OSGi Applications for the Next Generation of Automotive and Vehicle Infrastructure Systems

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Overview

- Emerging Trends in Automotive Infotainment
- Key Issues for the Car Industry
- OSGi Solutions
- Barriers and Resolutions
- Conclusions
Cars, CE and the Road... A Collision Course

Road Infrastructure Trends
- Infrastructure based safety systems
- Roadside communications
- US Vehicle Infrastructure Integration Program (VII)
- EU GST program

Key Issues:
- Device Integration
- Interoperability
- Upgradability/Features
- Regionalization
- Longevity/Lifecycle

The Next 5 Years

Car System Trends
- Graphical User Interfaces
- High capability Computing
- Wireless Communications

Portable CE Trends
- More functions per device
- High data rate short range wireless connectivity
- Geometric increase in data storage capacity

OSGi Alliance
CE and Automotive Life Cycles

Technology

Protos Protos Protos Protos Protos Protos
Prod Design Prod Design Prod Design Prod Design Prod Design Prod Design
Product Product Product Product

24-36 Months

Electronic Components

Vehicle

48-60 Months=4 to 5 Consumer Product Cycles!!

Vehicle Concept Vehicle Design Vehicle Prototypes Pilot Production Vehicle Production

36-48 months
Car-CE Device Integration

- Seamless CE Device integration in the car is critical...But...
  - CE technology changes many times over car life
  - Limited uniformity among devices makes integration a consumer nightmare
- Very risky to install interfaces for one type/make of device
  - Obsolete before the car launches!
- Very difficult to make single interface that supports many device types/makes
  - e.g. Bluetooth interoperability issues are causing many car makers to question approach (more consumer problems than benefits)
Automotive Features and Upgrades

- Optional features provide profitable upgrade market for makers and dealers... But...
  - Factory provisioning is risky, and dealers often end up discounting features to sell car (US issue)
  - Complex systems usually have problems, and fixing them is difficult after car is sold

- Car industry faces difficult choices
  - Forgo technology to avoid risk
  - Risk consumer dissatisfaction because technology features are out of date, don’t work properly, etc
Infrastructure Integration

- Integration of vehicle with roadside infrastructure is next important wave
  - US Vehicle Infrastructure Integration Program
  - EC GST Program
  - Both programs promise to enable new level of safety and roadway management systems

- But, Implementation is challenging
  - Difficult to require software uniformity across large independent regions with different problems to solve
  - Early systems will be obsolete quickly
    - Loss of safety benefits
    - Loss of consumer confidence, satisfaction
## OSGi Provides Elegant Solutions for the Next Generation of Car Systems

### CE Device Integration
- Provide core feature bundles with car
  - Hands free phone, music player, etc)
- Provision custom device interfaces after sale
- Adapt user’s CE devices to Car systems
- Fixes Interoperability issues AND creates new dealer market for software

### Infrastructure Integration
- Provide core application bundles with car
  - Safety applications
  - Mobility applications (e.g. probe data)
- Provision new functionality from roadside
  - Updates to existing software
  - New features and interfaces
  - Software to adapt car to regional apps

### Feature Implementation
- Provision software car features at sale
  - Huge profit margin, low risk
- Provide consumers with new features after sale
  - Opens new market for OEMs and dealers
  - May be able to sell and install online for even higher profit margins

### Lifecycle Management
- Provide upgrades and bug fixes over life of car
  - OSGi service paradigm provides much more controllable software architecture
  - Motivates increased dealer service over full life of car
  - Allows car to keep pace with technology
Barriers and Next Steps

• In the car industry, OSGi is misunderstood by many, and feared by some
  – Assumes more advanced software environments than many car makers understand - comes across as geek fantasy
  – Terrible fear of allowing third party software into car

• Need to develop simple easily understood examples of benefits
  – Best opportunities are probably VII and GST
  – Other opportunity might be “software defined” universal Bluetooth hands free system where phone specific interfaces are provided into general hands free system

• Need to develop and implement ways to certify and validate services
  – Probably on a car maker by car maker basis
Conclusions

• OSGi promises to revolutionize the car
  – General purpose computing and user interface environment
  – Software based features
  – Improved match between car and fast moving CE world
  – Ability to dynamically adapt car to varied regional infrastructure systems