



Australian Government  
Department of Defence

# Positioning, Navigation and Timing ..... a Warfighter's Perspective!

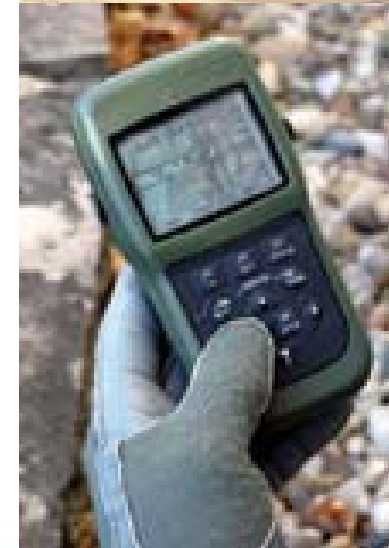
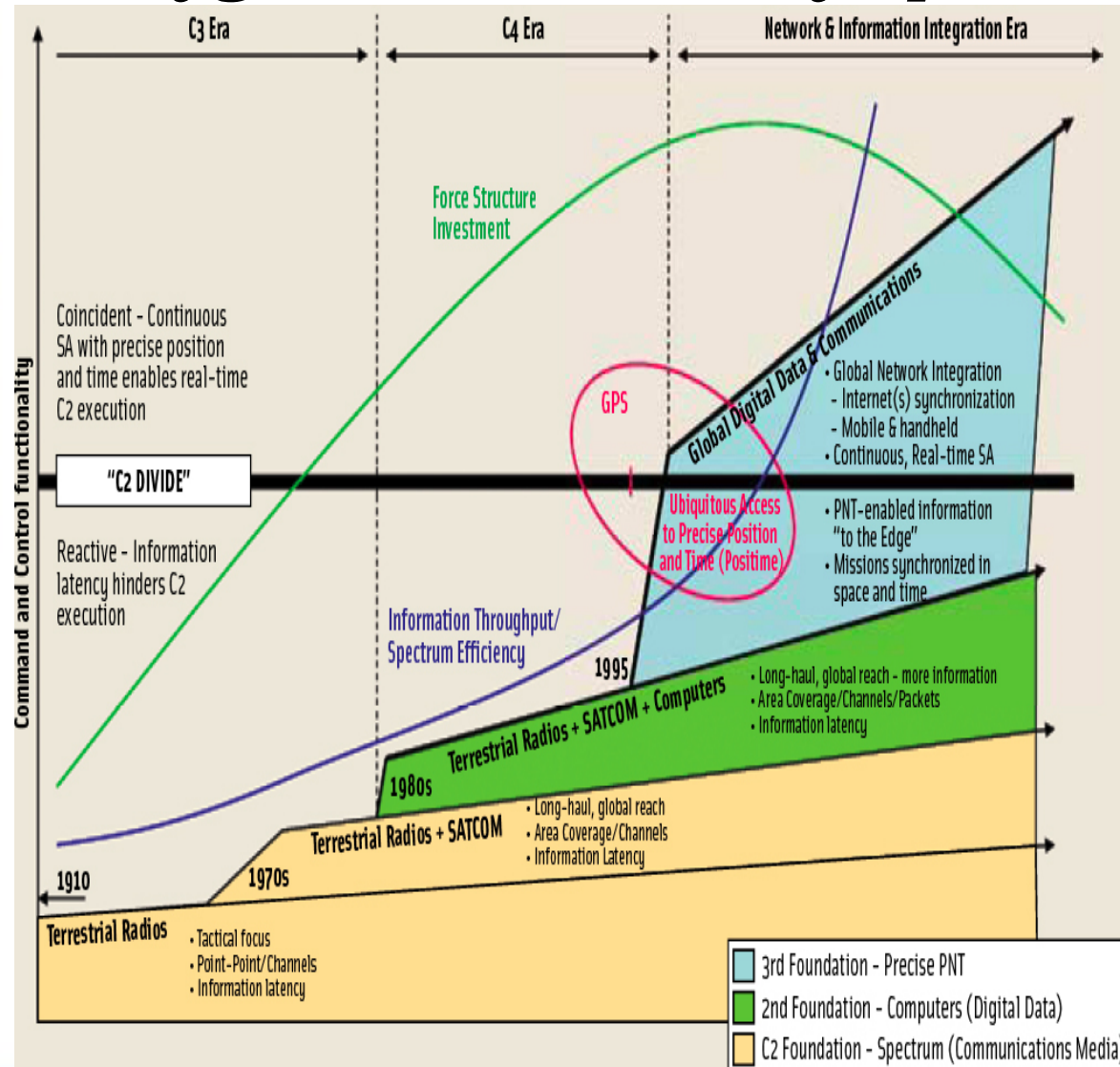


