

Wind River Platform for Android

Wind River Platform for Android is a commercial version of open source Android, a fully compliant software platform from which original equipment manufacturers, original design manufacturers, and operators may quickly add branding, personalization, and innovation. Wind River Platform for Android is the basis to rapidly deliver a customized solution to fit specific market and mobile service needs without having to reinvest in bringing up core platform components and ensuring their stability.

Android Challenges

With rich functionality, flexibility, extensibility, and developer-friendly openness, the Android Open Source Project (AOSP) has been widely adopted not only by smartphones but by other portable and embedded devices: tablet computers, TVs, set-top boxes, and so on. However, before embracing Android, there are some risks and issues that need to be taken into consideration to build a commercial solution based on the Android Open Source Project:

- **Internal complexity of Android:** Because the Linux kernel is in the General Public License (GPL), Android consists

of about 185 different subcomponents that are written under about 19 different open source licenses. It is a big challenge to manage the hundreds of components, multiple licenses, and associated obligations. The AOSP is continually evolving—five versions have been released since Cupcake version 1.5 in 2009. For each release, hundreds of branches are added into more than 200 different git repositories for new features, bug fixes, and patches by Google and the community. In-house development running in parallel with AOSP's fast-paced releases and updates challenges the successful testing and validation of Android products.

- **External complexity of Android:** For mobile phones or embedded devices, multiple hardware choices are available on the market today: Intel Architecture chipsets vs. ARM Architecture chipsets, dual processor design vs. single processor design, single core vs. dual core, and PowerVR graphics vs. Adreno graphics. Additionally, different hardware choices among cameras, LCD controllers, modems, Bluetooth devices, GPS devices, Wi-Fi devices, and power management integrated circuits (PMICs) make it even more complex. With this many choices of hardware components—the target hardware designs vary according to specific purpose—a lot of effort and challenges

are involved to adapt, optimize, and validate Android on a selected hardware platform to stay within budget and on schedule.

- **Lack of commercial readiness:** Android is designed for the handset platform, combining a mobile operating system, GSM/CDMA stack, and middleware, plus browser and application environment. However, as an open source project, it is far away from being commercial ready. More research and development are still needed to accommodate additional embedded devices. Even as a handset platform, some important functions are still missing; as an open source project, it is neither documented nor validated. AOSP still lacks roadmap, support, maintenance, and customization.

Commercial Android Platform

Wind River's years of experience in Android have resulted in an offering that combines the innovation of Android with the predictability of a commercial software platform. Wind River Platform for Android was developed for operators and handset manufacturers challenged to consistently achieve time and quality performance metrics as Android devices are brought to market. By delivering a commercial Android platform, Wind River is offering a fast way to innovate and differentiate without the risks common to open source software:

- **Up-to-date and license-compliant:** As an Open Handset Alliance (OHA) member, Wind River partners with OHA to get the newest updates and information. Wind River Platform for Android always stays updated with the latest

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CPU: ARMv7 Processor rev 3 (v7l)
kernel options: console=ttys2,115200n8 noinitrd root=/dev/mmcblk0p2 video=omapfb:mode:1280x720@50 init=/init rootfstype=ext2 rw rootdelay=1 nohz=off
time: 33:09

