



WIND RIVER SOLUTION ACCELERATOR FOR ANDROID, USER EXPERIENCE

Android has become one of the leading mobile operating systems through its openness, highly customizable features, robust ecosystem, and growing application availability. For device manufacturers, original equipment manufacturers (OEMs), original design manufacturers (ODMs), and operators, harnessing the power of Android for mobile devices of all kinds can be both rewarding and very challenging. The rapid technology release cycles and the growing competitive pressure make it difficult to meet time-to-market windows, add differentiating functionality, ensure user experience and quality, and control development costs. Wind River understands these challenges and is dedicated to helping our customers build leading-edge Android-based products in this dynamic and competitive environment.

Wind River Solution Accelerators for Android are commercial add-on software modules optimized for the Android operating system. Solution Accelerators are tested and validated applications and middleware components that are combined with specialized innovation design, consulting, industrial standard compliance, and comprehensive life cycle services. OEMs, ODMs, and service providers 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 Android Open Source Project and real-market requirements.

BENEFITS

As ready and well-tested software components, Wind River Solution Accelerators for Android also bring financial benefits to our customers by reducing engineering costs during each project phase:

- **Project startup phase:** Fewer technical evaluation and skills acquisition are required.
- **Development phase:** Effort is reduced for testing frameworks, license management, and refactoring.
- **Maintenance phase:** Effort is reduced for refactoring and regression testing.

Wind River Solution Accelerators are categorized and packaged by functions. Currently, three Solution Accelerator packs are defined. Each is a standalone product; however, multiple packs can be combined:

- Wind River Solution Accelerator for Android, User Experience
- Wind River Solution Accelerator for Android, Medical
- Wind River Solution Accelerator for Android, Connectivity

In addition, Wind River also offers Wind River Platform for Android, a fully compliant commercial software platform, and Wind River Framework for Automated Software Testing, a meta-test framework that automates software and system tests and their results for mobile Linux devices, as part of our solutions for mobile devices.

USER EXPERIENCE SOLUTION

User experience can affect a consumer's decision to buy or return a device. While Android provides the base platform and elements, certain "experience gaps" need to be addressed to deliver a competitive user experience. These include providing an innovative user interface, delivering unmatched performance and multimedia experience, and presenting the most updated user experience to all end users efficiently. Wind River Solution Accelerator for Android, User Experience helps our customers fill the gap with needed functionality, controllable schedules, and cost predictability.

KEY FEATURES

Android Boot Time Optimization

Wind River Solution Accelerator for Android, User Experience provides boot time technologies that support an "instant-on" capability and minimize power consumption during the boot-up process for different use cases. Normally Android boot process takes about 45 seconds, from pressing the "on" button to showing the home screen. This is unacceptable where "instant-on" capability is required. For example, automotive infotainment systems are required to be ready in 2 seconds to support rear camera usage. Wind River has optimized Android to speed up the boot process and provide determinism and real-time performance with two different technologies.

- **Accelerated boot:** This technology can speed up the Android boot time by 30% and is hardware agnostic. It can run on different hardware platforms with little or no customization effort. Accelerated boot focuses on optimizing the boot loader, the Linux kernel, the user space, and the Android framework (including footprint reductions, boot sequence adjustments, script changes, and Android package scanning optimization) to achieve boot time reduction. This is suitable for cases where boot time requirement is not so aggressive and the hardware configuration may vary.
- **Hyper boot:** To address more aggressive boot time requirements such as automotive infotainment systems or military devices, hyper boot implements a hibernation-like technology to enable Android devices to resume from RAM in less than 1 second and from flash devices in 8 seconds. In the RAM case, a small amount of power is required to keep the RAM refreshed during power off. This technology supports ARM Cortex-A8 and Cortex-A9; Intel Architecture support is in the planning stage.

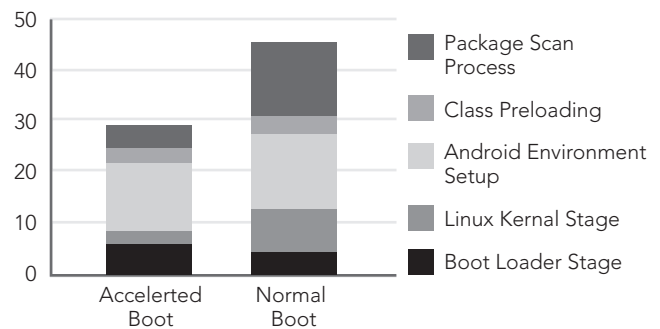


Figure 1: Accelerated boot

Multi-windowing

Wind River Solution Accelerator for Android, User Experience provides multi-windowing functionality for a more immersive and multitasking user experience. Users are already familiar with such behavior through the use of personal computers. It is especially important for big-screen devices such as tablets. However, as a mobile operating system, Android does not allow multi-windowing in its framework.

