



Weather Information Exchange Model

# **AIS & MET Data Link**

## ***Concepts, Applications, and Standards Development***

***RTCA SC-206 / EUROCAE WG-76***

# Statement of the Problem

- **Why are we doing AIS & MET data link?**
  - Inefficiencies of integrated flight preparation (PIB) – still a **lot of paper**
  - Inappropriate or outdated information may **hamper safe flight operations**
  - Printed information is often **obsolete** before the ink hits the paper
  - **Inconsistent information** between ATM / AOC and flight deck makes CDM inefficient

# Contents

- Concepts
- Role of AIXM & WXXM
- Selected applications and examples
- Standards
- Challenges and way forward

# The Current Context

- Predeparture flight paperwork is currently required
  - Flight Plan Information
  - Weather
  - NOTAMs
- Printed information can be obsolete before the ink hits the paper
- Changes since original information provided
  - Weather updates
  - Navigation outages / availability
  - Other NOTAMs

PAPER...





# The Concepts

## INFORMATION MANAGEMENT FOR ATM

*Need for timely, relevant, quality-assured information directly into the cockpit*

### AIS (Annex 15)

- *Aeronautical Information Package (AIP, AIC, etc.)*
- *AIRAC system*
- *Permanent changes and NOTAM*

### MET (Annex 3)

- *Various products and services (Reports, forecasts, etc.)*
- *Pre-flight planning / radio contact*
- *Dynamic and time-sensitive*

