

# LOST FUEL SAVINGS DUE TO LACK OF RNP 4 & FANS-1A EQUIPAGE

Presented To: ISPACG/28

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Date: March 5-7, 2014



**Federal Aviation  
Administration**

# RNP4 and FANS Improves efficiency

□ DAL2237  
340  
N157

□ DAL1151  
390  
N394

FANS  
RNP10

□ FDX3875  
360  
N410

□ DAL650 3  
350  
N536

Non FANS RNP10

FANS  
RNP4

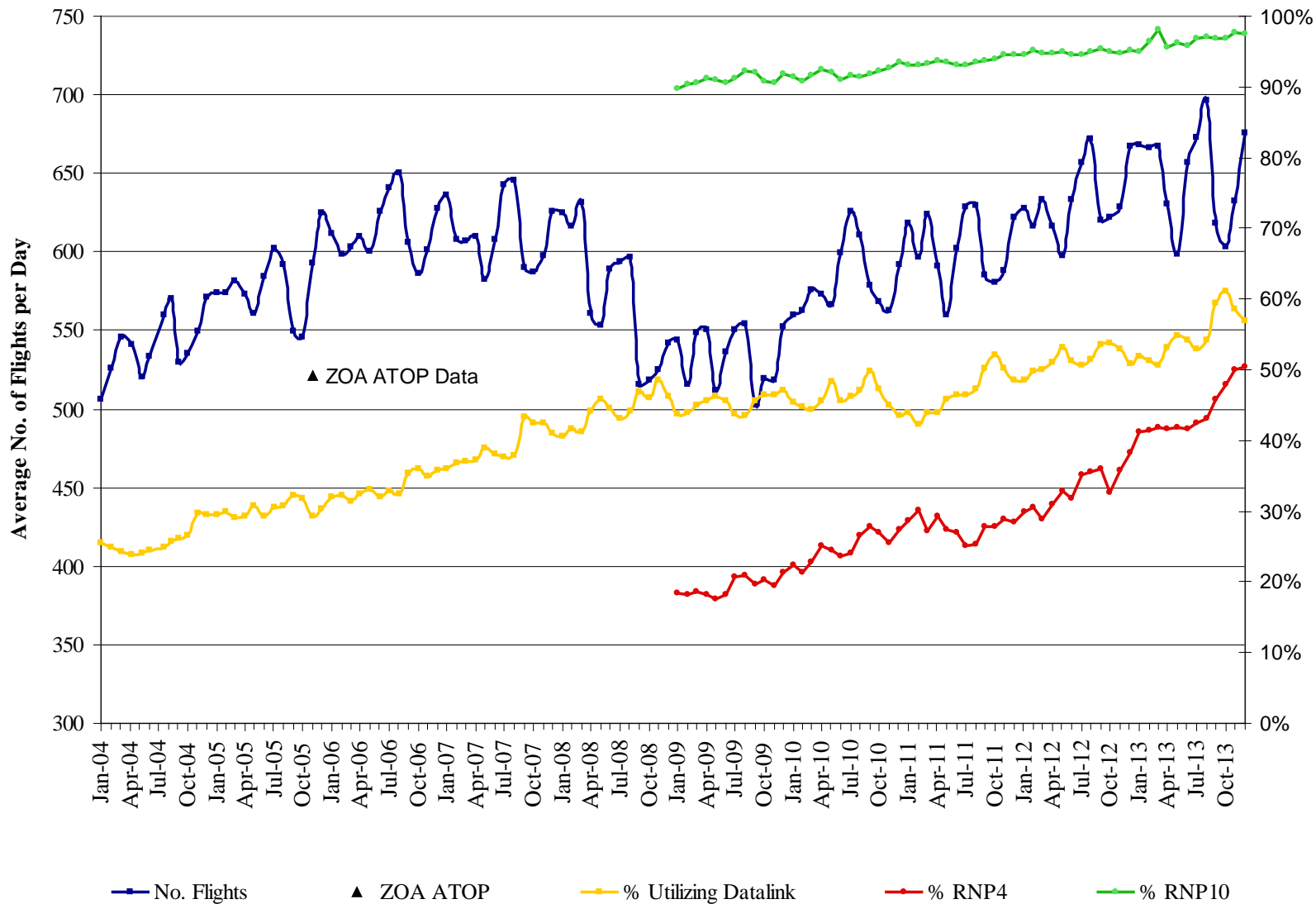
