ICAO ATFM Seminar
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Collaborative Decision Making Program
Domestic ATFM
Long Range ATFM

Peter Martland

CDM Strategy Manager

Air Traffic Management – 1940's and1950's

Procedural Control 1940s and 50's style…

- Manual flight progress tracking based on pilot position reports
- Area Control (En-route) were not involved in the sequencing of aircraft. Primary roles were separation and SAR alerting.
- Transferred aircraft to the Approach controller who decided and managed the sequence

Air Traffic Management – 1940's and1950's

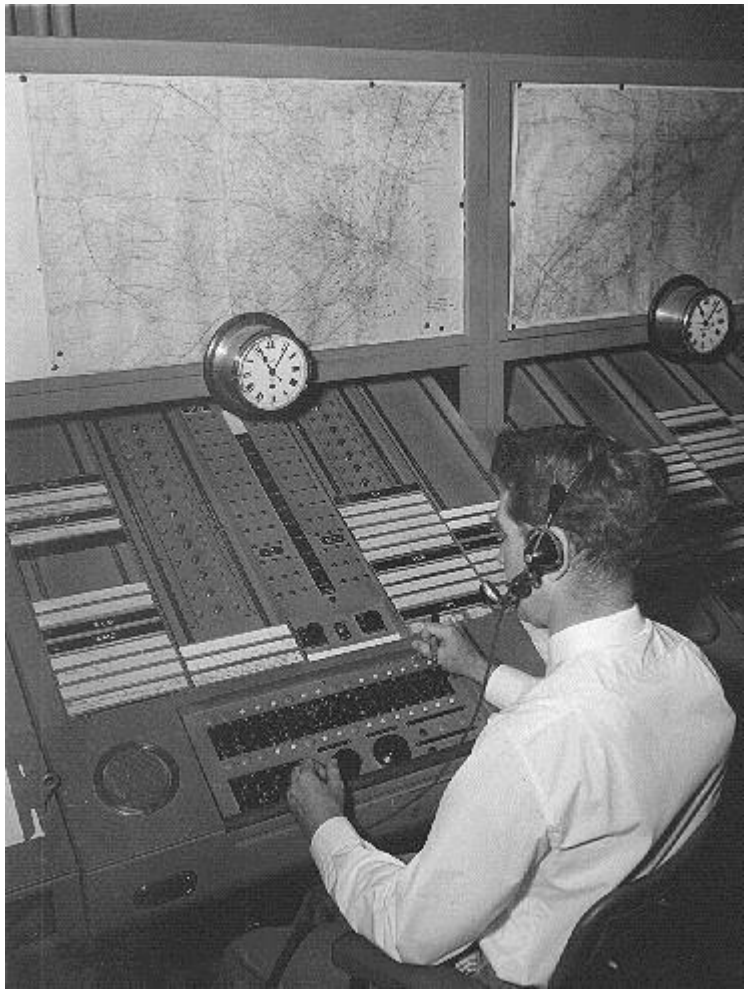
Approach Controller Ken Dalziel in the Approach Control soundproof office at Melbourne/Essendon aerodrome in 1947, located beneath the Control Tower.

The chequered sports jacket was the unofficial uniform of ATC for many years.

Procedural Control 1940's and 50's style…

- Basic Flow control:
  - Vertically separated holding stacks
  - Locator positioned holding points (10nm final)
  - Stack departure times
- Aircraft were taken over from Area (En Route) Control about 60-70 NM from the airport and maintained until handed off to the Tower Controller, usually about 10 NM out. In this era, the Tower exercised visual control only. The Approach Controller decided the landing sequence and held aircraft in a 'stack' if bad weather or traffic density required.

Air Traffic Management – 1950's



This September 1956 photo shows the Sydney Arrivals controller sitting at the then-new Semi-automatic Level Assignment Board (SLAB). Using a system of different coloured lights activated by the inserting or removing of a flight progress strip, the SLAB allowed the silent coordination of level assignment for arriving aircraft between Arrivals and the Tower.

This is the first example of sequence and coordination "automation" in Australia

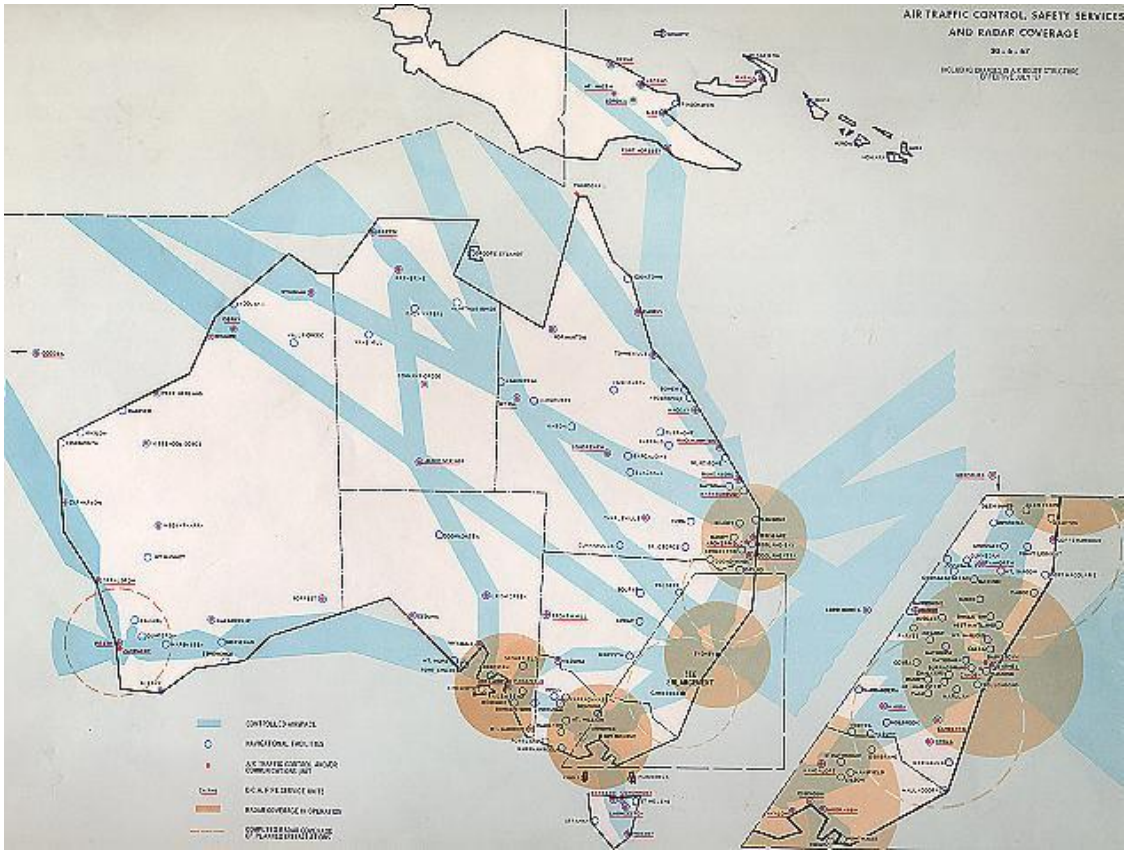
Air Traffic Management – 1960's

In the mid-1960s Area Approach Control Centres (AACCs) were established.

Radar Surveillance - 1960's

Department of Civil Aviation Chart

- Controlled Airspace and Radar Coverage
- Primary radar only
- Coverage up to 40,000'



Air Traffic Management - 1970’s

This 1977 photograph, taken in Sydney, shows the 'bright display' radar system. This display system gave good service in a variety of locations from the mid-1960s until the late 1990s - although it was well and truly obsolete when finally withdrawn from service.

The console in the background, right-side is the FLOW. This era introduced sequencing decisions by a dedicated Flow controller.

