

## Open Kernel Labs launches first dual-OS, single-core commercial smartphone

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### Event summary

- Open Kernel Labs announced that its embedded hypervisor, OKL4, is running on Motorola's just-released smartphone, the Evoke QA4. This touchscreen slider phone runs Linux's and Motorola's real-time OS (RTOS) on a single ARM 9 processor.
- This is the first commercially available mobile phone or smartphone to run two operating systems on a single-core processor. This avoids the higher bill of materials (BOM) cost for the device that would come with using two processors.
- As of the end of 2008, Open Kernel Labs' software has shipped on 250 million devices, including those from HTC, LG, Samsung, Sony Ericsson and Toshiba.

### The 451 take

Goodbye feature phone – hello midmarket smartphone. The high-end smartphone has been getting most of the market's attention, to the serious detriment of proprietary feature phones. While smartphones have enjoyed continued growth, even during tough economic times, in order to continue, their average selling prices will need to come down. The best way to drop the BOM without sacrificing performance is virtualization. Another issue that is starting to affect smartphones is how to provide openness and security at the same time. Virtualization can also answer this with the ability to sandbox untrusted applications, keeping core hardware components secure, to provide high availability of basic communications from a smartphone.

### Details

**Open Kernel Labs'** OKL4 is running on **Motorola's** latest smartphone, the Evoke, which runs mobile Linux – but it also runs an RTOS to support the real-time needs of the device's modem. The Evoke is a midmarket smartphone that will be priced below high-end smartphones due to its lower BOM costs. A key cost-saving method is using only one ARM processor to support two OSs, one for rich applications and the other for the device's modem. The use of an open source mobile Linux stack is another cost-saving method – meaning Motorola did not have to license the OS from **Microsoft** or **Symbian** of old (prior to the recent open sourcing of Symbian).

While virtualization on many devices, including PCs, offers two different environments – one for each operating system – the Evoke runs both OSs so that the virtualization is

transparent to the user. While seamless to the user, the two environments are separate and distinct from each other, even though they're using the same hardware and processor. This means that within the Linux environment of the phone, third-party applications can run within a sandbox that prevents interference with the core functionality of the phone. Only Open Kernel Labs' hypervisor runs in supervisory mode, everything else must go through OKL4 to use the device's hardware. Any hardware requests that go beyond the permissions set for that specific application type are denied.

## Competitive landscape

This dual OS environment faces a smartphone market crowded with operating systems, unlike the PC market, which is dominated by Windows client. In addition to mobile Linux offered by the **Open Handset Alliance's** Android and the **LiMo Foundation**, there is BlackBerry OS, iPhone OS, Windows Mobile, WebOS and Symbian. The main value of these high-level operating systems is the ability to run third-party applications, as opposed to an RTOS, which only supports trusted partner applications. While security is an issue for any device, a smartphone must work at all times, so it is critical that third-party applications don't interfere with the basic capabilities of the phone either directly (malware) or indirectly. Competing smartphone OSs without a hypervisor are unable to prevent direct access to hardware by sandboxing third-party applications.

The mobile hypervisor market is still in its infancy, but in addition to Open Kernel Labs, there are two other players. **VirtualLogix** offers VLX, which supports all multicore products based on the ARM 11 and ARM-A9 chipsets, as well as the ARM-A8. VLX also targets single-core mobile Linux smartphones. With the acquisition of **Trango Virtual Processors** in November of 2008, **VMware** now offers its Mobile Virtualization Platform (MVP). This will allow VMware to push its vClient initiatives into all network endpoints.

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