

Hate Your Internet Provider? Look to Space

Facebook, Amazon and others are aiming to blanket low-earth orbit with satellites to deliver fast online access anywhere, at anytime, for anyone. It's the commoditization of space, Christopher Mims writes.

By Christopher Mims

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If you hate your internet provider, the good news is that in the next five to 10 years, you may have the opportunity to ditch it in favor of a system that transcends regional monopolies, requires no visits by the cable guy and follows you wherever you go. That's because just over the horizon there will be constellations of satellites orbiting the Earth at high speed, providing fast satellite internet directly from space. The bad news is that you might just be trading one monopolist for another, since the companies that have embarked on the race to connect you to the internet through satellites include the ones that already comprise much of Big Tech: Facebook, Google and Amazon.

The reasons this is happening now are myriad, but it wouldn't be happening as quickly if not for the whims of eccentric billionaires—notably Jeff Bezos through Amazon's just-revealed subsidiary Project Kuiper, Elon Musk of SpaceX, and Richard Branson of Virgin Orbit—all of whom have plans to launch satellites to provide internet.

Many of the plans for these networks describe what eventually could be thousands of satellites, communicating both with one another through still-exotic technologies like laser interconnects and with the ground through novel sorts of electronically steered antennas. These are not the ambitions of companies that want to bring internet access to remote villages—they're the world-spanning, empire-building designs of companies that want to compete with Comcast, Verizon, Time Warner, AT&T and other giants as they race to bring ultrafast internet to our homes and businesses via fixed lines, wireless 5G and, eventually, satellite internet.

Wireless communications from outer space are as old as the space race itself. It was radio transmissions from the “new moon” of Sputnik that helped fuel America's ambitions for outer space, after all. But a number of factors have converged to make it so internet from space could

become just one more marvel we can all take for granted. Driving things on the demand side is our insatiable need for more and faster and always-on connections to the internet, plus a growing digital divide between those close enough to terrestrial networks to get high-speed connections and those who go without. Enabling technologies include advances in the microelectronics that steer radio beams, as well as big drops in both the cost of things to be flung into space and the cost of doing so.

To understand how all of this will work, it is helpful to visualize the scale of Earth and where satellites orbit in outer space. Picture a large navel

orange. If this citrusy orb were our planet, then up to the height of a grape away from its surface would be what's called low-earth orbit. In this orbit, which runs up to 1,200 miles high, companies like OneWeb are aiming to put a network of satellites that will give the world an internet service that's different and better than the expensive and slow kind people in remote areas are currently saddled with.

People in far-flung parts of Alaska, for example, are currently paying up to \$300 a month for just a couple of megabits per second of internet access from a satellite. (The U.S. average broadband download speed is more than 90 megabits per second.)

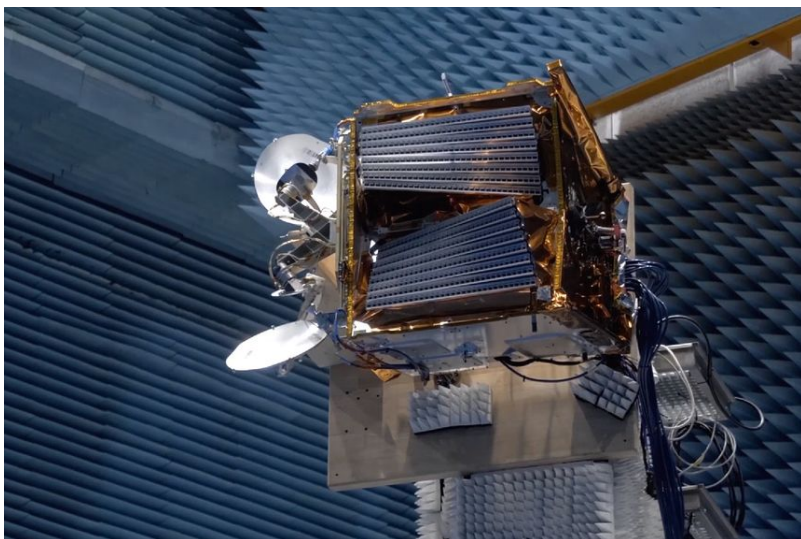
OneWeb, which already has launched its first six satellites out of a planned minimum of 650, wants to change the lives of such remote internet users by connecting to the ground from satellites that pass in and out of view of an antenna on Earth's surface every three minutes. Orbiting at 16,200 miles per hour, these satellites will have 16 independent radio beams, each with the ability to send and receive 400 megabits per second of data. It's hard to know exactly what that will mean for speeds for end users because everything depends on how popular the service is. Space internet, it turns out, means more bandwidth but not an end to wireless bandwidth issues.

One thing such a network will do better simply by virtue of the altitude of its satellites is reduce the round-trip time for a signal from Earth. Nearly all current satellites that provide internet require nearly a half second to bounce a signal from our planet as they orbit in the much more distant geosynchronous orbit—more than three orange widths away from our hypothetical orange. Satellites in low-earth orbit, however, can do it in a tenth of that time. And that determines whether or not you can have a phone call or browse the web on these networks and feel like you're more or less on a terrestrial internet connection.

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satellite networks leak through filings with the Federal Communications Commission and International Telecommunication Union, a United Nations agency that manages global wireless spectrum. While Google no longer appears to be building its own satellites, it has agreed to license technology to Canadian satellite operator Telesat for its own network of satellites. Virgin Orbit, meanwhile, hopes to be an affordable launch platform for the kind of small satellites that will comprise these networks.



A OneWeb satellite under construction at the company's factory PHOTO:ONEWEB

Satellite internet like the kind currently offered by Iridium, one of the few companies that already offers internet from low-earth orbit, is expensive and slow and mostly just connects airplanes and cruise ships and oil rigs in the North Atlantic. It's the possibility of making it accessible to smart connected cars of the future and homes and businesses and even individual mobile devices that has made it so appealing to so many companies. These companies play their cards close, but SpaceX, Amazon and Facebook have all seen detailed plans for their potential

This is a race that won't necessarily go to the most technologically sophisticated, says Bill Wolfe, a senior vice president at Moody's and author of a recent report on companies offering satellite internet. The amount of money required—what will eventually be tens of billions of dollars—means it could play out more like the battle for market share among ride-hailing companies, where Uber's strategy has been

as much about sucking up all available funding as about building a base of loyal customers.

Whichever the victors, some kind of affordable satellite internet now appears inevitable, says satellite industry veteran Shayn Hawthorne. Among the reasons he points to: the falling costs of

launching a pound of matter into space; the transition from one-off to mass manufacturing of satellites; and new designs for ground-based antennas that have no moving parts and are as small as a pizza box.

He is currently heading a project with Amazon Web Services—not affiliated with Project Kuiper—that has built a network of ground stations so that “anyone in a garage” can design their own satellite, launch it with the growing number of affordable launch companies, and never have to pay for the ground infrastructure required to connect to it.

“It’s not just us, but the whole space industry right now,” he adds. “We’re commoditizing space.”

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