Air Traffic Management - 1970's and 80's

The Bright Display system presented raw radar returns overlaid by a video map showing airspace, routes and other important features. Initially there was no labelling of returns.

From July 1974, SSR capability was introduced with non-discrete codes only, and no Mode C data.

Air Traffic Management – 1980's

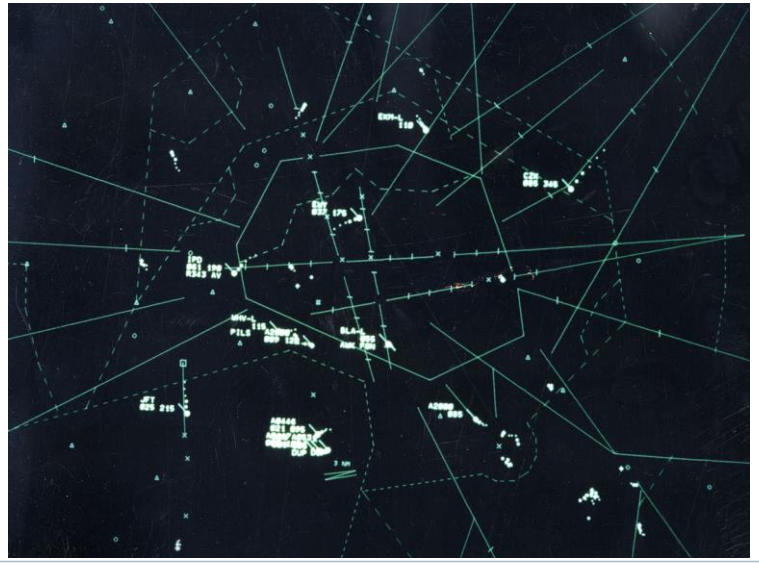
Interim Label Display System (ILDS)

- Upgraded Bright Display
- Basic SSR data labels (callsign only)
- No Flight Data processing
- Manual Flow control

Air Traffic Management – Late 1980's

Air Traffic Control and Radar Display System Melbourne and Perth 1988

- SSR Mode C was introduced in Australia in the late 1980s with the acquisition of ground systems, such as ATCARDS, capable of processing the information.
- Replaced the Interim Label Display System
- SSR data processing (callsign, altitude, groundspeed)
- No Flight Data processing
- Manual Flow control



Air Traffic Management – 1990's

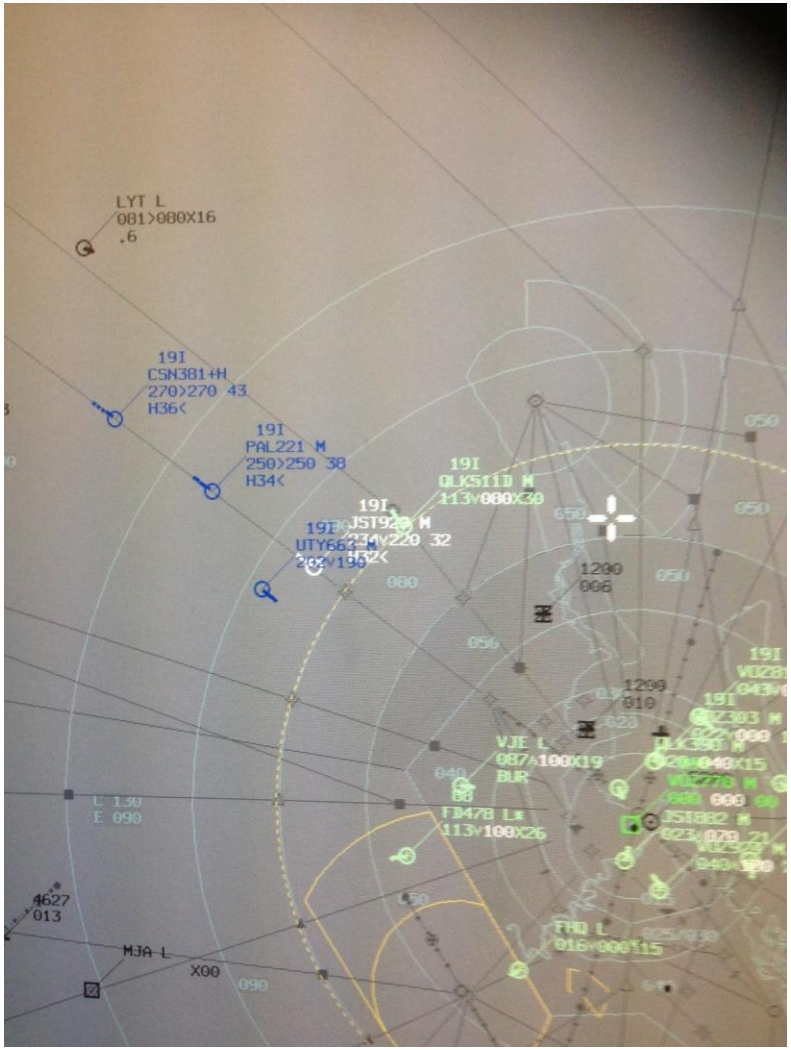
Interim Radar Display System (IRDS)
Sydney and Brisbane 1996

- Replaced the Interim Label Display System
- SSR data processing (callsign, altitude, groundspeed)
- No Flight Data processing
- Manual Flow control

Air Traffic Management – Eurocat 2000

- Transition commenced mid-1998
- Integrated Surveillance and Flight Data processing
- Semi-manual flow, using Flight Data Processing of ETA

Air Traffic Management – Eurocat 2000



Eurocat 2000

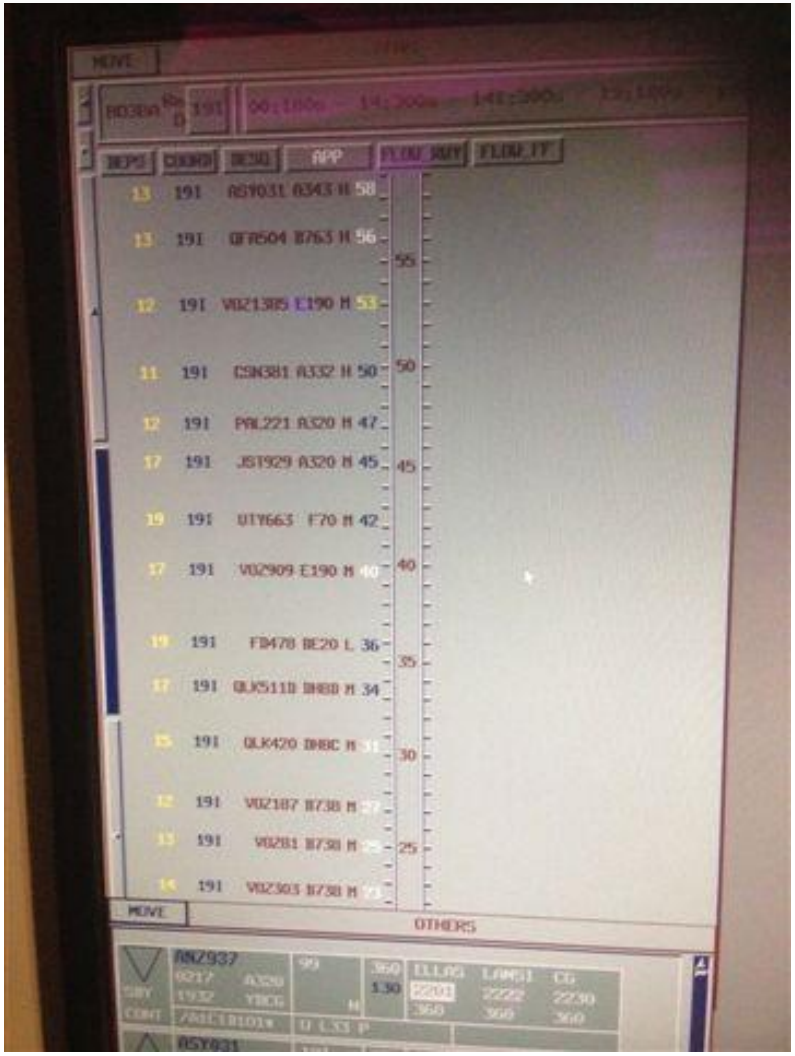
- System mapping
- Alerting (STCA; DAIW; MSAW; RAM; CLAM; PETO)
- Multi-radar tracking
- Flight Progress Strip display
- Primary and Secondary combined radar display
- Green tracks/strips Jurisdiction
- Blue tracks/strips Announced
- Black tracks/strips Uncontrolled
- White track/strips Highlighted
- Track symbol indication of:
  - Radar – SSR and Primary
  - ADS-B and ADS-C
  - Flight-Plan Track
- CPDLC (data link capability)
- External data feed through Flight Information Broker (FIB)
- FIB updates ATFM times (FIB to Harmony)

