



75 Years of Uniting Nations: Overcoming Conflict to Achieve Common Goals

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North Atlantic Treaty Alliance

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Committee Overview

To aid you in your comprehension of how this committee operates as well as its goals for the selected topics below find the history, background and relevant information vital to the understanding of this committee's objectives as well as advancing your own research.

NATO History and Purpose:

Following WWII and the subsequent tensions between American/European nations and the Soviet Union, President Harry Truman pitched a peace alliance with Europe signed on March 17th, 1948 under the name of the Brussels Treaty.¹ This treaty signed by Britain, France, Belgium, the Netherlands, and Luxembourg, was the start of a collective defence alliance which would lead to the creation of the North Atlantic Treaty Organization in April of 1949.

The Brussels treaty evolved into NATO as events such as the Czechoslovakian coup d'état of its democratic government in 1948 created an increased growth of anti-communist sentiments in the US and European members. After a period of negotiation and creating a framework for what ultimately would become NATO, finally on April 4th 1949 NATO was created by the original members of the brussels treaty as well as the US, Canada, Italy, Denmark, Norway, Portugal, and Iceland.

Presently, NATO as an intergovernmental organization has come to represent a political and military alliance through collective defence derived from Art.5 of the Washington Treaty²

"an armed attack against one or more of them in Europe or North America shall be considered an attack against them all; and consequently they agree that, if such an armed attack occurs,

¹ The Editors of Encyclopaedia Britannica. (2016, November 29). Brussels Treaty. Retrieved August 10, 2020, from <https://www.britannica.com/event/Brussels-Treaty-European-history-1948>

² Haglund, D. G. (2020, January 30). *North Atlantic Treaty Organization (NATO) | Founders, Members, & History*. Encyclopedia Britannica. <https://www.britannica.com/topic/North-Atlantic-Treaty-Organization>

*each of them, in exercise of the right of individual or collective self-defence recognized by Article 51 of the Charter of the United Nations, will assist the Party or Parties so attacked by taking forthwith, individually and in concert with the other Parties, such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area".*³

-(NATO, 2009)

NATO's Purpose began with the prevention of spreading communism in western countries, however the purpose has adapted since the collapse of the Soviet Union to "safeguard the freedom and **security** of all its members by political and military means. Collective defence is at the heart of the Alliance and creates a spirit of solidarity and cohesion among its members". NATO furthers the stability in the Euro-Atlantic area by aiding its members national security objectives and now actively responds to new international security threats by non-state actors (2010 NATO Strategic Concept).⁴

³ North Atlantic Treaty 1949. (1949, April 04). NATO
https://www.nato.int/cps/en/natolive/official_texts_17120.htm

⁴ *Strategic Concept 2010*. (2010, November 19). NATO.
https://www.nato.int/cps/en/natohq/topics_82705.htm?

NATO's Structure:

There are currently 30 members in NATO with its most recent member North Macedonia joining in 2020. Refer to the figure below for a complete list.

BELGIUM (1949)	THE UNITED KINGDOM (1949)	ESTONIA (2004)
CANADA (1949)	THE UNITED STATES (1949)	LATVIA (2004)
DENMARK (1949)	GREECE (1952)	LITHUANIA (2004)
FRANCE (1949)	TURKEY (1952)	ROMANIA (2004)
ICELAND (1949)	GERMANY (1955)	SLOVAKIA (2004)
ITALY (1949)	SPAIN (1982)	SLOVENIA (2004)
LUXEMBOURG (1949)	CZECH REPUBLIC (1999)	ALBANIA (2009)
NETHERLANDS (1949)	HUNGARY (1999)	CROATIA (2009)
NORWAY (1949)	POLAND (1999)	MONTENEGRO (2017)
PORTUGAL (1949)	BULGARIA (2004)	NORTH MACEDONIA (2020)

Figure 1. NATO members in chronological order of joining.

