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XXVI FIG Congress 2018

6-11 May 2018 ISTANBUL

EMBRACING OUR SMART WORLD WHERE THE CONTINENTS CONNECT:

ENHANCING THE GEOSPATIAL MATURITY OF SOCIETIES

Presented at the FIG Congress 2018,
May 6-11, 2018 in Istanbul, Turkey

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

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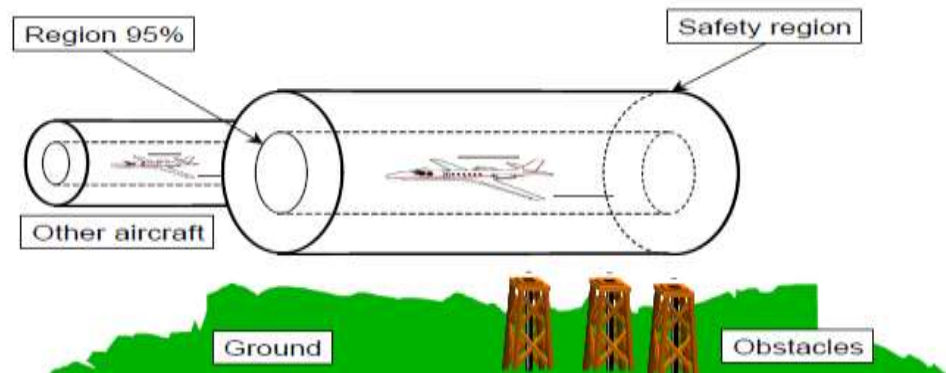
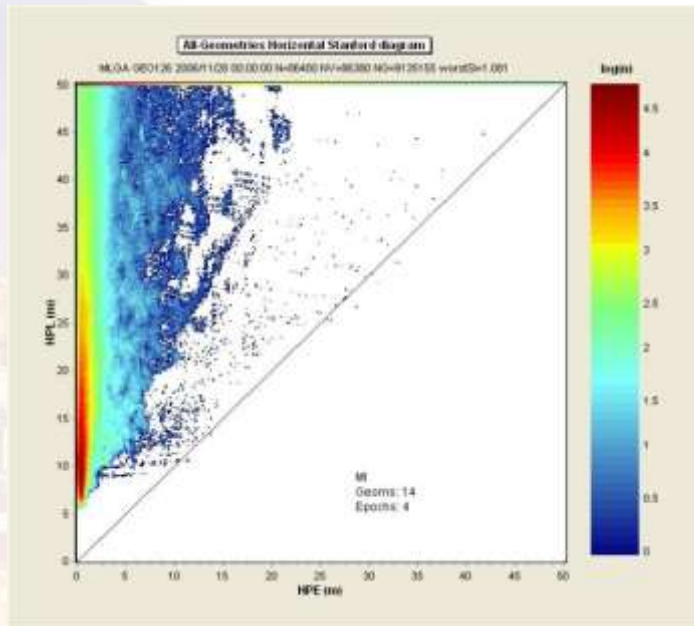


What is SBAS?

- 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.”

