

RacerTrak

Quick Start Guide

A guide for setting up RacerTrak on a new computer: importing your roster, creating the radio channel, connecting a radio (USB or Wi-Fi), and configuring each station. Follow it once per computer.

New to RacerTrak? A demo roster (TestRace.xlsx) ships with the program. Import it and practice the whole workflow — no radios and no real runners needed. See **Install** below.

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(Word fills this in when the document opens. If it ever looks empty or out of date, click it and press F9.)

What you need

- **RacerTrak.exe** (the program).
- **Your roster** as an Excel file (.xlsx) or a .csv file — one row per runner, with a column for the bib number, name, etc. *Or use the included TestRace.xlsx to practice first.*
- **A MeshCore radio** (e.g. Heltec V3) per station, flashed with companion firmware and configured with your region's radio settings. (Skip the radio parts if you only want to try Demo Mode first.)
- **For a USB radio: the CP210x USB driver** installed, so Windows sees the radio as a COM port. Free from Silicon Labs at

<https://www.silabs.com/software-and-tools/usb-to-uart-bridge-vcp-drivers>

Download the Windows VCP package, unzip it, and run the installer. Keep a copy of the unzipped folder in case a Windows update ever replaces the driver.

Some versions of Windows may not allow updating the driver, stating that the current driver is the most current. Testing has shown this to be acceptable — the most current standard COM driver is compatible with the Heltec.

- **For a MeshCore Wi-Fi connected radio: a small travel router** (e.g. GL.iNet GL-SFT1200). No internet connection is required — the router just makes a local network for the radio, the laptop, and operator phones. See **Flash a Wi-Fi companion node**.
- **An activation code** — only if you want this station to **sync with other stations** (by radio or over a network). Without one, RacerTrak runs as a full single-computer check-in program, and Demo Mode still works. See **Activation code**.

1. Install

1. Copy **RacerTrak.exe** to the computer — anywhere you like (Desktop, or a folder such as C:\RacerTrak\, recommended). No formal installer is required. **Creating a desktop shortcut is highly recommended.**
2. Double-click it to run. The first time, Windows may show a "Windows protected your PC" notice for an unrecognized app — click **More info → Run anyway**.
3. RacerTrak creates its own settings folder automatically at C:\Users\<you>\AppData\Roaming\RacerTrak\. You never need to open this; it holds the program's settings and is created on first run.

RacerTrak opens maximized to use the full screen. The app, and the panels within, can be resized to suit the operator's taste. Your roster file stays wherever you keep it — RacerTrak reads it in place and does not move or copy it.

Try it first with the demo roster (TestRace.xlsx)

TestRace.xlsx is a demo race database supplied with RacerTrak. It contains **fictitious runners** — invented names and bib numbers — so you can learn the program, train operators, and rehearse a race without touching real data.

To use it:

1. Put TestRace.xlsx somewhere easy to find (Recommend C:\RacerTrak\).

2. In RacerTrak, click **Setup** (F2) → **Database** → **Import Excel** → **CSV...**, pick TestRace.xlsx, and choose where to save the working CSV (name it something obvious, like TestRace.csv).
3. Check runners in and out exactly as you would on race day. Everything works — tents, filters, chat, the phone list, mesh sync.
4. When you're ready for the real event, import your real roster to a **different** working CSV. RacerTrak opens whichever CSV you last used, so keep practice and race files clearly named.

Tip: Pair TestRace.xlsx with **Demo Mode** (below) to demonstrate multi-station syncing on a single laptop with no radios at all — ideal for training volunteers.

2. Activation code

RacerTrak runs in one of two states, and it always tells you which in the **window title bar**: RacerTrak [Demo (unlicensed)] or RacerTrak [Licensed - exp 09/2026].

What works without a code

With no activation code RacerTrak is a fully working single-computer check-in program. What you lose is syncing with other stations — nothing else.

- Import your roster, look up bibs, check runners **IN** and **OUT**, assign tents, filter the list, edit times and comments — all normal.
- **Standalone use** — set **Mode: Off** in Setup → Mesh sync. One computer, no sync, no radio, no code. This is the right choice if you're running a single check-in station and don't need other tents. The toolbar reads Mesh: off.
- **Demo Mode** — two windows on one PC syncing through a shared file, for demos and training.
- **The phone check-in list** — works regardless.

