
PART II: SATELLITE HARM ANALYSIS

Chapter 5: Modes of Harm

It is much too simplistic to divide satellites into “bad” and “good,” or “harmful” and “harmless.” If one reflects on the wide range of possible space operations enumerated in Part I, it becomes apparent that one satellite can harm another, at least potentially, in a large number of ways. In this chapter we shall examine these modes of harm in some detail.

A modern spacecraft is a triumph of engineering. Within its compact structure are arranged a number of sophisticated subsystems, each operating in complex and reliable collaboration with the others, to execute the spacecraft mission — usually over a period of several years. These subsystems are many in number and diverse in character, and have implications for the potential harm that one satellite can do to another.

5.1 Classes of Harm Modes

The number of possible spacecraft designs, the current variety of mission requirements, and the range of orbital altitudes and inclinations all make the assignment of a harmfulness rating — or, as we shall call it, a “harm index” — very difficult indeed for any specific spacecraft. Only with the aid of a carefully crafted methodology⁵ can such an analysis be carried out. This chapter represents the first step in this methodology: defining *harm modes*.

A spacecraft must cause harm in a specific manner, using specific means. Some satellites may have only a few such harm modes, while others may have many harm modes, falling into five general *classes*:

Kinetic Energy	K
Directed Energy	D
Nuclear	N
Electronic/Optical Interference	I
Sabotage	S

Not surprisingly, harm modes belonging to a single class have key features in common, most notably, the manner in which the “target satellite” (or *target*, for brevity) is damaged. See Table 6.