

Space Resilience

Space Resilience – Safeguarding U.S. Assets

Resilience is the ability of an architecture to support the functions necessary for mission success in spite of hostile action or adverse conditions. An architecture that is more resilient can provide these functions with higher probability, shorter periods of reduced capability, and across a wider range of scenarios, conditions, and threats. Resilience may leverage cross-domain or alternative government, commercial, or international capabilities.

According to the Department of Defense, resilience encompasses avoidance, robustness, reconstitution, and recovery:

- **Avoidance:** countermeasures against potential adversaries
- **Robustness:** architecture properties and design features to enhance survivability and resist functional degradation
- **Reconstitution:** plans and operations to re-establish full operational capability and capacity for the full range of missions, operations, or contingencies

Why is Resilience Important?

Today, the U.S. is more reliant on space capabilities than ever before, at the heart of every aspect of our civilian, military and intelligence infrastructures. The areas impacted by space include navigation, communications, command and control, surveillance, television, weather, and support to first responders, to name a few. Hostile states are very much aware of this reliance.



CYBERSPACE THREATS

ATTACKING COMMAND AND CONTROL AND DATA DISTRIBUTION NETWORKS DIRECTLY AGAINST SPACE SYSTEMS, ASSOCIATED GROUND INFRASTRUCTURES, USERS, AND THE LINKS CONNECTING THEM.



DIRECTED ENERGY WEAPONS

LASERS, HIGH POWERED MICROWAVES, AND RADIOFREQUENCY WEAPONS TEMPORARILY (DAZZLING) OR PERMANENTLY DAMAGE SYSTEMS



ELECTRONIC WARFARE

JAMMING (UPLINKS AND DOWNLINKS) AND SPOOFING (INJECTING FAKE SIGNALS) TECHNIQUES



KINETIC ENERGY THREATS

ANTI-SATELLITE (ASAT) MISSILES



ORBITAL THREATS

DEBRIS, OTHER SATELLITES EMPLOYING MICROWAVES, RF JAMMERS, LASERS, CHEMICAL SPRAYERS, KINETIC KILL VEHICLES, OR ROBOTIC MECHANISMS



Space is a hostile and unforgiving environment with looming adversaries, extreme temperature fluctuations, complex radiation requirements, unpredictable solar flares and an increasing amount of flying debris. All of these events and more threaten to wipe out vital national capabilities in an instant. Satellites and their architectures, including supporting ground infrastructure, must be resilient to ensure operational systems are available for the warfighter and other commercial space users.

ManTech's Role in the Space Resilience Domain

Our work encompasses three main areas:

- 1. Cyber operations and defense:** Expansion of our existing full-spectrum cyber operations capabilities to include the utilization of our Advanced Cyber Range Environment (ACRE) in support of protecting the space architecture against cyber threats – this includes not only the space systems themselves, but also the ground infrastructures, the users, and the links between them. Further, we are expanding into the counter-space domain through research and development of cyber kill-chain tools, tactics, and strategies.
- 2. Data Analytics and Analysis** for space situational awareness and space object surveillance and identification (SOSI) and analyses of the entire space architectures for vulnerabilities. We collect and utilize data to thwart a critical event before it occurs. We analyze data to determine the true cause of critical events, for example, whether it is environmental, accidental, or intentional.
- 3. Developing More Resilient Space Architecture** and recovery, development of cross-domain solutions including multi-level security environments with a common operating picture, plus CONOPS, and program protection for self-protections and stand-off effects, high fidelity modeling, simulations and analysis.

LEARN MORE

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