Australian Government
Geoscience Australia

The future of satellite positioning in Australia

Dr John Dawson, Geodesy and Seismic Monitoring Branch

About: Geoscience Australia

- Geoscience Australia is Australia's public sector geoscience organisation
- We are the nation's trusted advisor on the geology and geography of Australia
- We apply science and technology to describe and understand the Earth for the benefit of Australia

PNT coordination in Australia

Australian Government Space Coordination Committee (SCC)

- Coordinate the Government's involvement in civil space

Positioning Navigation and Timing Working Group

- Federal government forum on PNT that reports to SCC

National Positioning Infrastructure Advisory Board

- Strategic guidance on requirements across government, industry and research

Space Cross-Sectoral Interest Group

- Trusted Information Sharing Network for Critical Infrastructure Resilience

NPI NATIONAL POSITIONING INFRASTRUCTURE CAPABILITY

An integrated national positioning capability to accelerate the adoption and development of location-based technology and applications in Australia

Accuracy

- How close is my Position to the ‘truth’?

Integrity

- Can I trust my Position?

Accessibility

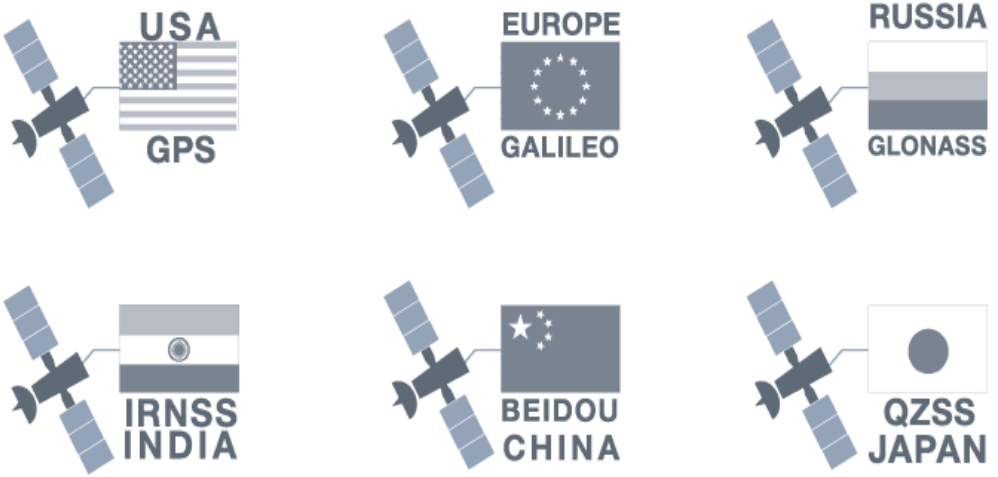
- Where can I receive corrections to improve my Position?
- Is it cost prohibitive?
- Is it supported by user equipment?

Resilience

- How susceptible is it to spoofing and jamming?

