



GBAS/SBAS IMPLEMENTATION in APAC **AUSTRALIA'S PERSPECTIVE**

Jorge Woods - CASA



PERSPECTIVES

- OVERALL
- GBAS
- SBAS
- RELATED NAV/SUR

OVERALL (1)

- Aviation is self funding in Australia
- Government Policy Task
 - Influence infrastructure investment and operating costs at the service of society
 - Whole of Government Approach
- Australia
 - Departments/Agencies under State Safety Program
 - Industry

OVERALL (2)

➤ Australia 'thinks'

- Global ATM Concept (GATMOC, Doc 9854)
- Balancing GATMOC's
 - Performance Service Asset Package (PSAP) (Cir335)
 - across its 11 KPA (Doc 9883)
 - using the GANP

OVERALL (3)

➤ GBAS/SBAS =

- part of Navigation Equation, which is
- part of ATM/CNS, which is
- part of Aviation Transport System, which is
- part of Transport System

GBAS

- 2006-2011 = SYD GBAS trials
- 2012(06) = SYD GBAS – restricted operators
- 2014(06) = SYD GBAS – all operators
 - RWY: 07, 16L, 16R, 25, 34L, 34R
- 2017(06) = MEL GBAS – all operators
 - RWY 09, 16, 27, 34
- FUTURE = Potentially BN, PH and AD

SBAS

- 2019(Q3): Cost benefit analysis across 10 industry sectors (including aviation)
 - Benefits expected = several billions AUD
- Test bed indicates performance compatible with cost benefits analysis
- Important to know the user base
 - SBAS = potential APV to 1000 RWY Ends

RELATED NAV/SUR (1) – Context

- GNSS/ADS-B mandate IFR (2013 => 2017)
- Navigation Rationalization Project (NRP) (2016)
- PBN
- TIFP
- Surveillance
- ADS-B Data Sharing

RELATED NAV/SUR (1) – Context

- GNSS/ADS-B mandate IFR (2013 => 2017)
 - Most IFR flights GNSS as primary
 - Extend surveillance coverage substantially
 - Progressive Steps: 2013; 2014 (2); 2016; 2017
 - GNSS/ADS-B Mandate ≠ SBAS equipped

RELATED NAV & SUR (2)

Navigation Rationalisation Project (NRP) (1)

- 2016 – Decommissioned ~50% ground-based navaids

- Backup Navaid Network (BNN):
 - Allow recovery of “flight in progress” if unable to access GNSS (e.g. localized jamming; aircraft fault)

 - Support aircraft without fault detection and exclusion (all SBAS receivers have FDE)

 - Provide limited ongoing network capacity in the case of a sustained failure (balance between flexibility and resilience)

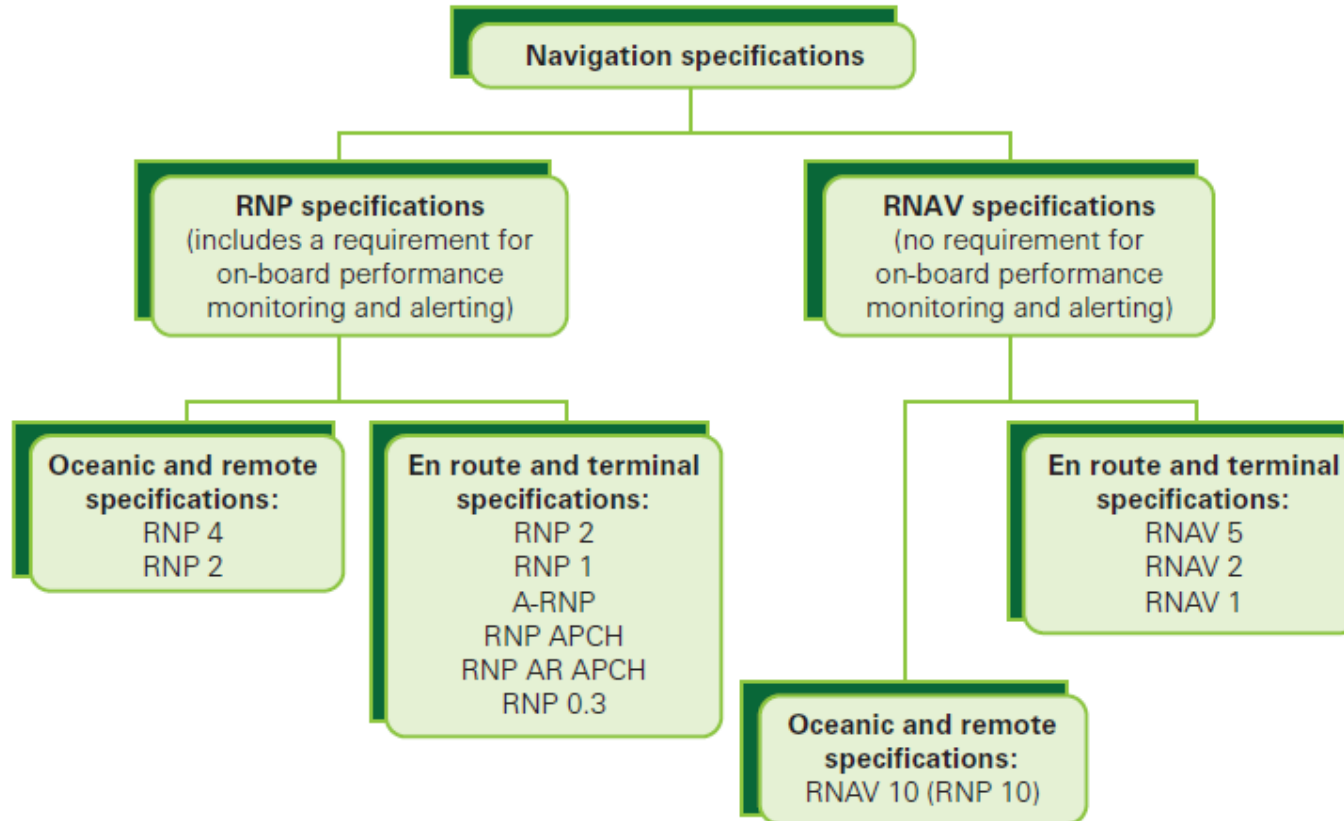
RELATED NAV/SUR (3)

