Australia and New Zealand Satellite Based Augmentation System (SBAS) Testbed

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What is SBAS?

- SBAS stands for Satellite Based Augmentation System
- Supports wide-area or regional augmentation through the use of satellite-broadcast messages
- Improves accuracy, reliability and availability of GNSS positioning
- Capable to provide instantaneous sub-metre positioning
What is SBAS?

- Originally designed for aviation, but has been used in many other non-aviation fields
- Includes integrity component
2011 SBAS Review Recommendation

- Australia applied for SBAS in 2011
- The main finding of the review was ... it is difficult to justify the significant investment involved in establishing SBAS to cover aviation operations at smaller aerodromes
- Any future investment in SBAS would need to be a part of a whole of Government approach with the cost considered against potential benefits across a range of industries
2017-2018 SBAS Testbed

- In late 2016, Australia invested $12 million for a SBAS Testbed Demonstration. New Zealand also contributed $2 million in Feb 2017
- The project will demonstrate the potential safety, productivity, efficiency and environmental benefits SBAS across a variety of industry sectors

“The Prime Ministers welcomed the signature today of the Australia New Zealand Science, Research and Innovation Cooperation Agreement. Agreed to ... test a second-generation Satellite-Based Augmentation System in both countries.”

Joint Statement by Prime Ministers the Rt Hon Bill English and the Hon Malcolm Turnbull MP, 17 February 2017
Current SBAS Coverage
Current SBAS Coverage incl Aus NZ Testbed
SBAS Testbed Partners
SBAS Testbed Partners
SBAS Testbed – Ground Station Coverage map
SBAS Testbed – Inmarsat 4F1 Satellite
SBAS Testbed – Lockheed Martin Ground Station
SBAS Testbed – GMV SBAS and PPP Servers
SBAS Trial Capabilities

- Generation 1 SBAS
  - L1 GPS

- Dual Frequency Multi-Constellation (DFMC) SBAS
  - L1/L5 and E1/E5a
  - GPS and Galileo

- Precise Point Positioning (PPP)
  - GPS Precise Orbits and Clocks transmitted over L1
  - GPS Precise Orbits and Clocks transmitted over L5
SBAS Testbed Signal Status

- PRN 122
- 0.5 metre accuracy
- RTCA DO-229D
- No ranging data

GEO L1 SBAS

June 2017

GEO L1 PPP

October 2017

DFMC GEO L5

October 2017

- PPP corrections on L1
- 0.1 metre accuracy

• RTCM DFMC WG62 GAL GPS SBAS MOPS v0.3.8
• PPP GPS+Galileo corrections on L5
DFMC SBAS

- Second Generation SBAS
- ICD not yet available, latest draft used in the testbed
- No commercial receiver can decode the signal, additional hardware is needed

New GMV SBAS/PPP receiver
Advantages of DFMC SBAS

• Better performance in regions with high ionospheric activity due to having two frequencies

• Better performance in difficult observing environments due to having more satellites

• Much less ground infrastructure required to achieve the same level of service
SBAS Testbed Objectives

- Assess current and future technology
- Explore current industry PNT requirements
- Explore industry innovations
SBAS Testbed Demonstrator Projects

- CRCSI is coordinating 27 demonstrator projects across Australia and New Zealand to showcase the economic benefits of SBAS technology in the following key sectors:

  - Aviation
  - Construction
  - Road
  - Utilities
  - Agriculture
  - Spatial
  - Rail
  - Resources
  - Maritime
  - Consumer
Example Demonstrator Projects – Aviation (incl. drones)

- Increase safety
- Operations at small aerodromes
- Reduce infrastructure cost
- Use of Drones in Agriculture
- Drone delivery
Example Demonstrator Projects – Maritime

- Under keel Clearance
- Safer Pilotage and Navigation
Example Demonstrator Projects – Road

- Connected and Automated Vehicles
- Road pricing
Example Demonstrator Projects – Agriculture

- Tractor guidance
- Cattle tracking
Example Demonstrator Projects – Agriculture (continued)
Thank You