

## LOST IN SPACE

# New directions for the heavens from national security statement

■ Nick Merrett/CANBERRA

With more than half of Defence's current (2006-2016) major capability development projects having a critical dependency on services derived from space, understanding the nature and extent of this reliance is becoming increasingly critical for industry as the definition of national security is progressively widened, and its delivery assumes a more network-centric command, control & communications construct, and whole-of-government approach.

Prime Minister Rudd, in launching 4 December 2008 what he described as Australia's 'first comprehensive national security statement', proposed a substantial re-structuring of national security architecture headed by an Office of National Security (ONS), and resourced via a base of expertise progressively built up in the Department of Prime Minister & Cabinet (PMC) under the previous Howard Government.

Central to Rudd's statement was the establishment of a National Intelligence Coordination Committee (NICC) chaired by the new National Security Adviser, which – in the absence of consolidated central agencies such as the now rejected Department of Homeland Security – will have to seamlessly coordinate activities across government agencies if an effective national security function is to be progressively delivered for the nation.

As a sub-set to the consolidation of national intelligence coordination functions, the Prime Minister flagged the Government would move to boost national crisis management capabilities, by establishing a new Crisis Coordination Centre (CRC). The new CRC would support government decision making and, in its first iteration, would subsume the existing Attorney-General's



### Key Points

- **The Rudd Government may now be close to delivering a new Defence White Paper** designed to substantially upgrade capability development guidance for all related national security infrastructure.
- **Subsequent to release of the 2009 White Paper**, the Department of Defence will move to recalibrate all its principal sub-documents, beginning with a new Defence Capability Plan, which should emerge by mid-year.
- **The 2007 Avalon International Air Show** witnessed the launching of a rather hastily prepared update of the Network Centric Warfare (NCW) 'Roadmap', whose contents clearly struggled to keep pace with rapidly-moving acquisition decisions, such as the F/A-18F 'Super Hornet' and the WGS satellites.
- **Australia's so-called 'first' comprehensive national security statement**, launched by the Prime Minister in Canberra in December 2008, contained a major reshuffling of Australia's national security architecture, with substantial implications for the nation's future utilisation of space.

Department Protective Security Coordination Centre (PSCC) – all supported by new communications and data transmission facilities to enable secure ministerial participation in rolling national security crisis management.

Elements of how more challenging national security events – both civil (natural disasters) and military generated – could be addressed by Australia's space science and related industry sector were most recently canvassed in a Senate Standing Committee on

Economics inquiry report – 'Lost in space? Setting a new direction for Australia's space science and industry sector' – and completed at the end of 2008. As will no doubt be addressed in the new Defence White Paper, the Senate inquiry's report also sought to pinpoint vulnerabilities in existing and potential space-based threats.

In that process – given the huge budgets involved – thought was given to determining the boundaries of Australia's own space capabilities, in the course of

making assessments as to what extent the Defence force and wider national security infrastructure should rely on space services delivered through allies, consistent with established principles of retaining the ability to independently execute operations determined to be in the national interest.

Australia's current framework for space policy assumes a decentralised approach in which Commonwealth agencies retain their own operational responsibilities in the space arena. Responsibilities of the Department of Defence include national security (*see also ADBR, Vol 27, No 08, p11*), remote sensing, and signals intelligence undertaken at joint facilities at Pine Gap (NT) and the Defence Signals Directorate (DSD) facilities. Some major initiatives in these areas were progressed in 2008 regarding decisions Australia would participate in the Wideband Global SATCOM (WGS) constellation, and Mobile User Objective System (MUOS) initiatives.

MUOS is the US military's next-generation narrowband global mobile satellite communications system. The first MUOS satellite is scheduled for launch and in-orbit hand over to the US Navy in the first quarter of 2010.

The MUOS earth terminals – located in Norfolk (Virginia); in Wahiawa, Hawaii, at the Australian Defence Satellite Communications Station in Geraldton (Western Australia); and Niscemi (Italy) – utilise a Ka-band antenna designed with highly accurate auto-tracking to meet system performance & availability.

