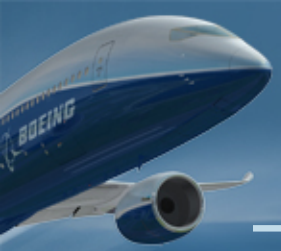


# **ATS Data Link Deployment Aircraft Manufacturer's Perspective**

**Operational Data Link Seminar  
Bangkok, Thailand  
May 2-4, 2016**

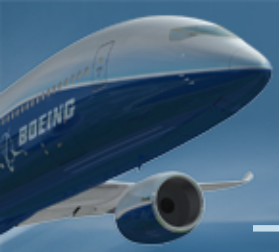
**Dung Nguyen  
Boeing Commercial Airplanes**



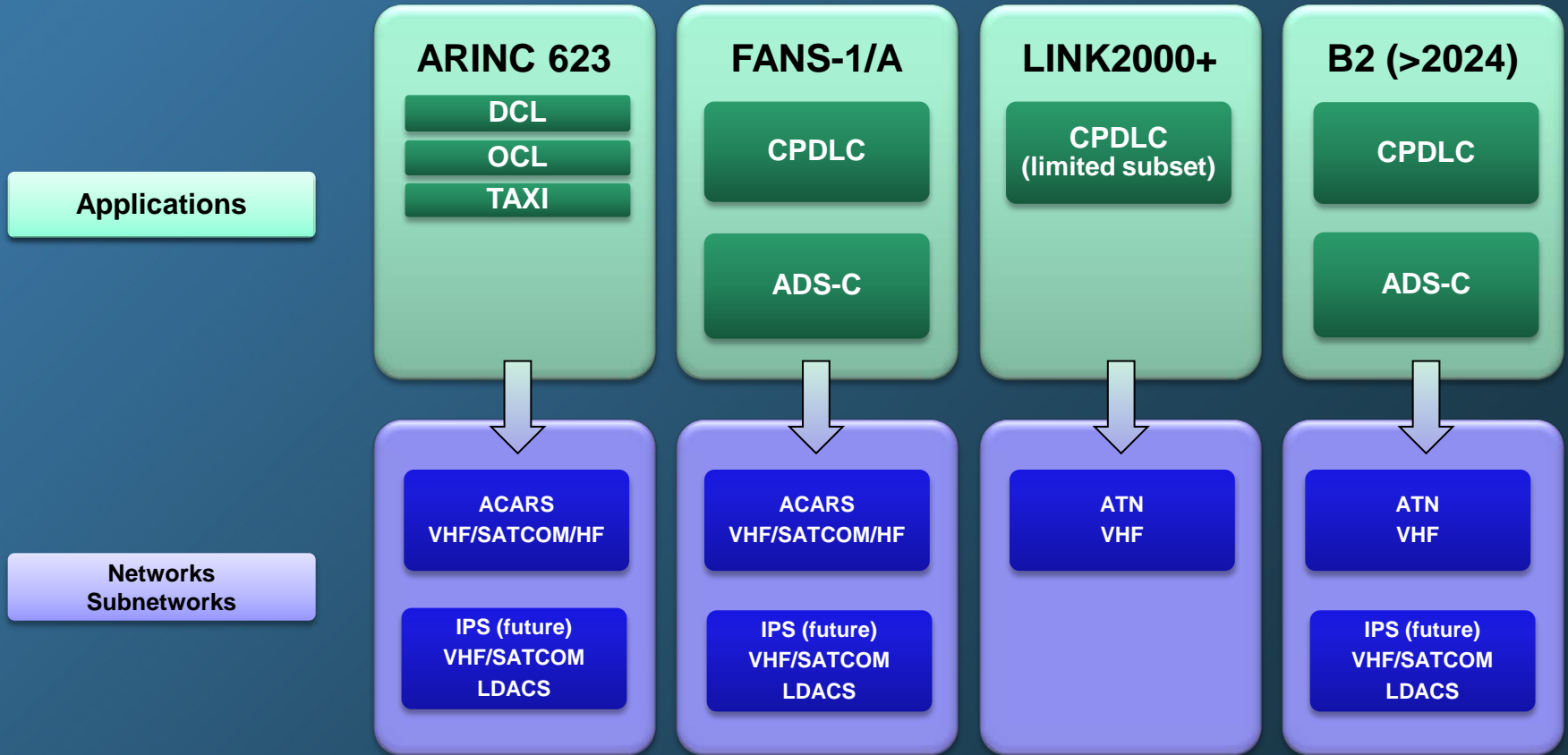
# Content

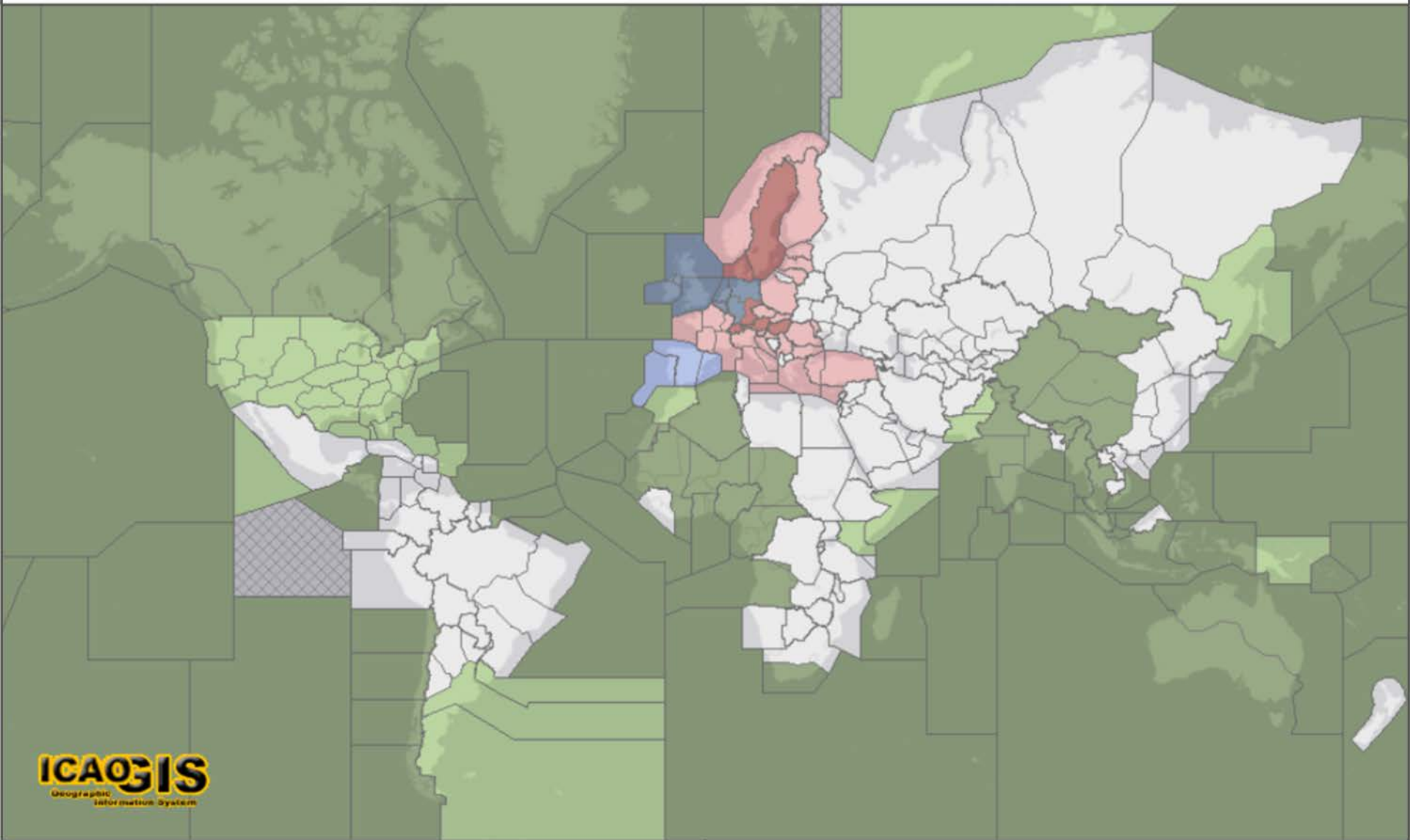
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- ATS Datalink Technologies
- Avionics Road Map & Design
- Design Requirements
- Interoperability Tests
- Implementation Issues
- Summary