NATO's purpose, structure and functioning are largely set out in the North Atlantic Treaty April 4th, 1949 otherwise known as the Washington treaty which is also later reiterated in the London Declaration in December 2019.⁵ When it comes to official texts, NATO issues a communiqué which is passed unanimously by procedure of consensus. Veto power is reserved by all states. The communiqués are approved by the North Atlantic Council, and these communiqués are legally binding on the members. The structure of NATO can be divided into two parts that is, its NATO delegations and its military representatives.⁶

⁵ *London Declaration. (2019, December 4). NATO.*

https://www.nato.int/cps/en/natohq/official_texts_171584.htm

⁶ *Structure. (2016, April 28). U.S. Mission to the North Atlantic Treaty Organization.*
<https://nato.usmission.gov/our-relationship/about-nato/structure/#:%7E:text=The%20key%20elements%20of%20NATO's,Allied%20Command%20Operations%20and%20Allied>

NATO DELEGATIONS:

Under the NATO delegations there is the North Atlantic Council which serves as the principal political decision-making body, where each member country has a seat and chaired by a secretary general. Additionally, there is the nuclear planning group which serves the same purpose and authority as the north Atlantic council when it comes to nuclear policy issues. For the purpose of discussion and topics in the present committee we will be focusing on simulating the North Atlantic Council and its political decision making.

MILITARY REPRESENTATIVES:

Under the Military representatives the military committee is composed by member's chiefs of defence. The international Military staff serves as an executive body, and finally the integrated military command structure (Allied Command Operations and Allied Command Transformation) is led by Supreme Allied Commander Europe and Supreme Allied Commander, Transformation.

NATO enlargement.

As dictated by Art. 10 of the North Atlantic Treaty "The Parties may, by unanimous agreement, invite any other European State in a position to further the principles of this Treaty and to contribute to the security of the North Atlantic area to accede to this Treaty." ⁷

The joining member in question must fulfil requirements such as: the joining member state must be European, must be democratic, must contribute to security of euroatlantic area.

Applicants are then assigned a membership action plan which "helps aspiring members prepare for membership and meet key requirements by providing practical advice and targeted assistance."

These MAP's cover a variety of requirements in the scope of Political economic issues, Defence and military issues, Resource issues, and Security issues and legal issues.

⁷ North Atlantic Treaty 1949. (1949, April 04). NATO
https://www.nato.int/cps/en/natolive/official_texts_17120.htm

Finally, after accomplishing the previous steps the existing NATO members shall then ratify the accessions procedures which may vary in time depending on the ratification processes of each member country.⁸

NATO FINANCING

NATO is funded by Direct and Indirect funding. Indirect funding which constitutes national funding/contributions is the largest amount of funding running NATO. These indirect funds are voluntary (unless it is an obligation from an article 5 collective defence operation). This includes but is not limited to the contribution of a few soldiers, to troops, vehicles, naval vessels, aircrafts, and any other miscellaneous equipment such as medical equipment. In 2006 NATO defence ministers announced the 2% defence investment guideline in which defence ministers “commit a minimum of two per cent of their Gross Domestic Product (GDP) to spending on defence”. Currently US defence expenditure exceeds $\frac{2}{3}$ of what NATO spends in total.

Direct funding on the other hand consists of common funding and joint funding, trust funds, contributions, ad hoc sharing arrangements and donations. Common funding exists after an expenditure need is identified and discussed by the resource policy and planning board. This funding involves NATO civil and military budgets and the NATO Security Investment Programme. Joint funding is dictated by the terms of an agreed NATO charter, and is arranged for multinational funding. Joint funding programmes are then varying based on cost share arrangements, number of members participating, and management structures.⁹

⁸ *Enlargement*. (2020, May 5). NATO.
https://www.nato.int/cps/en/natolive/topics_49212.htm

⁹ *Funding*. (2020, May 5). NATO.
[https://www.nato.int/cps/en/natohq/topics_67655.htm#:~:text=Common%2Dfunding%20arrangements%20principally%20include,Security%20Investment%20Programme%20\(NSIP\).&text=Member%20countries%20contribute%20to%20NATO,based%20on%20Gross%20National%20Income.](https://www.nato.int/cps/en/natohq/topics_67655.htm#:~:text=Common%2Dfunding%20arrangements%20principally%20include,Security%20Investment%20Programme%20(NSIP).&text=Member%20countries%20contribute%20to%20NATO,based%20on%20Gross%20National%20Income.)

