



ADS-B Avionics

APANPIRG ADS-B TASK FORCE SEMINAR
Nadi , Fiji

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Airservices Australia

from the ground up



Avionics – Available today

- Honeywell

- Air Transport
- Business / GA

TRA-67A

MST-67A & KT-73



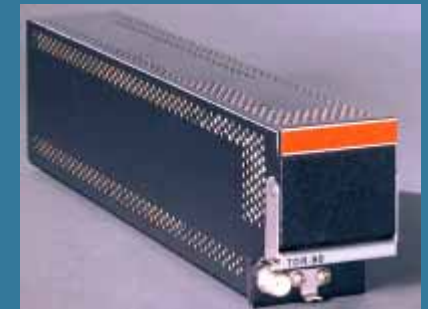
Bendix-King KT-73

- Rockwell Collins

- Air Transport
- Business / GA

TPR-901

TDR-94/94D - 108



Rockwell-Collins TDR-94D

- ACSS

- Air Transport
- Business / GA

XS-950 * Must have “ModA”

RCZ-852



ACSS RCZ-852

- UPS-AT

- Air Transport

AT7000



Lets talk about the famous “wire”

Transponder
Software

GPS data bus



*Adapted from a FedEx
presentation*

Don't need cockpit displays for ADS-B out



What do I need to have ADS-B?

- A GPS source – which provides the integrity data
 - Big Aircraft = ARINC label 130 : HPL

- A barometric altimeter

- A device which transmits ADS-B
 - A modern mode S transponder

Or

- An ADS-B transmitter box with antenna
- A wire between them that carries Position & Integrity



GPS requirements

- GPS MUST output HPL
- A GPS with Fault detection & Exclusion is strongly preferred
- A TSO145a GPS engine is preferred
- A GPS which does not assume “SA” in on is preferred

Regional Aircraft

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- SAAB, Embrarer, Bomardier slow to embrace ADS-B
 - Choices : Wait for integrated solutions or do it yourself
 - Transponder products exists
 - GNSS : More care needed
- Or an “ADD ON” solution :