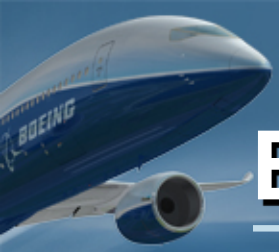
# ATS Datalink Technologies



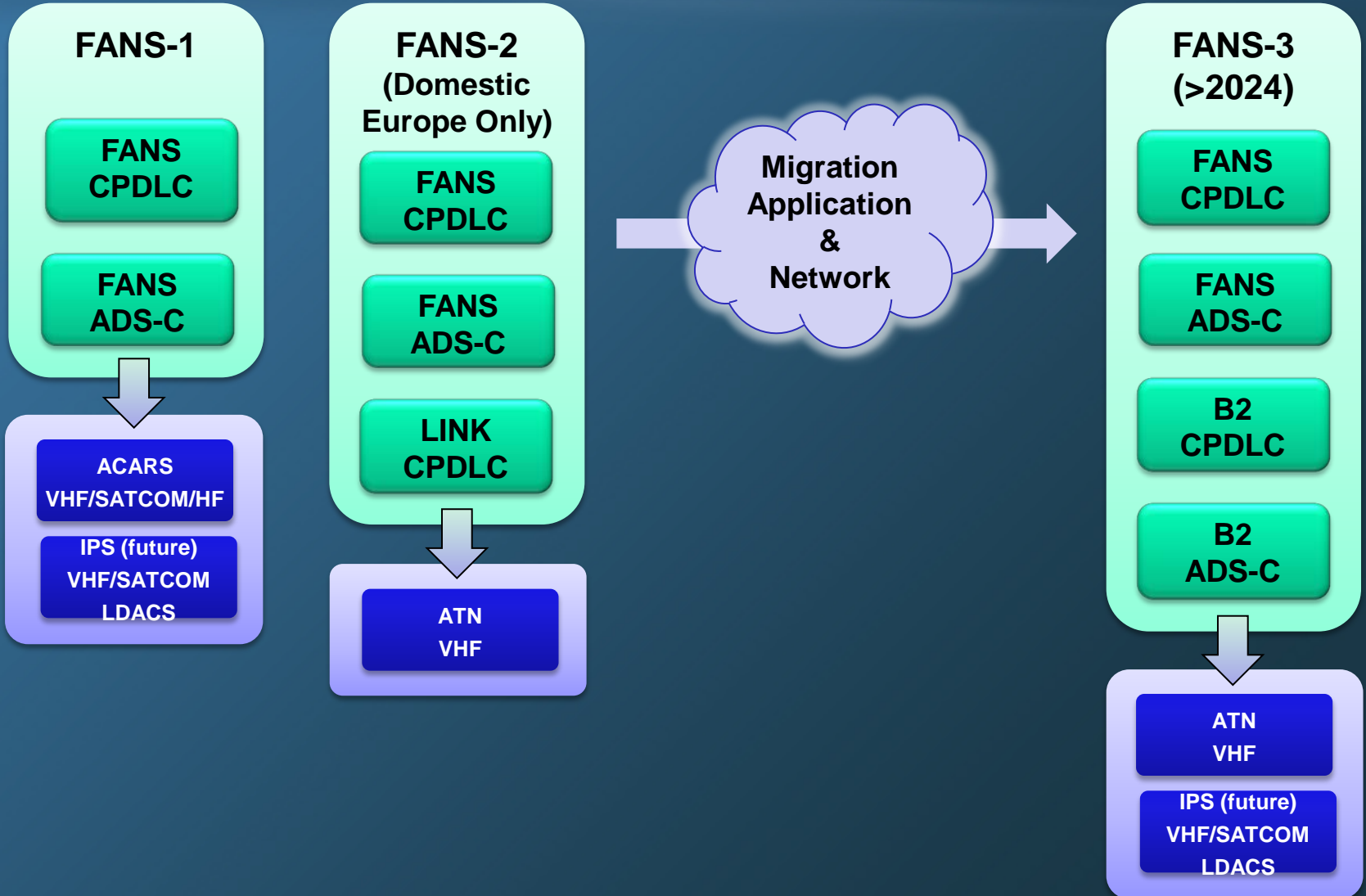


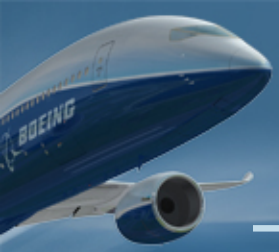
Flight Information Region (FIR) boundaries are provided by ICAO. Service availability is depicted to the best of Boeing's knowledge. Service is not necessarily available throughout an indicated FIR.

- |                                 |                                    |
|---------------------------------|------------------------------------|
| FANS operational                | LINK 2000+ operational             |
| FANS planned                    | LINK 2000+ planned                 |