Flow Management – Feeder Fix Flow

- Introduced in Brisbane and Cairns in the early 1990's
- Landing time back-calculated to a required time at the Feeder Fix, based on standard speeds and distance to threshold.
- En-route controllers managed to the FF time
- "Procedural" version of future automated concept

Cairns RWY 15

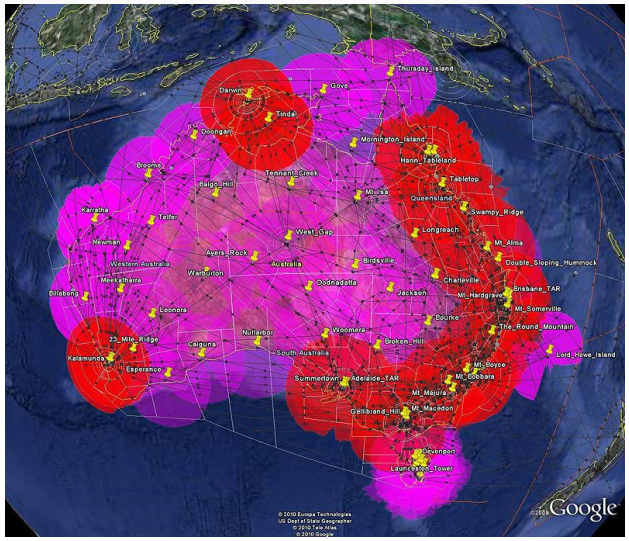
Flow Management - MAESTRO



MAESTRO - 2005

- Administered by ATC FLOW position
- Displayed at En-route and Approach consoles for sequence management
- Displayed at Tower ADC console for arrival sequence information
- Configurable to Airport acceptance rate or time metered gaps
- Specific runway configurable
- ETA based
- Airborne delay indication
- Displays STA_FF at en-route consoles
- En-route manages to Feeder Fix time
- Displays STA at APP, FLOW and ADC
- Harmony ATFM system takes Maestro STA (the runway ETA) data, providing up-to-date arrival information for airlines and airports

Surveillance – ADS-B



ADS-B commenced trials in Australia in 2003. In December 2009 a network of 28 out of a planned 43 ground stations was commissioned, providing continuous high-level coverage (above about FL300) across the Australian continent. Substantial lower-level coverage is also available. Air Traffic Controllers can use ADS-B data for separation in a similar way to radar data.

Airservices and the Indonesian Directorate General of Civil Aviation began exchanging ADS-B data between the Australian and Indonesian FIRs in November 2010. A world-first, the ADS-B data exchange allows air traffic controllers to precisely track aircraft up to 150 nautical miles (278km) inside each country's airspace. ADS-B has also extended Airservices real-time surveillance of air traffic out towards the boundary of Australia's FIR with New Zealand, midway across the Tasman Sea.

The fitment and operation of approved ADS-B avionics equipment mandatory on, and from, 12 December 2013 for all Australian aircraft operations at, or above, FL 290 (unless CASA has authorised otherwise).

Collaborative Decision Making - Challenges

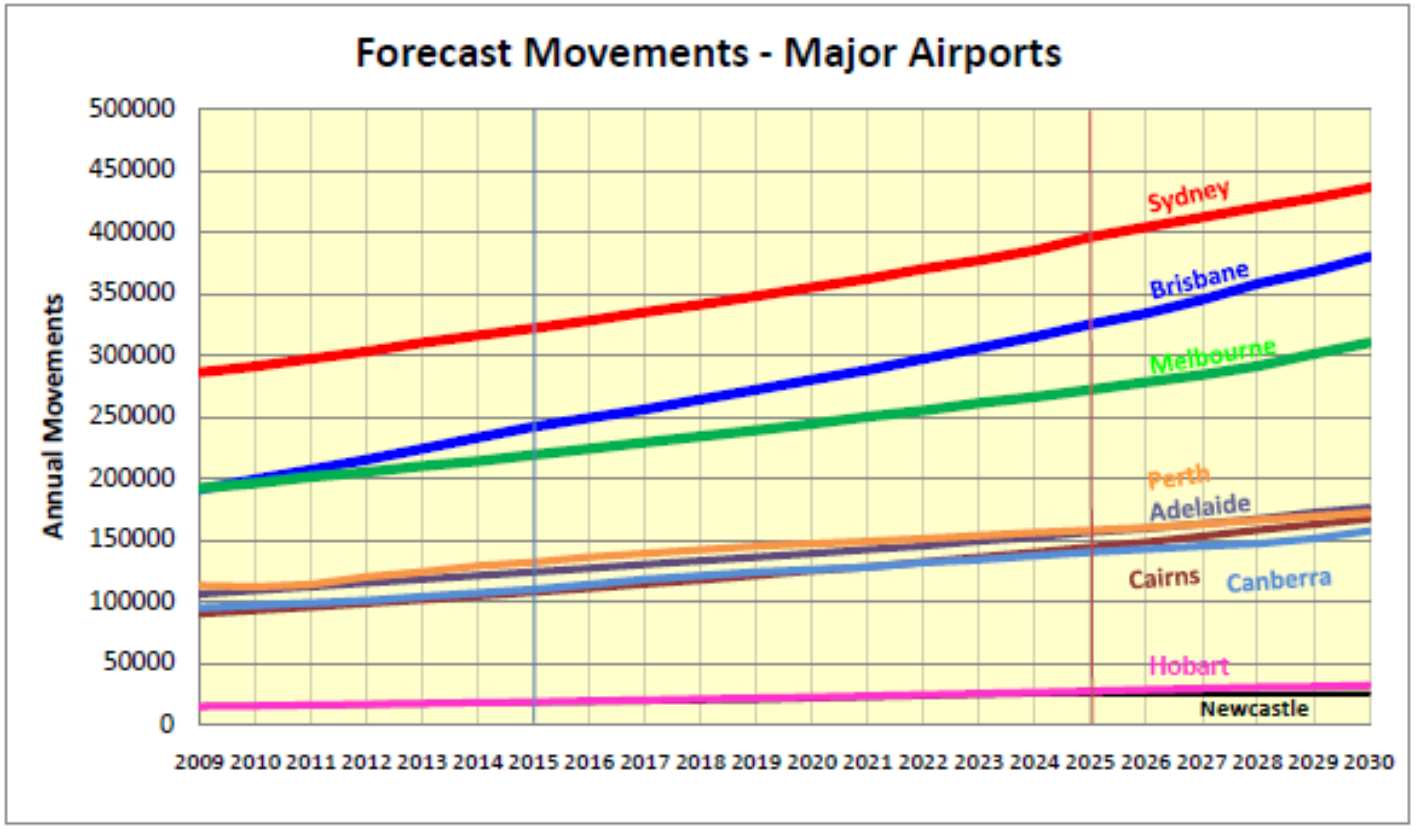
DEMAND GROWTH

National

- 2.2% pa through our major airports (averaged)
- from 1.1 million in 2008–09 to 1.7 million in 2029–30
- an overall increase of around 60 per cent

Growth markets:

- Mining (Fly-in-Fly-out workforce)
- Asia



Collaborative Decision Making - Challenges

CAPACITY GROWTH

Airports

- Brisbane - New Parallel Runway Project – opening 2020
- Melbourne - Parallel Runway Project – announced, built by 2020?
- Sydney - Limited capacity during peak periods, limited scope for growth. Options for a second airport being considered.
- Perth - Limited capacity during peak periods, planning a parallel runway, timeframe to be announced.

