Researcher finds that U.S. wireless networks are throttling video streaming 24/7

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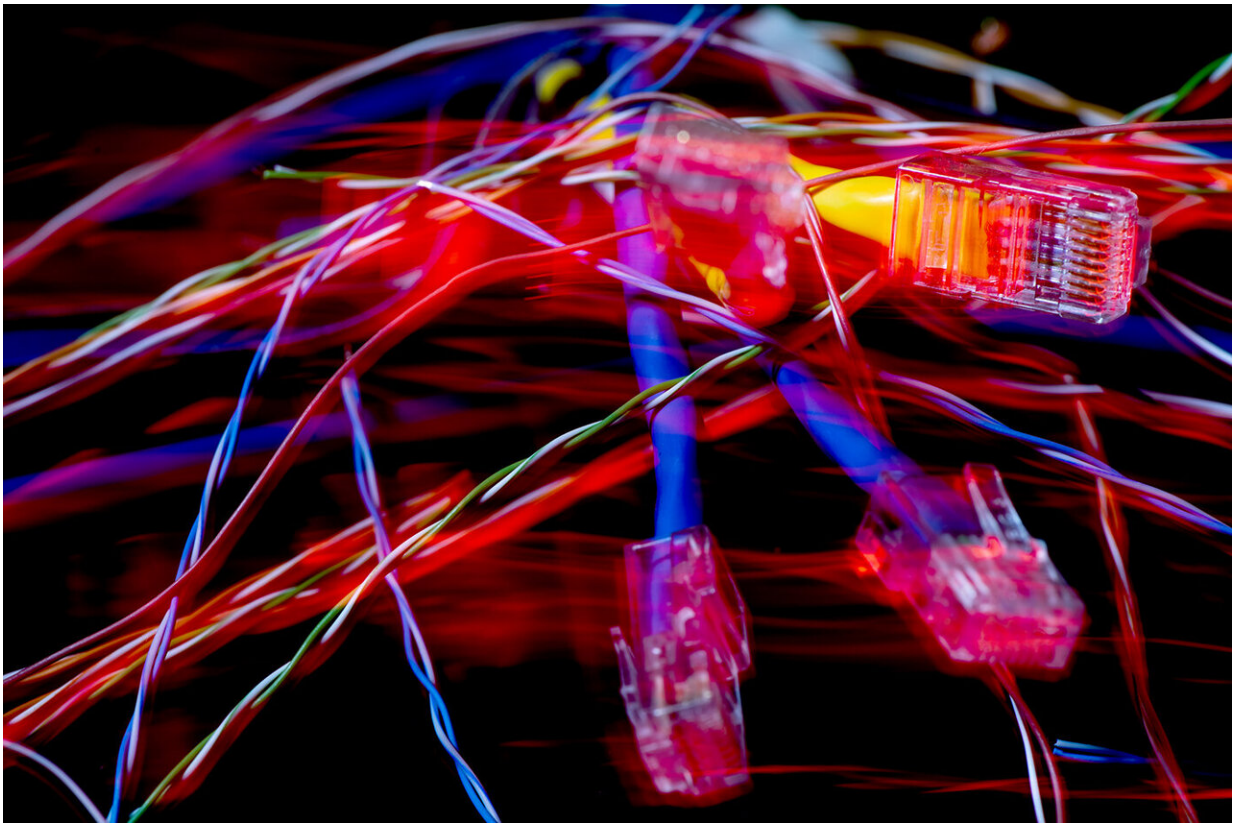

A new study by David Choffnes, an assistant professor of computer and information science at Northeastern, found that almost all wireless carriers pervasively slow down internet speed for video streaming, even when networks are not overloaded. Credit: Matthew Modoono/Northeastern University

All wireless carriers admit to doing it: They slow down internet speed for

video streaming, sometimes claiming that it is necessary to do so in order to control network congestion. It's probably why the YouTube trailer for the new *Star Wars* movie took you forever to watch on the train ride home.