| FANS and LINK 2000+ operational | No services operational or planned |
| FANS and LINK 2000+ planned     | FIR not delegated by ICAO          |

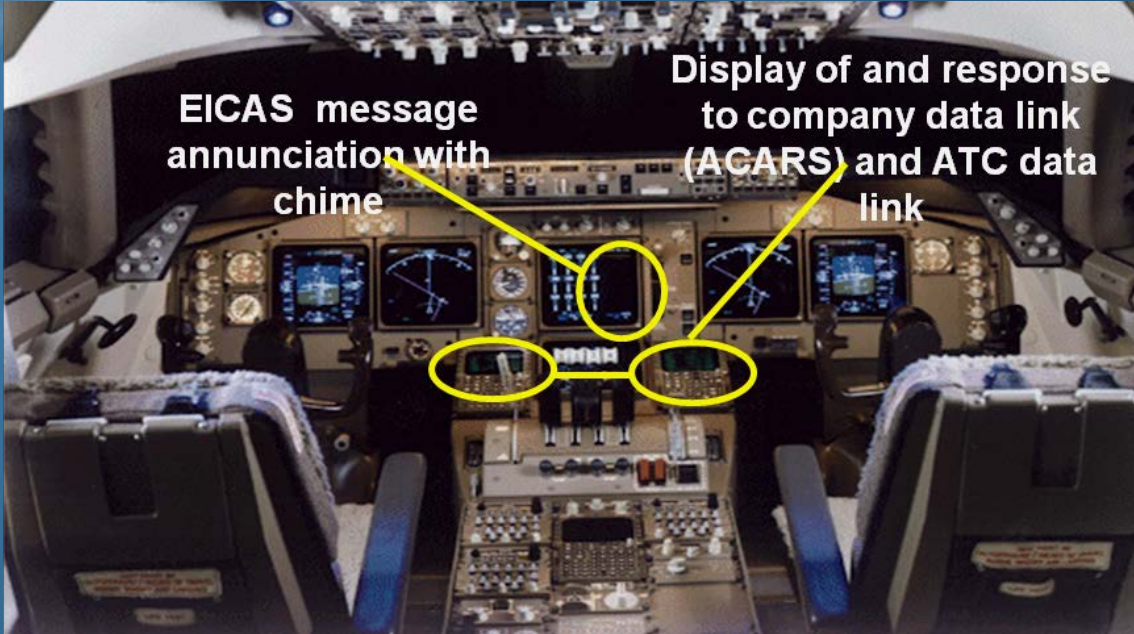


# Boeing Avionics Roadmap





# 747-8 Cockpit



EICAS message annunciation with chime

Display of and response to company data link (ACARS) and ATC data link

TAT +15c TO

979	979	979	979
97.1	96.7	97.0	97.1

N<sub>1</sub>

•ATC APU RUNNING STATUS

920	916	919	920
-----	-----	-----	-----

EGT

DOWN GEAR

FLAPS 10

NO STAB 0 15 NU 6.0

SAT FUEL TEMP +15c

GROSS WT TOTAL FUEL 3900 LBS X 1000

CLIMB TO FL320, REPORT REACHING FL320.

