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Commentary

When Satellites Collide: Commercial Ventures Beware

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In February, for the first time, two satellites — a defunct Russian military satellite and an operational, privately owned Iridium satellite — collided in orbit. The damage has yet to be fully ascertained, but it will likely include the total loss of the Iridium satellite, operational costs to minimize gaps in Iridium coverage and costs resulting from remaining gaps. The collision also created debris that may impact other satellites, potentially causing additional damage.

If this collision occurred between automobiles, ships or airplanes, determining liability and recovering damages would likely involve a fairly straightforward analysis based on established law and insurance agreements. But satellite-to-satellite collisions are uncharted territory, and the current legal framework for space operations provides little protection to private satellite owners. Even if this collision were between two state-owned satellites, assessing fault would be challenging.

In order to assess liability, one must first determine who owns the colliding satellites. Under the Convention on Registration of Objects Launched into Outer Space, known as the Registration Convention, each satellite must be registered. The Registration Convention, entered into force in 1976, reflects the early space age assumption that only states capable of launching satellites would own satellites. Therefore, registration is determined by the "launching state," defined as "a state which launches or procures the launching of a space object" or "a state from whose territory or facility a space object is launched." In another sign of its age, the Registration Convention does not address private space activity. Although government programs still dominate, commercial ventures represent an expanding portion of the space market. Tracing ownership from registration therefore depends on the launching state's regulations for commercial ventures.

Operational conditions do not permit easy determination of fault. There are no traffic controllers and no "right of way" conventions for satellites in orbit. Satellites generally do not veer much from their orbits, so collision is not considered a great risk. As Iridium Vice President Joseph Campbell noted at a 2007 conference: "We figure the risk of a collision on any individual conjunction is about one in 50 million." The "big sky, little satellite" approach is reinforced by difficulties in taking evasive action. Although the U.S. Space Surveillance Network tracks approximately 18,000 space objects and issues warnings, the warnings are not precise.

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Had these been ships at sea, the Iridium satellite, being "under power," would have had a duty to take evasive action. However, without a warning, unlike sailors on board a ship, the Iridium operators had no way to know that the Russian satellite was on a collision course.

The Russians should bear some responsibility for failing to "super-sync," or maneuver the dead satellite out of the path of active satellites. However, while super-syncing is recommended by the Inter-Agency Space Debris Coordination Committee, it is not required by treaty.

The Convention on International Liability for Damage Caused by Space Objects, known as the Liability Convention, lays out provisions for determining liability, but they are limited. When the Liability Convention entered into force in 1972, the emphasis was on the potential for damage from falling objects. Thus, owners of spacecraft causing damage on Earth or in the air are "absolutely liable." Liability for damage in space is assessed "only if the damage is due to [the launching state's] fault or the fault of the persons for whom it is responsible." The Liability Convention provides no guidance on determining "fault." Disputes are handled as diplomatic affairs, not legal actions. Under the Liability Convention, Iridium, which launched from a U.S. facility, must petition the United States government to intercede on its behalf with Russia. Claimants may bring actions through the launching state's legal system, but if a claim is processed through legal means, it may not be presented through the Liability Convention. Where the local law is favorable, a private suit might be the preferred option for commercial claimants seeking speedy resolution.

As on Earth, where a commercial venture is involved in a collision, there is likely to be an insurer. Space insurance is big business. In 2007, launch insurance alone accounted for nearly $3.5 billion in premiums. Insurance is available for:

- prelaunch, covering satellite or launch vehicle damage prior to launch;
- launch, covering complete launch failures and failure to place the satellite in the proper orbit;
- on-orbit operations, covering technical problems and damage of satellites in orbit; and
- liability insurance, which may be required by law.

Under U.S. law, commercial enterprises launching satellites must procure $500 million of liability insurance to cover public injury and another $100 million to cover government property damage in the event of a launch or mission failure. Damage resulting from collision is most likely to be covered under an on-orbit satellite life insurance policy, which is not required by law.

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It is unclear whether the collision will alter insurers' calculation of risk or business practices. In a recent interview with *Forbes* magazine, the chief operating officer at Global Aerospace, a specialist insurance company, opined that it is too soon to tell because "we do not yet understand the nature of the debris caused by the collision or the ultimate orbit of that debris." While satellite-to-satellite collisions will likely remain rare, space debris is increasing due to routine events, like satellite launches, and less routine events, like this collision and China's 2007 destruction of a defunct satellite, which created about 2,500 pieces of debris. For most commercial satellites, which operate in geosynchronous orbits 35,680 kilometers above the Earth, debris is not a concern. But satellites in lower orbits, like commercial imaging systems, may be more at risk of colliding with debris.

As the risk grows, collision disputes may become more likely. International space law requires debris to be traceable. Under the Registration Convention "space objects" that must be registered include "component parts." Debris resulting from a collision would therefore retain the registration of the original satellite. The Registration Convention is designed to enable anyone injured by a space object to determine which state registered the object that caused the damage. Where a state cannot determine the registration, the Registration Convention requires all other state parties to respond "to the greatest extent feasible to a request ... for assistance ... in the identification of the object." This traceability allows terrestrial victims of falling space debris to enforce the "absolute" liability provision of the Liability Convention, but it may also give rise to claims by owners of satellites struck by debris.

The recent collision illustrates that space collision events once thought only theoretically possible are not only possible but may increase with the swelling population of satellites and debris. Given the diplomatic bent of most space law, insurers may find that they need to not only adjust their risk calculations but also hone their client advocacy and diplomacy skills when satellites collide.

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