The practice is known as throttling, and according to a new study authored by David Choffnes, assistant professor of computer and information science at Northeastern, carriers throttle videos all the time—even when networks are not overloaded.

"One reason you might throttle video is because you don't have enough capacity for everyone to stream high-definition video at the same time," he says. "Such overloads are rare and fleeting, so we would expect that a reasonable network management policy would throttle video only during such rare busy periods. But we don't see evidence of internet service providers throttling only when the network is busy; as far as we can tell, it's 24/7, and everywhere."

The findings were based on more than 1 million tests conducted from 2018 to 2019. Using an app called Wehe (which Choffnes and two Northeastern students developed in order to track net neutrality violations) to test internet connections, Choffnes and his colleagues from the University of Massachusetts Amherst aggregated and analyzed data from more than 126,000 smartphones to determine whether data speeds are being slowed, or throttled, for specific mobile services.

The researchers discovered that just about every wireless carrier is guilty of throttling video platforms and streaming services unevenly.

They found that all four major carriers—AT&T, Sprint, T-Mobile and Verizon—throttle YouTube. AT&T throttled 70 percent of Wehe users' Netflix tests and 74 percent of their YouTube tests. The carrier did not interfere with Amazon Prime Video tests that used encryption, but they

did throttle tests without encryption, according to Choffnes.

T-Mobile throttled Prime Video in 51 percent of the tests, Netflix in 61 percent of the tests, and YouTube in 67 percent of the tests. It mostly steered away from Vimeo (until January 2019), and did not throttle Skype tests.

Sprint has denied the study's findings, says Choffnes, despite his team's finding evidence of throttling on a lab phone set up with a Sprint prepaid plan. AT&T has outright denied throttling different services based on content, despite evidence to the contrary from Wehe tests.

When carriers throttle one type of network traffic—say, video streaming—but not another, this is called differentiation, and it constitutes a violation of net neutrality.

"Differentiation opens the door to network providers picking winners and losers; for example, which video streaming service gets to stream at higher resolution or not," Choffnes says. "Such behavior is problematic because it threatens competition and fairness in the marketplace, potentially favoring some video streaming providers over their competitors."

New net neutrality rules, passed in 2015 then struck down two years later, were conceived to protect consumers' ability to access all online information equally. It was amid this activity that Choffnes began researching throttling by wireless providers.

"We had heard anecdotally that [cell providers] were engaging in violations of net neutrality and we wanted to develop a way to go out and measure this," he says. "Recent years have seen policy being made without important data about network management practices. And so we wanted to make sure that we can provide sound empirical evidence as to

what network providers are doing and the implications of what they're doing in terms of throttling or other violations of net neutrality."

The practice could have far-reaching implications for users as well as streaming services, Choffnes says. There are cases for which streaming video is essential for public safety and educational purposes, and throttling can literally put lives and livelihoods at risk. Recently, firefighters had to contend not only with massive wildfires, but also with unexpected throttling on the data plans of firefighters, emergency medical technicians, and police officers.

Beyond that, he says, he's concerned that throttling will take away the ability of consumers to make decisions about how they want to access the internet, and create an unlevel playing field in the video streaming market.

"The danger here is that there's a slippery slope," he says. "Today it's video, but what is it going to be tomorrow? When internet service providers decide to take control and make decisions on behalf of consumers and/or content providers, what's going to be the fallout for those decisions? Is it actually in everyone's best interests?"

Choffnes and his colleagues will continue collecting and measuring this data to keep average users informed, carriers accountable, and to help lawmakers make informed decisions when net neutrality rules and legislation come up for debate again.

"The more transparency, the better," he says.

More information: Fangfan Li et al. A large-scale analysis of deployed traffic differentiation practices, *Proceedings of the ACM Special Interest Group on Data Communication - SIGCOMM '19* (2019). DOI: 10.1145/3341302.3342092