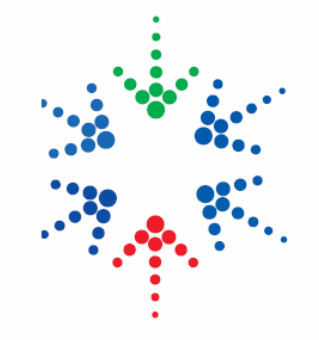
Wind River Mobile Solutions for

open handset alliance

and



LiMo Foundation

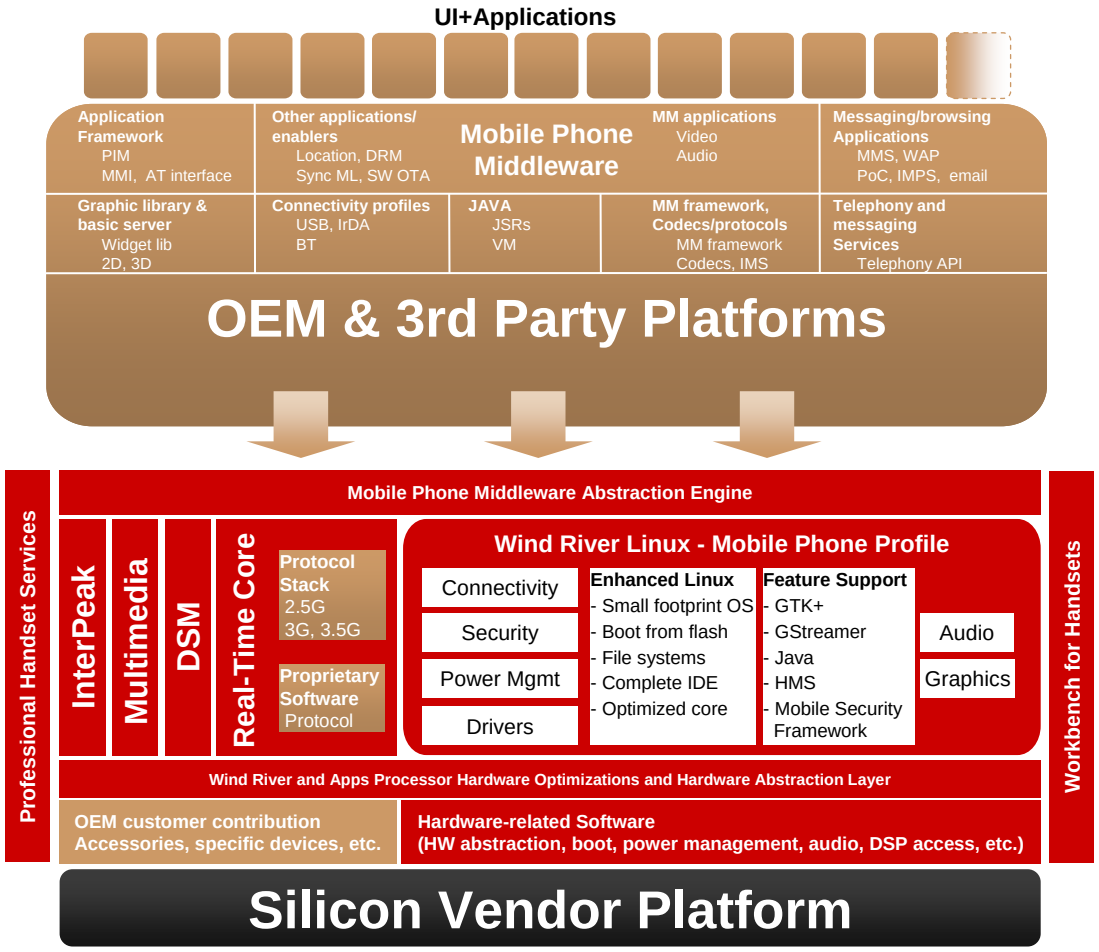
WIND RIVER

Our Mobile Handset Vision

As Linux emerges as the OS of choice for mass volume mobile handsets, Wind River's Certified Linux Solutions will de-fragment and standardize the software base platform for OEMs and semiconductor firms.