# The Objectives



✓ Provision of **relevant and up-to-date information** to the flight crews

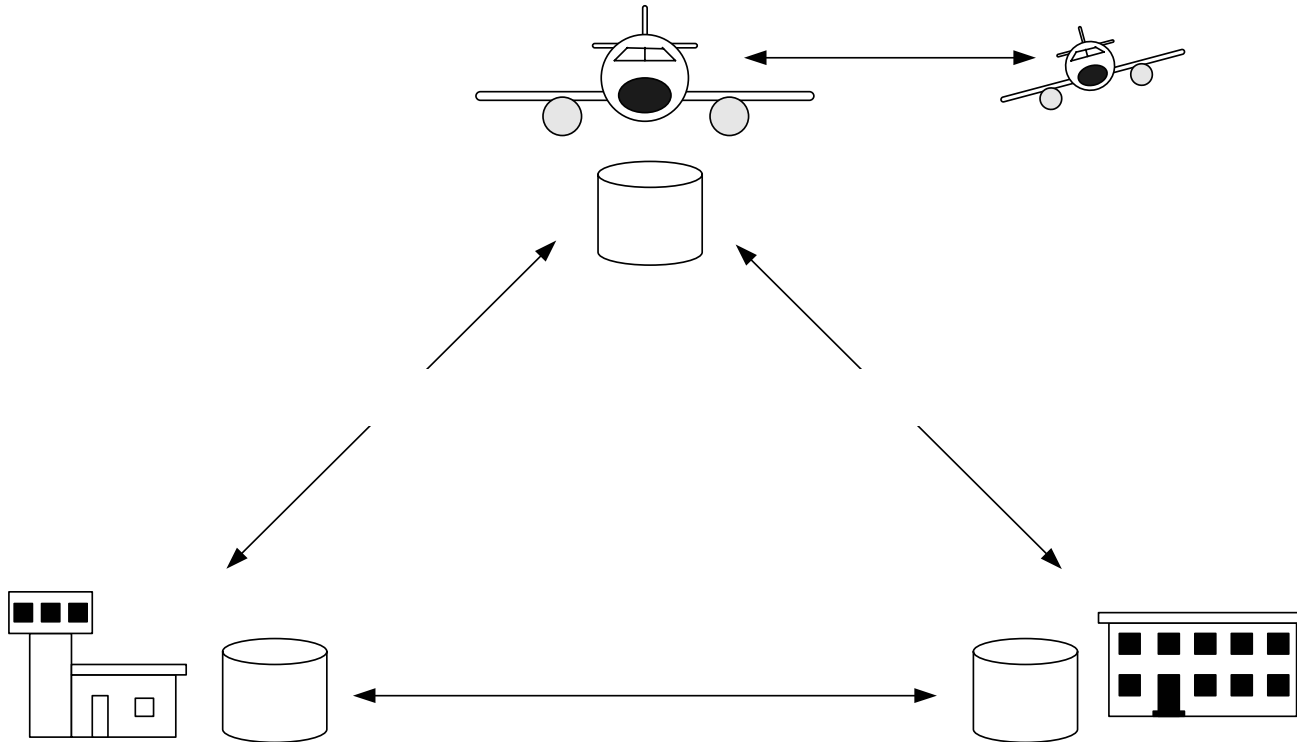
✓ **Collaborative decision making**

✓ Ultimate goal : **real-time information** to any user, anywhere, at any time



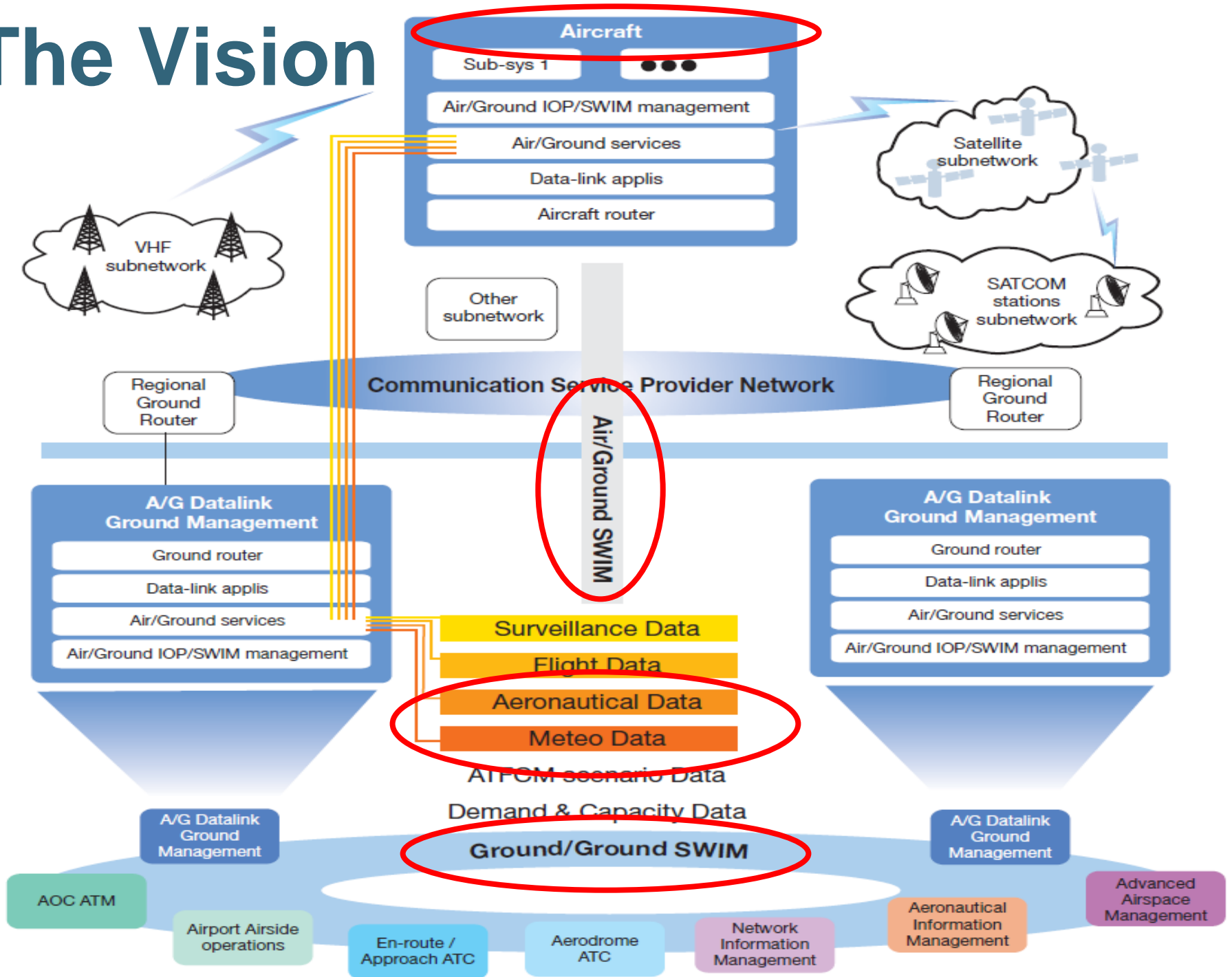
# Our Goal

## Shared Situational Awareness





# The Vision



# The Enablers

Standards

Aircraft / On-board Systems

