Researchers find T-Mobile's Binge On doesn't live up to the hype

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Credit: Northeastern University

New research from Northeastern University shows that what T-Mobile promises regarding its Binge On service is not what subscribers, or content providers, may actually get. In many cases, subscribers were left

with lower quality videos and unexpected charges.

"At the time of our study, important details about the Binge On policy were not in public documents," says researcher David Choffnes. "They are available now, but much remains largely hidden to the average content provider and subscriber. Both can be misled."

Choffnes' team conducted the research in February and March, and the paper was accepted in May by the IGCOMM Internet-QoE workshop. He has shared the paper with the Federal Communications Commission to help inform its investigation of T-Mobile's compliance with the Open Internet Order, passed a year ago.

To analyze Binge On, the researchers "reverse engineered" how T-Mobile implemented its policies. "We set out to learn exactly how Binge On works, and we compared what we found with its stated policies," says Choffnes. "There were significant differences between the two."

Consider: Binge On touts its use of "zero rating," which means the service doesn't count your streaming internet usage against your data plan as long as the videos you're viewing are from providers who participate in Binge On.

That qualifier, says Choffnes, presents a significant danger to the FCC's Open Internet Order. The order's central concept is "net neutrality," which means that, with few exceptions, ISPs must treat all internet traffic and applications the same. For an ISP to slow down one provider's video but not another's, says Choffnes, puts the former at a competitive disadvantage.

"The internet has been hugely successful because it enables innovation, where all new internet applications receive the same network service as incumbents—it's a level playing field," says Choffnes. "T-Mobile's

policy gives special treatment to video providers that work with them. What if every ISP did this, but in a different way? In such a world, the next Netflix, Hulu, or Pied Piper might never get off the ground because keeping up with ISPs and their policies would leave them chasing their tails."

Choffnes' findings also call into question T-Mobile's claims that it's up to subscribers to decide whether to enable Binge On on their plans. "Subscribers are opted in by default," he says, and he questions whether that's what they expect. Being opted in by default means means that to stream videos at high resolution, subscribers have to be savvy enough to drill down and figure out how to disable Binge On.

And then there's the challenge to content providers. "Our research showed that if a video provider does nothing, that is, neither opts into or out of participating with Binge On, its video traffic to T-Mobile subscribers who use Binge On will be given reduced bandwidth, but the subscribers will still be charged for the streaming," he says.

This practice of limiting the bandwidth available to an application—which in this case leads to lower resolution video—is called "throttling." The Open Internet Order contains a clause that expressly forbids throttling. In the case of T-Mobile, the limiting of bandwidth occurs without subscribers or video producers explicitly agreeing to opt in to the service, Choffnes found.

After concerns regarding net neutrality and free choice, the question for consumers becomes: Is the reduction of video quality worth the free streaming?

"When Binge On is enabled, it can have a very large impact on the quality of the video that you're watching," says Choffnes.

T-Mobile says that the resolution for Binge On streaming is 480p (progressive scan) or better, which is considered standard for DVD movies. However, the researchers did not find evidence to back up these claims. In their trials using YouTube, the resolution was only 360p, noticeably blurry on a modern smartphone.

On the other hand, when they turned off Binge On, they achieved a whopping 1080p, or full HD resolution. For its part, T-Mobile claims that 480p or better is possible but currently requires a specific Android device that supports it and works only for certain video providers.

Finally, the researchers questioned the ability of T-Mobile to track video streaming at all, given that content providers are not required to identify the kind of content they send over the internet. In one case, the researchers identified a video provider that T-Mobile had incorrectly labeled, and thus was enjoying high-quality streaming by default, unlike other providers.

The scary part, says Choffnes, is that the reverse is also true. "T-Mobile's detection methods are very simple, so there's no way they can always be right," he says. "That means that Binge On is likely slowing down traffic that is not video. This raises serious concerns about compliance with the Open Internet Order."

Those simple methods open the door to exploitation as well, allowing subscribers to get free data even for non-video content. The researchers developed simple software that manipulates internet traffic so that it looks like video. For example, it makes any web content—web pages, app downloads, and photos—look like YouTube traffic. "We realized we could make any network traffic zero rated by just putting the right text in the right place," says Choffnes. "That is a security vulnerability—it's potentially an open cash register that people can take from."

The researchers told T-Mobile about the flaw and have helped the company reproduce it so it can try to address it. Choffnes, for one, is not optimistic that the free-riding vulnerability can be fixed permanently. "We believe that it is fundamentally intractable," he says.

Provided by Northeastern University