What needs a code

Anything that syncs this station to another station:

- **MeshCore (Serial USB)**
- **MeshCore Wi-Fi (TCP)**
- **Network Sync (Wi-Fi/AREDN)** — it's a full station-to-station sync path, so it's licensed like the rest.
- **Bridge** (it drives a real radio via the bridge process)

What you'll see without one

Nothing breaks and nothing is hidden. Choose a sync transport with no valid code and RacerTrak simply doesn't start it — the status bar says *"Radio sync needs a license..."* (or *"Network sync needs a license..."* for Wi-Fi/AREDN). The station keeps working perfectly on its own; it just doesn't sync with the other tents. (**Bridge** is the one that behaves slightly differently: it quietly falls back to Demo Mode and tells you so.)

Entering a code

Setup (F2) → **Activation**. The status appears next to the field as you type, and in the title bar after you Save.

Leave it blank for Demo — that's a supported way to run, not an error state.

Codes expire. A code is licensed through a particular month, so a station that worked last season can quietly stop syncing. The title bar is the single source of truth — check it **before** the event, not on race morning.

The status strings mean:

- Demo (unlicensed) — no code entered. Radio sync off; everything else works.
- Licensed - exp MM/YYYY — valid, good through that month.
- Expired MM/YYYY — the code was valid but has run out. Radio sync stops until it's renewed.
- Demo (invalid code) — the code isn't recognized. Check for typos.

3. Import your roster

How RacerTrak handles your data, in one sentence: you import your roster **once**, RacerTrak copies it into its **own working CSV file**, and from then on that working CSV is the live file it uses for the whole event.

To import:

1. Click **Setup** (or press **F2**).
2. In the **Database** section:
 - **Import Excel → CSV...** — if your roster is an Excel .xlsx file. Pick the Excel file, then choose where to save the working CSV.
 - **Open existing CSV...** — if your roster is already a .csv file, or to reopen a working CSV you made earlier.
3. RacerTrak loads the data and remembers that working CSV. It **auto-opens it every time it starts**, so the day's check-ins are always there.

Two things worth knowing:

- **Import the original roster only ONCE**, at the start. After that, let RacerTrak reopen the working CSV on its own. Re-importing the original would wipe the check-ins you've already recorded.
- **If you move the working CSV** to a new location (different folder, USB stick, etc.), RacerTrak won't find it automatically next launch. Just open **Setup → Database → Open existing CSV...** and select it in its new spot. After that it remembers the new location.

Your original roster file (the .xlsx or source .csv) stays wherever you keep it — RacerTrak reads it once on import and never changes it.

4. Create your radio channel

RacerTrak stations talk to each other over a **private channel** you create. All your radios must share the **same channel name and key**.

The channel list comes from the radio, so the radio has to be active. Initially that means saving Setup and re-entering it before the channel names appear in the dropdown.

Using **meshcore.exe** (the MeshCore desktop app), on the first radio:

1. Connect to the radio.
2. Go to **Channels → Add channel → Join/Create a private channel**.
3. Enter a **channel name** of your choosing (e.g. MyRace). Note it exactly — you'll pick this name in RacerTrak.
4. Let it **generate a key/secret**, then **copy the key (or QR code)** — you'll need it for the other radios.
5. Confirm/save (the check-mark).

On every other radio (one at a time):

1. Connect to that radio.
2. **Channels → Add channel → Join a private channel**.
3. Enter the **same name** and paste the **same key** you copied (or scan the QR).
4. Confirm/save.

Notes:

- A channel lives in each **radio's** own storage — it does not travel over the air, so each radio needs it added.
- Same physical radio moved between computers keeps its channels; a *different* radio needs its own copy.
- If a radio's channel list looks wrong, fully close and reopen meshcore.exe — it sometimes shows a stale list.
- Re-flashing a radio with the Wi-Fi patcher **keeps** its channels (see the flashing section).

About your channel (important)

Your private channel is a shared, encrypted "room." A few things to understand:

- **The key is the password.** Anyone who has your channel name and key can join — from a radio or the MeshCore phone app. Share the key only with your own station operators. Don't post it publicly or hand it out at the event.
- **Anyone on the channel can see your check-in traffic.** Someone who joins will see RacerTrak's raw messages (lines like v1|Finish|...) scrolling by. It's harmless and they can't break your data, but it does expose your check-in activity to anyone holding the key.
- **Don't use the RacerTrak channel for outside chatting.** RacerTrak has its own built-in Tent Chat on this channel (see Run the event). Anything beyond short operational messages should go on a separate channel: every message competes for airtime with your check-in syncs (the radios share one frequency, one-at-a-time).
- **Stray messages won't corrupt RacerTrak.** If a non-RacerTrak message lands on the channel, RacerTrak ignores it — it only acts on its own messages. A stray chat line is a clutter/airtime issue, not a data-safety one.

