

An Empirical Study of Third-Party Tracking by Mobile Applications in the Wild

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Goals

To understand how **real consumers** are being tracked by **third-parties** while using **mobile apps**

Motivation

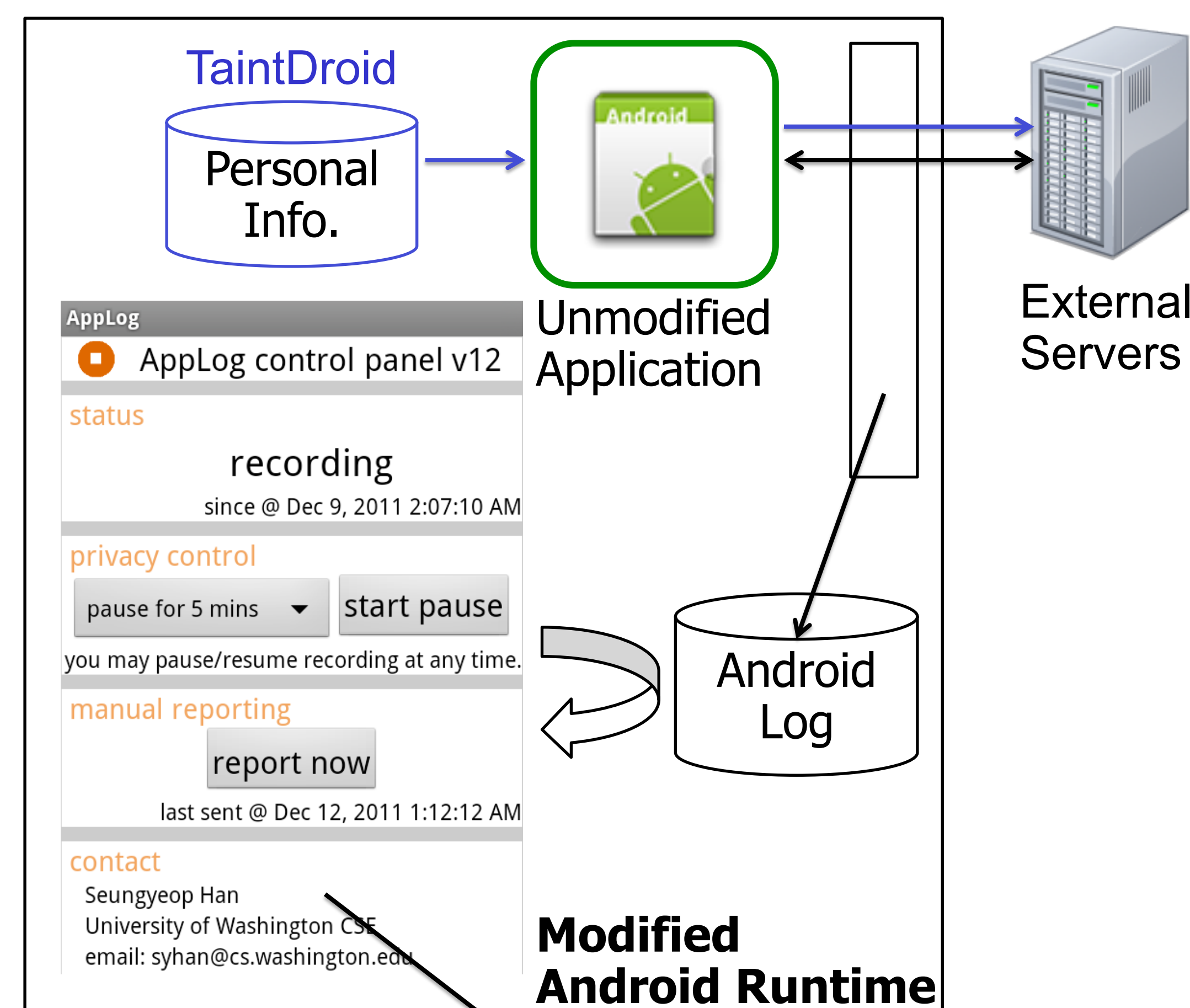
- **Widespread** privacy concerns
 - iPhone location tracking, CarrierIQ, Applications leaking personal information
- Higher privacy **risks** on Mobiles
 - A wealth of personal information, long-lived identifiers
- Tracking on mobile phones is less well understood.