Terminal Areas

- Affected by airport constraints
- Constrained airspace architecture
- Environmental complexities

Network

- Affected by terminal area and airport constraints
- Affected by weather, predominantly convective and fog events

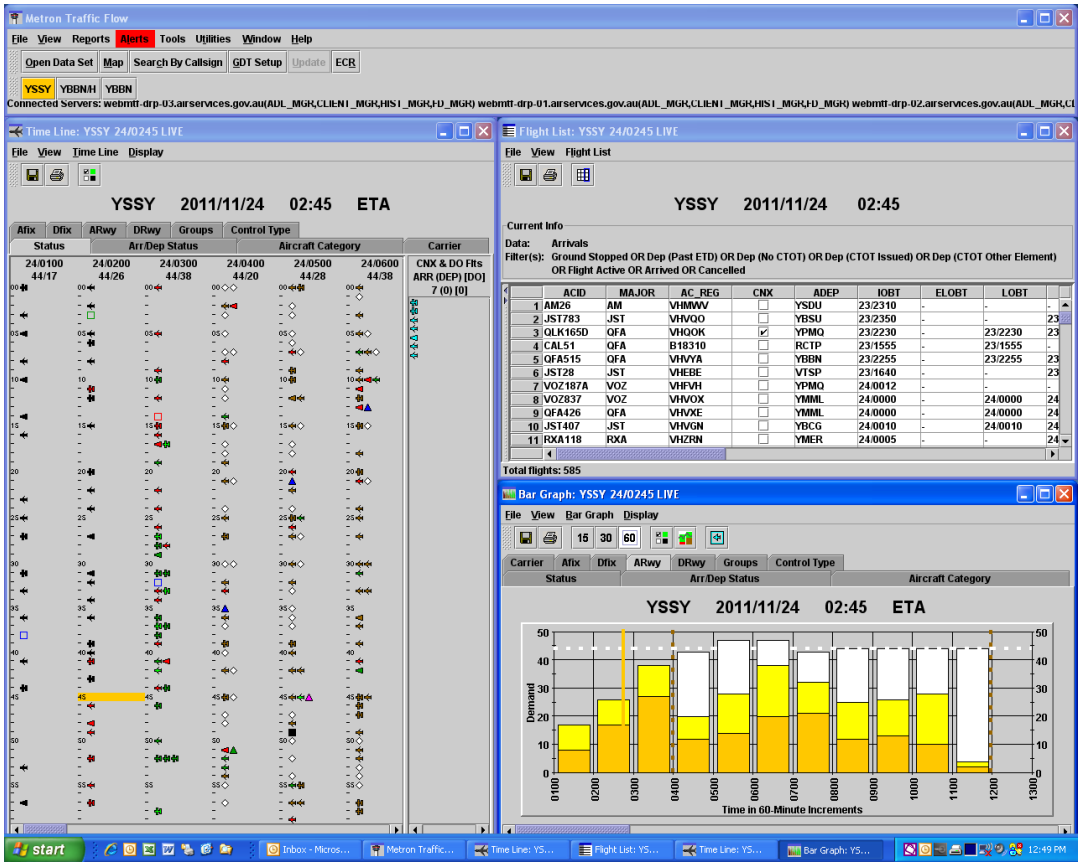
ATFM History

- 1994: Controlled Departure Time Program (CDTP) - first attempt to reduce airborne delays by controlling departure times.
- 1995: The Australian Government introduced the Sydney Demand Management Act and mandated an airport slot scheme.
- 1998: CDTP replaced by the Central Traffic Management System (CTMS)
- 2008: Integrated Data Exchange (InDex) Program; ATFM “proof of concept” application. Metron Aviation - Integrated Flow Manager
- 2010: Metron / Airservices Harmony development commenced

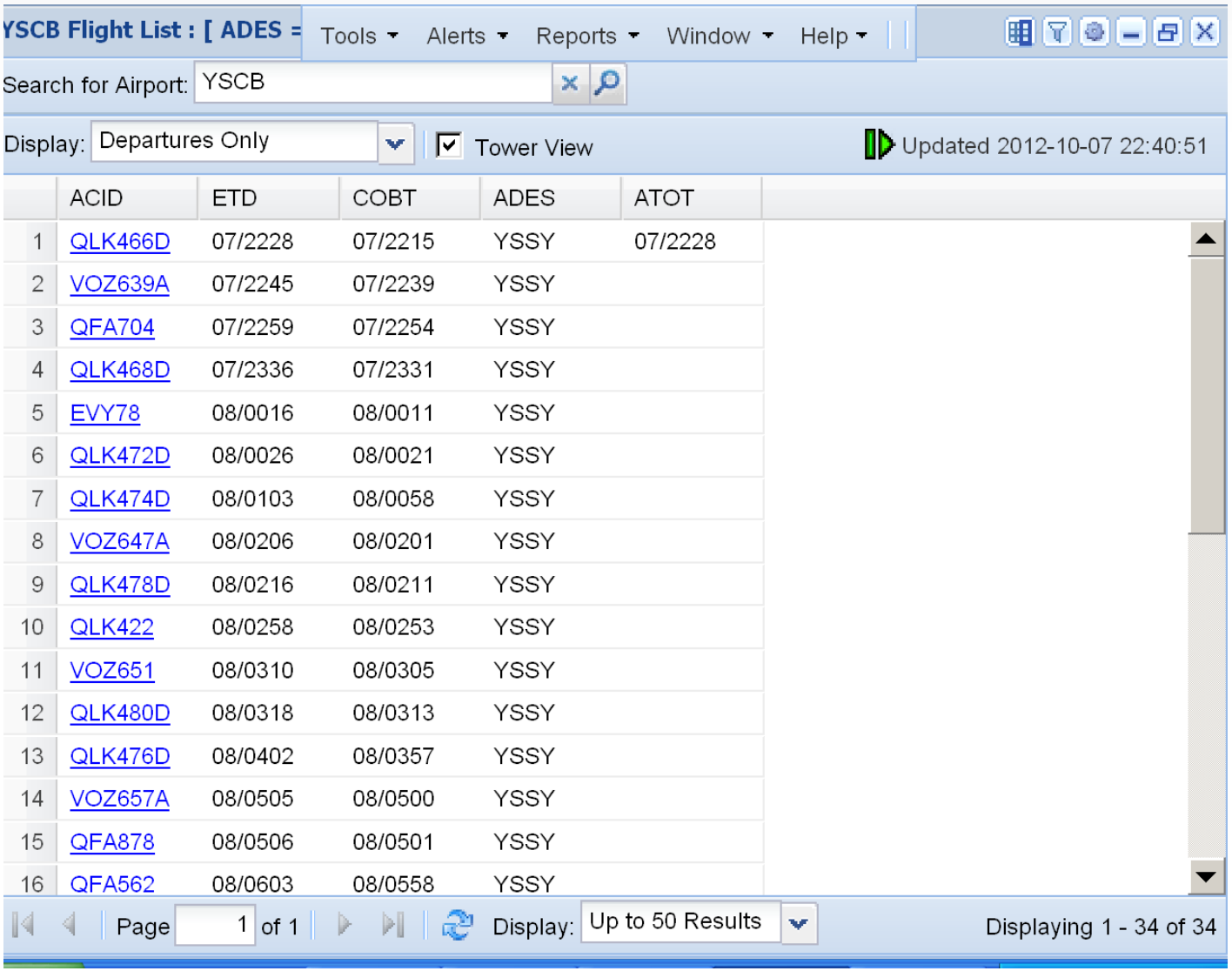
CDM - Air Traffic Flow Management

The first stage of the CDM project is Air Traffic Flow Management (ATFM). This entailed the replacement of the Central Traffic Management System (CTMS) with an advanced ATFM tool – Metron Harmony for ANSP's.