Space defence: From science fiction to science fact

Introduction

Space warfare has been depicted in a myriad of science fiction stories; from Star Wars, Starship Troopers, The Expanse to as far back as the 2nd Century AD in 'A true story'¹⁰. As of the 2nd of December 2019, NATO established space as its fifth operational domain alongside land, sea, air, and cyberspace¹¹. Though one might argue that the moment space warfare left the realm of science fiction was on October 4th, 1957¹², when the first artificial satellite reached orbit, NATO's designation marks the point where space no longer plays a supporting role in defence. From providing GPS services, communications, weather prediction, missile launch detection and so much more, space is essential for both military and civilian operations. Losing these essential services would undoubtedly throw our modern lives into disarray. But being such a new operational domain there are many challenges NATO must overcome to ensure peace and security in the final frontier.

This study guide will aim to orient you towards tackling the most important near future issues that NATO is facing in ensuring the long-term security and stability of space. We will begin by establishing what the current space arena looks like, from its current civilian and military uses, existing space treaties and finally what are the current and upcoming military space capabilities of both NATO and its adversaries. Once you are fully up to speed with the present state of space we are ready to tackle the future challenges of space including the

¹⁰ Georgiadou, A. (1998). *Lucian's Science Fiction Novel, True Histories: Interpretation and Commentary*. Leiden: Brill.

¹¹ Nato. (2019, November 20). Foreign Ministers take decisions to adapt NATO, recognize space as an operational domain. Retrieved August 20, 2020, from https://www.nato.int/cps/en/natohq/news_171028.htm

¹² Administrator, N. (2015, November 05). Sputnik 1. Retrieved August 21, 2020, from https://www.nasa.gov/multimedia/imagegallery/image_feature_924.html

integration and protection of NATO members' space assets and ensuring the growth of trust between NATO members and between NATO and its adversaries. This is essential in ensuring misunderstandings or mistrust do not lead to an unintentional arms race or worse yet a first strike. Finally, we will end with a summary of our discussion along with a set of important guiding questions to help you direct the debate.

It is important to focus on near term issues of space, that being issues relating to space capabilities within Earth's orbit and not beyond as most if not all commercial and military value is currently concentrated here. Secondly it is important not to put too much consideration into speculative or far future space technologies and to focus on technology currently used. Lastly do not get caught up in technical or tactical discussions on space weapons and technology, focus on their political implications and what they mean to security and diplomacy.

The current space arena

The last decades have seen unprecedented growth and shifts in space technology and the global balance of power. Consequentially NATO has continued to adapt their defence and deterrence strategies in the space arena in order to consistently demonstrate commitment to global security and preserve the core values of NATO. The following points shall focus on the history of space technology, current space treaty/policies, its continuous and new uses in the area of military and commercial use as well as its importance in the current global arena.

The importance of space:

Brief History of Space technological developments:

Our history in Space started on Oct. 4, 1957 with the first artificial Earth Satellite launched into space by the USSR. Since then, there have been numerous space technological breakthroughs. July 20th, 1969 the first human walks on the moon, and in 1998 the international space station is launched. This was followed by an era of planetary soft landings and the transmission of information on other planets such as imagery and physical mineral samples, and a creation of several active space programs which continue the development of space technologies today. Although such milestones in space technology seem to only be

focused on space exploration, it has recently become more and more evident that space technologies like GPS and satellite tracking is becoming a key part of our everyday lives on Earth.¹³

Covering the commercial uses of space:

Prior to 2004 most if not all the space missions and technological projects conducted were government funded. In 1982 after the US space transportation system was declared operational, the private business sector saw potential in paying for their own satellite launches. Europe also focused on commercial launch contracts through companies such as Arianespace. However, after the 1986 challenger incident which destroyed the challenger and killed its crew, it seemed that any privately funded commercial payloads would be unlikely anytime soon. Space technology has developed and steered more towards space exploration rather than just satellite launches. Consequently, this has piqued the interest of nongovernmental companies and has paved the way for a new era of commercial space technologies around the world. As defined in the USA's national space policy of 2010

