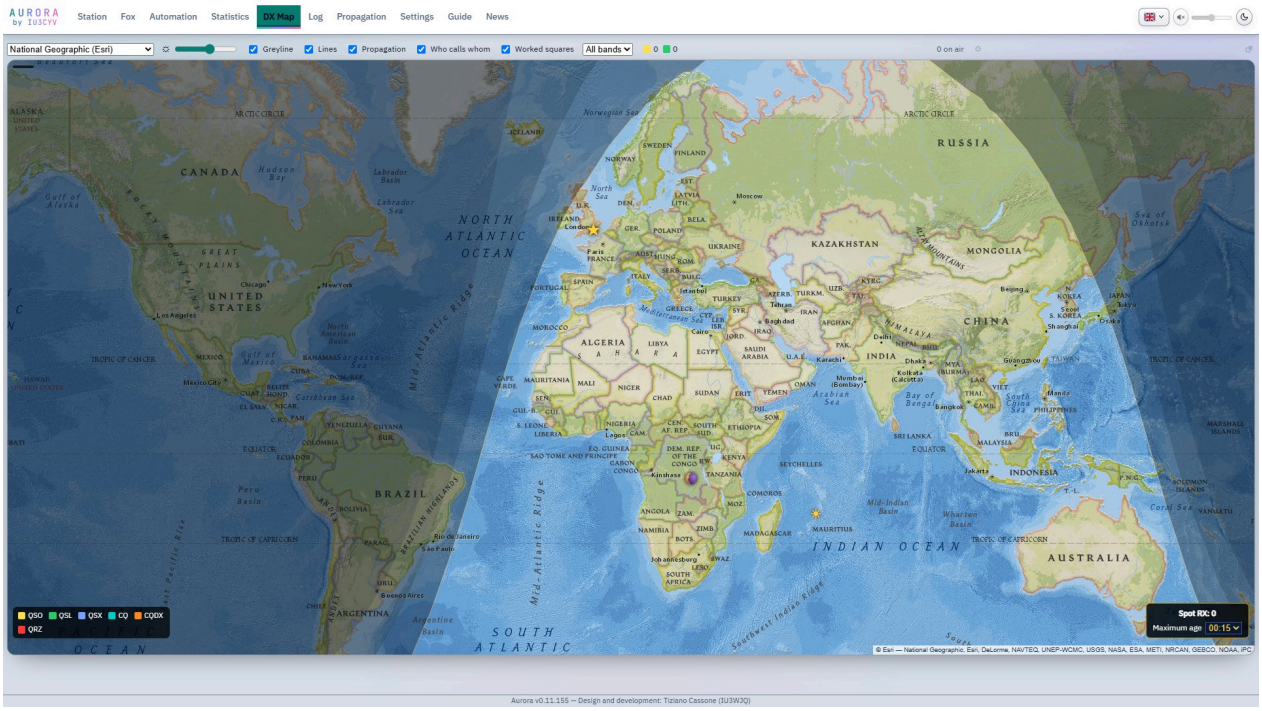


Figure 4: DX Map, light theme.

