Airline Spectrum

Challenges – 5G

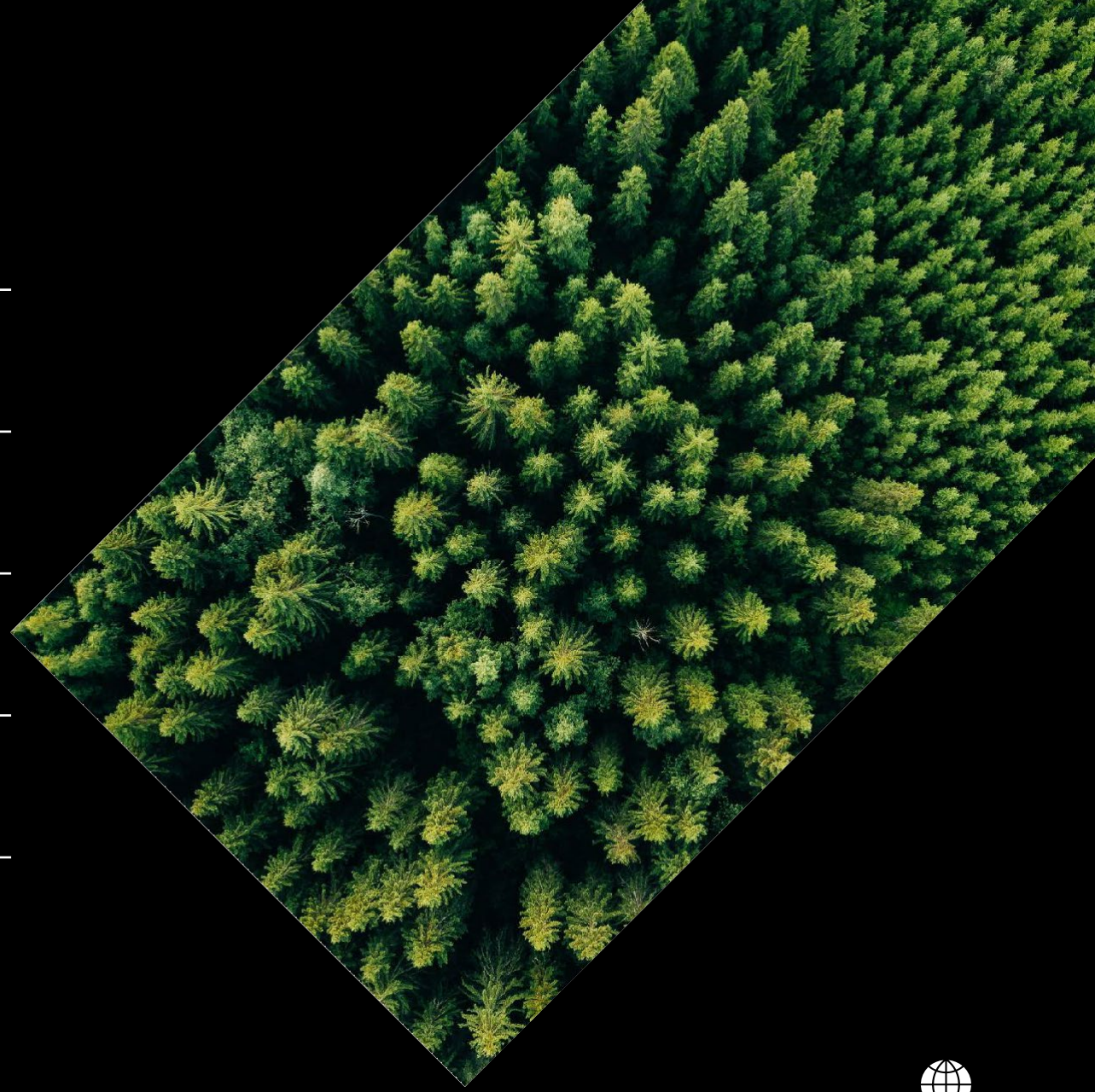
ICAO Webinar

Potential Safety Concerns to Radio Altimeters

American Airlines

IATA

Contents



About IATA | Our mission is to represent, lead, & serve the industry

Who we are

Since 1945, we are the leading air transport non-profit association that helps formulate industry policy and develops global standards upon which the air transport industry is built.