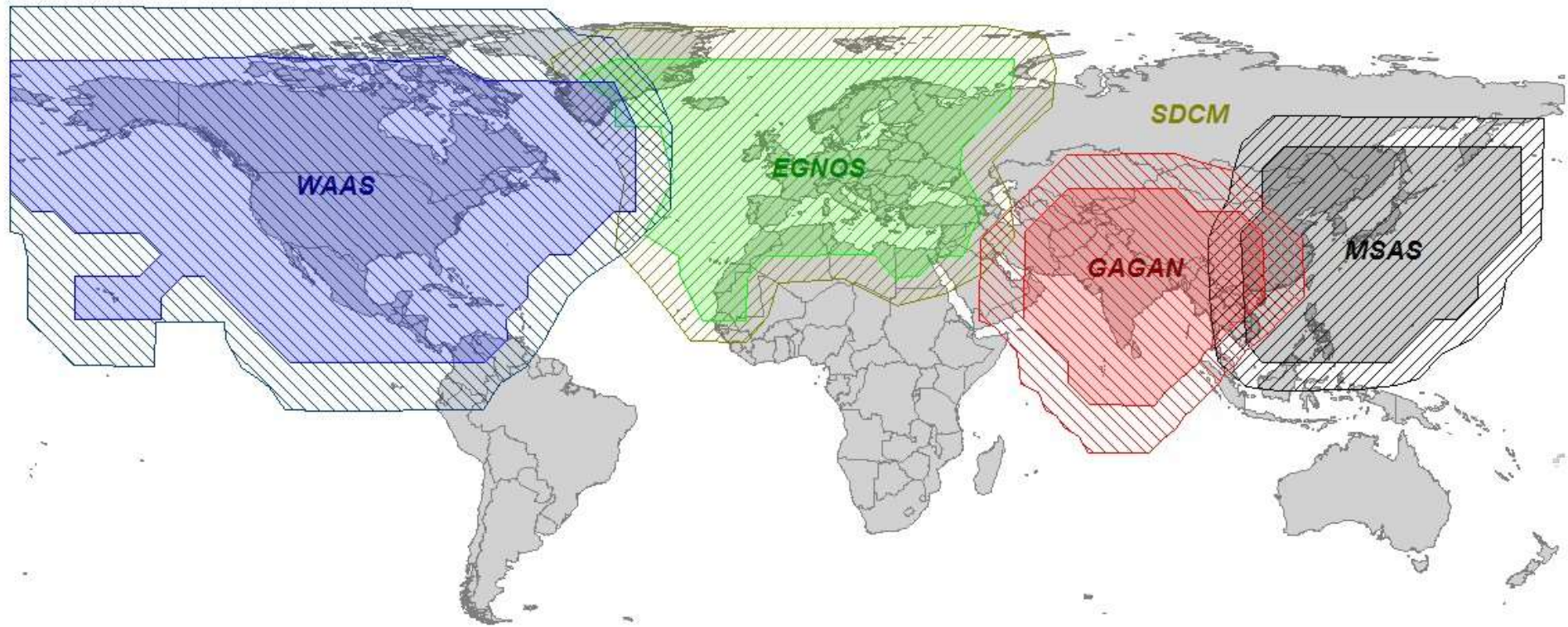
Joint Statement by Prime Ministers the Rt Hon Bill English and the Hon Malcolm Turnbull MP, 17 February 2017



