COOPERATIVE MANAGEMENT OF THE SPACE ENVIRONMENT

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The commercial satellite industry has been providing essential services for almost as long as humans have been exploring outer space. Over the decades, this industry has played an active role in developing technology, worked collaboratively to set standards and partnered with governments to develop successful international regulatory regimes. Success in both commercial and government space programmes has meant that new demands are being placed on the space environment. This has resulted in orbital crowding, an increase in space debris, greater demand for limited resources and the proliferation of sometimes conflicting military and commercial activities. The successful management of these issues will require a strong partnership between government and industry and the careful, experience-based expansion of international law and diplomacy.

Throughout the years, the satellite industry has never taken for granted the remarkable environment in which it works. Industry has invested heavily in technology and sought out the best and brightest minds to allow the full, but sustainable, exploitation of the space environment. Where problems have arisen, such as space debris or electronic interference, industry has deployed new technologies and adopted new practices to minimize negative consequences.

In the late 1970s and early to mid-1980s, both the Soviet Union and the United States engaged in the testing of anti-satellite (ASAT) weapon systems. Both abandoned these efforts, in part because the creation of additional space debris threatened their plans for the full exploration and exploitation of the space environment. Similarly, the future preservation of the space environment will rely on every state's appreciation that its own self-interest lies in preserving this precious common good.

All the major commercial satellite operators routinely share information and resources with each other and with governments to help ensure the protection of outer space. Intelsat operates a fleet of more than

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50 satellites—the largest geostationary commercial fleet ever assembled. In response to business opportunities and changing market needs, Intelsat regularly replaces satellites and relocates satellites in orbit. To change the orbital location of a satellite, Intelsat must delicately move a minibus-sized multi-ton object, travelling thousands of kilometres per hour, through the crowded geostationary arc while avoiding the potential for collisions with, or disturbing the radio communications of, any of the more than 250 other commercial communications satellites in that orbit.

With the exception of the initial grant of approval by a national regulator, this entire process is managed without governmental regulation or oversight, using rules developed through experience and implemented by consensus among the commercial operators themselves. This process has been used effectively and without incident since the commercial satellite communications era began in the 1960s. This remarkable example of international and inter-company cooperation and self-reliance is premised on a simple realization that the results of a collision could be catastrophic.

In low Earth orbits, objects and debris will slowly, over a decade or so, re-enter the Earth's atmosphere. In the narrow geostationary orbit (in which a satellite's orbit precisely matches the rotation of the Earth, thereby keeping the craft fixed over a single geographic location), the debris from a collision would endure for tens of thousands of years, effectively rendering a portion of this arc useless.

To be sure, the motivations behind the military space activities of states are far more complex than those of the commercial satellite industry. However, the central goal of preserving the operational space environment binds all space participants with a common purpose. Governments should play a leading role in this preservation effort. Specifically, concerned governments should:

Provide adequate funding for space situational awareness. Space situational awareness (SSA) is the ability to monitor and understand the constantly changing space environment. The task of locating and tracking active satellites and space debris is one of the most challenging aspects of SSA. Currently, the US Air Force Space Command's Joint Space Operations Center (JSPOC) plays a key role internationally in tracking, and reporting on, all man-made objects in orbit. JSPOC receives on-orbit positional data from the Space Surveillance Network, which is composed of both optical

and radar sensors throughout the world. This allows JSPOC to attempt to maintain accurate data on every man-made object currently in orbit. Today JSPOC is tracking more than 10,000 objects in space.

But the United States is not alone in its SSA efforts. Australia, China, Russia, several European states and others are making investments in such capabilities. But these investments alone are not enough. It is also a critical that states strive to create rapid, reliable and non-bureaucratic institutions for sharing the new data they are collecting.

Follow the model created by the US Commercial and Foreign Entities (CFE) programme for sharing information. Established by the US Congress as a pilot programme, CFE now provides a limited but essential set of US government data on existing space objects for release to certain commercial and foreign entities. Although CFE has been advantageous for governments and industry, the accuracy of the data currently provided is not sufficient for precise collision detection/assessments, support of launch operations, end of life/re-entry analyses or anomaly resolution. The current CFE pilot programme is set to expire in 2009 and efforts are underway within the United States to formalize and expand this programme. Beyond the CFE, it might be extremely valuable if satellite operators and governments would share their collected data in an organized, cooperative fashion. Such a sharing process could result in the creation of a "Global Data Warehouse" for space information. Governments and operators might be encouraged to submit information on the orbital elements of space objects as well as their manoeuvre plans and operational frequencies. If information were gathered in a central depository, warning and alert messages could be distributed automatically in a common format to participating operators, while protecting sensitive commercial or government data.

Begin an international dialogue on "Rules of the Road" for outer space. Although there may be disagreement as to the value of additional laws or space treaties, there seems to be general acceptance that certain guidelines or norms developed by consensus may play a useful role in ordering our activities in outer space. A good example are the space debris mitigation guidelines developed by the Inter-Agency Space Debris Coordinating Committee, an intergovernmental body created to exchange information on space debris research and mitigation measures. The development of other non-binding guidelines should be investigated. Such non-binding guidelines might include a formalization of existing rules regarding the

movement of spacecraft between orbital locations, protocols for informing other operators when a spacecraft under their control could potentially cause damage to other space objects, and protocols for managing the loss of control of a satellite.

Within the next decade, many more states will gain the ability to exploit outer space for commercial, scientific and governmental purposes. It is essential that the world's governments provide leadership on space management issues today in order to protect the space activities of tomorrow. Bad decisions and short-term thinking will create problems that will last for generations. Wise decisions and the careful nurturing of outer space will ensure that the tremendous benefits from the peaceful use and exploration of outer space are enjoyed by those who follow in our footsteps in the decades to come.