“commercial,” for the purposes of this policy, refers to space goods, services, or activities provided by private sector enterprises that bear a reasonable portion of the investment risk and responsibility for the activity, operate in accordance with typical market-based incentives for controlling cost and optimizing return on investment, and have the legal capacity to offer these goods or services to existing or potential nongovernmental customers.”¹⁴

Since the 90's, joint ventures between the US, USSR and China have been created for space launch technologies. Currently Asian countries such as China, India and Japan have marketed their own indigenous launchers. Additionally, with the new development of technologies for launching large communication satellites with potential for geosynchronous orbit, China,

¹³ Logsdon, J. M. (2020, January 6). *Space exploration*. Encyclopedia Britannica. <https://www.britannica.com/science/space-exploration/Major-milestones>

¹⁴ *National Space Policy of the United States of America*. (2010, June 28). National Space Policy. https://obamawhitehouse.archives.gov/sites/default/files/national_space_policy_6-28-10.pdf

Russia, and Europe are now competing for the opportunity to proceed with such launches.¹⁵ Private companies like SpaceX, Virgin Galactic, Blue origin among many others are now defining a new era of space technology and exploration as well as collaborating with NASA or other government entities to advance the potential commercial uses in space at an unprecedented efficiency and speed.¹⁶ Some commercial uses in space include: Resource management, Communication Satellite launches, Transportation technology, Earth Imagery and GPS systems and In-Space Manufacturing Systems and Services.¹⁷

Covering the military use of space:

The military in several countries has long had an interest in space technologies and exploration before any commercial interest. From pin-point navigation and targeting to real time surveillance, space assets provide militaries the ability to see their enemy and hit them with unrivalled precision without risking a single life. The first gulf war was described as the 'first space war', demonstrating the essential nature of space assets giving coalition forces unprecedented situational awareness and the ability to coordinate troops like never before. Where cruise missiles could be launched from over a thousand miles and guided by satellite imagery, hitting targets with incredible accuracy. Despite high motivation and resources to develop space technology for the military, there is a fine line of what may be possible according to international law and existing space treaties which limit the militarization of space by for example placing weapons in space.¹⁸ This view of the non-militarization of space to maintain peace comes from the space race between the US and the USSR during the cold war as space in that period was increasingly becoming a potential warfighting domain.

¹⁵ *In-Space Manufacturing*. (2019, May 22). NASA. <https://www.nasa.gov/oem/inspacemanufacturing/>

¹⁶ Logsdon, J. M. (2020b, June 1). *Space exploration - Commercial space transportation*. Encyclopedia Britannica. <https://www.britannica.com/science/space-exploration/Commercial-space-transportation>

¹⁷ Space Policy Online. (n.d.). *Commercial Space Activities*. Retrieved August 13, 2020, from <https://spacepolicyonline.com/topics/commercial-space-activities/>

¹⁸ Schumann, A. (2020, April 2). *Space Wars: Do we really need to be militarizing space?* Center for Arms Control and Non-Proliferation. <https://armscontrolcenter.org/space-wars-do-we-really-need-to-be-militarizing-space/>

However, despite existing legislation and space policy against militarization of space there have been continuous advancements in space technology for military purposes like: Satellite imagery, Early warning systems, Communication Satellites, Missile defence tracking satellites and Anti-Ballistic Missile Space Systems.¹⁹

Current space treaties:

Ever since the launch of the Sputnik and the newfound capability to bring humans to other celestial bodies, the rapid development of space technologies and exploration made clear that there should be a legal framework to prevent the appropriation or use of space for non-peaceful purposes. This framework would later become a reality as nations all over the world successfully ratified the Outer Space Treaty on October 10th, 1967.²⁰ The Outer Space treaty included 12 main principles which would be treated as obligations in international space law:

- the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind;
- outer space shall be free for exploration and use by all States;
- outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means;
- States shall not place nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies or station them in outer space in any other manner;
- the Moon and other celestial bodies shall be used exclusively for peaceful purposes;
- astronauts shall be regarded as the envoys of mankind;

¹⁹ Space. (2020, August 11). *Military Space - Spacecraft, Weapons and Tech*. Space.Com. <https://www.space.com/topics/military-space#:~:text=Today's%20armed%20forces%20rely%20on,X%2D37B%20robotic%20space%20planes>.