5. Choose how the radio connects

RacerTrak can reach its radio several ways. Pick one per station:

"Wi-Fi" means two different things here — worth separating. With **MeshCore Wi-Fi (TCP)**, Wi-Fi is only replacing the USB cable: it carries traffic between the laptop and *its own radio*, a few feet away, and the tent-to-tent sync still travels over **LoRa** exactly as it does with a USB cable connected radio. The Wi-Fi never leaves your tent. With **Network Sync**, the network *is* the sync path — stations reach each other over IP and there's no MeshCore radio at all.

Everything that syncs to another station needs an activation code — Serial USB, Wi-Fi (TCP), Network Sync and Bridge. Only **Demo Mode** and standalone use (**Mode: Off**) are free. See **Activation code**.

- **MeshCore (Serial USB)** — radio plugged into this computer by USB. The most common and most proven setup. Requires the CP210x driver.
- **MeshCore Wi-Fi (TCP)** — the radio joins a local Wi-Fi network and RacerTrak connects to it by IP address. This is a **cable replacement, not a sync method**: the Wi-Fi hop is laptop-to-its-own-radio, and the tent-to-tent sync still runs over LoRa. The win is that the radio can sit up high (on a fence or pole) while the laptop stays in the tent. Requires flashing the radio with Wi-Fi companion firmware — see the next section.
- **Network Sync (Wi-Fi/AREDN)** — stations sync with each other over an existing IP network by UDP broadcast, with no MeshCore radio in the picture. What carries that network is up to you: ordinary Wi-Fi, a wired LAN, or an AREDN mesh. (AREDN *is* a radio network — a licensed ham one — it just isn't a MeshCore radio, and RacerTrak only ever sees the IP on top of it.)
- **Demo Mode** — no radio; two copies on one PC sync through a shared file (see Demo Mode).
- **Bridge** — **advanced troubleshooting only**. Not a normal station setup: it exists as a fallback if the in-app radio ever misbehaves. Don't use it for an event unless you're deliberately working around a problem. See Troubleshooting.

6. Flash a Wi-Fi companion node

This puts the radio on a Wi-Fi network so RacerTrak connects over TCP — no USB cable, no COM ports. It is the recommended setup when you want the radio mounted away from the laptop (on a fence, a pole, up high) for better range.

Bonus: no wake-up step. Wi-Fi radios do **not** need the meshcore.exe wake-up dance that USB radios require (see Run the event). They come up ready.

Video walkthrough: search YouTube for "*How to connect to a MeshCore Companion to WiFi*".

The video shows the long way round. The steps below are condensed — everything now happens on the patcher page.

Before you start

- A Heltec V3 board and a USB cable (USB is only needed for flashing).
- **A 2.4 GHz Wi-Fi network** for the radio to join. At an event this is your travel router; no internet needed.
- The network name (**SSID**) and **password**, typed exactly — **both are case-sensitive**.
- A browser (Chrome or Edge) for the patcher tool.

WARNING — 2.4 GHz only. 5 GHz will not work. The ESP32 has no 5 GHz radio at all. On a 5 GHz-only network the node cannot even see the SSID, so it will never join and no amount of retyping the password will help. If your router broadcasts both bands under one name it usually works (the node picks 2.4 GHz), but a **separate 2.4 GHz SSID is safer** — flash the node for that one.

Flash for the network you'll actually use. The radio only ever joins the SSID it was flashed with. If you flash it for your office Wi-Fi, it will not join your travel router at the event. Flash it for the **travel router** and it works anywhere you take that router.

Patch and flash (one page)

1. Go to the patcher:
https://www.veyhmueeller.org/webtools/esp32_ssid_patcher.html
2. Under **Firmware File**, select your device's patchable Wi-Fi firmware (e.g. Heltec_v3_Companion_radio_wifi_patchable-v1.16.0.bin).
3. Enter the **SSID** and **password** exactly (case-sensitive, 2.4 GHz). To find your SSID in Windows, right-click the network/fan icon in the tray — it shows as Wi-Fi (<your SSID>).
4. Tick **Merge** and **Erase**, then flash the device **directly from this page** over USB. Wait for it to finish — do not unplug during flashing.