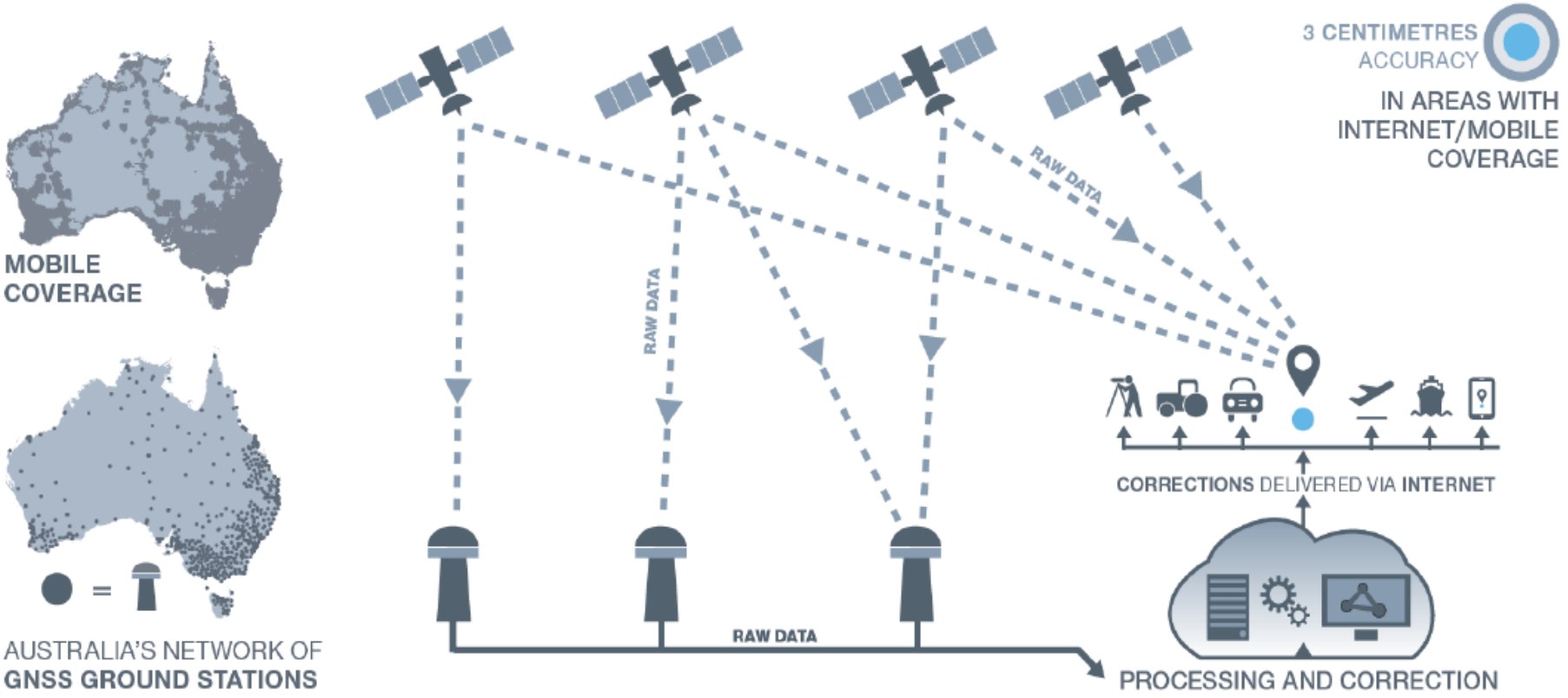
New constellations and signals

AUSTRALIA'S NETWORK OF
GNSS GROUND STATIONS

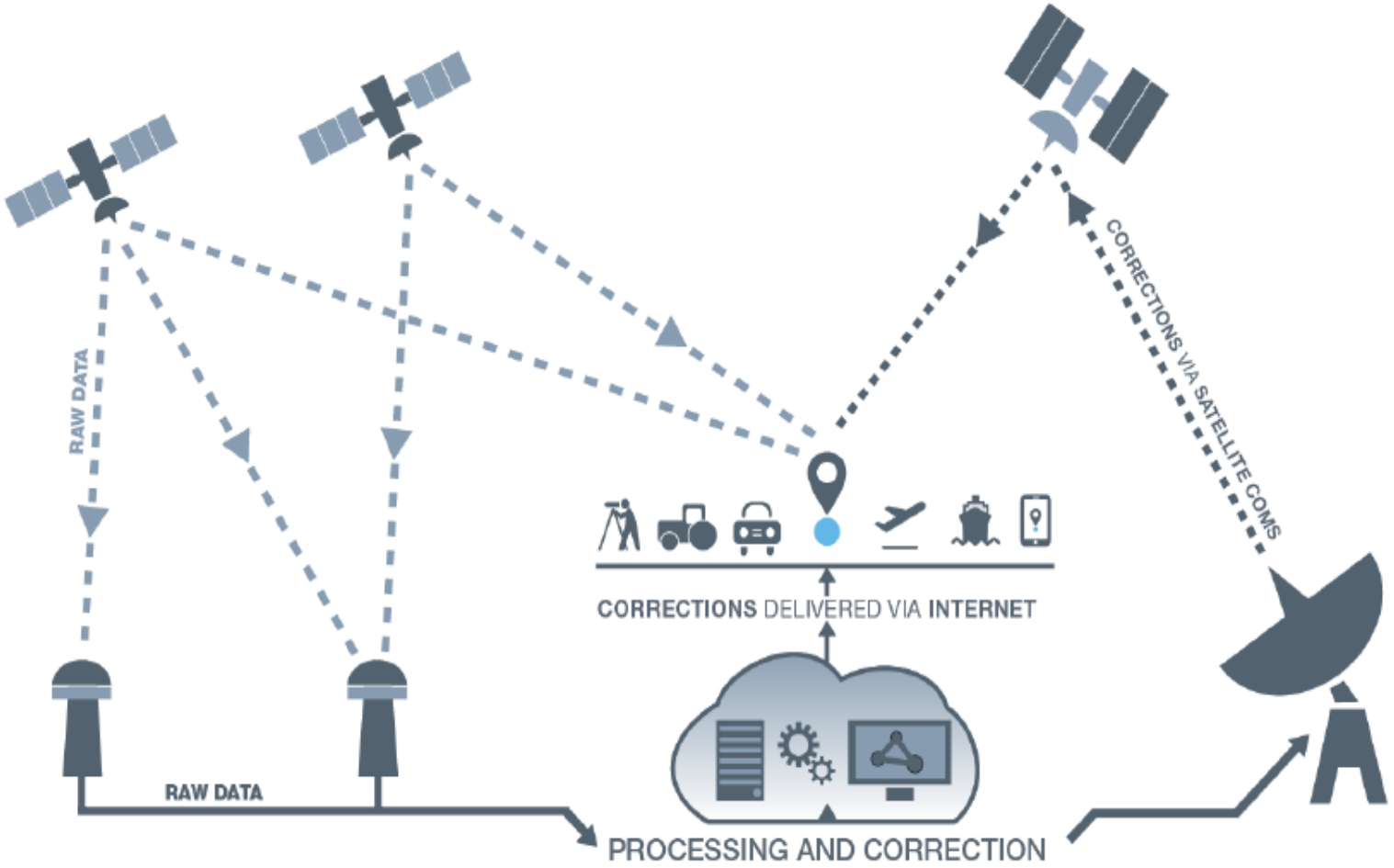


GLOBAL NAVIGATION SATELLITE SYSTEMS (**GNSS**)

High accuracy positioning



Satellite-Based Augmentation System (SBAS)



Why should the government get involved?

