

CASE STUDY

PowerBriX Cloud

Predictive Maintenance - IoT on the tracks



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Introduction

The world's first Auxiliary Power Supply (APS) with cloud connectivity is currently being brought to production. Embever, as IoT expert, has partnered with ABB Traction Converter (ABB) to set new standards in efficient power supply for rail vehicles. The task of the APS lies in the electrical onboard power supply of the train.

The innovative semiconductor technology based on silicon carbide and optimized system architecture makes the devices particularly compact and lightweight. In this way, PowerBriX helps to operate trains more efficiently and ecologically.

The software of PowerBriX already collects extensive data within the unit on, for instance, the energy consumption of the train's auxiliary units, the power network as well as the battery health. The operating status of the vehicle, the outside and inside temperature of the APS and commands from the control systems are also registered. This data is used to make maintenance predictions and analyze service events based on environmental conditions.

ABB is now taking the next logical step bringing PowerBriX to the Cloud. Operational data will be continuously recorded and evaluated to ensure top-quality service.



Pictures 1: Railway vehicles. Source: Canva

Challenge

As of yet, when a fault event occurred, device log data had to be extracted directly on the unit using diagnostics equipment. In some cases, this is done by the customers' mechanical staff or by the OEM. In the future, all data will be collected in the cloud, and events or anomalies will be automatically detected at a very early stage. Necessary services will be proactively suggested and scheduled remotely for better planning of maintenance and service. Time-consuming and expensive OEM on-site service will thus be significantly reduced.

Solution

With Embever Cloud as a Module (CaaM), Embever offers the appropriate module for PowerBriX expansion to the cloud. The CaaM-Module is integrated into a Service Module that is fitted into one of the APS' expansion slots.

Embever CaaM is the zero-touch one-stop-shop solution for Connectivity as a Service, allowing ABB to create and manage their own IoT product without additional complexity. Cloud as a Module comes as a complete bundle that includes everything from radio modules, eSIMs, communication protocols, IoT Cloud and Business System Connectors.



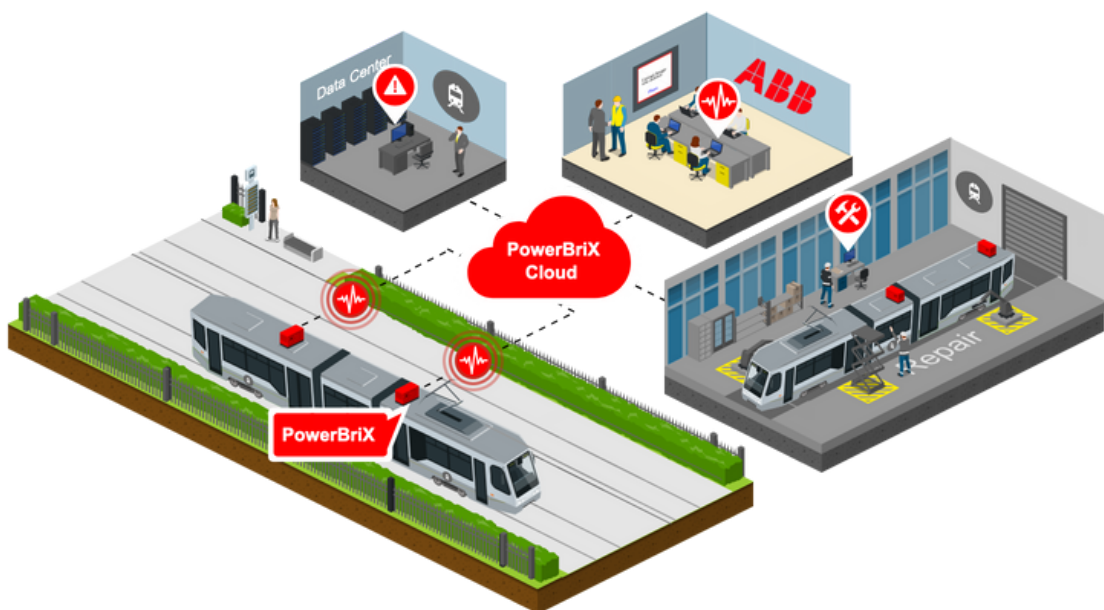
Picture 2: PowerBriX unit. Source: ABB Traction Converter

Objective

With this project, ABB wants to lay the foundation for a data-based analysis of trains and networks. In this way, train builders, operators and passengers will benefit equally from the insights gained from operational data.

