



# BRIEFING NOTES

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## GLOBAL SPACE SITUATIONAL AWARENESS SYSTEM AND OFFENSIVE COUNTER-SPACE CAPABILITIES

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## SUMMARY

- ✦ In recent years, several countries are analyzing vulnerabilities of space-based systems and are attempting to develop offensive counter space capabilities
- ✦ Due to these advances, developments, and enhancements, governments are putting more aggressive policies to ensure peaceful activities in the space.
- ✦ Counter space or space control refer to applications, developments, techniques and capabilities that help a government or country to achieve superiority in the space.
- ✦ Counter space capabilities can be offensive or defensive. Offensive capabilities can destroy, disrupt, or degrade either satellite, ground station, or the communication link. Information collected using space capabilities has a strategic role in both conventional and cold wars. This is the main encouragement for countries to enhance their offensive counter space capabilities to improve the military.
- ✦ Although such growth in the space environment has great benefits to the military establishment, it could also result in two main drawbacks. First, it is obvious that it could lead to inadvertent and unexpected/unanticipated conflicts on Earth. Second, are long lasting consequences in the global economy and society that could adversely harm humanity.
- ✦ Generally, space and military related policies are kept hidden from public which adds challenges to conducting research based on open-source material. Nevertheless, our goal is to investigate counter space capabilities of different countries in order to enhance the space related policies and technologies in Canada and for the CAF/DND stakeholders and policy makers.

## CONTEXT

### **Space Security Policy of UK**

- ✦ Through UK's national space security policy, a set of coherent approaches are defined to achieve the following objectives [1, 2]:
- ✦ Increase the resilience of the country in case of disruption in space services and capabilities.
- ✦ Proliferate the national security through space capabilities and services.
- ✦ Ensure the safe and secure space environment.
- ✦ Provide exploration opportunities to academia and industry to support national space security.

### **Overview of Space Situational Awareness (SSA) System:**

- ✦ According to the European Space Agency (ESA) there exist three aspects in SSA as follows [3, 4]:
- ✦ Space Surveillance and Tracking (SST) of objects on Earth orbit and monitoring active and inactive objects that are orbiting around Earth.

- ✦ Space Weather (SWE): Monitoring natural events that can cause damage to space-based or ground-based equipment such as solar wind.
- ✦ Near Earth Objects (NEO): Detecting natural objects that can cause damage on Earth.

## CONSIDERATIONS

- ✦ Comparing the UK policy with the Canadian space policy and their framework, it is observed that more collaboration and cooperation with other countries such as US can be noted in the UK's framework [5].
- ✦ Since US has the most advanced space situational awareness system, it is very crucial for Canada to collaborate with US to achieve the required information.
- ✦ This additional collaboration can help Canada to be more resilient in case of any counter-space event by predicting it [5].
- ✦ The functionality of many military and civil services is highly dependent on satellites and space services. Thus, it is very important to develop space-independent weapons and defensive tools [5].
- ✦ Canada should further participate in international practices that are related to space services. Similar to UK, Canada should enhance its participation in international space agencies and use its experts to advance the rules and regulations of using space capabilities for peaceful use of outer space [5].
- ✦ Due to limitations and constraints on current sensors, spatial positions of additional space debris are not readily available. Moreover, the smaller sized (in centimeter) debris are not detectable by current sensors while they can cause serious collision damage due to their high speeds [6].
- ✦ Processing and visualization of data from multiple sensors require new techniques in order to fast track, monitor, and interpret the space environment. Certain commercially software are available to SSA operators. However, researchers are looking for an open source software in this field [7].
- ✦ It is important to obtain new nonlinear multiple object estimation information for estimating the number and states of objects in future with high accuracy [8].
- ✦ It is critical to investigate and develop more advanced SSA sensors, processing software, and overcome limitations such as power consumption and other resources.

## NEXT STEPS

- ✦ The role of Canada in collecting space information and its participant in SSA activities should be studied to determine the research gaps and industry requirements and needs as well as policy makers.

## REFERENCES

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