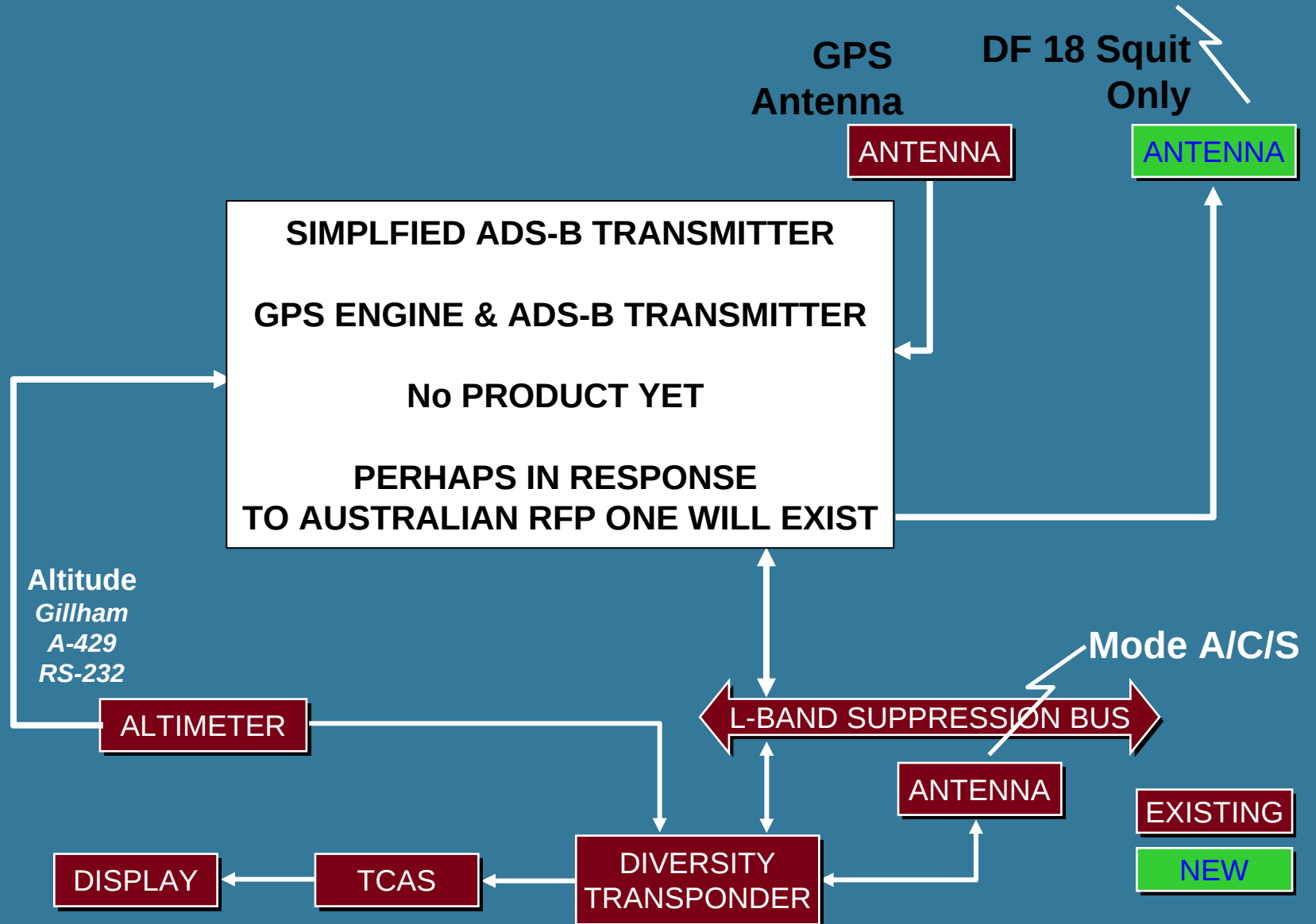
Non-TCAS Equipped Aircraft



As used in
Bundaberg Australia

DF 17 Squit +
Mode A/C/S







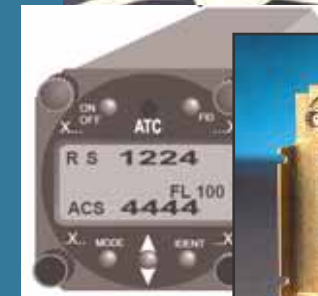
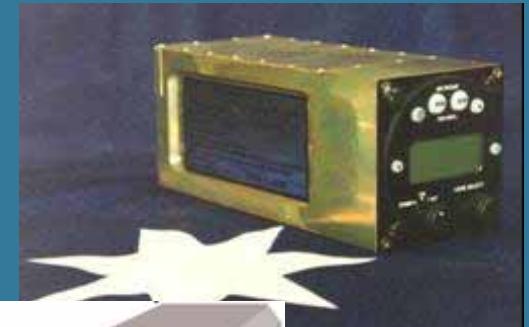
TCAS Equipped Aircraft