- Science and space infrastructure
- Reduce GNSS infrastructure duplication
- Improve network reliability
- Provide services in remote/regional Australia
- Eliminate disparate technology and standards
- Support safety-of-life services
- Reduce cost for users

- Make our industries more efficient
- Encourage positioning uptake in new sectors
- Encourage business innovation
- Creation of new products and services
- Australia to lead in new PNT services

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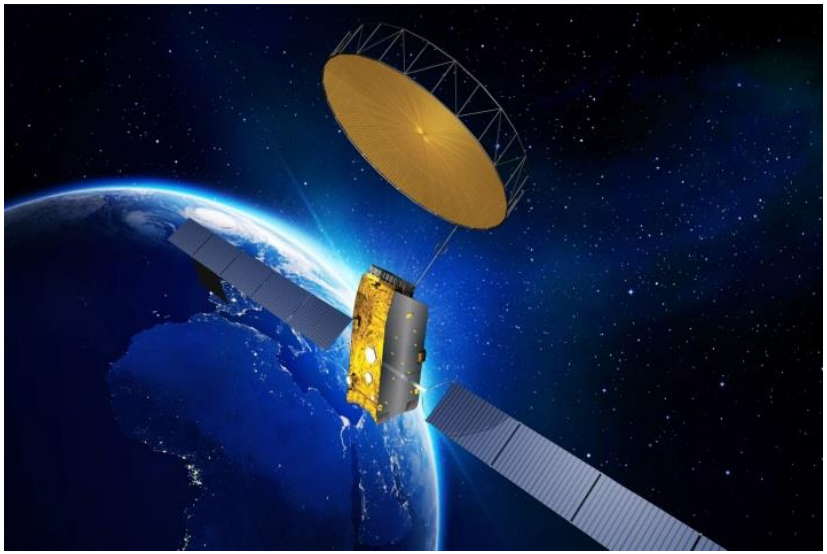
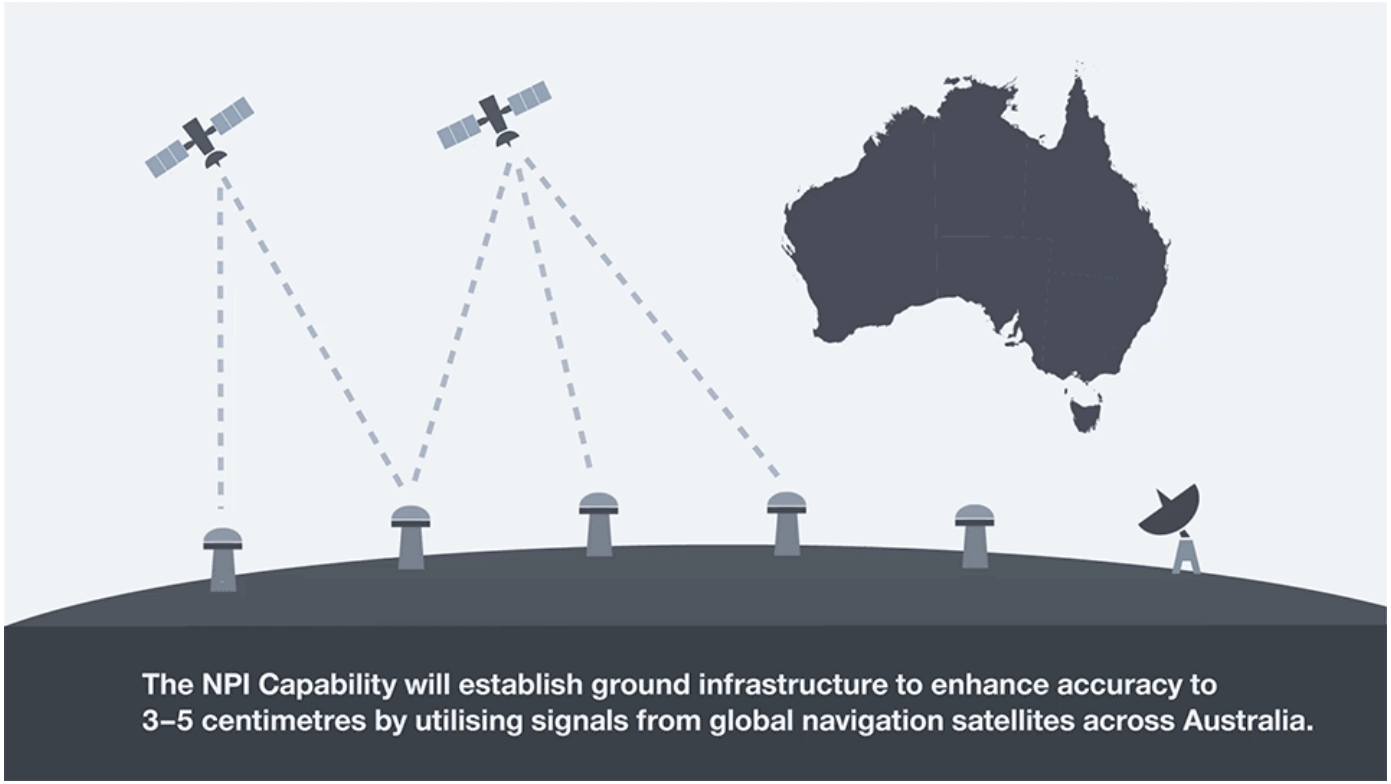


