



Four years ago, three big tech companies had plans in the works to beam internet down to Earth from the sky, and each scenario sounded wilder than the next. SpaceX requested permission to launch 4,425 satellites into orbit to create a global internet hotspot. Facebook wanted to use solar-powered drones and laser-based tech to shoot wifi to antennas. And Google's Loon was building giant balloons to house solar-powered electronics that would transmit connectivity down from the stratosphere.

As incredible as it all sounds, two of these schemes have started to come to fruition. Loon balloons made their (non-emergency) debut in Kenya this week, with 35 balloons transmitting a 4G signal to 31,000 square miles of central and western Kenya. And SpaceX is in the process of signing up beta testers for its internet-via-satellite, with over 500 satellites currently in orbit. Facebook, however, stopped work on its internet drones in mid-2018.

Here's a quick refresher on how the Loon and SpaceX systems work.

Big White Internet Balloons

Loon balloons are made of polyethylene, one of the most common plastics around (it's in grocery bags, plastic bottles, kids' toys, etc.). They're 15 meters (49 feet) wide, and designed to hover in the stratosphere 20 kilometers (12 miles) above Earth. They're launched by a custom-built crane that's pointed downwind.

Specially-developed software uses predictive modeling of stratospheric winds and decision-making algorithms to shift the balloons as needed for a more reliable connection down below (balloons need to be within 40 kilometers of users for the service to work). The software constantly learns to improve the balloons' choreography and thus the network's quality, and the system can function autonomously.

The electronics inside the balloons get a wifi signal from a local telecoms partner at a ground station. In Kenya, Loon partnered with Telkom Kenya, the country's third-largest carrier. The signal gets relayed across multiple nearby balloons that transmit it back down to peoples' phones and other devices. Each balloon can cover an area of 5,000 square kilometers (a little under 2,000 square miles, or about the size of the state of Delaware).

A field testing session in Kenya in late June registered an upload speed of 4.74 Mbps, a



download speed of 18.9Mbps, and latency of 19 milliseconds. For comparison's sake, the average speed in the US is 52 Mbps upload and 135 Mbps download; so service will be a bit slower in Kenya. One other small problem: since the electronics in the balloons are solar-powered, they only send down a signal during daylight hours; service is currently available from 6am to 9pm.

Signals from Starlink

Just this past week, SpaceX launched 57 more of its Starlink satellites, bringing the total in orbit to over 500. It's a fraction of the planned total of 4,425, but a pretty solid start. The satellites are orbiting 715 to 790 miles above Earth's surface. Each one weighs 260 kilograms, about as much as a small car, and can reach an area 1,300 miles in diameter on the ground at a speed of one gigabit per second.

SpaceX plans for the first 1,600 satellites to be at one orbital altitude, followed by 2,825 more to be placed at four different altitudes. Each satellite is estimated to last five to seven years.

In late June SpaceX announced it was looking for beta testers for its internet service. You can sign up on Starlink's website, and you'll be notified if testing is going to take place in the area where you live. The company plans to start at higher latitudes (like Seattle, according to a May 7 tweet from Elon Musk), then move progressively southward.

Internet for All

According to the Alliance for Affordable Internet, over half of the world's population now has internet access—but a large percentage of that is low-quality, meaning they can't use features like online learning, video streaming, and telehealth. A 2019 report by the organization found that only 28 percent of the African population has internet access through a computer, while 34 percent have access through a mobile phone.

Though expanding internet to the whole of the world's population will come with some drawbacks (such as more channels for misinformation or hate speech, and not being able to go anywhere to truly "unplug"), the broader consensus is that the internet will serve as a greatly empowering and liberating force, giving people instant access to information and enabling countless business and learning opportunities that otherwise wouldn't exist.



Google Loon Is Now Beaming WiFi Down to Earth From Giant Balloons

We probably didn't think this would happen via giant balloons and thousands of satellites, but it won't be the first time the developing world leapfrogs right over cumbersome, outdated technologies. If SpaceX and Loon continue on their current trajectories, it will only be a matter of time—and not all that much of it—before we're living in a planet-wide internet bubble.

Image Credit: Loon