²⁰ The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies, of 27 January 1967 <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html>

- States shall be responsible for national space activities whether carried out by governmental or non-governmental entities;
- States shall be liable for damage caused by their space objects; and
- States shall avoid harmful contamination of space and celestial bodies.

Despite reflecting on numerous issues of space it has elements of which can be considered too vague or even obsolete. Since then there have been a few miscellaneous treaties such as 1975 Registration convention²¹, or the 1979 agreement governing activities of states on the moon and other celestial bodies.²² Many of these miscellaneous treaties and even the original outer space treaty is based on maritime legal principles such as treating space resource mining as a benefit for the international community.²³ However there has been NO new full space treaty created to reflect the modern developments of space technology as well as its potential problems. There is also customary law and international principles for example resolutions passed by the general assembly, however just as the outer space treaty, some have not been ratified by its signing states. Therefore, the existence of the outer space treaty, and international law for space has created a framework that is in need of adaptation to current technologies as well as national policies but remains for the most part respected.

NATO has made public that it aims for its activities to be in alignment with International Law, the outer space treaty and existing space principles. In its statement made on their 2019 space policy they also demonstrate the intention to create a common information sharing forum for its allies to increase interoperability.²⁴

²¹ Convention on Registration of Objects Launched into Outer Space of 15 September 1976. <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introregistration-convention.html>

²² The Moon Agreement of July 1979. <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/intromoon-agreement.html>

²³ Mallick, S., & Rajagopalan, R. P. (2019, January). *An Examination of the potential of Space mining and its legal implications*. ORF. <https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/>

²⁴ *NATO's approach to space*. (2020, April 27). NATO. https://www.nato.int/cps/en/natohq/topics_175419.htm?

Current and up and coming space defence capabilities

Here we will briefly cover four components of NATO and NATO adversaries' space warfare capabilities which include their ability to threaten space assets, to protect them and to launch them into space as well as future capabilities on the horizon.

Offensive:

There are several offensive capabilities that threaten space assets. One of the current methods of destroying or disabling space-based assets include kinetic means like anti-satellite missiles aimed at colliding with satellites²⁵. These are typically launched from the ground or in some cases by high flying aircraft. Anti-satellite missiles are currently operated by the United-States, Russia, China, and India. Another offensive method involves electronic warfare where satellites or equipment receiving data from satellites are fired at with electro-magnetic signals to confuse or disable them. Electronic warfare is employed by most modern militaries in all domains of warfare, not just space. Finally, satellites can also be attacked through cyber warfare by means of hacking computer systems²⁶.



Figure 2: F-15 launching an Anti-Satellite (ASAT) Missile

²⁵ Paulauskas, D. (2020, March 13). Space: NATO's latest frontier. Retrieved August 20, 2020, from <https://www.nato.int/docu/review/articles/2020/03/13/space-natos-latest-frontier/index.html>

²⁶ Defence Intelligence Agency. (2019). Challenges to security in space

Defensive:

The next important topic is understanding what means of defending space assets do NATO have? There are a wide range of counter measures that NATO employs to defend against cyber and electronic warfare attacks. Electronic warfare counter measures typically involve advanced sensors, computers, and emitters to 'ignore' or 'overpower' jamming signals though the details of these systems are not within the scope of this study guide.

The details of cyber defence are also out of the scope of this study guide, but NATO has already defined cyberspace as its fourth operational domain and has established a Cyberspace Operations Centre in 2018²⁷. NATO has also established a Centre of Excellence (COE) to train personnel in cyber security called the 'Cooperative Cyber defence COE' ensuring personnel working for NATO and its members are well trained in countering cyber-attacks²⁸. Currently there is no centre of excellence or combined headquarters for NATO space operations.

