ADS-B OUT Key performance criteria

ADS-B Workshop – SP/17

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KEY PERFORMANCE REQUIREMENTS for 5 NM Separation and 3NM in NRA

	5 NM	3Nm
Accuracy	95% Accuracy < 0.5 Nm	95% Accuracy < 0.3 Nm
Integrity	Integrity requirement < 2.0 Nm at 1e-5 per fh	Integrity requirement < 1.0 Nm at 1e-5 per fh
Latency	95% Airborne latency for position & integrity < 1.5 seconds	

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NRA Application

RTCA – DO-303
EUROCAE – ED126
ICAO SASP Circ 311

	5 NM		3 NM	
	RFG Body (FAA/Eur)	RFG Appendix (AUS)	RFG Body (FAA/Eur)	RFG Appendix (AUS)
RoA	60Nm	200Nm	33Nm	60Nm
Accuracy	0.166Nm	0.55Nm	0.1Nm	0.1Nm
Integrity (HPL)	1.0 Nm	2.0Nm	0.6Nm	1.0Nm
Latency	95% Airborne latency for position & integrity < 1.5 seconds. Uncompensated latency <1 second			

RAD Application

- **RTCA – DO-318**
- **EUROCAE – ED161**

- **Alternate RoA in Annex B Appendix B**

- Range of applicability RoA
  - » RFG decided that ADS-B must be better than radar effectively in all coverage volumes
  - » Australia argues that ADS-B needs to meet minimum radar requirement (see RAD Annex B Appendix B)

- ADS-B in a radar environment
  - » Should requirements be more demanding or less demanding when radar is available too?
    - – RFG requirements are more demanding

