ABSTRACT
Smartphones are increasingly ubiquitous, and many users carry multiple phones to accommodate work, personal, and geographic mobility needs. We present Cells, a virtualization architecture for enabling multiple virtual smartphones to run simultaneously on the same physical cellphone in an isolated, secure manner. Cells introduces a usage model of having one foreground virtual phone and multiple background virtual phones. This model enables a new device namespace mechanism and novel device proxies that integrate with lightweight operating system virtualization to multiplex phone hardware across multiple virtual phones while providing native hardware device performance. Cells virtual phone features include fully accelerated 3D graphics, complete power management features, and full telephony functionality with separately assignable telephone numbers and caller ID support. We have implemented a prototype of Cells that supports multiple Android virtual phones on the same phone. Our performance results demonstrate that Cells imposes only modest runtime and memory overhead, works seamlessly across multiple hardware devices including Google Nexus 1 and Nexus S phones, and transparently runs Android applications at native speed without any modifications.

Categories and Subject Descriptors

General Terms
Design, Experimentation, Measurement, Performance, Security

Keywords
Android, Smartphones, Virtualization