

The ACCESS Linux Platform and the Hiker Application Framework

Accelerating Mobile Linux Market Growth
and Fostering the Mobile Linux Ecosystem



For mobile Linux developers, the presentation and handling of applications presents a significant challenge compared to the PC desktop. User expectations are vastly different, in part because screen size, and keyboard are all more constricted. These factors, in turn, affect how applications are installed, displayed, launched and exited, as well as how the applications themselves share data and are notified of events.

For all of this, Linux alone is not enough, which is why ACCESS has created an Application Framework specifically for mobile devices--the Hiker Application Framework™. The Hiker Application Framework is a key component of the ACCESS Linux Platform™. ACCESS has open sourced the Hiker Application Framework.

The ACCESS Linux Platform is the first complete, commercial grade Linux®-based platform for mobile phones and converged devices. Based on a standard Linux kernel and other open source components, the ACCESS Linux Platform includes all the middleware services required to build state-of-the-art mobile phones and converged devices. As its name implies, the Hiker Application Framework encompasses those services specifically related to applications.

The Hiker Application Framework: Design Considerations

To create the Hiker Application Framework, ACCESS engineers began by considering the crucial pieces missing from Linux on a handset. As a small device, with limited memory, storage and display, mobile phones and other mobile devices must do things differently, and this difference affects how mobile applications are represented and launched, how they inter-communicate, and what resources they require.

Consequently, mobile Linux users have distinctly different requirements than their desktop counterparts:

- Mobile users typically perform tasks based on short-lived activities—answering a call, looking-up a contact, playing a song, taking a picture
- But mobile users do occasionally perform longer tasks, such as watching a video, reading email, or browsing the Web
- They face frequent interruptions that require immediate attention: answering a call, a text message or an IM, or responding to a low battery-warning message
- Unlike on a PC, mobile users don't think in terms of background applications. They expect that all applications are equally available, easily opened and exited, with their contextual state maintained
- Users expect that all applications can exchange relevant data. If a picture is snapped, it can be emailed

These requirements led ACCESS to design an Application Framework with the following key features:

- The ability to handle a wide variety of small-screen applications, from native ACCESS Linux Platform to Java™ and more.
- The creation of mobile environments oriented around tasks, not documents. That means treating mobile applications as a single file package, regardless of whether they were downloaded, installed OTA, or synched Vfrom a PC
- The strict enforcement of code-signing based security to ensure each application can only access the appropriate services and data
- A system-provided inventory of installed applications, as well as a list of apps that can be installed, moved to and from a storage card, and uninstalled
- The ability to execute applications from internal storage or SD/MMC cards. The Application Framework from ACCESS is unique in allowing the viewing and launching of multiple application types (native Linux, Java, or Garnet) independent of their execution environment

The Hiker Application Framework

As part of its efforts to help grow the mobile Linux market, reduce fragmentation and foster a global ecosystem, ACCESS has created the Hiker Application Framework open-source project. The Hiker Application Framework is available under Mozilla® Public License (MPL) v1.1, and can be downloaded at: <http://www.access-company.com/about/opensource/download.html>.

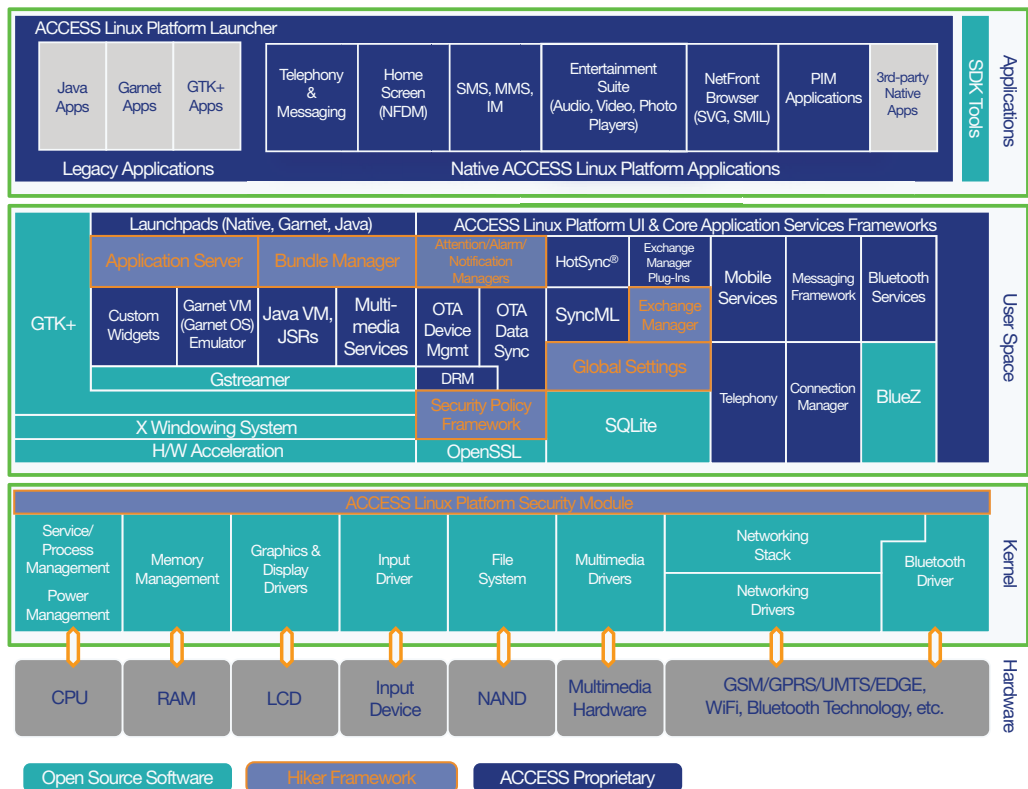
The Hiker Application Framework consists of several “managers” or service