A1051N21

□ DAL836 3  
& 340↑360  
N522  
r360

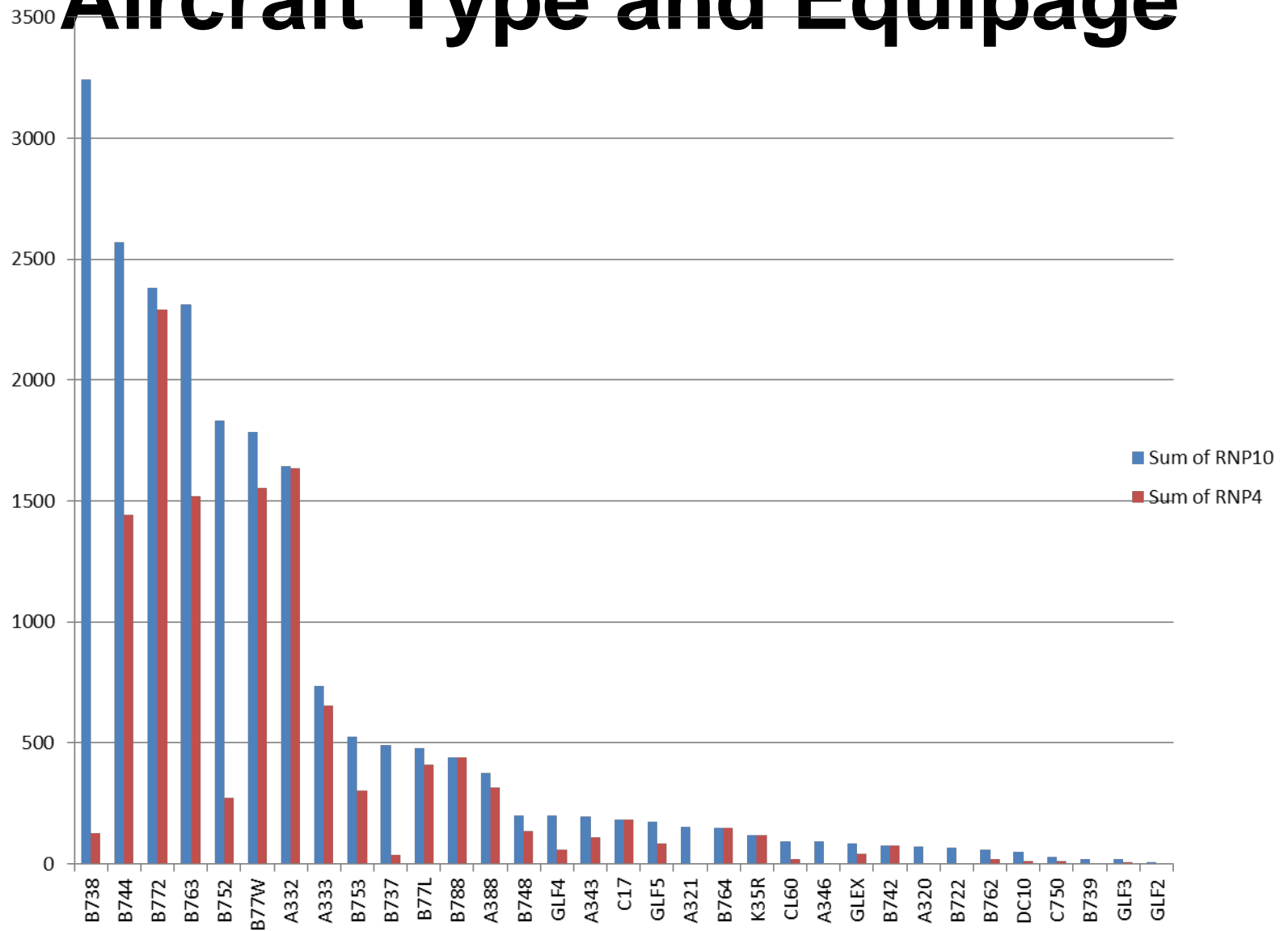
□ N17CX  
410  
N522



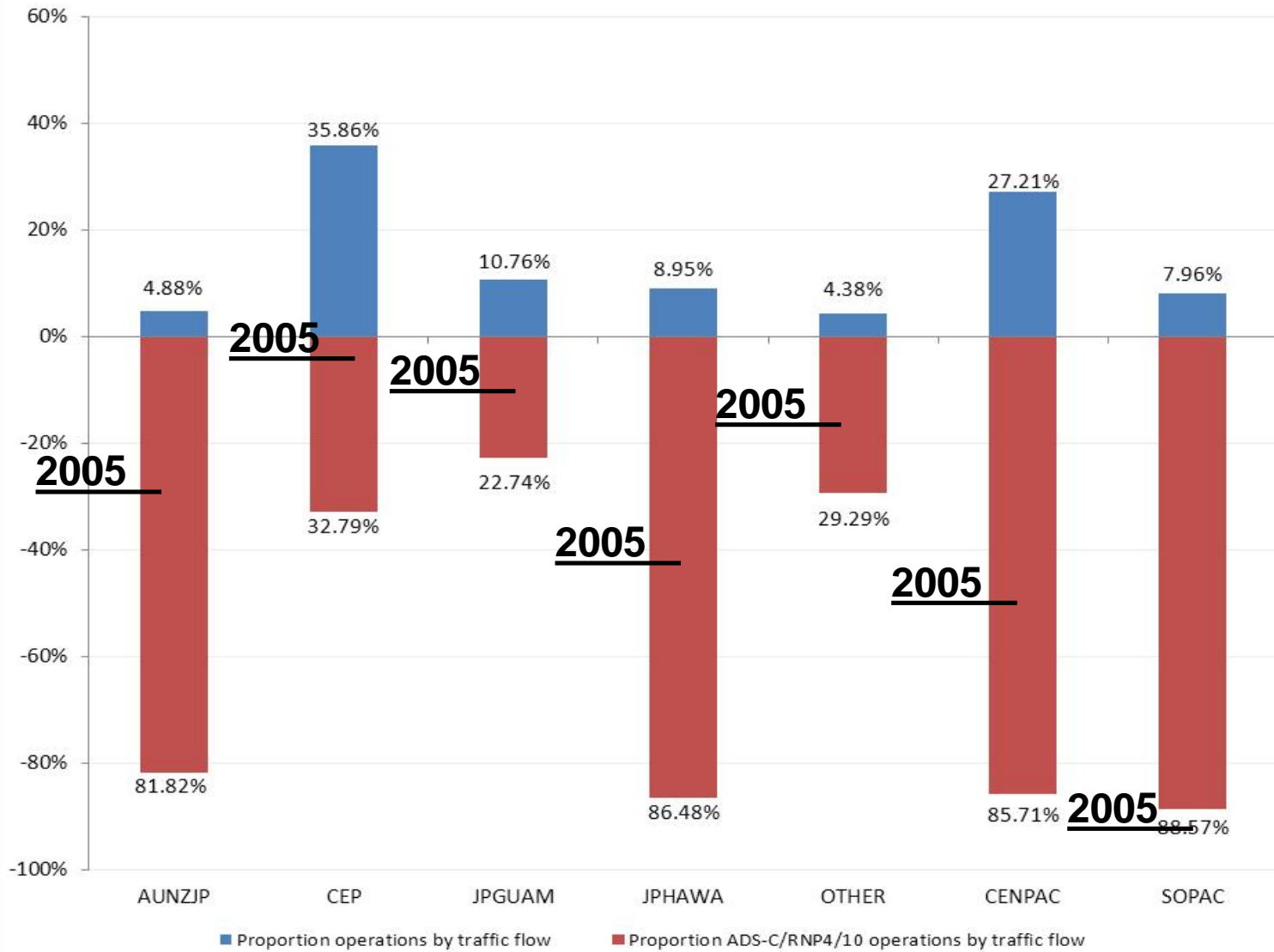
# ZOA Flights & Equipment Utilization



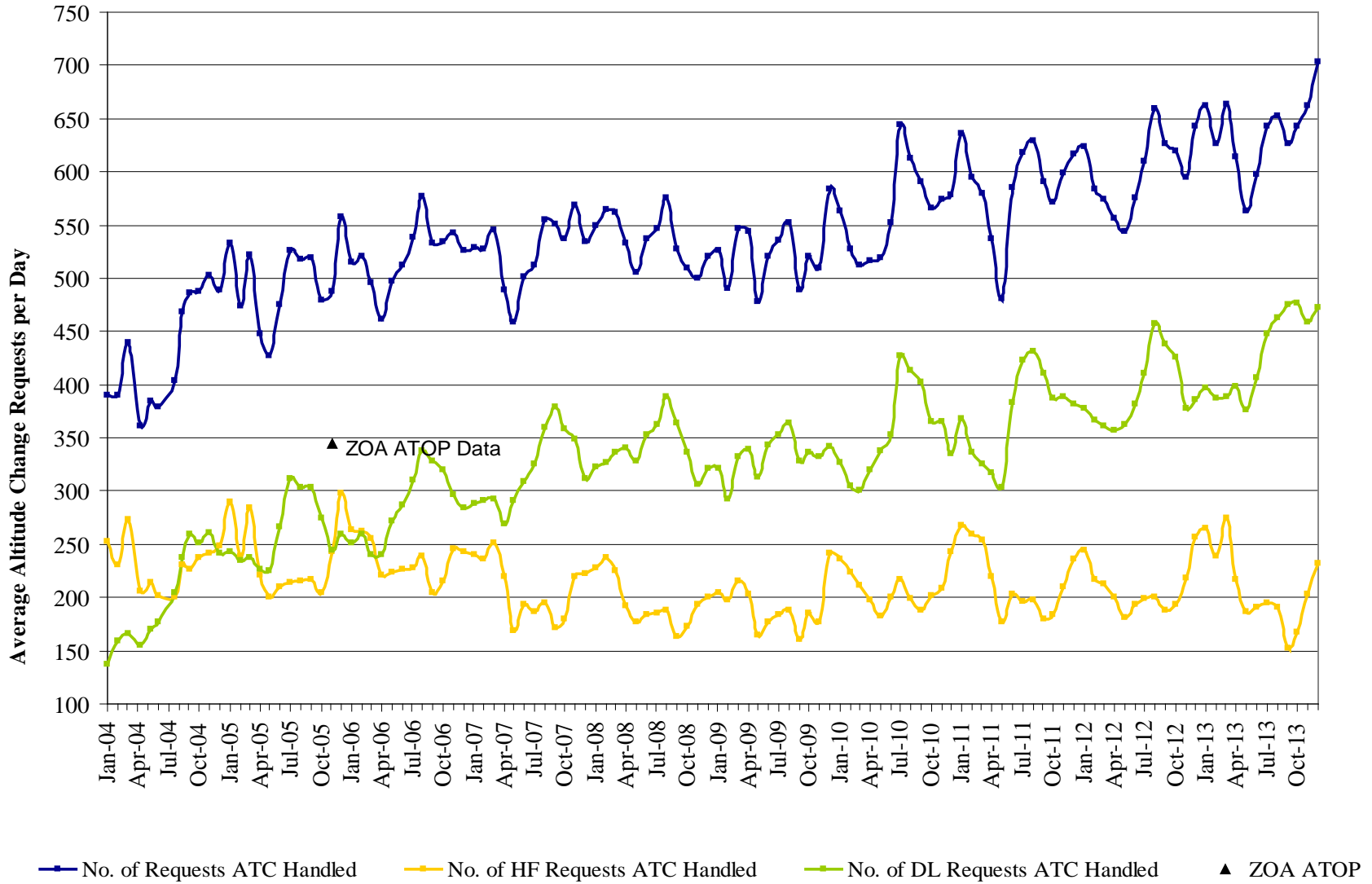