Wind River Mobile Solutions

- **Common Integration Environment**
  - Layered build, asynchronous development
  - Community source projects
- **Professional Services**
  - Full Tier 1 OEM deployments
  - From BSP to system integration
- **OEM-Grade Kernel**
  - Optimized for mobile
  - Power management, small footprint, fast boot
- **Middleware Optimization**
  - Tailored to MW/apps framework
  - Optimized for application dependencies
- **Workbench Tools**
  - Market leader, Eclipse-based IDE
  - Single cockpit
- **Commercial Support**
  - Tailored to Silicon
  - Middleware Abstraction
- **Real-Time Core**
  - Real-time executive
  - Full technical GPL isolation
- **Hardware Optimization**
  - Deep security, multimedia, power management
  - Maximum OEM reuse on silicon platforms



Wind River – Solution Strategy

Wind River Value Proposition

- **Common Integration Environment**
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- **Professional Services**
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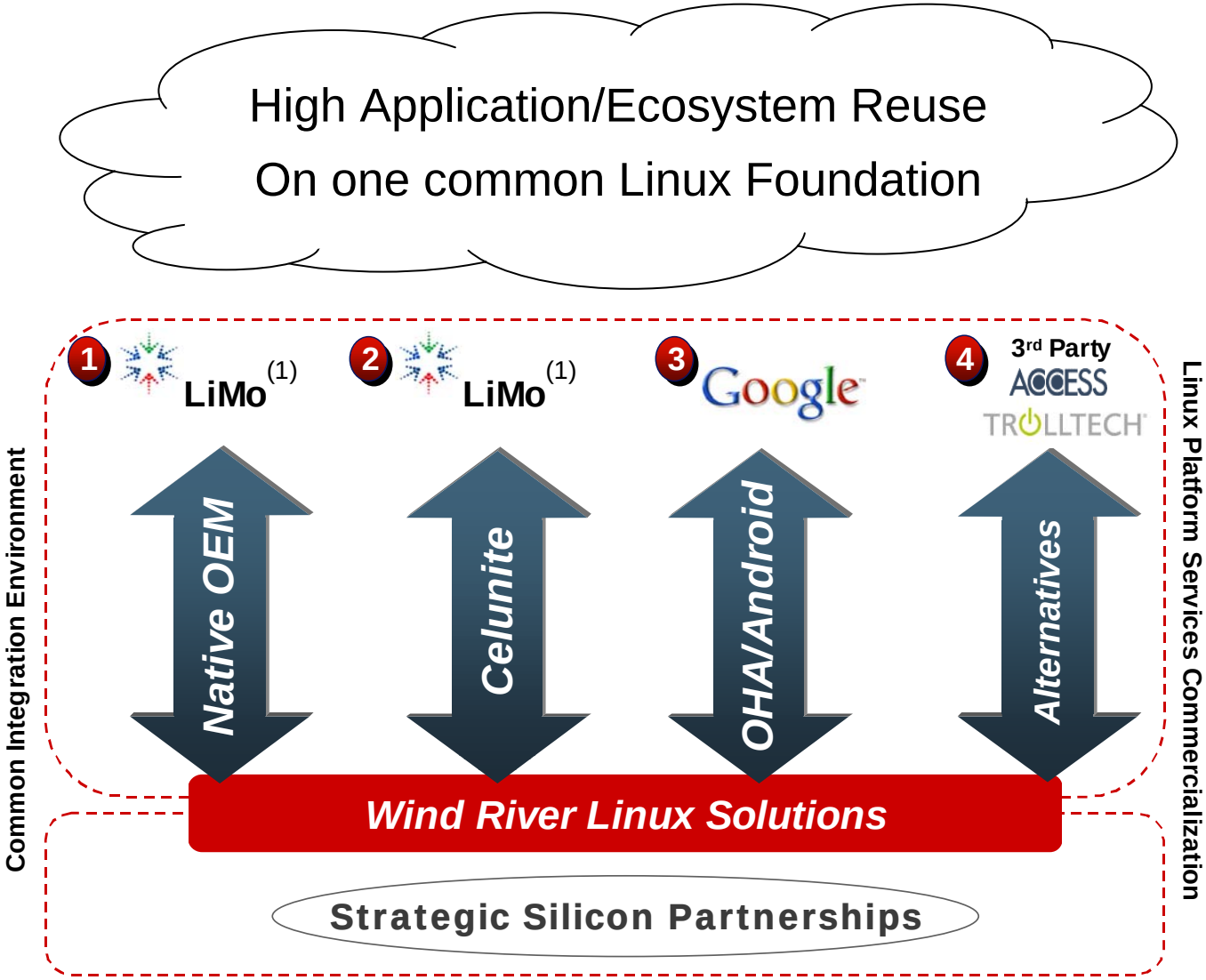

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What are the Challenges of Commercializing the ANDROID Platform?

