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Mobile Apps and Security
Mobile Ecosystem

Users

Apps

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Mobile Apps

User runs App written by Developer
Mobile Security Problems

Malicious App
- Activate camera and take pictures or record videos for surveillance
- Eavesdrop on private conversations
- Disclose contacts and personal data
- Track geo-location
- Make loud noise or vibration
- Make calls drop
- Make device unusable

Miserable User

Evil Developer

Call or send texts to toll numbers

written by

runs
Mobile Security Problems

Miserable User

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Malicious App

- Call or send texts to toll numbers
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- Disclose contacts and personal data
- Eavesdrop on private conversations
- Activate camera and take pictures or record videos for surveillance
- Make device unusable
- Run written by:
Current Solution

User

A Trusted Distributor

App

Downloaded from

Checks and signs

Runs

Written by

Protects

Restricts

OS Security Feature

Developer
Better Solution

A Trusted Distributor

downloaded from

verifies and signs
with static analysis!

runs

written by

written by

OS Security Feature

User

Developer

App

runs

written by

restricts

protects
Static Analysis for Android “Permissions”
Android "Permissions"

Code Sending SMS

```java
String phoneNumber = "010-1234-5678";
String message = "hello!";

SmsManager sms = SmsManager.getDefault();
sms.sendTextMessage(phoneNumber, null, message, pi, null);
```

requires permission declaration in

```xml
<uses-permission
    android:name="android.permission SEND_SMS"/>
```
Android “Permissions”
Granting Permissions

1. User tries to install the app.
2. The app asks to grant permissions.
3. The Android system allows privileged operations to be performed.

Declared in `AndroidManifest.xml`
Problem

• Clumsy Developers just declare too strong permissions!

• Users get inured to colorful warnings from most of the apps!

• Android “Permissions” won’t work against malware :'( 
Idea

Provide static analysis tools to make permission declaration more precise!

• Developer tool for weakening or automating permissions declaration

• Distributor tool for detecting unnecessary declaration
Developer Tool

1. Analyze app’s source code in Java and XML

2. Estimate calls to protected
   - APIs
   - Activities
   - Broadcast Receivers
   - Background Services

3. Fill or minimize declared permissions
Distributor Tool

1. Analyze app’s Dalvik executable and XML in its packaged binary .apk

2. Estimate calls to protected
   - APIs
   - Activities
   - Broadcast Receivers
   - Background Services

3. Detect unnecessary permissions
Thank you
References

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- Malware Examples
  - TrojanSpy:AndroidOS/Tapsnake.A
  - Trojan:AndroidOS/Fakeplayer.A
  - 09Droid Debacle
  - J2ME/GameSat.A
  - iPhone/Privacy.A