Case Study

First IoT OCF-Over-Thread Embedded Module to Earn UL Certification

Cascoda

Innovation in IoT

Empowering Trust®

Internet of Things (IoT) devices are helping to build a more connected and secure world. The technology behind these devices exhibits increasing complexity, presenting challenges regarding interoperability, scalability, security and power consumption. IoT device manufacturers, such as Cascoda®, seek out UL's services to demonstrate that their advanced devices comply with applicable standards.

Founded in the U.K. in 2007, Cascoda supplies semiconductor radios and software platforms for IoT devices. Its new module, Chili2, is a low-power smart module that offers built-in interoperability, scalability and security for applications in smart homes and buildings. The module facilitates end-to-end wireless communications between devices, such as smart light bulbs and alerts, by incorporating two different connectivity technologies developed by not-for-profit groups: Thread and the Open Connectivity Foundation (OCF).

Thread – From Thread Group, this low-power wireless mesh IoT protocol focuses on the networking layer for smart homes and smart commercial buildings.

Secure IP Device Framework – From OCF, this is an application-layer protocol that allows IoT devices to securely communicate with each other or directly with the cloud, focusing on IoT communication in smart home, smart city and smart commercial buildings.

As the leading global IoT standard development organizations, Thread Group and OCF open standards

Chili2, low-power smart IoT module

are based on internet protocol (IP), support native IPv6 communications and use Datagram Transport Layer Security (DTLS). Both organizations provide certification programs that build trust in IoT devices by empowering manufacturers to bring certified, reliable products to market.

However, these technologies had remained distinct, as opposed to combining in the same small, embedded module, until the development of Chili2. Cascoda's module would be the first product seeking certification using the OCF application layer on top of the Thread network-layer communication technology – this is why the connected technologies industry refers to Chili2 as an OCF-over-Thread module. In addition to protocol certification services for the Thread and OCF technologies, Cascoda sought radio frequency certification for Chili2 with UL.

Because of global market demands for its smart module, Cascoda required a single-source testing provider with sufficient geographical scope, particularly in East Asia. With Thread Group authorized laboratories in Taiwan and China, UL was an ideal partner for Cascoda.

Three-phase certification process

To pursue the path of certification that Cascoda sought, the customer worked with UL to establish a multi-step testing strategy: radio frequency testing, Thread networking layer testing and OCF application layer testing.

Many electronic-electrical devices, such as Cascoda's smart module, emit radio frequency energy and must comply with the Federal Communications Commission's (FCC) specifications and European Radio Equipment Directive (RED). UL performed radio frequency testing on Chili2 and found that the product meets FCC and RED requirements; Cascoda obtained FCC/CE certification.

"UL's deep involvement with global standardization bodies gives the company technical expertise on standards from particular industries and products."

– Bruno Johnson, CEO, Cascoda

Meeting the challenges of testing to new standards

Certification services for Thread and OCF testing raised several project challenges. “Besides being the first-ever small, embedded OCF-over-Thread module in the world, our biggest challenge was the fact that these new IoT standards incorporate the latest security features,” said Bruno Johnson, Cascoda’s CEO.

To overcome these challenges, UL’s Engineering teams liaised with the OCF and Thread certification workgroups throughout the whole project. “Through our positive and close relationship with both certification workgroups, we helped Cascoda to meet the OCF and Thread compliance needs simultaneously,” said Answer Sung, UL’s operations manager of Consumer, Medical and Information Technologies.

“UL’s deep involvement with global standardization bodies gives the company technical expertise on standards from particular industries and products,” Johnson said. UL shared its knowledge regarding these standards with Cascoda’s engineering teams.

With UL’s support throughout the entire process, the OCF and Thread Group certification workgroups reviewed the test report and issued the certificate to Cascoda Chili2.

The smart module became the first-ever certified OCF-over-Thread IoT module supporting IP public key infrastructure security.

First-ever certified OCF-over-Thread small, embedded module

Following the FCC, Thread and OCF certifications, Cascoda expanded its reach in the Asia Pacific region. One Cascoda customer in Taiwan, a smart city solutions provider, immediately adopted the Chili2 low-power IoT module into smart, energy-saving LED streetlights at National Taipei University.

Chili2 also facilitates wireless communication in smart parking meters in Hong Kong and Macau, inspiring another Cascoda customer to use the module for similar parking meter projects across Greater China.

Thread is a gateway-free wireless mesh networking protocol for IoT devices in smart homes and smart commercial buildings. Based on the universal IP, it supports IPv6-based connectivity standards. Thread allows secure development of an interconnected network of low-power IoT smart devices directly with the cloud as well as communication between devices.

The Thread Group leads market education around the Thread networking protocol. It has a rigorous certification program and selected UL as its third-party testing laboratory.

In its capacity as the transport and networking layer of IoT technology, the Thread Group actively collaborates with many application-layer technologies such as Apple HomeKit and OCF.

The Open Connectivity Foundation (OCF) is a global, member-driven technical standards development organization. Its 500+ members are working to enable trust, interoperability, and secure communication between IP-connected IoT devices and services. It does this by fostering collaboration between stakeholders across the IoT ecosystem to deliver the freely-available ISO/IEC specifications, including the Secure IP Device Framework, its open-source reference implementation, and an industry-recognized certification program. This enables innovative new secure use cases and user experiences, reduces development costs, integration complexity and time to market, and simplifies regulatory compliance to IoT security and privacy baselines.

OCF members work across the enterprise layers of infrastructure, applications, and data. They collaborate to co-create and deploy systems in an open and standardized way, enabling devices to communicate over IP, regardless of form factor, operating system, service provider, transport technology, or ecosystem.

In its capacity as the application layer of IoT technology, OCF liaises with other active consortia and standard bodies in the IoT universe such as Wi-Fi Alliance, CSA and Thread Group.

Discover more about UL's testing and certification services for advanced IoT protocols at UL.com/services/thread-group-certification-testing-iot-devices.

UL.com

CS65462 - 0222