- Android is NOT a commercial product –> Pre-release software with limited documentation at this time
- Android middleware and applications require a solid software foundation for porting, but dependencies and issues are poorly documented, if at all
- Tools provided by OHA address Java application development, but native-side development critical for productization is not included

What Wind River Does in the open handset alliance

Wind River enablement for android :

- Using PCD-LE as basis, port Android kernel enhancements
- Port Android platform on target platform
- Write/commercialize BSPs per OEM needs
- Integrate and optimize Android functionality on target platform
- Test Android functionality on target platform
- Tune underlying PCD-LE Linux kernel and abstraction layer
- Roll-in Eclipse and mobile handset development services
- Deliver training on Linux and toolchain
- Manage (or co-manage) overall program
- Create/Revise/Deliver Android Porting Guide

Speed of enablement will be a key factor driving Android OEM business for Semis and OEMs

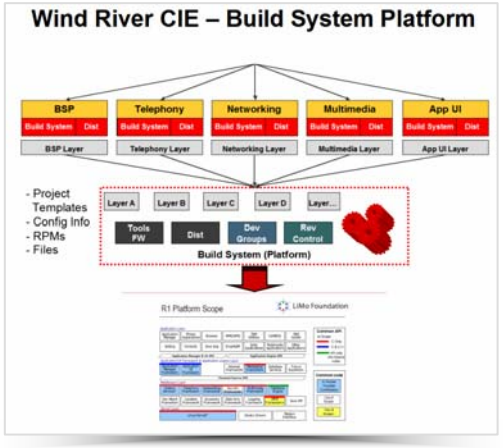
What are the Challenges of Commercializing the LiMo Platform?

- LiMo is not a fully commercialized product
- No common HW reference platform, requiring a stable SW platform for target architecture porting

Wind River Role in LiMo Foundation

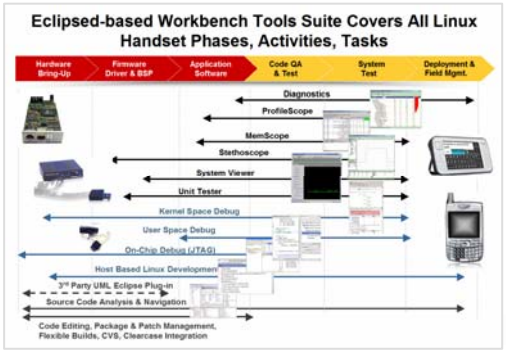
1 Contribute key technology to CIE for LiMo Platform Development

- ✓Common software format for different components
- ✓Embedded distribution builder
- ✓Rollout to 5 LiMo OEMs this month



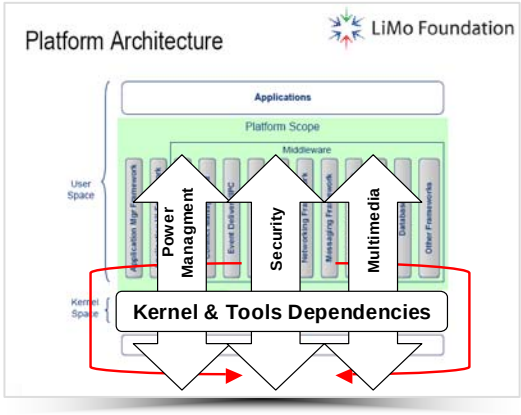
2 Found and Lead LiMo Tools Working Group