Our vision

To work together to shape the future growth of a safe, secure, and sustainable air transport industry that connects and enriches our world.

IATA in numbers

340+
member airlines
83% of total air traffic

$466B
handled annually
by our financial systems

1,500
full-time staff
in **56** offices

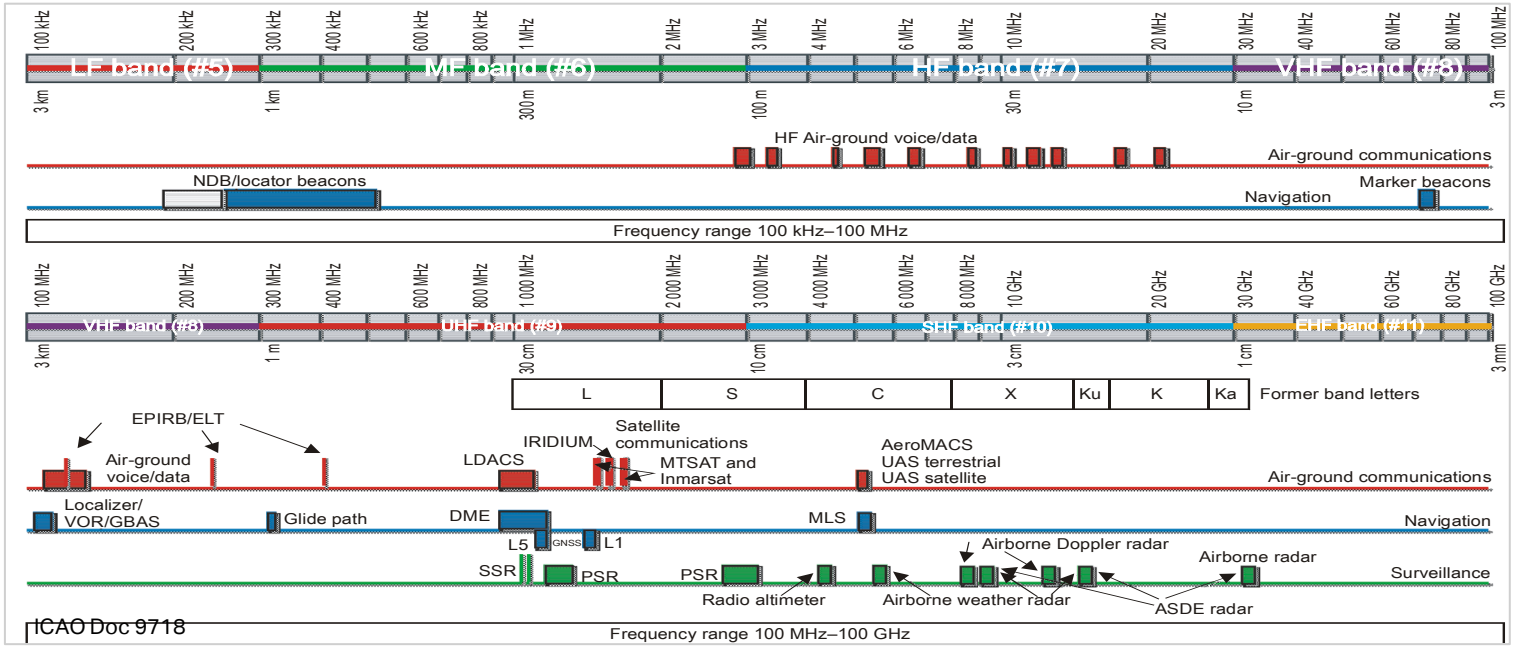
Adjacent Bands in the Skies

ITU Constitution, Article 40

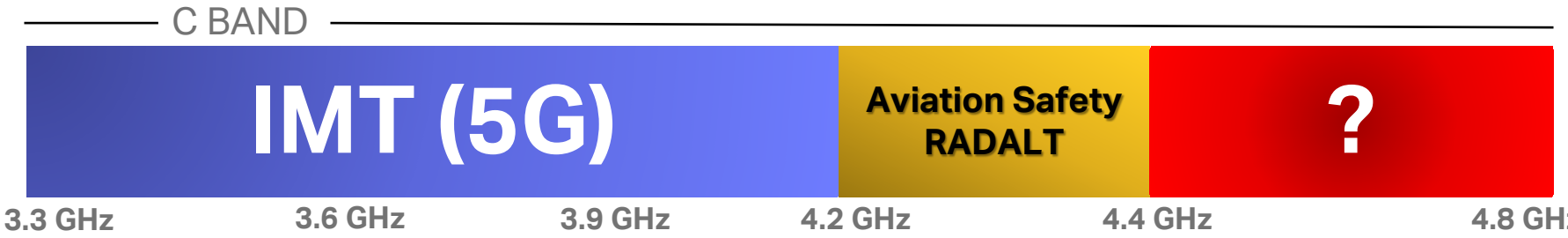
ITU RR No. 4.10

Aviation Value

$4.1 trillion
global economic impact
(3.9% of global GDP)



Radio Altimeter and 5G



Manufacturers implemented a set of filters which, **when combined with the 5G operator mitigations**, enabled continued flight operations in a 5G environment.

Remember that the 1st 5G related radio altimeter upgrade (to Group 4 compliance) cost the aviation industry estimated $637M.

Current 5G Mitigation Sunsets