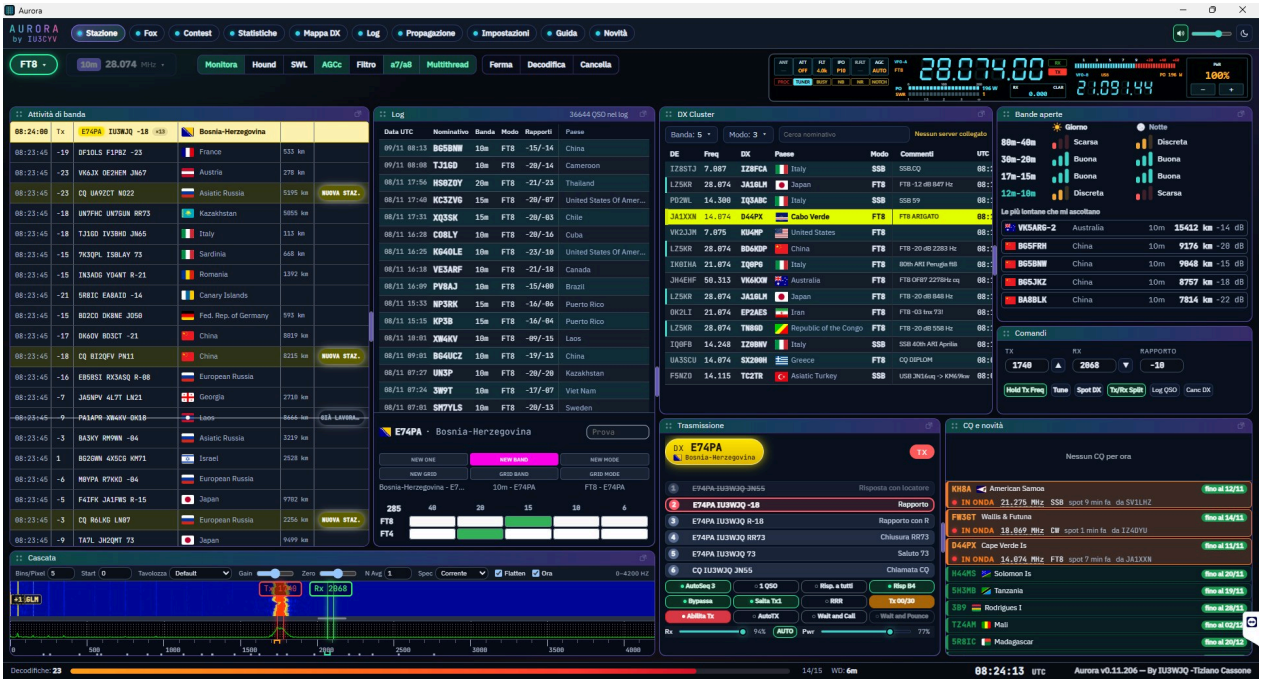


Figure 5: Station page while transmitting: the guided QSO step by step, the red TX indicator and the Tx and Rx markers on the waterfall.



Figure 6: Settings, Radio tab: the frequency display styles, from the Yaesu fluorescent and the analogue needle to the Kenwood amber LCD and the full Yaesu and Icom panels.

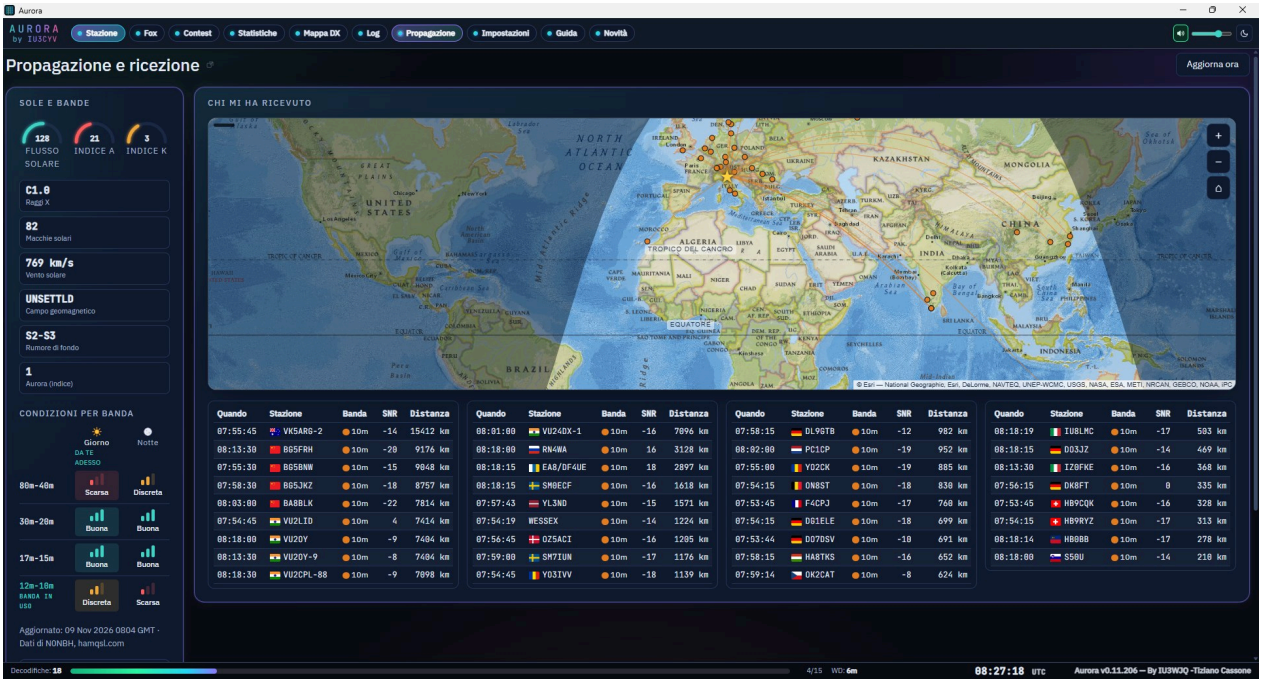


Figure 7: Propagation page: solar flux and indices, conditions per band by day and night, a map of who has heard you and the list of received signals.

