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CRITICAL INFRASTRUCTURE IN SPACE: DEFENDING THE UNDEFENDABLE?

Abstract

In response to growing concern about the emergence of hostile behaviour in outer space, States have started investing in military systems that would safeguard their critical space infrastructure from external threats. The development of such military systems is appealing to States as tensions increase in this strategic domain. Over the past decade, space-based assets have become increasingly vulnerable to attack and disruption due to the continuing development of advanced capabilities including electronic warfare, directed-energy weapons, and ASAT missiles. Certain satellite systems form a key component of critical infrastructure (CI) globally, and are vital to modern society across civil and military domains. As a consequence of these developments, and the importance of satellites, the concept of “space defense,” or mitigating threats to critical space-based infrastructure, is a constantly evolving topic.

There has been a long-standing assumption that defence of space-based CI could be achieved solely via deterrence using terrestrial retaliatory measures. This is no longer true. The variety and capability of disruptive tools wielded by potential adversaries means states are now considering direct and asymmetric responses in the space domain itself. As more and more actors develop effective counter-space capabilities (space- and Earth-based), it remains to be seen whether CI in orbit can be effectively defended using active and passive measures, or whether space is a “use it or lose it” domain, where the aggressor has the advantage. As more nations develop “defensive” and “offensive” capabilities in space, it is unclear whether these capacities can truly be differentiated, and whether pursuing space defence will only add fuel to a space arms race.

By exploring national policies and doctrines related to national security and space, this paper conceptualises a common understanding of space defence and CI. To provide a sufficient diversity of policies, the doctrines of China, France, India, the Russian Federation, and the United States, will be analysed. Building on this, a taxonomy of Critical Infrastructure and associated risks in space will be created, and compared with the varying national policies and capabilities. We will develop three hypothetical scenarios related to the protection of CI and to what extent these scenarios could escalate into a wider conflict between space powers, drawing lessons learned for potential future conflicts. The paper concludes by making recommendations for securing space-based CI, evaluating the risks of deploying defensive systems, and providing recommendations to reduce the risk of conflict in space.