Common  
reference  
information

ATM / Ground Systems

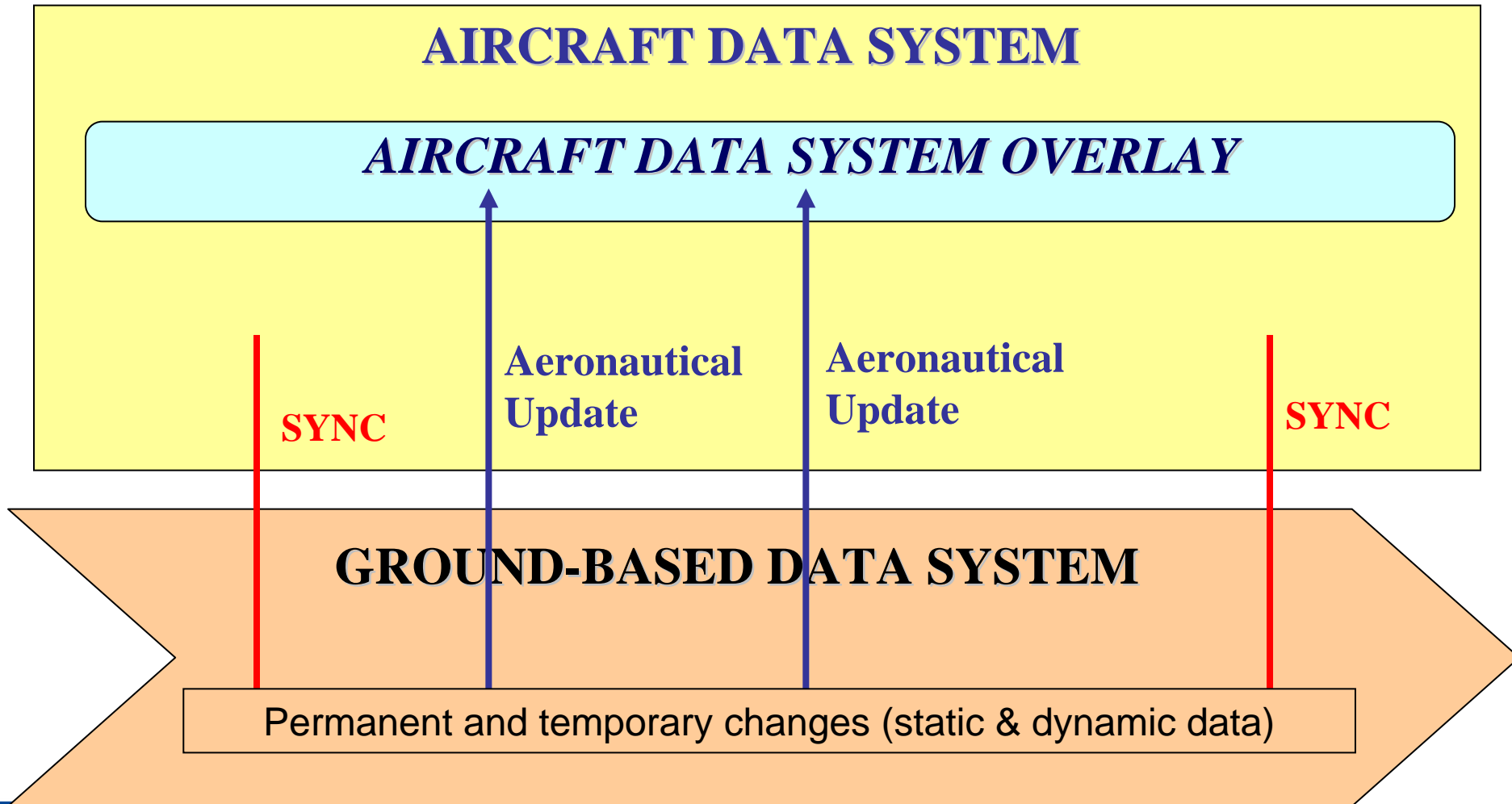
Adapted avionics

Data links

Data exchange models

Reference / source data

# AIS Data Link Services





# MET Data Link Services



- MET information services definition is based on the intended pilot decision support

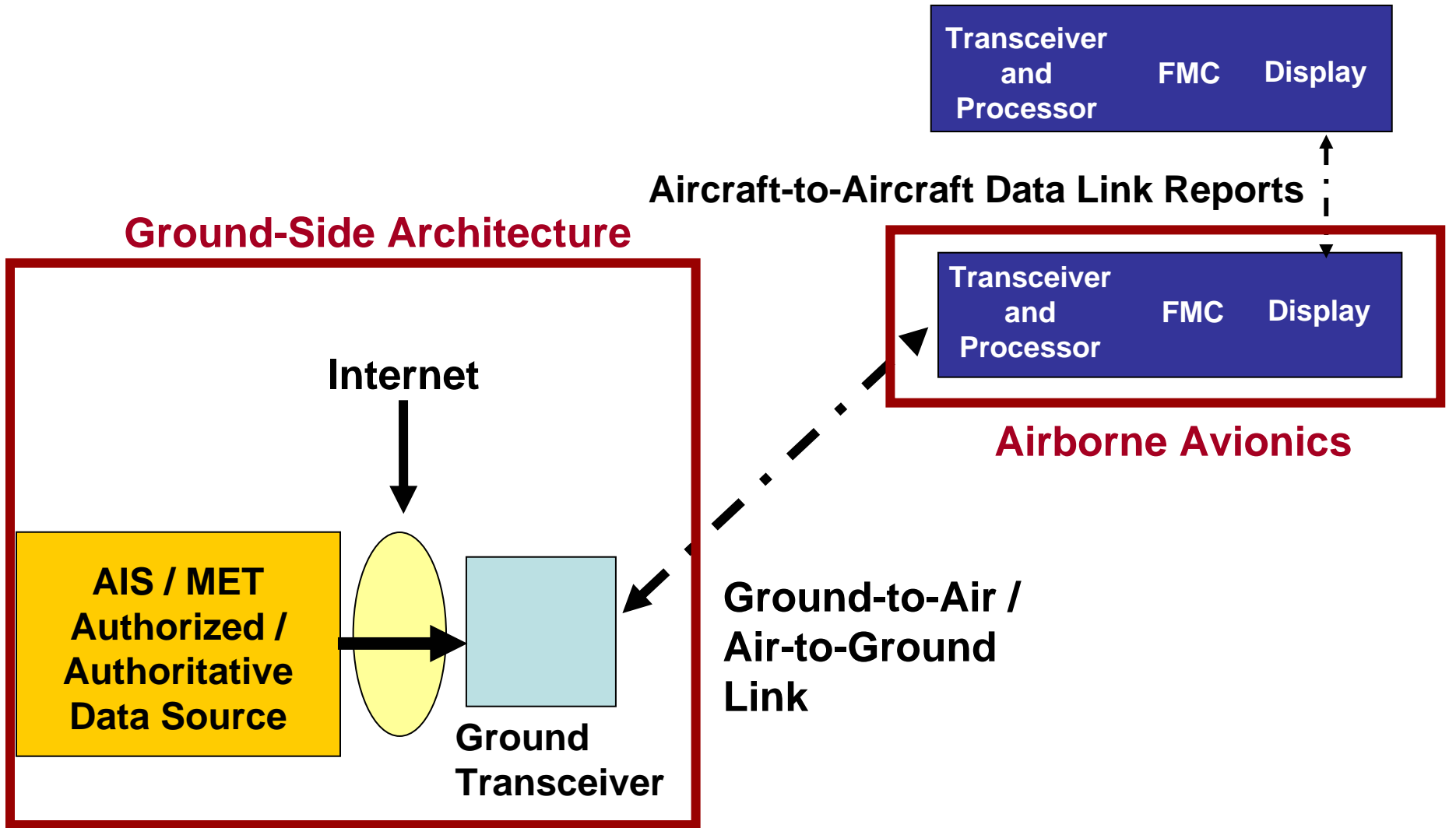
Planning decisions (> 20 min – D-**WPDS**) – advisory

