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Celestial Lines of Communication: The Space Domain and The Airminded Warfighter

James O'Keefe
Royal Australian Air Force

Introduction

Australia's air power is critically dependent on space-based systems that are increasingly vulnerable; therefore, RAAF aviators must train deliberately to fight through degraded or denied space conditions. Modern air power relies critically on space-based "celestial lines of communication (CLOC)". As these systems become increasingly vulnerable to denial or degradation, the airminded warfighter must develop resilience and adaptability to operate effectively without CLOC. This blog will explore: (1) the enhancements offered by the space domain to the air domain (2) how an adversary will attempt to degrade our satellite-based communications and (3) how the airminded warfighter would cope with without them.

The extended capabilities the space domain offers the air domain

Space-based systems fundamentally extend air power by enabling awareness, connectivity, and precision at scale. At the Air and Space Power Conference 2026, a panel discussion led by Lieutenant General Susan Coyle delved into the various opportunities and the threats posed in the space domain. In the simplest terms, I want to discuss how space allows us to see, talk, strike and build fighting depth. Satellite services offer a myriad of functions from visually identifying troop buildups, bushfire impact assessments, enabling communications between headquarters and airborne assets, and to the positioning, navigation and timing (PNT) used in targeting. GPS forms the backbone of these functions. Current modern communication channels used in the air domain would not be possible without assets and agreements found in the space domain. These are the products of Clausewitz's celestial lines of communication or CLOCs (Klein, 2004). Cooperation between partners on international satellite capabilities expands the reach and persistence for ISR and results in additional time, a core tenet of depth, to react to threats. Collectively, these space-enabled functions allow the RAAF to generate air effects with greater depth, persistence, and tempo.

One of the key takeaways is that Australia builds fighting depth in the air domain by leveraging our partners' far greater space-based capabilities. The RAAF increases its range, persistence and reach through space-based systems, enabling us to see further and for longer. Many commentators present this cooperation between the two domains as modern natural progression; however, the progression occurred as early as WWII. The Nazis' technological development of the V-2 rocket, a weapon designed for terrestrial destruction, led to the technology used in NASA space aircraft landing on the moon. Chronology aside, the added benefits of investment into the space domain is a direct and exceptional advancement in our fighting depth.

The Vulnerability of Our Space Assets

The same space-based capabilities that enhance air power also present lucrative targets for adversaries seeking to reduce Australia's fighting depth. Multiple countries have already successfully tested anti-satellite weaponry despite this being counter to the principles of the Outer Space Treaty and subsequent agreements. This technology exists and will likely improve in terms of range and impact. States or non-state entities, due to the lower costs of space activity, now have the potential to acquire the capability to degrade or destroy satellite systems that Australia relies heavily on. As access to space becomes more affordable, the number of actors capable of interfering with Australia's CLOCs will only increase.

Despite the immense capability space systems offer, one reality often overlooked is the fragility of the infrastructure itself. The systems are built with efficiency to allow for and withstand the impacts of being projected into, and existing in, space. The systems are not generally designed with a focus on physical defence, like a tank would be to send into the battlefield. The fragility opens up another vector for attack by the adversary directly or indirectly regarding space junk. Space junk poses two threats, first the perceptively random cascading series of collisions as objects in low-earth orbit (LEO) crash into each other (Kessler Syndrome), secondly, manoeuvrable objects of ambiguous purpose.

Russia's Kosmos 2581 is an example of such space objects, manoeuvring in undeclared and erratic behaviour, and is suggested to be an anti-satellite device (Jones, 2025). A collision, intended or unintentional, could cause a satellite, without capacity to counter the impact, to begin an uncontrolled catastrophic re-entry to Earth's surface. Such ambiguous and manoeuvrable systems complicate space situational awareness and increase the likelihood of sudden, irreversible loss of critical satellite services.

An adversary can further disrupt satellite transmissions through jamming. This is standard practice in the air domain, and is also available in space. Disruptions caused by jamming or incapacitation prevent the delivery of data, visual and audible communications critical for Australia's defence. With degraded satellite supported communications Australia's fighting depth would reduce significantly.

How can the airminded warfighter adapt to degraded or denied CLOCs?

A recent example from RAAF Tindal illustrates how adaptability under disruption is already part of our character. During the 'Northern Focus' discussion during the Aviator Symposium, the impact that flooding had on 17SQN and 75SQN at RAAF Tindal, separating it from Katherine, was discussed. For an undetermined period, the base was cut-off from delivery of supplies and people from Katherine. This is important as RAAF Tindal uses contractors for a variety of duties, such as dishwashing in the mess. The flooding resulted in Air Force members, including commanding officers, fulfilling these civilian duties. This simple but powerful example shows the adaptability of an airminded warfighter. Base operations must continue.

A thought provoking scenario is extrapolating this, relatively minor, disruption to losing all space based assets. Given the notable impact of a flood in a single region to standard base operations, the consequences of losing satellite communications are immense. With broken CLOCs, the airminded warfighter is faced with a set of circumstances requiring immense resilience and adaptability. The spatial extension offered to the air domain by space would cease. Australia's ability to see incoming threats would fall to lesser technology, potentially even visual identification by forces on the front line. The time to identify and strike targets reduces.

So What Does This Mean For Us Everyday?

For aviators accustomed to flawless connectivity, degraded space means reverting to fundamentals, and training those fundamentals. The circumstance above is not entirely hypothetical and we need to train our aviators in an operating environment of satellite denied communications in peacetime so they are ready for conflict. The realities of “a day without space” should be incorporated into planning of our major exercises, so we can identify and remediate any shortcomings.

To adapt to a loss of space-based assets the warfighter may need to; connect air domain related assets physically, calculate and calibrate assets manually, access terminals on-site instead of remotely, communicate using older robust UHF/VHF technologies. Loss of fighting depth in the space domain is a circumstance the warfighter could exist in and should be prepared for.

With the potential to be faced with degraded or denied CLOCs, the reality of the warfighter’s need to adapt and perform outside their intended duties exists. I recommend that our exercise routine should account for a loss of space capabilities. Such exercising will force our aviators into taking on new roles, the multi-skilled aviator. Questions like ‘’Why am I doing this?”, this is not my job?” are best asked, and answered, now rather than for real. Given the very real potential of “A day without space” the question is one the airminded warfighter under duress will not ask but instead be able to perform the task and move on to the next.

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