Are we ready for the connected car?

A look into automotive security from a microchip perspective

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Infineon

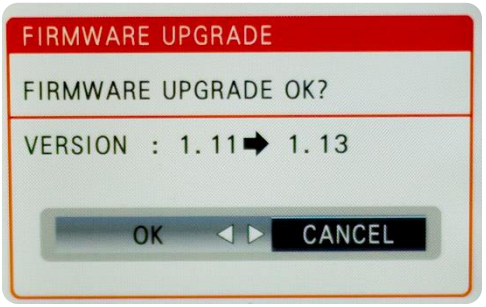
Agenda

- Connected Car Will Change Our Industry
- A Look Into Automotive Security – Some Basics
- What's Needed For Automotive Security

Connected Car Will Allow

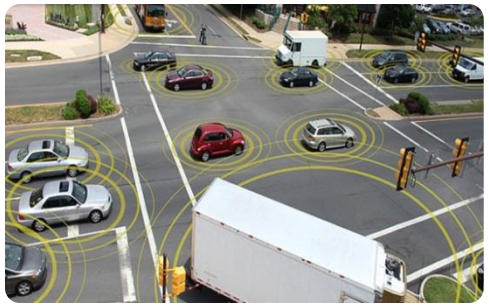
Apps

Content from Cloud



Software Updates

V2I for Convenience



V2V for Safety

Connect Car Will Allow Autonomous Driving

Convergence of Automotive & Consumer Worlds

Similar to the PC Market
History Repeats Itself – Changing Value Stream

November 6, 2013

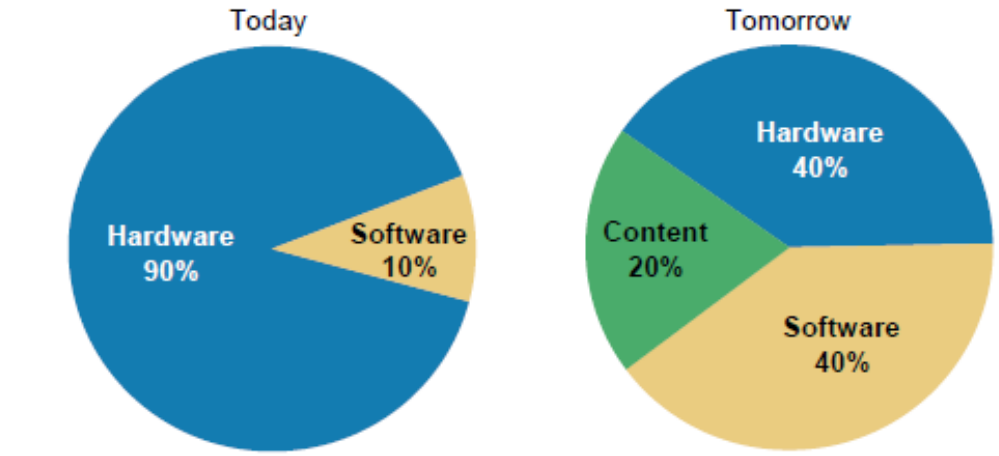
MORGAN STANLEY BLUE PAPER

Autonomous Cars

Self-Driving the New Auto Industry Paradigm

Exhibit 59

Value of the Car – Today vs. Tomorrow



Source: Morgan Stanley Research

What does this mean?

New Requirements are Necessary to Support the Connected Car

New Requirements for Connected Cars

Safety

Protection against ***unintentional*** errors, malfunctions and anomalies

Functional Safety

Security

Protection against ***intentional*** errors, tampering, theft and data privacy

Dark-Side Scenarios

Automotive Security Dark-Side Scenarios

www.autosec.org

2011 **Comprehensive Experimental Analyses of Automotive Attack Surfaces**

2010 **Experimental Security Analysis of a Modern Automobile**

Papers' Conclusions

"…should be read as a **wake-up call**…"

today's car owners should not be alarmed, …it is time to focus squarely on **addressing…automotive security** issues…"

"potential analogy with desktop personal computers… pervasive **broadband connectivity** exposed… latent flaws… to attackers…"

"…will require a concerted effort from **all relevant stakeholders**…"

February 2015 Examples

BMW Security Patch

SECURITY 2/02/2015 @ 8:45AM | 5,882 views

BMW Update Kills Bug In 2.2 Million Cars That Left Doors Wide Open To Hackers

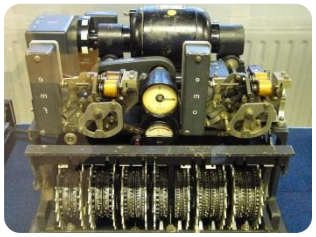
+ Comment Now + Follow Comments

Senator Markey Report with 8 Key Findings

http://www.markey.senate.gov/news/press-releases/markey-report-reveals-automobile-security-and-privacy-vulnerabilities