The Geraldton facility is subject to governance arrangements first concluded in October 2007, supported by a Satellite Communications Partnership Statement of Principles signed at February 2008's AUSMIN meeting in Canberra. The Statement of Principles is said to have committed both governments to 'explore options to enhance joint access to satellite

communications capabilities, and to encourage greater technical collaboration in this field'. The three large 18.4m antennas mounted on 53-foot-tall pedestals in Hawaii are said to "push the envelope of what has been fielded in this frequency band in the past."

The Lockheed Martin (the prime contractor for MUOS) communications system design features third generation (3G) mobile technology sourced from Ericsson, that will deliver simultaneous voice and data services, as well as the ability to increase capacity and features over the life of the program. Following the MUOS initiative, Australia and the United States have also been exploring the hosting of a US Army Fixed Regional Hub Node on land adjacent to the ADSCS 'Geraldton' facility.

Looking more broadly – and with the decline of infrastructure at the 'Woomera' facility – Australia's indigenous space capabilities and investments are largely limited to ground and space segment operations, and the exploitation of space derived services and products.

Australia has no substantive launch (except for its Hypersonics International Flight Research Experimentation, or HiFIRE endeavours with the US Air Force), or significant satellite component manufacturing capability following progressive industry rationalisations, including the demise of Auspace (a subsidiary of UK based EADS Astrium) following

its incorporation into Nova Aerospace on 21 December 2007.

According to the Department of Innovation, Industry, Science & Research (DIISR), only \$30m has been provided for space industry development programs (not including mapping/earth observation-related services) since 1996 under the AusIndustry suite of programs.

In contrast, the global space economy in 2007 (according to a 2008 Space Foundation report) generated a record setting US\$251 billion in revenues; ten states had demonstrated an independent space vehicle launch capability (with Iran perhaps being the next), and 47 nations operate indigenous civil satellites.

Unlike Australian governments since the 1950s, most countries are said to believe competencies in space and space related capabilities are strategically too important to leave to market outcomes alone.

Hence, if Prime Minister Rudd's most recent pronouncements on national security and the new Defence White Paper's assessments of developing threat scenarios do not see a mustering of resources towards the creation of a national space program, then the conclusions of the Senate Inquiry suggest there exist little other drivers upon which the nation can develop a competitive space capability.

Department of Defence officials giving evidence to the Senate inquiry during the course of 2008 stated the Department could

see value in greater national level policy coordination of Australia's space dependency, however, acknowledged current arrangements were "not able to fully address this complex area of policy. We think that some form of coordinated whole of government policy discussion might assist a more consistent and clearer approach, especially as space policy becomes more complex."

Defence did not, however, see itself as the owner of such a policy or as the coordinating type of office, but acknowledged it possessed "significant experience in both those areas, and also in the policy development work we will do as part of the Defence White Paper."

Merit was seen in the establishment of a coordinating agency to provide Defence with a point of contact where it engages with civil matters and other government departments, as against "where there is currently more of a coordinating discussion forum, as opposed to a forum that provides direction".

The Defence submission also noted Australia's niche contributions and support given to previous allied space programs, which it said had enabled the Australian Government to leverage off the returned investment, "so we would continue to suggest that that is a positive way forward."

Within Defence itself, better management of its space related efforts has been driven through implementation of a Defence

space governance framework – consisting of the classified Defence Space Coordinating Plan (SCP), which is understood to extensively articulate the framework mechanisms and associated responsibilities endorsed by the Chiefs of Service Committee (COSC) in September 2007.

Defence resources a Space Coordinating Office (DSCO) to manage the overall process. Central to the governance framework, has been the establishment of a Defence Space Council, which includes senior Defence stakeholder representation for high level guidance, and a subordinate Defence Space Coordinating Group that provides oversight of issues and initiatives.