Navaid Rationalization Project (NRP)(2)

➤ BNN Limitations

- Cost of IFR training that is not used
 - E.g. recency on NDB/VOR approaches
- Proximity of alternate airports for aircraft without FDE
- Network architecture needs review

RELATED NAV/SUR (4) – PBN (1)



➤ Navigation Specifications used in Australia

Specification	Intended Use
RNAV 10 (RNP 10) Oceanic Operations <i>Supported in Australia</i>	<ul style="list-style-type: none"> Supports 50 NM lateral and longitudinal separations in oceanic / remote continental airspace.
RNP 4 Oceanic Operations <i>Preferred in Australia</i>	<ul style="list-style-type: none"> Supports 30 NM lateral and longitudinal separations in oceanic / remote continental airspace.
RNP 2 Enroute Operations	<ul style="list-style-type: none"> Oceanic and enroute use.
RNP 1 Terminal Operations	<ul style="list-style-type: none"> Provides connectivity between enroute airspace and Instrument Approach Procedures in terminal airspace (SIDs and STARs).
RNP APCH Approach Operations <i>Chartered "RNAV GNSS"</i>	<ul style="list-style-type: none"> Provides RNAV GNSS approach operations: NPA = LNAV (MDA/H) and APV = LNAV/VNAV (DA/H)
RNP AR APCH Approach Operations <i>Chartered "RNAV RNP"</i>	<ul style="list-style-type: none"> Authorisation Required (AR) for such operation. Supports RNP 0.3—0.1 and curved paths.

RELATED NAV/SUR (6) – TIFP

➤ Total ≈ 300 aerodromes (certified or registered)

➤ TIFP figures (now/planned)