1. Upgraded national network
2. GNSS software and products
3. Encourage open data access

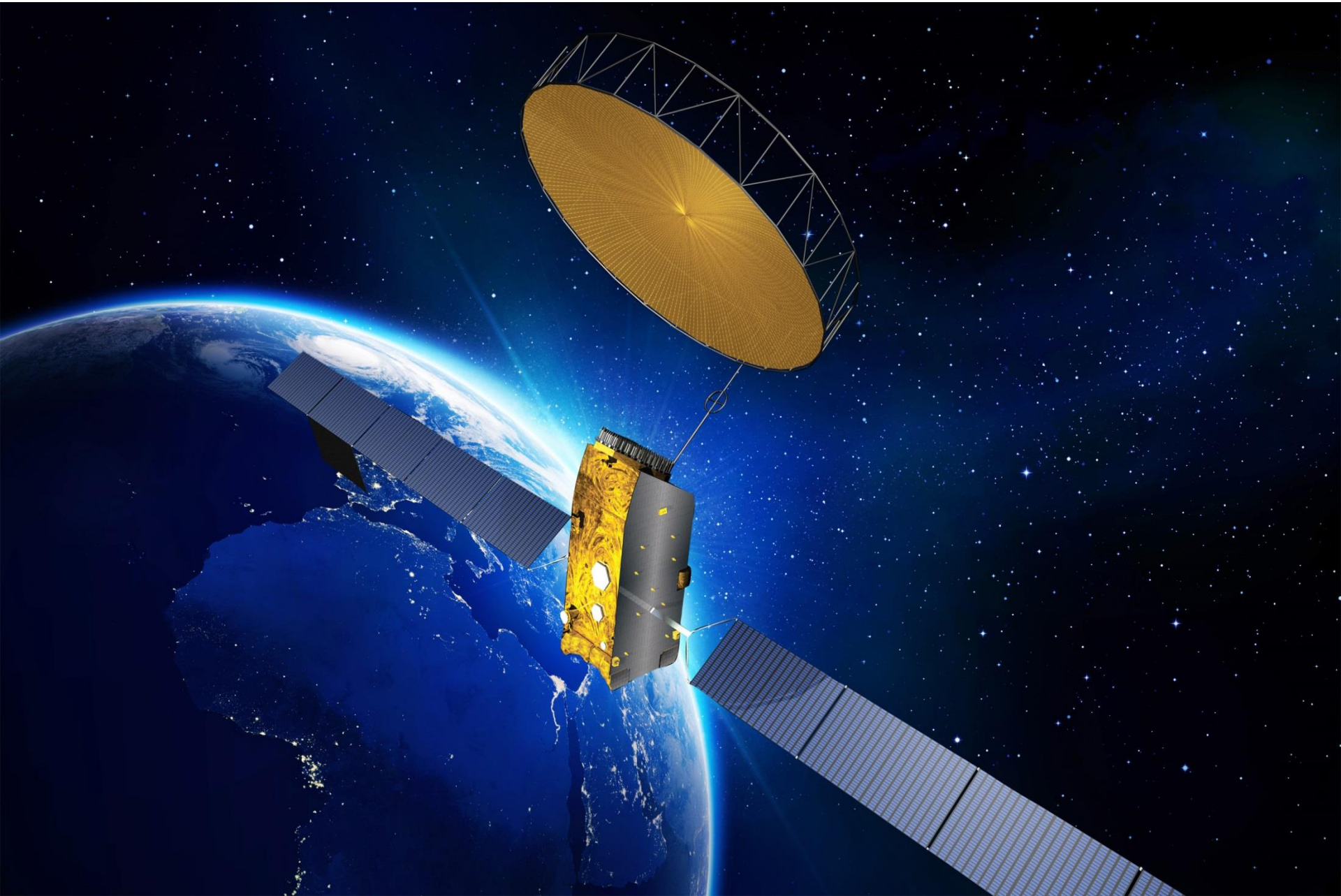
1. SBAS Test-bed
2. SBAS benefits analysis
3. Government(s) investment in SBAS?