That's the whole flash. You do not need to visit flasher.meshcore.io — patch and flash happen on the one page.

After an Erase, the device name resets to a default. Your **channels survive** (no need to re-add them), but rename the radio back to its station name in the MeshCore app or meshcore.exe. Otherwise it shows up under a default name in Tent Chat and in the routing log, and you'll be guessing which node is which.

Find the radio's IP address

1. **Power the router first**, then power the Heltec. Order matters: if the network isn't up, the radio has nothing to join.
2. The radio joins the Wi-Fi and **shows its IP address on its own screen** (e.g. 192.168.8.55). Just read it off the display — no scanning, no router admin page.
3. **No IP on the screen = it did not join the Wi-Fi.** Check the SSID and password (case-sensitive), confirm the network is 2.4 GHz, and confirm the router is actually running.

Set up the router

- **Use the main network, not the Guest network.** On a GL.iNet router, **Isolate Clients is unchecked by default on the main network** — so isolation usually isn't your problem there and there's nothing to change. Two things still matter: the **Guest network is isolated by design** (devices on it can't talk to each other, so don't use it), and isolation is the classic cause of "I can see the radio but can't connect" on office, hotel, and venue Wi-Fi. To verify on GL.iNet: LuCI → Network → Wireless → Edit SSID → Advanced Settings → **Isolate Clients** unchecked.
- **Reserve the IP addresses.** In the router's LAN → Address Reservation (or Static IP Binding), bind both the **radio** and the **laptop** to fixed addresses. Reserving inside the DHCP pool is fine. Then reboot the radio and reconnect the laptop so they pick up the reserved leases.

- **Why reserve the laptop too?** The phone check-in list lives at the laptop's address. Reserve it once and operators can bookmark the URL for the whole event.

Windows may wander back to another Wi-Fi. Because the travel router has no internet, Windows can quietly jump back to a known internet-connected network (your office Wi-Fi) — which looks exactly like a mesh failure. On the event laptop, **uncheck "Connect automatically"** on every other known network, or forget them. At the event there's nothing else in range, so this is mainly a bench-testing trap.

Test before you trust it

With a phone on the same router, open the **MeshCore app → three dots → Connect via Wi-Fi**, enter the radio's IP and port **5000**. If the app connects, RacerTrak will too. If it doesn't, fix the network before touching RacerTrak — it's a network problem, not a RacerTrak one.

- **Don't rely on ping.** The radio may not answer ping even when it's working. Test port 5000, not ICMP.
- **Check you're on the same network.** If the radio's IP is 192.168.1.x and your phone is on 192.168.8.x, they're on different networks and can never talk. The radio joined the wrong Wi-Fi.

Range and placement

- A travel router only needs to cover **your own tent** — the laptop to the radio (a few feet to ~30 ft) and the laptop to operator phones. Tent-to-tent traffic goes over LoRa, which is a different radio with far more range. The router never needs to reach another tent.
- Plastic/fabric tent walls are no obstacle at 2.4 GHz. A radio on a fence ~10 ft outside the tent is well within range.
- Keep the router in the tent, off the ground, away from metal and coolers. Keep the **radio** high and clear — that's what helps the mesh.
- **Metal fences:** don't strap the radio flat against chain-link or steel — it detunes the antenna. Stand the antenna vertical with a few inches of clearance, ideally facing the other tents.

7. Configure RacerTrak (Setup screen, per station)

Open **Setup** (F2). Fill in the **Mesh sync** section:

- **Mode:** Send + Receive (a station that only watches can use Receive; one that only feeds can use Send; Off disables sync).
- **Station ID:** a **unique** name for this station (e.g. Finish, Brewery, Mile3). Each station must be different — this is how check-ins are attributed and merged. Match it to the tent name where you can; the coverage report groups by it.
- **Channel:** pick your private channel **by name** from the dropdown. RacerTrak resolves the right slot on each radio automatically. (The list is filled in from the radio the last time it connected.) **May require a Setup save to see the channel names.**
- **Transport:** see "Choose how the radio connects" above.
- **Radio:** what this field holds depends on the transport — the **COM port** for Serial USB (e.g. COM5), the radio's **IP address** for Wi-Fi (e.g. 192.168.8.55, or 192.168.8.55:5000 for a non-default port), or the **UDP port** (e.g. 4000) for Network Sync. Leave blank for Demo Mode.

