The AMIC APIs: OSGi in an Automotive Platform

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AMIC is a worldwide organization of motor vehicle manufacturers created to facilitate the development and standardization of automotive multimedia interfaces to motor vehicle communication networks.
All of the world’s automotive manufacturers and their suppliers achieve consensus on common core requirements for mobile information and entertainment systems.
Establish a global automotive industry organization dedicated to creating common requirements that:

- Enable the OEMs to take advantage of current developments in mobile information and entertainment systems
- Enable cost reductions for mobile information and entertainment systems
- Improve customer satisfaction with mobile information and entertainment systems
- Enhance the safe in-vehicle operation of mobile information and entertainment systems
- Enhance participation in the development of mobile information and entertainment systems
- Improve quality of mobile information and entertainment systems
Contributing Organizations

- AAA
- ACUNIA
- Alpine Electronics
- B2i
- Delphi
- Denso Corporation
- Harmonia, Inc.
- Infineon
- Kshema Technologies
- Mecel
- Mindready
- Molex
- Motorola
- NavTech
- Parrot
- Sensoria Corp.
- Sumitomo Electric Industries
- Sun Microsystems
- Tata Elxsi
- Toshiba KN Systems
- Tyco Electronics
- Visteon
- Wipro Technologies
- Xanavi
- XM Satellite Radio
- Yazaki
Why AMIC?

- **Common platform (device interfaces and software specifications) spurs industry growth**
  - Examples: PC, Palm, Pocket PC, Internet

- **Common Platform can benefit auto industry directly**
  - Merges balkanized markets
  - Stable, allows introduction of new technologies later in design cycle
  - Leverages development work
  - Uses software to implement many new functions on same hardware
The AMIC specifications fall into three broad areas:

- Specifications for Physical network interfaces
  - Multimedia and information networks, not controller networks
- Specifications for network protocols on the multimedia networks
- Specifications for Software interfaces on in-vehicle computing platforms
  - Telematics and local applications
Release 2 deliverables

- **Bluetooth**
  - Hands free phone specification
- **Common message set/network specifications**
  - Abstract message set (ASN.1)
  - 1394, MOST implementations
- **Physical interface specifications**
  - Power/power moding
  - Connectors
- **Software specifications**
  - Java APIs for core services
  - Execution environment
Requirements for entertainment systems, information systems are in scope.
- Audio system, Rear seat entertainment
- Navigation, Telematics
- Phone interface, mobile device interface

Vehicle control modules (brakes, powertrain, suspension, door/window control,...) are out of scope

AMIC will define a uniform interface to the control modules for access by information systems
AMIC Specified Elements of Integrated Platform Architecture

- Vehicle Interface Spec
- Network Architecture & Common Message Set
- Vehicle Gateway
- AM/FM/CD Audio Head
- Audio arbitration, power management, Etc.
- Software Architecture Core System Management APIs
- Application APIs
- Processor

Application Software APIs
The AMIC architecture has four components:

- In-Vehicle Network
- Networked devices
- Vehicle Interface
- Host (computing platform)
The problem: how to define a common environment for applications to access vehicle information and controls across a wide range of vehicles without standardizing the vehicles.

The solution: Define a vehicle interface that presents a standard set of services to the multimedia/mobile information networks.
- May be a separate physical component, or may be combined with another multimedia or physical device.
- Will be present in every vehicle that implements the AMIC specifications.

The vehicle services interface will be discussed in detail in a subsequent talk.
A host is a platform that executes non-embedded software
- Downloaded from a Vehicle Service Provider
- Locally installed

Achieves platform independence by using java

Provides a Java interface to services available on the local network

AMIC Host
Why is AMIC interested in OSGi?

- **Similar requirements**
  - Remote services provided to a local network
  - Services can be managed by remote provider
  - Services should run on a variety of local platforms
  - Should run on resource constrained (low cost) platforms

- **Similar solutions based on Java**
  - Vendor independent
  - Mechanisms for combining services from multiple vendors
  - Functionality provided by OSGi platform covers most of that required by AMIC

- **Using existing APIs will improve AMIC’s solution**
  - Leverage experience and expertise that went into prior implementations
  - Reduce amount of API development required by using common solutions wherever possible.
How Does OSGi fit into the AMIC APIs

- OSGi framework provides the basic execution environment
- The services running in this framework can be grouped into three categories:
  - Services local to the host
  - Services provided by other devices on the vehicle network
  - Services specific to an application domain
- Services local to the host are mostly OSGi defined services
- Services provide across the network must match the functionality defined by network protocols
- Services specific to an application derive from domain specific specifications
Software Interface Categories

AMIC APIs

APIs for Host Services

Application APIs

APIs for vehicle Network Services

Implements

Common Message Set

1394 Message Set

Bluetooth Message Set

Most Message Set
The host specific services are those needed to support application execution on the host. They will be described in more detail in a subsequent talk.

The network services include:
- Vehicle interface services (Also described in a subsequent talk)
- Human Machine Interface services
- Preliminary Audio/video services

The Application domain services include:
- Off-board navigation
- Telephony/hands free phone
- Address book
- User preferences
Future Directions

- **Additional infrastructure interfaces, including**
  - System diagnostics
  - DSRC interface
  - Security extensions

- **Additional application APIs, including**
  - Further navigation functionality
  - Real-time road/traffic information

- **Audio/Video enhancements, including**
  - Stream management framework
  - MPEG4 support

- **Transient device support, including**
  - Bluetooth phone data support (PAP)
  - Bluetooth SIM access profile
  - Data synchronization between host and personal device