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Defending Australia and its National Interests  
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# ***Position, Navigation, and Timing are as essential as oxygen for our military operators***



# Briefing flow

- PNT in modern military operations
- What is Defence doing about Navigation Warfare?

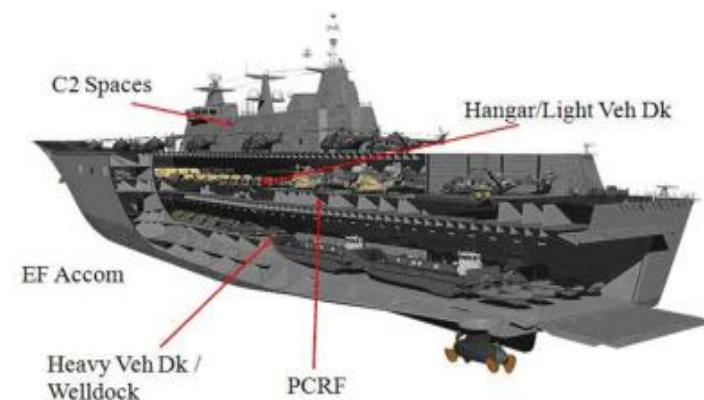




# PNT and the Warfighter

***PNT is ubiquitous across the military! For example, 116 systems have a GPS feed in just the LHD!***

- Combat and control systems
- Combat support systems
- Situational Awareness and Navigation
- Weapon Systems and Targeting
- Surveillance Systems
- Radios
- Crypto



# Command and Control

***C2 is dependent on various capabilities that in turn are dependent on PNT***

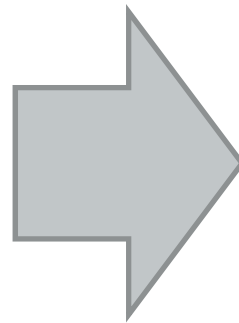
- Theatre-wide comms
- Situational awareness
- Common Operating Picture
- Dynamic targeting
- Effective logistics
- Joint Personnel Recovery
- + many others!



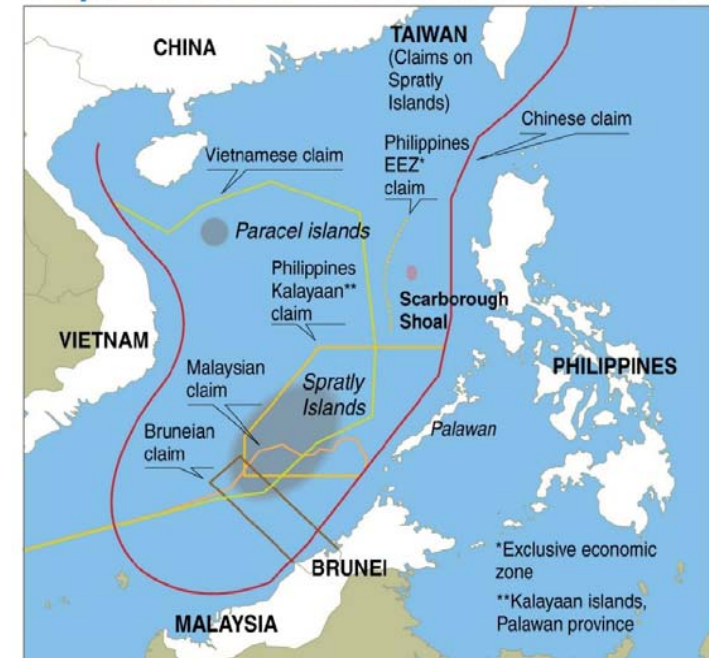
# Situational Awareness

*Navy incursions into Indonesian waters causing 'go slow' in military relationship, Defence Force Chief David Hurley says*