REJECT 2037Z ACCEPT

ATC ALT REQUEST 1 / 4

ALTITUDE REQUEST  
FL350 CRZ CLB>

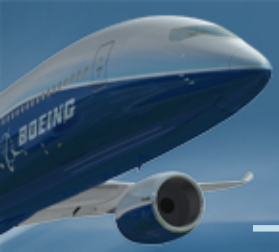
STEP AT MAINTAIN OWN SEPARATION / VMC>

< AT PILOT DISC DUE TO PERFORMANCE>

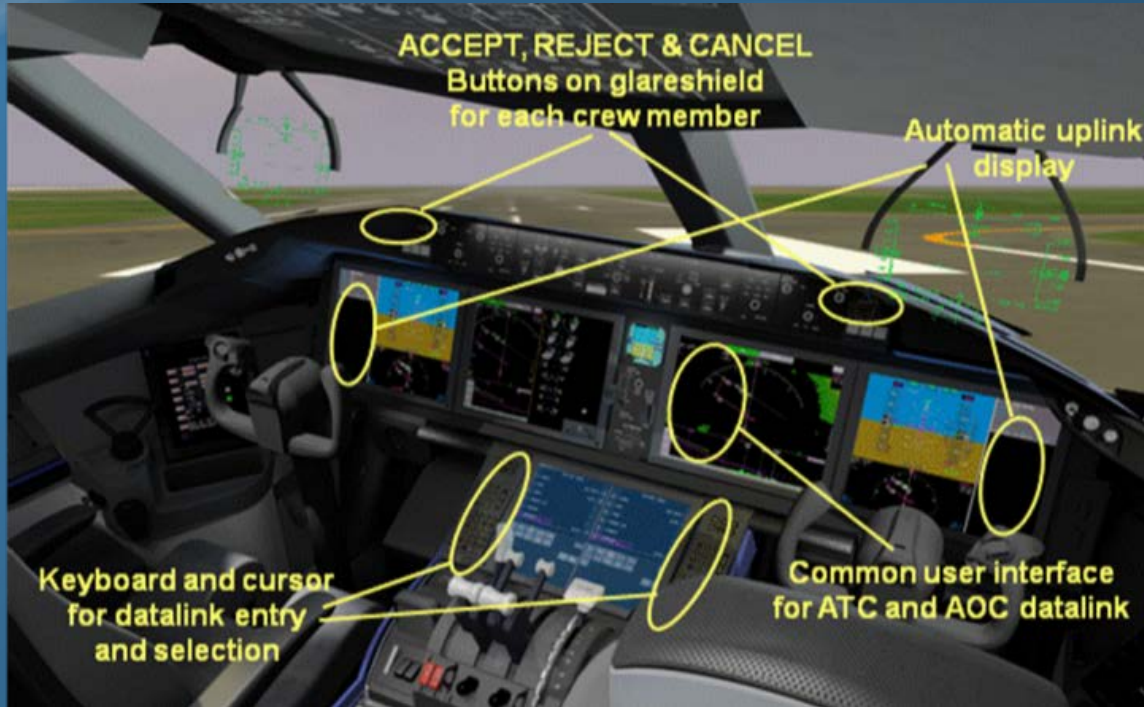
< REQUEST DUE TO WEATHER>

