

## Mobile Linux Puzzle Coming Together

Vendors and operators are midstream in an active push to standardize mobile Linux BY PETER RYSAVY

➤ WONDERING HOW LONG IT WILL BE before Linux makes its way onto mobile communications devices in your enterprise? So are a lot of other people.

Mobile Linux is becoming a significant force in the mobile phone arena. Although it hasn't made inroads in the United States, it runs on about a quarter of smartphones globally, according to one estimate. And Asia is especially hot for mobile Linux right now. In the United States, proponents are clearing a path for the operating system on enterprise mobile devices. Motorola's mobile Linux consumer multimedia phone, the Motorizr Z6, will be available later this year. Smartphones won't be far behind.

For IT, mobile Linux promises an open and modular platform, facilitating deployment of Linux client applications that interact with back-end Linux-based enterprise apps. For application vendors, it provides a familiar application environment, unlike other mobile platforms, which can take some time to learn. And the potential benefits for handset vendors are huge—evenually mobile Linux may enable a common handset OS to support not only smartphones, but also the much larger market of multimedia phones, with features such as music and video players.

But the efforts around mobile Linux are fragmented, and various handset-makers are implementing their own approaches to the technology; no one group has

taken the lead on the needed standardization, though a number of efforts are under way. Mobile Linux will have an easier time infiltrating the consumer market; the challenge will be the enterprise.

### > (THE... LOWDOWN \_

- **THE PROMISE** / Standardized mobile Linux promises an open phone platform with consistent interfaces across a large number of smartphone handsets, and support from a rich ecosystem of application and middleware vendors.
- **THE PLAYERS** / Handset vendors supporting a standardized implementation of mobile Linux are **Motorola, NEC, Panasonic** and **Samsung**. Operators include **NTT DoCoMo** and **Vodafone**, which represent a major global presence, but little of one within the United States. Software vendors/integrators working toward mobile Linux include **Access/PalmSource, Aplix, Celunite, Enea, Esteemo, FSMLabs, MontaVista Software, OpenMoko, Purple Labs, Trolltech, VirtualLogix, Wind River** and **Wipro Technologies**.
- **THE PROSPECTS** / Prospects are mixed, as mobile Linux initiatives are quite fragmented. However, leading players are working to develop reference platforms that, if adopted, could make this a serious contender to existing platforms such as BlackBerry, Palm OS, Symbian OS and Windows Mobile by the end of the decade.

### TIMELINE // MOBILE LINUX MOVEMENT



{2005-2006}

Early mobile Linux phones available in Asian markets

{2007}

Key standards/specifications, such as from the Linux Foundation, emerge; smartphones possibly introduced in European/U.S. markets

{2007}

First multimedia mobile Linux phones available in the United States

{2008-2009}

Possible widespread U.S. availability of mobile Linux-based smartphones and multimedia phones

{2010}

Some existing smartphone platforms potentially threatened by mobile Linux

# TECH TRACKER

## ROOM TO GROW

While most people think of their mobile telephone handsets as just convenient telephony devices and others use the handset for simple e-mail access, the platform may be the next major battleground for computing. Today, smartphones, such as Palm Treos or Research in Motion BlackBerrys, comprise only a small percentage of the overall phone market; Gartner estimates that about 81 million units were sold in 2006, but projects this market will approach 1 billion devices, leaving a lot of room for growth. But that's still a large number of smartphones, and growth in 2006 was 75 percent more than in 2005.

Over time, smartphones will represent an increasing percentage of total mobile phone sales, though multimedia-oriented consumer phones will always be a larger market. The leading smartphones today run Palm OS, Symbian OS, RIM BlackBerry, Windows Mobile and, yes, mobile Linux (which, according to leading mobile Linux vendor MontaVista Software, globally runs on 25 percent of smartphones). We estimate the United States has about one-third of the global market for these devices.

Although there are different mobile Linux implementations, individual handset vendors will be able to standardize on one implementation across their handset offerings, which can range from midtier (some multimedia) to high tier (advanced multimedia) and smartphones. That mobile Linux could work for both consumer and business markets is part of its appeal: A vendor can standardize on one platform. Given the huge complexity of these platforms, minimizing the number vendors must work with significantly reduces R&D expenses. For cellular operators, mobile Linux is a potential avenue for converging the number of mobile platforms they must support, by reducing the total number of mobile OS platforms in their product portfolio as well as by having more models based on the same OS.

## PUTTING IT TOGETHER

So what's the holdup on mobile Linux smartphones in the United States? The biggest issue is the number of pieces in the overall puzzle. The Linux kernel, currently at version 2.6, is just one element of the overall handset architecture. There's no problem implementing the kernel on a mobile device, but a working phone with a full set of features must have additional components.

The architecture includes device drivers to interface with the hardware; a user interface framework; telephony and networking stacks; a wide variety of application services, including synchronization, messaging, browser capabilities and PIM functions; a Java Virtual Machine; and, finally, a rich set of multimedia services. Each of these has interfaces to the application layer.

Finally, there are the applications that come with the handset, as well as third-party applications that users can install. Packaging all this in a cost-efficient and standardized fashion, in the constraints of a small handheld device, is a significant engineering challenge. One reason current systems like BlackBerry, Palm OS, Symbian and Windows Mobile are successful is that they include all these components, and in a way that is consistent across multiple handsets. To be successful in the enterprise, mobile Linux needs the same kind of versatility.