- **Beacon interval (seconds):** how often a station sends its safety-net sync beacon when everything is quiet and in agreement. Default **120**, minimum **60**. Set **0** to switch the beacon off entirely (battery saving). You don't need to lower this for responsiveness — RacerTrak automatically switches to a fast 15-second beacon the moment anything changes or a station disagrees, then drops back to the slow rate once everyone matches.
- **Send comments:** check if you want Runner/Racer comments shared across stations.
- **Log mesh routing (coverage capture):** diagnostic logging for planning repeater coverage — leave off for normal events. See **Coverage report**.

In the **Phone check-in list (Wi-Fi)** section:

- **Serve this tent's list to phones on the Wi-Fi:** turns on the phone list (off by default). **Port** defaults to 8000. See **The phone check-in list**.

Other useful Setup fields: Header title (the banner text), Tent names, Default tent for this station, Font size, Time format (12/24-hour).

Critical: every station must have the same Tent names, and they are case-sensitive. Tent names are how check-ins are attributed and grouped across the mesh — a mismatch ("Brewery" on one station, "brewery" on another) will not line up.

Click **Save**.

The Mesh: indicator — your first check

The right-hand end of the toolbar shows what sync is actually doing. **This is the single most useful thing on the screen** — check it every time you start a station.

What you'll see:

- Mesh: send+recv - Finish Line — working. It shows the **mode** and the **Station ID** this station is using. This is what you want.
- Mesh: send - Finish Line Or Mesh: recv - Finish Line — working, but in a one-way mode (Send only / Receive only).
- Network: send+recv - Brewery — same thing, but the prefix says **Network** because this station is on Network Sync (Wi-Fi/AREDN) rather than a radio.
- Mesh: off — **no sync is running**. See the warning below.
- Mesh: n/a — the sync module isn't available in this build.

"Mesh: off" does not only mean you turned it off. It also appears whenever the radio **failed to start** — no activation code, radio not found, COM port in use, wrong IP, no roster loaded yet. So if you set **Send + Receive** and the toolbar still reads Mesh: off, something went wrong: read the **status bar** at the bottom, which says why. A station sitting on Mesh: off looks completely normal while quietly syncing with nobody.

Two more things the indicator earns its keep on: it only comes up **once a roster is loaded** (no roster, no mesh), and the **Station ID** shown after the dash is your quick confirmation that this laptop is identifying as the right station — a duplicated Station ID across two stations will merge their check-ins together.

Monitoring stations (a station that isn't a tent)

Not every station has to run a tent. You can set one up purely to watch the event — a race director, or someone keeping an eye on the whole picture. Exactly one thing makes it a monitoring station: **Default tent for this station** is left at **(none – Info station)**. Everything else is normal.

Say you create one with **Station ID** Ed — a Station ID is just a unique name, so a person's name is fine; it doesn't have to be a place. Then:

- **Any mode works.** Receive only suits pure watching, and the toolbar reads Mesh: recv - Ed. But **Send + Receive** is equally valid — use it if Ed also checks runners in — and reads Mesh: send+recv - Ed. The mode and "is it a tent" are independent settings.
- **Chat still reaches Ed.** General messages go to every station's history, Ed included. Tent-specific and ALL messages pop up there too.
- **Checking a runner in asks which tent.** With no default to assume, RacerTrak shows the tent buttons and the status bar says "Bib 1023: select the tent." Pick one and it commits.
- **The phone check-in list stays off.** That list serves *this tent's* runners, and Ed has no tent to scope to — so no URL appears even if the box is ticked. (See **The phone check-in list**.)

Light Mode / Dark Mode

The button to the right of **Setup** toggles between Dark Mode (default) and Light Mode — useful in bright daylight. The change **applies on restart**: click it, then close and reopen RacerTrak.

8. Run the event

Finding a runner

Enter a bib number in the **Quick Entry** field, then press **Lookup**, **Check-IN** or **Check-OUT**. Alternatively, search for the runner in the list above using the **alphanumeric buttons**.

Searching the list

Enter the first characters of the **last name**, and optionally the first characters of the **first name** separated by a comma — e.g. JO,C displays **Jones, Charles**. Select the person from the list and make changes in the **Runner Detail** panel.

SAVE must be pressed to complete the entries in the Runner Detail panel.