VERIFY >





# 787 Cockpit



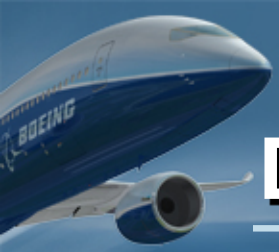
**ATC UPLINK**

1234z FROM KZAK

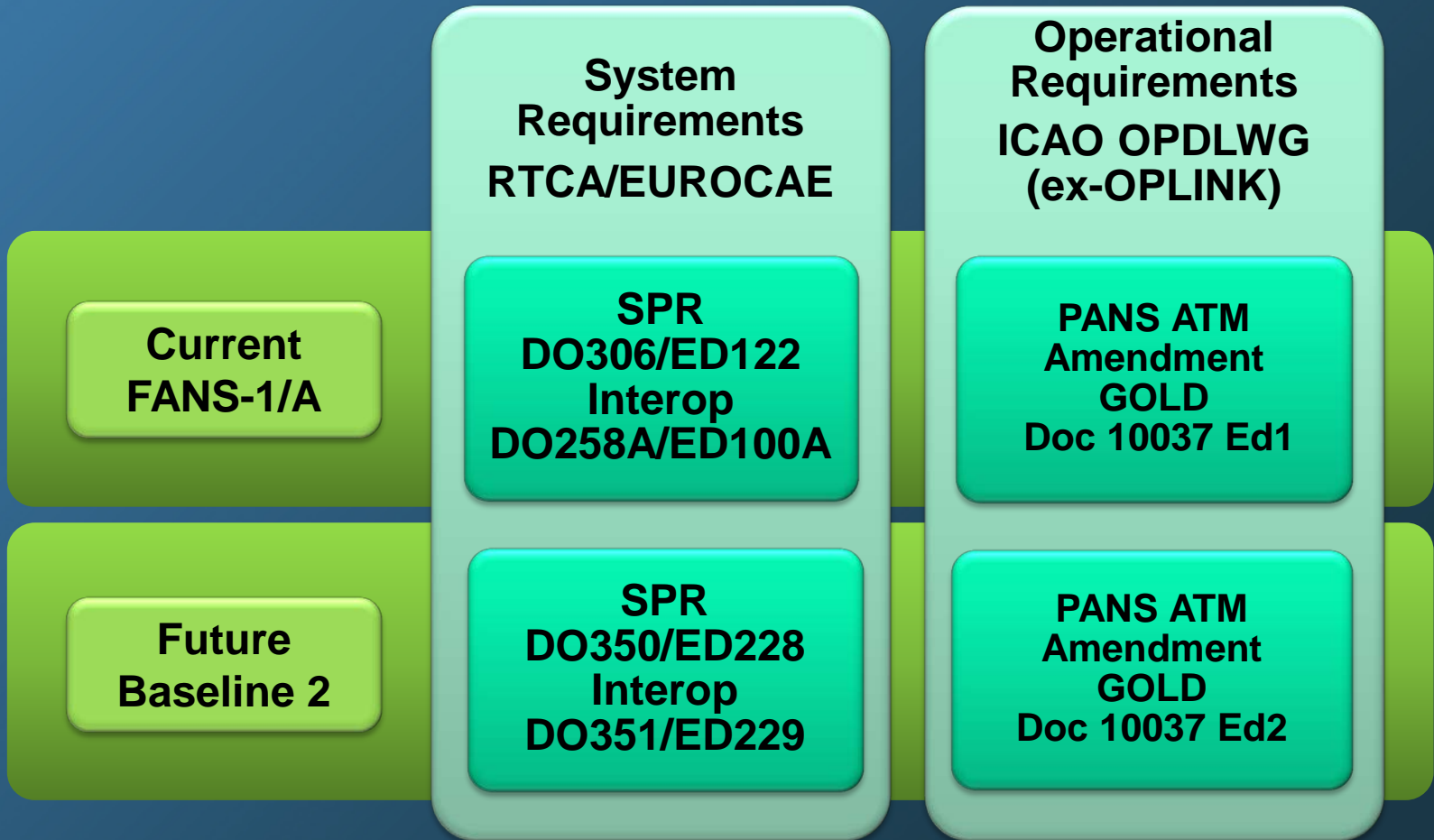
**MAINTAIN FL310,**  
**AT NANUK CLIMB TO FL330,**  
**REPORT LEAVING FL310,**  
**REPORT MAINTAINING FL330.**