Near-term decisions (3-20 min) – D-**WNDS**) – advisory

Immediate decisions (< 3 min) – D-**WIDS**) – hazards

Phase of Flight / Time Delta	Preflight Briefing	Flight Environment			
		Ground Operations & Take off	En Route / Cruise	Descent	Landing
Day/Hours	Planning Decisions				
Hours	Planning Decisions				
Hour	Planning Decisions				
3 – 20 Minutes		Near-Term Decisions			
< 3 Minute		Immediate Decisions			

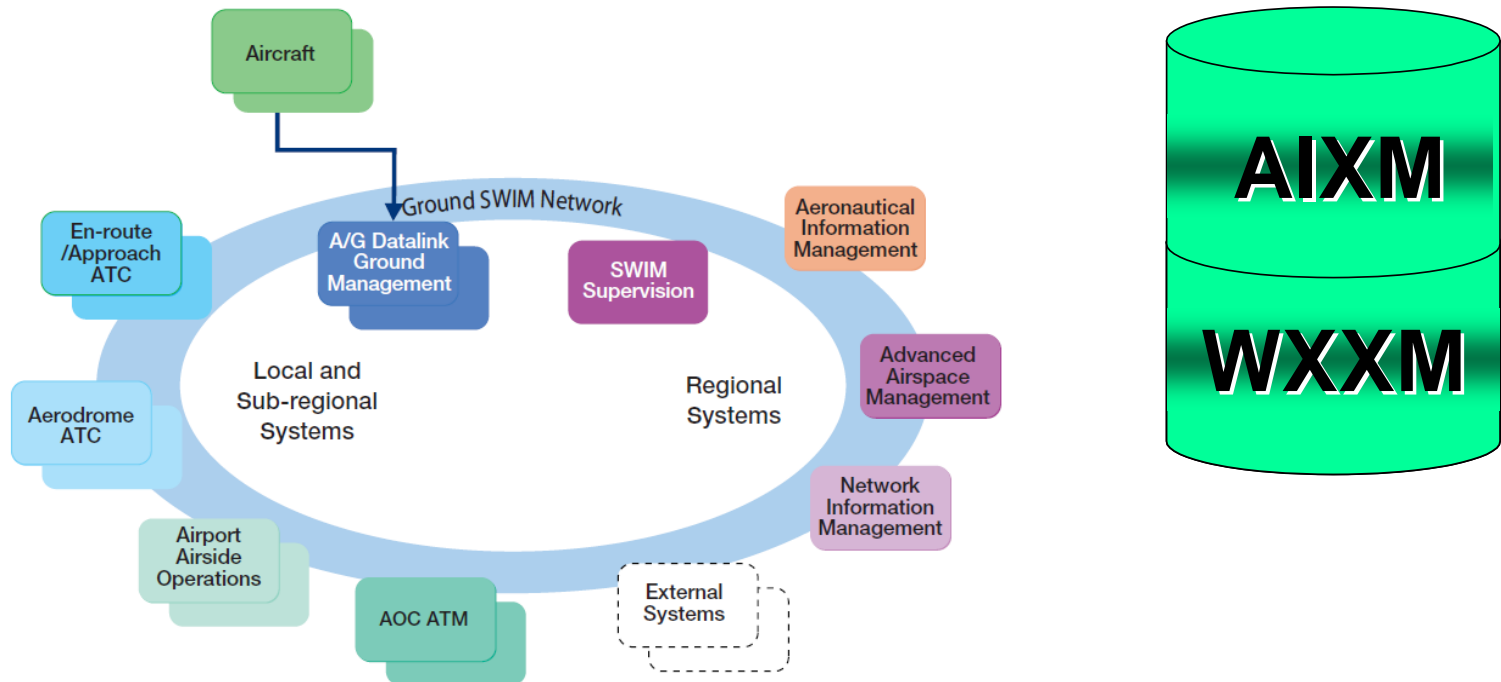
# Notional AIS & MET Ground & Air Data Link Architecture





# The Role of AIXM / WXXM

- Key enablers for ground communications
- Provides the required temporality model for the anticipated services (updates, sync, weather decision services)
- Meets the data requirements (scope, structure)



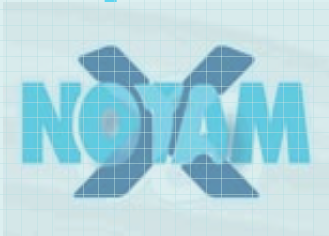
# AIXM – WXXM Support Services and Applications

Application

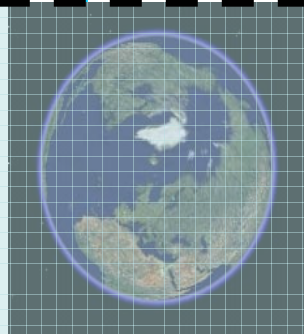


Common enabler : data exchange models (AIXM, WXXM)

