

 IDnomic Embedded Security

Secure Elements for smart home applications



 infineon

Atos

Using cryptographic functionality provided by Atos to secure embedded platforms in Smart Home Applications

Application context and security requirement

With today's Smart Home Applications more and more home devices are connected to the internet and IT security becomes more and more an issue. Smart Home devices are an attractive target for attackers, so confidentiality, integrity and authenticity must be maintained and additionally privacy protection becomes a concern.

Challenge

With the increase in networking in the Smart Home area, communication must be protected in order to prevent attackers manipulating data. This protection is mainly based on the secured storage and processing of cryptographic keys. These keys are used to prove the integrity and authenticity of data, which can be checked by cryptographic signatures. Additionally, for certain applications, some messages must also be encrypted. And the integrity of software running on application controllers needs to be monitored. The most efficient solution for those requirements is a dedicated secure element, providing much better security than software only solutions. The Smart Home secure element must provide the typical hardware interfaces used by the microcontrollers integrated on the respective controller boards.

Implementation

The Atos solution is based on a dedicated security controller which can be easily integrated into existing Smart Home controller without deeply affecting the complete board design. Infineon's SLE 78 was selected as the security chip to provide state-of-the-art security as known from the smart card area and in addition the needed hardware interfaces. Together with the chip platform Infineon provides a cryptographic library which supports the cryptographic functionality.

On top of this platform Atos implements its well-known operating system CardOS®, which performs the cryptographic functionality over standard interfaces like ISO 7816, SPI or I2C.



CardOS is a multifunctional native operating system, which provides a high level of flexibility by adapting the file structure. In addition, it is extendable by customized packages to amend or adjust the operating system functionality.

To ease implementation of the cryptographic functionality Atos also offers the abstraction layer CardOS API (Application Programming Interface), which appliance developers will use to access the keys and cryptographic functionality of the Atos secure element via high level interfaces.

User benefits

- State-of-the-art crypto functionality provided by a certified chip platform based on Integrity Guard and SOLID FLASH™ and CardOS™ operating system
- Easy integration of cryptographic functionality by embedding a dedicated secure element into an existing board design
- Easy implementation of cryptographic functionality in application controllers by integrating CardOS API

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The control units of Smart Home devices like heating installations, air conditioning systems, alarm systems, entertainment electronics and many other devices communicate with each other and externally. Especially the external communication is critical because an attack using this attack surface endangers the functionality of the devices and enables a fast proliferation within the devices of a Smart Home appliance provider. To achieve the best protection for external communication a dedicated secure element should be used within these Smart Home devices rather than relying on a software based security solution.

The secure element provided by Atos uses Infineon's SLE 78 chip as hardware platform and the CardOS operating system. The interface to the application controller is either ISO 7816-3 (T=1), SPI or I2C, with the last two being commonly used in embedded microcontrollers.