Basic Security Elements/Functions

Secure Memory
For
Passwords & Certificates



Cryptography
For
Encryption & Decryption

Authentication
For
Genuine Confirmation

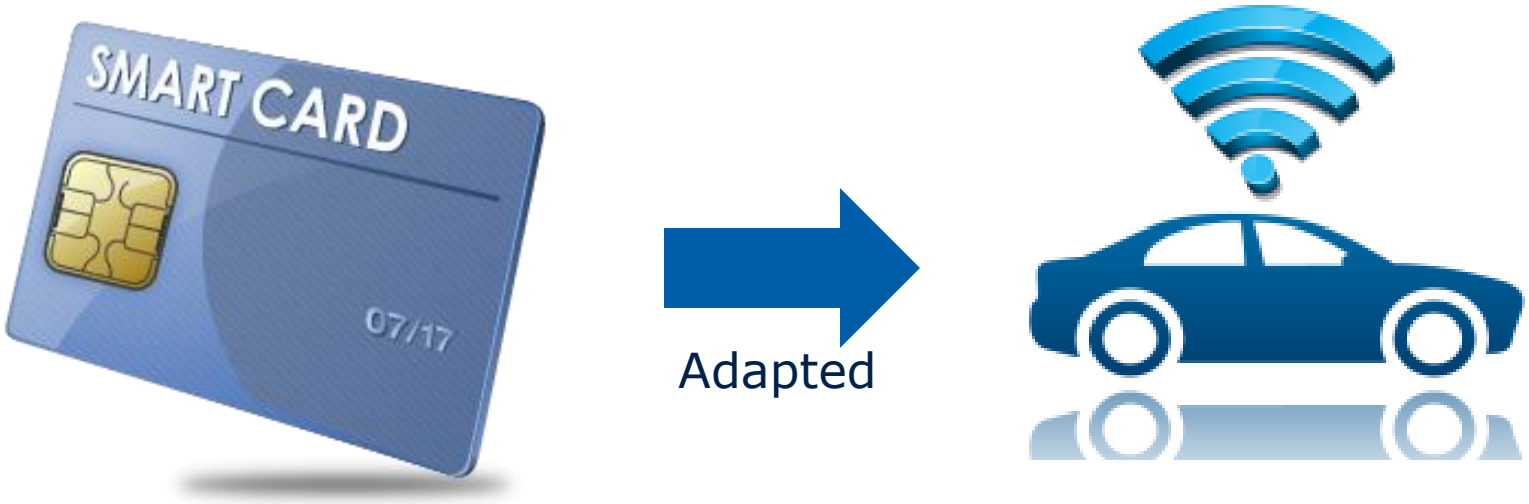
Root of Trust
Designed As & Always
Assumed As Genuine

Revocation
Is the ability to Cancel
Security Clearance

Security Technology Already Exists

Smart Card Security Technology

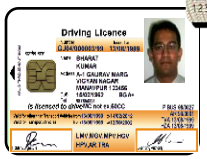
Will Be Needed For the Connected Car



Smart Card Security Technology = Dedicated Security Microcontroller

Smart Card's Since 1980's

3G Phones



e-Passports

Debit Cards

Content Protection

Computers

GSM Phones

Pay-TV

Debit / Credit cards

Applications

Prepaid Phone Cards

Health Insurance

ID cards

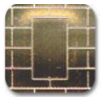
Patient cards

Ticketing

1980's 1994 2000 2006 ...