# Aircraft Type and Equipage



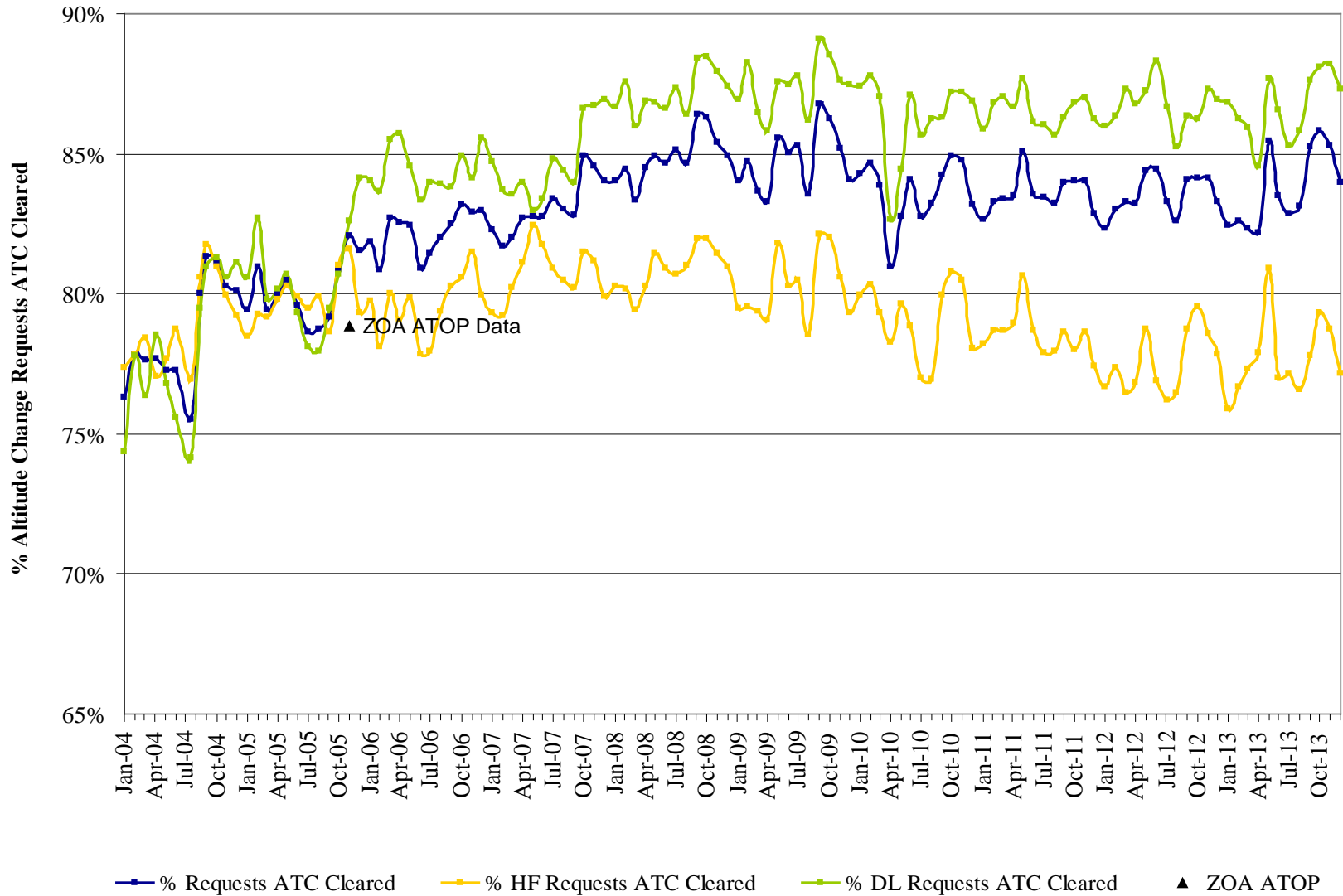
Proportion of Operations by Traffic Flow and ADS-C + RNP4/10 within Traffic Flow -  
Aug/Sep/Oct/Nov/Dec 2013



