



# Sharing of ADS-B Data and Establishment of a Database to Support ATC Operations and Safety Monitoring for the APAC Regions

(Presented by Hong Kong, China)

49th Conference of DGCA  
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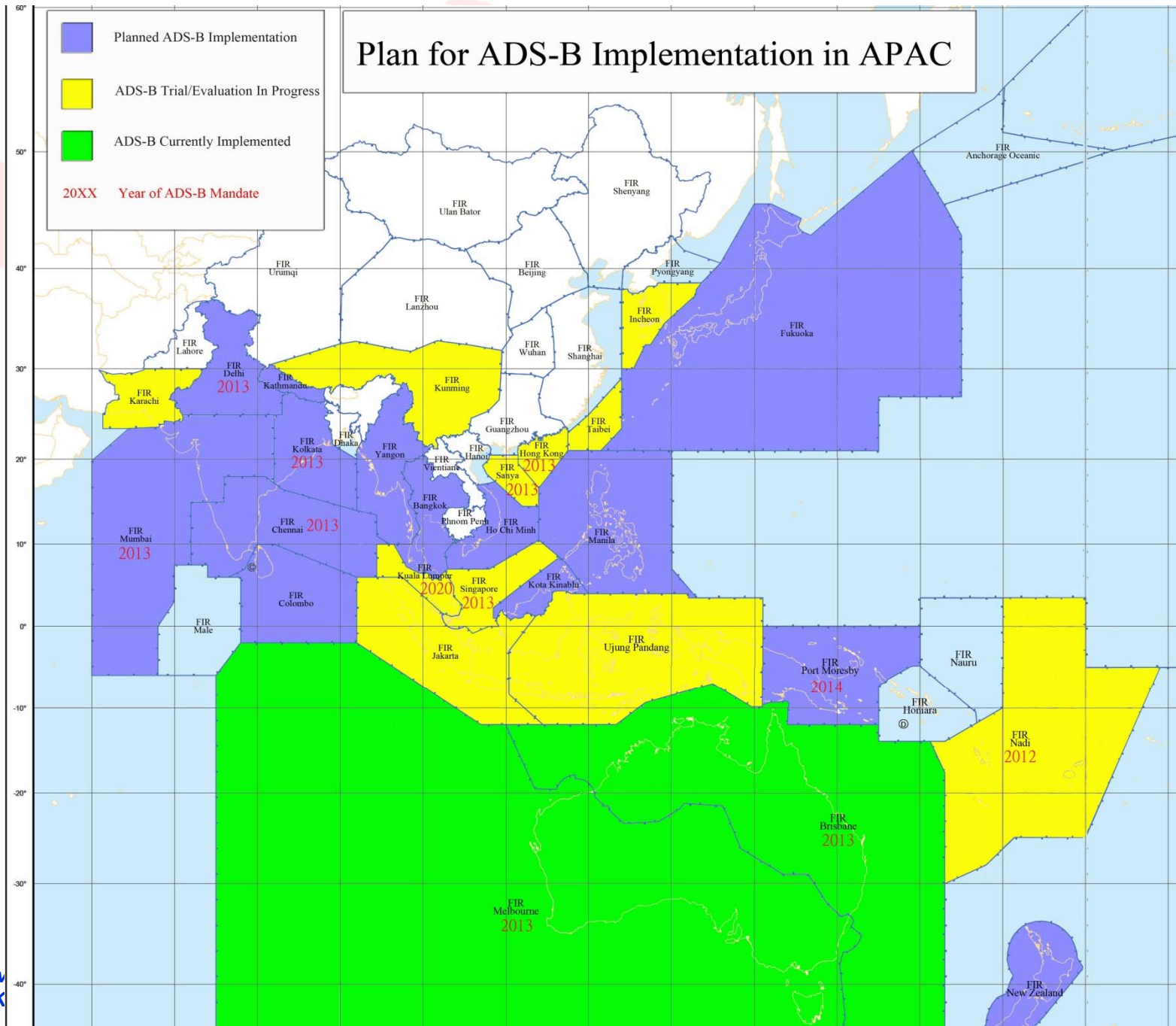
## Background

- Automatic Dependent Surveillance – Broadcast (ADS-B), is recognised as a key enabler in bringing operational benefits and enhanced safety to aviation stakeholders.
- Many States/Administrations in APAC have been taken proactive steps to plan, conduct trials and implement ADS-B technology.
- Full benefits of ADS-B could only be achieved through harmonized implementation.
- An action item was formulated during the 48th DGCA Conference to urge States/Administrations to expedite ADS-B implementation and share with ICAO Regional Office their implementation plan.