- Typing digits instead searches **bib numbers** (any bib starting with what you type), listed in bib order.
- Name search is not case-sensitive, and results are ordered by last name, first name, then age.

How check-ins spread

- Check-ins **sync automatically** to the other stations on the same channel.
- Each station keeps its own working CSV; the merge keeps everyone consistent (newest entry wins).

Filtering the list (the two view buttons)

Two buttons above the runner list control what you see. They work together:

- **Button 1 — scope.** Cycles ALL → each tent → ALL. This picks *whose* runners you're looking at.
- **Button 2 — view.** Filters within that scope. When scope is ALL it toggles **IN DATABASE** ↔ **PROCESSED**. When scope is a tent it cycles **PROCESSED** → **CHECKED IN** → **CHECKED OUT**.

What the views mean:

- **IN DATABASE** — everyone on the roster.
- **PROCESSED** — has a check-in OR a check-out (i.e. you've dealt with them).
- **CHECKED IN** — checked in and not yet checked out (still with you).
- **CHECKED OUT** — has a check-out.

The counter at the top always begins with the **global processed total** across all tents — the same number the sync beacon uses, so it should match on every station. In a tent scope it also shows that tent's numbers (e.g. "Processed: 26 - BREWERY: 10").

Tent Chat

The **Chat** button opens messaging between stations on your channel. Pick a recipient:

- **General** (the default) — goes to everyone's chat history but pops up on nobody's screen. Use it for routine traffic.
- **A specific tent, or ALL** — generates a pop-up on that device (or every device). Use it when you need attention.

Per station, day-of checklist

1. **USB radios only: reset the port.** Open **Device Manager**, find the radio's port (e.g. COM5), **disable** it, then **enable** it again.
2. **USB radios only: wake the radio with meshcore.exe.** Open meshcore.exe and connect to the radio. (The first Connect often doesn't take — if so, click Connect again.) Wait until it finishes syncing and shows your channel in the list.
3. **USB radios only: close meshcore.exe completely.** Only one program can use the radio's COM port at a time, so meshcore.exe must be closed before RacerTrak can use it.
4. **Wi-Fi radios:** power the router first, then the radio; confirm the IP on the radio's screen matches what's in Setup. No wake-up needed.
5. Start RacerTrak — it reopens the working CSV automatically and connects to the radio.
6. Confirm the toolbar reads Mesh: send+recv - <your Station ID>. If it says Mesh: off, sync is **not** running — check the status bar for the reason before you start checking runners in.
7. If a USB station shows no other stations on its sync dots (or stops receiving), reboot that radio: press the **RST button** (the right-hand button on the Heltec; the screen restarts and re-shows your channel), then start RacerTrak again.

Why wake a USB cable connected radio first? The radio can always *send*, but on a fresh start it needs a one-time wake-up before it will reliably *report the messages it receives* back to the computer. The reliable sequence is: open **Device Manager**, **disable** the radio's port (e.g. COM5) and then **enable** it again; then connect once with the MeshCore app; exit the app; then start RacerTrak. The radio stays awake until it is powered off or reset. This is a known quirk of the MeshCore USB companion firmware, not a fault in

RacerTrak. Without it, a station sends its own check-ins but never sees anyone else's — its sync dots stay empty even though everything looks fine. **Wi-Fi (TCP) radios do not have this quirk.**

9. The phone check-in list

A busy tent operator can't always watch the screen. The phone check-in list puts this tent's currently checked-in runners on a phone browser, so an operator can walk the tent, see who's actually still there, and work out who needs checking out.

It's read-only: the phone shows you the list, you make the check-outs in RacerTrak. Everything stays on the local Wi-Fi — **no internet is involved.**

Turn it on

1. Setup → **Phone check-in list (Wi-Fi)** → tick **Serve this tent's list to phones on the Wi-Fi**. Leave Port at 8000 unless you have a reason to change it. Save.
2. The first time, Windows Firewall will ask to allow RacerTrak — **Allow** (Private networks).
3. The URL appears at the **bottom of the Runner Detail panel** (e.g. `http://192.168.8.20:8000`). Type it into the phone's browser.
4. **Bookmark it on the phone.** With the laptop's IP reserved on the router, the address never changes for the whole event.

Requires a default tent. The list shows *this tent's* runners, so a monitoring station with no default tent has nothing to show — the feature stays off there even if ticked, and no URL appears.