- ✓Contribute LiMo “Eclipse-based” IDE
- ✓Single Cockpit for LiMo Platform



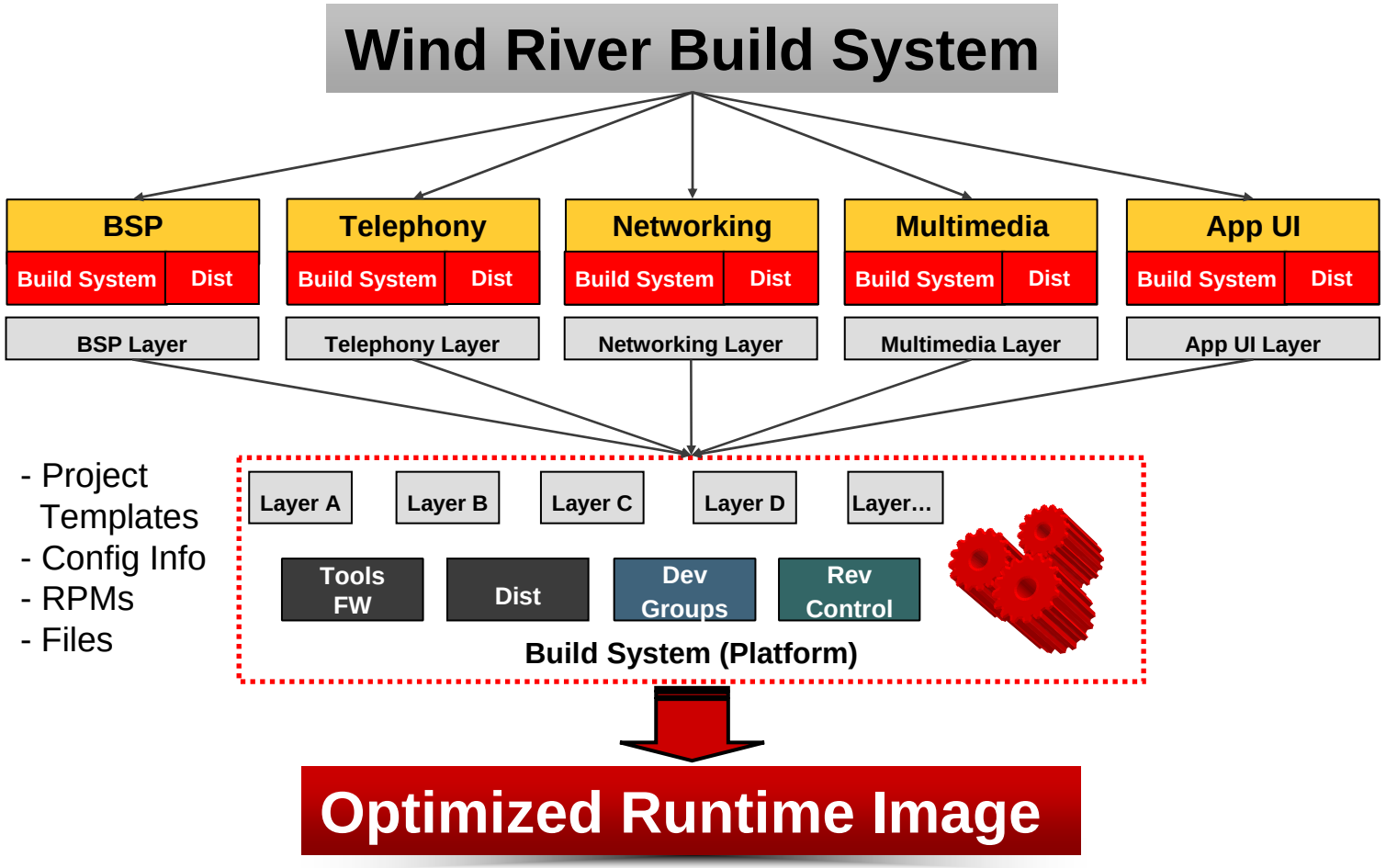
3 Contribute to LiMo Kernel Working Group

- ✓Optimizing common dependencies to LiMo Platform
- ✓Optimizing common dependencies into different HW



