

FreeWire Technologies Uses Eurotech IoT Gateway and Everyware Cloud Platform for Smart Energy Charging Systems

Mobile EV charging stations utilize second-life batteries to deliver energy when and where it's needed.



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Challenge – Building a Scalable Smart Energy Storage Solution

Although electric vehicles (EVs) are gaining in popularity, one of the roadblocks for widespread adoption is charging capabilities. Drivers are hesitant to purchase electric vehicles due to a perceived scarcity of charging stations, and energy costs, while lower than gasoline, are still high. To address this need, FreeWire developed the Mobi Charger, a mobile EV charging station that can move from car to car to allow for easy charging at a workplace, mall or public parking structure.



Figure 1 – Mobi Charger

Early in the development process FreeWire wanted the Mobi Charger to provide a fast charging solution that lowered energy costs and was scalable with no permits needed to increase charging capacity. FreeWire envisioned the Mobi Charger would use advanced IoT technology to be efficient, scalable and simple to install.

FreeWire initially began with a basic communication system for sending the Mobi data to a backend server. “We hired a developer out of Lawrence Berkeley National Lab (LBNL) to build our communication protocol,” said Jawann Swislow, FreeWire Technologies Chief Commercial Officer. “We used a consumer grade single board computer and a consumer grade Wifi hotspot,

and our developer wrote basic code to pull data from the Mobi and put it on Rackspace.”

During the product development phase, the communication system worked okay, but it was unreliable and hard to change. “It didn’t serve our needs long term, since we believe EV charging data is valuable,” said Swislow. “We wanted a more reliable and robust setup.”

While looking at mobile carriers, FreeWire was introduced to Eurotech and found that Eurotech provides all of the IoT communication pieces that they had spent time creating in house. Eurotech offers an IoT gateway, cellular adapter, services and the [Everyware Cloud](#) platform developed to easily read data from devices and send it to the cloud for a complete IoT solution. FreeWire engaged with Eurotech to create a reliable, scalable communication infrastructure for the Mobi Charger.

“The basic architecture was already there with Eurotech. It didn’t make sense for us to continue building out something when we could buy the Eurotech solution on a similar budget that would also work better,” said Swislow.

IoT Enabling Hardware – ReliaGATE and ReliaCELL

FreeWire adopted Eurotech’s ReliaGATE IoT Gateway and ReliaCELL mobile cellular adapter inside of the Mobi Charger. The ReliaGATE IoT Gateway is a low power multi-service gateway that enables bidirectional communication between the Mobi Chargers in the field and the Everyware Cloud IoT Integration Platform. The [ReliaCELL](#) is a rugged cellular module for plug-and-play and highly-reliable cellular connectivity. The ReliaCELL saved FreeWire time and money because it comes pre-certified so they avoided the hassle and delay of certifying with cellular carriers.

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Figure 2 – Eurotech IoT Gateway with ReliaCELL module

The initial application developer had moved on, so FreeWire needed someone to finish transferring their basic code to the Eurotech platform. They found that Eurotech provided professional services as well, so they engaged with Eurotech to get their software deployed on the Eurotech hardware and IoT platform. FreeWire had made strong progress, and Eurotech filled in the gap to finish the development in approximately one week.

Bringing Valuable EV Data to the Cloud

There are three reasons FreeWire values the data they pull from Mobi Chargers. First, having real-time access to Mobi data assists in daily operations. For instance, early customer LinkedIn has one person managing the Mobi Chargers at the corporate office. They need to know where the units are, whether they are charging, and if the vehicle is finished so they can move on to the next vehicle. They need a lot of diagnostic information so one individual doesn't have to walk from Mobi to Mobi to see if a car is finished charging.

Second, FreeWire believes there is a lot of insight to be gained in EV charging data that most of the industry is ignoring. Predicting demand on the grid and having enough supply to meet demand is essential to the success of EVs. "An EV can draw more electricity than a house with a slow charge, and ten times as much with a fast charge," said Swislow. "Without data, it is hard to know with certainty when that hit on the grid will happen."

Last, they are using second-life batteries to power the Mobi, and as a result those need to be monitored very closely to make sure they are performing to the standards FreeWire expects. "We need to be able to predict when to perform maintenance and when to switch out the packs," said Swislow.

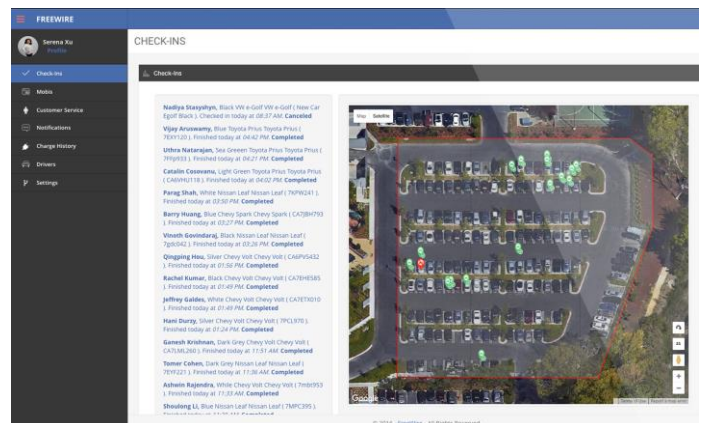


Figure 3 – FreeWire Check-ins Dashboard

FreeWire hopes the data they are gathering from Mobi Chargers will eventually show trends in when and where EV owners are charging. "EVs are predicted to be a large strain on the grid in the coming years and we need to know how to handle charging needs," said Swislow.

Since Eurotech hardware comes with the [Everyware Software Framework](#) (ESF) and is ready to connect to the Everyware Cloud, FreeWire went with Eurotech for those pieces to simplify the whole process and ultimately save time and money.

ESF is a comprehensive and targeted Java OSGi software framework for IoT applications that provides a secure, reliable bridge between the Mobi Chargers in the field and the [Everyware Cloud](#) platform. Today FreeWire has the Eurotech hardware in place, the application completed and an Everyware Cloud account, so they will begin to retrofit all of the Mobi Chargers with the new technology.

"Now that we have the code finished, we are in production and we will start retrofitting all of our Mobi Chargers with the new hardware so we have data flowing daily," explained Swislow.

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LinkedIn extended the initial pilot program to a 9-month commercial relationship to have 5 Mobi Chargers at their corporate office. FreeWire aims to have 100 units in the field by the end of the year and they are confident that the Eurotech solution will be able to grow and change with the company. “Instead of plugging in a USB to update each Mobi Charger, we can do it remotely,” said Swislow. “Once the hardware is installed we never have to touch it because software updates can be done automatically which is a huge benefit. This is what Eurotech is in the business of doing and their solution is a very good fit for our needs.”