



ENGINEERING
TOMORROW

Danfoss Thermostats as Smart Connected Products using SecureDeviceGrid™

The Danfoss Living™ products are a series of thermostats and sensors enabling the customers to have perfect heating comfort in their homes and minimize their energy consumption.

Inside the home the thermostats and sensors are connected to a central controller using wireless technology to control the heating of the home. But in order to bring increased value to the customers a smartphone integration to the Danfoss Living™ platform was planned by Danfoss as an Internet-of-Things (IoT) solution.

The challenges

The main challenge was to access the Danfoss Link™ central controller inside the home from a Smartphone connected somewhere on the internet. Danfoss prioritized the system security and the data privacy of the customers very highly. All information about the status of the heating system should be kept safe and was only to be displayed to the individual customer. At the same time Danfoss should be able to offer customers support in relation to setting up the system and troubleshoot any connectivity issues once installed. Without a total secure connection to the devices Danfoss was not willing to enter the market of IoT.

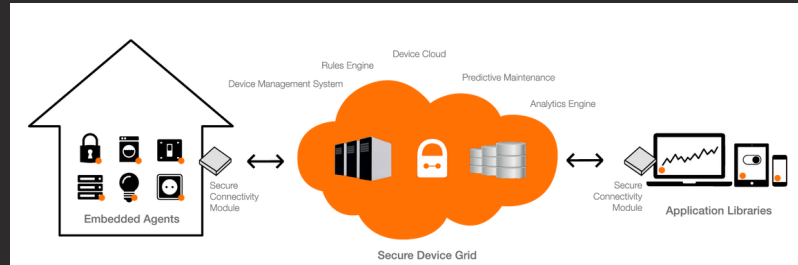
Another challenge was to secure scalability and accessibility and at the same time minimize the operational cost per controller. The system should be able to handle a very large number of simultaneously connected devices from all over the world. The accessibility of the system had to be very high, running 24/7 with no single point of failure.

The solution

Trifork was given the challenge to find a solution on the connectivity and communication issues. This was done in very close collaboration with the Danfoss software developers who were programming the central controller.

After the solution was developed all of the central security elements were documented and reviewed by several external international security experts providing a blueprint for the building of the system based on SecureDeviceGrid™.

The SecureDeviceGrid™ software was integrated into the existing controller through a small software footprint and an easy to use API providing the handles for pairing the Smartphone with the controller and encrypting the data sent between the controller and the Smartphone. Cloud services provides the control mechanism to connect the controller inside the home with the Smartphone on an external network. The Danfoss Living™ support team are able to access the SecureDeviceGrid™ Device Management System in order to resolve problems with installed heating controllers.



Working with Trifork

“Trifork has proven to be the right partner bringing both innovation and the right technologies into our domain. In a short timespan they were capable of delivering the basic security and connectivity elements to our engineers which enabled us to focus on the embedded platform”, states Peter C. Andersen, Senior Director, R&D, Danfoss and continues: “With a coordinated agile project approach, Trifork delivered the right functionality as the features were implemented on the central controller of the Danfoss Link™ system. Due to the solid design of the SecureDeviceGrid™ platform the service has been running 100% of the time since it was launched in the autumn of 2014”.

Trifork continues to work on new features on the Danfoss Living™ product and provides operational support to the cloud platform of the system.

SecureDeviceGrid™

The SecureDeviceGrid™ product from Trifork is a state-of-the-art IoT platform providing not only secure, private and scalable connectivity to Smart Connected Products. The product also offers analytics that can give detailed information about the status of the installed devices. Fast and reliable connectivity from a mobile device to devices inside any normal firewall are provided as the basic feature of the platform. Building blocks like software update, predictive maintenance and analytical intelligence can extend the platform and enable new business models for Smart Connected Products. The footprint of the security software is less than 40k and can be integrated on even the smallest CPU boards like the \$5 Raspberry Pi Zero or TI CC3200.

SecureDeviceGrid™ provides the fastest way for a company to build connectivity on existing products and the IoT domain knowledge of Trifork will secure a solid implementation in any infrastructure.

Peter C. Andersen, Senior Director, R&D, Danfoss:



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