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Current SBAS Coverage



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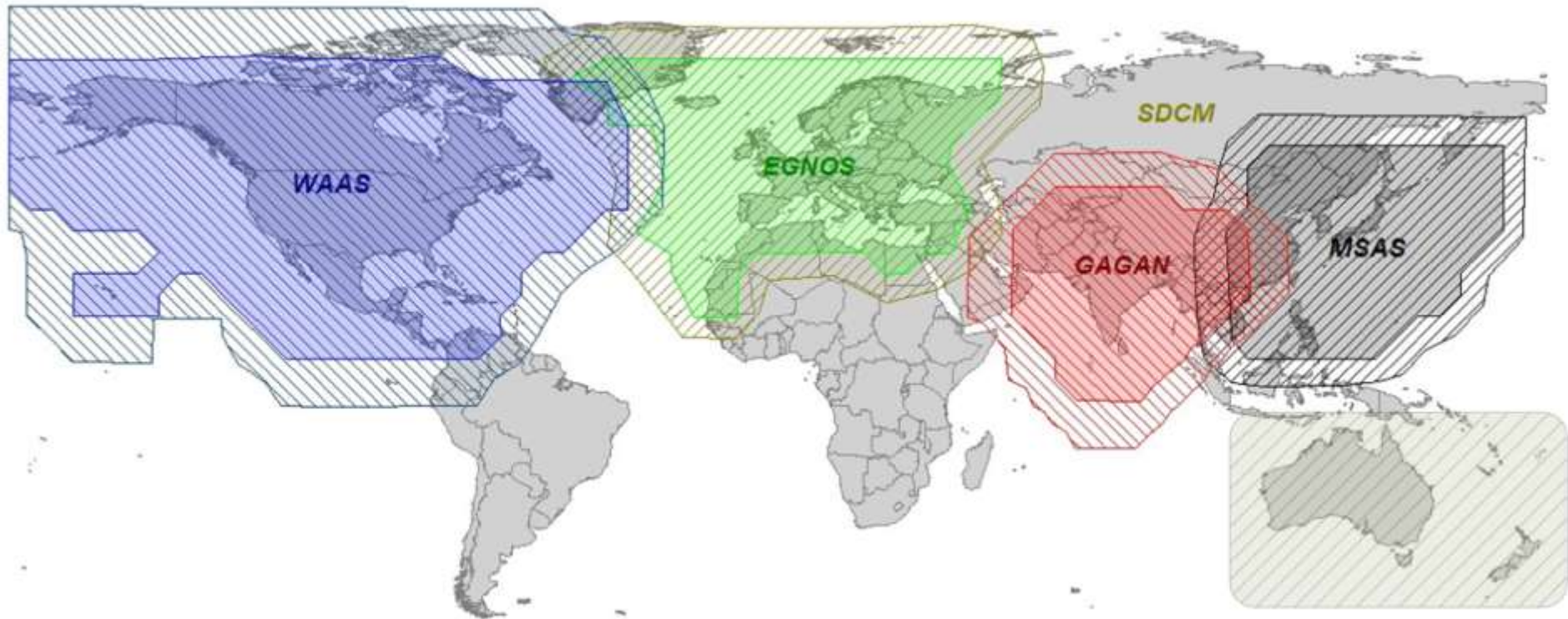
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Current SBAS Coverage incl Aus NZ Testbed



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SBAS Testbed Partners



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SBAS Testbed – Ground Station Coverage map