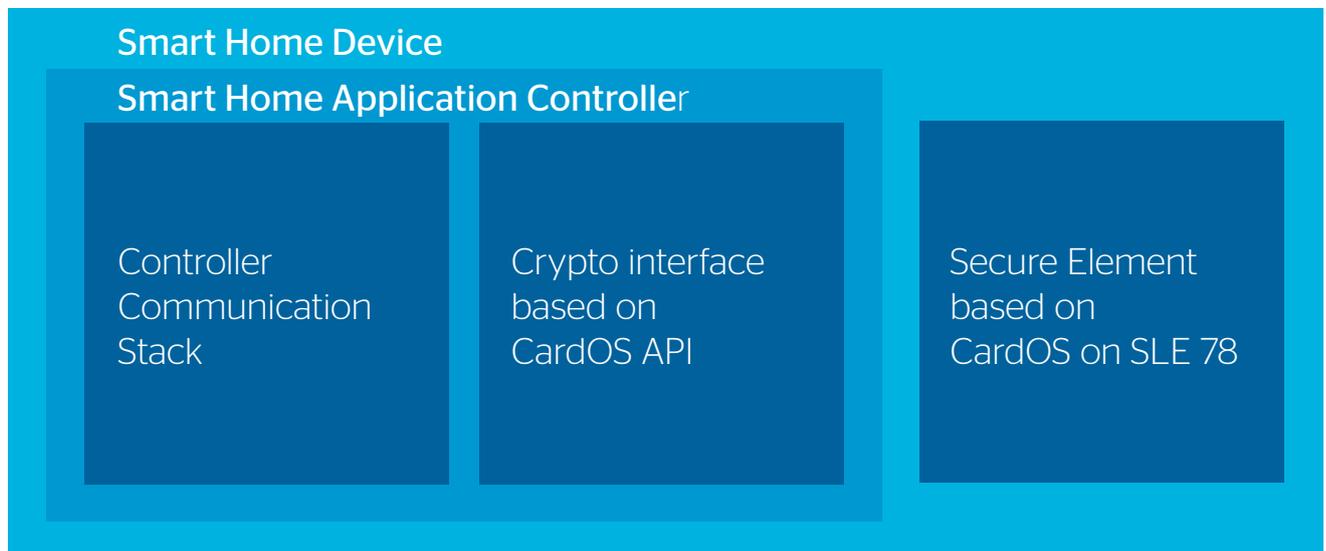
The multifunctional native operating system CardOS provides all required state-of-the-art crypto functionalities like:

- Key generation and secure key storage
- Authentication with application controller or another communication end point
- Signature creation and validation
- Message encryption and decryption
- Cryptographic Algorithms: 3DES, AES (up to 256 bit), AES CMAC, SHA-2, ECDH (up to 521 bit), EC-KAEG, RSA (up to 4096 bit), ECDSA (up to 521 bit)
- True Random Number Generator (class PTG.2).

Applications are supported by a dynamic, highly flexible file system based on the ISO 7816-4 standard. In addition to the comprehensive basic functionality of the operating system, CardOS allows users to add additional functionality by loading

software enhancements. Besides that this mechanism also offers the possibility to change existing functionality thus offering a patch mechanism for the operating system.

To simplify the software interface to the secure element, Atos provides in addition CardOS API. This API serves as an abstraction layer for using CardOS based secure elements, thus avoiding the complexity for the customer by dealing with low level communication. CardOS API allows applications to connect the secure element using standard interfaces. CardOS API will also support IoT specific platforms such as Embedded Linux or Windows 10 IoT.



Main benefits of the Infineon product

The SLE 78 SOLID FLASH™ family is Infineon's state-of-the-art generation of 16-bit security controllers optimized for high security applications. With its Integrity Guard technology it provides highest standards for security controllers available on the market. Being certified according to Common Criteria EAL5+, the SLE 78 family meets the highest security levels for implementation of Smart Home security applications.

About Atos

Atos is a global leader in digital transformation with 110,000 employees in 73 countries and annual revenue of € 12 billion. European number one in Cloud, Cybersecurity and High-Performance Computing, the Group provides end-to-end Orchestrated Hybrid Cloud, Big Data, Business Applications and Digital Workplace solutions. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and operates under the brands Atos, AtosSyntel, and Unify. Atos is a SE (Societas Europaea), listed on the CAC40 Paris stock index.

The purpose of Atos is to help design the future of the information space. Its expertise and services support the development of knowledge, education and research in a multicultural approach and contribute to the development of scientific and technological excellence. Across the world, the Group enables its customers and employees, and members of societies at large to live, work and develop sustainably, in a safe and secure information space.

About Infineon Security Partner Network

Partners from the Infineon Security Partner Network help you secure your devices and applications: understand which threats can undermine your business, propose solutions that will protect your business, build and implement such security solutions and, when relevant manage their operation. They have been selected by Infineon on the basis of their system security competence and ability to design and deliver strong and trustworthy security solutions. Their activities are diverse and include security consulting, security solution provision, electronic design, systems integration and trust services management. For some, offers are off-the-shelf; while for others, offers are custom-built

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