Technologies

Secure Memory Card



Contactless Chip Cards

Secure Controller Cards

Contactless Label/ID/Tags

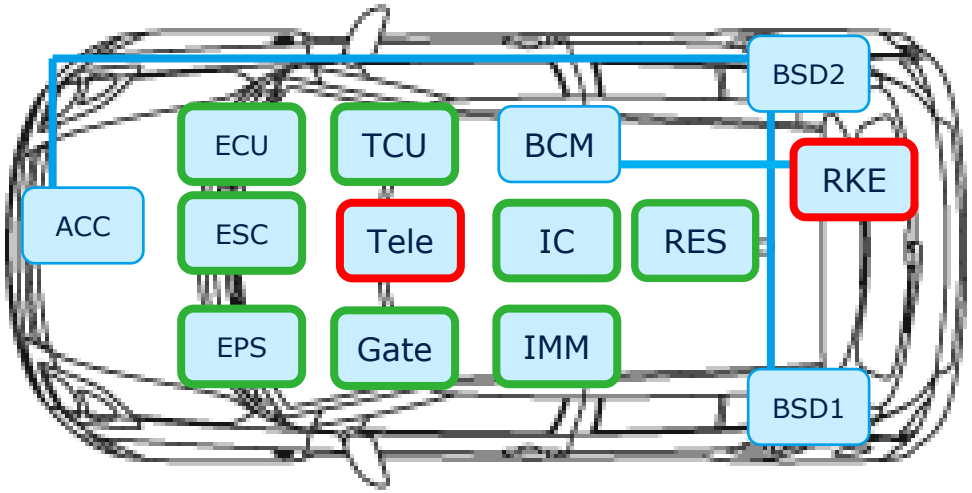
Trusted Platform Modules

Automotive Security Questions

With Up to 70 ECUs in a Modern Car

What Security Technology Adaptions are Needed?

Which ECUs Need Security and to What Security Level?

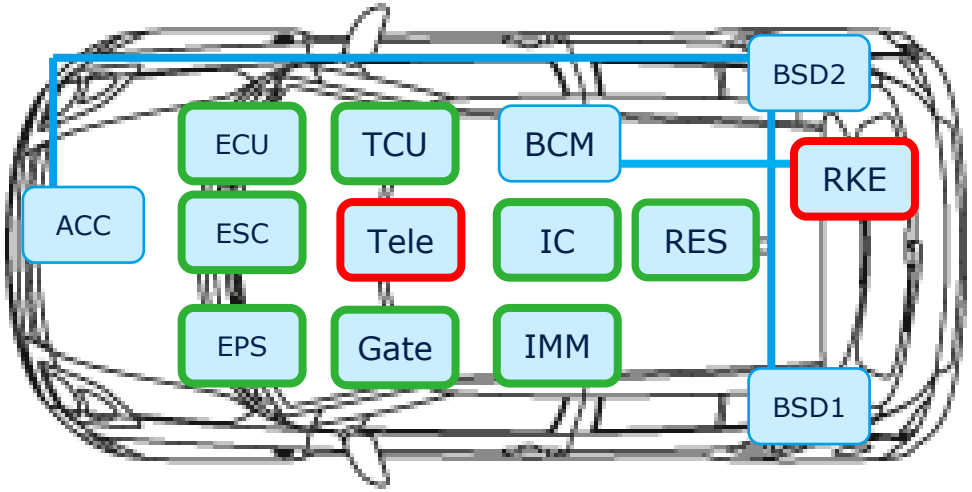


ACC – Adaptive Cruise Cntl
BCM – Body Cntl Module
BSD – Blind Spot Detection
ECU – Engine Cntl
EPS – Steering
ESC – Braking / Stability
GATE – Gateway
IMM – Immobilizer / Ignition
IC – Instrument Cluster
RES – Restraint / DCU
RKE – Remote Entry
TCU – Transmission Cntl
Tele – Telematic / Radio Ent.