## Progress of ADS-B Implementation in APAC

- Three States/Administrations published notices for mandate carriage of ADS-B avionics in their respective airspace by 12 December 2013
  - Australia (entire airspace)
  - Hong Kong, China (L642 and M771 within HK FIR)
  - Singapore (L642, M771, N891, M753, L644 and N892 within Singapore FIR)
- Four States expressed their near-term plan for ADS-B mandate
  - Mainland China (end 2013 for L642 and M771 within Sanya FIR)
  - Fiji (end 2012)
  - Papua New Guinea (end 2014)
  - India (end 2013)

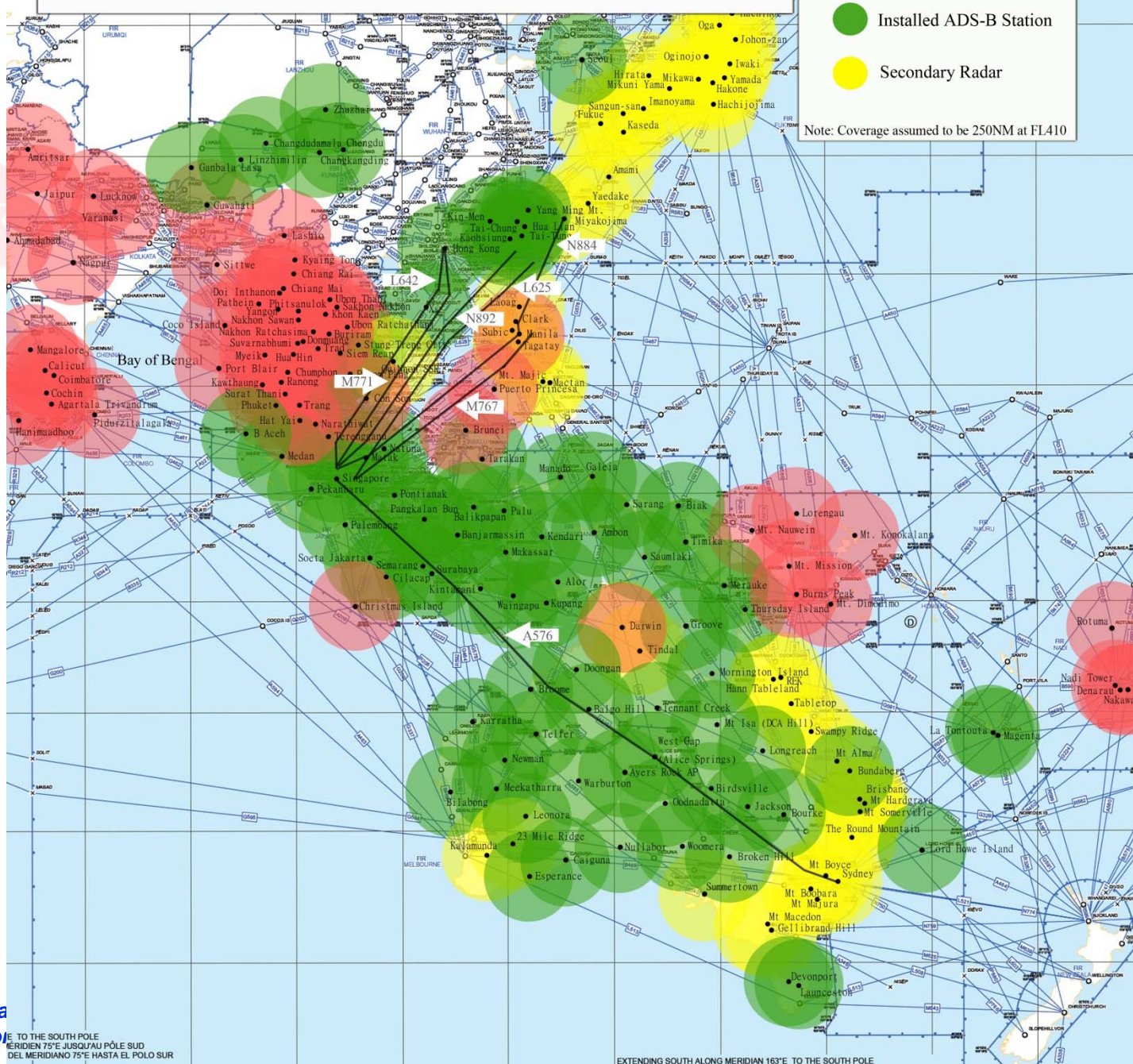




# Surveillance Coverage along trunk routes in APAC

- Planned ADS-B Station
- Installed ADS-B Station
- Secondary Radar

Note: Coverage assumed to be 250NM at FL410



Civil Aviation  
Hong Kong

TO THE SOUTH POLE  
MÉRIDIEN 75°E JUSQU'AU PÔLE SUD  
DEL MERIDIANO 75°E HASTA EL POLO SUR

EXTENDING SOUTH ALONG MERIDIAN 163°E TO THE SOUTH POLE



# Hong Kong China's Plan for ADS-B Implementation

ADS-B mandate for FL290 or above :-

- **End 2013** along L642 and M771
- **End 2014** for entire HKFIR

## Survey Results in Aug 2012:

### L642

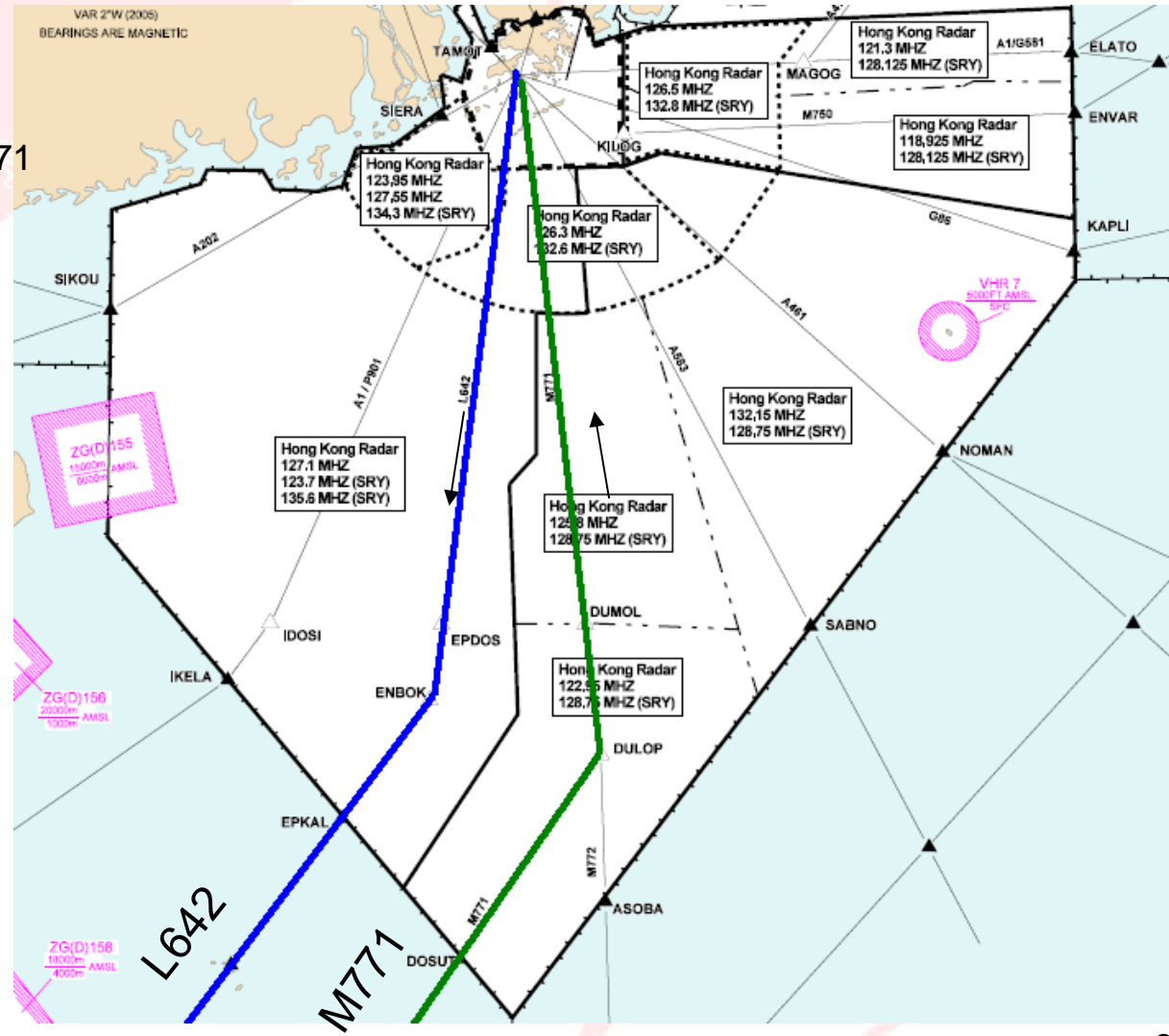
- 78% aircraft equipped with ADS-B

### M771

- 75% aircraft equipped with ADS-B

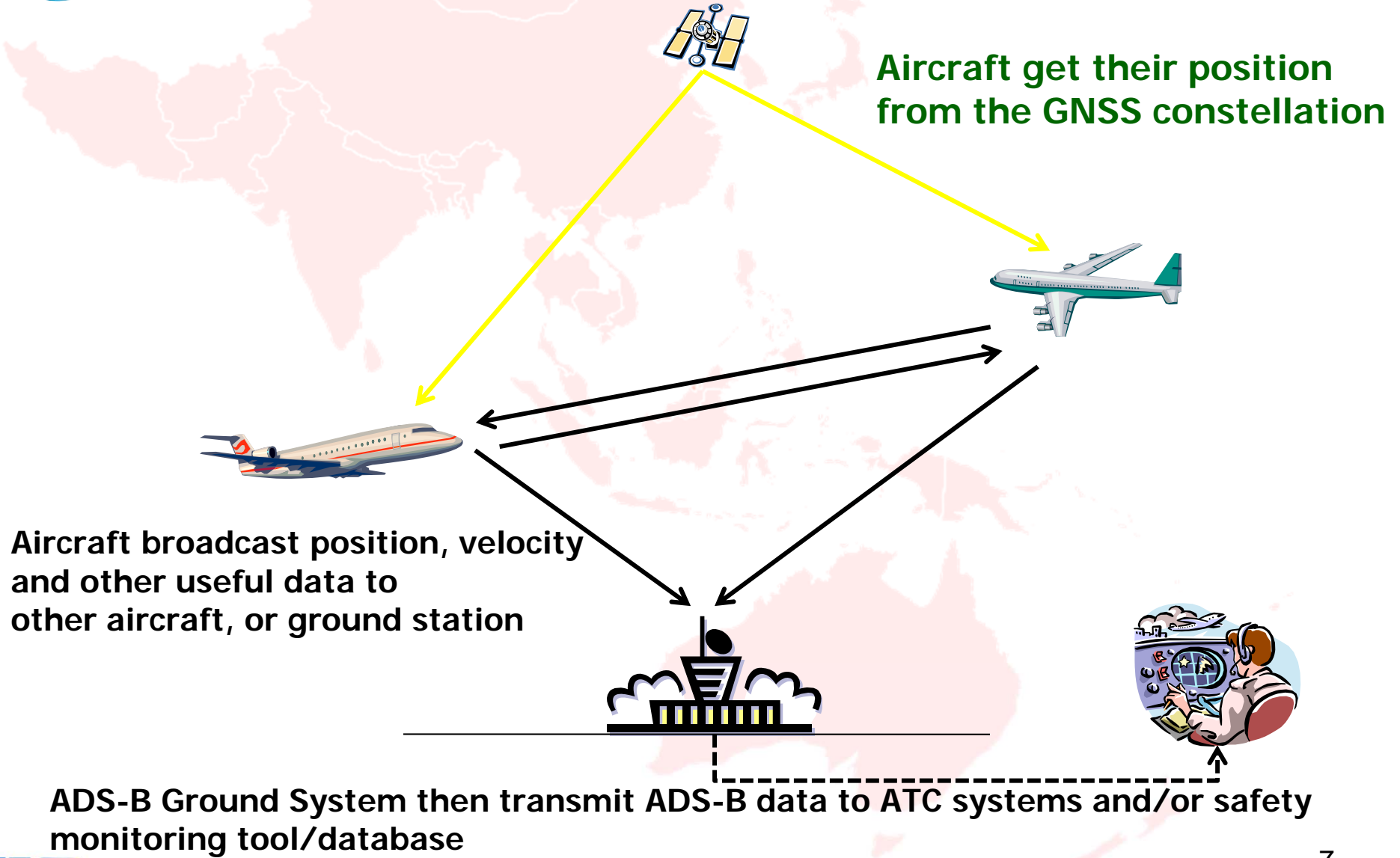
### HKFIR

- 73% aircraft equipped with ADS-B