Airservices is deploying this capability to manage Sydney, Brisbane, Melbourne and Perth airports.



ATFM Project Milestones



Year 2014 activities

- Melbourne airport Ground Delay Program 01 February

- Progressive deployment of Ration-by-Runway functionality and procedures
    - more efficiently manage multi-runway modes of operation

- Development of procedures to utilise existing Harmony Ground Stop functionality
    - replace tactical ground stops at controlled airports
    - ability to ground stop at all departure airports

- Ongoing work to deploy a technical solution for Long Range Air Traffic Flow Management

Year 2015 activities

- Long Range Air Traffic Flow Management deployment. Target Q2 2015.
- Airspace flow management programs using Harmony. Target Q4 2015
- Graduated implementation of Regional ATFM

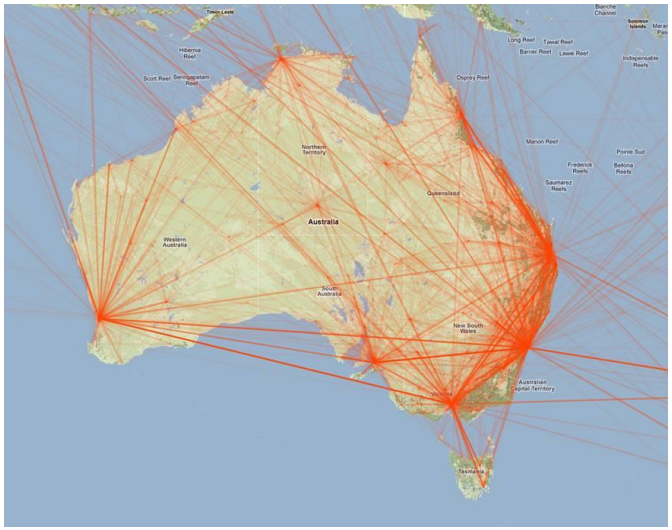
Long Range ATFM

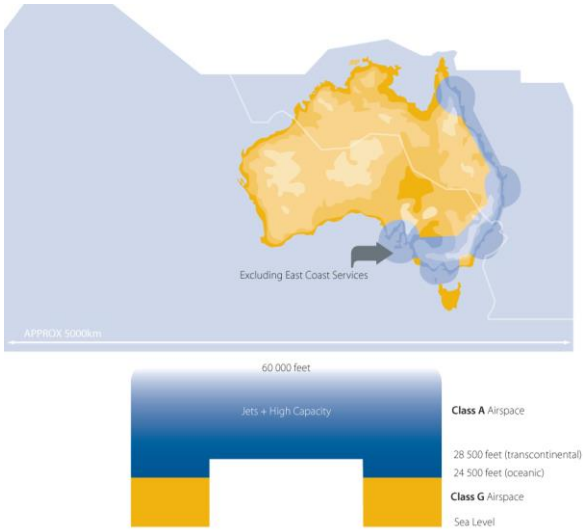
- Airservices Australia and Metron Aviation have entered into a collaborative program to develop a long range ATFM capability. This entails a four stage process of concept analysis, exploration, development, and demonstration. Subject to successful capability demonstration, the program will progress to software version release and the operational deployment of Long Range ATFM capability at the four GDP airports.

- Timeframe for a technical solution is within 2 years.

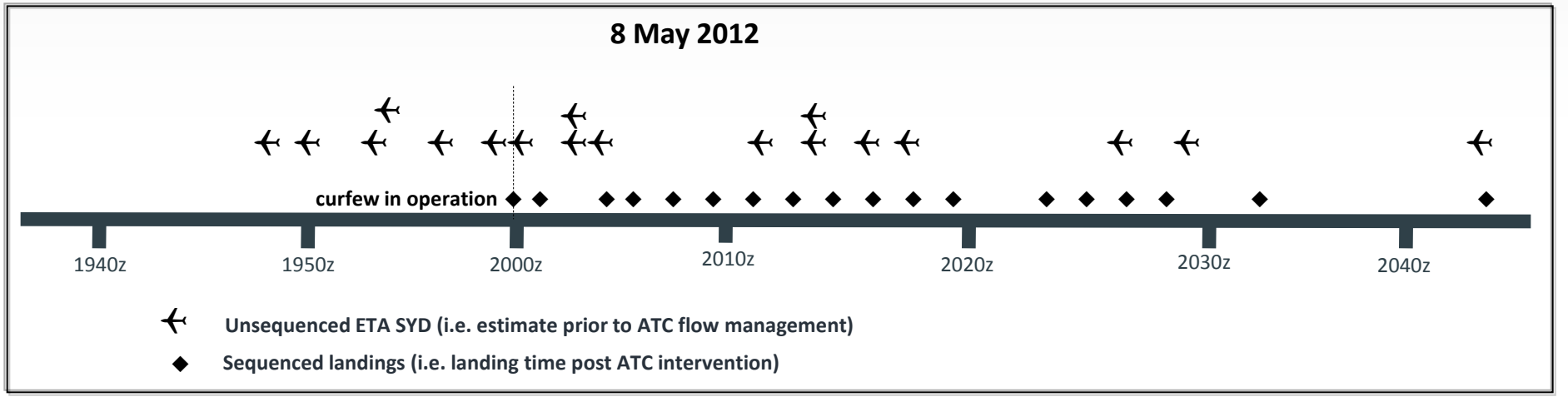
- This capability will initially be applied wholly within the Australian FIR':
  - First application will be to manage the Sydney post-curfew traffic
  - Rollout to Perth, Brisbane and Melbourne to follow

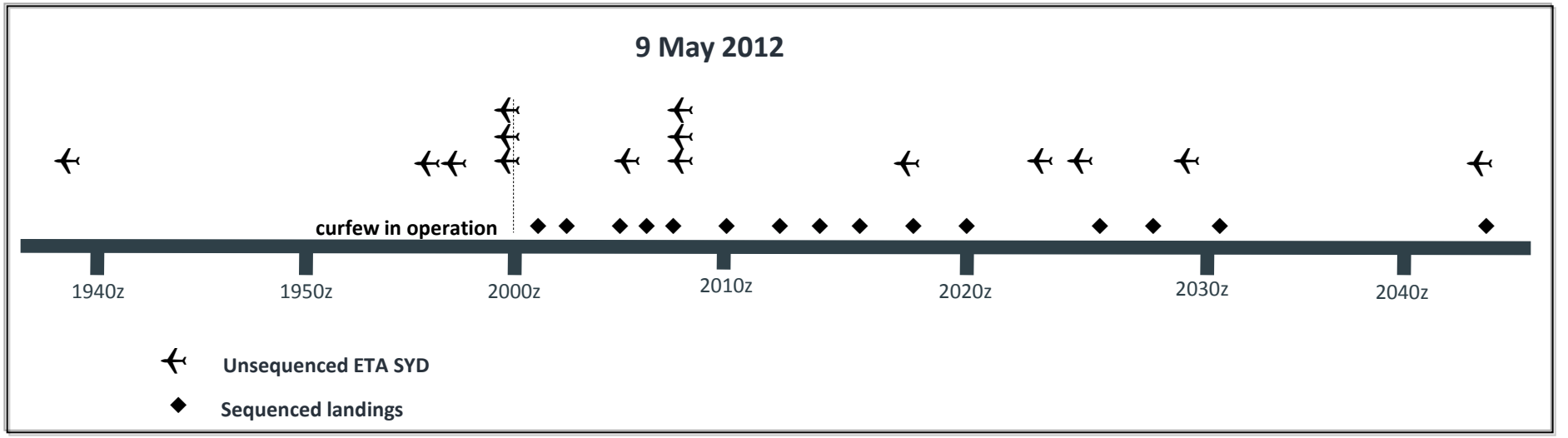
- Due to the large geographic area controlled by Airservices, we have an environment which is suitable for proof of concept.



