PATHFINDER
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SPACE: EMERGING CAPABILITIES AND POLICY ISSUES

Many of the capabilities employed today by the ADF depend on space-derived services for their effectiveness; indeed, some terrestrial missions could not be conducted without space-based navigation, imagery or communications support. Future capabilities envisioned for Defence aim to further exploit the advantages of space, allowing the ADF to conduct operations more effectively and efficiently. In order for these capabilities to deliver on their promise, the issues shaping the space operating environment and the Defence expectations for space need to be understood, and a clear vision articulated.

Space capability has traditionally been a high-cost endeavour limited to major powers willing to invest significant resources to achieve them. For a long time the providers of space-derived services could not exist without substantial government/military support. In such an environment, it was relatively easy to control the proliferation of technology involved in space operations. The recent growth in the commercial space sector, allied with the emergence of new Space Powers, has altered the situation in many respects. Nations, such as Australia, who used to have an advantage when it came to space capabilities (either indigenous or through alliance partners), can no longer assume this advantage.

From a technological perspective, space capabilities are becoming cheaper to build and operate. While historically the development of a space capability required the indigenous development of design and construction skills, today there are a range of commercial vendors able to supply spacecraft, while another set of vendors are prepared to launch them at market rates. As such, nations without a space pedigree are increasingly able to purchase 'turn-key' national systems in a timely and affordable manner.

Space-derived services are becoming easier to acquire on-demand from the commercial sector. For those nations (or actors) unable or unwilling to purchase an entire capability, the commercial sector is able to meet many needs for communications and remote sensing data as an 'on-demand' utility. In addition to providing additional capability, such a development also blurs the line between civilian and military infrastructure. When both ally and adversary are dependent on the same commercial space-based service, the decision to interfere with that service becomes more difficult.

As a result of these factors, and the increasing threat of collision with debris or other space objects, the space environment is becoming more congested and contested. The notion of 'red' and 'blue' space objects is now being swamped by the 'green' (neutral) and 'grey' (commercial/unaligned) entries to the space catalogue. Besides difficulties in maintaining orders of battle, such an increase in objects impacts on the ability of satellite operators to maintain safe separation from other objects. The recent collision between an Iridium platform and a decommissioned Russian satellite demonstrate the issues that arise when accurate space situational awareness is lost or not achieved.

Due to the importance of space-derived services, the capability to degrade or deny these services is becoming more attractive to many nations. Whilst the Chinese ASAT test in 2007, and subsequent USA 193 shoot-down, have illustrated the potential for direct attack on satellites from the ground, this is not the limit of the threat. While operating in space, satellites and their systems are still vulnerable to the same principles of electronic warfare applied on Earth. Communications links can be jammed or spoofed; imagery and radar sensors can be jammed, dazzled or destroyed. Future operations will increasingly need to consider such possibilities in planning and execution.

Space elements are already irreversibly embedded into Defence capability as shown in the table below, and will grow over the coming decade within the Joint Warfighting areas of force application, deployment, protection, sustainment, command and control and knowledge dominance. A review of the 2007-17 Defence Capability Plan shows that 54 per cent of projects have some form of space dependency.

Function	Comms SATCOM	Earth Observation ISR	Position Navigation & Timing PNT	Meteorology & Space Weather MET&SW	Space Situational Awareness SSA
Force Application	H	VH	VH	VH	H
Force Deployment	H	H	H	M	M
Force Protection	H	H	H	H	VH
Force Generation Sustainment	H	M	M	H	M
Command & Control	VH	H	M	M	H
Information Superiority & Support	VH	VH	M	H	H

The relevance of space capability to the pillars of Australian warfighting-2009
(Relevance VH-Very High, H-High, M-Medium, L-Low)

As the ADF continues to be employed nationally, regionally and globally, in an extensive array of operations, the requirements for space capabilities will evolve. Space power expands the strategic choices available to government on how to use and empower a relatively small force to greatest effect and the expectations are many. They include:

- A need for Defence to undertake a wider spectrum of operations across a wide area of operations.
- Defence activities characterised by multi-dimensional manoeuvre, within a non linear and diverse battlespace.
- Growth in the capability and application of space assets of key coalition partners, and expectations of Australian participation and interoperability.
- The move away from threat based planning to concept-led and effects-based themes.
- Adoption of network centric warfighting concepts, partially through space means.
- The need to rapidly scope and assess strategic and operational risk and countermeasures in asymmetric warfare and whole of government planning and execution.

Consistent with COSC direction, the ADF has embarked upon an approach to achieve a coordinated future for space through the formation of the Defence Space Coordination Office (DSCO) within AFHQ. This has led, in part, to the development of a draft space doctrine, and space input into the Future Joint Operating Concept. However the future path for Defence space suggests a transformational agenda for the way Defence uses space to:

- Develop and integrate space operations expertise
- Enhance indigenous Defence space capabilities
- Develop and enhance space relationships
- Promote space-related research and development
- Support national space initiatives

These are significant and aspirational goals which need to be clearly articulated through the near, medium and long term. Any transformation of such significance will create issues and new challenges. As such, in order to meet these goals in a consistent and coordinated manner, the development of an ADF Space Roadmap should be the next identified goal.

- *The space operating environment is becoming increasingly congested and contested.*
- *In order to meet future warfighting needs, Defence's expectation of space is changing.*
- *The development of an ADF Space Roadmap is a means to meeting these challenges in a consistent and coordinated manner.*

'Our space force may need to become a military entity in its own right, equal and apart from our air, land and maritime forces.'

General Chuck Horner, USAF, 1999

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