Wind River Layers Methodology

Methodology and tools delivered to Silicon and OEM customers



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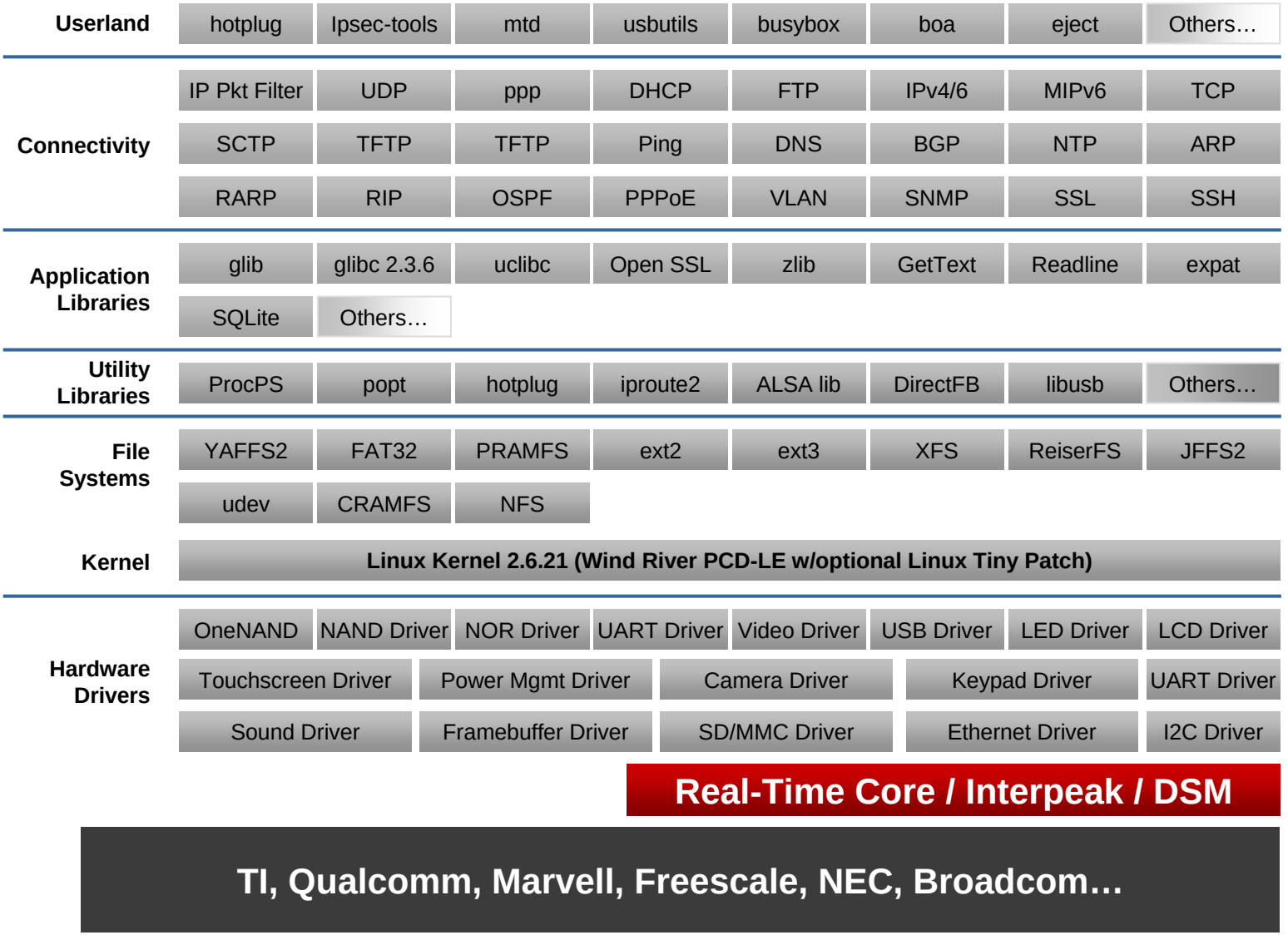
Wind River Linux Core Handset Offering



