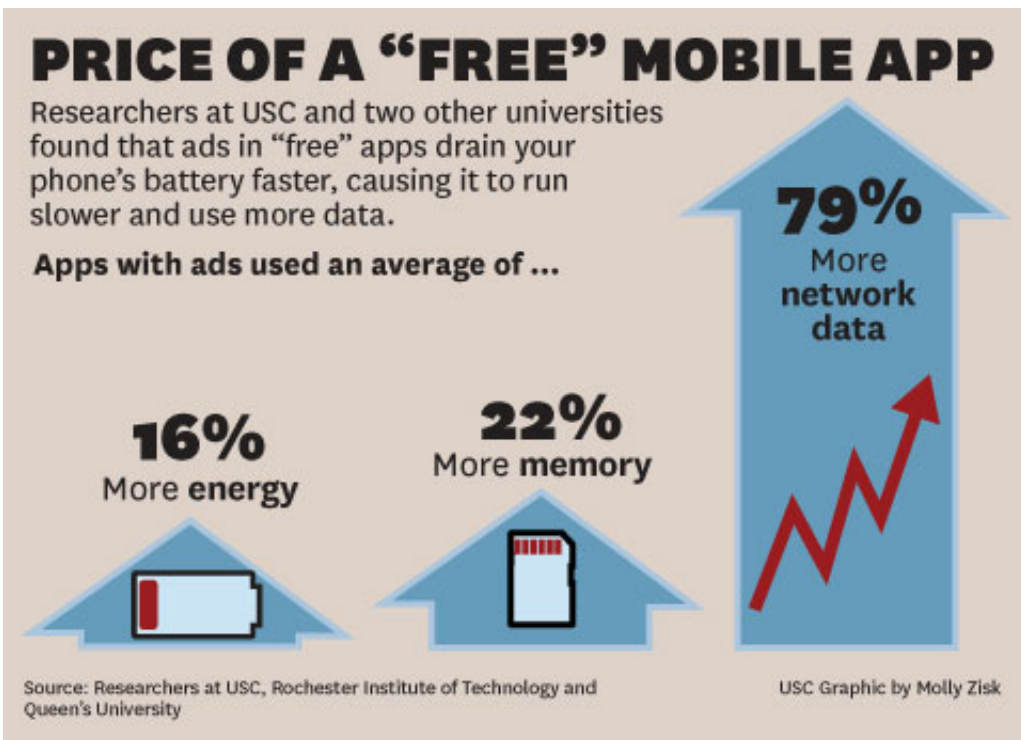


Ads in free mobile apps have hidden costs for both users and developers, study finds

April 1 2015



Hidden cost of ads in smartphone apps. Credit: USC Graphic by Molly Zisk

There's no such thing as free - especially with smartphone apps, according to a new study.

"Ads in 'free' apps drain your phone's battery faster, cause it to run slower, and use more data," said William Halfond, co-corresponding author of the study, which will be presented at the International

Conference on Software Engineering (ICSE) in Italy in May. Halfond collaborated with researchers at USC, Rochester Institute of Technology (RIT), and Queen's University in Canada.

When compared to apps without ads, the researchers found that:

- Apps with ads use an average of 16 percent more energy - but up to 33 percent more. That lowers the [battery life](#) of a smartphone from 2.5 to 2.1 hours on average - or down to 1.7 hours at the high end of energy usage.
- A phone's Central Processing Unit (CPU) is like its brain - and ads eat up a lot of that brain power, slowing it down. Apps with ads take up an average of 48 percent more CPU time - 22 percent more memory use and 56 percent greater CPU utilization (the amount of time the CPU was used).
- Because the ads themselves are content that has to be downloaded, apps with ads cause smartphones to use much more data - up to 100 percent more, in some cases. On average, these apps use around 79 percent more network data, costing an estimated 1.7 cents every time they're used (based on the average cost per MB charged by AT&T).
- Together, these frustrations and expenses led users to rate apps with ads lower - costing them an overall average of .003 stars on a five-star rating scale.

"In absolute terms, this is very low, but in the crowded and competitive world of apps it's a huge difference," Halfond said. "It can make the difference between your app getting downloaded or going unnoticed."

Halfond hopes app developers will take note of this study. "Right now, they're kind of clueless," he said.

Halfond's co-corresponding author on the study is Meiyappan Nagappan

of RIT. To complete the research, they worked with Stuart Mcilroy of Queen's University and Jiaping Gui of USC.

The team compared 21 top apps from the past year - culled from a list of 10,750 that had been in the top 400 of each of Google Play's 30 categories from January to August of last year - then measured their effect on phones using analysis tools loaded onto a Samsung Galaxy SII smartphone.

Next, Halfond said he hopes to create models that will allow app developers to predict how well their products will be received by the public - both with and without [ads](#).

"Apps are the future of software," he said. "The thought that we'll all be continuing to consume software on desktops is passé."

Provided by University of Southern California

Citation: Ads in free mobile apps have hidden costs for both users and developers, study finds (2015, April 1) retrieved 6 May 2024 from <https://phys.org/news/2015-04-ads-free-mobile-apps-hidden.html>

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