Ethernet and the AUTOSAR Adaptive Platform as basis for future E/E Architecture

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Overview

Ethernet and the AUTOSAR Adaptive Platform as basis for future E/E Architectures

- AUTOSAR: Where we are
  - Ethernet and the AUTOSAR Classic Platform
  - New AUTOSAR Acceptance Tests for Ethernet

- AUTOSAR Adaptive Platform
  - Motivation and challenges
  - IP / Ethernet as basis technologies
AUTOSAR: Where we are

- AUTOSAR has become a global standard for Automotive Software Architecture.
  - Number of new developments and platforms adopting AUTOSAR is increasing fast
  - Number of AUTOSAR partners has grown to 190 companies (July 2015)

- AUTOSAR is on the road:

  Millions of ECUs already use AUTOSAR solutions today.
More than 70 companies active in the development of the standard

More than 250 persons active in technical workgroups
The Release R4.2 of the Classic Platform has improved significantly the support of AUTOSAR for IP / Ethernet based communication.
Introduction of transformers

- RTE calls protocol specific transformer
- SOME/IP transformer translates data to bus-specific representation
- Additional transformers can be called, e.g. End-2-End protection transformes (for safety)
- RTE provides byte-array to COM

Main advantages

- No need for additional wrappers, only configuration.
- Reduced effort and integration time.
**AUTOSAR Products**

- AUTOSAR Classic Platform (CP) available, R4.2.2
- AUTOSAR Acceptance Tests (TC) available, R1.0.0
- AUTOSAR Foundation (AF) planned
- AUTOSAR Adaptive Platform (AP) planned
AUTOSAR Acceptance Tests

AUTOSAR Acceptance Tests Objective: **Minimize test effort**
- Common test development and maintenance
- Methodology
- Exchange of trustable test execution results

Acceptance Tests enable OEM’s acceptance on a suppliers’ platform focusing the interoperability of different Basic Software implementations.
Available Test Suites

- Communication (CAN, LIN, FlexRay)
- Diagnostics
- NVRAM
- Mode Management
- RTE

- Maintenance
- Extension on
  - Communication (CAN, LIN, FlexRay)
  - Mode Management
  - RTE
  - Ethernet (UDP, TCP, IPv4)

Q3/2014 R1.0.0

Q4/2015 R1.1.0
Future of AUTOSAR -
Main drivers for a new software platform

The Adaptive Platform is AUTOSAR’s answer to meet the requirements of the next generation of automotive applications.

Highly automated driving

Car-2-X applications

Vehicle in the cloud

Increased connectivity
Selected main drivers, example: Highly automated driving

- Support dependable systems including fail-operational systems
- Support of high-performance micro-controllers and computing
- Support for high data transfer rates
- …
Selected main drivers, example: increased connectivity

- Interaction with non-AUTOSAR and off-board systems
- Dynamic deployment of software components
- Security

Challenges
Adaptive Platform

- Completes AUTOSAR with a platform capable of supporting adaptive software deployment and interaction with non AUTOSAR systems.

Derived requirements

- Applications must be dynamically initiated and scheduled
- Communication paths must be established at start-up or run-time
- Security measures must control the access to vehicle network and ECUs
- …
Challenge: 
Integration of different platforms

- Classic Application SW-C
- Adaptive AUTOSAR API
- Adaptive AUTOSAR Services
- Adaptive AUTOSAR Foundation
- (Virtual) Machine / Hardware
- Standardized Interface
- Middleware
- Adaptive AUTOSAR
- (Virtual) Machine / Hardware
- Classic Application SW-C
- Adaptive Application
- Adaptive Application
- Non-AUTOSAR Application
- Non-AUTOSAR Application
- Non-AUTOSAR Basic Software
- Non-AUTOSAR Offboard System

- Service Layer
- ECU Abstraction Layer
- Microcontroller Abstraction Layer
- Runtime Environment
- CD
- Microcontroller
- AUTOSAR Classic Platform
- AUTOSAR Classic Platform
- AUTOSAR Adaptive Platform
- AUTOSAR Adaptive Platform
- e.g. SOME/IP

- Static application
- Dynamic application
- Car-2-X application

Software Abstraction
Common Bus Interface Specification
Service Oriented Communication (SOC)
- as main communication paradigm

IP / Ethernet as common interface
- Re-use of existing solutions
- High bandwidth
- Efficient transfer of long messages
- …

The main communication approach from AUTOSAR Adaptive is based on SOC, IP / Ethernet.
AUTOSAR Adaptive Platform
Dynamic creation of communication path – Service Discovery

Ethernet and the AUTOSAR Adaptive Platform
AUTOSAR Adaptive Platform - Architecture Overview

Adaptive Application

- Standardized Adaptive AUTOSAR API
- Standard Interface

Adaptive AUTOSAR Services

- Vehicle Software Configuration Manager
- Security Manager
- Diagnostic Manager
- Platform Software Configuration Manager

Adaptive AUTOSAR Foundation

- Operating system (POSIX based)
- Bootloader
- Application Execution Manager
- Software Health Monitor
- Hardware Acceleration Manager

(Virtual) Machine / Hardware

- In scope of R1.0.0 – (2017 / Q1)
- Planned for future releases

Middleware

- Intra-machine communication
- Inter-machine local communication
- SOME/IP-Stack

In scope of R1.0.0 – (2017 / Q1)

Planned for future releases
Summary

- The Adaptive Platform completes the AUTOSAR standard to address new requirements and use cases as:
  - Highly automated driving,
  - Dynamic deployment of SW-Components,
  - Car-2-X applications.

- The main communication approach from AUTOSAR Adaptive is based on:
  - Service Oriented Communication
  - Ethernet and IP technologies

- Acceptance Tests Release 1.1.0 will extend AUTOSAR support for UDP/TCP/IP Acceptance Tests.
More Information Available Online

More Information about AUTOSAR:
http://www.autosar.org

Become a partner and get exploitation rights for the AUTOSAR standard
request@autosar.org

For information only (see disclaimer)

Published Releases
References