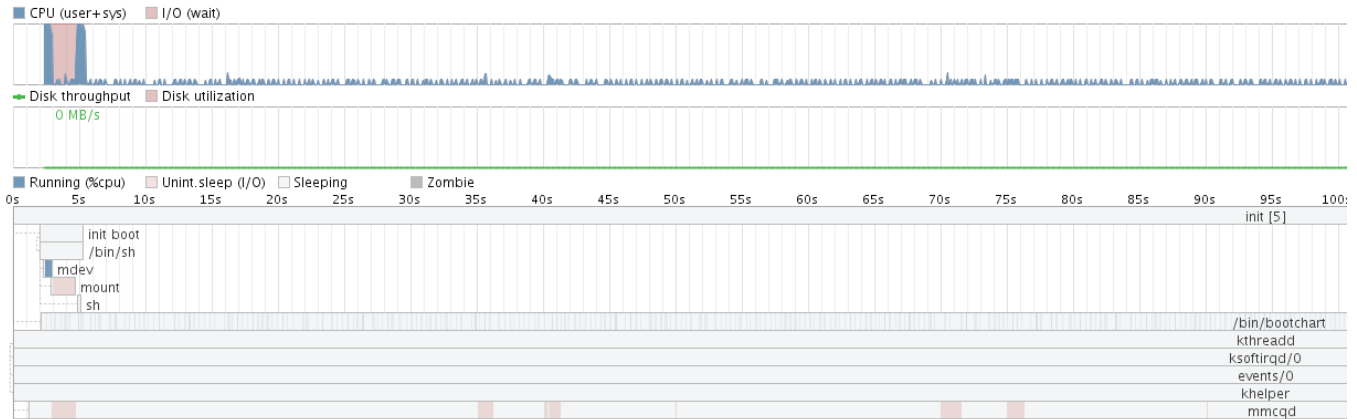


Figure 1: Accelerated kernel boot support

version of Android. For every release, there is a rigorous intellectual property review process to manage all the licenses involved in the release, to provide visibility, control, and compliance.

- **CTS-compliant, tested, validated, documented:** Open source Android code is validated and tested by Wind River in a rigorous process combining hundreds of manual test cases and tens of thousands of automated test scenarios including compliance with the latest Android Compatibility Test Suite (CTS) by Wind River Framework for Automated Software Testing (FAST).
- **Optimized to unlock hardware’s potential:** Wind River has proven knowledge to enable Android on the leading mobile hardware platforms with different hardware designs, such as Texas Instruments OMAP, Qualcomm QSD, and Intel Moorestown.
- **Pre-integrated with commercial software from leading providers:** Platform for Android is pre-integrated with third-party software that includes existing Flash technology from Adobe, OpenCORE mobile multimedia software from PacketVideo, and Firmware Over-the-Air (FOTA) updating and device management software from Red Bend.
- **Award-winning global support:** Wind River global customer support and services provide quality-controlled update and bug fixes, hotline support, 24/7 availability, consulting, and implementation services for any customization of the platform.

Key Features

Wind River Platform for Android is the foundation to quickly deliver a customized solution to fit specific market needs without having to reinvest in bringing up core platform components and ensuring their stability. A commercial version of open source Android can streamline the process for industry players wanting to build Android-based devices and test them for market readiness. This can improve time-to-market and offer improved end-user experiences.

Accelerated Boot Support

Wind River optimized Android’s Linux kernel to speed up the boot process and provide determinism and real-time performance. Enhancements focus on optimizing the boot loader, the Linux kernel, and the user space, including footprint reductions, boot sequence adjustments, and script changes. The accelerated boot support enhancements help support an “instant-on” capability and help minimize power consumption during the boot-up process.

SyncML Support

Mobile communications rely on the ability of devices to deliver information to users when they want it or need it. As such, users want access to information and applications from the device they

are using with the ability to back up, synchronize, and access this same information to other devices and locations from wherever they are. Wind River has incorporated the SyncML protocol into Platform for Android, providing users with the sort of information synchronization they desire.

Because SyncML is an open standard protocol, it is not reliant on proprietary hardware or software, meaning that device manufacturers, service providers, and application developers can focus on communicating with one universal standard rather than needing to create and maintain multiple interfaces to a myriad of protocols.

Currently, Wind River Platform for Android implements SyncML with a user’s contacts and images. Future implementations will further utilize SyncML for more applications.

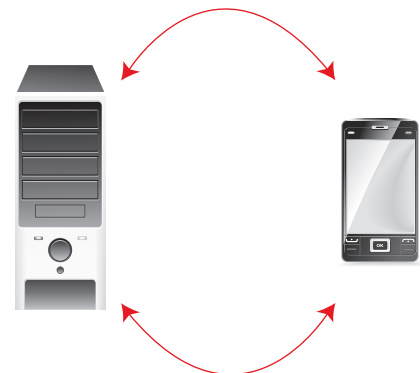


Figure 2: SyncML capability delivers information synchronization

Multi-windows Support

Multi-windowing behavior has been supported on the personal computer for many years. This provides a more immersive, multitasking user experience. Wind River's implementation of multi-windowing behavior on Android devices with larger screens supports the ability to have navigable and concurrently executing multiple windows active on the screen. The result is a visual representation of the Android operating system multitasking ability, creating an impressive demonstration of computing prowess.

The concept behind multi-windows is that a user who owns a device with multitasking capabilities should not have to continually switch from one application window to another to observe progress for each task or to accomplish one task (e.g., sending email) while another task is running. By default, each Android application uses its own virtual machine and runs its own Linux process. Therefore, multi-windows simply provides a visual link into each running application, making available on the screen what the device is already doing.

Application windows are sized based on the remaining portion of the visible screen, meaning that users are not limited to automatic sizing but can size

windows based on importance or immediate need. Users can minimize, resize, and arrange application windows to provide a personalized experience.

