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FCC Dishes Out First-Ever Fine for TV Network's Space Junk

Analysis by Dr. Joseph Mercola | November 08, 2023

STORY AT-A-GLANCE

- In a historic first, the Federal Communications Commission (FCC) fined TV provider DISH $150,000 over space debris
- DISH failed to properly deorbit its EchoStar-7 satellite, posing potential safety concerns
- FCC's announcement was followed by a nearly 4% drop in DISH's share price and sends a message to other satellite operators
- An estimated 200,000 pieces of space debris between 1 and 10 centimeters (0.4 and 4 inches) are floating in space; another 15,000 pieces of space junk larger than 10 centimeters (cm) (4 inches) are also being tracked, while the smallest pieces likely number in the millions
- In 2022, more satellites were launched than any other prior year, and there aren't enough retired satellites leaving orbit to make up for it; if left unchanged, humans' space behaviors are deemed "unsustainable"

Pollution on Earth has gotten so bad that it's reached the Southern Ocean surrounding Antarctica — an area long considered to be pristine.[1] But man-made pollution is not only reaching the farthest corners of the globe — it's launched into orbit and outer space.

In a historic first, the Federal Communications Commission (FCC) fined TV provider DISH $150,000 over space debris, specifically for failing to properly deorbit its EchoStar-7 satellite.[2] According to an FCC news release:

> *"This marks a first in space debris enforcement by the Commission, which has stepped up its satellite policy efforts, including establishing the Space Bureau and implementing its Space Innovation Agenda. The settlement includes an admission of liability from the company and an agreement to adhere to a compliance plan and pay a penalty of $150,000."*

DISH Satellite Sent to Lower Altitude, Posing Safety Concerns

DISH's EchoStar-7 satellite was launched in 2002. In 2012, the FCC approved an orbital debris mitigation plan filed by the company, which stated the satellite would be retired to an altitude of 300 kilometers (km), or 186.4 miles, when its mission was completed. DISH estimated that the satellite's end-of-mission deorbit maneuvers would occur in May 2022, based on its fuel level and other factors.[3]

In February 2022, however, the satellite's propellant had diminished, such that it would not be able to complete the orbital debris mitigation plan as committed. Instead, DISH sent the retired satellite to a disposal orbit that was significantly lower than originally intended, at about 122 km (75.8 miles) above the geostationary arc.[4]

Geostationary orbit is 35,786 km (22,236 miles) above the Equator. In contract, much space debris is found in low Earth orbit, which is within 2,000 km (1,200 miles) of Earth's surface.[5] At a lower altitude, it's possible the DISH satellite could pose safety concerns. FCC reported:[6]

> *"The FCC's investigation found that the company violated the Communications Act, the FCC rules, and the terms of the company's license by relocating its direct broadcast satellite ("DBS") service EchoStar-7 satellite at the satellite's end-of-mission to a disposal orbit well below the elevation required by the terms of its license. At this lower altitude, it could pose orbital debris concerns."*

While a $150,000 fine for a company valued at about $3 billion is pocket change, the FCC's announcement was followed by a nearly 4% drop in DISH's share price and sends a

message to other satellite operators. Michelle Hanlon, a space lawyer at the University of Mississippi, told MIT Technology Review:[7]

> *"It is definitely a very big symbolic moment for debris mitigation. It's a great step in the right direction … Honestly, I would love to see that if you don't meet your license requirements, you're banned from launching for a number of years. If you're driving under the influence you can have your license revoked. These are the kinds of measures we need to see."*

How Much Junk Is Floating in Space?

An estimated 200,000 pieces of space debris between 1 and 10 centimeters (0.4 and 4 inches) are floating in space. Another 15,000 pieces of space junk larger than 10 centimeters (cm) (4 inches) across are also being tracked by the United States Space Surveillance Network. In terms of space debris smaller than 1 cm, the numbers could be in the millions.[8]

Once in orbit, the debris doesn't necessarily stay there. Junk that's low — below 600 km (375 miles) — will orbit for a few years before falling back to Earth. But space junk that's in orbit 1,000 km (600 miles) in space may circulate for hundreds of years.[9] Once in space, even tiny pieces of debris smaller than 1 mm (0.04 inch) can be catastrophic if a collision occurs.

In addition to damaging space shuttle windows, satellites can be destroyed. According to Britannica:[10]

> *"If there is a greater than 1-in-100,000 chance of a known piece of debris colliding with the International Space Station (ISS), the astronauts perform a debris avoidance maneuver in which the ISS's orbit is raised to avoid collision. On particularly dangerous occasions, such as in November 2021, when the ISS passed through the debris cloud from a Russian anti-satellite test, astronauts close the station's hatches and shelter in their spacecraft."*

In September 2023, a near-miss occurred when two large pieces of space junk nearly collided in low orbit. One object was likely an 880-pound Soviet payload launched in 1976. The other was a Chinese rocket body launched in 2018 and estimated to weigh about 4,400 pounds.

The objects passed within 118 feet (36 meters) of each other, with a probability of collision of 1 in 1,000. As Space.com reported,[11] "Each would have been traveling at around 7.5 kilometers per second, or 16,800 miles per hour as they passed overhead at an altitude of around 428 miles (689 km). A collision of these highly-energetic, massive chunks of space junk would create around 3,000 pieces of debris in low Earth orbit, according to Leolabs."