Automotive Security Architecture

Car Makers will have to Consider Security

in Future Electrical Architectures

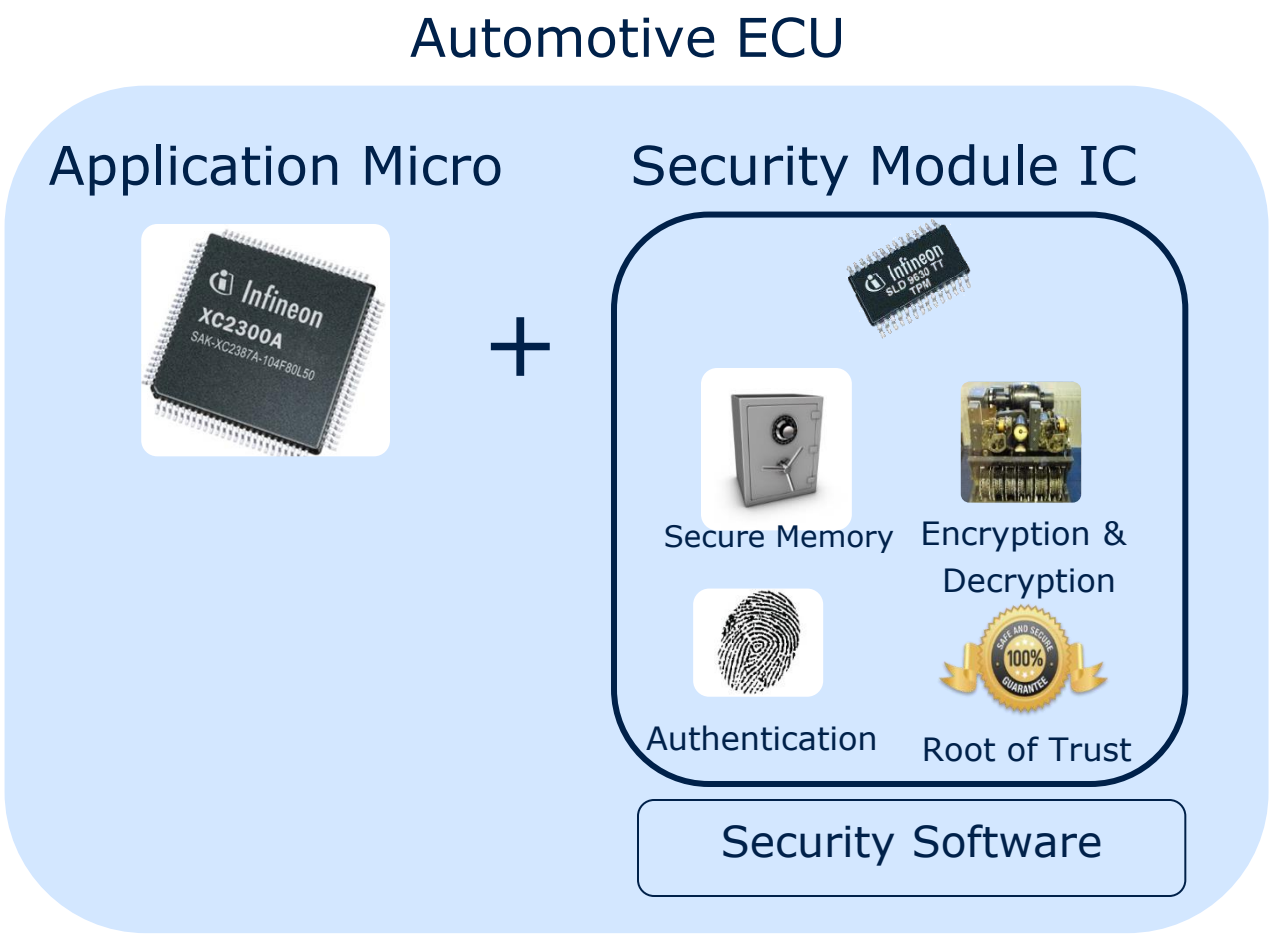


ECUs Will Need

Specialized **Security Hardware**

Specialized **Security Software**

Stand Alone Security IC Example



Considerations:

- Security Level
- Performance Needs
- Automotive Qual?

Be Aware: Non-Automotive Security ICs May Work

But, Most Are **Not Designed for Automotive** Applications!