To date, Defence's major direct investments in space systems have been focused on satellite-based communications (SATCOMs), including investment in or purchase of services from foreign allied and civil systems, such as Optus' C1 and C2 satellite, Inmarsat services and 'New Skies' SATCOM.

Officials considered the global SATCOM industry was 'truly commercially viable' (albeit with the quantum of services delivered governed strictly in parallel with perceived demand growth. Defence also noted the main Inquiry report's identification of remote sensing and hypersonics research as strong potential areas for future development.

The Senate Committee report also considered the construction,

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**PER ARDUA AD ASTRA:** Although the Senate Standing Committee on Economics may have been uncomfortable with the concept, the ADF's network centric warfare strategy envisages an increasing reliance on the militarisation of space to secure the nation's borders, and enhance combat operations across the land, sea and air domains, both in the 'Defence of Australia' and its interests overseas. Global communications capabilities are being enhanced through buying into the USAF's WGS satellites (far-L) as well as hosting ground stations for the MUOS (L). New naval vessels (ie: AWDs & LHDs) will be fitted with BAE Systems' MASTIS to support satellite communications (R), whilst the Government may give direction in the 2009 Defence White Paper, in terms of the schedule for Australia's adoption of an anti-satellite missile capability. The USAF test launched in 1985 an ASAT missile with a 350 mile range off an F-15 fighter, after which it mothballed the capability (far-R).

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launch and operation of small satellites (50-150kg) to be well within Australia's technical capabilities.

An ability to understand 'object events' and 'activities in space' (ie the threat of space debris to low earth orbit satellites and anti-satellite attacks) are also considered of growing importance to Defence, with events like China's anti-satellite test in January 2007 viewed as creating misunderstandings and instability in the region. In this particular case, the impact created a cloud of debris accounting for about a quarter of the current space junk in orbit.

Defence's principal investment in space related science and research has largely been through the Defence Science and Technology Organisation (DSTO), which has developed a core of deep expertise in developing and operating military SATCOM systems, and who were the source of critical advice (in securing access to new bandwidth) in negotiating Australian participation in the WGS system.

The ADF is now receiving 'operational capability' communications over the Pacific from the first of six WGS satellites recently launched for the US Air Force. The initial communications capability now being obtained under Phase 4 of Project JP 2008 will continue to increase until full operational capability is achieved in 2013, when six satellites will ring the globe.

Access to the WGS satellites will enable the next generation of ADF military capabilities – air warfare destroyers, amphibious ships, multi-mission unmanned aerial vehicles & land platforms (eg: the 'Abrams' tanks) – to operate in a network centric environment. Each satellite has the capacity to transmit information at rates of more than three gigabits per second.

During operational testing in June, WGS-1 is said to have transmitted a record-breaking 440 megabits-per-second communications test signal through the satellite. WGS is also the world's first satellite to incorporate multi-beam X-band communications through phased array antennas, and the first satellite capable of cross-

banding signals between X-band and Ka-band.

Phase 3F of Joint Project 2008 is scoped to enhance the ADF wideband satellite communications ground infrastructure through the development of a Satellite Ground Station near Geraldton in Western Australia. Known as Satellite Ground Station-West (SGS-W), the facility will anchor satellite links from deployed forces through the WGS system, which in turn provides the ADF with global SATCOM connectivity.

SGS-W will directly link deployed forces to the national Defence Wide Area Network supporting ADF command and control, logistics, intelligence and administrative support. Given phase 3F is post-'first pass', tenders for SGS-W have been sought (with a number of Australian companies presently tendering for this) and Defence in November 2008 was postured to act following Government 'second pass' consideration.

Phase 5 of JP 2008 is scoped to provide the ADF with a family of wideband terminals for use in the land environment, which will match the deployed force needs for mobility and communications capacity or bandwidth. These terminals will allow deployed forces to access the WGS system. Ship-based terminals have been provided to the ADF through JP 2008

Phase 3E allowing RAN ships to access both the Defence Payload on Optus C1 and the WGS System.