Wind River's implementation of multi-windowing behavior on Android devices supports the ability to have multiple navigable and concurrently executing windows active on the screen. The result is a visual representation of the Android operating system's multitasking ability. This creates an impressive demonstration of computing prowess, which makes the multi-windowing from Wind River a unique competitive user experience suitable for tablets, automotive infotainment systems, media phones, and industrial devices.

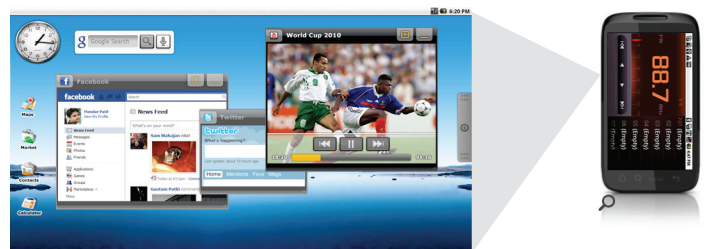


Figure 2: Multi-windows allow active experience for the end user

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, showing 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.

Wind River Media Center

Digital media has become an important part of our lives, and the capability of media sharing is key in consumer electronic devices today. Wind River Solution Accelerator for Android, User Experience includes Wind River Media Center. Media Center provides multimedia interoperability for Android devices, enabling an Android device to connect to another device and view that device's digital media, or connect to another device and allow it to access the media on the Android device following the Digital Living Network Alliance (DLNA) standard. Wind River's implementation is comprised of three components:

- Digital Media Server stores content and makes it available to networked digital media players.
- Digital Media Player finds content on digital media servers and provides playback and rendering capabilities.
- Digital Media Controller finds content on digital media servers and plays it on designated players.

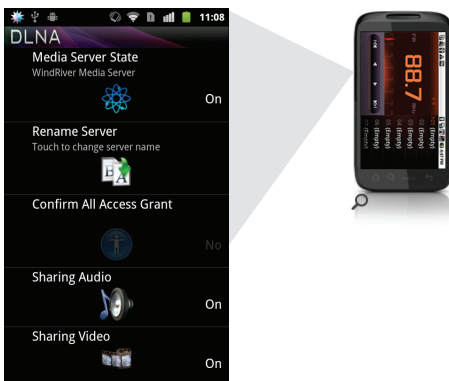


Figure 3: DLNA allows multimedia sharing across various devices

The full-feature media sharing capability makes Wind River Media Center suitable for Android-based smartphones, tablets, automotive infotainment systems, media phones, and other devices where the media sharing benefits.

ANDROID FIRMWARE MANAGEMENT

Wind River Solution Accelerator for Android, User Experience also includes the Wind River Android firmware management system. The firmware management system delivers firmware updates to Android devices and supports both online and offline update methods. This helps address a critical missing element in the Android framework. A well-designed and tested firmware management system can help mobile operators and device manufacturers efficiently deliver an up-to-date user experience to all end users. The system must be able to address the following:

- Recovering from failures: Corrupt update packages; power loss during updates, etc.
- Preventing malicious attacks: Unauthorized update packages, etc.
- Interacting with other parts of the system: Updating the modem firmware, for example

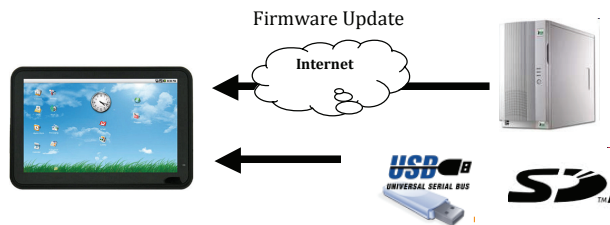


Figure 4: Android firmware management

Unlike many other firmware over-the-air (FOTA) solutions, simplicity is the key principle to the design of this solution. It allows a lightweight update method to be quickly integrated into any Android system with much lower cost. The solution provides the following:

- Browser-based and USB disk/SD card-based update mechanism
- Error tolerance from power off, corrupt package, and disk error
- Security that allows only authorized and signed update packages to access the device
- Software-specific updates including boot loader, boot (Linux kernel), system, data, recovery, and firmware

To learn more about Wind River's Android solutions, visit <http://windriver.com/solutions/mobile-handsets/>. To have a representative contact you, call 800-545-9463 or write to inquiries@windriver.com.

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