How the operator uses it

1. Open the page. It lists everyone **checked in and not yet checked out** at this tent. Every checkbox starts **empty**.
2. **Check off everyone you can actually see** in the tent.
3. Whoever is left **unchecked** has gone. The box at the bottom builds that list live: "Needs check-out (3): 1023, 1105, 1187".
4. Go back to RacerTrak and check those bibs out. Their check-outs sync to the other tents as normal.
5. Tap **Refresh** to pull the current list and start a fresh sweep (it clears the checkboxes).
 - **The page holds still until you tap Refresh.** That's deliberate — a list reshuffling mid-sweep would lose your checkmarks and give you a wrong answer.
 - **Refresh always gives live data.** The page is built fresh from RacerTrak the instant you tap it — there's no update delay to wait out.
 - iOS may warn that the Wi-Fi has "no internet." That's expected — type the address in anyway and it loads.

10. Coverage report (planning repeaters)

RacerTrak can record how each message reached it — direct from another station, or relayed by a repeater — and how strong the signal was. Use it to decide where repeaters are needed and whether they're earning their keep. This is a planning tool, not something to run on race day.

Capture

1. Setup → Mesh sync → tick **Log mesh routing (coverage capture)**. Save.
2. RacerTrak writes mesh_routing.log **next to your roster CSV**, so it's easy to find.
3. Let traffic flow. Walk the venue. For the most useful capture, run it on more than one station.
4. Click **Coverage** on the toolbar (it only appears while routing is logged) to read the report. **Copy** puts it on the clipboard.

The log appends and is never cleared. Delete or rename mesh_routing.log before a capture you actually want to analyze, or the report blends every past session together. Turn logging off when you're done.

Reading it

The section that matters is **PER-TENT COVERAGE**. For each tent it shows how that tent's messages reached you:

- **Both paths** — heard direct *and* via a repeater. The direct link is healthy; the repeater is redundant here.
- **Repeater only** — the direct link no longer reaches you and the repeater is carrying that tent's traffic. **This is a repeater earning its keep.**
- **Direct only** — the repeater didn't relay or didn't reach you.
- **SILENT** — a tent you configured but never heard from at all. That's a gap: out of range of both the direct link and any repeater.

Each bucket shows signal as **min/avg/max** (SNR in dB, RSSI in dBm). The **TX echo check** counts your own sends that came back relayed; sends with **no echo** mark moments when nothing heard you — on a site walk, those cluster in weak spots.

On a bench, everything reads "Both paths" because stations close together hear each other directly. The report only becomes decisive at real distance, with real obstructions. Walk the actual venue.

11. Demo Mode (show how sync works, no radios)

What actually happens

Demo Mode replaces the radio with a shared file on disk. Instead of transmitting, a station writes its messages into that file; instead of listening, it reads them back out. Two copies of RacerTrak running on the same computer both use the same file, so a check-in made in one window appears in the other.

Everything above that swap behaves exactly as it does on real radios — the same merge rules (newest entry wins), the same Station IDs, the same sync health dots, the same beacon. The only thing missing is the radio itself. **Nothing is transmitted, and no licence is required.**

Set it up

Great for demos and training on a single PC — pair it with TestRace.xlsx:

1. Launch **two** copies of RacerTrak.exe on the same computer.
2. In each: Setup → Mesh sync → **Transport: Demo Mode, Mode: Send + Receive**, and give each a **different Station ID** (that's what makes them look like two stations).
3. Leave the **Bus file** field at its default — both windows will then share the same file automatically.
4. Check in a bib in one window; it appears in the other. No radio needed.

Where the shared file lives. The **Bus file** field is pre-filled with `mesh_bus.log` — it isn't blank. A bare filename like that resolves into RacerTrak's settings folder (`C:\Users\<you>\AppData\Roaming\RacerTrak\`), which is why both windows find the same file without you configuring anything. Enter a full path if you'd rather keep it somewhere you can watch it.

Understand your mesh network (and test coverage early)

RacerTrak's sync is only as good as the radio link between your stations. Before the event, take time to understand and test your coverage — radio range in a real venue is never as good as it looks on paper.