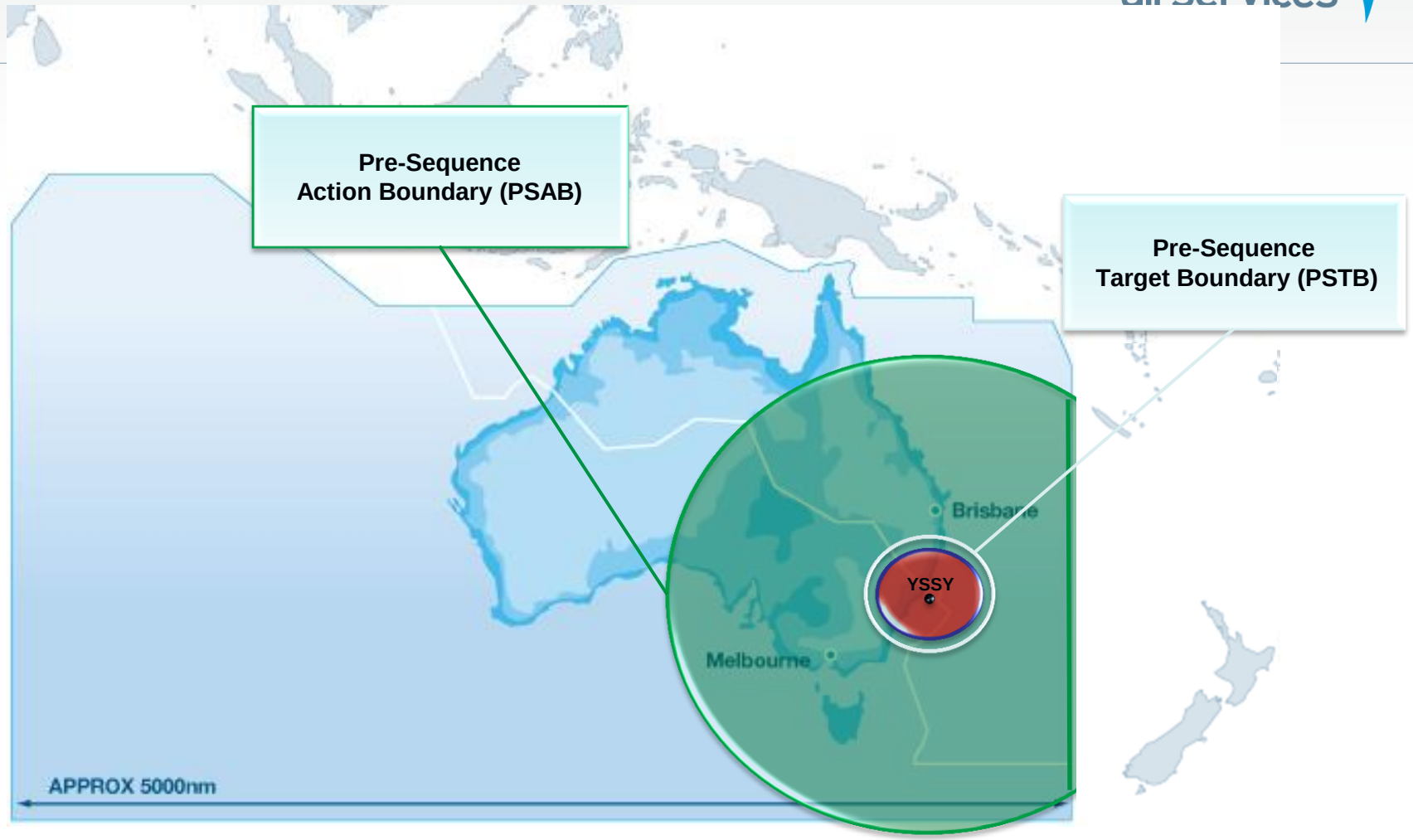


Flights with airport allocated Slot times 0600-0700 Local





Long Range ATFM Overview



Australian FIR Airspace

Pre-Sequence Action Area (PSAA) ~180 mins

MAESTRO Area of Control ~25 mins

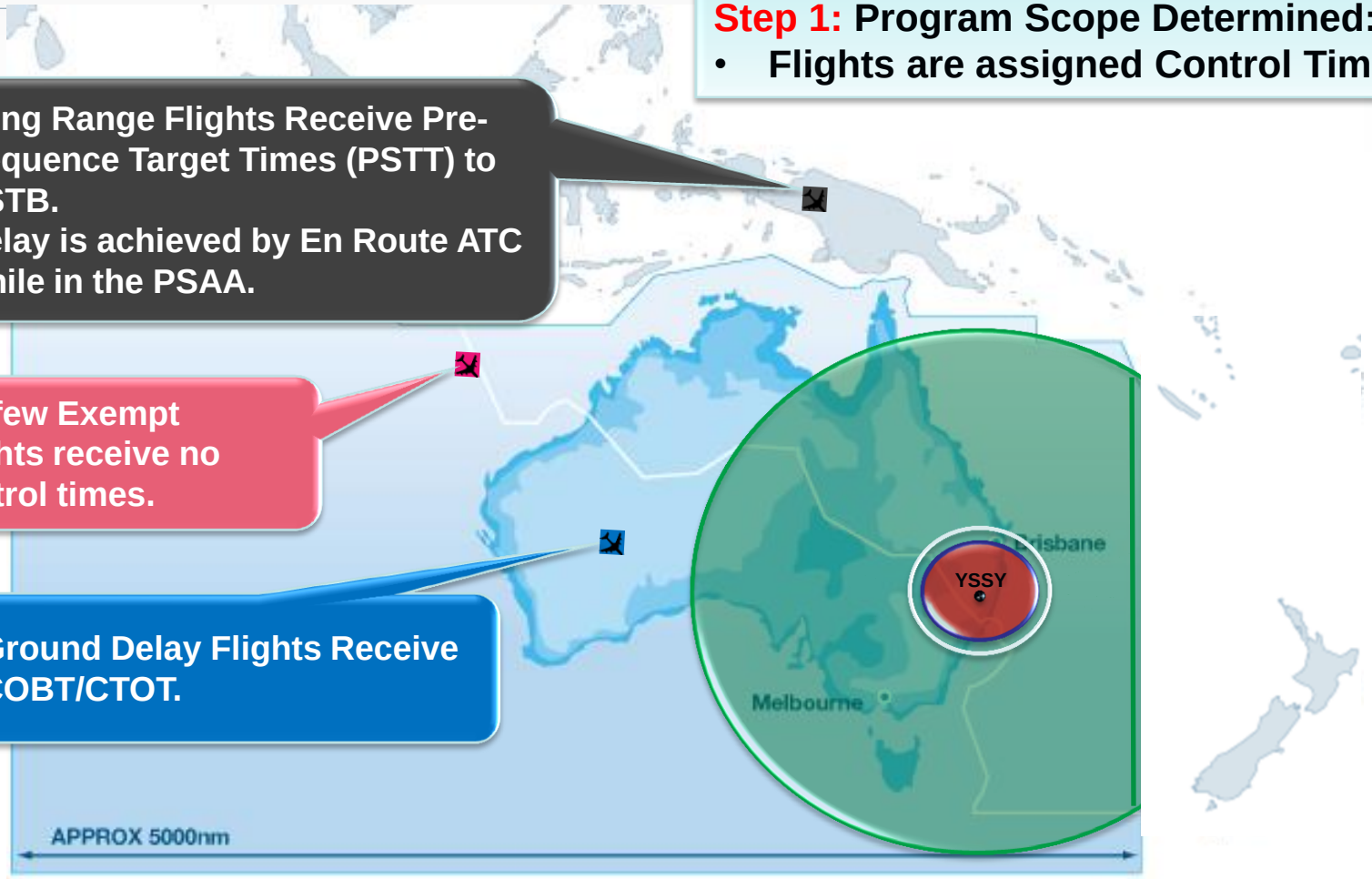
Long Range ATFM Overview

Step 1: Program Scope Determined:
- Flights are assigned Control Times

- Long Range Flights Receive Pre-Sequence Target Times (PSTT) to PSTB.
- Delay is achieved by En Route ATC while in the PSAA.

Curfew Exempt Flights receive no control times.

