Future Architecture of Vehicle Cockpit Displays with Multiple Inter-Operating Systems

GENIVI All-Member Meeting – May 15, 2019
Displays are transforming the automotive cockpit.
Augmented Rearview Mirror
Instrument Cluster
Augmented Sideview Mirror
Infotainment
Navigation Controls
Driver Information
Backup Camera
Climate Control
Audio Controls
Rear Seat Entertainment
Augmented Reality Head-Up Display
Augmented Reality Rear Seat Windows
Common data needs require these systems and operating systems (OSs) to work together.
Hardware Architecture in the Transforming Cockpit

- Hardware changes as requirements change (multiple ECUs and inter-ECU communication)

Industry shift

**Yesterday**
- One display per ECU
  - Cluster (MCU)
  - CID/Radio/Navigation (SoC)
- Very little content exchanged
- Purpose-built devices

**Today**
- Single SoC (domain controller) driving multiple displays
- Massive sharing of content
- Configurable devices
Challenges Arising from this Trend

Content sharing
- EX: Video stream from navigation system to cluster/additional display

Third party content
- Apps
- Contacts
- Media lists

Cyber security

Safety
- Mixture of non-safety and safety relevant content in one display
- Driver distraction because of information overflow
Multiple OS Requirements

Hardened OS
  • Safety applications directly communicating with vehicle data

No OS (or very thin OS)
  • Small accessory items (headlights, mirrors, HVAC)

Commercial/Connected OS
  • Infotainment (Android/Apple)
Multi-OS Architectures for Display Systems
Integrated Solutions

Software Solution  Virtualization  Hardware Resource Allocation
Flexible communication in integrated cockpit solution using Altia Domain

• Advantages:
  – Can use any communication protocol.
  – Number of processes and data structure can vary.
  – Systems only receive data they need.
  – Can allow for systems to be distributed.
Flexible communication in integrated cockpit solution using Altia Domain

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Altia Domain works the same with or without hypervisors.
Altia Domain can communicate on a single SoC or across multiple devices over any protocol including the GENIVI generic communication protocols.

- Build your code once, deploy to different HW scenarios based on cost targets as appropriate.
Altia eCockpit Showcase at CES 2019
Graphics Content Sharing
Graphics Sharing Solutions

Integrated Cockpit – GPU Sharing / Surface Sharing/Shared State (Single SOC Solution)

Video Stream (Rendering Completed)

Shared Screen Descriptions (Remote HMI)

“Remote” (API Remoting) Rendering (ex. Ramses)
Control multiple displays in a single modeling environment
Altia Layer Manager

Easily control your hardware

- Deep integration with HW features controlled directly from design environment.
- Layer manager enables you to:

Output to Multiple Displays  Video Layers  HW Safety features
Full control of your display real estate
Content Sharing Concept Demo