Authorization Framework for Secure Cloud Assisted Connected Cars and Vehicular Internet of Things

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Connected Cars Ecosystem
On-Board Application and Sensors
  • Tesla and Jeep X
Over the Air updates
V2X fake messages
In-vehicle ECU communication
Personal Data
Third Party devices
User Privacy Preferences
Spoofing, Ransomware, Injection...
Loss of Information in Cloud
On-Board Application and Sensors
  • Tesla and Jeep X
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Loss of Information in Cloud

- Software Reliance
- Broad Attack Surface
- Untrusted Entities
Extended Access Control Oriented Architecture

a) Extended ACO Architecture for Connected Car and IoV

b) Connected Car and Vehicular IoT Components in Extended ACO Layers
Authorization Framework

Cloud Services Level
- AP - AP
- FG - CL
- CSR - CSR
- AP - CSR
- CL - CL
- FG - FG
- U - AP

Object Level
- OAP - OAP
- AP - OAP
- AP - OB
- AP - CO
- CO - OB
- CO - CO
- U - OB
- OB - OB
- U - OAP

Virtual Object Level
- VCO - VCO
- VOB - VOB
- VCO - VOB
- VOB - VOB
- AP - VCO
- AP - VOB
- AP - VCO - CO
- AP - CL - VOB - OB
- AP - CL - VOB - OB
- CSR - VCO
- CSR - VOB
- AP - VOB
- OAP - VOB
- OB - VOB
- OAP - OB
- U - OB
- U - OAP

Legend:
- U: User
- CO: Clustered Objects
- OB: Objects
- OAP: Object Layer Applications
- CL: Cloud
- FG: Fog
- CSR: Cloud Services
- VCO: Virtual Clustered Objects
- VOB: Virtual Objects
- AP: User Applications

Direct vs. Indirect Access
Access Control Strategies

➢ Static vs Dynamic

➢ What kind of relationship they have?
  • Owner
  • Manufacturer
  • Friend

➢ Multi-Layered
➢ Groups Based
➢ Trusted Interaction
  • How I trust you?
  • Previous interaction..?

➢ ABAC, ReBAC Models
➢ Who will administer?
➢ Data in Cloud, cross cloud sharing, how?
Research Questions

➢ External Interface
➢ In-Vehicle Interaction
➢ Whom to TRUST? How establish TRUST?
➢ Cross Cloud Sharing
➢ Data in Cloud