# ZOA Altitude Change Requests ATC Handled



## ZOA % Altitude Change Requests ATC Cleared



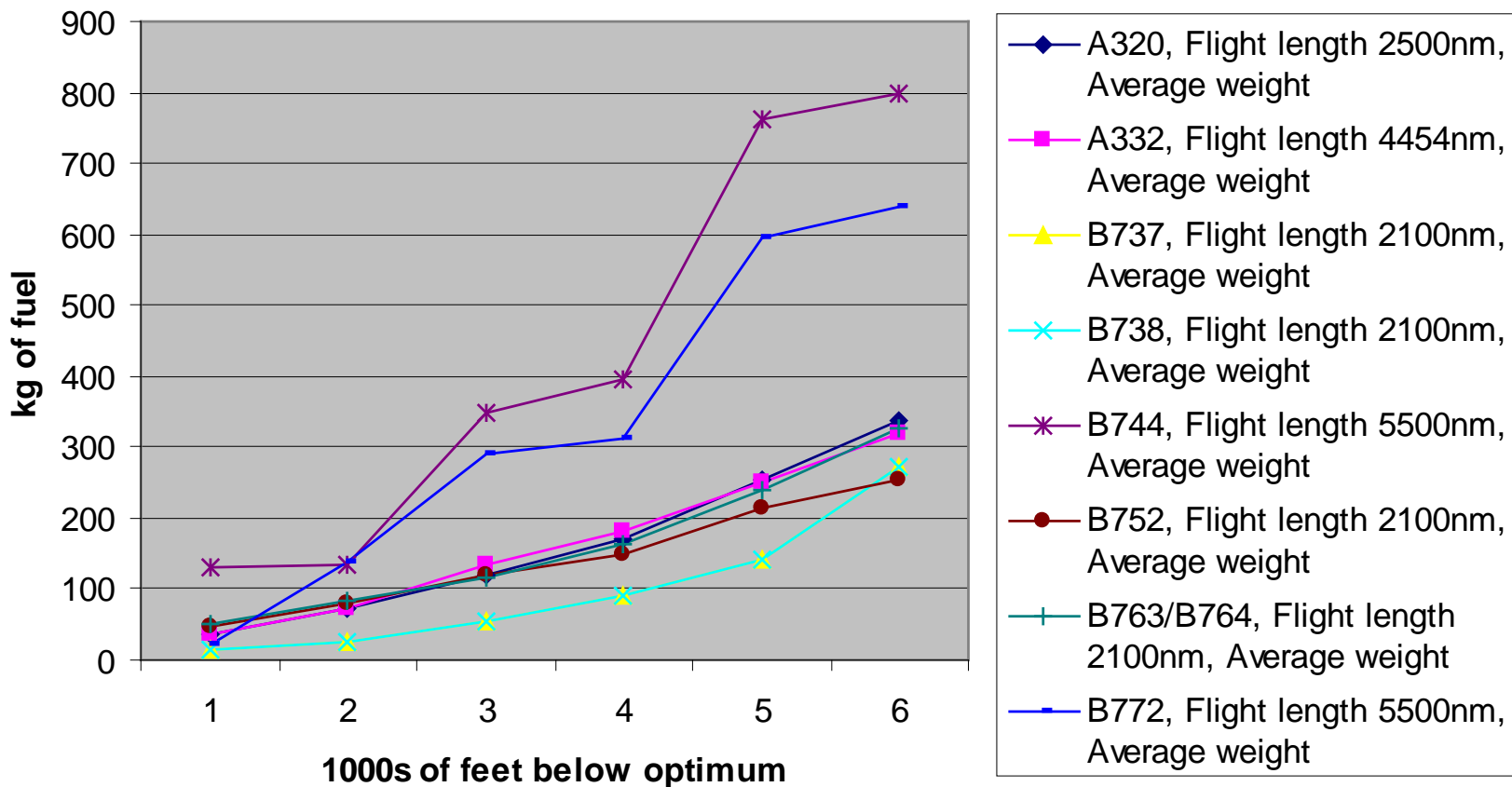
# Lost Fuel Burn Savings

The following slides identify denied aircraft requests for climb to optimum altitudes and places a value on the increased fuel burn due to lack of FANS equipment and RNP certification



