

GERS No Time At All: Opportunity Cost of Android Permissions

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Android Permissions

Android applications have to request permission to access privacy-sensitive functions on phones.

- Internet
- Read/write messages
- SMS messages

All-at-once model leads to contact harvesting by several companies, including large multi-national and consequent investigations by regulation authorities.

Questions

Given the potential dangers to privacy, questions pop up: - What investment is required from users to read all the permissions for the applications they download?

- What is the opportunity cost for Android smartphone users if they would actually read all the user permission screens?

- How do different Android permission models change the cost to privacy?

- What is the opportunity cost to the United States?

Rough Estimation Methods

$Cost = T_R \times wage$

Cost, the opportunity cost T_R , the time it takes to read permissions wage, the average hourly wage

 $T_R = n \times Words \div R$

n, the average number of applications downloaded Words, the number of words on a permission screen R, the average reading rate

See more details in the paper, available from the FTC workshop website and at:

http://www.winlab.rutgers.edu/~janne

See also

elasticpathing.org and securegestures.org for other work.



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Evolution of Permission Screens

4	op permissions			
~	needs access to:		Network communication	
	torage		Google Play billing service	
	lodify or delete the contents of your USB torage		Allows the user to purchase items through Google Play from within	
	letwork communication		this app. Receive data from Internet	
	hone calls ead phone status and identity		Allows apps to accept cloud to device messages sent by the app's service. Using this service will incur data usage. Malicious apps	
F	lide ^		could cause excess data usage.	
	our applications information		View Wi-Fi connections	
s	strate access to protected storage		Allows the app to view information about Wi-Fi networking, such as whether Wi-Fi is enabled and name of connected Wi-Fi devices.	
	letwork communication		View network connections	
G	oogle Play billing service, receive data from iternet, view Wi-Fi connections, view network		Allows the app to view information about network connections such	
	ACCEPT			
	Explicit		Explicit II	
\$	In-app purchases	~		
8	Identity	× 🔾	Allowto acc	
9	Location	~	this device's locat	ion?
E	Photos/Media/Files	~ 🗆	Never ask again	
•	Wi-Fi connection information	~		
8	Bluetooth connection information	~	DENY	ALLOW
i	Device ID & call information	~		
Goog	gle Play ACCEP	т		
	Grouped		Request	

Opportunity Cost

Models	Lower	Point Esti-	Upper
	Bound	mate	Bound
Explicit	\$0.52	\$1.86	\$4.34
Explicit(II)	\$2.32	\$8.40	\$20.14
Grouped	\$0.05	\$0.25	\$0.76
Grouped(II)	\$0.32	\$1.77	\$5.16
Grouped(III)	\$0.63	\$2.83	\$7.43
Request	0	\$0.16	\$0.75

Annual opportunity cost for person if read at leisure

Models	Lower	Point Esti-	Upper
	Bound	mate	Bound
Explicit	\$4.23	\$14.96	\$34.83
Explicit(II)	\$18.58	\$67.24	\$161.21
Grouped	\$0.41	\$2.06	\$6.03
Grouped(II)	\$2.53	\$14.19	\$41.35
Grouped(III)	\$5.05	\$22.71	\$59.46
Request	0	\$1.29	\$6.03

Annual opportunity cost for person if read at work

Models	Lower	Point Esti-	Upper
	Bound	mate	Bound
Explicit	\$2.407B	3.405B	\$4.404B
Explicit(II)	\$10.569B	\$15.032B	\$20.375B
Grouped	\$234.9MM	\$469.8MM	\$763.4MM
Grouped(II)	\$1.468B	3.229B	\$5.226B
Grouped(III)	2.877B	\$5.167B	\$7.516B
Request	0	\$293.6MM	\$763.4MM

Annual opportunity cost in millions and billions to the USA if permissions are read at work.

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