Cloud & Connected Services Overview

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Agenda

• GENIVI Background, Scope & Results
• Cloud & Connected Services Project
• Takeaways
GENIVI Background, Scope & Results
GENIVI Accomplishments (2009-2017)

✓ Introduced open source software and Linux operating system into the automotive industry
  - Brought OEMs together to align requirements for IVI systems
  - Facilitated collaboration between suppliers to deliver reusable IVI software components and a reference platform based on open source software

✓ Built a global, collaborative community where standards and software could be jointly developed, demonstrated, and adopted in commercial products
  - GENIVI software in many brands worldwide

✓ Established a global, buyers/sellers network and facilitated high-visibility events where business relationships could develop and grow
  - Highly attended showcases & receptions at CES, TU-Automotive, and GENIVI annual events
So GENIVI declared victory and expanded scope

  - Consolidation of infotainment, safety and connected device software “domains”
  - Example projects: Display sharing, Hypervisor deployment, cross-domain communication protocols
- Multi-OS Integration (2019)
  - Next logical step to interaction → integration of operating environments running infotainment, safety and connected devices
  - Example projects: Android Automotive SIG, System Health/Debugging/Analysis in a Multi-OS context, evolution of domain interaction projects
And revised our Mission

The GENIVI Alliance develops standard approaches for integrating operating systems and middleware present in the centralized and connected vehicle cockpit. The alliance links adopters of Android™ Automotive, AUTOSAR, Linux, and other in-vehicle software with solution suppliers resulting in a productive and collaborative community of 100+ members worldwide.
GENIVI Cloud & Connected Services Project
Future Vehicle EE and Software Architecture

- **Vehicle centralized E/E architecture**
- **(Cross) Domain centralized E/E architecture**
- **Distributed E/E architecture**

Diagram showing:
- Vehicle Cloud Computing
- Vehicle functions in the cloud
- Vehicle Computer
- Vehicle Computer and pot. Zone Oriented Architecture
- Domain Fusion
- Central Cross Domain ECUs
- Centralization
- Central Domain ECUs
- Integration
- Functional Integration
- Modular
- Each function has his ECU

Increasing no. of SW
A few trends impacting Vehicle Data & Cloud Connectivity

- Increasing number of Connected Vehicles
- Increasing focus on mobility
- Monetizing Vehicle Data
Resulting in an End-to-End Chain from Vehicle Data to Cloud

Secure & Reliable Data Exchange

Vehicle Function Execution
(with increasing complexity)
To bring harmony, where possible, to the currently fragmented “end-to-end” chain between vehicle data and back-end cloud to ease interoperability, develop common solutions, enable and secure data access, clarify responsibilities and terminology and facilitate business opportunities

Start-ups already delivering vehicle data to the market; multiple organizations looking at facets of the same problem space
Exemplary SW Reference architecture
Project Goals and Approach

• Primary Goal: To align, combine and integrate technical standards and solutions to achieve a seamless coupling of in-vehicle and back-end architectures resulting in an end-to-end, vehicle computing platform

• The platform shall leverage existing standards but also identify gaps and work collaboratively to fill them

• To achieve this, GENIVI will investigate:
  - Reference software and system architectures for data exchange
  - Data models and their representations
  - Data protocols for requesting data (low to medium speeds)
  - Data protocols and software architecture for big data (high-bandwidth data streams, high-volume processing)
  - Nomenclature, terms, names, definitions and contracts so that we understand each other in both technology and business terms
  - Use cases and requirements to drive the other work areas in the right direction.
Cloud & Connected Services (CCS) Project Execution

• GENIVI Cloud & Connected Services (CCS) project currently open to all stakeholders willing to contribute

• Project wiki found at: https://at.projects.genivi.org/wiki/x/PIAVAg
  - Weekly teleconferences (Mondays @ 1400 CET / 1000 US EDT / 0700 US PDT)

• Project composed of three phases:
  • Analysis: review of existing projects, specifications & data models (thru end-2019)
  • Design: resulting in a definition of prototype architecture (thru mid-2020)
  • Implementation: resulting in prototype testing and presentation (@ CES 2021)
Analysis Phase Initial Targets

- SENSORIS (Protocol for sensor data, Vehicle surrounding and internal car data)
- Automat Project (http://automat-project.eu/)
- W3C (GEN2 Vehicle Signal specification)
- ISO 20078 Extended Vehicle (ExVe)
- Android Automotive – AOSP
- Eclipse Kuksa Project
Project Work Completed/In-progress (as of September 2019)

- **Analysis:** Review of existing projects specifications & data models (thru end-2019)
  - Sprint 1: Review of existing projects and specs DONE
  - Sprint 2: Gap analysis between specs WIP
  - Sprint 3: Production of a gap analysis deliverable WIP – expected date of delivery in November 2019 at the GENIVI Technical Summit

- **Design:** resulting in a definition of prototype architecture (thru mid-2020)
  - Sprint 1: Identification of communication and interface structure – will start in Q4, 2019
  - Sprint 2: Selection of possible SW and communication technologies for building blocks; requirement update
  - Sprint 3: Definition of reference system and software architecture

- **Implementation:** resulting in prototype testing and presentation (@ CES 2021)
  - Sprint 1: Selection of prototype building blocks and prototype platform
  - Sprint 2: Implementation and/or integration of mandatory components
  - Sprint 3: System test
Takeaways

• GENIVI remains committed to developing data and protocol specifications within the W3C
• GENIVI believes the future architecture needs several building blocks in which W3C standards play an important role.
• GENIVI is currently focused on software and architecture in a multi-OS, vehicle context
• GENIVI’s future outlook is toward vehicle cloud computing
• GENIVI is laying a groundwork for seamless coupling of in-vehicle and back-end architectures resulting in an end-to-end, vehicle computing platform
• GENIVI’s approach requires collaborative and inclusive engagement with other SDOs and organizations
• GENIVI welcomes member and non-member participation in its cloud & connected services project

Contact Gunnar Andersson (gandersson@genivi.org) (GENIVI Development Lead) for more information
Thank you!

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