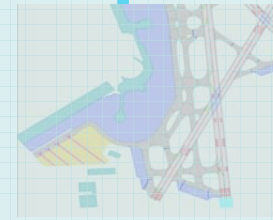
Service



Digital NOTAM service



Display Service



AMDB Information Service

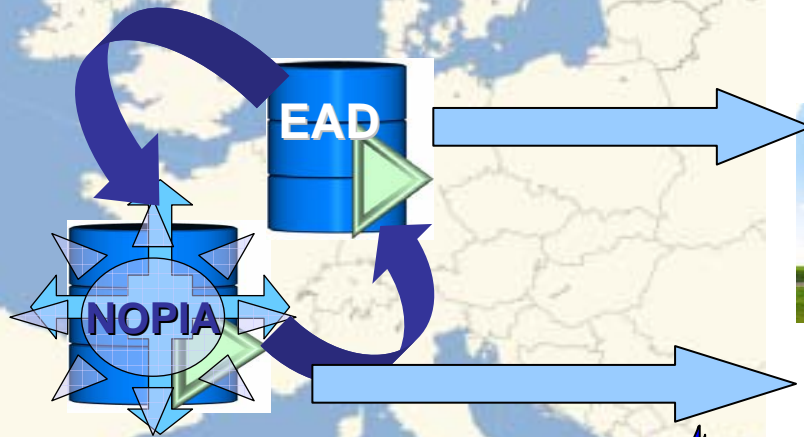
# AIS Data Link Services

## *The French Vision*

Use of interoperable reference data systems

*AIXM-enabled*

*Quality Enhancement*



Upload to airborne systems



European Data Link ground stations



# AIS & MET Data Link Services

## *The American Vision*

- **A Similar Vision**
- SWIM and airborne SWIM ConOps being drafted
- Goal is shared situational awareness and data amongst all users, enabled by SWIM connectivity





# Applications

## AIS & MET

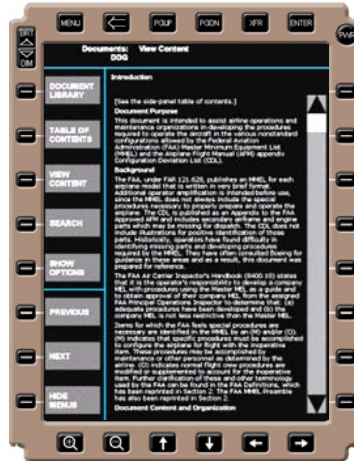
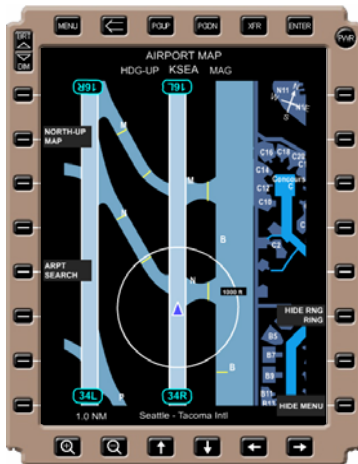
### Data Link Services





