

# New Means of Warfare against Orbital Targets, a thin line between Compliance and Violation of the International Conflict Law

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International Conflict Law**

*By Brieuc Perrin*

In the context of the new attention given by the states to the three strategic "oceans", the air and space domain embodies duality. On the air side, the rule of law is already quite clear. The real issue revolves around the space side of the subject. Given the growing need for space facilities to ensure a coherent military strategy, force projection, surveillance, intelligence, etc. It is necessary to address the legality of conducting an attack in orbital space against such installations.

## Introduction

Space is no longer the unreachable final frontier for humankind. The 20th century showed that men mastered science enough to be able to reach this new geographical area. The 20th century saw the moon as the main battleground for the future. States made sure no one could claim it as it owns with the Outer space treaty of 1967, formally referenced as the "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies".

The 21st century began with the United States, Russia, China and India demonstrating their ability to use means of warfare to target orbital facilities (artificial satellites). However, the question arises as to whether using such means in space is subject to the international law of conflict as in conventional warfare?

## Short Typology of the Means of Warfare in Space

To develop this subject, it is preferable to know how the doctrine categorises the means of warfare. It is widely accepted that such means fall into two types, the "soft kill weapons" (SKW) and the "hard kill weapons" (HKW) (Kartik Bommakanti). For each category, we will explain the law requirement when used throughout an example.

Firstly, we must look at their characteristics to define soft kill weapons. These weapons are characterised by discretion in when used (Stephens, Dale and Steer, Cassandra), and by their objective, they are not made to destroy the satellite's structural integrity but rather to disable them (Bill Boothby). Soft kill weapon includes cyber-attacks, electronic jamming, and dazzling lasers (Ivan Beyek).

However, hard kill weapons are quite the opposite. They are high-velocity missiles called Ascent Anti-Satellite (ASAT) that use kinetic energy on impact (Anil K. Maini et Varsha Agrawal) to damage or destroy the structural integrity of an artificial satellite.

To analyse the legality of such means of warfare, we will develop a legal analysis of two examples. For SKW, a practical example will be the laser dazzling and for the HWK, it will be the ASAT.

## Snapshot of applicable law

This section will paint the main legal framework used to assess the legality of such means. Hence, it is necessary to begin by the postulate that United Nations norms on the jus in bello and ad bellum apply to space warfare (by Pascal Imhof has already made the demonstration). Furthermore, it will be considered that international conflict law is part of jus cogens (Article 53 of the 1969 Vienna Convention on the Law of Treaties). This argument is backed up by the « Avis consultatif sur la licéité de la menace ou de l'emploi d'armes nucléaires » of the 8th of July 1996, which states that the geographical space in which international conflict law takes place is not relevant to its application.

In addition, we are forced to narrow the applicable international conflict law. It is highly improbable that non-international conflict will occur in orbital space. Hence, only international conflict can take place (for the moment) in space and fall under Geneva Conventions and the first additional protocol (API).

An attack in space could raise multiple problems. On the one hand, the target of such an attack could be a civilian or a military satellite. One is a lawful target under the principle of distinction, as stated by article 51 (4) API :

"[...]

4. Indiscriminate attacks are prohibited. Indiscriminate attacks are:

- (a) those which are not directed at a specific military objective;
- (b) those which employ a method or means of combat which cannot be directed at a specific military objective; or
- (c) those which employ a method or means of combat the effects of which cannot be limited as required by this Protocol; consequently, in each such case, are of a nature to strike military objectives and civilians or civilian objects without distinction. [...]"

The other could be lawful if turned into a military objective, as stated under article 52(2) API;

"in so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage."

However, satellites are well known to be dual-use objects. These objects could be used for civilian purposes (telecommunication, mapping, GPS ...) or commandeered by military forces to serve other purposes (Pelton, Joseph N). They then fall under the academic debate on the targeting of a dual-use object and its inherent relation to the principle of proportionality of the attack under article 51 (5) API;

“[...]”

5. Among others, the following types of attacks are to be considered as indiscriminate:

(a) an attack by bombardment by any methods or means which treats as a single military objective a number of clearly separated and distinct military objectives located in a city, town, village or other area containing a similar concentration of civilians or civilian objects; and

(b) an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.

[...]”

Following the International Red Cross Committee’s interpretation of the matter in its “International expert meeting report: The principle of proportionality”, two schools of thought are debating the subject on one side;

“if a fairly minor military use has turned a civilian object into a military objective (assuming that it fulfils the definition of Article 52 AP I), the damage caused to the remaining civilian part – however important it is – would have no bearing on the decision to launch an attack.”

