

HIDENETS – FP6 STREP

Scenarios and Resilience Solutions

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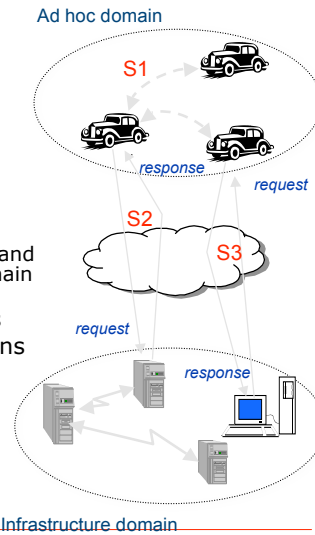
HIDENETS Goals

- Develop and analyze **end-to-end resilience solutions**
 - for scalable distributed applications and mobility aware services
 - in ubiquitous communication scenarios
 - Example use-case: car2car communication with server-based infrastructure
 - assuming highly dynamic, unreliable communication infrastructures
 - Planned **results** are
 - architectural and design solutions
 - communication protocol extensions and dependability middleware
 - methods for quantitative analysis and testing
 - tools for development and analysis
- for end-to-end system level resilience and dependability
- based on standard off-the-shelf components
 - in wireless communication networks and infrastructure-based settings

HIDENETS Scenarios

- **Applications** with varying dependability requirements, e.g.
 - Platooning
 - Floating car data, hazard warning
 - Distributed black-box
 - Streaming (video/data)

- **Challenges** of the C2C/C2I scenarios
 - **Dynamicity/Mobility:** changing topologies and communication characteristics in ad-hoc domain and in connection to infra-structure services
 - Open systems with (C)OTS components
 - **Heterogeneity:** different network domains [and different node capabilities]
 - Resource limitations and strong cross-influence between system parts
 - Accidental and malicious faults
 - + large number of nodes, privacy aspects...



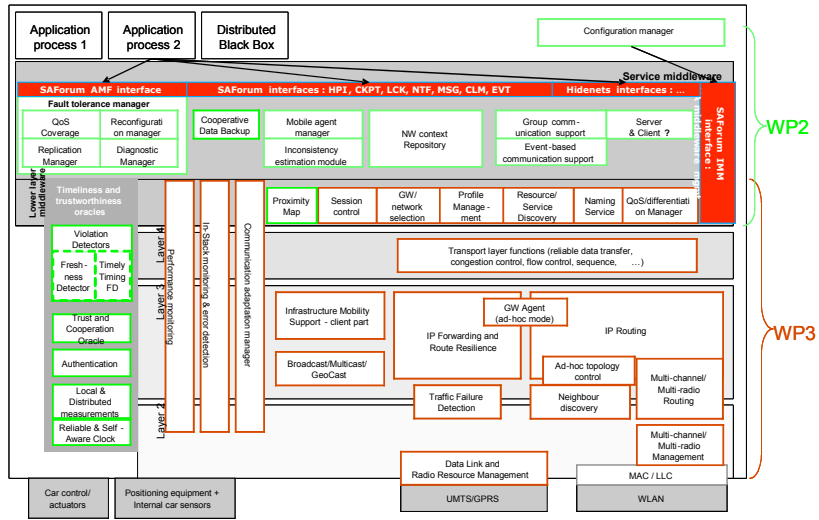
HIDENETS Approach

- **Steps (inter-linked)**
 - Applications/use-cases → requirements → necessary middleware and communication layer functions
 - Network and node architecture → fault-models → detailed function/algorithm/protocol development, experimental implementation, modeling and assessment
- **Resilience solutions: joint optimization via**
 - Differentiation
 - Architectural: wormhole concept
 - Flow/packet/message treatment: scheduling/routing/etc.
 - Fault detection and recovery, as well as masking
 - Communication interfaces/links/paths: interface selection, (multi-path) routing, Gateway selection
 - Node functions: data storage, computations
 - APIs that allow for adaptive applications

While maintaining the end-to-end, holistic system view, covering

- All nodes on the end-to-end path
- Communication protocols as well as service middleware

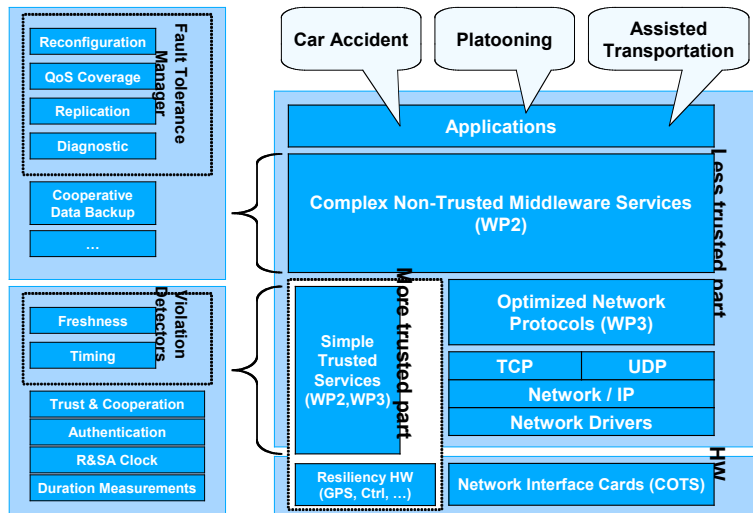
HIDENETS node software architecture



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HIDENETS hybrid architecture



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Summary

- Goal: end-to-end resilience solutions for car-to-car and car-to-infrastructure scenarios
 - Communication protocols (L2-L4), middleware functions, application interfaces, application development tools
 - Mainly (but not exclusively) accidental faults: communication links and nodes (both in ad-hoc and infrastructure domain)
 - Interaction of resilience mechanisms while still keeping a layered structure
 - Assessment in analytic/simulation models, and experimental set-ups

Technical deliverables are available on web-page: www.hidenets.aau.dk

Final results: December 2008