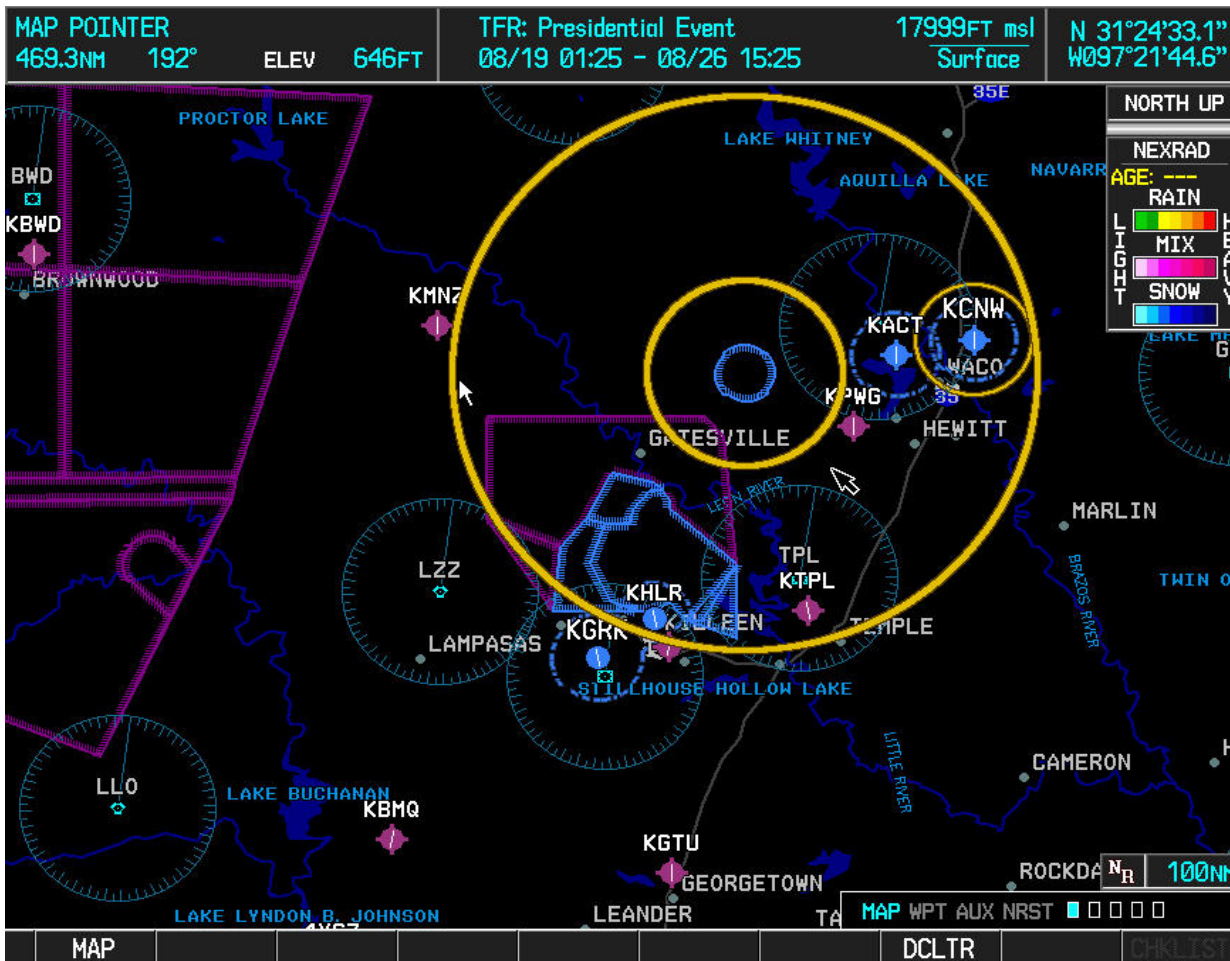
# Electronic Flight Bags

*Used for AIS & MET Display in Both Legacy and New Aircraft*



# AIS Data Link example

## *U.S. Special Activity Airspace (SAA) TFR*





# AMDB and AIS Data Link Services

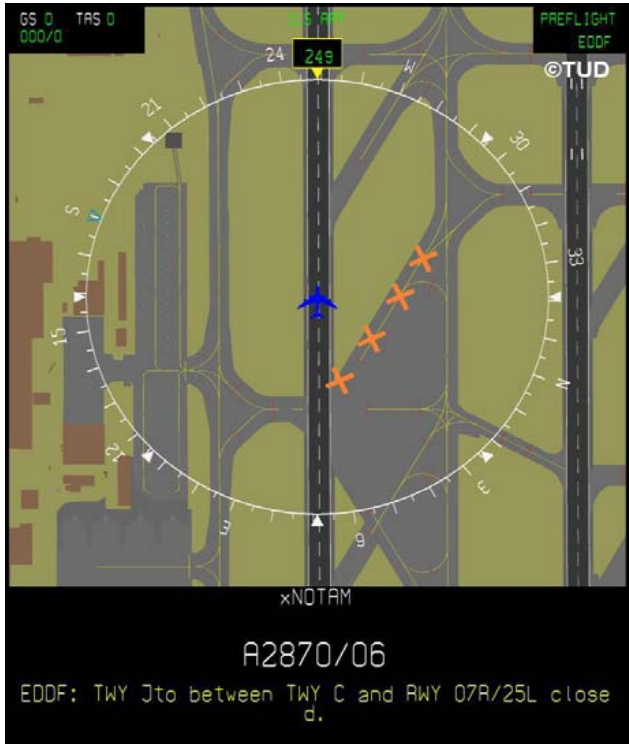
## *Dynamic Taxiway Elements*



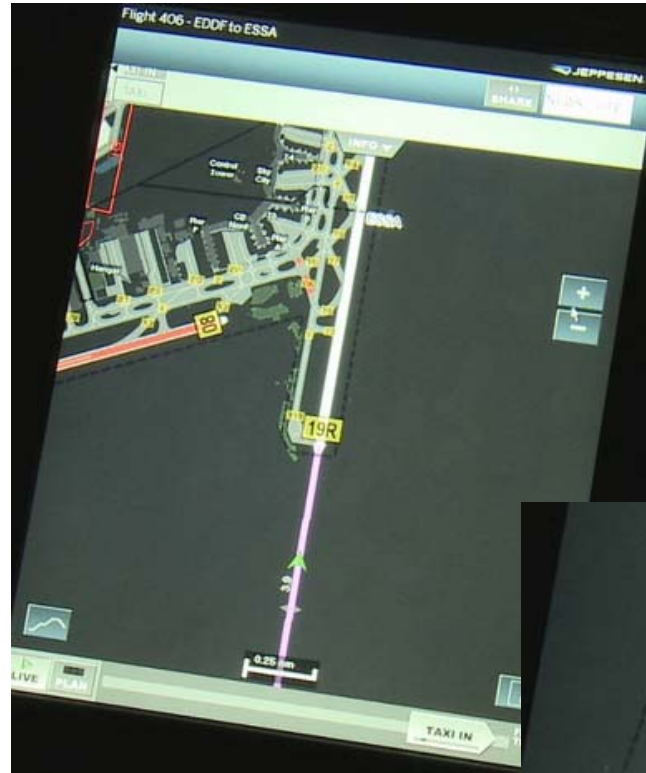


# D-(Aerodrome) NOTAMs

## *Display Concept*



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D-AIM trial (LFV, Eurocontrol, Jeppesen) snapshots