Smaller Aircraft Equipment are being developed

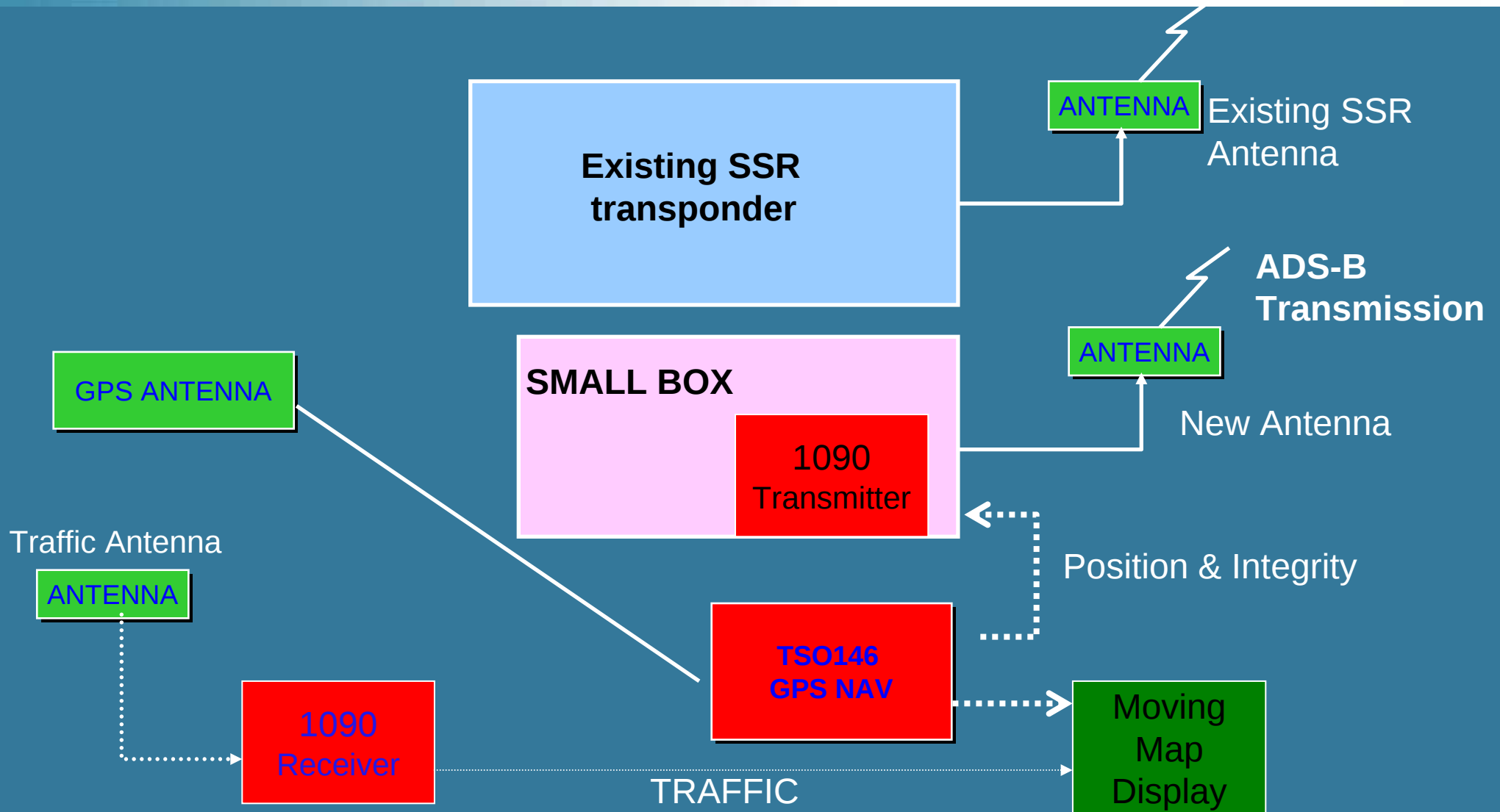
- Development of ADS-B capability in transponders
- Low cost, size and weight
- eg Microair : Bundaberg Queensland
- eg Avionics AustralAsia :Brisbane Queensland
- eg Filser & Becker & Eurotelematik : Germany
- eg Honeywell & Garmin : USA