Vehicle-mounted, wideband SATCOM terminals are scoped within the formerly cancelled Joint Project 2072, albeit with Defence having progressed limited upgrades of certain radio systems. Prior to the rescoping of military capability acquisitions as part of the Defence White Paper development process, phase 5 of JP 2008 Phase 5 has not achieved 'first pass' approval.

WGS addresses the ADF's wideband communications needs, but at the frequency range at which it operates, users need reasonably large terminals – making it unsuitable for use in aircraft or in mobile, briefcase configurations. Defence's Director General Integrated Capability Development (then Brigadier David Welch) indicated in evidence "we now need to follow up that decision with an investment in narrow-band satellite."

This service is currently provided through the Optus C1 satellite, parked over the western Pacific and on a range of leased services on satellites over the Indian Ocean. Space support to the ADF encompasses SATCOM, Positioning, Navigation and Timing (PNT), intelligence, surveillance and reconnaissance (ISR) and me-

teorological and other environmental information to support terrestrial defence activities.

Other government agencies also rely on Defence space support for things like emergency management for homeland security activities, with remote sensing data expanding across the Australian Government, being supported in part by the Defence Imagery and Geospatial Organisation (DIGO).

Australia gains free access to over \$10b worth of space-based data annually from more than 180 member countries of the World Meteorological Organisation (WMO) Space Program in exchange for the Bureau of Meteorology also provides \$100m worth of largely surface-based data.

Summing this up, the report considered, "access to allied space systems has largely met our needs, in particular for intelligence and more recently for SATCOM. The high operational tempo (both Australian and allied) of recent years, and consequent demand for space products, has highlighted that assured access to allied systems may not necessarily be guaranteed in all circumstances (except WGS) and is subject to host nation priorities."

Australia's treaty obligations with the Missile Technology Control Regime (MTCR) and the US ITAR regulations (*see ADBR, 'Defence trade treaty too elusive for overwhelmed Congress', Vol. 27, No 06/07, Sept-Oct 2008, p26*) - which prevents Australians and the ADF, for instance, receiving more precise GPS signals - constitute further limitations.

Australia is said to have conducted no quantitative study on the risk of denial of GPS, with no backup plans at the national level and no national approach to responding effectively to GPS interference events from GPS jammers.

The Sensor Signal Processing Group in Adelaide is conducting multifaceted research in sensor signal processing including world-class work on GPS anti-jam technologies for The Technical Cooperative Program and joint MOU contributions in this area. But at present, the ADF, and all



KERGUELEN ISLANDS – NASA IMAGE

its GPS-dependent network centric warfare (NCW) operations providing precision engagement, enhanced awareness, global connectivity and synchronisation of forces, are vulnerable to these attacks.

The report also notes a growing number of countries and commercial service providers now operating advanced remote sensing satellites is progressively diluting Australia's strategic advantage in the utilization of space. Access to these capabilities is said to be enabling states and non-state actors alike to regularly spy on Australian national territory (as well as its deployed forces) using increasingly higher resolution sensors encompassing visible, hyperspectral and all-weather radar satellites.

Further, the report says most existing satellites in orbit were not designed to view the South Pole, and thus, Australia will need to be more pro-active in future international forums that determine satellite build programs and deployments to ensure Antarctica receives more coverage (especially important for anti-whaling efforts).

To date, satellite surveillance coverage has largely been sourced by the Australian Customs & Border Protection Service (formerly Border Protection Command) through the Envisat and 'Radar-sat 1' satellites (via French-based Collecte, Localisation Satellites - CLS), a subsidiary of the French space agency CNES). The Australian Customs Service issued a Request for Tender (RFT) in June 2008 seeking daily satellite surveillance of Australia's Heard and McDonald Island Exclusive Economic Zone (HIMI EEZ).

On 30 September the incumbent provider, CLS, was announced as winner of an \$1.83m contract commencing on 1 September and running to 30 June 2010. The satellite's general characteristics enable the targeting of large steel fishing vessels approximately 30 metres in length or longer.