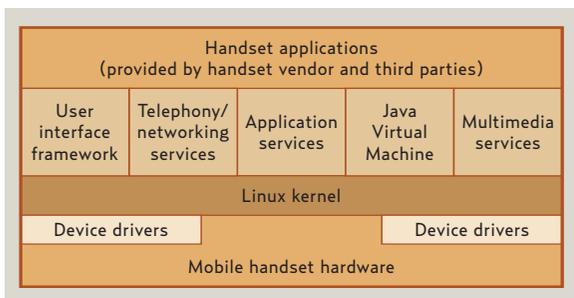
## IN-PROGRESS INITIATIVES

So far, there is no reference platform or standardized APIs for all the services mentioned. Mobile Linux phones, therefore, are highly particular to handset vendors. However, various efforts under way could provide these critical items, resulting in an open, or at least more consistent, platform.

The first of these is the Mobile Linux Initiative (MLI) within what was previously called Open Source Development Lab. OSDL merged with the Free Standards Group last month and is now called the Linux Foundation. The MLI group is working on a specification due this quarter to address security requirements, file systems and application-development tools. Given the enterprise emphasis of other OSDL specifications, we expect the group's work to apply more to enterprise-oriented smartphones rather than consumer-oriented multimedia phones, though ultimately all Linux phones should be able to leverage this work.

Companies involved with the MLI include many of the leading mobile Linux software and hardware vendors: Access, Celunite, ETRI, Fujitsu, Intel, MontaVista, Motorola, NEC, Nokia, NTT, Shanghai Datang Mobile Communications, Siemens, Trolltech and Wind River. The specs this group develops will help standardize some of the components shown in the architecture (at left). However, since the specs aren't available yet, and because vendors haven't publicly indicated to what extent they will incorporate them, it's too early to tell how significant this

## MOBILE LINUX ARCHITECTURE



The mobile Linux architecture for a mobile phone consists of the **Linux kernel**, device drivers for controlling the hardware, a user interface framework and a variety of services. All **these components support** applications provided by either handset vendors or third parties.

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effort will be. In addition, it's unclear whether OSDL's merger with the Free Standards Group will increase or decrease the emphasis on the MLI.

The Consumer Electronics Linux Forum is addressing a broad range of consumer devices, including mobile telephones. This group primarily comprises Japanese consumer electronics firms and is working on a range of products, including TVs, set-top boxes, in-car systems, multimedia systems and so forth. The forum includes a mobile telephony group working to standardize a telephony interface and power management. OSDL is also working on power management, but it's likely the two groups will harmonize their efforts, based on an overall willingness by the various Linux groups to work as collaboratively as possible.

Another group, the LiPS (Linux Phone Standards) Forum, is driven heavily by France Telecom. This forum is examining the application of Linux across multiple telephone devices. It also hasn't yet published any specifications. The emphasis of LiPS is at a higher level of the overall phone architecture compared with the Mobile Linux Initiative, addressing service delivery and applications, including voice support, multimedia, messaging and browsing. As such, this effort is quite complementary with MLI, which is focusing on lower-level functions that are closer to the kernel.

## WHAT HAPPENS NEXT

The impact these various initiatives will have is hard to determine: Their work is at an early stage, and much depends on what handset vendors and their operator customers choose to implement. That's why another industry effort might be particularly potent: Announced jointly by its members on June 15, 2006, this group was named the LiMo Foundation in January. Members include Motorola, NEC, NTT DoCoMo, Panasonic Mobile Communications, Samsung Electronics and Vodafone. The group's stated intent is "to establish the world's first global, open Linux-based software platform for mobile devices." The intent of LiMo is not to compete with any of the previously described mobile Linux standardization groups, but to adopt available specs, then fill in any missing pieces to create realizable working phones.

To what extent LiMo adopts the standards and specs being developed remains to be seen, though it's likely it won't try to reinvent any wheels. It's important to note that the various mobile Linux standards will not address every aspect of a mobile Linux phone, so any complete

reference platform will consist of both standardized interfaces and some vendor-specific interfaces. In an ideal world, the vendor-specific portions will be minimized.

The LiMo Foundation is significant because it includes two of the largest global cellular operators and leading handset vendors. By defining a mobile Linux reference platform that they produce and market in large volumes, they could effectively create a de facto standard for the industry. Christy Wyatt, vice president of ecosystem and market development for Motorola Mobile Devices, has said this project is particularly strategic for Motorola. She also explained that mobile Linux will be successful to the extent that there is a rich ecosystem of participating vendors, something Motorola is encouraging through developer support programs.

Another player in this space is PalmSource, now owned by Access. PalmSource is working to port the Palm environment to a Linux kernel. Although Palm is a dominant platform in the smartphone arena, no handset vendors have said they will adopt the Linux-based version of Palm OS. However, successful execution here could bring a large number of Palm OS developers into the Unix fold. Although mobile Linux is a collection of efforts by a diverse set of companies and organizations, we see the handset companies like Motorola and Samsung as most important in making it successful.

How will all these mobile Linux efforts shake out? If all goes well, within a year or two we could have multiple mobile Linux smartphones with consistent interfaces, letting applications function across multiple vendor devices, with features competitive with other smartphones. However, independent mobile Linux expert Bill Weinberg, who previously worked for OSDL, says he feels a sense of urgency. He sees a huge opportunity for mobile Linux to establish itself as a dominant platform, but only if there is some immediate consolidation. Any delays or significant fragmentation could result in loss of traction and a secondary status, much like what happened with Linux in the desktop space. Meanwhile, OS vendors such as Microsoft aren't standing still, and quite a few enhancements are planned for Windows Mobile.

Participating vendors, however, are optimistic. With good execution in 2007 by key players, mobile Linux is well-positioned to become a common handset choice within the next two to three years and a viable option for IT looking to extend applications to mobile devices. ■



**MOTOROLA'S**  
Motorizr Z6 Linux-based handset

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