○ Baro-VNAV ≈ 105/337

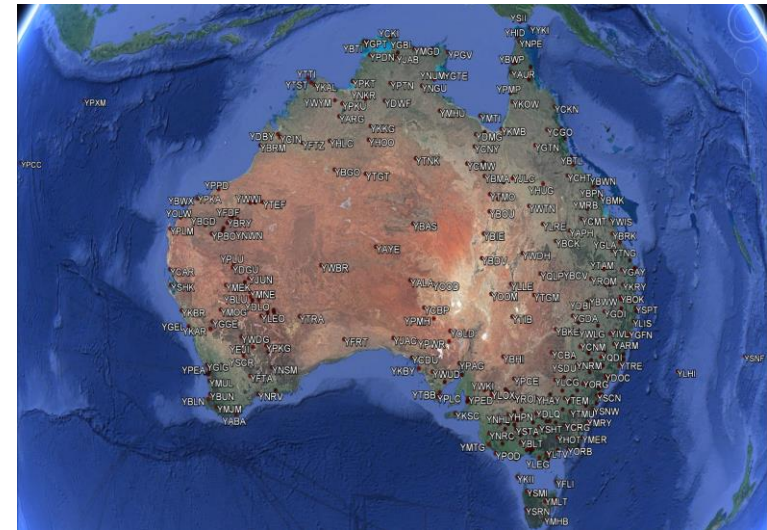
○ RNP-AR ≈ 40/44

○ GLS ≈ 10/18

○ SBAS Potentially

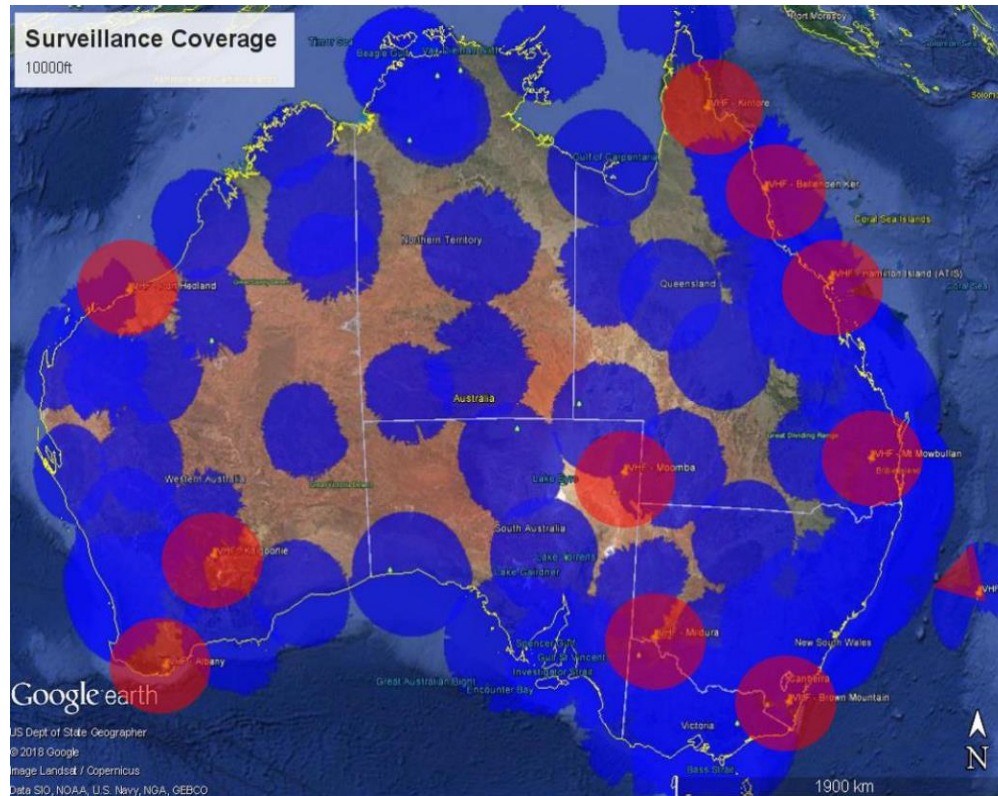
- to all ≈ 1100 Runway Ends

- depending on benefits for each individual case



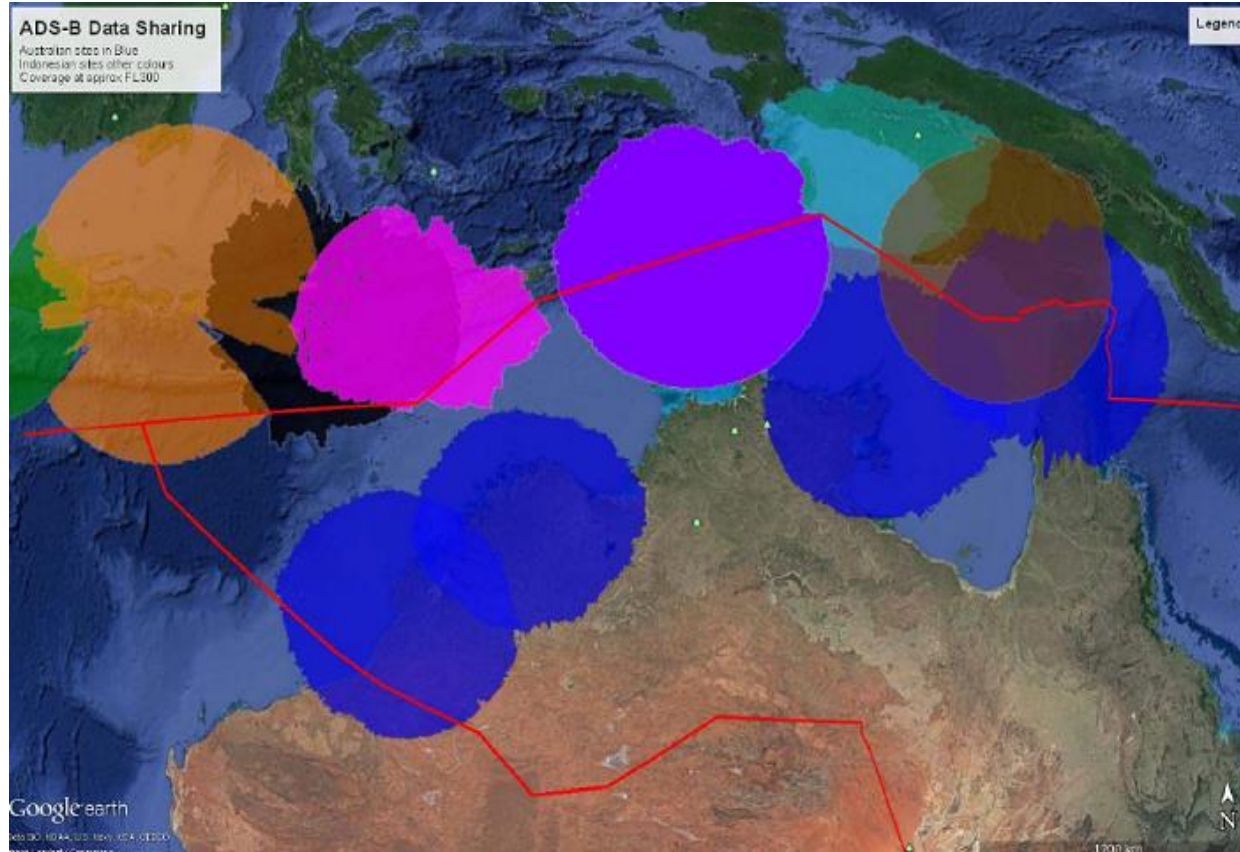
RELATED NAV/SUR (7)

➤ SUR Coverage 10000 ft



RELATED NAV/SUR (8)

➤ ADS-B Data Sharing – Australia/Indonesia



WRAP UP (1)

➤ WE 'THINK'

- balance ICAO *Performance Service Asset Package (PSAP)*
- for 11 KPA in ICAO GATMOC
- across known user base
- with stakeholders moving in synchronism
- using the GANP
- Ref: Docs 9854, 9883, Circ. 335

WRAP UP (2)

- GBAS: proved net benefits in specific cases
- SBAS: viable for user-base > than aviation
- RELATED NAV/SUR: GBAS/SBAS within context
 - navigation rationalisation and backup
 - PBN, TIFP
 - surveillance needs

END

SPARE SLIDES

➤ GNSS/ADS-B Mandate – Schedule (1)

AIRCRAFT EQUIPMENT

Effective Date	Applicable to
12 December 2013	Aircraft operating at or above FL 290
1 January 2014	New aircraft registered on or after 1 January 2014 <ul style="list-style-type: none"> • MCTOW >5700 kg or >19 passengers
6 February 2014	New aircraft registered in Australia on or after 6 February 2014
	Existing aircraft modified on or after 6 February 2014 and:
	Operating in class A, B, C, or E airspace, or Operating above 10,000ft in class G airspace. Note: Not applicable to aircraft operating in class E airspace or above 10,000ft in class G airspace if the aircraft has no engine or insufficient electrical power capacity to operate a transponder.
	New aircraft operating in RPT or charter operations
	New aircraft operating in aerial work or private operations
	Existing aircraft operating in RPT or charter operations, if modified on or after 6 February 2014
	Existing aircraft operating in aerial work or private operations if modified on or after 6 February 2014

➤ GNSS/ADS-B Mandate Schedule (2)

4 February 2016	Aircraft operating in class A, B, C or E airspace in the 500nm quadrant north and east of Perth
	Aircraft operating at Brisbane, Sydney, Melbourne, or Perth aerodromes
	Existing aircraft operating in RPT or charter operations
	Existing aircraft operating in aerial work or private operations
2 February 2017	Existing aircraft on the Australian register before 6 February 2014

Notes

1. Requirements are applicable to aircraft conducting IFR operations only.
2. Refer to CAO 20.18 and 20.91 for full details of requirements.