MeeGo IVI

In-Vehicle Infotainment for Connected Mobility

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> Rudolf Streif Director of Embedded Solutions The Linux Foundation rudolf.streif@linuxfoundation.org





Outline

Introduction

- What is In-vehicle Infotainment?
- History
- Current IVI Systems
- Integration of Technology and Services
- Challenges

Technology

- IVI System Overview
- What does MeeGo need to provide for an IVI platform?

MeeGo IVI

- Working Group and Project Team
- Who is MeeGo IVI collaborating with?
- Community Participation
- MeeGo IVI Roadmap





Introduction



Introduction - In-vehicle Infotainment

Infotainment

- Infotainment is "Information-based media content or programming that also includes entertainment content in an effort to enhance popularity with audiences and consumers." (Demers, David: Dictionary of Mass Communication and Media Research)
- Infotainment *noun*: (in television) the reporting of news and facts in an entertaining and humorous way rather than providing real information (Cambridge Online Dectionary, http://dictionary.cambridge.org)
- A television program with a mixture of news and entertainment features, such as interviews, commentaries, and reviews. Also called *docutainment*.
- Refers to all the information and entertainment services delivered to the home, which are essentially telephone, TV and Internet access. (encyclopedia2.thefreedictionary.com)
- A television program that presents information (as news) in a manner intended to be entertaining. (www.merriam-webster.com)

In-vehicle Infotainment (IVI)

 A combination of technologies, applications, services and content for, but not limited to, automobiles which satisfy a broad variety of consumer needs including entertainment, communication, navigation, safety, maintenance, and commerce.



Introduction – A Short History of IVI



IDESTA

Sources: www.radiomuseum.org, www.caranddriver.com, various Internet sites

Introduction - A Variety of IVI Systems/Head-Units



This is only an overview and not intended to be complete. If your favorite system is missing, please send me a picture.



Introduction - Modularized and Distributed Architecture



- Sources and Sinks are not necessarily integrated within the same physical unit e.g. Navigation Computer and Head Unit can be separate.
- Multiple Sources can deliver data to and accept controls from a sink e.g. Navigation Computer and Climate Control deliver data and accept input from the Head Unit.
- A Source can deliver data and accept controls from multiple sources e.g. video from DVD player can be delivered to multiple Rear-Seat Entertainment units.

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- Different Sinks can show and control different content.
- Similar to distributed home entertainment.

Introduction - Integrated Technologies and Services



Choice of vehicle is personal only. It applies to any make.

Smartphones are eclipsing IVI Systems providing more functionality at a lower price.

- Smartphones offer navigation with down-loadable maps, location-based services and more.
- Smartphones provide multi-media services allowing users to consume stored and live content.
- Smartphones allow users to customize the user experience by setting wallpapers, arranging menus, adjusting visible and audible notifications and more.
- Smartphones provide a software platform that can be extended with 3rd party applications.
- Smartphones provide over-the-air software updates.
- Smartphones function as mobile offices providing access to e-mail, documents etc.
- Smartphones synchronize address books and personal databases with desktop computers and other devices.
- Smartphones offer entertainment with games etc.
- Smartphones integrate social networks.

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IVI Systems need to leverage CE technologies. However, a vehicle's life cycle is planned for 10 years or more.



Infotainment System

Unified User Interface Distributed Audio Management CE Connectivity Network Connectivity Content Management

Technology

Technology - IVI System Overview



Technology - MeeGo HW/SW Stack



Technology - MeeGo IVI HW/SW Stack



Technology - What is needed in MeeGo for IVI?

MeeGo needs to add features and functionality to become a viable IVI solution.

Vehicle Buses

- Controller Area Network (CAN)
- Media Oriented Systems Transport (MOST)
- FlexRay
- Local Interconnect Network (LIN)

Human Machine Interface (HMI)

- Multi-zone Video
- Split Screen
- Layered HMI
- Video Policies (priorities)

Audio Management

- Multi-zone Audio
- Audio Routing and Ramping
- Audio Policies (priorities)

Hands-free Phone/Control

- Voice Recognition
- Text-to-Speech
- Acoustic Echo Cancellation
- Noise Suppression

User Input

Button, Knobs, Joysticks, Touch, Gestures

Software Updates

- Over-the-Air Updates with Binary Delta
- Secure, failsafe, surviving power cycles

Fast Boot

- Kernel Boot < 250ms
- Device Activation < 50ms from Ignition
- Early Audio < 2s; Early Video < 2s
- Secure boot loader

Network Connectivity

CE Device Connectivity

• iPod/iPad, iPhone, Zune, MP3 Players, USB Drives, Android, Blackberry, MeeGo, etc.

IVI Application Framework

- Standardized access to vehicle data e.g. fuel level, temperature, rain sensor, etc.
- Control API



This list is not necessarily complete.

Controller Area Network (CAN)

- Multi-master broadcast serial bus; up to 1 MBit/s
- Initiated 1983 by Bosch; Released 1986 by SAE
- Used to connect ECUs and for OBD
- Specification: ISO 11898-1..5, ISO 11991-1

Media Oriented Systems Transport (MOST)

- Multimedia and infotainment network in vehicles
- Synchronous network; packets carry streaming, packet and control data
- 7 Layer OSI; up to 150 Mbit/s (3rd generation)
- www.mostcorporation.com

FlexRay

- High-reliability serial bus; up to 20 Mbit/s
- Time-/event-triggered behavior; redundancy; fault-tolerance; deterministic
- www.flexray.com

Local Interconnect Network (LIN)

- Low cost sensor/actuator network; typically sub network of CAN
- Master/slave with 1 master and up to 16 slaves; up to 19.2 kBit/s
- www.lin-subbus.de



Technology - IVI HMI

Multi-zone Video

• Video from the same source distributed to multiple screens.

