TETRACOM: Technology Transfer in Computing Systems

FP7 Coordination and Support Action to fund 50 technology transfer projects (TTP) in computing systems.
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Analysis of security risks & threats and the design of a hardware secure module to perform cipher algorithms for automotive applications

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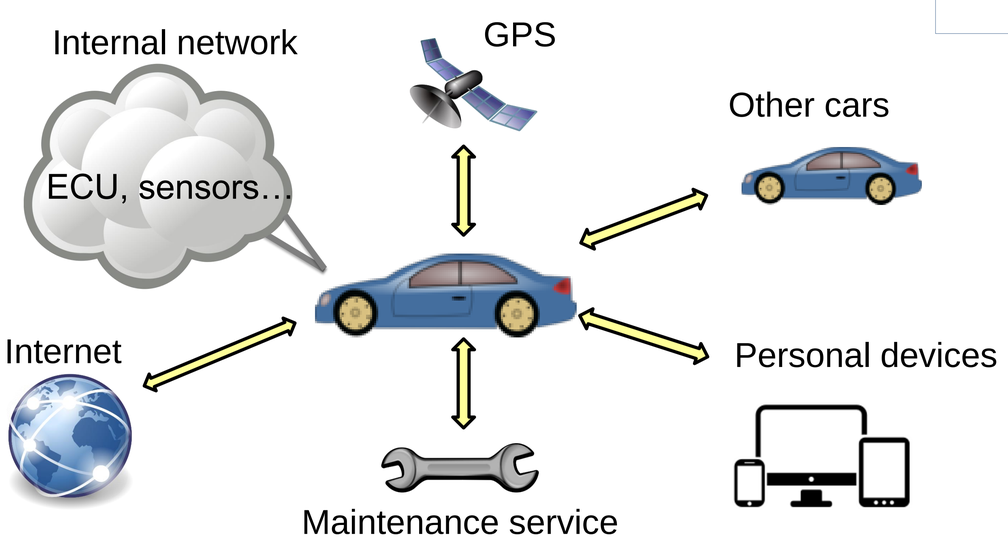
TTP Problem

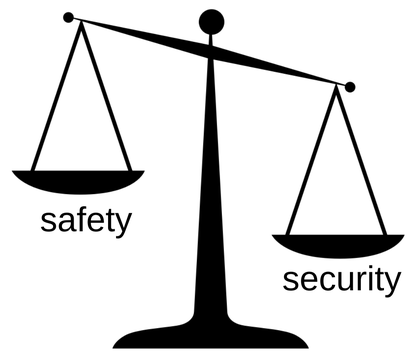


Problem and context

- Increased car connectivity with external entities and other cars
- Security issues that can involve safety related ECUs over the car internal network

Pure software solution drawbacks

- Slowness in safety timing constrained environments
- Resource inefficiency
- Weak SW level security countermeasures



TTP Solution

Secure HW (SEC-HW) for each ECU microcontroller that guarantees:

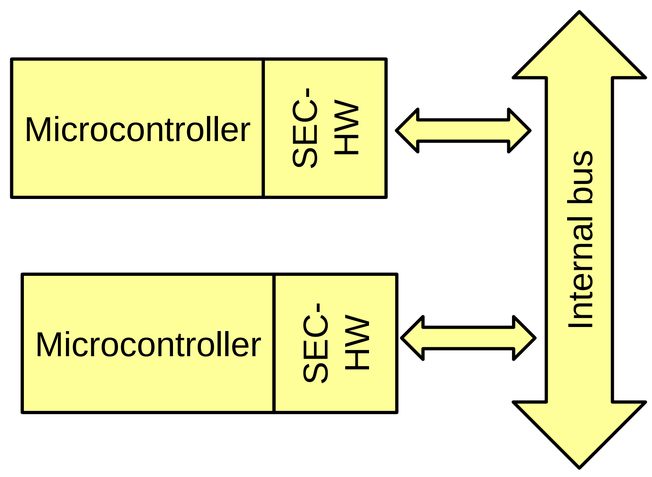
- Memory/data encryption (using cryptographic algorithms)
- Random number generators
- Bus data encryption
- Tamper resistance

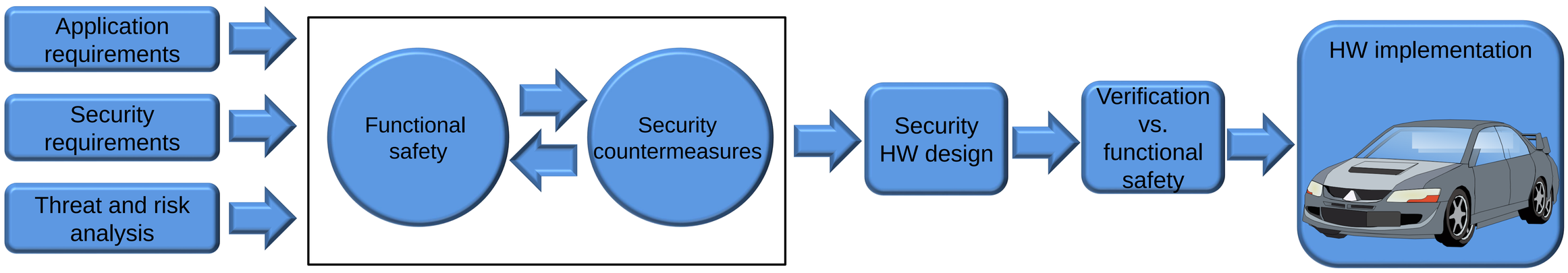
The Safety-Security trade-off is carefully evaluated to do not decrease the performances in terms of :

- Latency/throughput
- Area
- Power consumption

Architectural choices:

- Strong flexibility that allows a SEC-HW for each application-security requirement (e.g. strong security -> AES-256, low security AES-128)
- AES cryptographic algorithms fully compliant with the MACsec IEEE 802.1AE standard
- Key exchange of the cryptographic algorithm fully compliant with the MACSec Key Agreement (MKA) IEEE 802.1X-2010 standard





TTP Impact

Increased security of the automotive environment

- Protection of the data flowing over the internal buses
- Reduction of risk for the user, in particular when safety critical tasks are required
- Strong flexibility in order to cover additional threats, technologies and requirements
- Reduction of costs on high volumes using optimized special circuitry instead of general purpose hardware

Additional security features

- Identification of malicious software, using the hardware as trusted security anchor
- Acceleration of the security hardware using specialized security hardware

Future work

- Security countermeasures to protect the user in case of communication with other car or the infrastructures
- Privacy and authenticity protection when communicating with external entities

TTP Facts

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