ACCEPT REJECT

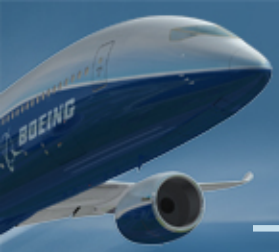
ATC	FLIGHT INFORMATION	COMPANY
REVIEW	MANAGER	NEW MESSAGES
1234z	LEVEL REQUEST	
◆ LEVEL:	<input type="text" value="3100"/>	
<input type="checkbox"/> STEP AT:	<input type="text" value="....."/>	
◆ BLOCK:	<input type="text" value="...."/>	
TO:	<input type="text" value="...."/>	
◆ REQUEST CRUISE CLIMB TO:	<input type="text" value="...."/>	
<input checked="" type="checkbox"/> AT PILOTS DISCRETION		
<input type="checkbox"/> DUE TO WEATHER		
<input type="checkbox"/> DUE TO AIRCRAFT PERFORMANCE		
<input type="checkbox"/> MAINTAIN OWN SEPARATION AND VMC		
FREE TEXT:	<input type="text" value="....."/> <input type="text" value="....."/> <input type="text" value="....."/>	
<input type="button" value="SEND"/>	<input type="button" value="PRINT"/>	<input type="button" value="RESET"/>
<input type="button" value="RETURN"/>		
<input type="button" value="EXIT"/>		
SCRATCH PAD		



# Design Requirements



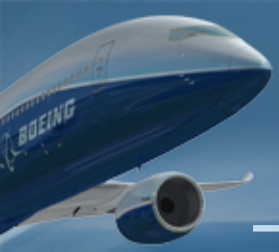




# Interoperability Tests with Boeing

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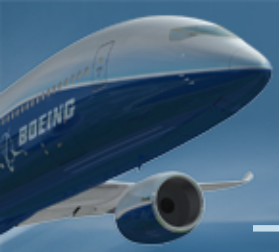
- Test with Test Benches
  - Using “real” Avionics
  - Using “live” ARINC or SITA network
- Test coverage
  - Exchange CPDLC messages
  - ADS-C Reports
  - Transfer from center to center
  - Use Boeing or ANSP test procedures
- Interop Test Request Contact
  - Ms. Rochelle Perera
  - [rochelle.e.perera@boeing.com](mailto:rochelle.e.perera@boeing.com)



# Monitoring

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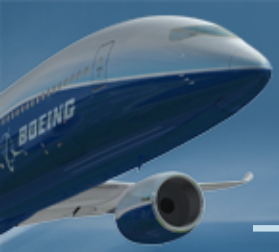
- Register with ISPACG FANS-1/A Central Reporting Agency (CRA) - [ispacg-cra.com](http://ispacg-cra.com)
- Provides a means for FANS-1/A stakeholders to report problems and to seek resolutions
  - Only authorized stakeholders may raise problem reports
  - Only authorized stakeholders have access to the full CRA problem report details.
- Timely report problems with CRA for analysis and resolution



# Implementation Issues

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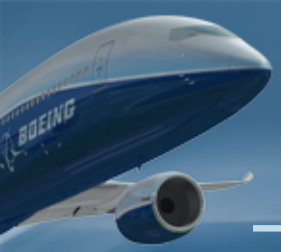
- Internetworking between Datalink Service Providers
  - Agreements between DSPs to forward each other's ATS messages
  - Allows seamless access between aircraft and ATC Facilities
- DSP not deliver downlink messages after acknowledging the message
- Rejection of logon from aircraft
- Unable to Transfer
  - Current center not terminating connection
  - Next center not establishing connection



# Summary

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- FANS-1/A now and plan for B2 in the future
- Follow RTCA/EUROCAE standards and ICAO Operational Requirements (PANS ATM and GOLD) to ensure interoperability
- Perform interoperability tests with Boeing before operational and for each software upgrade
- Participate in ISPACG FANS-1/A Central Reporting Agency (CRA)
- Timely report problems with CRA for analysis and resolution



Thank You!

Questions?