# Impact of Denied Altitude Change Requests

## Fuel Burn Below Optimum Altitude



# ADS-C Reporting Costs



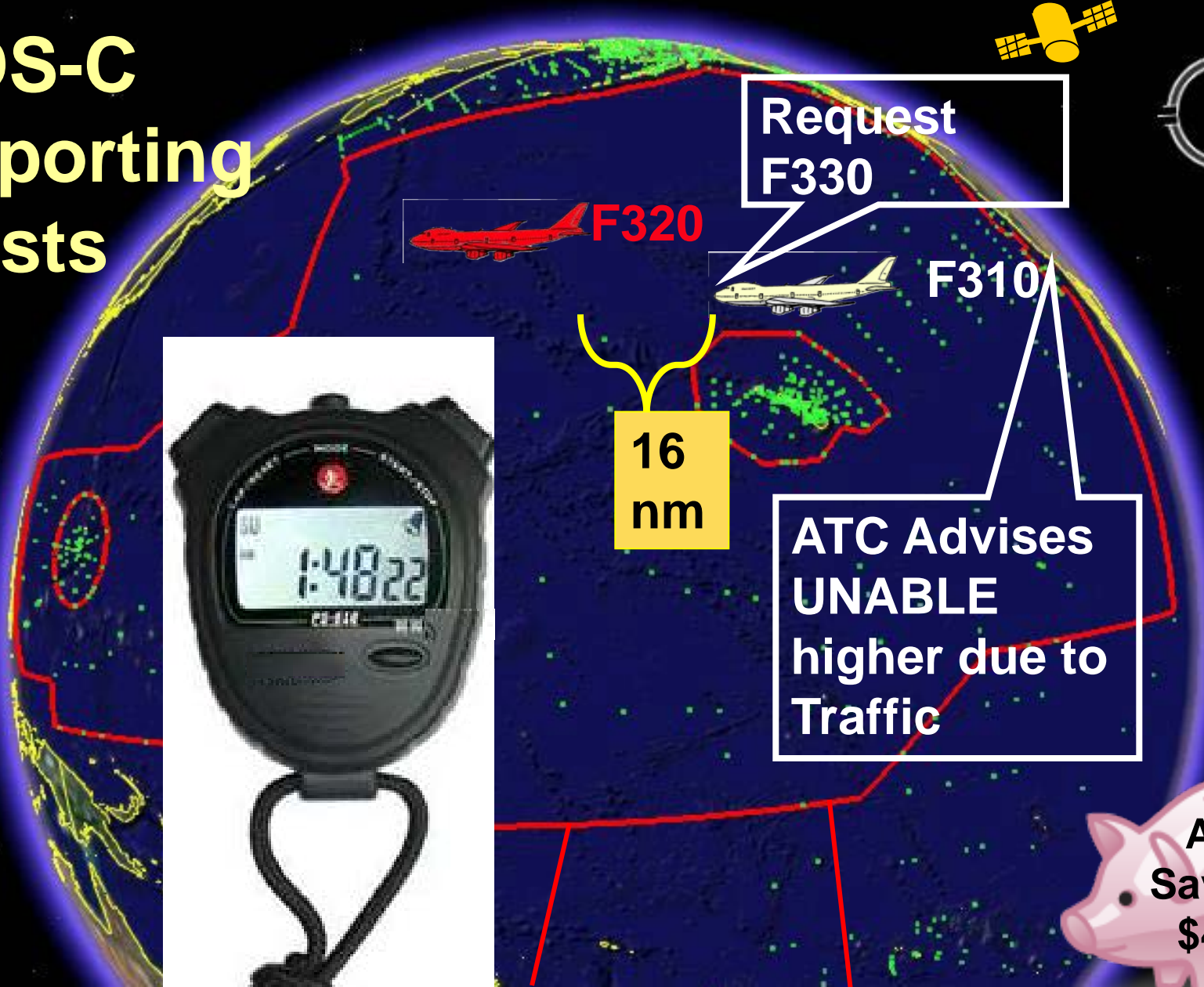
25¢

8 Hour Flight

RNP10  
\$4.50

RNP4  
\$8.75

# ADS-C Reporting Costs



# Lack of RNP4 extra fuel burn

- ✓ Is the traffic a Same Direction Conflict?
- ✓ Is the distance between the aircraft 16nm or more?
- ✓ If the these two conditions are met; Track:
  - ✓ Aircraft type
  - ✓ Feet below optimum altitude
  - ✓ Time the altitude request was denied

F320

Request  
F330

F310

ATC Advises  
**UNABLE**  
higher due to  
Traffic



# Lack of RNP4 extra fuel burn

ATC Clears ZZZ123 Climb and Maintain F320 ✈️

Request F350

- ✓ Calculate time from the aircraft's denied climb to optimum altitude.
- ✓ Begin new tracking if still below optimum altitude.