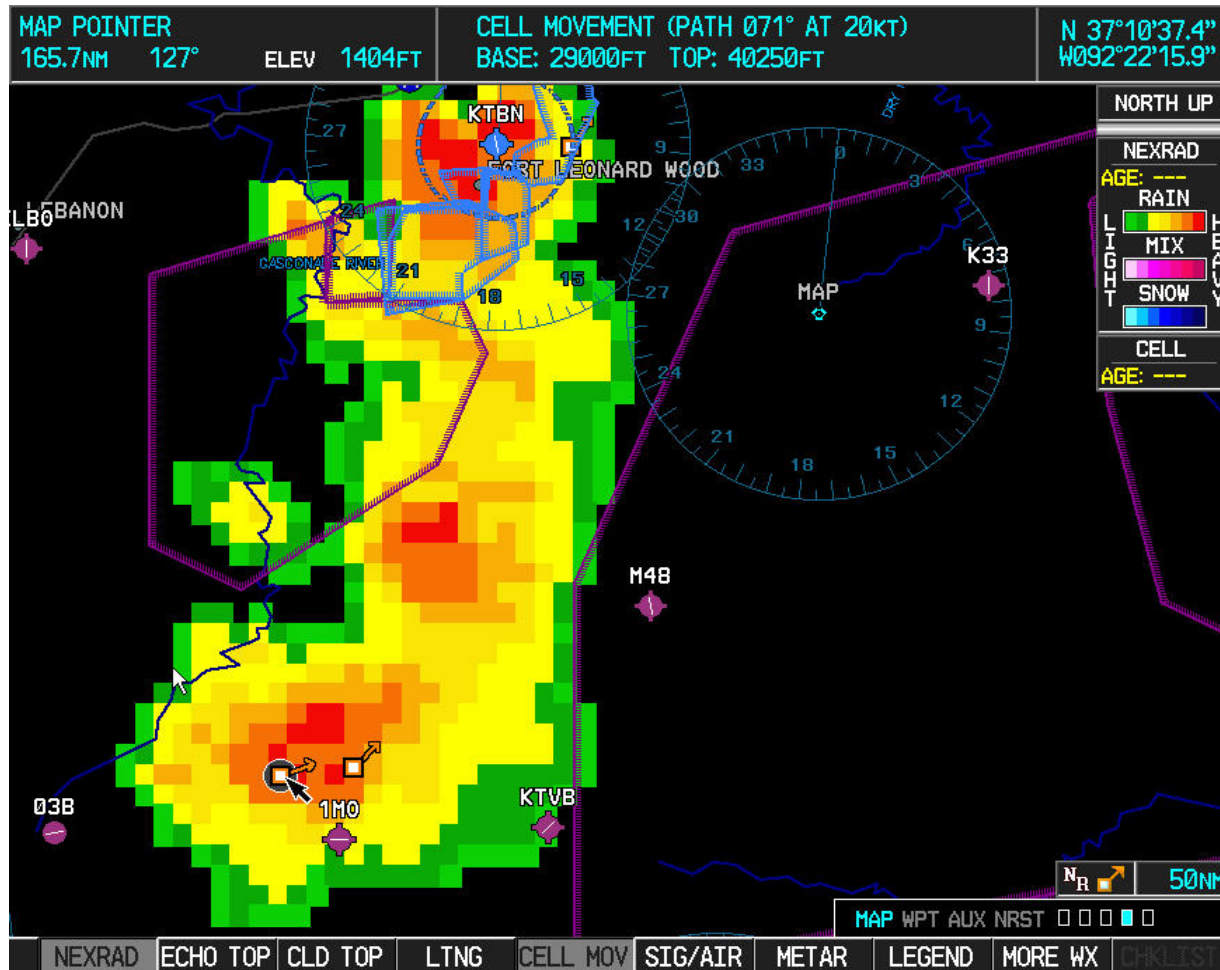






# MET Data Link Example

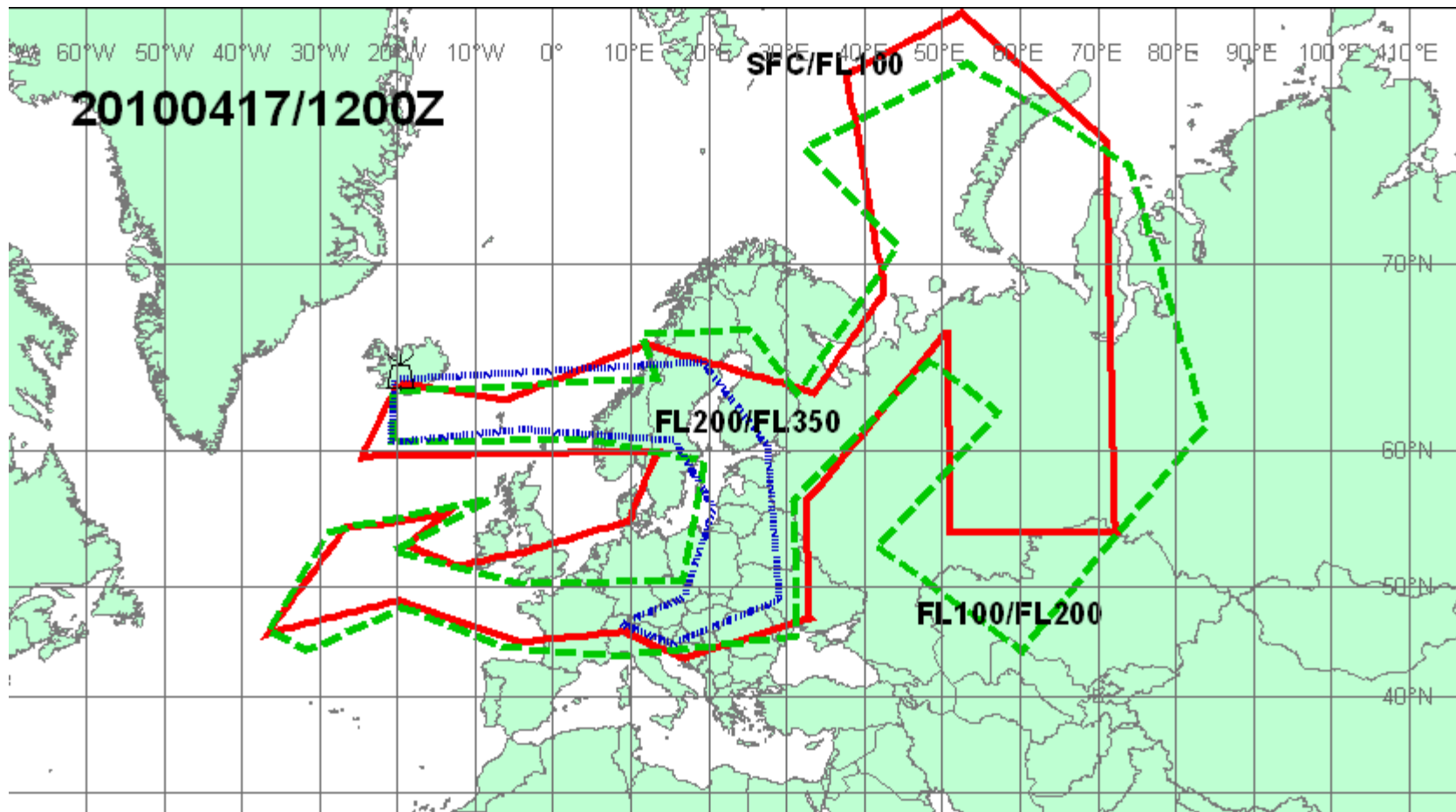
## *Convection Depiction*





# Eyjafjallajokull

(a.k.a. "That Volcano in Iceland")