# Useful Data in ADS-B Reports





## ADS-B Data for Height Monitoring

- With endorsement by ICAO Separation and Airspace Safety Panel (SASP) and the Regional Monitoring Agencies Coordination Group (RMACG), ADS-B data could now be used for calculating the altimetry system error (ASE) which is a measure of the height-keeping performance of an aircraft.
- Aircraft ASE can vary over the population of operational aircraft of the same type, and for each specific airframe, the ASE can vary with time in service.
- It is an ICAO requirement that aircraft operating in RVSM airspace must undergo periodic monitoring on height-keeping performance.





# Comparison of Different Aircraft Height-keeping Monitoring Methods

	Pros	Cons
Height Monitoring Unit (HMU) / Aircraft Geometric Height Measurement Element (AGHME) Station	<ul style="list-style-type: none"> <li>- Comprehensive data for continuous monitoring</li> <li>- No specific requirements on avionics (Mode A/C/S transponders sufficient)</li> </ul>	<ul style="list-style-type: none"> <li>- Need to establish dedicated ground-based monitoring units</li> <li>- Must arrange aircraft to specifically fly over</li> </ul>
GPS Monitoring Unit (GMU)	<ul style="list-style-type: none"> <li>- No specific requirements on avionics and ground equipment</li> <li>- Can be performed during normal routine flight</li> </ul>	<ul style="list-style-type: none"> <li>- Costly. Requires on-board equipment and on-board personnel to operate GMU</li> <li>- Only one monitoring result each time</li> </ul>