RAD Application

RTCA – DO-318
EUROCAE – ED161

Developed for future, high performance heavy traffic areas

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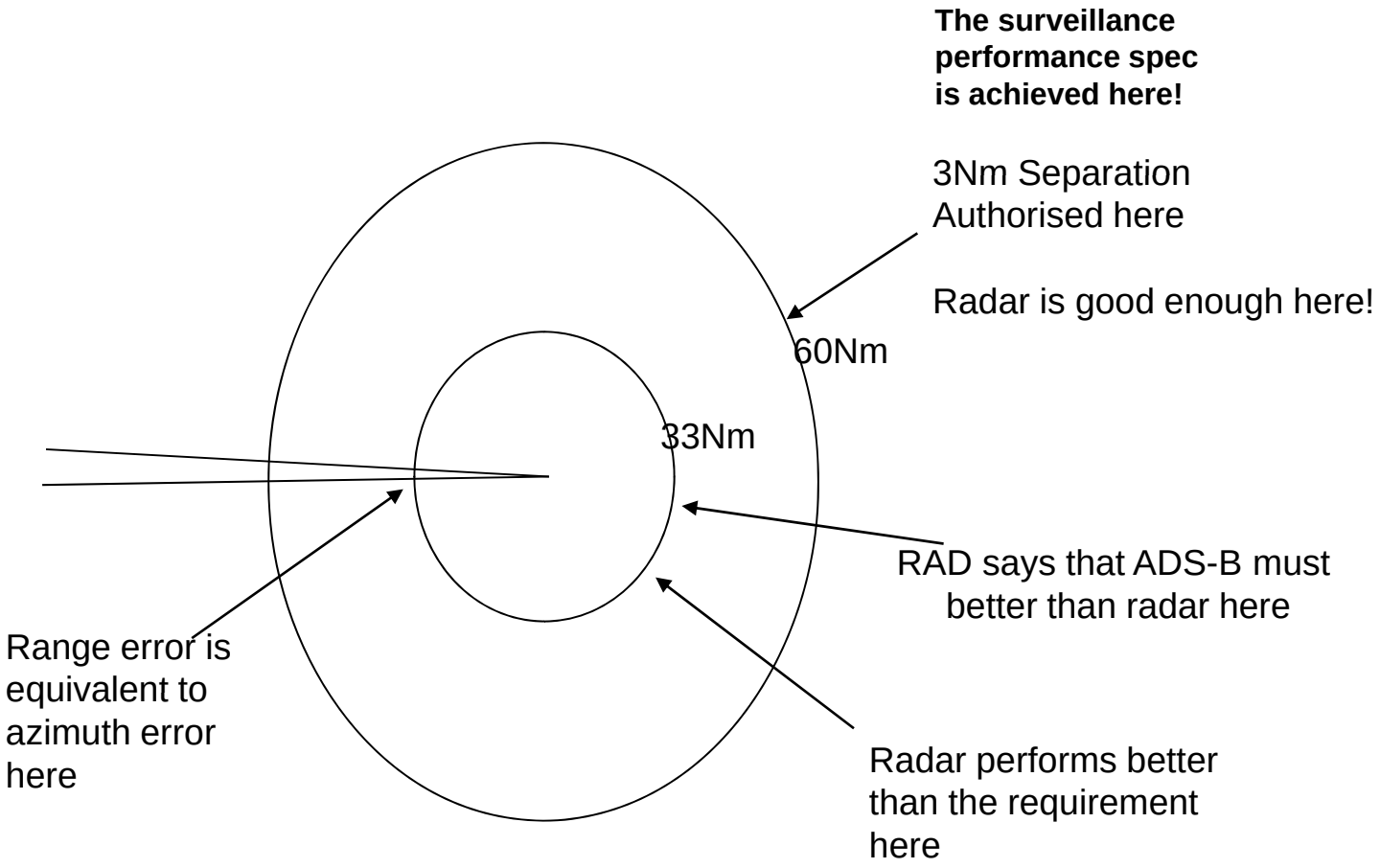
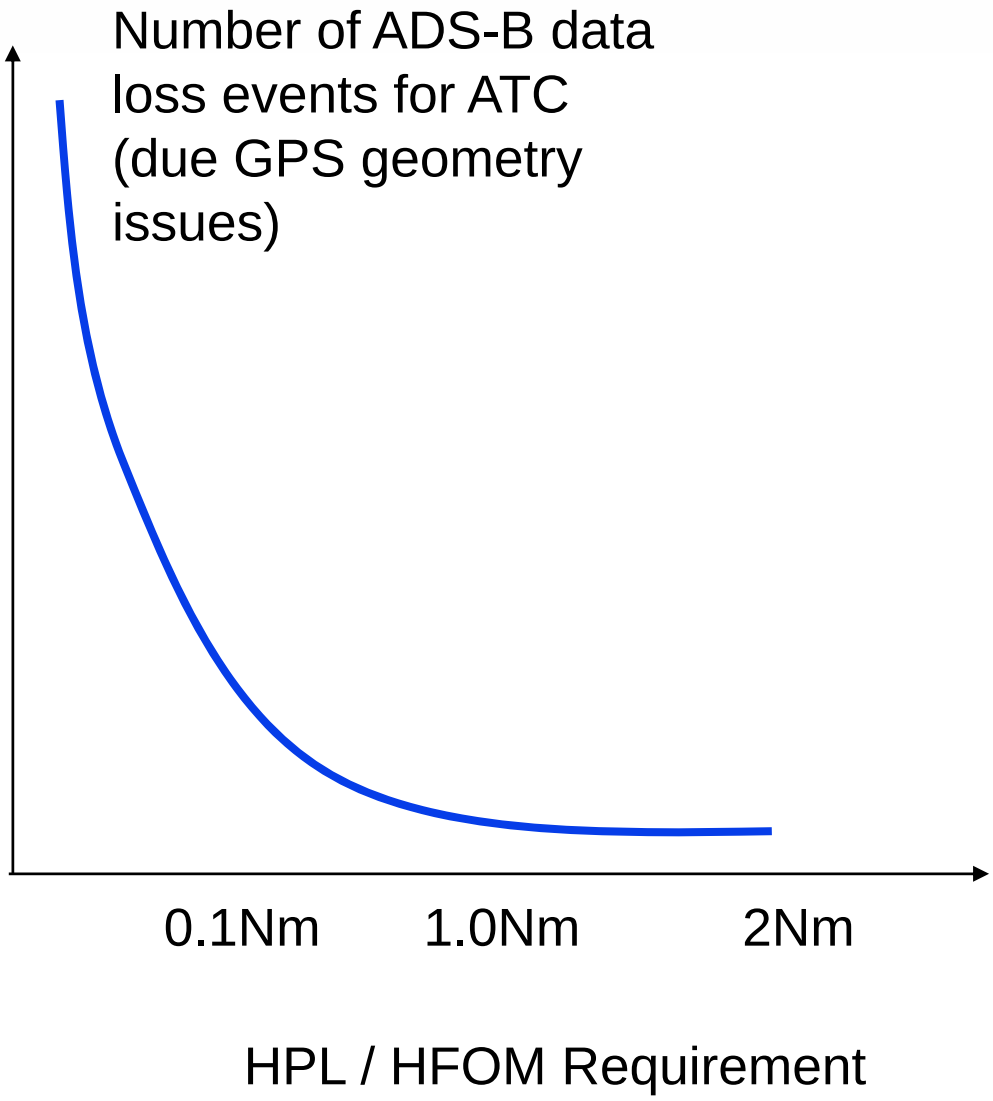
Choice of RoA

(3 Nm case)