Layered HMI

• Video from different sources overlaid on a screen.

Split Screen

- Video from different sources displayed side-by-side.
- Video from different sources visible from different angles.

Policies

- Policies define what content gets displayed in what context on the screen.
- Minimize distraction for the driver.
- Bring critical information to the immediate attention of the driver.













Technology - IVI Audio Mangement

Multi-zone Audio

• For example 2 front and 2 rear zones plus one master zone.

Audio Routing

- Route audio to the correct zone dependent on the media source selected for that zone.
- Route audio for driver information systems e.g. parking aid etc. to the right zones.

Audio Ramping

 Ramp down one audio source in favor of a second for a particular zone e.g. lower music in the driver's zone for incoming phone call or navigation turn-by-turn instructions.







MeeGo IVI





Working Group

- Seeks alignment with companies and organizations in the automotive industry.
- Collects, organizes and prioritizes market requirements.
- Defines the roadmap.
- Identifies gaps and develops requirements documents that detail the need for capabilities.
- Does not manage the project.

Project Team

- Executes the roadmap and manages the project..
- Develops technical solutions.

Meel

• Implements solutions and delivers the product.

MeeGo IVI - Who is MeeGo IVI collaborating with?

Automotive Industry Companies and Organizations

- Consortia such as GENIVI
- Car Makers (OEM)
- Large Suppliers (Tier 1)

Hardware and Software Companies

- Semiconductor Companies
- Operating System Vendors
- Independent Software Vendors / Integrators

The Community

• YOU









How can the community get involved with MeeGo IVI?

Upstream Projects

 Participate in and contribute to upstream projects relevant to IVI for instance BlueZ, ConnMan, Qt for IVI, etc.

Hardware Ports

• Port MeeGo to hardware platforms e.g. single board computers (SBC) suitable for invehicle use for various CPU architectures: ARM, MIPS, x86, etc.

Applications

• Develop applications for the MeeGo IVI Application Framework.

Come and join the IVI BoF today at 5:15 PM in the Havelock Suite to exchange ideas and get involved.



Terminal Mode (8704)

 MeeGo 1.2 shall provide Terminal Mode client capabilities to enable a connected smartphone to replicate its display to the IVI, to receive events from the IVI controlling application user experience, to allow for remote launch and termination of smartphone applications, and to route audio stream from and to the IVI.

Multi Screen Support (7668)

• For IVI, multiscreen support is required to facilitate both Driver and front/rear seat passengers. Each screen 'zone' needs to be have seperate control (touch).

Tethered Device Indexing (7669)

 In an IVI context, we expect a multitude of potential tethering scenarios. In terms of context presentation, we need to present information as fast as possible. This feature focuses on tethered devices - the nuance here is these devices need to be recognized quickly and can be removed without warning.

Multi-Zone Audio (7670)

 Zones represent physical areas in a vehicle occupied by passengers and the driver. A simple zone set would represent 2 front zones and 2 rear zones, plus one master zone. The zone concept is presented to facilitate tailored interaction with IVI depending on the zone.





Distributed Audio Management (7671)

 The system needs to be able to handle policy control decision in a distributed scenario – i.e external amplifier servicing multiple channels and needing to ramp down one in preference to a second.

Network Gateway (7672)

 In the scenario where a phone is tethered to the system providing DUN support to the head unit - this feature proposes to extend the service to passengers. The system shall support an ad-hoc network for secondary devices to route IP traffic through the supporting DUN connected handset.

Phonebook Synchronization with CE Device (7674)

• Enhance Buteo with server side synchronization capability. This is needed for a tethered BT device to sync the phonebook to the system.

Media Synchronization with Home Device (7675)

• IVI system enters home WiFi spot. Facilitate the synchronization of media files from home PC to Vehicle.

Power Management (7680)

• For EV cars, running out of power, this feature presents a framework for terminating non-critical applications to facilitate extending vehicle range.

Numbers in braces refer to MeeGo Bugzilla ticket (http://bugs.meego.com/).



Multi-User Support (7677)

Whereas typically a handset/netbook/slate is associated with 1 user, from an IVI perspective we need to cater for multiple users and partition their personal data. A vehicle can have a number of different drivers which persist personal PIM/Settings data. A vehicle will have a number of rear-seat passengers who will wish to persist personal PIM/Settings data. Multiple users may interact with the system simultaneously.

Fastboot (7678)

• Kernel boot in less than 250ms. Instant device activation in less than 50ms. Early video and audio in less than 2s.

Persistence Management (7679)

• From an IVI perspective, we need to consider the requirement that flash usage will have a longer life span expectancy than for example a typical handset.

System Health Monitor (7681)

• Essentially monitoring of stalled applications and processes, for example, bouncing an infrastructure component and ensuring the associated UI process is considered.



Inertia-based Application Control (7682)

• From a driver safety perspective, certain application should not be allowed to function when a car is in motion. This feature is to provide a framework to detect when such a state is reached and control disabling applications that are deemed not appropriate for operation when in motion..

Speech Recognition

• Build in support to IVI UX to have a fully controlled speech UX, driving application selection and subsequently application behavior.









Thank You! Questions?

IVI is not just for cars!





Backup Slides