How the network is built

- **Stations (companions).** Each RacerTrak computer has a companion radio (USB or Wi-Fi). Companion radios send and receive your check-ins — but, by design, they do **not** relay each other's traffic.
- **Repeaters.** Because companions don't relay, two stations that can't hear each other **directly** won't sync on their own. A **repeater** placed high (a window, a mast, the top of a tent pole) is a dedicated radio that relays messages between stations, extending coverage across the venue. For anything beyond a couple of close-together tents, plan on at least one repeater.
- **Same radio settings, not the channel key.** A repeater must use the **same RF settings** as your stations (frequency, bandwidth, spreading factor, coding rate). It does **not** need your channel key — repeaters relay encrypted packets without decrypting them, so your channel stays private.

Placement matters more than power

- LoRa works best with **line of sight** and **height**. A radio flat on a table inside a tent performs far worse than the same radio in a window or up high. (This is exactly what a Wi-Fi node buys you: the radio can go up on the fence while the laptop stays on the table.)
- Walls, metal structures, vehicles, crowds, and terrain all cut range. A link that works on an empty course at 7 a.m. may struggle once tents, trucks, and people are in place.

Test coverage BEFORE the event — a realistic dry run

1. Set up stations at (or near) their **actual planned locations**, with radios where they'll really sit (window/height/fence, not buried in a tent).
2. Add a **repeater** if any two stations can't hear each other directly.
3. Turn on **Log mesh routing** and use the **Coverage report** to see what's actually happening rather than guessing.
4. From each station, check in a few test bibs and confirm they appear at **every other** station within a few seconds.

5. Walk the **worst-case** links — the farthest-apart tents, anything with a building or hill between them. Those are where it breaks.
6. If a link is weak or drops: raise the radio higher, move it to a window or fence, reposition or add a repeater, and re-test.
7. Do this **on a different day** than the event if you can, so you have time to buy or place another repeater if coverage gaps show up.

Better to find a dead spot during a quiet dry run than during peak check-in on race morning.

Troubleshooting

- **Toolbar says "Mesh: off" but you set Send + Receive:** the radio didn't start. Read the **status bar** — the usual causes are no activation code, no roster loaded yet, the radio not found, the COM port in use by another program, or a wrong/unreachable IP. Fix that and the indicator switches to Mesh: send+recv - <Station ID>.
- **"Radio sync needs a license" / "Network sync needs a license" in the status bar:** no valid activation code, so that sync transport is off. Check the **title bar** — it shows Demo (unlicensed), Expired MM/YYYY, or Demo (invalid code). Enter or renew the code in Setup → Activation, or use Demo Mode / Network Sync. Everything else in the program still works normally.
- **Station synced last year but not now:** check the title bar for **Expired** — codes are licensed through a particular month.
- **Radio port won't open / "in use":** another program (meshcore.exe or a second RacerTrak) has the COM port. Close it — only one program owns the port at a time. RacerTrak frees the port when it closes.
- **Stations not syncing:** confirm all radios are on the **same channel name + key**, each station has a **unique Station ID**, and Mode includes Send/Receive. (Slot numbers do not need to match.)
- **One USB station sends but never receives (its sync dots stay empty):** that radio wasn't woken up. Close RacerTrak, open **Device Manager** and disable/re-enable the radio's port, connect once with the MeshCore app, exit it, then start RacerTrak again. Wi-Fi radios don't have this problem.
- **Wi-Fi radio won't connect:** work through it in this order — (1) is the radio showing an IP on its screen? No IP = it never joined the Wi-Fi. (2) Is the IP on the same network as your laptop/phone (192.168.8.x vs 192.168.1.x)? (3) Is Client/AP Isolation off, and are you on the main network rather than Guest? (4) Does the MeshCore phone app connect to that IP on port 5000? If the app can't, RacerTrak can't either — fix the network first. Don't rely on ping; the radio may not answer it.
- **Laptop keeps dropping to another Wi-Fi:** Windows prefers a network with internet. Uncheck "Connect automatically" on your other known networks (or forget them) on the event laptop.
- **Phone can't open the check-in list:** confirm the phone is on the same router as the laptop, that the feature is ticked in Setup, that this station has a default tent, and that you allowed RacerTrak through Windows Firewall.
- **Nothing happens on import:** make sure you picked the .xlsx roster and then chose a location to save the working CSV.
- **Channel missing after moving a radio:** fully restart meshcore.exe; the list can be stale.

- **Bridge mode (advanced):** if the in-app radio ever misbehaves, you can run a separate bridge process (`mesh_sync.py --bridge COM5 1 <busfile>`) and set the app to **Bridge** transport on the same bus file. Normally not needed.