If 3Nm separation is authorised at 60Nm with radar then

Required surveillance performance is radar performance at 60Nm



Consequence of more demanding Accuracy & Integrity

ADS-B performance improved by

- SA aware GPS
- WAAS GPS
  - Asia Pac does not have WAAS

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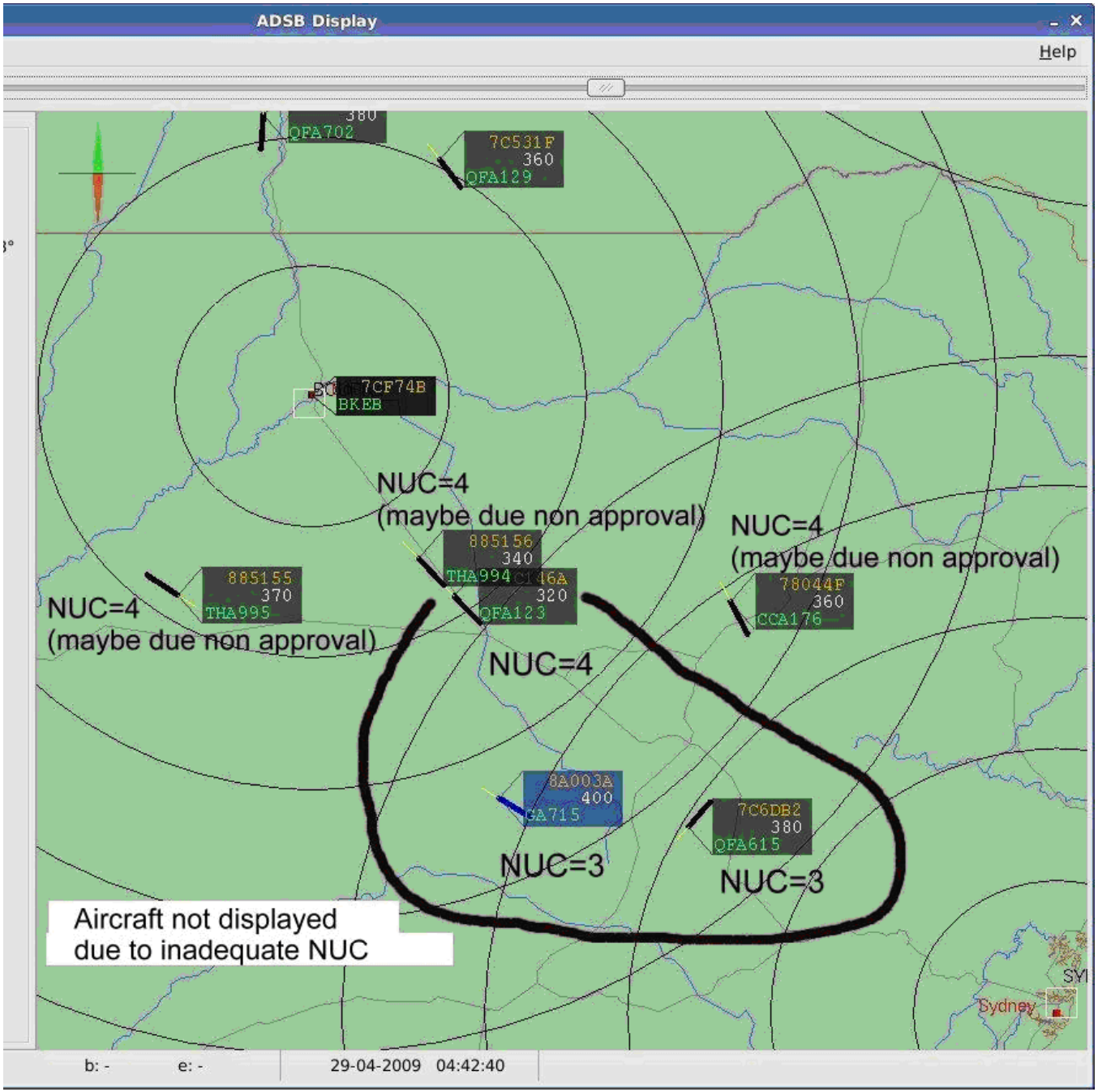

OUTAGES OCCUR

GPS performance matters

- Real outages – will trigger reversion to procedural ATC
- Affecting multiple aircraft
- Eg: 16 April 2008
- -12 minutes
- - 24 minutes

- Harmonise towards DO260B but use DO260 at least until 2020

- Maximise availability & continuity by
  - » Use largest safe HPL as acceptable display threshold
  - » Use SA GPS when possible
  - » Use augmentation if possible (eg MSAS)

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Harmonisation

- Asia-Pac ATC systems and regulations should accept FAA/European aircraft with more demanding requirements

- Can demand more stringent requirements in future
  - » Give operational & safety benefits to DO260 equipped customers

APANPIRG DECISION 19/37

The implementation would require aircraft equipped with avionics compliant with either;

1) *Version 0 ES as specified in Annex 10,Volume IV, Chapter 3, Paragraph 3.1.2.8.6 (up to and including Amendment 82 to Annex 10) and Chapter 2 of the Technical Provisions for Mode S Service and Extended Squitter (ICAO Doc 9871) (Equivalent to DO260) to be used till at least 2020. or*
2) Version 1 ES as specified in Chapter 3 of the Technical Provisions for Mode S Services and Extended Squitter (ICAO Doc 9871) (Equivalent to DO260A)

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CONCLUSIONS

- We can deliver ATC radar like separation benefits to customers with Do260 avionics
- FAA and Europe have more demanding environments and legacy constraints
  - » No problem
- Be careful of safety issue with GPS integrity causing ADS-B outages

Questions?

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