SMARTSAT
COOPERATIVE RESEARCH CENTRE

Capability Demonstrator: Indo-Pacific Connector

Mission Goal: The Indo-Pacific Connector will identify and develop technologies to support a potential evolved space architecture for Australia and its Allies enabling resilient command and control (C2) and situational awareness across the Indian and Pacific Ocean regions.

The Australian government has placed increased emphasis and priority on enhanced regional engagement covering disaster response, security and economic assistance for neighbouring nations across the Indo-Pacific. In addition, the 2020 Defence Strategic Update notes the region is undergoing a strategic realignment, making the region more contested and apprehensive. Australian space capabilities across the three SmartSat research programs can contribute to regional diplomacy and security partnership through technology collaboration.

The Indo-Pacific Connector (IPC) mission provides a concept for integrating SmartSat technologies into an end-to-end system able to deliver advanced communications and situational awareness for Australia and our allies.

This can be achieved through collaborative technology development aimed at capacity building with regional partners. This is a regional security and diplomatic engagement concept, requiring Australian industry leadership enabled by advanced space technology.

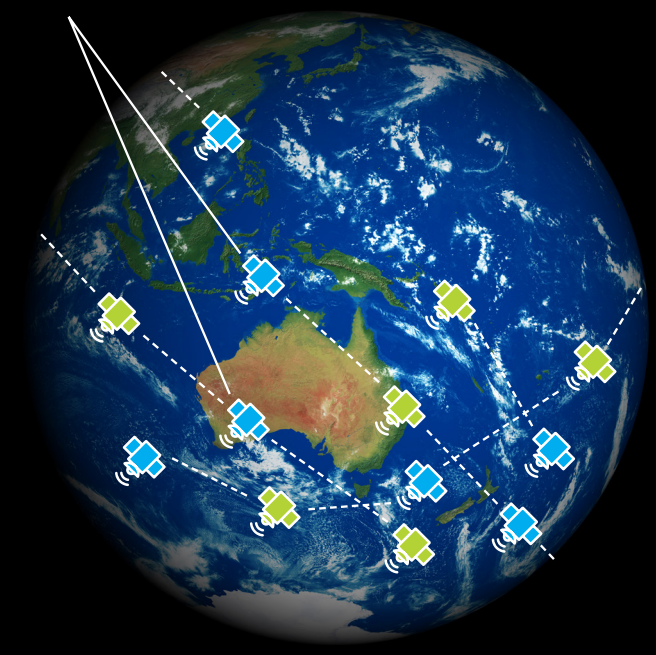
SmartSat will work closely with the Department of Defence to ensure research outcomes from the Indo-Pacific Connector are aligned and synchronised with the timing of planned missions for the Resilient Multi-mission Space StarShot.

Priority research areas for Indo-Pacific Connector include:

- Advanced communications including optical and high mobility radio frequency communications.
- Cognitive networking approach to increase capacity and availability, including in contested spectrum.
- Space-based sensor processing and direct dissemination to end-users.
- Intelligent Constellation Operations to deliver optimised coverage and service availability under all conditions.
- Enhanced services from novel sensors, embedded timing and position determination.
- Technologies supported fractionated ‘space-space’ and ‘space-ground’ payloads inc. high performance, short-range inter-satellite links.
- System modelling and visualisation tools to support rapid assessment of constellation and service resilience.

Distributed, Fractioned, Resilient C2/SA for Regional Security

Southern Indian/Pacific Ocean Priority Coverage



Hybrid LEO-MEO-GEO constellation
- Highly autonomous satellites
- Proliferated, distributed constellation design

Sensors optimised for Maritime and Littoral Domain Awareness
- Spectral, spatial and temporal resolution

LEO Service Delivery through agile, resilient networking capabilities
- User interface exploits API for evolved cloud services across the network

Networked Infrastructure Nodes
- Optical/THz LEO crosslinks
- V/E band ISL between LEO/MEO
- S band/X band user access

Integrated Space and Ground Nodes
- Fractioned service provision
- Secure but flexible access control
- Supports fixed and mobile network access
- Distributed intelligence through space and ground nodes - including user access terminals

Impacts

The 2020 Defence Strategic Update highlighted that space is becoming more congested and contested. Australia plans to introduce a range of new space capabilities from 2025 including enhanced communications, earth observation and space domain awareness. These updated space capabilities seek greater levels of control by the Department of Defence in partnership with Australian industry.

The Indo-Pacific Connector seeks to increase the capacity of Australian industry to supply all elements of space capabilities, including space-based components. The development of a novel space architecture comprising a hybrid constellation of low earth orbit, medium earth orbit and geo-synchronous earth orbits, will identify emerging technologies that might transform thinking about future national security space capabilities.

To provide maximum research impact, SmartSat has established **three Capability Demonstrator missions.** This goal-orientated research and innovation aims to meet some of Australia's major challenges including water and land management **(Aquawatch Australia)**, defence and national security **(Indo-Pacific Connector)**, and response to increasing frequency of natural disasters **(I-in-the-Sky)**. Research outputs from these CDs may be translated for operational adoption by end-users as fully fledged missions.

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AusIndustry
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