On the other side:

“While the dual use object is a military objective, the impact of the attack on the civilian part or component of the object (such as apartments in a building whose basement is used as a munitions depot) or on the simultaneous civilian use or function of the object (such as in the case of a bridge or electricity station used for both military and civilian purposes) must also be taken into consideration in the assessment of proportionality.”

This paper does not intend to answer this debate, but both sides need to be shown on the proportionality of attack on dual-use objects.

The last principle of a lawful attack is the precaution, defined in article 57 API:

“1. In the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects.

2. With respect to attacks, the following precautions shall be taken: [...]”

### **Soft Kill Weapons / Hard Kill Weapons, legal analysis of the international law of armed conflict.**

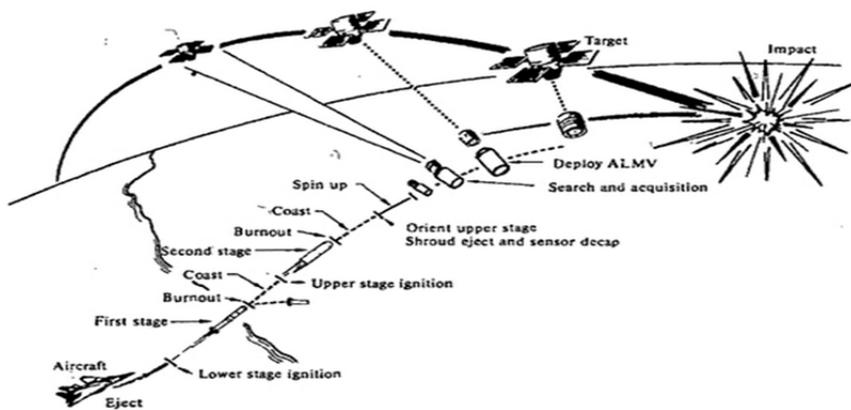
With this knowledge, we can now provide an overview of the thin line between legality and illegality in the use of warfare in space.

As a soft kill weapon, we chose the dazzling laser. This means of warfare drastically limits the impact and blast radius of the weapon. The laser makes it possible to carry out a precise and localised attack, impacting only one or several sensors (Jean Durand), without being able to destroy the satellite directly. This method avoids lengthy calculations to ensure that only the target is hit, thus avoiding collateral damage.

However, the precautionary analysis must also be understood in terms of the function assigned to this military satellite. The most obvious example is the Global Positioning System (GPS), primarily owned by the US military and requires 31 satellites for functional coverage (Dale Stephens et Cassandra Steer).

These satellites are a legal target, but the principle of proportionality raises another issue. Their destruction or disablement could have the indirect consequence of greatly damaging the civilian economy. Their destruction would also potentially cause great suffering to civilian populations (OBRADOVIC Konstantin), as marine and air navigation systems largely depend on the GPS to travel and avoid storms. This would break the primary legality of the attack in terms of the collateral damage caused.

**Figure 1**  
**ASAT System Mission Profile**



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Figure 1 US government declassified illustration of an ASM-135 ASAT being launched at a target from an F-15

Conducting the same analyses on ASAT systems. Thus, ASAT places a physical payload without explosives in the target object's orbital path. In the proportionality analysis of this means, however, it should be remembered that there is a myriad of satellites in orbit, so the orbital path of these satellites must be predicted to avoid any impact with another satellite, creating collateral damage. That would violate the principles of proportionality and distinction of a legal attack.

Regarding compliance with the precautionary principle, the physical difference in the spatial environment should be noted. In the case of a kinetic attack, the fragmentation arising from the impact must also be considered. It is estimated that a thousand pieces of debris are formed in the wake of the impact, drifting into different orbits at a velocity of approximately 27,000 kilometres per hour. This provides them with a high destructive capacity and can lead to the indiscriminate destruction of any space object in their wake, multiplying their number with each impact, as Kessler's theory suggests (Donald J Kessler & Burton G Cour-Palais).

This theory is based on the principle of a chain reaction that begins with an impact between two orbiting objects, creating a cloud of debris which increases exponentially in size on encountering other objects.

## Conclusion

We have demonstrated the illegality of using ASAT under the principles of the international law of armed conflict, because they are likely to violate the principles of precaution, proportionality, and distinction concerning the physical consequences (debris) they produce.

However, the dazzling laser does not seem to suffer from the same ills as the distinction and the debate surrounding the notion of dual use.

Nevertheless, according to some specialised newspapers, the Russian "Kalina" project could see the light of day (Laurent Lagneau). This would result in using a laser to destroy rather than damage the satellite. This brings us back to the same considerations that apply to using ASATs.

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