CLS has a ground receiver station on the Kerguelen Islands (France maintains an EEZ extending 360km offshore from this territory), located approximately

400km from the Heard and McDonald Islands. Launched into orbit 14 December 2007 and orbiting earth 14 times a day, the Australian Customs & Border Protection Service is also watching Radarsat 2 developments very closely.

In the main, space-related training within Defence has been limited to an immediate focus on satisfying short-term operational and technical demands. Recognising this deficiency, the Department has established a continuum of space training and education intended to address general awareness of space through to specific detailed space expertise education.

The Director of the Defence Space Coordinating Office, Group Captain Dennis Davison said in public hearings "we have gone through a process over the last year or so doing a space education review within Defence to define where our space training needs are. We have analysed a model of four levels of space that we need to achieve.

We are going through the process of determining how we source that training to meet that requirement. Some of that is US-based, some of it is Australian based." Defence's specialist space expertise, although limited, presently ranges from vocationally skilled personnel, such as payload managers and analysts, to post graduate qualified members in policy and capability domains.

Space policy also found its way into politics in October 2007, when former Prime Minister John Howard confirmed the relocation of an element of the Edinburgh-centred Air Operational Support Group (AOSG), 462 Squadron, from Canberra to Edinburgh by 2012, making South Australia "the home of the ADF's future space-based projects".

The plan involved the relocation of approximately 50 personnel and has provide advantages in the coordinated development of information operations and operational support capability for Air Force. While 462 Squadron – not AOSG (which manages the Woomera Test Range) – have assumed substantial responsibility for space projects or new capabil-

ity development, they will provide a sound foundation for space research and space vehicle launch activity in the state of South Australia.

Then Deputy Chief of Air Force, Air Vice Marshal Geoffrey Brown, considered ADF troops were not being put in added danger as a consequence of Defence not being more industrially self-sufficient in space. At public hearings officers submitted that Defence had a tactical advantage thanks to organisations like DIGO, which "provided a connectedness down to the tactical level, which I do not think you would see in a lot of the other militaries."

As the delegated coordinating capability manager for geospatial information, DIGO is working towards establishing enterprise level geospatial services across Defence. The first element (Phase 3 of JP 2064) of this was the recent creation of the Defence Handheld Image Gallery, providing Defence users with a capability to access and store operational, intelligence, exercise, training and historical hand held imagery.

The next element is to provide geospatial visualisation services to a broader range and larger number of ADF personnel (Phase 4). DIGO has established a defence-wide Working Group that recently (September) identified the requirements and issues related to this capability. DIGO is also responsible for Defence geospatial and imagery standards and specifications. Additionally, DIGO works with the Capability Development Group and the DMO to ensure new capabilities such as smart weapons and navigation systems meet the appropriate data requirements.

Officers also indicated there was yet to be any sort of further Government decision on engagement in broader missile defence activities, including the space-based laser (SBL) and space-based infrared system (SBIRS) which are part of the US missile defence program. The only current engagement was indicated to be through Defence's missile defence capability development and policy discussions in its Strategic Policy

division and Capability Development Group.

Australia's position on missile defence and the weaponisation of space is a further area of national security policy expected to be addressed in the new Defence White Paper. Rather than an air-based solution as initially tested by the USAF in the mid-1980s (see story page 44), if a decision is made to extend the capabilities of the new project Sea 4000 air warfare destroyers (AWDs) to accommodate SM-3 missiles (in addition to the extant SM-2s), it would potentially provide the RAN a satellite killing capability.

Such capacity was demonstrated 21 February 2008 by a US Navy 'Aegis'/SM-3 equipped destroyer shooting down a faltering satellite, although the incremental national security capability was subsequently said to have been disengaged from the cruiser's routine ballistic missile defence (BMD) shipboard operating capabilities.

The Committee' report opposed any moves by nations toward militarising space, and called on the Government to cease any weapons testing that would result in the creation of further space debris.

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BOEING WGS IMAGE