GNSS software and products



- GNSS biases, satellite orbits and clocks in real-time
- Atmospheric products
- Operational software to support the IGS and government partners
- Open source software for Australian businesses

SBAS: Inmarsat 4F1 GEO Satellite



SBAS: Ground Station

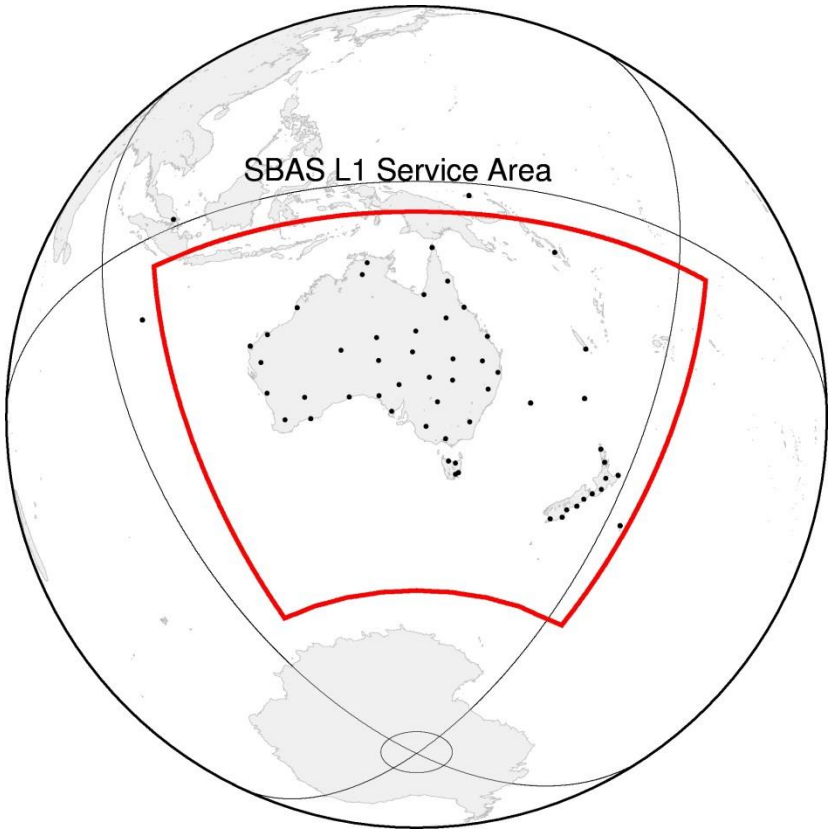
SBAS Test-bed Signal Status

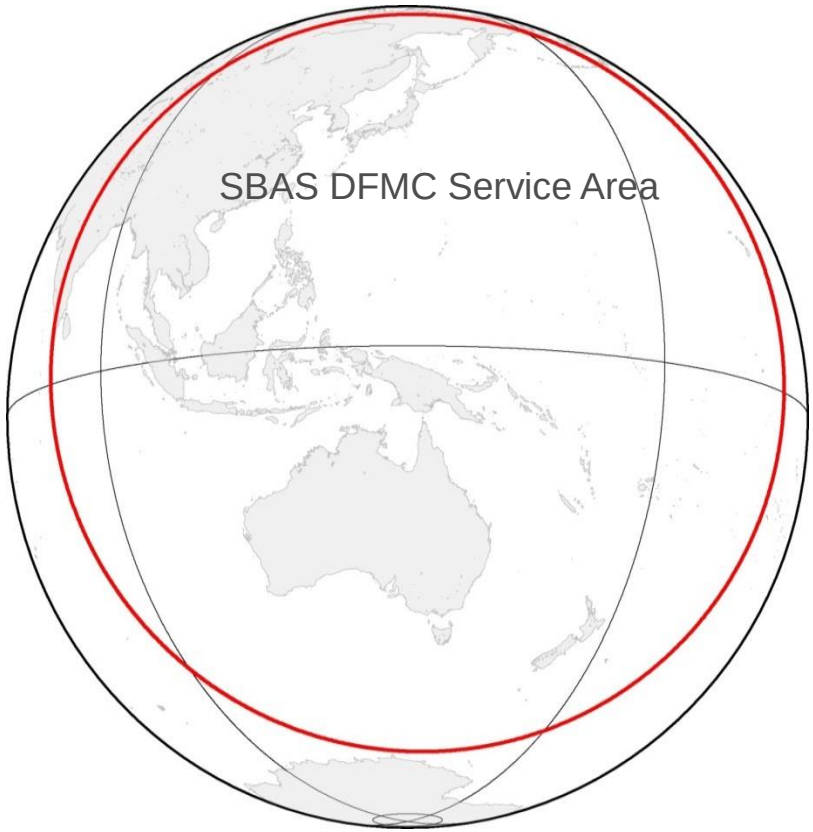
- Satellite 122
- 0.5 metre accuracy
- Widely implemented RTCA DO-229D standard

- 0.1 metre accuracy
- New Precise Point Positioning (PPP) on SBAS technology

- 0.5 metre accuracy
- Better in challenging environments (more satellites
- High availability (better for aviation)
- Regional capability