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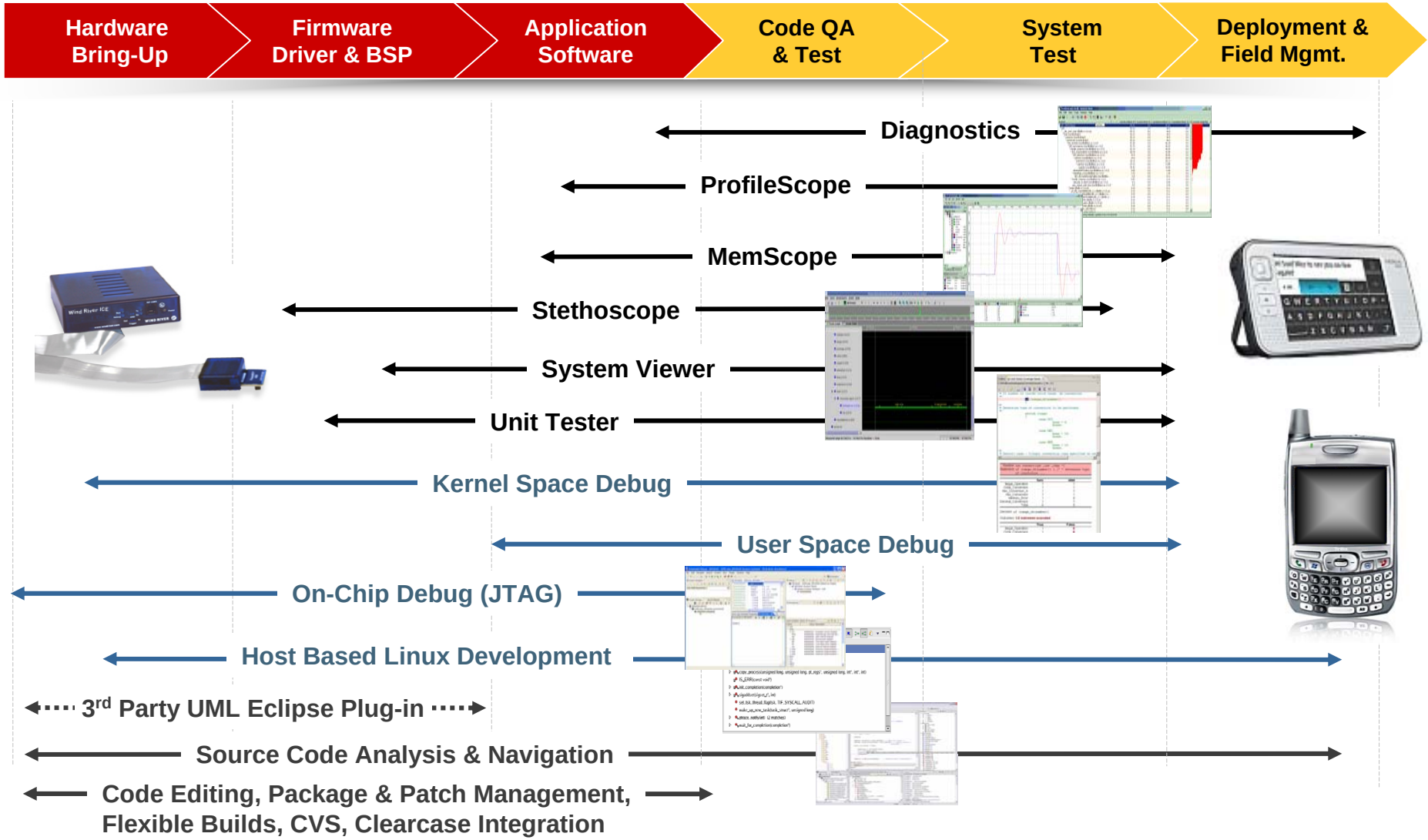
Eclipsed-based Workbench Tools Suite Covers All Linux Handset Phases, Activities, Tasks



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Wind River On-Chip Debugging for Mobile