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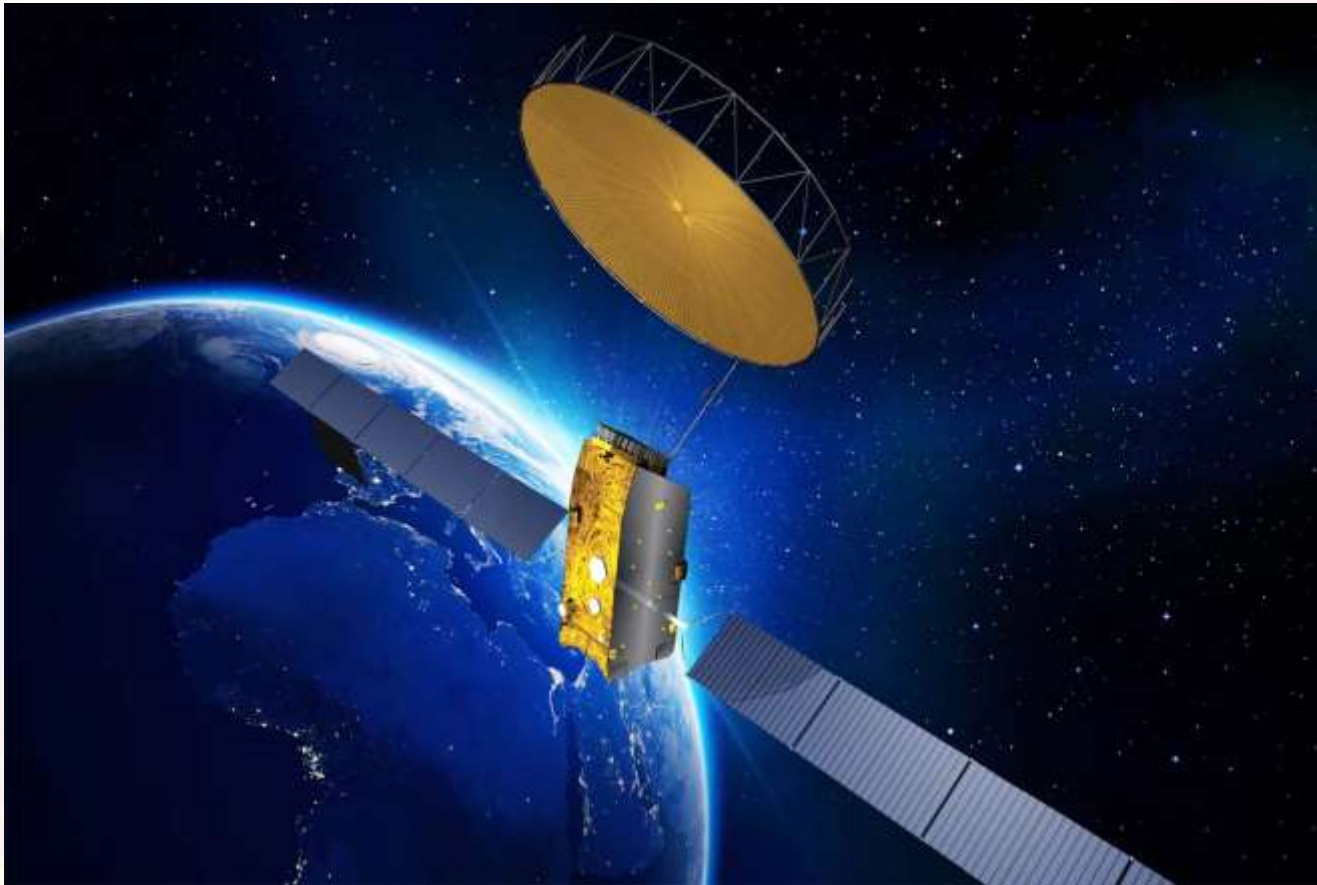
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SBAS Testbed – Inmarsat 4F1 Satellite



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SBAS Testbed – Lockheed Martin Ground Station



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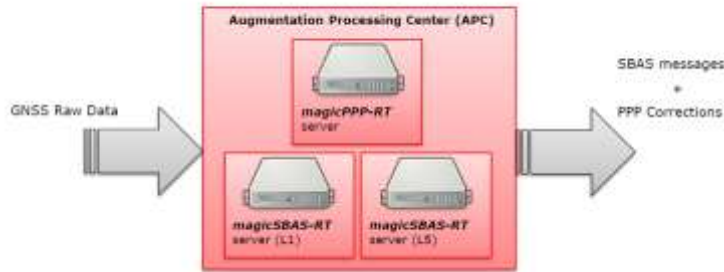
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SBAS Testbed – GMV SBAS and PPP Servers



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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



Carrier wave



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SBAS Testbed Signal Status



GEO
L1
SBAS

June
2017

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

GEO
L1
PPP

October
2017

- PPP corrections on L1
- 0.1 metre accuracy

DFMC
GEO
L5

October
2017

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

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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



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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

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SBAS Testbed Objectives

- Assess current and future technology
- Explore current industry PNT requirements
- Explore industry innovations



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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

Road

Agriculture

Rail

Maritime

Construction

Utilities

Spatial

Resources

Consumer

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Example Demonstrator Projects – Aviation (incl. drones)

- Increase safety
- Operations at small aerodromes
- Reduce infrastructure cost
- Use of Drones in Agriculture
- Drone delivery





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Example Demonstrator Projects – Maritime

- Under keel Clearance
- Safer Pilotage and Navigation



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Example Demonstrator Projects – Road

- Connected and Automated Vehicles
- Road pricing



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Example Demonstrator Projects – Agriculture

- Tractor guidance
- Cattle tracking



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Example Demonstrator Projects – Agriculture (continued)



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Thank You



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