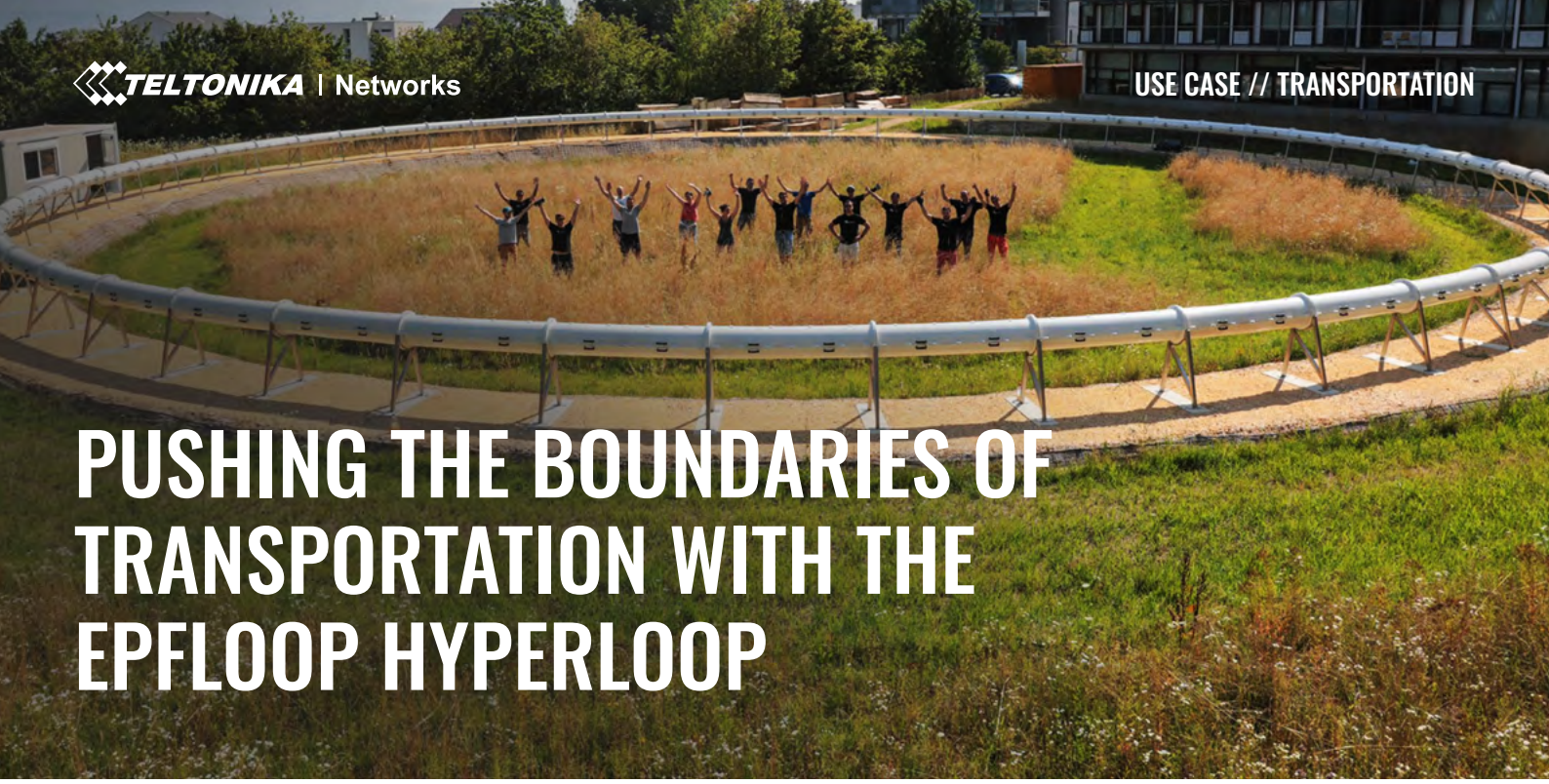


PUSHING THE BOUNDARIES OF TRANSPORTATION WITH THE EPFLOOP HYPERLOOP

HIGHLIGHTS

EPFLOOP

- EPFLoop is a project of the Swiss Federal Institute of Lausanne – Europe's most cosmopolitan technical university. As a pioneer in hyperloop solutions since 1974, it is among the most prestigious universities in the world in terms of education and research quality.
- Aiming to push the speed bottleneck of the transportation sector, EPFLoop is modelling and studying the best operational practices of the Hyperloop: an energy-efficient rail and pod infrastructure that moves through a very low air-pressure tunnel.
- To effectively do so, they needed a networking device to establish connectivity between the pod and the control room. Meeting the strict criteria and harsh environment of the Hyperloop model, our TRB500 was chosen as the best fit for this solution requiring the ultra-fast data transmission with ultra-low latency of 5G SA.

THE CHALLENGE: THE BOTTLENECK OF LOGISTICS SPEED

The global transportation sector has been facing significant challenges due to bottlenecks in logistics. One of those bottlenecks is the speed of logistics, which refers to the cost, efficiency, and timeliness of moving goods from one point to another. This is a critical factor in determining the competitiveness and profitability of transportation companies, as well as retail companies that rely on fast shipping times to stay competitive.

