INDUSTRIAL INTERNET IN ACTION   **CASE STUDY**

Keysight Technologies Helps IoT Device Manufacturer Cut 2 Months Off Its Development Cycle

EXECUTIVE SUMMARY

While developing a LoRa-based smart water meter for a smart grid application in the Industrial Internet of Things (IIoT), a device manufacturer realized it lacked the visibility it needed into its device's power consumption to effectively optimize battery life and find design flaws early in the design process. Accurately characterizing the device's current consumption and correlating it to RF or analog voltage/current events proved elusive and threatened to delay product development. For a faster, more accurate analysis of its device's current consumption, the manufacturer adopted Keysight Technologies' X8712A IoT Device Battery Life Optimization Solution and KS833A1A Event-Based Power Consumption Monitoring Software.

> *"Discovering the issue with power consumption early in our design cycle was incredibly beneficial. Finding the issue later would have cost us a great deal of time and resources and delayed shipping. Plus, our reputation would have been jeopardized."*
> -   Senior Design Engineer

THE CHALLENGE

One of China's largest water meter manufacturers set out to build a LoRa-based smart water meter that would provide real-time measurements of water usage and be embedded with a wireless module, enabling it to receive and perform commands from the server. Early in the product development cycle, the manufacturer struggled to get accurate insight into its device's power consumption and the critical events or subsystems that were contributing to that power consumption. Without this information, the development engineers did not have the knowledge they needed to make design changes or trade-offs to optimize the device's battery life.

As a critical component in an IIoT smart grid, the smart meter was required to have a battery life of at least 10 years. As a result, the manufacturer had to ensure its LoRa-based meter design would last at least that long in the field. Measurement was the only way to gain this confidence. However, LoRa devices have a long sleep time between each data transmission. This meant that to completely characterize the device's battery life, it would take a long time, since the manufacturer would need to capture the current waveforms over several transmission cycles. Using this approach, the product design cycle would have been greatly prolonged and result in a fragmented, inaccurate view of the device's battery life, risking the manufacturer's reputation for quality and precision in the water meter industry.

THE SOLUTION

The answer to the manufacturer's dilemma came in the form of the Keysight X8712A IoT Device Battery Life Optimization Solution and KS833A1A Event-Based Power Consumption Monitoring Software. Using the X8712A, the manufacturer quickly detected potential weaknesses in its design and was able to perform in-depth current consumption analysis to estimate battery life. The KS833A1A software then automatically correlated power consumption to RF or analog voltage/current events in the smart meter. This information proved critical in helping the manufacturer understand which parts of its device were consuming the most power, so that it could make changes to optimize its design, early in the development cycle.
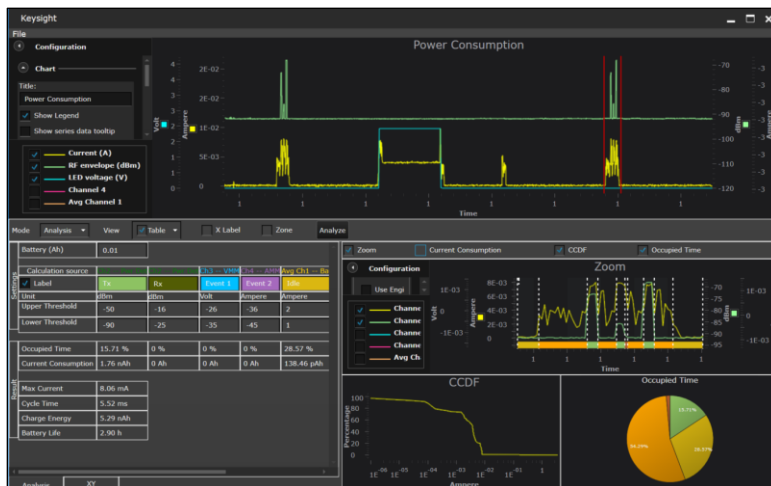
Event-based power analysis software showing correlation between RF/DC events and current drawn.

The manufacturer also leveraged the X8712A's data logging capability to perform post analysis of its device behavior. The analysis uncovered a problem. The battery capacity originally designed into the smart meter was unable to sustain the required battery life of greater than 10 years because the maximum current consumption was higher than what was expected at a specific spreading factor. In response, the manufacturer changed one of the module subsystems to reduce the overall power consumption.

RESULTS

Using Keysight's X8712A hardware and KS833A1A software solutions, the manufacturer quickly identified and fixed a potentially costly design flaw that was causing high power consumption in its smart water meter. In the process, the manufacturer cut 2 months off its development time and testing cycle and was able to deliver its smart meter to its customer on budget and ahead of schedule.

ABOUT KEYSIGHT TECHNOLOGIES

Keysight Technologies, Inc. (NYSE: KEYS) is a leading technology company that helps enterprises, service providers, and governments accelerate innovation to connect and secure the world. Keysight's solutions optimize networks and bring electronic products to market faster and at a lower cost with offerings from design simulation, to prototype validation, to manufacturing test, to optimization in networks and cloud environments. Customers span the worldwide communications ecosystem, aerospace and defense, automotive, energy, semiconductor and general electronics end markets. Keysight generated revenues of $3.2B in fiscal year 2017. In April 2017, Keysight acquired Ixia, a leader in network test, visibility, and security. More information is available at WWW.KEYSIGHT.COM

ABOUT THE INDUSTRIAL INTERNET CONSORTIUM

Keysight has been a member of the Industrial Internet Consortium since 2016. The Industrial Internet Consortium is the world's leading organization transforming business and society by accelerating the Industrial Internet of Things (IIoT). Our mission is to deliver a trustworthy IIoT in which the world's systems and devices are securely connected and controlled to deliver transformational outcomes. Founded in March 2014, the Industrial Internet Consortium catalyzes and coordinates the priorities and enabling technologies of the industrial internet. Visit www.iiconsortium.org.