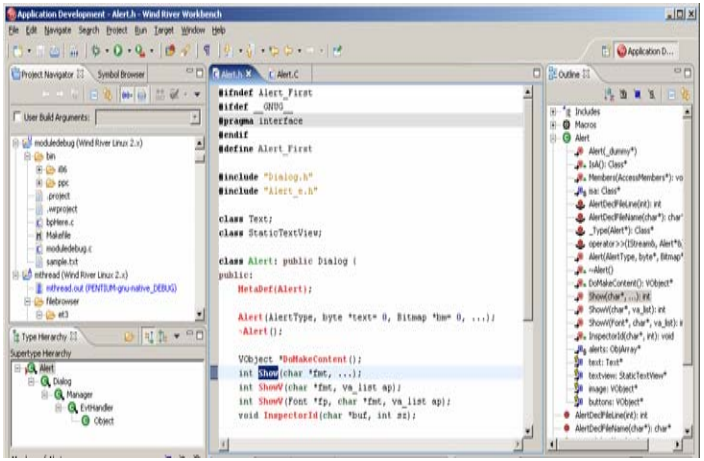
Wind River PROBE

- 100 Mhz JTAG Clock
- USB 1.x and 2.0 Compliant
- Autovoltage
- Bus Powered

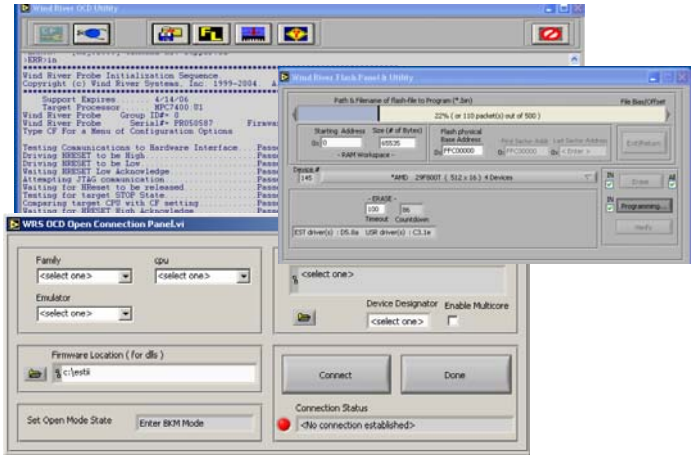
Wind River ICE

- 20 Mhz JTAG Clock
- Multicore
- Multisession

Workbench On-Chip Debugging



On-Chip Debugging API and Utility

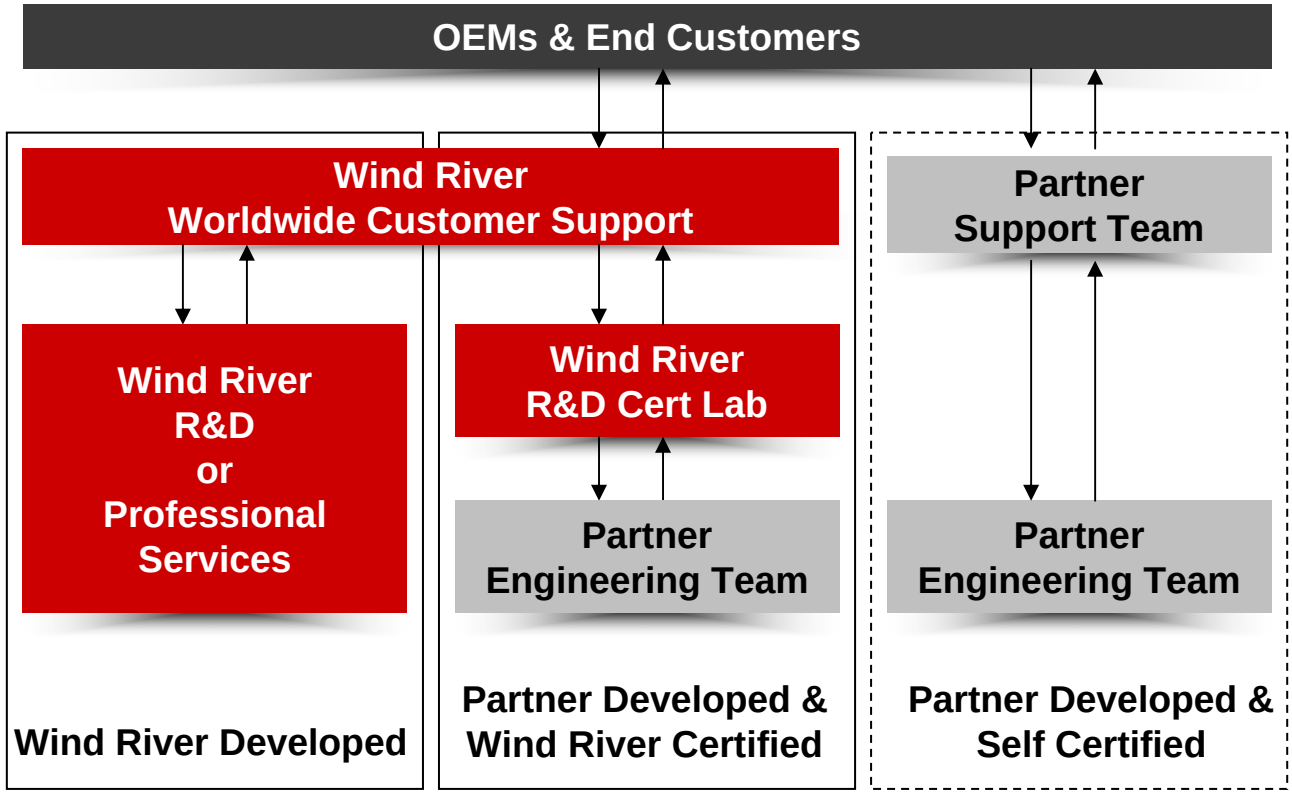


Wind River Trace

- High-speed real-time trace buffer (up to 200 MHz)
- Filtered trace
- Modular hardware design
- Graphical User Interface
- Target versatility
- Ability to capture up to one million lines of code
- 200 MHz Trace Speed

