Investigating Satellite Threats: Beginning My PhD Research

Alexandra Östman

Supervisor, Marcus Nolhberg

Today, I am in the 7th month of my PhD Journey with the Swedish Defense University and the University of Skövde. When I accepted this position, I was informed that the ultimate goal of my research would be twofold; first, to identify existing and emerging space-based services that are critical to Sweden's society and total defense, and second, to identify and develop strategies for improving the redundancy, resiliency, and robustness of these services. This PhD is also a part of the Knowledge Foundation's Jubilee Doctoral Students Program, which emphasizes collaboration with external industry stakeholders.

Space-based services and capabilities are essential in modern society and depend on satellite systems for their successful operation. These include, for example, navigation and positioning systems (e.g., transportation, GPS, and emergency services), telecommunications systems (e.g., internet, radio, and TV), financial services (e.g., card payments and stock trading), and Earth observation services (e.g., weather forecasting, resource exploration, and climate monitoring). However, because these services are dependent on space infrastructure, they are vulnerable to threats.

As such, the first project I decided to focus on is conducting a scoping literature review on malicious threats to satellite systems. In this review, a satellite system is considered to comprise of three segments: the space segment, including satellites and their onboard systems; the ground segment, including all infrastructure required for controlling, operating, monitoring, and maintaining the satellite system; and the end-user segment, including any infrastructure and applications used by the end-user. This review focuses exclusively on threats targeting the space and ground segments and uses a combination of academic and grey literature.

In this presentation, I will share my journey so far, from how I began with having extremely limited knowledge of the space field, to identifying the foundational knowledge needed to begin my PhD, how my understanding of the importance of space-based services has (and continues to) evolve, and how I hope my current efforts lead to an effective collaboration with industry partners and ultimately apply this knowledge within the Swedish context.