**Airservices Australia
Request for Proposal
closes soon**

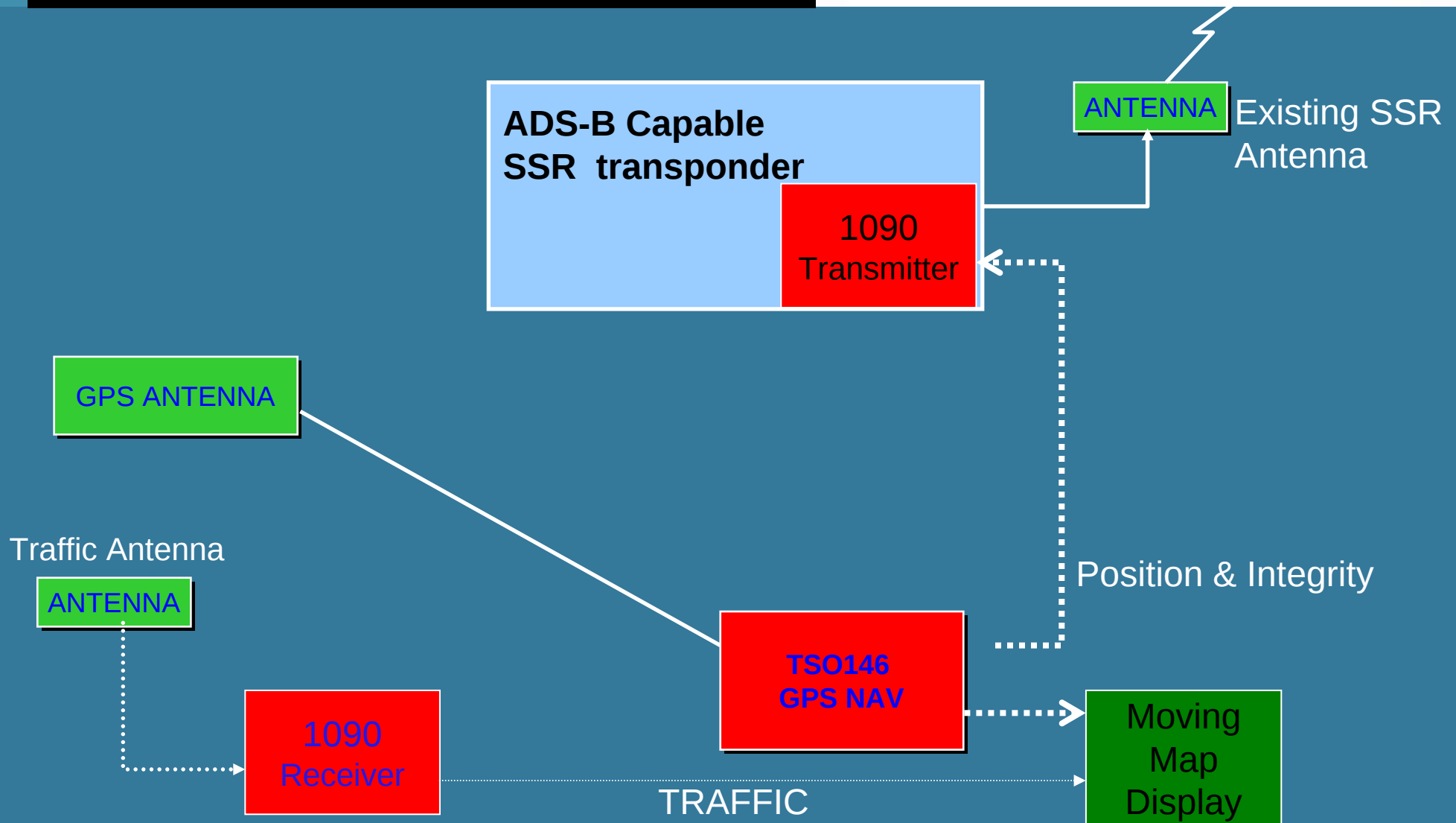
IFR ADS-B Option 1

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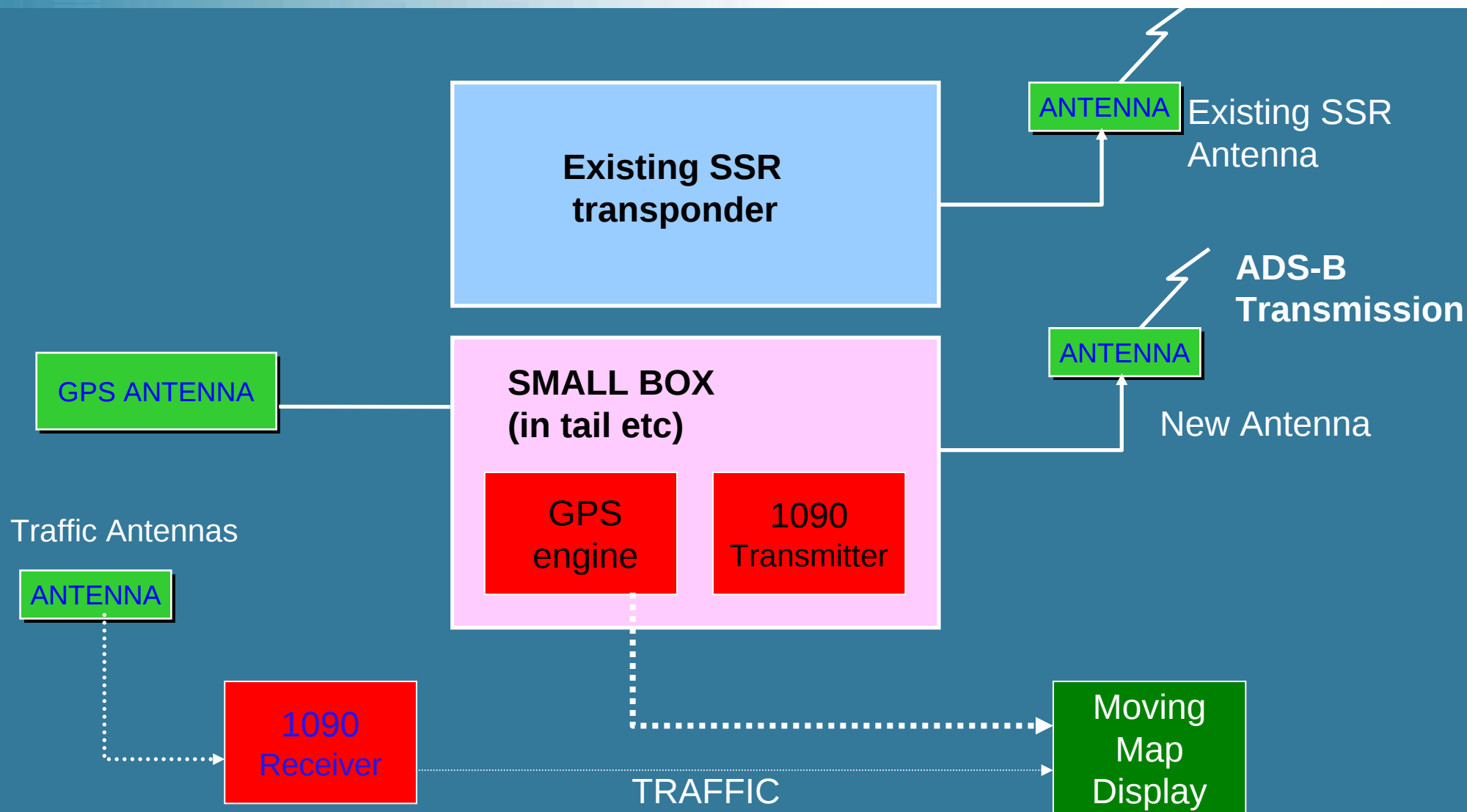
IFR ADS-B Option 2