# Lack of RNP4 extra fuel burn



✓ Aircraft ZZZ123 is a B744 that was 1.5 hours and 2000 feet below optimum altitude.

133 kg per hour

Multiplied by 1.5

Equals 199.5 kg extra fuel burn for this event



- ❖ **Data tracked for 15 days**
- ❖ **April 1-16, 2012 Extra fuel burn of 27,331kg (60,128) lbs due to lack of FANS and RNP4**
- ❖ **Sept 10-24, 2012 Extra fuel burn of 28,829kg (63,423 lbs) due to lack of FANS and RNP4**
- ❖ **Jan 6-21, 2013 Extra fuel burn of 28,858kg (63,487 lbs) due to lack of FANS and RNP4**
- ❖ **Extrapolated over a 1 year time period, an annual extra fuel burn of 702,211kg (1,544,850 lbs)**
- ❖ **Extra 4.9 million lbs of CO2 emissions**

# Lack of RNP4 extra fuel burn



- ❖ Data tracked for 15 days (Sept 1-16, 2013)
- ❖ Extra fuel burn of 21,310 kilograms (kg) (46,882 lbs) due to lack of FANS and RNP4
- ❖ Extrapolated over a 1 year time period, an annual extra fuel burn of 518,543 kg (1,140,795 lbs)
- ❖ Extra 1.6 million kg of CO2 emissions