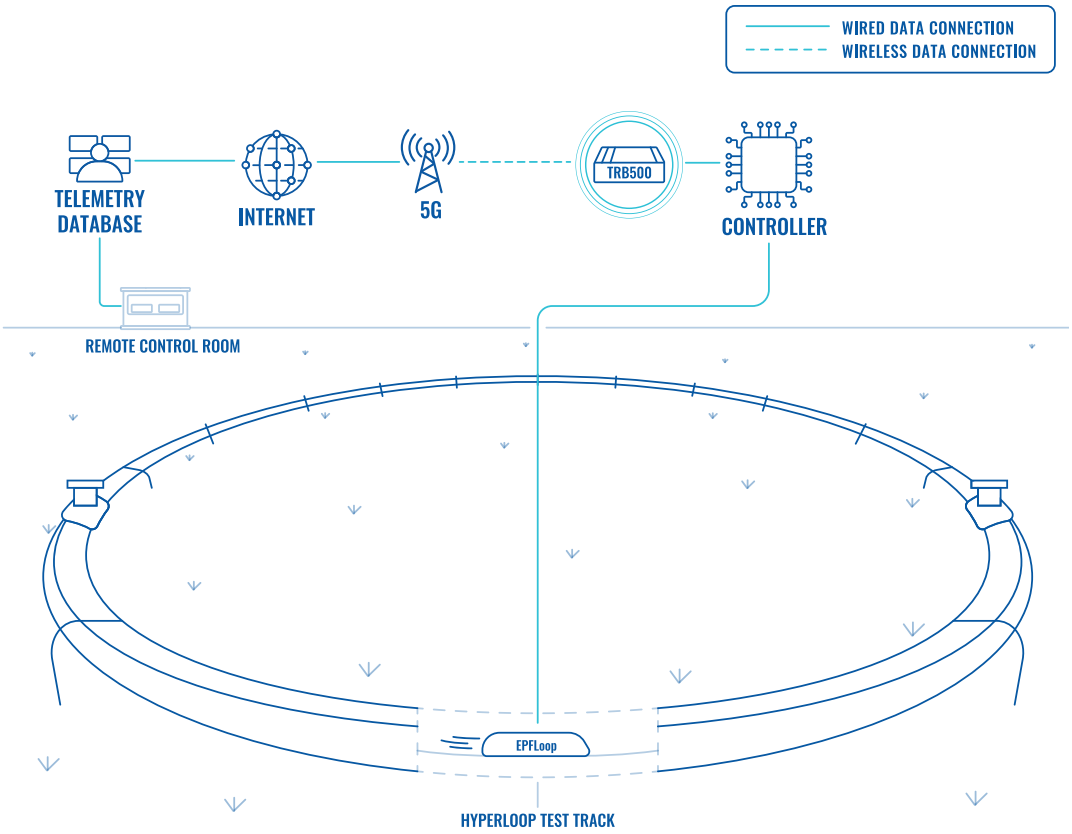
In order to solve this issue, the boundaries of transportation need to be pushed.

Indeed, pushing these boundaries is the aim of the EPFLoop initiative at the Swiss Federal Institute of Lausanne. Focusing on energy efficiency at the systemic level, the EPFLoop is part of the Hyperloop proposed ultra-high-speed terrestrial transportation system: a rail and pod infrastructure that moves through a very low air-pressure tunnel.

EPFLoop has developed a 120 m-long reduced-scale test track of the Hyperloop, in which it carries out rigorous testing. To effectively do so, facilitating connectivity between the pod and the control room is necessary. This is essential for the efficient and safe control of the pod, which requires real-time data exchange for operations like position identification, speed control, failure notifications, telemetry, and the activation of emergency breaks and alimentation cutoffs.

The challenge is that this low-pressure, high-speed environment results in strict size, weight, and energy consumption criteria. EPFLoop needed a 5G Stand Alone (SA) networking device that can withstand such a harsh environment, fully meet those criteria, and ensure that communication is effective, reliable, and low-latency.

TOPOLOGY



THE SOLUTION – THE 5G FUTURE OF TRANSPORTATION

EPFLoop chose our TRB500 5G industrial gateway to ensure wireless connectivity in its Hyperloop model solution. The TRB500 is a compact, energy-efficient 5G gateway perfect for solutions requiring ultra-fast data transmission with ultra-low latency. The gateway is placed in a cylinder inside the pod and is connected to a CompactRIO Single-Board Controller via Ethernet. From there, it provides up to 1 Gbps of uninterrupted 5G cellular speed using SA architecture.

However, apart from speed and reliability, the TRB500 has a few more tricks up its durable aluminum sleeve that make it the optimal choice for this particular solution. The atmospheric pressure of the cylinder the device is placed in necessitates it to meet the following criteria: it must be as light as possible, consume as little energy as possible, withstand high temperatures, and fit inside the 90 cm-long cylinder that's 12 cm in diameter.

The TRB500 easily meets all of these criteria. It boasts the standard Teltonika Networks operating temperature range of -40 °C to 75 °C, weighs only 241 g, and consumes up to 6 W at maximum capacity. At a size of 100 x 30 x 93,4 mm, this device is also very compact compared to its bulkier market competition.

Last but not least, this gateway offers good monitoring and customization options for ensuring the optimal functioning of the Hyperloop system. Compatibility with our Remote Management System (RMS) and support of VPN services and port forwarding are great tools for any form of mechanical experimentation, and its RutOS operating system is simple to work with but full to the brim with functionality and versatility.