- Ground Delay Flights Receive COBT/CTOT.



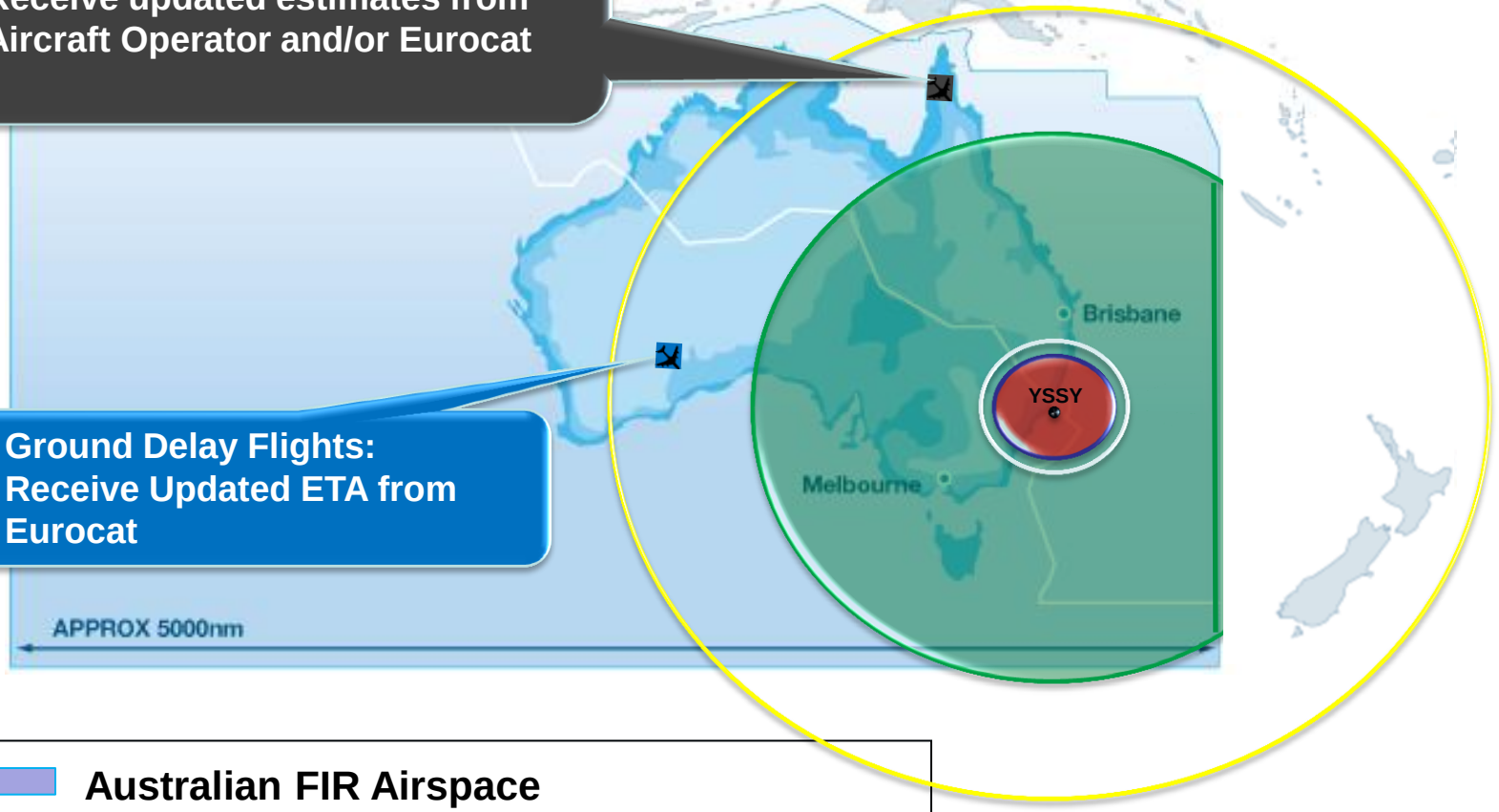
Australian FIR Airspace
Pre-Sequence Action Area (PSAA) ~180 mins
MAESTRO Area of Control ~25 mins

Long Range ATFM Overview

Step 2: Updated estimates are received:
- System Refines solution prior to PSAB.

- Long Range Flights:
  Receive updated estimates from Aircraft Operator and/or Eurocat

- Ground Delay Flights:
  Receive Updated ETA from Eurocat



Australian FIR Airspace
Pre-Sequence Action Area (PSAA) ~180 mins
MAESTRO Area of Control ~25 mins