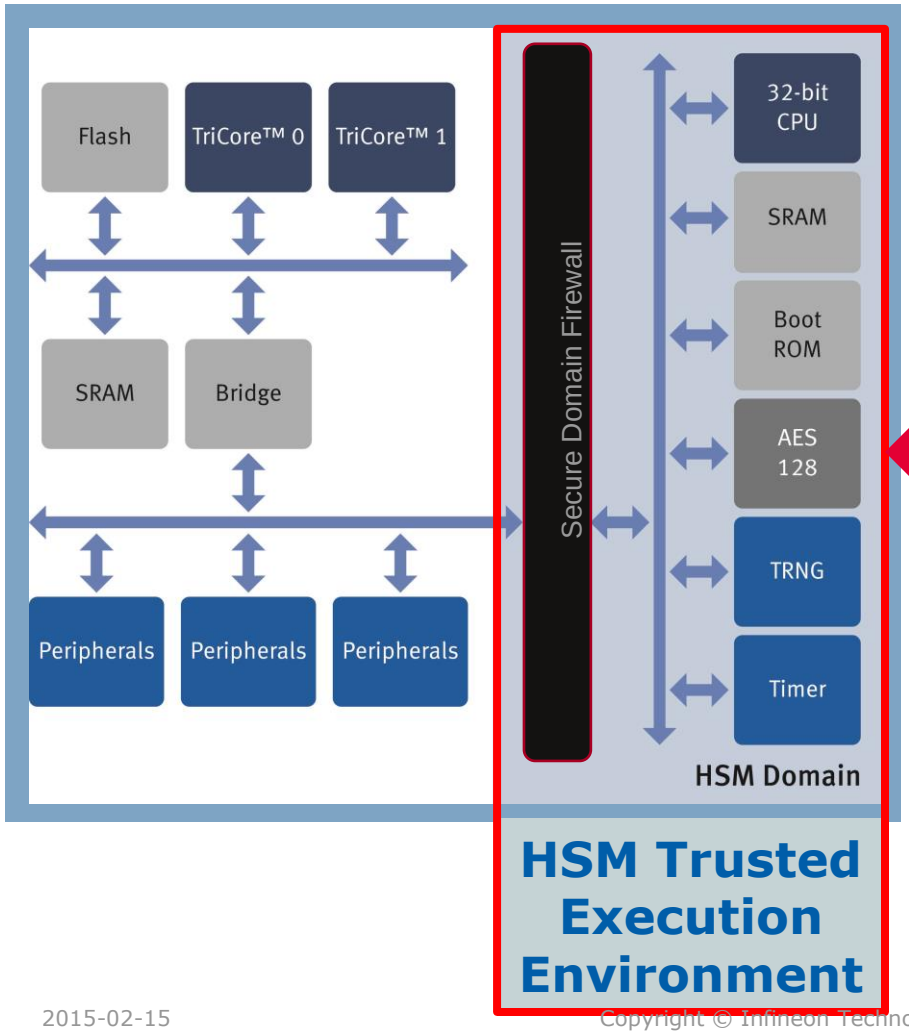
Automotive Security Project

EU Funded Project:
Security architecture for automotive on-board networks

www.evita-project.org

Embedded Automotive Security Example HSM

Infineon Aurix



Hardware Security Module (HSM)

Specification

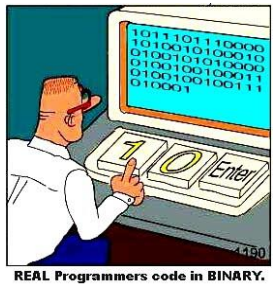
Secure Memory

Encryption & Decryption

Authentication

Root of Trust

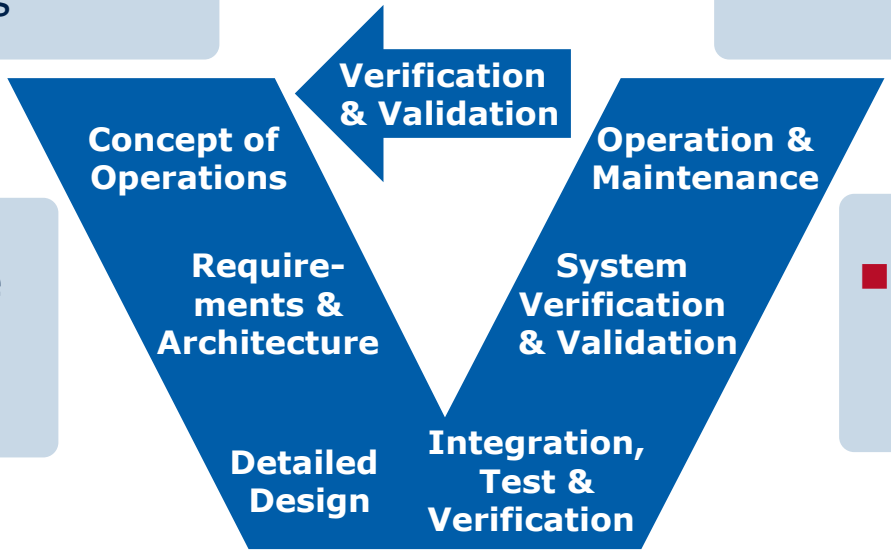
Security Software



Automotive Development Process Will Need to Consider Security

- Threat and attack scenario analysis
- Security objectives and measures

- Security certified production
- Secure personalization



- Security hardware architectures expertise

- Large portfolio of Security certified products

- Security-certified design and development process

- Security Lab for hardware security penetration testing

Automotive Security Will Need a Coordinated Ecosystem

V2V for Safety

Content from Cloud

Service Garages

IT Security Infrastructure

Automotive Supply Chain

Si Supplier

Tier 1

OEM

New Roles & Expertise Needed

- For Car Development
  - Security Architects
  - Engineers with Security Expertise

- For Manufacturing:
  - Security Officers (Key Management)
  - IT & Operations Security Experts

- For IT:
  - Security Architects
  - IT Key System Developers
  - Security Life Cycle Managers (for EOL)

Automotive Security Summary

- Smart Card Technology Will Be Adapted for Automotive

- Connected Cars will Need:
  - Security Defined into Vehicle Architectures
  - New Security HW & SW for ECUs
  - Security Included in Development Process

- Security Eco-System will Require New Expertise

- It’s Not Simple; We All Need to Build Our Security Expertise Now!

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