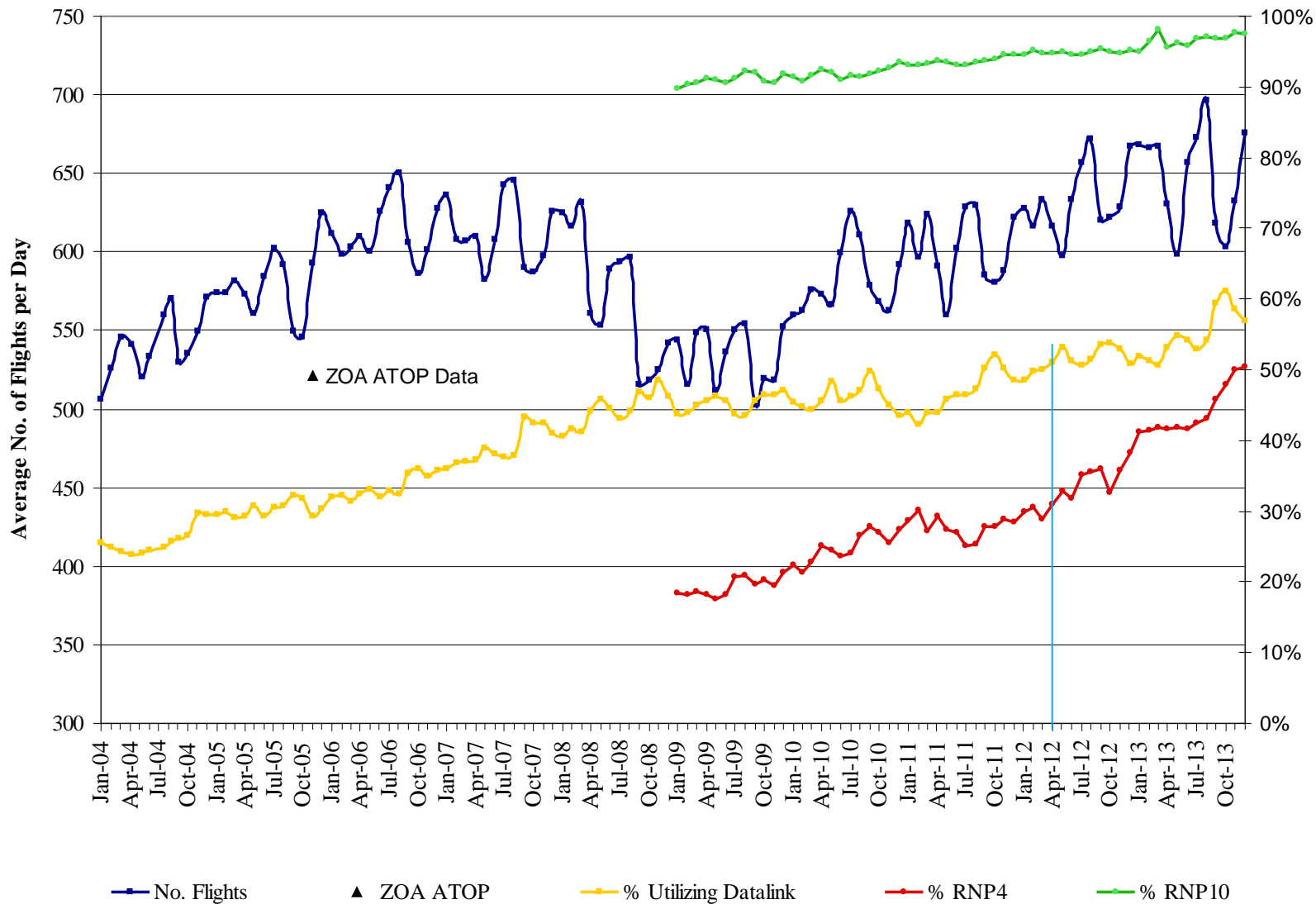


# RNP4 Aircraft extra fuel burn



- ❖ Data tracked for 15 days (Sept 1-16, 2013)
- ❖ Extra fuel burn of 13,534 kilograms (kg) (29,744 lbs) due to lack of FANS and RNP4
- ❖ Extrapolated over a 1 year time period, an annual extra fuel burn of 329,282 kg (724,420lbs)

# ZOA Flights & Equipment Utilization



# Additional benefits are not tracked

- 30nm separation after two opposite direction aircraft have passed
- If an aircraft is held below optimum altitude because of traffic and does not make requests for a new optimum altitude.

# Additional benefits are not tracked

- Savings that could be realized by developing route systems based on a 30nm lateral standard.
- This paper only captures the lost savings for the Oakland FIR. It would be much higher if calculated for all FIRs

# Conclusion

- **The meeting is requested to:**
  - **Recognize the benefits of RNP 4 and FANS equipage; and**
  - **Consider certifying FANS equipped aircraft as RNP 4; and**
  - **Consider equipping aircraft with satellite FANS and RNP 4 certification.**



**Anchorage**  
D50, 30/30  
PAZN FIR

**Fukuoka**  
D50, 30/30

**Anchorage**  
PAZA FIR  
D50, D30

**Vancouver**  
D50

**ZSE, ZOA,  
ZLA**  
D50, 30/30

**Brisbane**  
D50, 30/30

**Guam**  
D50, 30/30

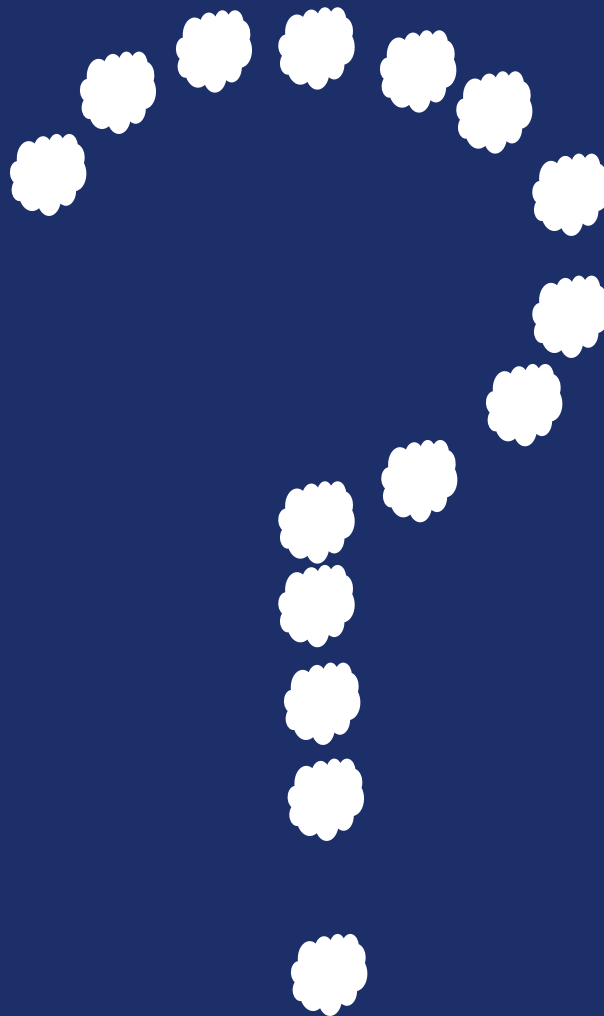
**Nadi**  
D50, 30/30

**HCF**  
D50, 30/30

**Moresby**  
FIR D50

**Auckland**  
D50, 30/30

# ADS-B Distance Based Separation



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**Dennis Addison, FAA**

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