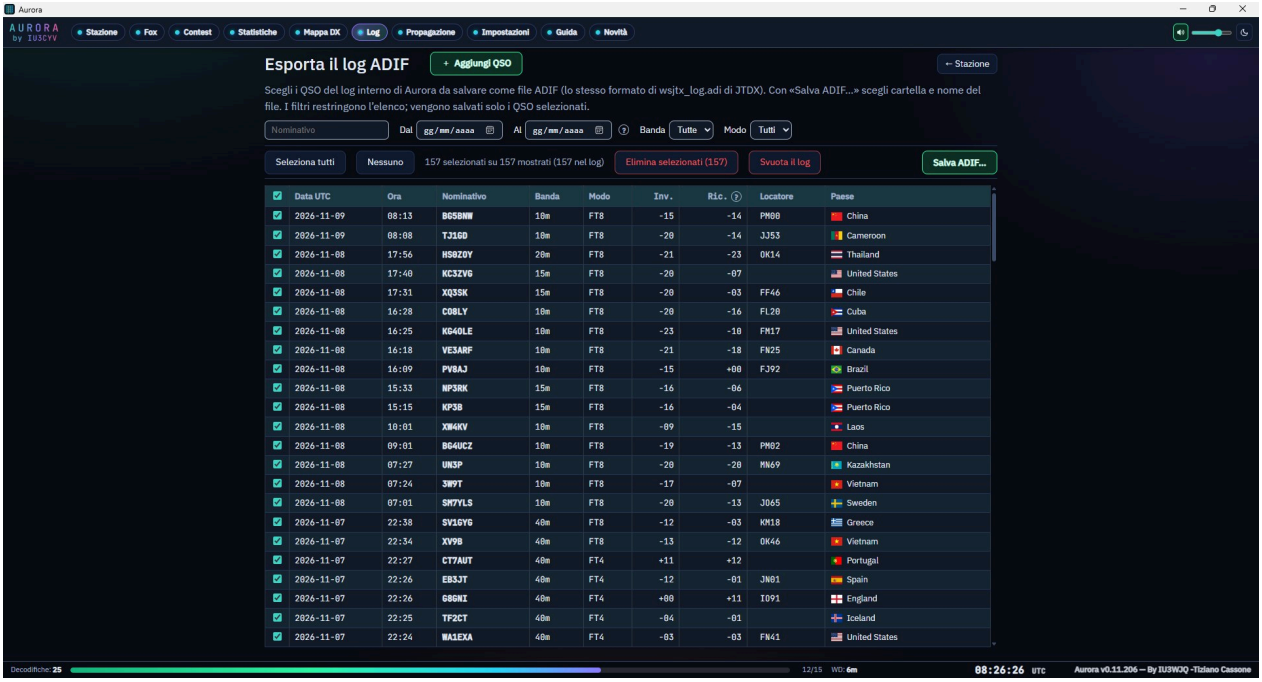


Figure 8: Log page: the QSO list with filters for callsign, date, band and mode, and saving to an ADIF file.