Bundle Manager: Provides a unified view of all applications on the system, regardless of their location within memory. This is a major divergence from the file/folder/user shortcut architecture found on desktop PCs.

Bundle Manager is key to the ACCESS Linux Platform’s ability to handle its wide variety of applications including GTK, Java, ACCESS Garnet™ OS and native ACCESS Linux Platform, transparently providing the appropriate resources for each. As a result, developers can populate a device with a broad mix of applications from a wide variety of sources without worrying about specific resource requirements.

Bundle Manager registers each new application and consigns locale-specific resources. The executable code can reside internally or on an external memory card—and can be a compressed CramFS file image. Bundle Manager also validates security settings by validating an application’s permissions. (Security will be discussed in detail in a future white paper.)

Exchange Manager: Handles the exchange of data between applications and between devices. High-level inter-application exchange goes beyond that found in Linux. For example, a user can move from a messaging program to the camera, then incorporate a picture as part of the message. Exchange Manager coordinates the two applications, maintaining the contextual state of each.



Finally, Exchange Manager directs data traffic between devices via Bluetooth® wireless technology, IR, SMS, email and other transports. When a user wants to transmit data, the application queries Exchange Manager to get all available transports, displaying them as a menu. The user provides the destination IP address, while Exchange Manager handles the protocol details. It is expected that developers will be able to readily add new transport protocols simply by writing a new plug-in. Once the plug-in is installed, Exchange Manager makes the new transport available to all applications.

Notification Manager: Informs applications of unsolicited events, including incoming calls, messaging, system sleep and network signaling. This powerful feature allows both active and inactive applications to receive notifications. Because messages are not "hard wired" to specific applications, developers can substitute and add new applications at any time—simply by registering their application to the required notifications. Several applications can be registered for the same event.

Application Server: Manages an application's lifecycle—installation, launch, suspension, resumption, and termination. The service coordinates the appearance and functionality of the foreground and multiple background applications, tracking the states of each. Frequently used applications including the dialer always remain open and in the background for immediate use. The Application Server also provides global services, including system error dialogs and system preference management, while providing default behavior for critical system functions such as opening and closing a clamshell handset and managing system power.

Attention Manager: Provides a central clearing house for application-generated events that are displayed to the user. Alerts include incoming calls, SMS, MMS, appointment, incoming email marked urgent, user-set target stock price alarms, and low battery. The Attention Manager logs in these notifications, assigns them a priority, and displays them in a consistent manner on the screen. Developers are expected to be able to easily customize these notifications for specific hardware, services and applications.

Alarm Manager: Notifies both active and inactive applications of real-time alarm events, (which are managed by Attention Manager.) Whereas standard Linux provides just a single alarm, Alarm Manager maintains a database of alarms, all linked with the device's calendar information. The service is being designed to provide developers a consistent way to request that an alarm be triggered at a particular time.

Global Settings Service: Provides a common API for all applications and services to access user preferences, including fonts and font sizes, and system themes. Read-Only settings can be installed with package installation. Applications can register to be notified when a particular setting has changed, allowing dynamic UI updates.

Global Settings Service is an example of joint innovation between ACCESS and the open source community. The manager is based on the open source sqlls project developed by ACCESS—the libsqls software library—, which provides hierarchical file system facilities on top of an SQLite database. ACCESS has extended sqlls and created the libsqls software library by providing a system registry, including a secure space for storing device management information in compliance with OMA device management—the secure standard for vendor updates of device setting. ACCESS has contributed the libsqls software library to the open source community under a Lesser General Public License (LGPL). It is available for download at:

<http://www.access-company.com/products/downloads/>

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