The future of embedded is Intelligent – Wind River solutions to accelerate your development

Hawk Su
APAC Service Sales Manager
Agenda

- Wind River Introduction
- Wind River Automotive Platform
- Android IVI specifics
- Wind River best practice examples in automotive
- Wind River Solution Accelerators for Automotive
- Wind River Industrial / Medical Market
- Business challenges
- Safety & Security Requirement in Transport
Heritage
- 1981: Founded
- 1993: IPO
- 2009: Acquired

Leadership
- 30+% Commercial Market Share
- Broadest Portfolio

Scale
- 1,900 Employees
- 42,000 Developers

Investment
- $100m Annual R&D Spend
- Rich History of M&A

Commitment
- 95% Customer Satisfaction
- 20% Net Promoter Score
Auto Challenges: Increase in Software Complexity

- Provide a comprehensive user experience
- Provide integration with user electronics
- Adapt to all new communication technologies
- Cope with the rising demand for services

Which is the best way to meet these challenges?
OEM Android High Level Use Cases

A few points captured through conversations with several OEMs:

- “Apps, Apps, Apps”!
  → Provide support to deliver (Managed/Third Party) applications to end user

- Have Managed Apps coexist with Native Apps
  → such as: AM/FM Tuner, Navigation, Media playback

- Ensure that overall system performance of the IVI unit does not degrade by installing Apps

- The overhead (resource consumption/BOM cost) caused by providing support for managed apps should be minimal

- Be able to scale down system configuration to low-end systems which do not require Managed Apps
ANDROID IVI SPECIFICS
<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Work Scope</th>
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<tbody>
<tr>
<td>Semi. Vendor</td>
<td>• BSP for App Processor</td>
<td>• Reference Hardware</td>
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<td>• Multimedia</td>
<td>• Linux BSP</td>
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<td>• Graphics</td>
<td>• OpenGL/OpenVG</td>
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<td>• Reference Hardware</td>
<td>• Media Codec</td>
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<td>Wind River</td>
<td>• Requirement Analysis</td>
<td>• Kernel Drivers create/modify/integrate</td>
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<td>• Software Architecture Design</td>
<td>• IVI Framework create/modify</td>
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<td>• BSP/Middleware Enablement</td>
<td>• Application create</td>
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<td>• Applications</td>
<td>• Software Integration</td>
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<tr>
<td></td>
<td>• Kernel Drivers create/modify/integrate</td>
<td>• iPod, Fast Boot, Test Automation, Firmware</td>
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<td>• IVI Framework create/modify</td>
<td>Management, Security Enhancement</td>
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<tr>
<td>ISV</td>
<td>• Telematics</td>
<td>• Telematics, ADAS, VR, Navigation</td>
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<td>• ADAS</td>
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<td>• Voice Recognition</td>
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<td>IHV</td>
<td>• Device Drivers</td>
<td>• Device Drivers in Binary and/or Source</td>
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<td>• Systems Integration</td>
<td>• Commercial Hardware</td>
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<td>• Device Manufacturing</td>
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<td>• Design / Product Validation</td>
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<td>Car OEM</td>
<td>• System Specification</td>
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<td>• Quality Assurance</td>
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## Typical IVI Requirements

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Description</th>
</tr>
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</table>
| R.01| Fastboot              | • Early Camera: 2 Sec.  
                       | • Initial Screen: 8 Sec.  
                       | • Full Navigation + Voice Recognition: 20 Sec.                               |
| R.02| 3D Navigation         | • 10 ~ 30 frames per second                                                  |
| R.03| Multimedia            | • HD (720p & 1280p) Video  
                       | • XSM / HD Radio                                                            |
| R.04| Connectivity          | • iPod & Android  
                       | • MirrorLink, DLNA, Miracast                                                 |
| R.05| Telematics            | • 3G / 4G LTE, Remote Management, Cloud Connectivity                         |
| R.06| Internet              | • Web Browser, Social Networking                                             |
| R.07| Car Network           | • CAN / Ethernet AVB / WiFi Direct                                            |
| R.08| SW Framework          | • HTML5 Web Runtime, App Store  
                       | • Firmware Management, Security Enhancement                                  |
| R.09| SW Architecture       | • Scalability (High, Med, Low end device)  
                       | • Reusability (Different models, different OEMs, different CPU, etc)         |
The Ideal IVI Platform

