# New extension improves inflight Wi-Fi: ScaleUp loads websites up to four times faster

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Boeing 737-700 jet airliner. Credit: Wikipedia/Arcturu

To air travelers who waste precious time inflight staring blankly as your browser struggles to load a page, relief may be a quick download away.

Inspired by the notoriously turtlelike service, a team of researchers led by Northwestern Engineering's Fabián Bustamante has developed an extension for the Google Chrome browser that drastically improves web browsing speeds at 30,000 feet.

Called [ScaleUp](#), the solution is deceptively simple.

Most websites are crammed with images, fonts, videos, social sharing buttons, links, and more, none of which you notice while accessing the Internet from your employer's speedy broadband connection or your favorite coffee shop's Wi-Fi. These networks are robust enough to handle the load, and, we've come to expect it.

That kind of connectivity gets considerably more difficult hurtling through the air thousands of feet above the ground. Whether the plane uses satellite or cell towers, the signal latency—the time it takes to travel from your computer in seat 22B to the ground and back—increases dramatically.

Using a tool it developed called [WiFly](#), Bustamante's team tested the Internet connection speeds on a number of flights. Despite the premium that travelers pay for the privilege, the results were bad. Like dial-up bad.

"Travelers are paying a lot of money and getting modem-like performance," said Bustamante, professor of computer science at Northwestern's McCormick School of Engineering. "Honestly it was a simple observation: If your performance on a web browser is going to be determined by the number of images that need to be loaded on the page, then how do you limit those images."

The answer? As the name indicates, ScaleUp makes everything bigger. Much like a responsive website adjusts the layout to your desktop or

tablet or phone, ScaleUp adapts the content by increasing the size of the images, which pushes content down the page and reduces the number of objects the browser has to handle at any one time.

ScaleUp also employs other tricks to speed up the process.

"Some websites load a lot of font types," Bustamante said, "but that takes time." A website is designed, if the fonts are not there, to render the page anyway and still look presentable, he said, so ScaleUp just drops the font-load request, and the website adjusts. You don't see much difference, but it loads faster.

ScaleUp also increases the font size a tiny bit, which simplifies the load even further by pushing other objects down the page.

In an example on Bustamante's website, ScaleUp drew a CNN page four times faster, saving 60 seconds. That would add up quickly during an average web browsing session.

"It wasn't something we expected to turn out as well as it did," said James Newman, a doctoral candidate working with Bustamante on ScaleUp. "The improvements we're seeing are better than what you would normally see."

Still, Bustamante says they need more data. ScaleUp will deliver much of that as more travelers use it, and Bustamante said he is also developing relationships with the inflight Internet providers.

"We need to better understand how else we can improve the web experience regardless of the conditions," Bustamante said. "That is something that James has on his long list of things to do."

One issue Bustamante hopes to better understand is packet loss. When

transmitted, a website is broken into pieces called packets. When you visit a website, your browser loads the website by putting those packets back together. If a packet gets lost, maybe because of a connection failure, your browser asks for it again. It waits for every packet before drawing the page.

"We see high levels of packet loss inflight," Bustamante said. "While we know some of the factors behind the loss, we need to better understand all of the reasons causing the problem."

Bustamante sees plenty of room for study—and progress.

"We're in this space alone. It is like a gold mine," he said. "There's a lot we don't understand, and the more we learn about it, not surprisingly, the more we learn how much we don't know. That's the way things always go. Our list of questions is very long now."

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