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Stealth File Systems for Proactive Forensics Support in Custom Android ROMs

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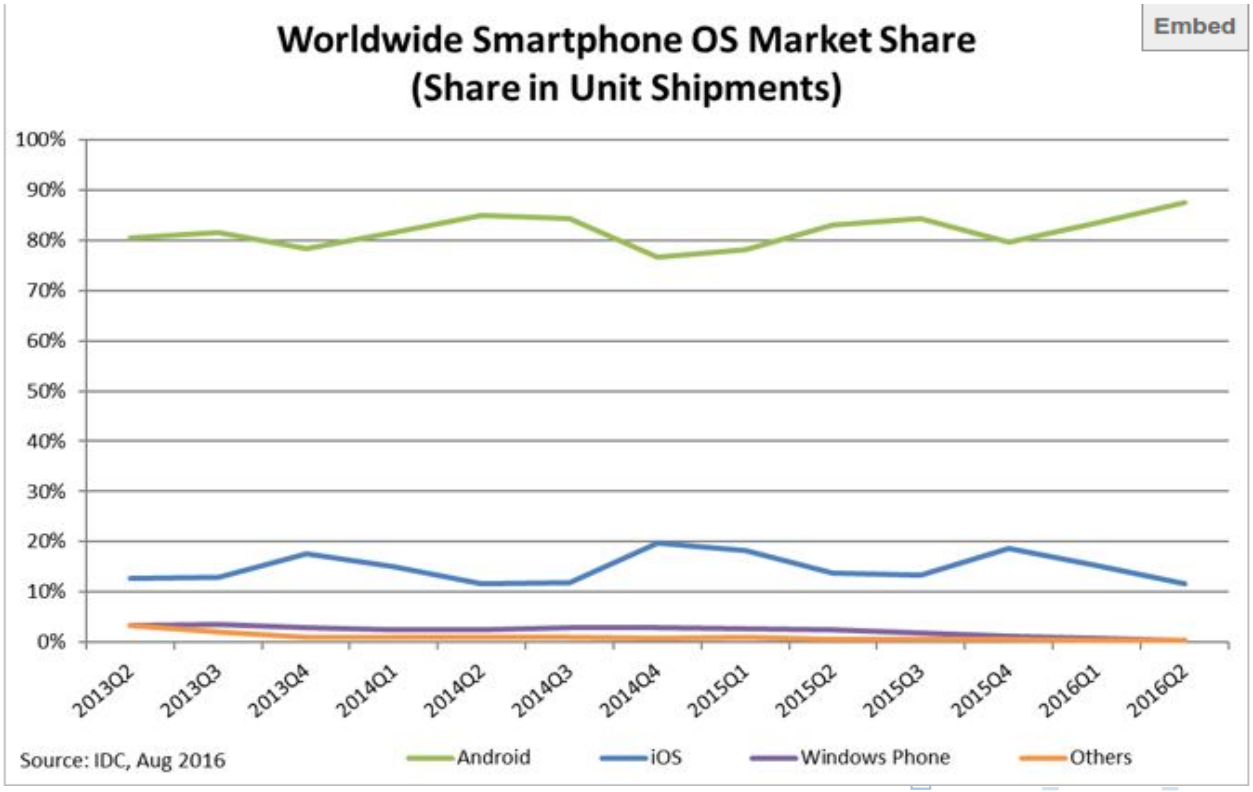
Outline

1. Introduction
   - Why Mobile Forensics
2. Background
   - Forensic Rom
   - Shortfalls
   - Possible Solutions
3. Proposed Framework
   - File System in User Space
   - Linux Cloud Drive
   - Android Rootkits
   - Stealth File Systems

Outline

Smartphone OS Market



Why Mobile Forensics Is Important

Just from cell phones, a mobile phone forensic analysis can reveal a great deal of data, including:

- **Dialed, incoming and missed calls (history logs)**
- **Text messages**
- **Instant message activity**
- **Email**
- **Internet activity including search histories**
- **Video and audio recordings**
- **Phone location information (using GPS) and cell phone tower triangulation**

Outline

Forensic Rom

Work Done Till Now

- **Features of Aiyappan Et.al [1] and Karthik Et.al [2] Forensic Rom:**
- **Captures All User Activities.**
- **Key-logging and Call Tapping Facility.**
- **Opportunistically Uploads In Cloud.**
- **Hiding the Process using hidepid =2.**
- **Data Stored in /forensic partition only accessible to Root.**

Outline

Shortfalls

- **What if The Suspect Roots the Phone ?**
- **Can Find the /forensic Partition.**

Outline

Posible Solutions

- **Encrypting The /forensic partition can Still arise Suspicion.**
- **Creating A Fuse File System and enable Stealth Features and Copy all Forensically Relevant Data in that File System.**

Outline

File System in User Space

- **The Filesystem in Userspace (FUSE) is a special part of the Linux kernel that allows regular users to make and use their own file-systems without needing to change the kernel or have Root privileges.**

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Linux Cloud Drive

- **Using FUSE we can mount Cloud Drive in Our System and Use it Like a Local File System.**
- **Gcsfuse: A user-space file system for interacting with Google Cloud Storage.**
- **Wingfs: A debian Package to mount various cloud storage drives as user-space file systems.**
- **Azurefs: A python package to mount Azure blob storage as Local File system.**

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Android Rootkits

- **Dong-Hoon Et.al [3] has listed the various ways Rootkits can infect Android Kernel Like:**
  - **sys_call_table hooking through /dev/kmem access technique.**
  - **exception vector table modifying hooking techniques.**
- **Our Objective is to Make the /Forensic Partition a Fuse File system and Hide it using Rootkits.**

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Stealth File Systems

Proposed Framework

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Summary

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This Framework can effectively Hide the forensic as well as the cloud file system so that even if the Suspect is connecting to adb to check the internal state , He will not be able to find the hidden File systems.

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- **Process Hiding** can also be Implemented Using this Technique
- The **Stealth File-system** will periodically copy the forensically relevant data from the normal file system
- This data will be moved to the **Mounted Cloud Drive** and opportunistically uploaded to the cloud server.
- Outlook
  - Have Developed a High-Level Overview of the Framework.
  - Implementation Needs to be done.

References I

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