OSGi Deployment and Traction
In Automotive Environments
10.22.03
Topics

- Challenge in vehicle E/E-architecture
- Benefits of OSGi
- View on work of Vehicle Expert Group
- BMW – OSGi deployment
- Research vehicle
The importance of automotive electronics

Percentage of Production Costs: 20-35%

Increase: 10-15% p.a.

- Engine Management
- Security-Sytems
- Multimedia/Telematic
- Driver Assistance
- Comfort-Electronics
- Bus Systems
The importance of automotive electronics

<table>
<thead>
<tr>
<th>Number ECU’s</th>
<th>16-24</th>
<th>33-70</th>
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<tbody>
<tr>
<td>Increased Networking</td>
<td>PT-CAN (500 kBD)</td>
<td>PT-CAN (500 kBD)</td>
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<td>I/K-BUS (9.6 kBD) P-BUS (9.6 kBD)</td>
<td>K-CAN (100 kBD) K-CAN-P (100 kBD)</td>
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<td></td>
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<td>byteflight (10 MBd)</td>
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<td>MOST (22 MBd)</td>
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Driving Forces for Networking:

- Increasing number of ECU’s and software, distributed functionality
- Multi usage of sensor signals and resources
Impact of Consumer Products, Wireless Networks and Internet technology
Some Resulting Challenges…
Manage increase in system complexity, save costs – handle the variety forced by the market in the most efficient way!

- Optimize vehicle system architecture:
  - resource sharing: shared functionality in the network
  - dynamic partitioning: flexible integration of functions in ECU’s

- Increasing Configuration Management

- Achieve reusability of hw / sw-components in different product lines

- Enable “easy” maintenance of components

- Solve lifecycle mismatch between consumer hardware / software and vehicle

- Reduction of development time

Standardization is a MUST
Adressing the Multimedia/ Telematic Domain: Some Benefits of OSGi Standardization

- Cost savings by reuse of approved software modules – standardization of a basic software library
- Focusing on customer added value functionality
- Reducing development time and costs by programming against common interfaces – reduce time to market
- Decoupling from Hardware and Software
  - choice of implementations from different suppliers
  - choice of different hardware
- Functional scalability is possible
- Software Download enables “Software as a Product”-business model and decouple lifecycles
The goal of the Vehicle Expert Group (VEG) is to tailor and extend the OSGi specification in order to meet vehicle-specific requirements…

… The deliverables of the VEG are requirement documentation and API's with a reference implementation and a test suite…
Gateway → Service Platform

**VEG – Standardization**

**Framework**

**Execution Environment**

- **R1**
  - Device Manager
  - Http Service
  - Log Service
  - Preferences Service
  - Configuration Admin
  - Service Tracker
  - User Admin

- **R2**
  - Package Admin
  - Permission Admin
  - Wire Admin
  - XML Parser Service
  - Measurement
  - Position
  - Connector Service
  - Jini Service
  - UPnP Service

- **R3**
  - Start Level
  - URL Handler

Focus: "complete horizontal focus"

"horizontal and vertical"
VEG – Standardization Effort

- **Service/Device-Arbitrator**
  - Concurrent access to the same device/service/resource

- **Car Diagnostics**
  - Test and retrieve information from/to device (local/remote)

- **Resource Requirement and Management**
  - Checking system before installing bundles, describe bundle requirement,..

- **Power Management**
  - Obtain and set information about power state of the gateway and act appropriate

- **Navigation Service**
  - Standard entities (destination, address, waypoint) = navigation domain model, ..
BMW 5 series

High-End Platform is OSGi based
More about BMW ConnectedDrive in the Automotive Track tomorrow…
Thank you for paying attention
Questions?
The Future – New Structure

<table>
<thead>
<tr>
<th>Application</th>
<th>Parking Info</th>
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<th>Traffic</th>
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<tbody>
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<td>Java Runtime Environment</td>
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vehicle bus