Hardware Integration Support Models

Accelerate Hardware Integration by Offering Subscription-based Support to OEMs or End Users



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Wind River Real-Time Core

Single Core Linux Market Leader

- In Single Core 2G/3G Linux Platforms
- Targeted at Feature Phone Market
- Best-in-Class performance
- Non-invasive architecture
- Strong advantages to competition
- Integrated with Wind River Linux

Real-Time Core works in 2G/3G Prototypes

Wind River Real-Time Core: Overcoming Handset Resource Constraints

Demonstrated Single Core Linux

Calls made on 2.75G stack w/70% + CPU available for apps (worst case). 95% CPU available during audio calls (3G data NDA)

Clock Rate

Calls made on a 2.5G stack with 70% or more CPU available for apps on a 208MHz ARM9 with 16k I-Cache, 8k D-Cache.

Using threads to manage resources

Elevate interrupt handlers to threads to allow control of CPU resources. Allows easy emulation of HW interrupt priorities.

Flash

Real-Time Core adds very little additional flash requirements (just enough to store the binary – 200kB).

Real Time Core Footprint

Real-Time Core requires 300kB (or less) RAM and 200kB flash beyond what Linux and apps require. Compiler & option dependent.

Memory

XIP (possible, but performance impact, reduced by loadable kernel modules). Thumb optimization often necessary, highly compiler dependent.

Drivers are easy

Adapting drivers is easy for all communications stacks

Development Time

Develop from Windows and Linux with a standard POSIX API for Real Time Core. Minimal use of Real Time Core and Linux apps work without a change to binaries.

Wind River Global Professional Services and Support for Linux Handsets

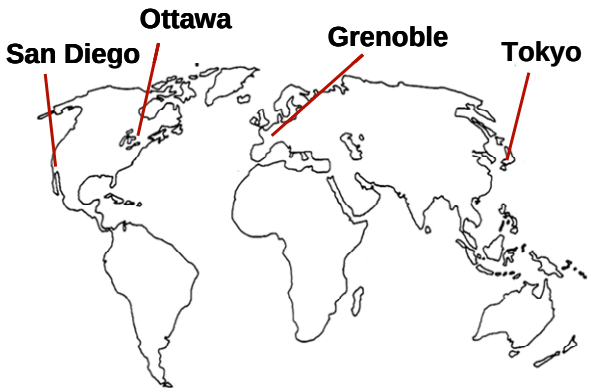
Customer Mobile Handset Platform Projects

Professional Services

Hardware Bring-Up → Firmware Driver & BSP → Middleware Software → Code QA & Test → System Test → Deployment & Field Mgmnt.

- Worldwide delivery capability
- From handset silicon enablement to operator customizations
- CMMI Level 3 certified
- Our services staff:
  - 240 engineers worldwide
  - Design Centers across the globe
  - Local field consulting engineers
  - Extended services team

Design Centers



Global Support

Dedicated Platform Support Teams

- Six major support centers worldwide
- 21 additional support hubs located across the globe
- 150+ experienced support engineers; average 10+ years of industry experience
- The largest customer support organization in the device software industry
- Support Center Practices Certified

WIND RIVER

Mobile Handset Professional Services Practice

Skills

Core Linux expertise

- ARM9, ARM11 and XSCALE
- File systems, USB, Multimedia, Security
- Power management
- Performance, footprint, boot time optimizations
- Board-specific
  - All device drivers, Boot loader
  - NAND / NOR Flash and memory
  - TI, QCOM, NEC-EL, EMP, Marvell, others
- Stacks (USB, BT, Gstreamer, OpenMAX)

Mobile Handset Enabling Services

- Custom BSPs including all device drivers
- CIE and Software Foundation Test and Regression Harness
  - Key Foundation elements tested prior to application integration (Connectivity, Power Management, stress / soak)
- Middleware Integration and Testing
- Solve the OEM problem:
  - OEM-Grade Software Foundation
  - Rigorous testing and validation

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