

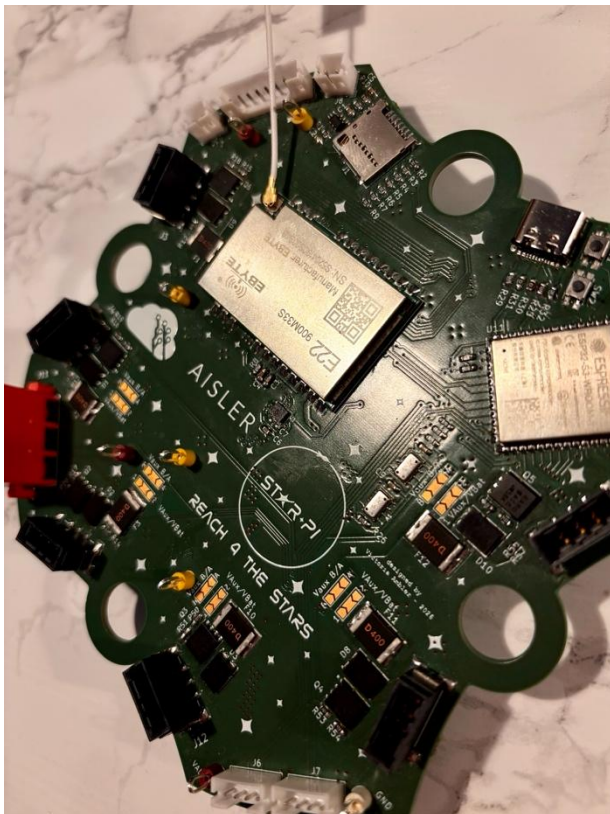
StarPi Rocketry Partner Spotlight: Engineering a Bulletproof Link for EuroC with Ebyte

By Victoria Ambler and Gioele Gueli, Avionics Department, StarPi Rocketry Team

At StarPi Rocketry, our mission to conquer the European Rocketry Challenge (EuroC) in Portugal demands hardware that refuses to quit. This year, as our Italian student engineering team designs a high-power sounding rocket to hit a precise 3,000-meter apogee, our biggest hurdle isn't just reaching the sky—it's staying connected to it.

When a rocket is tearing through the atmosphere, standard commercial radios simply cannot keep up with the structural attenuation and the intense radio frequency noise floor at the launch site. That is why we partnered with Ebyte, integrating their industrial-grade RF ecosystem to build a highly optimized telemetry link from the launch rail to the recovery zone.

Here is how Ebyte's cutting-edge components have become the absolute backbone of our flight campaign.



Airborne Optimization: Power, Precision, and Compliance

The heart of our onboard electronics is our custom-designed, multi-layer flight computer. To guarantee our telemetry data cuts through the noise, we chose the Ebyte E22-900M33S as our primary transceiver.

This surface-mount LoRa module is an absolute powerhouse. Built around the advanced Semtech SX1262 architecture, it is technically capable of outputting a massive 2 Watts (+33 dBm) of raw RF power. However, operating in European airspace means we are bound by strict telecommunications regulations, which heavily limit our maximum allowable transmission power. We cannot legally transmit at 2W. So, why choose a 2W module? Efficiency and headroom. By leveraging the E22-900M33S, we can dial back the transmit power via software to perfectly comply with European ERP (Effective

Radiated Power) standards. Because the module's power amplifier is barely breaking a sweat at these lower legal limits, it operates with incredible thermal efficiency and zero power-sag risk to our main flight microcontroller. Furthermore, we get to take full advantage of the module's industry-leading receiver sensitivity and LoRa spread-spectrum modulation, ensuring our data streams seamlessly even through the high-vibration environment of the Max-Q launch phase.

Ground Station Engineering: Maximum Gain, Ultimate Flexibility

Because we are capping our transmission power on the rocket, our ground station requires an incredibly sensitive, high-gain setup to compensate for the reduced airborne power and to track our rocket throughout its entire 3,000-meter arc.

The crown jewel of our station is the Ebyte TX900-PB-4545 directional panel antenna. Boasting an incredible 14 dBi of forward gain, this flat-panel antenna allows us to focus our listening capability directly on the rocket's flight path. This high directivity pulls in weak signals over long distances while entirely ignoring ambient radio chatter from the dozens of other European teams sharing the airspace.

A Modular Design for Final Integration

To connect this heavy-duty antenna to our ground control trailer, we rely on the 3-meter Ebyte XC-NK-SJ-300 extension cable. This industrial coaxial line features an N-K type connector on one end (for the panel antenna) and an SMA-J terminal on the other. It provides a clean, low-loss transmission path, allowing us to mount our antenna high on a tracking mast in the clean air, while keeping our sensitive receiver electronics sheltered safely inside the control trailer.

Right now, our software and telemetry teams are evaluating different receiving architectures to select the final LoRa module for the ground station. Ebyte's component ecosystem gives us unparalleled engineering freedom during this critical prototyping phase:

- If we select an SMA-based module: The XC-NK-SJ-300 extension cable will hook directly into our receiver node, giving us a highly efficient, plug-and-play setup.
- If we select an IPX-based module: We are completely covered. To adapt the SMA terminal of our main antenna cable to a miniature IPX port on the final module, we will utilize the Ebyte XC-IPX-SMA-15 adapter. This 15 cm pigtail cleanly and securely converts the connection, ensuring that we don't lose any of that precious 14 dBi gain through messy hardware hacks.

Why Ebyte Matters to StarPi Rocketry

Ebyte provides a comprehensive RF toolkit that gives our team the freedom to design, adapt, and succeed.

Thanks to Ebyte's highly configurable transceivers, low-loss interconnects, and high-performance antennas, StarPi Rocketry is set to maintain optimal telemetry visibility through every second of our EuroC campaign. We are incredibly proud to fly with Ebyte technology onboard, proving that when Italian student innovation meets world-class wireless hardware, the sky is just the beginning.