# Relevant RTCA / EUROCAE Technical Standards

## ■ Ongoing committees

- RTCA SC-159 Global Positioning System
  - RTCA SC-186 / EUROCAE WG-51 Automatic Dependent Surveillance – Broadcast (ADS-B)
  - **RTCA SC-206 / EUROCAE WG-76 AIS & MET Data Link Services**
  - RTCA SC-214 / EUROCAE WG-78 Air Traffic Data Communications Services
  - **RTCA SC-217 / EUROCAE WG-44 Terrain, Obstacles, and Airport Mapping Databases**
  - RTCA SC-222 Inmarsat AMS[R]S
  - RTCA SC-223 / EUROCAE WG-82 Airport Surface Wireless Communications (based upon IEEE 802.16-2009)
- 
- RTCA / EUROCAE activities include participation from the entire aviation community: ANSPs, AIS and MET service providers, national and international regulatory authorities, data link users, manufacturers and system designers, airframe representatives, and airlines

# RTCA SC-206 / EUROCAE WG-76

## AIS & MET Data Link Vision:

- Provide timely, accurate, and authoritative AIS / MET data to any user, anywhere, at any time, using data link
- Provide “Gate-to-gate” (airline) and “Chock-to-chock” (GA) data services
- Update onboard databases from authoritative source(s) using data link
  - Data rendered onboard aircraft into meaningful depictions prior to departure and during flight
  - Data also suitable for use by onboard automation systems, including aircraft’s Flight Management System (FMS)
- AIS & MET data link supports ground-to-air, air-to-ground as well as air-to-air connectivity

# SC-206 / WG-76 Deliverables

- **OSD / ConOps for AIS & MET Data Link Services (DO-308 / ED-151)**
- **Safety, Performance, and Requirements (SPR) document. *Final Review And Comments [FRAC] expected Q3 2010.***
- **MASPS / MOPS (SC-206 only)**



# RTCA SC-217 / EUROCAE WG-44

## Aerodrome, Terrain and Obstacle Databases

- Revise AMDB user requirements document (DO-272B/ED-99B), supporting:
  - D-(Aerodrome) NOTAMs, D-Taxi, and D-Traffic
  - Plus multiple other applications
- Other documents to be revised:
  - RTCA DO-276/ED-98 and DO-291/ED-119
  - ARINC 816 and ICAO SARPs



# Relevant ARINC / AEEC Interface Standards

- ARINC 620. Datalink Ground System and Interface
- ARINC 633. Air-Ground Data and Message Exchange
- ARINC 718A. Air Traffic Control Transponder (ATCRBS / Mode S)
- ARINC 763A. Network Server System (NSS) Form and Fit
- ARINC 811. Commercial Aircraft Information Security
- **ARINC 816. Airport Map Data Bases (AMDBs)**
- ARINC 821. Aircraft Network Server System (NSS) Functional Definition
- ARINC 823. Data Link Security for ACARS
- ARINC 828. EFB Standard Interface
- **Work in Progress: AEEC Project Paper 839. Manager of Air / Ground Interface Communications (MAGIC)**

# Relevant SAE G-10 Human factors

- **On-going and planned SAE G-10 activities**
  - ARP 5364 Human Factor Considerations in the Design of Multifunction Display Systems for Civil Aircraft (published)
  - ARP 5621 Electronic Display of Aeronautical Information - Charts (published)
  - ARP 5289A Electronic Charting Symbology (in progress)
  - ARP 5740 Cockpit Display of Data Link Weather Information (in progress)
  - ARP xxxx Temporary Aeronautical Data. (Agreed to in principle, August 2009. Work presently on hold pending sponsor identification and deliverable definition)
  
- **SAE G-10 has been asked to provide timely AIS & MET HF guidance to SC-206**
  - RTCA SC-206 would reference the MET ARP & Temporary Aeronautical Data ARP in the SC-206 AIS & MET MASPS
  - SC-206 is their de facto “sponsor” for the SAE G-10 work

# The Challenges

- Authoritative Data Source
  - Authoritative data source as a key-enabler
  - Accurate, up-to-date and quality assured information and data
- Adoption and maintenance of a common data formats for both aeronautical information and weather exchange models (AIXM & WXXM)
- Development and harmonization of standards and initiatives
  - Leverage ICAO and WMO process to achieve global convergence of standards and practices
  - Consistency needed between the regulatory approach and industry standards and developments

# The Way Forward

- SWIM governance and data quality standards like the European “Aeronautical Data Quality Implementing Rule”
- Continued AIXM and WXXM exchange model development and maintenance
- Completion and harmonization of ongoing standardization activities (e.g., within EUROCAE / RTCA, ARINC, SAE, ICAO, WMO)
- Pursuit of AIS and MET initiatives within regionally coordinated R&D programmes (e.g., SESAR and NextGen)
- Reference data management systems at source level

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