What’s in Your Dongle and Bank Account?
Mandatory and Discretionary Protection of Android External Resources

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Ordered alphabetically

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Channels of communication

Bluetooth

Audio

Internet

SMS

NFC

Bank
These channels often carry sensitive information
Channel Use

Permission

INTERNET 1.695E+06
BLUETOOTH 3.311E+06
NFC 1.485E+07
AUDIO 8.218E+06
SMS 6.038E+06

Average #downloads

0E+00 2.667E+06 5.333E+06 8E+06 1.067E+07 1.333E+07 1.6E+07
Channel Use

Apps that make use of these channels are popular
Problem Statement

Mis-bonding
Approach
Approach

OS-level Access Control: flexible and uniform

• Permissions: user DAC

• SELinux: admin MAC
Approach

OS-level Access Control: flexible and uniform

- Permissions: user DAC
- SELinux: admin MAC

Coarse-grained vs. permission bloat
SELinux
SELinux

Vendor / Admin Policies:
• BYOD
• Mobile App Management (MAM)
• Mobile Device Management (MDM)

User Policies:
• Personal Resource Management
SEACAT
Security Enhanced Android Channel Access Control
SELinux rule

allow trusted_app my_file:file read_write
Assigning Apps to Domains

allow trusted_app my_file:file read_write
Assigning External Resources to Types

allow trusted_app my_file:file read_write
SEACAT rule
SELinux rule

allow trusted_app my_file:file read_write

Domain       Type       Class       Access Vector

SEACAT rule

allow trusted_app bt_dev1:btacc connect
Enforcing the policies
SEACAT Enforcement

Policy Manager -> DAC Policy Manager Service

BT stack

Fast Resource-Type Cache

AVC

DAC

MAC

Policy Module

Policy Module
Evaluation
Effectiveness Evaluation

KNOWN THREATS

Bluetooth Mis-bonding attack

Unauthorized adb-based screenshots

Unauthorized read of an SMS message

Unauthorized access to audio device

Unauthorized read of an NFC device’s contents

♦ demonstrated in related work
Performance Evaluation (enforcement)
Summary
Summary

Protection of Android external resources
MAC for vendors and admins
DAC for users
Backward compatible
Effective and efficient
Summary

Protection of Android external resources
MAC for vendors and admins
DAC for users
Backward compatible
Effective and efficient
Thank You!

VIDEO DEMOS: sites.google.com/site/SeacatChannelControl