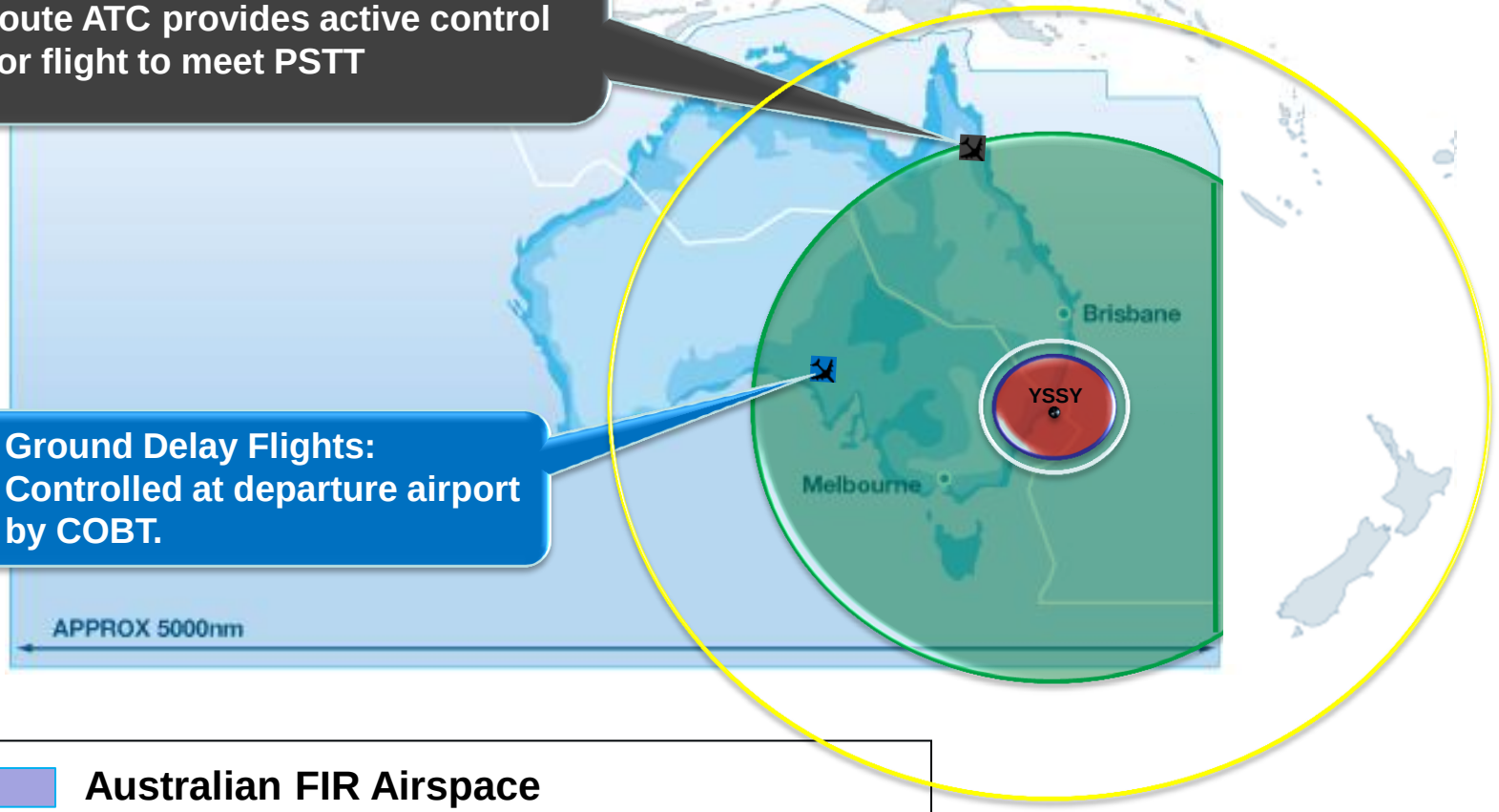
Long Range ATFM Overview

Step 3: Long Range Flight enter PSAA.

- En Route ATC Active Control of flight to PSTT

- **Long Range Flights:**
  Once Flight crosses PSAB, en route ATC provides active control for flight to meet PSTT

- **Ground Delay Flights:**
  Controlled at departure airport by COBT.

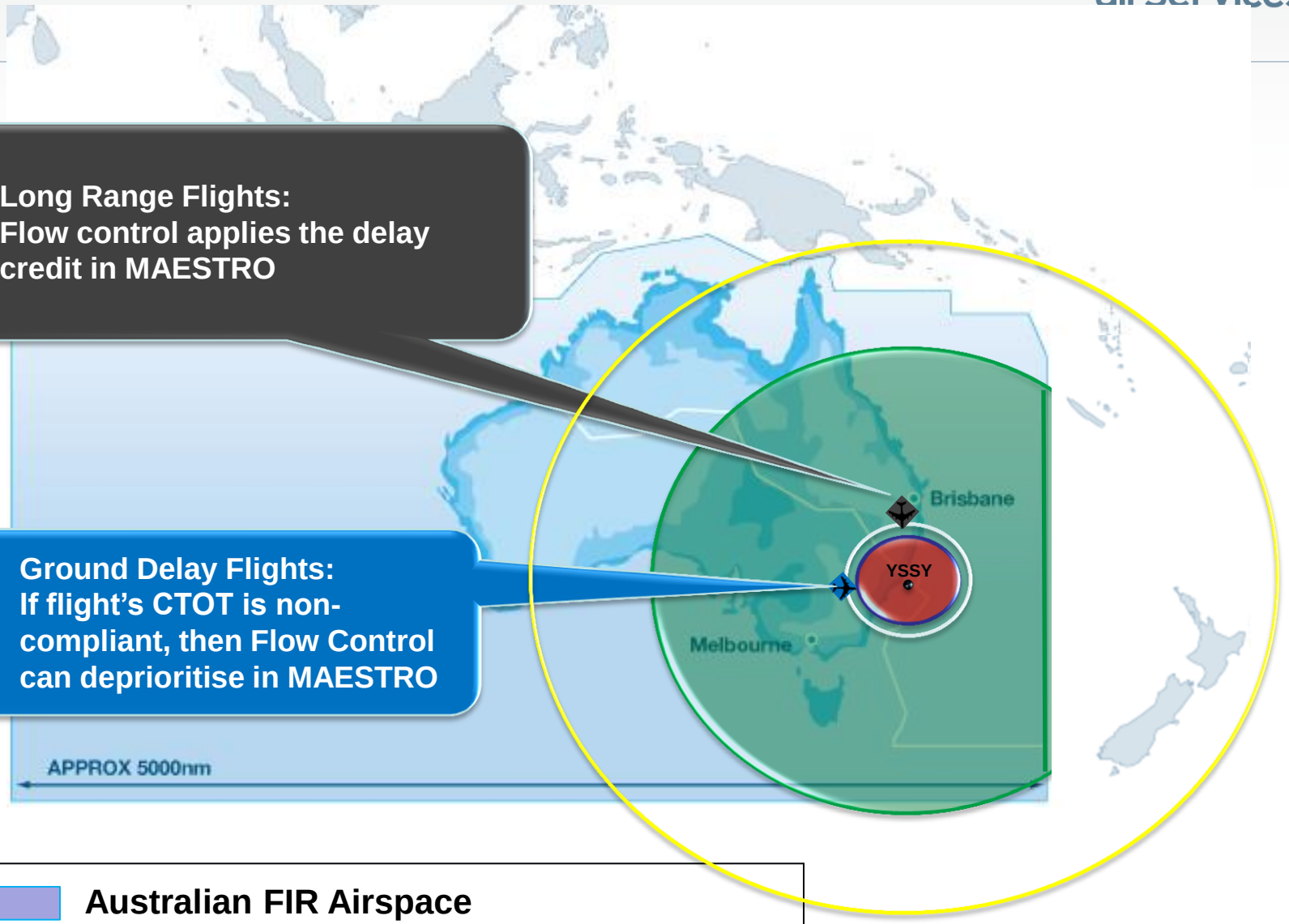


Australian FIR Airspace
Pre-Sequence Action Area (PSAA) ~180 mins
MAESTRO Area of Control ~25 mins

Long Range ATFM Overview

- **Long Range Flights:**
  Flow control applies the delay credit in MAESTRO

- **Ground Delay Flights:**
  If flight's CTOT is non-compliant, then Flow Control can deprioritise in MAESTRO



Australian FIR Airspace
Pre-Sequence Action Area (PSAA) ~180 mins
MAESTRO Area of Control ~25 mins

Regional ATFM

- Regional integration involves the design and activation of process and systems that bring the surrounding ANSP's and international airlines into the information / decision flow. This may involve City Pair Programs or agreed target trajectories being applied across state boundaries.

- For this to occur there is significant operational and technical integration required to ensure an end to end ATFM capability. Problems to be resolved will include Regional Business Rules and Collaboration guidance; International Airline and ANSP information exchange; International Airline and ANSP compliance protocols.

- The Airservices Long Range ATFM project will ensure that the concept and technical solution takes into account future regional integration initiatives.

- Airservices encourages open discussion and collaboration with other ANSP's to develop the roadmap for Asia Pacific ATFM.

Collaborative Decision Making Program

http://www.airservicesaustralia.com/projects/collaborative-decision-making-cdm