Defence against anti-satellite missiles is currently extremely difficult. The only current way to counter anti-satellite missiles is to intercept the missile or launch system from the ground or to give the satellite the ability to manoeuvre and attempt to dodge the missile. Some satellites have limited manoeuvring capability, able to change its orbit with small thrusters but it is questionable if this is sufficient.

Launch capabilities:

There are two major obstacles limiting NATO's ability to launch space assets, those being cost and gravity. There are currently twelve countries capable of launching objects into space, these include three NATO countries being the United States, France, and the United Kingdom. As a result of the extremely high cost of launching space assets this has, limited the number of satellites NATO members can send to space and has made it difficult to replace

²⁷ Nato. (2020, July 21). Cyber defence. Retrieved August 21, 2020, from https://www.nato.int/cps/en/natohq/topics_78170.htm

²⁸ Nato. (2018, April 20). Centres of Excellence. Retrieved August 20, 2020, from https://www.nato.int/cps/en/natohq/topics_68372.htm

space assets that may be damaged or outdated. This also meant putting more eggs into fewer baskets putting the entire of NATO's space infrastructure in a more vulnerable position.

This has started to change thanks to rapidly falling launch costs partly due to the rise of several private rocket operators causing increased competition including Rocket Labs, Space X and Blue Origin. Legacy aerospace contractors have also stepped in to compete including Boeing, Lockheed Martin, Northrop Grumman, and several others. In the commercial sector which was once dominated by large expensive satellites is now making use of swarms of miniature satellites often called CubeSat, thanks to the rapid fall in launch costs and hence the ability to launch a high number of rockets. Militaries across the world are showing a great deal of interest in utilizing swarms of miniature satellites in low earth orbit as opposed to a small number of large satellites which are arguably more vulnerable. The commercialization of space is now providing a huge number of opportunities to greatly expand NATO's launch capabilities.



Figure 3: A SpaceX Falcon 9 Rocket carrying 60 StarLink satellites in a single launch

Future capabilities:

There are several systems relevant to space operations on the horizon. One of the most important of these future developments is the introduction of new rocket designs aimed to further drop launch costs. Whether it be Rocket Labs micro rockets launching small satellites anywhere at any time for minimal costs or Space X's starship aimed at being the biggest rocket in history, cutting costs through reusability and sheer economies of scale. Rapidly reusable rockets will revolutionize the way we access space and will undoubtedly help NATO increase its access to space and its operational flexibility.

Other on the horizon systems include offensive satellite systems equipped with directed energy weapons (lasers, microwave weapons etc.) or dedicated jamming satellites however no NATO member has employed offensive satellite or show any intention in doing so. This puts these systems out of the scope of this debate with one exception. Both the United States and the United Kingdom have accused Russia of placing and testing an anti-satellite weapon in space on July 15th²⁹. It is unclear how this weapon works but it is speculated that it is a satellite designed to manoeuvre near enemy space assets and launch kinetic objects to destroy them. This puts interesting questions on the table for NATO regarding how they should respond.

The challenges facing NATO in space security:

There are a number of important issues facing NATO in maintaining peace and stability in space. First and foremost is ensuring the safety of NATO members' space assets and their ability to access space, interoperability between NATO's members in space and finally building trust and understanding between NATO and other space fairing countries.

²⁹ Burns | AP, R. (2020, July 23). US accuses Russia of testing anti-satellite weapon in space. Retrieved August 20, 2020, from https://www.washingtonpost.com/world/national-security/us-accuses-russia-of-testing-anti-satellite-weapon-in-space/2020/07/23/85cfd89a-cd19-11ea-99b0-8426e26d203b_story.html

Protection of its space assets from adversaries:

Considering the vulnerability of NATO space assets and the inability to easily counter weapons such as anti-satellite missiles, the best way to protect NATO space assets from an attack is to prevent an attack from happening at all. This is one of the major conundrums facing NATO in space security. A serious worry from many NATO planners is the possibility of a first strike on key space infrastructure. This could disable NATO's ability to communicate, coordinate military operations and worse yet to detect the launch of a nuclear ballistic missile. Losing these capabilities would leave NATO members vulnerable to attack and unable to mount an effective response. To prevent the possibility of a first strike NATO must develop an effective deterrence policy.