By analyzing the data collected in the APS, it is already possible to draw conclusions about the energy consumption of the onboard networks, irregularities in the overhead lines, the CO2 footprint of the rail vehicles, the condition of the systems onboard and the number of trains on the line. With the help of the cloud, this data is available at any time and allows for live analysis of the vehicle itself, comparisons between different vehicles and the network itself.

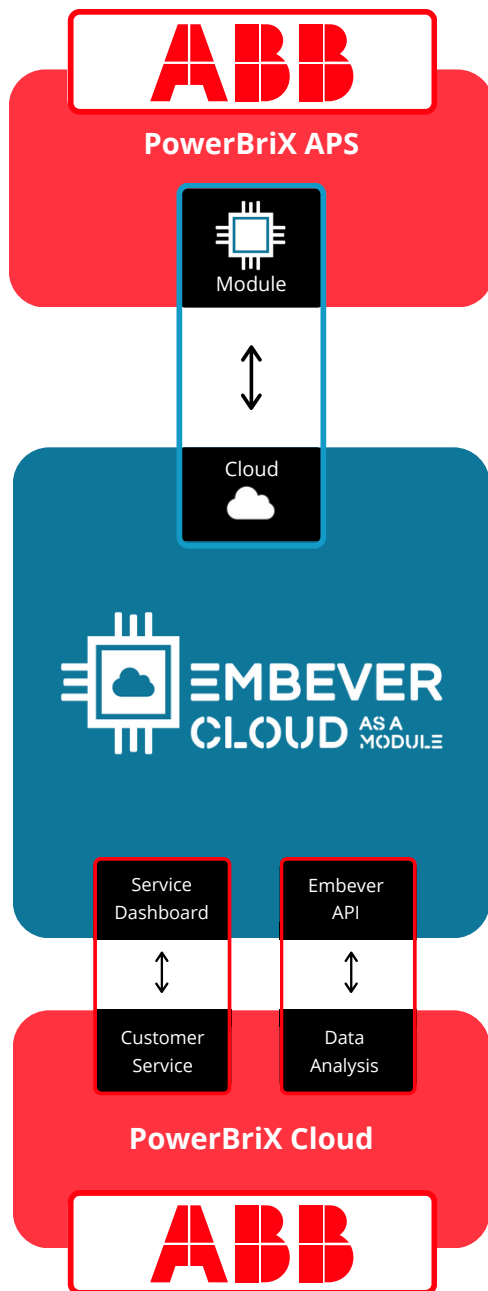
Work is underway to collect further data and make it available to external parties. For example, a map could show stress in the network in real time. Also, anomaly detection can predict potential breakdowns. The added value of such insights improves access to reliable, demand-oriented and environmentally friendly mobility for all road users.



Picture 3: PowerBriX Cloud System. Source: Embever GmbH

PowerBriX units on the traction units send operational data to the PowerBriX Cloud. There, the data is analysed by ABB and forwarded to operators' workshops and data centres.

System architecture



PowerBriX APS Hardware

The PowerBriX Cloud Service Module is inserted into one of the PowerBriX APS's Expansion Slots. The Service Module carries the Embever CaaM Module that handles all Data Communication with the PowerBriX Cloud.

Embever Cloud as a Module

The Embever CaaM Module communicates securely via the NB-IoT Cellular Network with the Embever IoT Cloud using specialized protocols. The Embever IoT Cloud manages all CaaM Modules and provides secure data channels for the PowerBriX Cloud.

PowerBriX Cloud

The PowerBriX Cloud receives the Data from all Service Modules and analyzes the APS's measurements to create predictive maintenance forecasts and to provide data for fast issue resolutions.

Become an IoT innovator

Would you like to develop an IoT product? Get in touch with one of our experts.

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