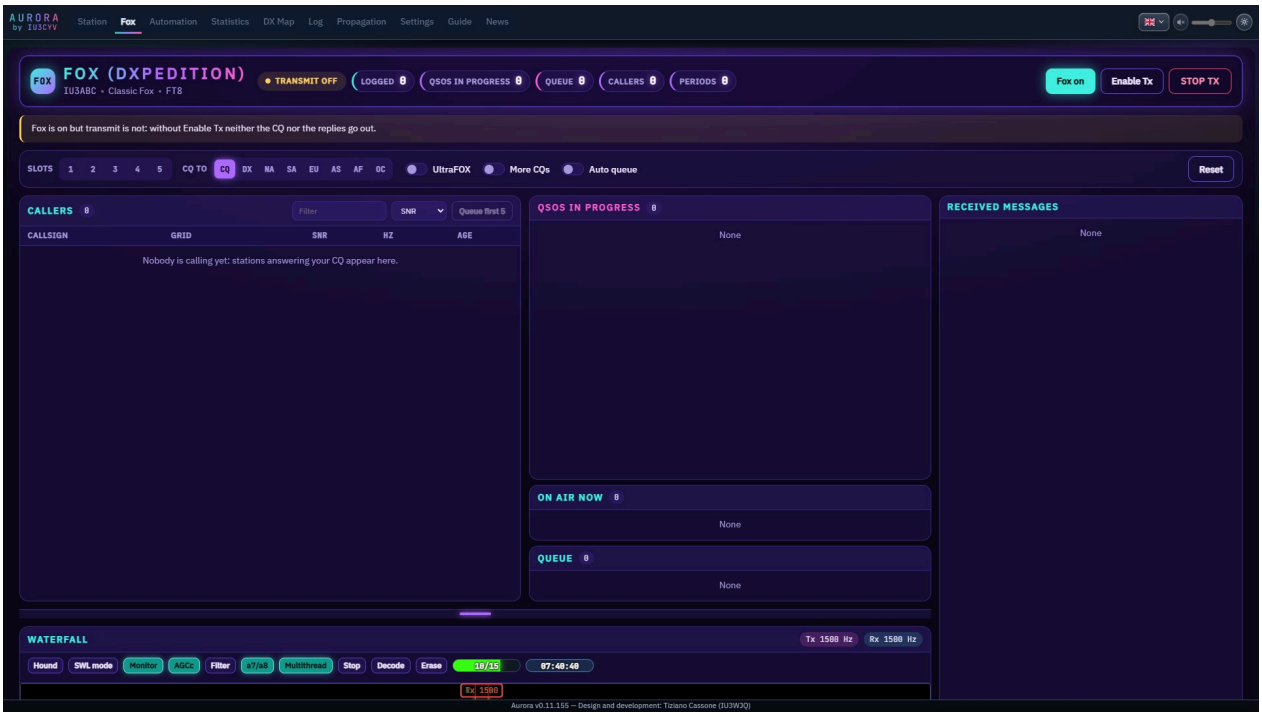


Figure 9: The Fox (DXpedition) page with its own neon look: status, options, callers, QSOs in progress, on-air list, queue and received messages.

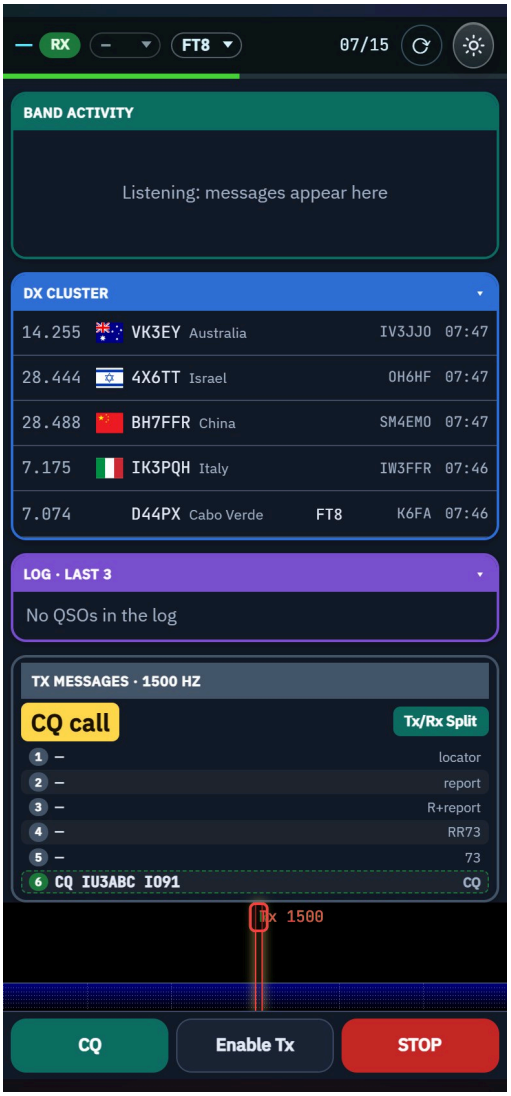


Figure 10: Phone view: band activity, DX cluster, log, transmit messages and the CQ, Enable Tx and STOP buttons.

> Screenshots taken while using the program: the callsigns in the messages are the ones received at that moment. Without a radio connected some lists may be empty.

FAQ and troubleshooting

- No waterfall: check that the audio input is the radio's sound card and that Monitor is on.
- Decodes are late or missing: check the PC clock; Aurora has an NTP client and a one-click correction.
- «Radio not connected»: check CAT port, model and, for OmniRig, that OmniRig is running.
- The phone cannot connect: the PC network must not be «Public» and the firewall must allow Aurora.
- Transmission does not start: AutoTX and Enable Tx must be on; STOP TX or Esc turn them off.

> Still stuck? Open an issue on GitHub.

About this guide

This guide is generated automatically from the Aurora documentation and release data (version 0.11.232, November 10, 2026).

The help built into the program is always the most up-to-date reference.

Aurora is free software under the GNU General Public License v3. Design and development: Tiziano Cassone (IU3WJQ). Project: github.com/wifi75/Aurora

Support the project

Aurora is free and open source. If it is useful to you, you can make a voluntary donation. It unlocks nothing: every feature is free for everyone.

♥ Donate