There are two methods of deterrence which include deterrence by denial and deterrence by punishment. Another key component to deterrence is maintaining the credibility of deterrence³⁰.

Deterrence by denial aims to deny the enemy the benefits of a first strike or denying their ability to launch one at all. For example, one of the major reasons for the creation of ARPANET, being the cold war predecessor of the internet, was to ensure the US military could continue to communicate and coordinate its operations even when a large part of their communication network was destroyed by a nuclear first strike³¹. This system ensured that a first strike would not put the military's ability to respond to a nuclear first strike in jeopardy essentially denying one of the major benefits of a first strike.

In the context of space defence this could take on the form of increasing the use of swarms of CubeSats making it difficult to disable the entire network thanks to many redundant systems. The question is what ways can NATO facilitate this if they choose to do so?

³⁰ Paulauskas, D. (2020, March 13). Space: NATO's latest frontier. Retrieved August 20, 2020, from <https://www.nato.int/docu/review/articles/2020/03/13/space-natos-latest-frontier/index.html>

³¹ Featherly, K. (2016, November 28). ARPANET. Retrieved August 21, 2020, from <https://www.britannica.com/topic/ARPANET>

Deterrence by punishment means maintaining the ability to respond to a first strike in a proportional manner. In its most basic form, if country x destroys one satellite country y will respond by destroying one satellite. The most well-known example of this in play is the doctrine of mutually assured destruction where both the United States and the USSR maintained a large nuclear capability to ensure they were capable of responding proportionally to a nuclear first strike.

A similar scenario could potentially play out in space with the use of anti-satellite missiles. As China and Russia expand their anti-satellite missile arsenals it may become necessary for NATO members to respond by doing the same. To deter a potential first strike with anti-satellite missiles NATO may need to be prepared to respond in a proportional manner with its own arsenal. However, this could lead to an arms race which may have dire consequences. In the past there have been many notable close calls where the US and USSR were both close to launching nuclear attacks due to misunderstandings or breakdowns of relations. Similar misunderstandings may occur in space leading to a full anti-satellite missile exchange which could potentially create huge fields of space debris making space access much more difficult for the entire international community. An extreme case of this is known as Kessler syndrome where a chain reaction of collisions causes an ever-increasing cloud of space debris in orbit of Earth.

The important question to consider is, what is NATO's approach to this form of deterrence? Is NATO willing to make greater use of anti-satellite missiles? Is employing mutually assured destruction as a means to defend its space assets despite the risks politically viable? Another very important question is whether article 5 of the Washington treaty should explicitly extend to space assets?

The credibility of deterrence is an important factor to NATO's approach to deterrence. The purpose of deterrence is to maintain the ability to defend yourself to avoid a conflict all together. But it is equally important that you clearly show your capabilities to your adversary. If your adversary is unaware or does not believe in your capabilities, they may launch a first strike meaning your deterrence has failed regardless of how effective your defensive capabilities are.

One of the most common methods of displaying a military's capability is through highly visible military exercises. A recent example of this are the trident juncture 18 exercises which displayed NATO's ability to operate and defend the arctic region. In the past NATO has also released documents containing their Alliance Maritime Strategy and Joint Air Power Strategy which is in of itself a show of their determination to modernize, which can be seen as a kind of deterrence. At this moment NATO has no clear Space policy strategy or has chosen not to publish it. This example shows that credibility of one's defence does not just involve a show of physical force but showing a tangible commitment to work on an issue.



Figure 4: NATO soldiers participating in Trident Juncture 18

To conclude, NATO's approach to deterrence in space will likely involve some combination of deterrence by denial and deterrence by punishment, the question is how can NATO properly implement these deterrent measures and how far is it willing to go? Also, how can NATO properly display its defensive capabilities while also balancing this with the need to grow trust in space? Even though NATO aims to defend its members against certain adversaries mutual understanding and cooperation with these adversaries is still key to stability and peace in space.

