ITEA 3

Project Results

PARFAIT

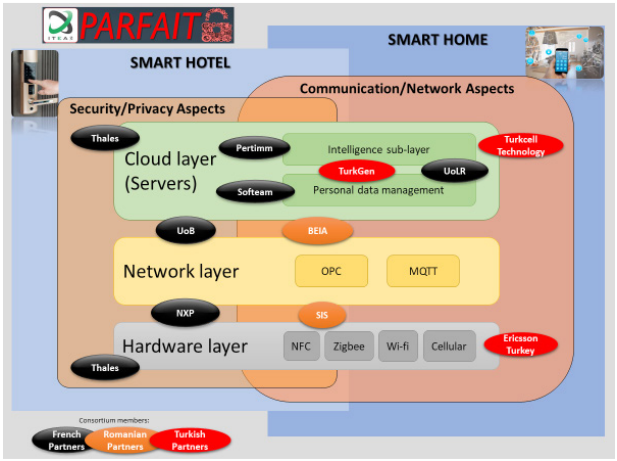
Connecting IoT with greater security

EXECUTIVE SUMMARY

To enable greater security and interoperability in IoT, the ITEA project PARFAIT has developed a framework and methodologies for personal data protection. With a focus on smart living, the project targeted emergent needs in the IoT domain as a gateway to largescale applications and business cases.

PROJECT ORIGINS

By 2020, Internet of Things (IoT) had transformed the internet into a global network connecting billions of communicating objects – 52% of which featured no security countermeasures. The threat of personal data misuse makes security the most significant barrier to the growth of IoT applications. Additionally, a lack of structures for interoperability increases the complexity of services and application development; complexity increases production and maintenance costs. These challenges must be met if IoT is to redefine human-computer interactions for the better.



To open the path to more securely connected ecosystems, the ITEA project PARFAIT (Personal Data Protection Framework for IoT) has developed a framework for personal data protection in IoT applications. This defines indistinct aspects of IoT, interoperability and privacy through the implementation of rules, guidelines and methodologies. The framework's modules and guidance can be combined and utilised in the development of new solutions, having already been implemented in two use-cases: Smart Home and Smart Hotel. By increasing the security of IoT, PARFAIT offers knock-on benefits in better communication, reduced costs and greater access to services.

TECHNOLOGY APPLIED

PARFAIT examined IoT through the lens of smart living and has produced an integrated solution for security & privacy and interoperability.

Although the hotel use-case dealt more with security & privacy and the home use-case more with communication and network aspects, the same three-layer (cloud, hardware and network) architecture can be applied in both domains. The cloud layer contains an intelligence sub-layer and personal data manager; the former enables PARFAIT to provide a good user experience (such as with chatbots that allow humans to interact with IoT devices) while the latter manages privacy in situations such as hotel reservation.

In the hardware layer, different solutions are brought together to increase operability. Hotel door locks, for instance, mostly use Near-Field Communication (NFC) whereas actuators in the home predominantly use Wi-Fi. Cellular technology and the Zigbee specification are also integrated into this layer. OPC and MQTT protocols in the network layer enable these forms of hardware to communicate with IoT devices. Other key technological innovations within the project include secure chipsets for IoT, an NFC/secure element (SE) combination for IoT implementation in hotel door locks and a Personal Information Management System (PIMS) for IoT.

Ethical AI is an important aspect of PARFAIT, which has also investigated data anonymisation for privacy. In order to guarantee user trust in the project's legal and moral responsibilities, Thales has implemented the FIDO standards via the FIDO Alliance, which aims to enhance authentication standards and reduce reliance on passwords. They have also participated in a workgroup (IOT TWG) for IoT device attestation/authentication profiles to enable interoperability between service providers and IoT devices, automated onboarding and

binding of applications and/or users to IoT devices and IoT device authentication and provisioning via smart routers and IoT hubs.

MAKING THE DIFFERENCE

PARFAIT has enjoyed rich technical and commercial results, which will continue to be developed through standardisation and future projects. Perhaps the most important technological result is the development of the Smart Hotel platform to TRL 4 (a hardware and software-based demonstrator), which is a vital step towards validation in an operational environment. Dissemination of the project's core security and interoperability concepts is also aided by its achievements in user experience: Turkgen's chatbot, for instance, has reached an 85% understanding of written Turkish and English versus a state-of-the-art of 75%.

As interoperability and security issues currently limit the deployment of global IoT applications, huge business potential lies in the standardisation of frameworks and practices – including commercial access to a market set to be worth USD 11.1 trillion by 2025. This brings benefits for companies of all sizes. SME Beia, for example, expects revenues of EUR 150,000 within five years of PARFAIT exploitation, while giant NXP expects to maintain its largely dominant share and leadership position in the mobile NFC market despite rising competition. Other notable achievements include a patent by Thales (an invention related to a method for post-issuance of operating systems within PKI infrastructure) and the recruitment of 22 new personnel across seven of the project's partners.

Further dissemination is ongoing, with PARFAIT having so far attended 12 events and released 17 publications. It also forms a basis for two future ITEA projects, IoT Security and NGAST, through which the longevity of the project's results can be strengthened and guaranteed. As NGAST will focus on static code analysis for security, PARFAIT's successes will also take on a broader scope and become applicable in more areas. In regard to standardisation, Thales has met its target of reaching level 3 in FIDO implementation and has involved over 130 FIDO2-certified authenticator providers. This will help to transfer knowledge from PARFAIT worldwide, leading to greater security, lower IoT production and maintenance costs and a paradigm shift in our interactions with machines.

MAJOR PROJECT OUTCOMES

Dissemination

- 17 publications, 12 event participations and 31 presentations

Exploitation (so far)

New products:

- Secure chipsets in IoT
- Generation of smart eIDAS/Fido Token for IoT
- Certification of FIDO2 Authenticator
- Smart Lock/Door
- Gateway for secure IoT data collection

New services:

- Integrated bot with IoT Platform
- Mobile and remote access for Smart Home data
- Communication service via instant messaging application
- OPC Interface in IoT Gateway
- Multiligual NLP platform
- Bid-Aware Privacy-Preserving data collection in IoT

New systems:

- Single chip NFC/Secure element for Android
- Personal Information Management Systems for IoT
- Secure reservation system

Standardisation

- Participation in the FIDO standards via the FIDO Alliance-IoT Workgroup

Patents

- 18306538.2 Invention related to a method for post-issuance of operating system within a PKI infrastructure

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Partners

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PERTIMM
Softeam
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University of Burgundy
University of La Rochelle

Romania

Beia
Societatea de Inginerie Sisteme SIS

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Project start
January 2018

Project end
December 2020

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