- Advanced Infotainment Platform
  - Use commercially available software components as framework
  - Support for multiple hardware platforms with a common S/W platform
  - Support for accessory devices on a readily available vehicle bus
  - Use an application framework with developer community support
  - Connectivity solutions to support consumer devices
  - Cloud access to manufacturer services for applications, concierge services, etc.
  - Upgrade path to offer low cost upgrade to keep pace with market demands

- This model allows for
  - Multiple OEMs
  - Multiple HMI and app developers
  - Longevity of platform and flexibility to offer superior features
Wind River Automotive Portfolio

**SW Platforms**
- Automotive-driven roadmap
- GENIVI compliant
- WR Linux kernel user space
- Android IVI
- CE industry alignment
- Ready for connected services
- Link to AUTOSAR
- Support of multiple silicon partners

**Technologies and ISVs**
- Wind River Apps (Apple integration, USB, etc.)
- Wind River ISVs:
  - Wind River Apps
  - Wind River ISVs: SIMICS, TESSERACT, etc.

**Automotive Solutions**
- Development Platforms
- Automotive IP
- Customization Services
- Software Integration
- SW Project Management
- Hardware Enablement
- Optimization
- Support & Maintenance

**Automotive Services**
- Dedicated for various product segments
- CMMI level 3 certified
- Customer satisfaction

- Workbench w/ Qt plug-in
- Hypervisor support
- Wind River Tools
- SW Platforms
- GENIVI
- Android IVI
BEST PRACTICE EXAMPLES
<table>
<thead>
<tr>
<th>Device Name</th>
<th>Android based IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Period</td>
<td>2010 ~</td>
</tr>
<tr>
<td>Device Type</td>
<td>Android Froyo &amp; GingerBread based IVI System</td>
</tr>
<tr>
<td>CPU</td>
<td>Freescale i.MX 536</td>
</tr>
</tbody>
</table>

**Development details**

- Complete Software development and integration (including Software for Factory and Service Centers diagnostics)
- Porting Android onto customer’s hardware
- Android adaptation for In Car integration (Android customization (with large button, redefined positions,…), multi-sources support in Media and Video players (SD, USB, Bluetooth, Aux, iPod/iPhone), FM Radio Application, specific Bluetooth management for user contacts, specific Audio manager, Made For iPod/iPhone, specific Power manager, …)
- Productization
<table>
<thead>
<tr>
<th>Device Name</th>
<th>Android based IVI System</th>
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<tbody>
<tr>
<td>Project Period</td>
<td>2011 ~</td>
</tr>
<tr>
<td>Device Type</td>
<td>Android based IVI System</td>
</tr>
<tr>
<td>CPU</td>
<td>FREESCALE I.MX Series</td>
</tr>
</tbody>
</table>

### Development details

- High Level Design
- Software Integration
- Android Framework Customization for IVI system (Bluetooth, HMI Widget, Audio Flinger, etc.)
- Kernel/BSP Customization for IVI system
- Automotive Specific Middleware Implementation (MICOM Interface, Mode Manager, Radio, DMB, CDP, etc.)
- Kernel/Middleware test-automation by using Wind River FAST
ind River in Automotive with VxWorks

- Ferrari, BMW, Renault, Sauber, Minardi, BAR, others (FIA certified ECU)
- BMW CCC Siemens VDO (VxWorks)
- VW RNS Siemens VDO (VxWorks)
- Sony DJ-Bank HDX-1000 Car Audio Player (VxWorks)
- Peugeot RT4
- Maserati Magnet Marelli Car Information System
- Alfa 147, Fiat Stilo, Fiat Ducato, Fiat Doblo, Fiat Ulysse, Lancia Phedra, Peugeot 307, Peugeot 807, Citroen C3, Citroen C5, Citroen C8, Maserati Spyder, Maserati Coupe.