Unifying and integrating NATO space assets:

In terms of space assets, currently NATO does not own any satellites, but instead has a few satellite communication anchor stations and terminals. In order to use satellites or access information of its member's space assets it needs to request access granted by the individual member states.³² Despite not directly owning many space assets, they have become a vital component of their data provision and have been relied on in most if not all modern military operations.

Due to this, there is an emerging need for NATO to unify its space assets or create a reliable system that lets them access information from its members' space assets in a faster and more efficient way. Additionally, cyber vulnerabilities have granted NATO's existing space assets with possible risks to the performance of their operations. As stated in their most recent space policy, NATO plans to respect international law and the outer space treaty by not placing any weapons in space. Additionally, NATO has allocated over one billion euros to invest in satellite communication services to facilitate the fast and flexible communication of NATO operations (ships, aircrafts, troops).

Trust in space:

Recently, deteriorating relations between nations has been increasing distrust in space. Specifically, within NATO, one of its goals is to create transparency and communication between its members with regards to information collected.

Treaties such as the Open skies treaty of Jan 1st, 2002 with 35 party states were made to facilitate short notice/unarmed reconnaissance flights over the member's countries to collect information on military activities. Information could be collected using satellites however since not all members have access to such technology the use of reconnaissance

³² Unal, B. (2019, July). *Cybersecurity of NATO's Space-based Strategic Assets*. Chatham House. <https://www.chathamhouse.org/publication/cybersecurity-nato-s-space-based-strategic-assets/2019-06-27-Space-Cybersecurity-2.pdf>

flights created more trust and transparency between the members.³³ This treaty was made to create trust between members and familiarity to deter potential warfare/conflict. However, on May 21st, 2020 the United States announced it would withdraw from the treaty creating much speculation, discord, and uncertainty of what this will mean for international security and the incitement of unnecessary warfare.

Other situations such as China and Russia's movements into the Arctic circle and their recent development of hybrid warfare technology utilizing space satellite communications has damaged the trust between nations with regards to the possible military use of space technology.³⁴ It is vital now more than ever to find a way to not only repair trust between nations using their space assets but also a way to maintain this trust and transparency regarding space to prevent future conflict.

Conclusion

It is difficult to fully emphasize the importance of space assets to not just NATO operations but for a huge portion of commercial operations. As put by Brigadier General Massimo Panizzi:

"Free access to global commons – cyber, space, land, maritime – is fundamental to NATO's ability to operate. It is inconceivable that we could operate effectively should our forces be denied the use of even one of these four domains. We must continue to work to assure the freedom of these global domains.21" -(Panizzi, 2011)

Throughout this study guide we have outlined the wide range of military and civilian applications of space as well as the consequences of losing these assets. We have explored the current space arena, looking at the various international treaties placed on the use of space as well as the space warfare capabilities of NATO and its adversaries. Finally, we explored the major issues facing NATO including the formation of a deterrence strategy,

³³ *The Open Skies Treaty at a Glance | Arms Control Association.* (2020, May). ACA. <https://www.armscontrol.org/factsheets/openskies>

³⁴ Robsinson, J. (2017, September 18). *The Space Review: Deterring Chinese and Russian space hybrid warfare by economic and financial means.* The Space Review. <https://www.thespacereview.com/article/3331/1>

unifying NATO space assets and last but not least, ensuring the growth of trust and transparency in space.

With this information we hope you will be able to formulate a NATO communique with your fellow delegates stating the overarching goals strategic and political goals of NATO in its pursuit to ensure peace and security in space.

We leave you with these guiding questions that you may use to help focus the debate:

1. What form will NATO's deterrence strategy take and what will it do regarding the following issues:
 - a. How will NATO deny the benefits of a first strike from its adversaries?
 - b. How will NATO maintain the ability to launch a proportional response to a first strike?
 - c. How will NATO maintain the credibility of its deterrence while avoiding an increase in tensions?
2. Should article five explicitly apply to space assets?
3. How will NATO increase the interoperability between its members space assets and operations?
4. Should NATO develop closer relations with the expanding commercial space industry? If so, how could it leverage this relationship?
5. Should NATO develop closer relations with organizations like NASA and ESA?
6. How will NATO increase trust and transparency between its members and its adversaries?

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