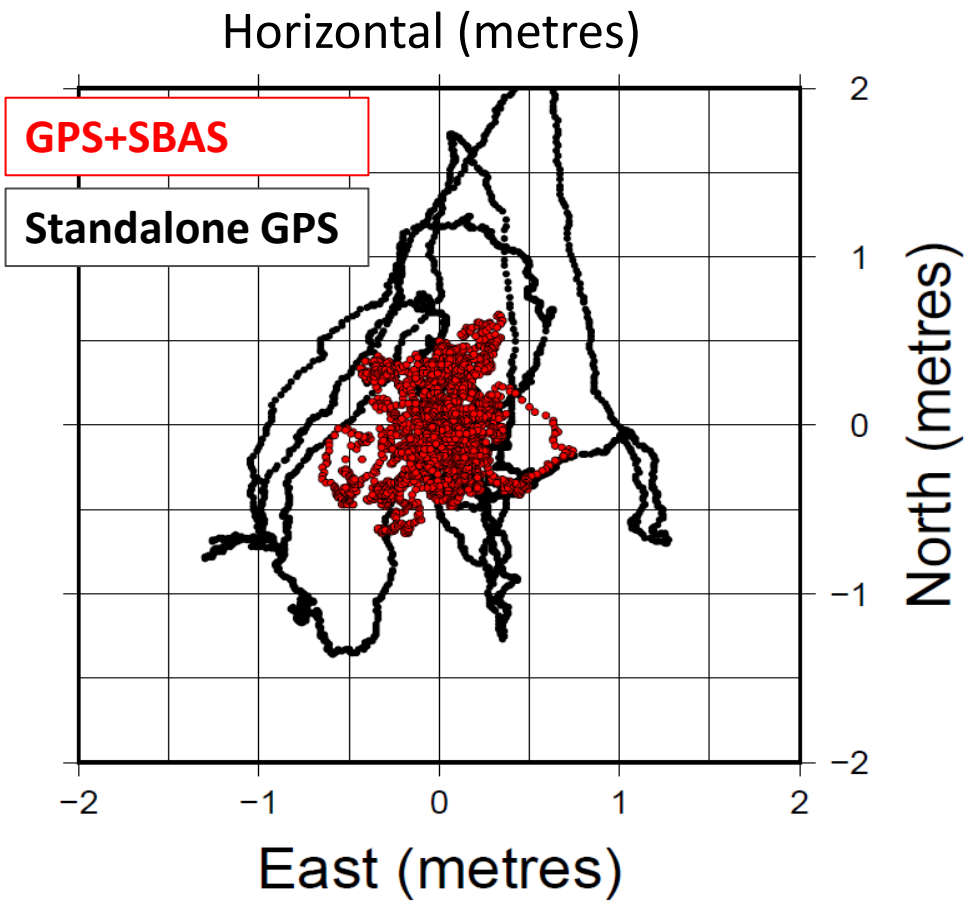
SBAS – coverage and service areas

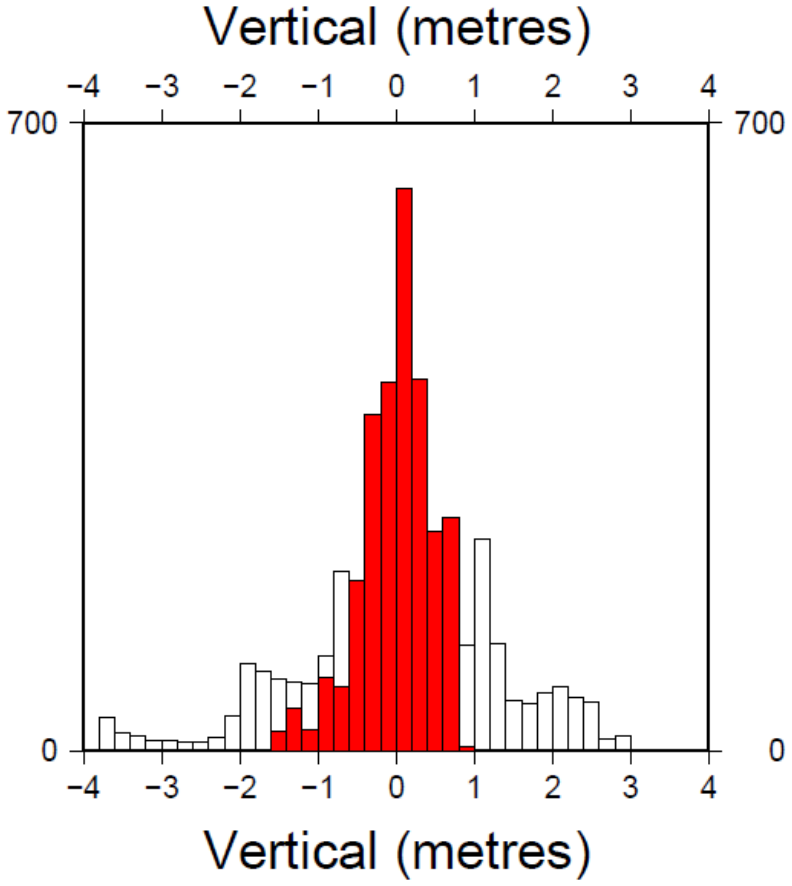




- SBAS L1 service area extended to the East to cover Chatham Islands, NZ
- Additional ground stations added to address performance issues in NZ
- Performance issues around Darwin under investigation

SBAS Trial performance (L1 GEO)