ABC News, 20 Feb 2014



## Disputed claims in the South China Sea



Source: D.Rosenberg/MiddleburyCollege/HarvardAsiaQuarterly/Phil gov't

AFP

2018+!?



# Common Operating Picture

- Fog of War
- Troops in contact
- Blue-on-blue
- Joint Fires
- Cooperative targeting



# Dynamic Targeting



Joint  
Headquarters  
(CENTCOM/  
ISAF)

Calculates target  
coordinates

Ground  
Commander

Ground  
Commander  
approval

CAOC

Check Collateral  
Damage Estimate and  
Coordinates

Joint Terminal  
Attack Controller



Target identified





# Logistics

- Tracking of consignments
- GPS guided air delivery
- Autonomous logistics delivery vehicles



# Joint Personnel Recovery

- PNT becoming key to recovering personnel
- Sometimes separated people, sometimes kidnaps, sometimes down helos/aircraft.....
- PNT enables much of the JPR chain:
  - Satellite (Locator Beacons)
  - Surveillance (find and track the personnel to be recovered)
  - Recovery land forces (Blue Force Tracking)



# Briefing flow

- PNT in modern military operations
- **What is Defence doing about Navigation Warfare?**





# Counter Navigation Warfare Operations

- Starting to consider the ROE and International Law implications – how do you react to deliberate GNSS jamming?
- Developing ability to track GNSS jamming
- Procedures to mitigate the threat
  - Avoid localised threats – NOTAM/NOTM
  - WoG options - Diplomatic/UN?
  - ‘Space free’ training
- Redundancy provides capability
  - Eg bombs that are both laser guided and GPS guided
- Harden our systems to jamming/disruption



# Recent Acquisition Activities

***JP 5408: 'GPS Enhancement for legacy platforms' is delivering anti-jam GPS for many platforms***

- GPS Anti-Jamming System 1 – now installed on RAN Frigates and F-18
- DAGR is an updated hand-held receiver
- The GPS Enhancement System
  - provides a jamming indication among other improvements for Navy platforms





# Capability Development Activities

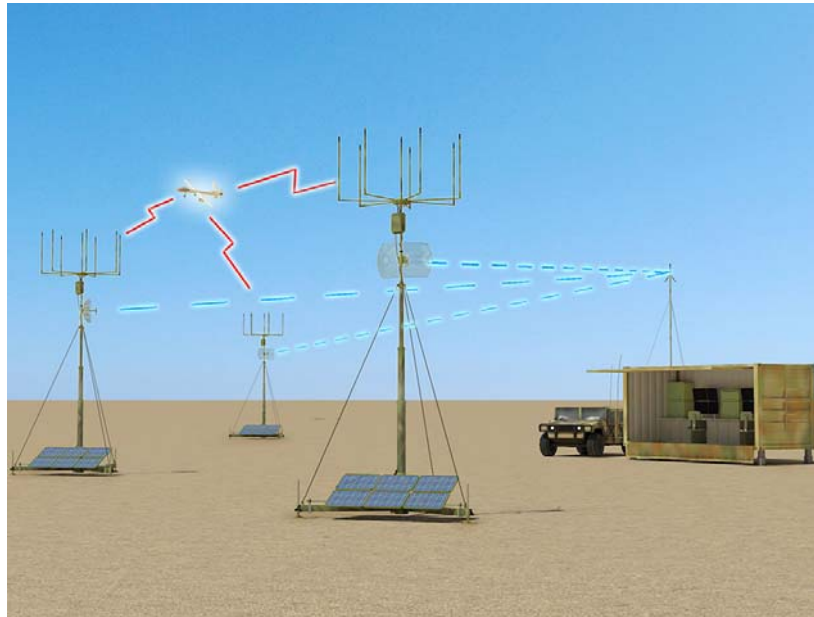
***JP 9380: 'PNT in a Contested Environment' will provide PNT under the most demanding combat conditions***

