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Start Line

Targeting an Adversary's Space Capabilities Begins with the Terrestrial Segment

By LTC Dean Taylor and CW4 Daniel Rupp

Negating our enemy's ability to take advantage of Space-based capabilities is a basic objective in our Space control doctrine. The need to maintain the friendly use of Space while denying its use to our opponents will clearly be critical to Army Objective Force successes on the future battlefield. Understanding how and why our adversary uses Space is an important aspect of the Space portion of our intelligence preparation of the battlespace (IPB) doctrine. Using that IPB to determine how to most effectively take that capability away from our enemy is the desired end-state. The satellite, the on-orbit segment of the Space system, seems to get most of the attention when we consider an adversary's use of a Space-based capability. But it is the terrestrial segments of the Space system that control and task the satellite and deliver the product or service to the user that are, for virtually every Space-based capability in use today, the most vulnerable parts of that Space system. Accordingly, the ground-based part of an adversary's Space system deserves the most detailed scrutiny in the IPB and targeting processes.

Adversary's access to and use of Space capabilities

Space-based capabilities allow a threat actor to instantly overcome numerous and significant military disadvantages. Even a third-world adversary can inexpensively leap forward technologically and field a more lethal and agile military force by making use of available commercial Space capabilities. These services allow our opponents to close the gaps in our technology lead without having to establish huge developmental programs that take years and require considerable monetary resources. An excellent example is the worldwide availability of commercial satellite imagery. Countries are obtaining photographic intelligence that as recently as three years ago, was the exclusive preserve of the Central Intelligence Agency and the Pentagon. The resolution quality of commercial imagery is good enough to monitor the massing of troops or artillery and to identify the

state of preparedness of military facilities, and it is improving every year. Today a few thousand dollars can access what was once the exclusive domain of the superpowers. For less than a hundred dollars, archived imagery, which is good enough to make military plans, can be purchased and delivered from the Internet. A growing number of countries and commercial consortia are building and operating satellite imagery systems simply because of the demand and profitability.

Commercially available Space-based communications are even more readily available. Mobile satellite telephone services are now available almost worldwide, are very reliable and the technology (for the user) is easy to operate. This service is reliable, inexpensive, and increasingly more secure from "eavesdropping" due to extremely sophisticated encryption technology. Mobile, secure satellite communications (SATCOM) give an adversarial commander immediate command and control capability, without the need for bulky and vulnerable terrestrial communication equipment. Military forces with 1960-era tanks and personnel carriers are carrying global positioning system receivers, satellite phones, and maps that were made from commercial imagery. These technological advances require us to be even better at IPB and associated Space analysis and presage the future need for sophisticated means to find and kill terrestrial Space targets.

An adversary desires to gain intelligence on a U.S. troop buildup in the region. Since he is a thinking adversary, his IPB has helped him determine potential enemy staging and assembly areas in the region. For several years he has consistently imaged these locations to verify his IPB analysis and to build a database to assist in determining changes that would indicate actions or a possible buildup for an attack. He augments his IPB with high-resolution imagery, which helps with detailed target planning. The target folders are then put in the hands of small teams that finalize plans for sabotage attacks against his adversary's most critical nodes

The threat's use of Space

Space-based capabilities are increasingly integral to our adversary's security and operational doctrine. Capabilities such as high-bandwidth communications, satellite-generated intelligence of our dispositions and movements, and precision navigation and weather data can provide invaluable combat advantages to a threat nation. Access to Space and the advantages derived from operating in Space are being affected by technological progress throughout the world. Recent trends in the availability of Space technology and the directions of its development clearly suggest that the military community needs to aggressively identify and pursue the best techniques and procedures to target the adversary's use of Space. The Army Space Support Team is uniquely qualified and properly positioned at the tactical and operational levels to help take away an adversary's use of Space. The place to start the process is in the evaluation of the terrestrial segment.

in the marshalling area. The adversary does not need to get continuous high-resolution imagery to receive early warning or build the target folder. For more of a time sensitive "key read," a quick phone call from his imagery analyst at a downlink site may be all that is needed. While many analysts are fixated on how the enemy decision-maker will receive the actual image, a simple phone call or text report has told him all he needs to know about U.S. troops approaching his border. He also augments his own imagery satellites with open market commercial imagery sales that will fill holes in his planning, targeting and basic situational awareness. Our adversary is using this imagery system to help him trigger when to launch a massive ballistic missile attack on our forward tactical assembly areas in order to disrupt our operations.