DIAB Compiler for Tier1
Wind River
Solution Accelerators
for Android
Wind River Solution Accelerators for Android defined

- Wind River Solution Accelerators for Android are commercial add-on software modules on Android.
- They are tested and validated applications and middleware components.
- Solution Accelerators can help you shorten time-to-market by filling the gap between the Android Open Source Project and real-market requirements.
The value of Solution Accelerators

- Implementation-ready Android components that can be integrated with your solution and branding
- Complies with Android or industry standards (e.g. medical)
- Support and maintenance that keeps your Android OS implementation up-to-date
- Financial benefit from reduced time-to-market and lowered engineering resource requirements
Solution Accelerators get you closer to the finish line

Examples of Solution Accelerators:

- Wind River Media Center
- Android Firmware Management
- Hyperboot
- Multi-Windowing
- SyncML
- Medical HDP/IEEE 11073
- FM Radio
Wind River and Android

- 5 years
  - Wind River GPO directly with Google
- Contributed 100+ programs
  - Contributed the enablement of several hundred Android SKUs
- 9 Android design centers worldwide
  - Beijing, Shanghai, Seoul, Stockholm, Galati, Grenoble, San Diego, Beaverton, Kanata
- Customers span entire value chain
  - Silicon, device manufacturers, operators, software vendor and integrators
Solution Accelerators for Automotive

- Automotive Pack is designed to overcome barriers of porting Android to an automotive platform to create a connected vehicle experience. OEM and tier-1 manufacturer can utilize Solution Accelerators to quickly build their own Android products, solutions or services, and add branding, personalization, and innovation to fill the gap between the AOSP and real-market requirements. The Pack including followings:
  - Mandatory class of the automotive technologies such as additional BT profiles, FM Radio or automotive UI extension
  - Mandatory class of the horizontal Solution Accelerators for Automotive including iPod on Android, Firmware Management, Multi-Windowing, Hyperboot
## Our Customers, Our Industries

<table>
<thead>
<tr>
<th>Aerospace and Defense</th>
<th>Industrial and Medical</th>
<th>Network Equipment</th>
<th>Mobile and Consumer</th>
<th>Automotive</th>
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Wind River’s Industrial/Medical Market Focus

- Transportation
- Power/Energy
- Medical
- Process Automation
- Complexity Liabilities Connectivity
- Control Automation
Transport Markets and Customers - Focus

<table>
<thead>
<tr>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Equipment Suppliers to Tier 1 &amp; Tier 2</th>
<th>Integrators</th>
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IEC 61508 / EN50128 – Enabling Success

Scalability in Product
- Certified (qualified) products
- No one fits all strategy (e.g. SIL1 – SIL4)
- Mainstream to enable affordable safety

Predictability through close cooperation with CERT partners
- Joint customer/authority/WRS audits
- Scalable WRS validation partners

Flexible but complete safety tool chain
- Process models require tools
- Modeling, verification and validation is key
- Rigid qualification process requires agility
- Tight tools partner integration is key

Safety in Transportation

Productivity through Services
- Program Managed engagements (QA, local interface in time zone)
- WW global footprint
- Close cooperation with cert authority
- CMMI Level-3 certified

No Safety Solution without Semiconductor collaboration
- IEC 61508 Rev2 more specific to diagnostics functions
- Common failure analyses on CPU enables synthesizing solutions

Reduce Supply Chain Complexity
- Strategic partner validation programs
- Allignment of technologies
- Optional one stop shopping
Case: On-Board Propulsion Control (Certified CENELEC EN50128)

Programmable Logic Controller (PLC) (Non Redundant, Modular Redundant, Triple Redundant)

HMI - Control Display

VxWorks, VxWorks CERT, VxWorks 653

Process Model

Closed-Loop Simulation

Input (examples)

Output (examples)
imple: On-Board HMI (*Certified CENELEC EN50128*)

Programmable Logic Controller (PLC) (Non Redundant, Modular Redundant, Triple Redundant)

HMI - Control Display

VxWorks, VxWorks CERT, VxWorks 653

Process Model

Closed-Loop Simulation

Input (examples)

Output (examples)

VxWorks, VxWorks CERT
Let us help you solve your challenges!

- Check out the demo stations in the lobby to see many of these live products today
- Take a copy of the printed materials for more details
- Contact Wind River Account Manager with any questions

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WIND RIVER