User Study

- 20 participants use instrumented phones for 3 weeks (Nov. 2011)
 - 9 F, 11 M, age 18-41. Android heavy users.
- Nexus S running **dynamic information flow tracking** using **TaintDroid** (modified Android)

[Enck10] Taintdroid: An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones

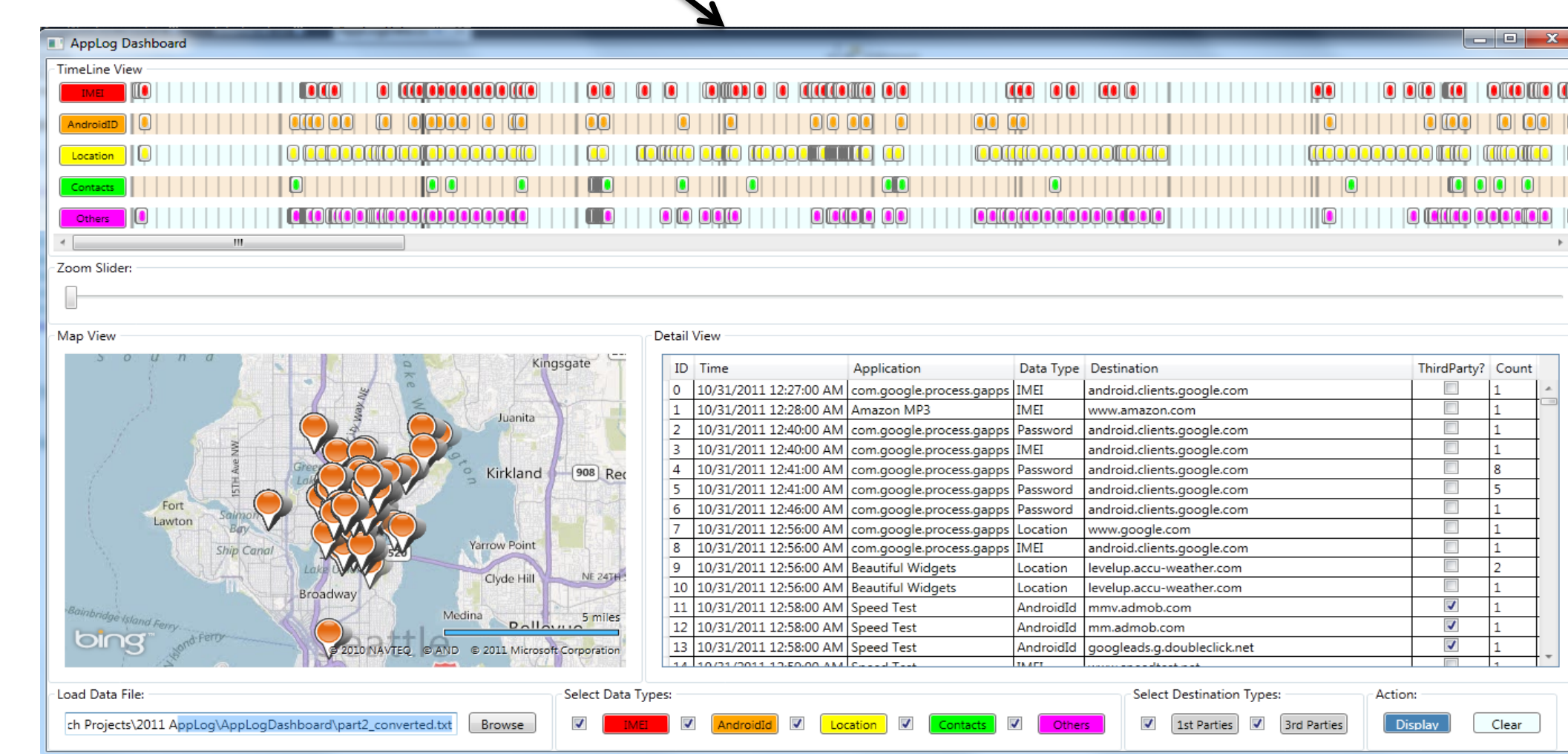


Tracking Identifiers We Monitor

- **Cookies** in Embedded Browser (Webview)
 - System IDs (**AndroidID**) – bound to OS
 - Device IDs (**IMEI, Build.Serial**) – bound to device
 - Simcard IDs (**IMSI, Phone Number**) – bound to SIM
- Persistent IDs**
Cross-app profiling

Findings: Tracking in the Wild

- Tracking is widely distributed
 - 75% (168/223) of apps, 38% (224/591) of domains were tracking
- Many use persistent IDs (AndroidID, IMEI, Phone Number, ICCID)
 - 90% (152/168) of tracking apps, 42% (93/224) of tracking domains



User view

Popular Advertisers & Analytics

Advertiser	Apps / Participants	Token	Location
DoubleClick.net	65 / 20	Md5(AndroidId)	
Admob.com	46 / 19	Md5(AndroidId)	Y
Mydas.mobi	9 / 10	IMEI	Y
Jumtap.com	9 / 9	IMEI	Y
Atdmt.com	8 / 9	Cookie	

Analytics	Apps / Participants	Token	Location
GoogleAnalytics	49 / 18	Cookie	
Flurry.com	28 / 17	AndroidId	Y
Scorecardresearch	13 / 14	Md5(Serial, salt)	
Quantserve.com	7 / 7	Cookie	
Medialytics.com	6 / 6	Md5(AndroidId)	Y