STARS, SATELLITES, AND SPACEX

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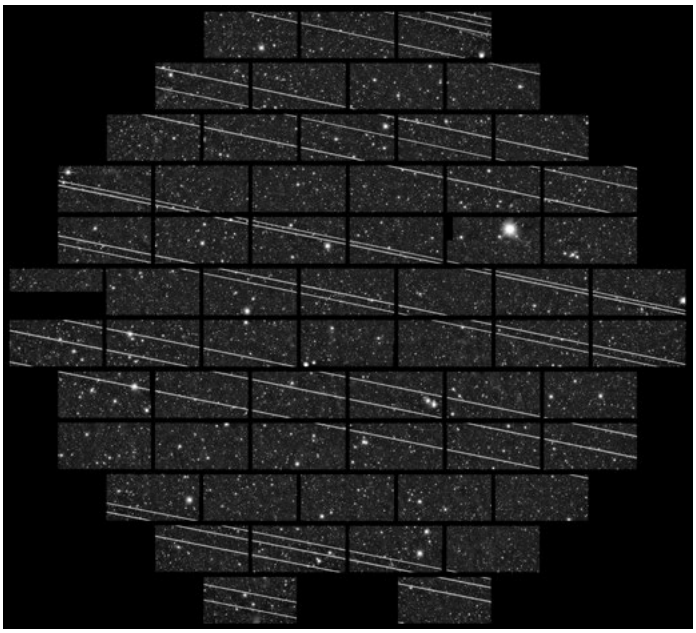
A Starlink constellation over city hall in Tübingen, Germany. Dktue on Wikimedia Commons.

On August 16, 1858, the first transatlantic telegram was sent. Suddenly, the speed of global communication diminished from weeks or days to minutes. The story of global communication is the story of humankind. What began with horse riders charging across the Eurasian Steppe has reached a peak with the world wide web. However, this progression has not been equal across the planet. Many places still have limited or no internet access. In recent years, work has started on several projects to provide low-cost, high-speed internet to every part of the globe. SpaceX's Starlink is the highest profile and most successful of these attempts. The goal of the project is to launch thousands of small satellites that will provide internet to the most remote places.

Elon Musk began the endeavor as a way to raise money for SpaceX's Mars missions. While this is still the stated goal, outside investors have begun to support the project to fully connect the planet. The growth of the project has led to a standoff between the company and the astronomical community as Starlink has come under scrutiny for the satellites' potential impacts on astronomy. Satellites are made of shiny materials that are excellent reflectors of sunlight. The International Space Station demonstrates this perfectly since it can be seen racing across the sky on a clear night. Most commercial satellites are coated with anti-reflective paint or have predictable orbits. However, this was not the case for the initial batch of Starlink satellites that were deployed. Not only were they highly reflective, they also had on-board programming that would reposition them based on the need to provide internet coverage. This meant that their flight paths were unpredictable even to SpaceX. Astronomers could not plan for the satellites crossing the paths of their telescopes and interrupting research. As the long-term goal of launching thousands of these satellites became public knowledge, scientists panicked. Such a large number of satellites would mean that these objects would eventually outnumber the stars in the sky, all but ruining ground-based space observations.

Unsurprisingly, this is not the first time in the history of astronomy and communication that the two areas have come into conflict. Harvey Liszt, a radio astronomy specialist, explained in The Atlantic that the same problem occurred with the advent of GPS in the 1970s. "Without very strict regulation, it's all too easy for users of the radio spectrum to spill over into each other's spectrum," said Liszt. Eventually, the U.S. government and the International Telecommunication Union stepped in to help regulate the distribution of the radio spectrum around the world. While the Federal Communications Commission has to approve the launch of the satellites, it holds no power over what the satellites do after they are in space. This problem requires a solution because other major companies, like Amazon, have committed to deploying thousands of satellites over the next decade to provide internet.

Commercial expansion in space is inevitable and something that governments, scientists, and companies will have to compromise on. With hundreds of space missions planned over the coming decades from dozens of countries and companies, the satellite issue is merely the tip of the iceberg. What the public sees now reflects a growing problem of space debris that has no easy solution. Hopefully with thousands of engineers working on the challenge, society will see a solution soon.



An image from the Blanco 4-meter telescope Cerro Tololo Inter-American Observatory in Chile. The five-and-a-half minute exposure shows many streaks from the second batch of Starlink satellites launched in November 2019.