Cells: A new virtual machine architecture for mobile phones

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Design & Implement Usage model Switch Authority Architecture functionalitie Scalability a

Scalability and Security multi mobile phone numbers

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# Cells: A new virtual machine architecture for mobile phones

ACM 10 Diao Kelu

March 16, 2013

Cells: A new virtual machine architecture for mobile phones

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- Why we need virtualization
- 2 Limits in mobile devices
  - resource
  - users' tolerance
- Cells is a lightweight virtualization architecture

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- Lightweight OS virtualization.
  - only one OS
  - isolation
  - yet, with combining filesystem
- 2 Foreground-background-model: take full advantage of the small display of smartphone
- Provide independent phone numbers for each virtual phone(VP) without using multiple SIM cards
- 4 Fully support present hardware devices with nearly no overheads

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# Key words

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#### The key words are:

- switch
- security
- authority

# Foreground-background-model

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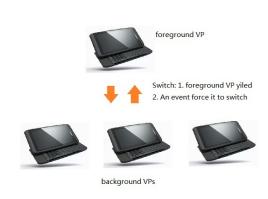


Figure: foreground-background-model

### Foreground-background-model

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Figure: malicious application

## Foreground-background-model

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Figure: forbid auto-switching

# Authority

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Figure: user tends to modify the application

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Figure: user tends to modify the application

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Figure: set the authority

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Authority

- no access
  - This VP have no access to a certain device(IT admin's VP)

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- 1 no access
  - This VP have no access to a certain device(IT admin's VP)
- 2 shared access
  - Some device(e.g. frame buffer) can not be set to shared access
- 3 exclusive access
  - It's necessary for mobile security(e.g. microphone)
  - It's used to implement part of the isolation

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### Architecture

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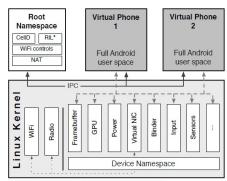
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\*RIL: Vendor Radio Interface Layer library is loaded by CellD

Figure: Overview of Cells architecture

# Three ways for scalability

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- 1 the same base file system is shared read-only among VPs.
- when a new VP is started, Cells enables Linux Kernel Samepage Merging (KSM) for a short time
- 3 Cells leverages the Android low memory killer to increase the total number of VPs, making it possible to run on a device without sacrificing functionality.

# Three ways for scalability

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# Three ways for scalability

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- user credentials
- 2 kernel-level device namespaces
- 3 mount namespaces
- 4 CellD(create device nodes)

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user credentials

2 kernel-level device namespaces

mount namespaces

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## Multi mobile phone numbers

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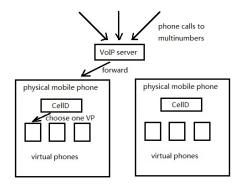


Figure: multi phone number mechanism

### Experimental results

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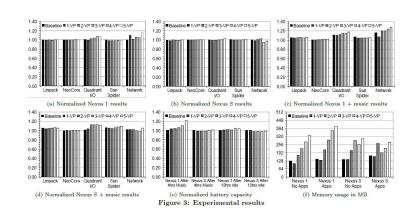
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- All the security it can provide can be provided by normal mobile phones
  - from applications
  - from other users
- The only highlights of this Cells architecture is the multi phone number support
- 3 Unfortunately, We have Phelps copycat mobile and iphone double card double standby
- 4 And the experimental results

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#### Cells sucks

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