Preventing the above scenario requires a thorough understanding of that satellite imagery system that delivered the key piece of information including understanding the imagery satellite's capability (resolution, coverage area, slew angle off nadir, etc.). Our intelligence analysts must be able to conduct nodal analysis to examine the entire tasking, processing, exploitation and dissemination (TPED) of the satellite imagery system. The analyst needs to know when the collection requests are ordered, how the image is sent to the processing facility, the level and expertise of the analysts conducting the exploitation, and the dissemination paths of the actual digital image. Within these links and nodes there are sufficient opportunities to deny or delay the adversary's ability to gain timely intelligence from his imagery. A satellite imagery system clearly includes the satellite, along with command and control, ground control operations,

satellite ground stations, analysis and processing facilities, and telecommunications nodes. The adversary's terrestrial Space assets include: telecommunications centers (radio and television); radio relay facilities; fiber optic networks, nodes, and repeater stations; microwave transmission networks and nodes; SATCOM links; and fixed and mobile national command, control, communications, and intelligence centers. The elements of the satellite ground station component can include the antenna apertures, power generation, operations area, communications links, or digital storage systems. The TPED components of the Space system are critical to understanding how we can target to achieve the desired effects.

IPB to Target Development

Once targeteers have identified the enemy activity they need to disrupt or deny, they can determine the key target systems, components, or elements that should be attacked, degraded, or exploited to produce the desired effects. Effectively targeting an adversary's ability to obtain imagery may very well get "inside his decision-making cycle" as well as reduce his ability to support his forces in the field. Targets can be neutralized by a variety of means, including nonlethal fires generated by the commander's information operations (IO) campaign. Effective non-lethal fires against a Space system node could well become the preferred method of attack, but this requires extremely detailed nodal analysis and Space IPB. Another non-lethal IO capability available to the targeting process is electronic warfare (EW). In our terrestrial Space asset example, an EW attack might be the perfect approach. Jamming overpowers the right SATCOM dish signal, which causes the imagery report to be disrupted and never delivered to the intended user. Simply adding a

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terrestrial Space segment to the commander's target list may be sufficient in many instances to negate certain adversary uses. However, against an enemy's Space capabilities, we are clearly now in an era where collateral damage must be carefully considered in every operation. Reversible effects may be a critical goal.

While many Space system nodes are fixed facilities or sites, many also are mobile and present another dimension to the targeting process. Under the best conditions, the requirement to find and fix the enemy's movers, shooters, and emitters is a challenge. Our enemies know that mobile terrestrial Space system targets present unique challenges to intelligence collection. Our enemy also knows that fixed sites are very vulnerable to many forms of attack. He knows that although he may give up some capability (mobile systems also have unique weaknesses, such as radio frequency power capability), highly mobile nodes remain difficult to find, fix, and destroy. An example of a time sensitive terrestrial Space target would be the mobile long-range cordless phone system or a telecommunications relay van used to disseminate the imagery report to the field

commander. Such targets are important to us now and will continue to be through the Objective Force timeframe. They will, however, change and become more difficult to find, target, and kill. We will see lower signal strengths, more low probability of intercept/low probability of detection signals, more active deception, and more physical and electronic hardening. Since the information these enemy signals carry is of critical importance in land warfare, the Army should be at the leading edge in developing combat capability to attack these small, mobile, and hardened nodes.

How the ARSST Can Help

Army Space Support Teams (ARSSTs) can provide the supported commander with a unique capability to enhance the targeting process. The ARSST is trained to understand all aspects of Space systems. The intelligence officer assigned to the ARSST is specifically trained to perform IPB on the threat's use of Space. The ARSST will contribute to the G-2's overall IPaB effort by trying to determine the enemy's Space system vulnerabilities, especially his most critical link or node in a particular targeting situation. By integrating

itself into the targeting process, the ARSST is properly positioned to nominate the right piece of the threat's Space system for disruption or destruction. For relatively limited ordnance or nonlethal weapon expenditure, the payoff of taking away the adversary's use of Space will likely have a huge effect. This is especially true if the enemy relies on Space for intelligence, surveillance and reconnaissance, and command and control.

The training and positioning of the ARSST makes it an inevitable asset in the effort to deny an adversary's use of Space.

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