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VFR ADS-B options

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Indicative Low-end ADS-B Avionics for GA

MANDATORY

- Low weight, low cost, low power, low installation costs
- CASA approval
- Compliant with any or all of the following (or equivalent):
 - ATSO C1004: ATC transponder (DF18)
 - ATSO C1005: ADS-B only (DF18)
 - TSO C112: Mode S transponder
- Operable up to FL150 (125W output)
- Base model to include TSOed GNSS receiver with:
 - Ability to take advantage of Selective Availability (SA) off
 - Fault Detection & Exclusion (FDE)
 - Provision of HPL for ADS-B
- Must operate on aircraft with existing transponders
- Bottom antenna only required
- STC Approved Model List (AML) to cover a wide selection of aircraft with MTOW < 5,700 kg
- Available mid to end-2007

DESIRABLE

- Integrated altitude encoder (with an optional (lower cost?) configuration able to receive data from an external altitude encoder)
- Integrated TSOed GNSS navigator (with an optional (lower cost?) configuration able to receive GNSS data from an external source)
- Baro-aiding
- Squat switch (on ground reporting)
- Emergency input discrete
- Emergency input SPI
- Future growth to incorporate ADS-B receivers (for CDTI etc)



Prices for Avionics

- Close low for new aircraft off the production line
 - Eg: Airbus, Boeing
 - BUT Bombardier, SAAB & Embrarer don't support it yet
- Expensive for old aircraft without GPS (eg B767)
- Cost of Service Bulletin from Boeing/Airbus depends on relationship. Low cost to Very high cost

Standards for Mode S

proposed AIRSERVICES AUSTRALIA



- ICAO → Signals in Space

- Annex 10 SARPS Amend 77

- AVIONICS & TEST STANDARDS

- RTCA

- ADS-B MASPS DO242
- ADS-B MOPS 1090 DO260 & DO260A
- Mode S MOPS DO-181c include ADS-B

- FORM/FIT STANDARDS

- AEEC

- ARINC 718A

- FAA (Regulator)

- TSO C112
- TSO C116

- AVIONICS & TEST STANDARDS

- EUROCAE

- ED73B Mode S MOPS
- ED102 ADS-B for 1090Mhz

- FORM/FIT STANDARDS

- EUROCAE

- ED86

- JAA (Regulator)

- JTSC 2C112

- CASA (Regulator)

- ATSO C1004 ModeAC + ADS-B
- ATSO C1005 ADS-B only



What about the DO260 vs DO260A debate?

- Points to note :
- FAA's TSO C166 allows DO260 AND DO260A
 - Expects DO260 to be inadequate for some applications
 - Regional class TDR94D -108 is the only DO260A box available
- At least 2 years till large aircraft DO260A boxes available



RFG NRA Interop Doc exists

- Final draft Interop document defines minimum requirements for ATC use of ADS-B



What's missing?