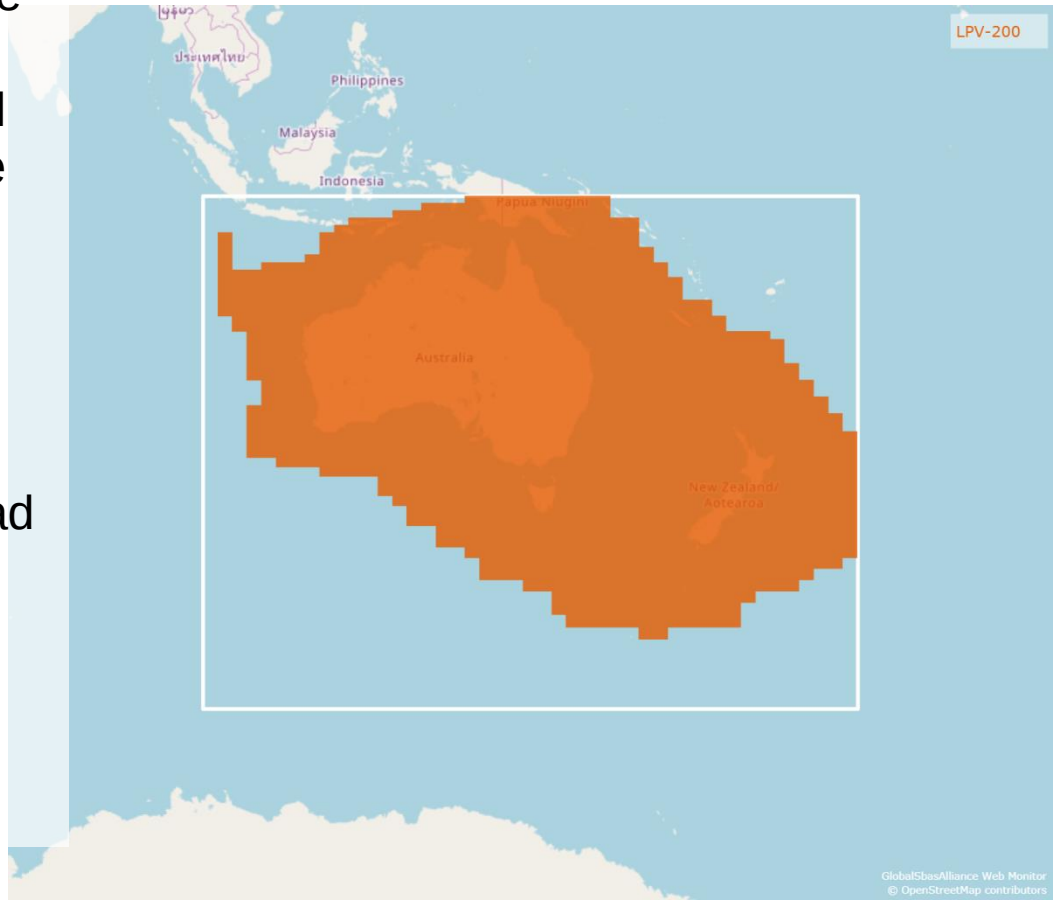
SBAS for Aviation (LPV-200) Performance

LPV-200 (Localizer Performance with Vertical guidance)

- Lateral and vertical guidance without the need for visual contact with the ground until an aircraft is **200 feet** above the runway

Why?

- Increased accessibility to airports.
- Pilots can land an aircraft more safely, especially in bad weather conditions, thus reducing delays, diversions and cancellations
- More efficient landings cut costs and fuel consumption

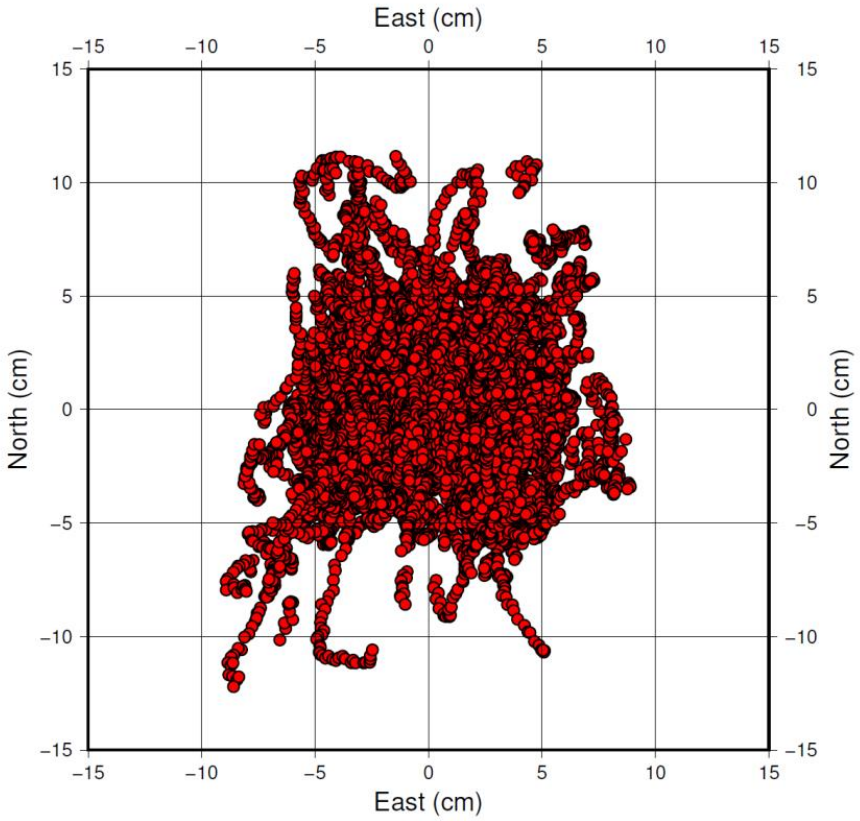


SBAS Trial Performance (PPP)

Precise Point Positioning (PPP)

- PPP after convergence
- 7cm uncertainty (95% CL)
- Convergence times 20 to 120 minutes
- Static setup

- Tested – rapid convergence
- Tested – gap bridging




NPI
NATIONAL POSITIONING
INFRASTRUCTURE CAPABILITY

More Information

http://www.ga.gov.au/scientific-topics/positioning-navigation/positioning-for-the-future/

http://www.crcsi.com.au/sbas

Email: npi@ga.gov.au

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