Results on Australia and New Zealand Second Generation SBAS and PPP Augmentation System

Speaker
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SYSTEM DESCRIPTION
Australia and NZ SBAS Testbed

Land Information New Zealand

Australian Government
Geoscience Australia

FRONTIER S I

LOCKHEED MARTIN

gmv

INNOVATING SOLUTIONS

inmarsat

LOCKHEED MARTIN
Aus & NZ SBAS Testbed System Overview

GPS

Galileo

CORS stations
Geoscience Australia
Land Information NZ

User Terminals
GMV’s terminals

SBAS GEO
Inmarsat 4F1 (E143.5°)
PRN 122

Signal Generation
and Uplink
LMSSC Uralla TT&C Station

Processing Centre
GMV magicSBAS™
GMV magicPPP™
Services Broadcasted

SBAS DFMC & PPP
GPS L1/L2 + Gal E1/E5a

SBAS L1 & PPP
GPS L1/L2

Inmarsat-4F1
(143.5E)

PRN 122 L5
Technology Map (Data Processing)

Orbit and Clock Estimation
Ionospheric Estimation
Integrity (GIVE, UDRE, DFRE)
SBAS and PPP message

System Operation
RT System Monitoring
Performance Analysis

magicSBAS
magicODTS
TECHNOLOGY MAP (Uplink System)

Uplink Safety Monitor
INTEROPERABILITY
WITH OTHER SBAS IN THE REGION

SIGNAL Generation
Signal Control and Sync
GEO Uplink

Results on Australia and New Zealand Second Generation SBAS System
International Technical Symposium on Navigation and Timing
Toulouse 14th November, 2018

14/11/2018
USER SEGMENT SBAS L1, DFMC, PPP
System Availability

(*) 10 meters Upon complete GPS+GAL constellations

SBAS L1 Legacy
06/06/2018 APV-I Availability Map

SBAS L5 DFMC
06/06/2018 LPV-200 Availability Map

<table>
<thead>
<tr>
<th>SBAS L1 (LEGACY)</th>
<th>SBAS L5 (DFMC)</th>
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<tbody>
<tr>
<td>APV-I (50m)</td>
<td>LPV200 (35m)</td>
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<tr>
<td>LPV200 (35m)</td>
<td>CAT-I (15m)(*)</td>
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Vertical error GPS Single Frequency

**GPS L1**
Vertical Error (GPS)

Typical P95
> 3 m

**GPS L1 + Legacy SBAS**
Vertical Error (GPS_Sbas)

Typical P95
1 to 1.6 m

Canberra
6 days of Data
25/08/18-31/08/2018
Vertical error GPS Dual Frequency

**GPS L1/L2**

Typical P95
3 to 4 m

**GPS L1/L2 + DFMC SBAS**

Typical P95
1 to 1.6 m
**Vertical error GPS+GAL Dual Frequency**

**GPS L1/L2 + Galileo E1/E5a**

Typical P95
2 to 3 m

**GPS + Galileo + DFMC SBAS**

Typical P95
0.8 to 1.4 m
Vertical error at 95% for GPS L1

**GPS L1**

**GPS L1 + SBAS L1 Legacy**
Vertical error at 95% for GPS L1/L2

GPS L1/L2

mSBAS L5 GPS 95% vertical accuracy trends at selected stations

GPS L1/L2 + SBAS DFMC

mSBAS L5 Augmented 95% vertical accuracy trends at selected stations
GPS+GAL PPP THROUGH SBAS L5
GPS+GAL PPP THROUGH RTCM
RT-PPP Daily Analysis

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RT-PPP Daily RMS average at PARK station for 5 months

<table>
<thead>
<tr>
<th></th>
<th>RTCM GPS</th>
<th>SBAS L1 GPS</th>
<th>RTCM GPS+GAL</th>
<th>SBAS L1 GPS+GAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
<td>8.97 cm</td>
<td>10.17 cm</td>
<td>6.80 cm</td>
<td>8.35 cm</td>
</tr>
<tr>
<td>Vertical</td>
<td>10.67 cm</td>
<td>14.47 cm</td>
<td>7.54 cm</td>
<td>11.69 cm</td>
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</table>
AUS+NZ SBAS TB
All services up since Oct. 2017
with excellent performance
THANK YOU

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