- Internationally accepted Airworthiness requirements/ certification
 - FAA, CASA & EASA expected to work on them soon
 - Following work of RFG or following work of an ATC provider or foreign regulator
- Airliner “certification”
 - What is needed?



Discussion

More details on Airservices Website

<http://www.airservicesaustralia.com/pilotcentre/projects/adsb/adsb.htm>

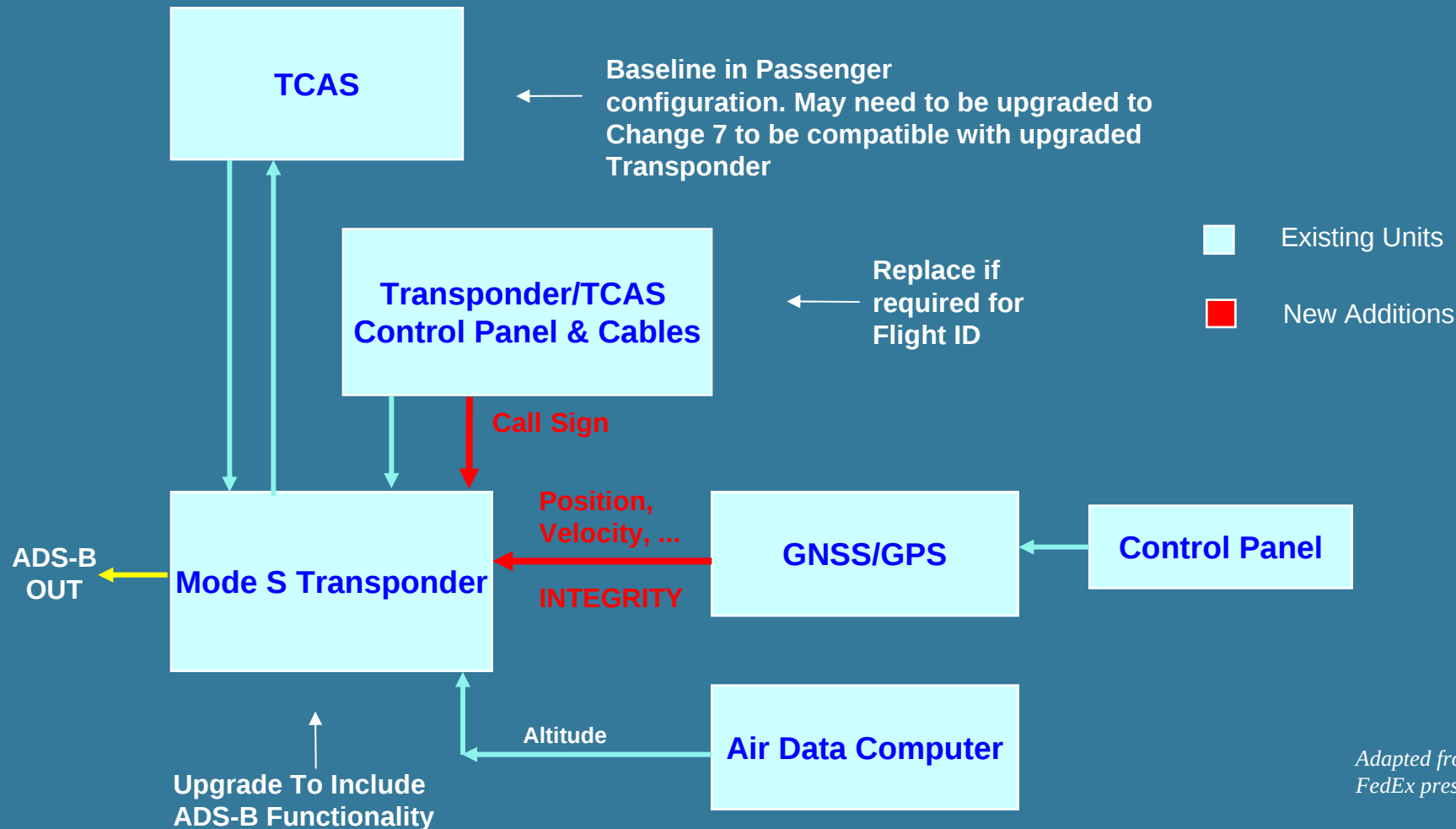
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ADS-B Class B (ADS-B Out) Avionics Architecture



Adapted from a FedEx presentation