USB On-the-Go Support

Standard Android devices can only connect to computers as mass storage devices or debug clients in slave mode through the USB connection. Wind River's implementation of USB On-the-Go (OTG) allows an Android device to become the host when paired with another USB device using the same USB port. This enables Android devices to access files on USB disks without a computer to act as middleman between the devices. Wind River's USB OTG also supports USB keyboards and mouse.

With this feature, users can connect a USB disk or a flashcard reader to a phone and browse, copy, and move files between the phone and the USB disk and between USB disks with an enhanced file manager. Music, videos, and pictures from USB disks are scanned and indexed by the system automatically. This is a transparent process to media players, meaning any media player designed for Android can play the media files from USB disks without any software or hardware change, allowing users to get extended media capacity.

USB OTG provides several useful options to users, enabling them to perform actions that used to be impossible. An ordinary computer keyboard and mouse can be connected to the device, such as tablet computers. Even a second phone in mass storage mode can be connected, allowing two phones to share files between them without a computer.

Firmware-Over-the-Air

Mobile device operators struggle with a means of keeping firmware on their devices up-to-date. Firmware and device updates that depend on end users are seldom reliable. Wind River has partnered with Red Bend to deliver Firmware-Over-the-Air (FOTA) updates to mobile devices. Devices running on Wind River Platform for Android employ Red Bend's FOTA to make sure device operators can provide the most updated firmware to all their end users.

Open Mobile Alliance Device Management (OMA DM) focuses on mobile device management and defines a vendor- and device-neutral protocol for managing device settings as well as software installation and even firmware updates. Using OMA DM, a compatible server can query a device for its capabilities and settings by traversing a configuration management tree using a standard protocol independent of the device manufacturer or model.

Using the Firmware Update Management Object (FUMO), an OMA DM server can inspect the firmware version and currently installed updates as well as transfer and install additional firmware updates. The OMA DM protocol does not specify the type of firmware update images and thus leaves enough room for differentiation and competition for the most efficient delta algorithm and patch mechanism used to update the device. OMA DM establishes



Figure 3: Multi-windows allow active experience for the end user

a standard protocol for downloading and installing the updates, enabling OMA DM vendors to concentrate on building the best server solution rather than having to support each individual update mechanism.

Wind River Platform for Android integration of the Red Bend solution enabled FOTA. The combined solution provides the following:

- The smallest update package in the industry
- Open Mobile Alliance Firmware Update Management Object (OMA FUMO) that allows compatibility and interoperability with all FUMO-compatible servers
- Error tolerance from power off, corrupt package, and disk error
- Security that allows only authorized, signed update packages to access the device
- Software-specific updates including boot loader, boot (Linux kernel), system, data, recovery, and firmware

Professional Services

The introduction of multi-core and virtualization provides many more choices to design teams delivering next-generation devices. But there is often a lack of experience and expertise in these new technologies. Wind River Professional Services is on the leading-edge of the multi-core and virtualization revolution and can help accelerate the introduction of these technologies while reducing risk.

Wind River Professional Services, a CMMI Level 3-rated organization, enables you to focus on development activities that add value and differentiate your design. Wind River

offers industry-specific services practices, with focused offerings that help you meet strict market deadlines while keeping development costs down. Our experienced team delivers device software expertise globally to solve key development challenges and directly contributes to our clients' success.

Backed by our commercial-grade project methodology, Wind River Professional Services includes the following:

- Requirements discovery and definition
- Multi-core and virtualized board support package (BSP) and driver optimization
- Power management tuning and optimization
- Software system and middle integration
- User interface customization
- Application and infrastructure development

Typical projects range from two to four man-weeks for driver and BSP implementation; one man-month to one man-year for hardware design or extensions to an existing software solution; and multi-man-year programs that bring customer concepts to reality through design, creation, and system test and verification.

Professional Services has extensive experience with platform design, including safety-critical systems and navigation/infotainment systems. Professional Services has implemented both hardware and software solutions for the embedded device market and continues to work with standards organizations to establish next-generation platforms.

Education Services

Education is fundamentally connected not only to individual performance but also to the success of a project or an entire company. Lack of product knowledge can translate into longer development schedules, poor quality, and higher costs. The ability to learn—and to convert that learning into improved performance—creates extraordinary value for individuals, teams, and organizations. To help your team achieve that result, Wind River offers flexible approaches to delivering product education that best fits your time, budget, and skills development requirements.