The first in-orbit collision occurred in 2009, when Iridium-33, a privately owned U.S. communication satellite, collided with Kosmos2251, a Russian military satellite, destroying both. The incident generated 2,300 fragments, some of which have since re-entered Earth's atmosphere, causing them to burn up.[12]

The number of near-misses and collisions are expected to increase as more space junk enters the equation, and collisions are expected to become the primary source of space debris in the future.[13] As it stands, the exact number of space debris objects orbiting Earth is just an estimate.

The European Space Agency (ESA) has a tally of its own and estimates there could be 29,000 pieces of space debris larger than 10 cm, 670,000 larger than 1 cm and more than 170 million larger than 1 mm. ESA explains:[14]

> *"Any of these objects can cause harm to an operational spacecraft. For example, a collision with a 10-cm object would entail a catastrophic fragmentation of a typical satellite, a 1-cm object would most likely disable a spacecraft and penetrate the ISS shields, and a 1-mm object could destroy sub-systems on board a spacecraft.*
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> *Scientists generally agree that, for typical satellites, a collision with an energy-to-mass ratio exceeding 40 J/g would be catastrophic."*

Is Kessler Syndrome Already Occurring?

When collisions occur in space, the objects stay in motion, as do their fragments, creating ever-larger debris fields and even more collisions, with no going back. The scenario was outlined by former NASA scientist Donald Kessler, who wrote in his 1978 paper that as the number of satellites in Earth's orbit increases, so, too, does the probability of collisions.[15]

"Satellite collisions would produce orbiting fragments, each of which would increase the probability of further collisions, leading to the growth of a belt of debris around the earth," he predicted. Indeed, many believe Kessler Syndrome is already well underway. As described by ESA:[16]

> *"With today's annual launch rates of around 110, and with future break-ups continuing to occur at average historic rates of 10 to 11 per year, the number of debris objects in space will steadily increase. As a consequence of the rising debris object count, the probability for catastrophic collisions will also grow progressively; doubling the number of objects will increase the collision risk by approximately four times.*
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> *As the debris population grows, more collisions will occur. In a 'business-as-usual' scenario, such collisions will start prevailing over the now-dominating explosions within a few decades from now. Ultimately, collision fragments will collide with collision fragments, until the entire population is reduced to subcritical sizes.*
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> *This self-sustained process, which is particularly critical for the LEO [low-Earth orbit] region, is known as the 'Kessler syndrome'. It must be avoided by the timely application of mitigation and remediation measures on an international scale."*

Humans' Space Behaviors 'Unsustainable'

ESA's 2023 Space Environment Report paints a dire picture of the state of junk in space, noting that "Earth's orbital environment is a finite resource."[17] In 2022, more satellites were launched than any other prior year, and there aren't enough retired satellites leaving orbit to make up for it.

Meanwhile, old satellites left to collect dust in space increase the risk of fragmenting into "dangerous clouds of debris," with active satellites having to perform avoidance maneuvers increasingly often to stay out of debris' way. While most people think of space as infinitely large, satellites often compete for the same orbital space.

"Space may be unfathomably large," ESA notes, "but the regions with economic value can be shockingly small." In short, there are traffic jams even in space, with highly sought-after orbits becoming increasingly congested and dangerous as a result:[18]

> *"The number of new satellites launched last year was dominated almost entirely by those establishing or expanding commercial satellite constellations in low-Earth orbits. These constellations are launched to provide services such as global communications, but only a narrow band of orbits are suitable for these purposes.*
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> *As a result, a collision or fragmentation in these orbital regions would be catastrophic for the rest of the satellites in similar orbits, and for satellites or crewed space vehicles passing through this region on their way to more distant destinations."*

Graveyard Orbits, Space Junk Removal Among Cleanup Options

Under space debris mitigation guidelines, satellites are supposed to leave protected orbits within 25 years of their retirement, either deorbiting or entering farther away "graveyard" orbits. While early satellites often did not comply with this guideline, recently launched satellites are much more likely to comply.[19]

The FCC's recent fine to DISH may further bolster compliance and could even increase demand for a burgeoning industry — space junk removal services. In October 2023, for

instance, the Japanese government hired company Astroscale to remove a retired satellite from orbit. ESA also commissioned Switzerland-based ClearSpace to remove debris from orbit, with a launch planned for 2025.[20]

In 2018, British satellite RemoveDEBRIS tested using a net and a harpoon to capture space debris. Another test used a dragsail to slow down a satellite and allow it to reenter the atmosphere, but the test failed.[21]

Removing junk from space seems to be a more sustainable solution in the long run than sending debris further into space, but the industry is in its infancy. At the very least, it seems clear that more thought should go into the types of objects being launched into space with no clear plan for their removal. The FCC's move, however, is a step in the right direction.

"It's a really interesting question about what effect a fine of this magnitude has on a potential market for active debris removal services," Christopher Newman, a space lawyer at Northumbria University in the U.K., told MIT Technology Review. "Companies have now been put on notice that they're going to be liable for noncompliance of licenses. So that should stimulate a discussion between these two industries."[22]

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