Integration and Use of Mobile Devices In the Car
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Agenda

• Car Integration Context
• Mobile Device Integration Context
• Technical Solution
• Some Current Projects
• Summary
Car Integration Context

- Internet
- E-mail
- GPS
- Satellite-Broadcast
- Terrestrial Broadcast
- Home
- Office

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Market Trends

• Communication and mobile office facilities
• Linking to home and office IT environments
• Dynamic and hybrid navigation
• Driver assistance such as e-calls, after-theft and fleet management
• Audio and video broadcasting
• Openness to SW upgrades and plug-and-play capabilities
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Mobile Device Integration Context
Market Trends

- Enhancing the in-car system at low cost
- Downloading of applications/data from mobile devices to in-car system: address book synchronization, MP3 files, …
- Transfer of applications/data from in-car system to mobile devices: map transfer …
- Use well-known features and contents everywhere
- Extend communication channels
Business Cases

• Enhancing the in-car system
  – Display of the map on a PDA instead of the monochrome display of the system
  – MP3 player used as files storage
• Mobile Devices used as the only system in the car
  – Navigation application running on a PDA
  – Hands-free kit Phones
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Key Points

- Available Connectivity
- Data Transfer Capabilities
- Standard Data Format

In addition...
- Standard Service Platform
Available Connectivity

• A large set of connections available
• Wire Connections
  – USB
  – FireWire, …
• Wireless Connections
  – Bluetooth
  – Wifi
  – IrDA
  – GPRS, …
Data Transfer Capabilities

• Different bandwidth capabilities according to needs
  – Update frequency
  – Amount of data

• Standard Protocols used
  – TCP/IP Protocols: IP, TCP, UDP, …
  – Cellular Protocols: GSM, GPRS, CDMA, …
  – Specific Protocols: Bluetooth, irDA, …
Standard Data Format

• Large variety of data formats mainly using XML description
  but more interesting…
• OSGi (VEG) is working on key navigation entity definitions
  – Address
  – Map
  – Location
Standard Service Platform

• Where OSGi Service Platform comes into the game
• Becomes the unifying platform for Home Gateways, Automotive Platforms and soon for Mobile Phones
• Offers the possibility to share Services and Applications
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Some Current Projects

• Projects that integrate mobile devices
  – Bluetooth enabled Mobile Phones
  – Map Transfer Application
  – Address Synchronization
  – MP3 Files Transfer

• Built with TLA Platform: an OSGi Technology based In-car System
TLA Platform Architecture

- TLA
- OSGi Service Platform
- JVM (Personal Java)
- RTOS & Native Stacks
- Hardware
Bluetooth enabled Mobile Phones

1. Bluetooth mobile phone detected by in-car system
2. Codes entered in both sides
3. Mobile Phone connected to in-car system
4. User can perform a call

Any Bluetooth Phone usable in car
Phone fully controlled from the car
Calls heard on car audio system
Map Transfer Application

1. User requests a Map Transfer of 1 up to 9 km²
2. Connection established with PDA
3. Map around Destination converted in SVG
4. Map transferred to the PDA

Map with CCP and destination banners
User can zoom in and out
User can scroll and search

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Map Transfer Application

TLA

OSGi Service Platform

JVM (Personal Java) + JSR 82

Map Creation

Map Transfer Application

BT Manager

BT-BIP
MP3 Files Transfer

1. User selects hot spot proposed by system
2. Connection established with hot spot (laptop)
3. User can browse and copy files to HDD
4. MP3 files are now visible to in-car MP3 Player

Any WiFi enabled devices can be used
Any data files can be transferred
MP3 Files Transfer

TLA

OSGi Service Platform

JVM (Personal Java)

File Service

FTP Client

MP3 File Transfer

W-LAN Manager

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Seamless Integration

• Seamless integration with less or no user interaction
• Use of mobile devices like other cars!
• Bi-directional transfer to and from the car
• Connectivity is now available and widely adopted…

… The OSGi Service Platform supplies the execution environment
Remaining Issues

• External Application integration at the HMI level
• Security Issues
  – for in-car applications/services use
  – for in-car resources use
Questions?

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