ADS-B	<ul style="list-style-type: none"> <li>- Comprehensive data for continuous monitoring</li> <li>- Can be performed during normal routine flight</li> <li>- Cost-effective. No extra cost by taking advantage of investment for ADS-B surveillance</li> </ul>	<ul style="list-style-type: none"> <li>- Require ADS-B equipped aircraft</li> <li>- GPS/avionics problems may affect monitoring results</li> </ul>



## ADS-B Data Analysis

- Only ADS-B position data meeting certain navigation accuracy and integrity category values should be used.
- Aircraft may transmit erroneous ADS-B data (i.e. data with incorrect position information).
- Develop a system to analyze the ADS-B data to identify aircraft with consistently unreliable ADS-B data transmitted (i.e. blacklisted aircraft) based on comparison with independent surveillance source, accuracy and integrity quality indicators of ADS-B data, ATC reports, etc.



## Hong Kong, China's Plan for ADS-B Data Analysis

- Develop a system to monitor and analyze ADS-B equipped aircraft within the HK FIR after ADS-B mandate for HK FIR has become effective by end 2014 so as to:
  - monitor the height keeping performance of all aircraft flying within the HK FIR
  - to effectively discharge the regulatory duties in ensuring that the ICAO standards for RVSM operation can be met by aircraft under the Hong Kong's registry
- The analyzed results, which contain a list of aircraft broadcasting erroneous ADS-B data (blacklisted aircraft), will be promulgated and shared with States and relevant regulatory authorities.



## Sharing of ADS-B Data & Establishment of a Database

- During the CNS/MET SG/16 and APANPIRG/23, Hong Kong, China proposed and the meetings endorsed on early adoption of a holistic approach in collecting and managing ADS-B data shared from States for safety monitoring purpose.
- With more States/Administrations in APAC Regions identifying need to perform safety monitoring using ADS-B data, States/Administrations could cooperate to share monitoring results on regular basis with a view to establishing a database with consolidated monitoring results for use by the entire APAC Regions.
- The database should be promulgated to CAAs/ANSPs within APAC or other Regions to enhance safety monitoring.



## ACTION BY THE CONFERENCE

The Conference is invited to:

- a) note the Hong Kong, China's plan to develop a system for ADS-B data analysis to facilitate safety and height keeping monitoring of ADS-B equipped aircraft within the HK FIR;
- b) note the intention of Hong Kong, China to promulgate and share the analyzed results with States and relevant regulatory authorities; and
- c) support the idea of sharing the monitoring results among States/Administrations that are ready to perform safety monitoring using ADS-B data with a view to establishing a database to enhance the overall safety level of the entire APAC Regions, and refer to ADS-B SITF to deliberate the best arrangement.



# Thank you