- Survey of ADF PNT/GPS receiver users
  - Commenced mid-2015
  - Collated database of equipment & users
  - Better understanding of user accuracy requirements
- Looking at what industry and technology have to offer
- DSTG assisting in drafting the requirements
- Project is still early in approval process (pre-Gate 0)
- YOD early 2020s



# Capability and Technology Demonstrator Program

- RF Interference Geolocator
  - GPSat Systems Australia
  - Geolocation of GPS RF interference to support Defence operations
  - ‘Griffin’ successfully trialled in February 2017

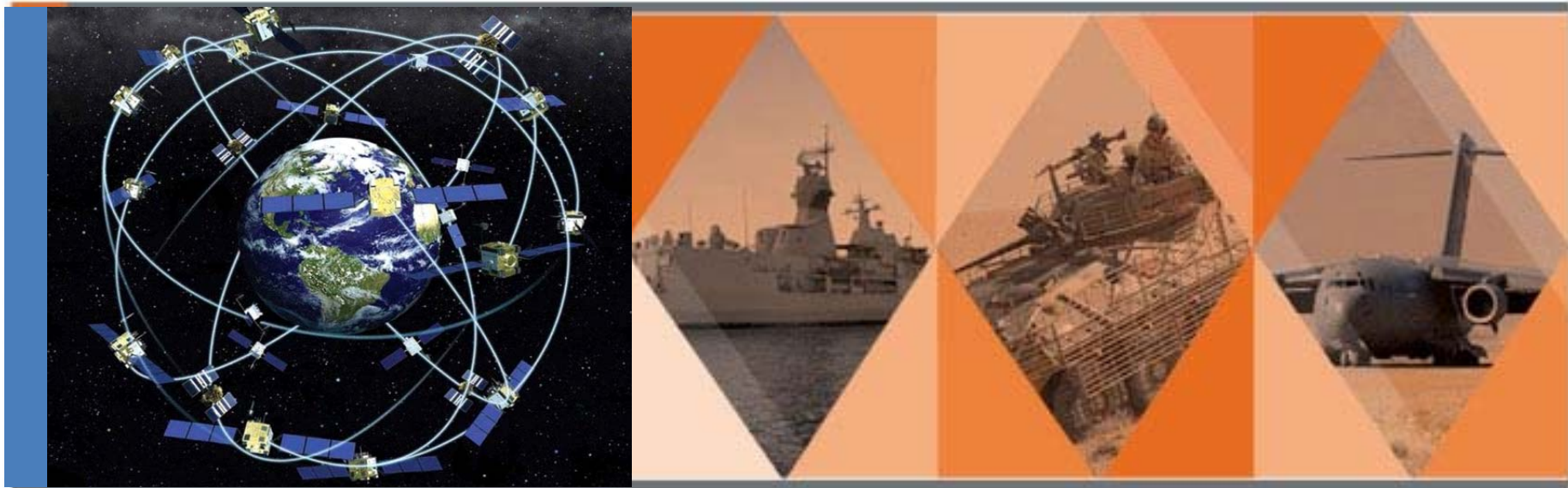


# International Engagement

- Defence engages widely in international forums
- This reduces risk for JP9380
  - Informs us of US and Allied GPS / GNSS developments
  - Collaborative trial opportunities
  - Collaborative development opportunities
  - 11 Nations GPS & NAVWAR RDT&E MoU
    - GNSS Project Agreement
      - GNSS receiver / algorithm development
    - Test Capabilities Project Agreement
      - Test / simulation capability collaboration
    - SPACEJAM Project Agreement
      - Simulated Programmable Aircraft Embedded Jammer
      - GPS denied/degraded training environment simulator



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