# Sailing and Coastal Cruising

# Cross-Reference: Offshore and Bluewater Sailing

Comprehensive coverage of LoRa mesh for offshore and bluewater sailing - including AIS integration, mast-mounted antenna installation, SSB radio coexistence, and long-passage MQTT gateway strategies - is provided in the *Use Cases* book under the Maritime Operations chapter. This page focuses on recreational day sailing, fleet racing, and harbour approaches where different constraints apply.

> **Mesh is a coordination tool, not a marine safety system.** Meshtastic is best-effort - messages may not get through, and positions can be stale or missing. It does NOT replace marine VHF (Channel 16 distress/DSC), an EPIRB, AIS, a PLB/satellite messenger, or 911. The Coast Guard and search and rescue do NOT monitor Meshtastic. Carry dedicated marine safety gear; use mesh only as a supplement for routine, low-urgency coordination.

# Day Sailing and Recreational Fleet Use

A Saturday afternoon race fleet of twenty boats benefits from Meshtastic in ways that differ from an offshore passage. Distances are short, conditions are variable, and the communication needs are primarily coordination rather than emergency signalling.

## Start Line to Finish Line Coordination

Race committee boats equipped with Meshtastic nodes can broadcast fleet-wide messages - course changes, postponement signals, and finish line positions - to fleet boats in mesh range. Boats relay the message through the mesh so boats at the far end of the course can receive it (delivery is best-effort and depends on relays being in range), without requiring every boat to monitor a VHF channel attentively.

Pre-race, the course marks can be entered as named waypoints and shared across the fleet, providing an on-screen map of the racecourse that updates as mark boats move into position.

# Fleet Position During Races

Position sharing during a race provides a tactical picture that adds to, not replaces, visual observation. Boats that duck behind a headland and disappear from the committee boat's sight may remain visible on the mesh map (when a relay path exists; positions are best-effort and can be stale or missing). This can be a low-cost supplement for multi-leg offshore race tracking, but it is range- and relay-limited and is NOT a replacement for a dedicated AIS or transponder system, which transmit continuously and are designed for vessel tracking and collision avoidance.

> **Racing rule consideration:** Check your racing class rules before using position-sharing devices for tactical purposes during a race. Some classes prohibit electronic position data on instruments during racing. Mesh use for safety and fleet management is generally unaffected.

# Harbour Approach Coordination

Returning to a crowded harbour in fading light, following a race fleet or a club rendezvous, involves competing for fairway and dock space with many boats. A mesh message from the harbour master's dock to the approaching fleet - "slips 14 - 20 available, raft to dock B" - can reach boats in mesh range at once without tying up VHF channel 16.

Meshtastic's text messaging capability is well-suited to this low-urgency, high-information-value use case. It does not interfere with VHF radio use for safety calls and allows longer messages than are practical on voice radio. **Note:** VHF channel 16 remains the required distress and calling channel; mesh handles only routine, low-urgency coordination.

# Antenna Placement on Small Boats Without a Tall Mast

Offshore and cruising vessels benefit from mast-mounted LoRa antennas at 10 - 15 m elevation, which improves range substantially over a low-mounted antenna (specific figures are community-anecdotal and depend on LoRa preset, antenna, and conditions). Small day sailors and racing dinghies cannot do this. Practical options for low-freeboard small boats:

- **Stern rail mount:** A 1/4-wave whip antenna on a stainless steel stern rail bracket at 1 - 1.5 m above the waterline. This is the most common and practical solution. Range from this height is roughly 2 - 5 km in racing conditions as a rough estimate - actual range varies widely with LoRa settings, antenna, and sea state.
- **Backstay routing:** On sloop-rigged boats with a backstay, a semi-flexible whip can be secured alongside the backstay with UV-stable cable ties, raising the antenna effective height (on the order of 5 - 8 m, approximate). This can improve range, but note that a metal backstay close to the whip can detune the antenna and distort its radiation pattern - keep some separation and test before relying on it.
- **Handheld device in cockpit:** For racing and day sailing, simply keeping the device in the cockpit - not stowed below decks - provides adequate performance. A crew member's chest pocket is roughly 1.5 m above water level; expect a rough 2 - 4 km range in open water, noting that a body close to the antenna absorbs RF and reduces body-worn range.

# Waterproofing for Spray, Salt, and Immersion

The marine environment is uniquely hostile to electronics. Salt spray is electrically conductive and corrosive; even "waterproof" devices fail over time when salt crystals accumulate in seals and degrade gaskets. Requirements for sustained marine use:

- **IP67 minimum for deck-mounted hardware:** IP67 indicates 30-minute immersion to 1 m. For spray and rain protection this is adequate; for repeated immersion in rough conditions, budget for IP68 or a secondary dry bag.
- **Fresh water rinse after every salt water exposure:** Rinse all deck-mounted nodes with fresh water after each sailing session. Salt crystal accumulation is the primary failure mode for marine electronics, even sealed ones.
- **Conformal coating on antenna connections:** PL-259 and SMA connectors exposed to salt air oxidise rapidly. Coat connector threads with Lanoline or a marine-grade corrosion inhibitor; conformal-coat the PCB antenna pads inside the enclosure.
- **T-Echo in a window dry bag:** For crew-carried devices during racing and dinghy sailing, an inexpensive window dry bag (submersible-rated) gives strong protection at low cost (typically well under $20, as of 2026-06-08). Replace annually; UV and salt degrade dry bag welds faster than most users expect.

# Range Expectations on the Water

Open water is the best propagation environment for LoRa. Without terrain obstacles, a low-mounted antenna can reach an estimated 5 - 15 km (this is an estimate dependent on LoRa preset and conditions, not a guaranteed figure). With a mast-top antenna, 15 - 40 km is documented by

the community in best-case line-of-sight reports. Note that the radio horizon limits any single hop: it is roughly 4.12 x the square root of the antenna height in metres (in km), so elevation on both ends is what enables the longest links. Key factors:

- Rain has negligible effect on 915 MHz range. Real degradation in rough weather comes from wave crests and wet conditions blocking the path to low-mounted antennas, not the rain itself.
- Dense fog has minimal effect on 915 MHz.
- Other vessels between nodes do not significantly attenuate signal unless they are metal-hulled large ships directly in the path.
- On protected waters (harbours, estuaries), nearby structures and moored vessels create multipath that reduces range compared to open ocean.

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