GENIVI Vehicle Domain Interaction Strategy
KICK OFF - 2 November 2017

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• Note Well: All discussions during this call will governed by the GENIVI IPR Policy. If you represent a GENIVI member and are not familiar with the Policy, please review it prior to contributing any intellectual property. If you do not represent a GENIVI member, please refrain from contributing intellectual property and contact the GENIVI Executive Director for additional information on IP management.
The Challenge

• A unified, in-car experience now requires interaction between multiple car software domains (e.g., safety, IVI, consumer electronics)

• Multi-domain product complexity increases proportionally to the number of cross-connected domain’s interfaces
  • Many suppliers building one product using many APIs
  • OEMs pushing suppliers to standardize internal interfaces
  • Dynamic API changes – 4-5 times per year for 2 to 4-year lifecycle -> big development impact
  • Because of that – low SW reuse, maturity and efficiency
Frequently Asked Questions

• Large interest since GENIVI first announced the Vehicle Domain Interaction Strategy – leading to many questions

• To meet the demand we have created a Frequently Asked Questions document for the most common questions
  http://tinyurl.com/DIROFAQ

• We will reserve a short Q&A at the end of today's presentation to discuss logistical details and questions specific to the prioritized projects and other information presented today.

• Please refer to the FAQ for all general questions. In the interest of time we may defer some general questions to the FAQ document, or to contacts after the meeting.

• Questions written in the chat window will be prioritized in the Q&A.
Example Architecture – Combined IVI System

[Diagram showing the architecture with various domains and systems connected through signals and messages.]
Example Architecture – Android IVI System
Example Architecture – QNX in IVI or Cluster

Cluster/Combi

QNX IVI

CE Device

AUTOSAR

Graphics

Video

Audio

Signals/Messages

Network

Non-safety Domain

Safety Domain

External Domain

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GENIVI Vehicle Domain Interaction Strategy

Deliver open standard interfaces and code that bridge multiple car software domains

- Enables cross-industry, collaborative effort
- Addresses an industry-wide challenge of domain interaction
- Simplifies development and improves solution quality
- Leverages expertise already existing in GENIVI community
Work Done to Date

- GENIVI has completed several 1v1 conversations with members actively addressing the cross-domain challenge.
- Conversations provided basis for workshops during its recent Seoul meeting resulting in the below short-list of initial targets:

  - Graphics Sharing & Distributed HMI Compositing
  - Developing or Extending Hypervisor APIs
  - Determining Preferred Generic Communication Protocols
  - User Input Distribution and Coordination
Projects Identified During Fall AMM workshops in Seoul

1. Hypervisor solutions & low-level API standardization (virtio etc.)
2. Generic Communication Protocol – for cross domain GNU-Linux / AUTOSAR / Android / other
   • Including Safe network protocol (End-2-end, etc.)
3. Graphics Transfer/Sharing
   • Including Distributed HMI Compositing
4. Input Handling Coordination
5. System Health/Debugging/Analysis (incl. Log & Trace)
6. Distributed System Lifecycle / Node State
7. Network Traffic routing & accounting (priority/bandwidth/payment…)
8. (Distributed) Audio management
9. Distributed User / Login / Profile management
Graphics sharing & Distributed HMI Compositing

Description:
• Top-level compositing across domains for the same physical display
• with or without mixed safety levels
• Graphics transfer encoding/technology, multiple displays vs. multiple systems

Goals:
• 1 to 2 applicable, open standard/specifications, implementable on Linux and other OS
• Demonstration implementations, education and design material.

Existing technologies to explore
• 1. Wayland, IVI-layer/IVI-shell, Waltham + graphics encoding
• 2. Graphics framework “R”, to be open source?
Graphics sharing & Distributed HMI Compositing

Topics and investigations:

• Can Wayland/Waltham be a full standard across the industry?
  • Including non-Linux? – Android, QNX, custom HMI-tools
• Graphics framework “R” – *complementing*
• Are there other levels of protocols needed, not like Wayland?
• Adjacent projects: Application coordination, Input coordination
Developing or Extending Hypervisor APIs

Goals

• Extending / developing HV APIs e.g. virtio?
• Understanding *where* Common Interface is feasible and realistic
• For implementors who are interested: Surveying and analyzing available choices
• Challenges specific to virtualized systems

Scope

• Multiple HV support, safety-critical and more generic
• Industry consolidation across vendors
• Cross-VM low-level communication standard?
Determining Preferred Generic Communication Protocols

Goals

- Analyze choices among a vast number of messaging protocols & encodings
- Deep dive: SOME/IP - where is it applicable, and where is it not?
- Reach consensus on preferred options: Among 10-15 choices, find 3-5 recommended (and for which scenarios they are recommended)

Scope

- Messaging and generic protocols
  – not application-specific, and not TCP/UDP level. → i.e. OSI level ~ 4-5
- Network protocols for functional safety

Existing technologies to explore

- MQTT, WAMP, AMQP, XMPP, CoAP, SOME/IP, REST-ful HTTP, D-Bus, gRPC,… Protobufs, MsgPack, JSON, Thrift, Avro
- System modeling: Franca IDL, Franca+, Common API C++, model-based dev.
User Input Distribution and Coordination

Challenge

• Multiple inputs, varying by car model, technology, etc.
• Complexity in encoding rules from input to effect
• Bounded latency guarantees, time identification
• System states, modality, dynamic rules

Goals

• Define/adopt one shared common protocol for input distribution
• Guaranteeing non-functional demands
• Design guideline + methods for rule/logic definition

Scope

• All input devices: Button, touch, gesture, speech, etc. Multi-modal scenarios
• Existing technologies to explore
• VSM – Vehicle Signal Manager. Open-source input libraries
Invitation to Participate

De-centralized Projects
- Driven by OEM with their suppliers under NDA/Agreement
- Discussion unique to their solutions
- Relevant findings contributed to GENIVI for consolidation

Centralized Projects
- GENIVI-driven with project management and technology facilitation resources
- Open to members & non-members
- Recurring teleconferences, project wiki pages and email lists, etc.
- Creates, consolidates and delivers content for interfaces & code
Next Step

   → If you’re there – get in touch! Find GENIVI in the presentation and showcase

2. Register yourself to projects on the on-line form & survey
   (https://www.surveymonkey.com/r/JZJV5KP)

3. Project #1: Graphics Sharing and HMI Coordination
   Project start: Thursday, November 16, meeting time same as today’s kick-off.
   (Future meeting time-zone depending on participants).

4. Projects #2, #3 and #4 – meeting times to be announced
   – register your interest on the on-line form (https://www.surveymonkey.com/r/JZJV5KP)

5. Questions? Philippe Robin - philippe.robin@technoveo.com
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Use the community mailing list! genivi-projects@lists.genivi.org
Q&A
Thank you!

Visit GENIVI at http://www.genivi.org or http://projects.genivi.org
Contact us: help@genivi.org

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Backup
Example Architecture – Combined IVI System
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Cluster/Combi

Linux IVI System

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