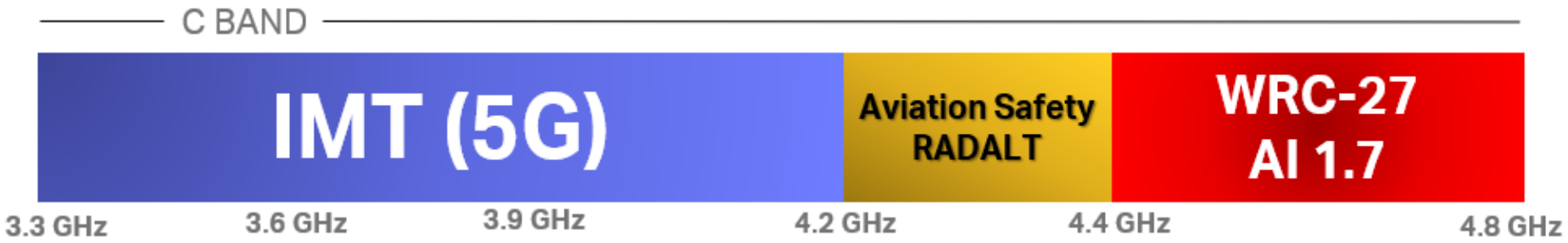
IATA Welcomes Telcos' Agreement to Extend 5G Mitigations but More is Needed

Geneva - The International Air Transport Association (IATA) welcomed the agreement by AT&T Services, T-Mobile, UScellular, and Verizon to extend until 1 January 2028 the voluntary mitigation measures for 5G C-band transmissions at 188 US airports. These mitigation measures, which were put in place in January 2022, concurrent with the rollout of 5G C-band operations at or near US airports, include lowering the power of 5G transmissions and had been set to expire 1 July 2023. However, while the agreement is a welcome stop-gap development, it is by no means a solution. The underlying safety and economic issues around 5G C-band deployments by telecommunications services providers (telcos) have only been kicked down the road.

2026

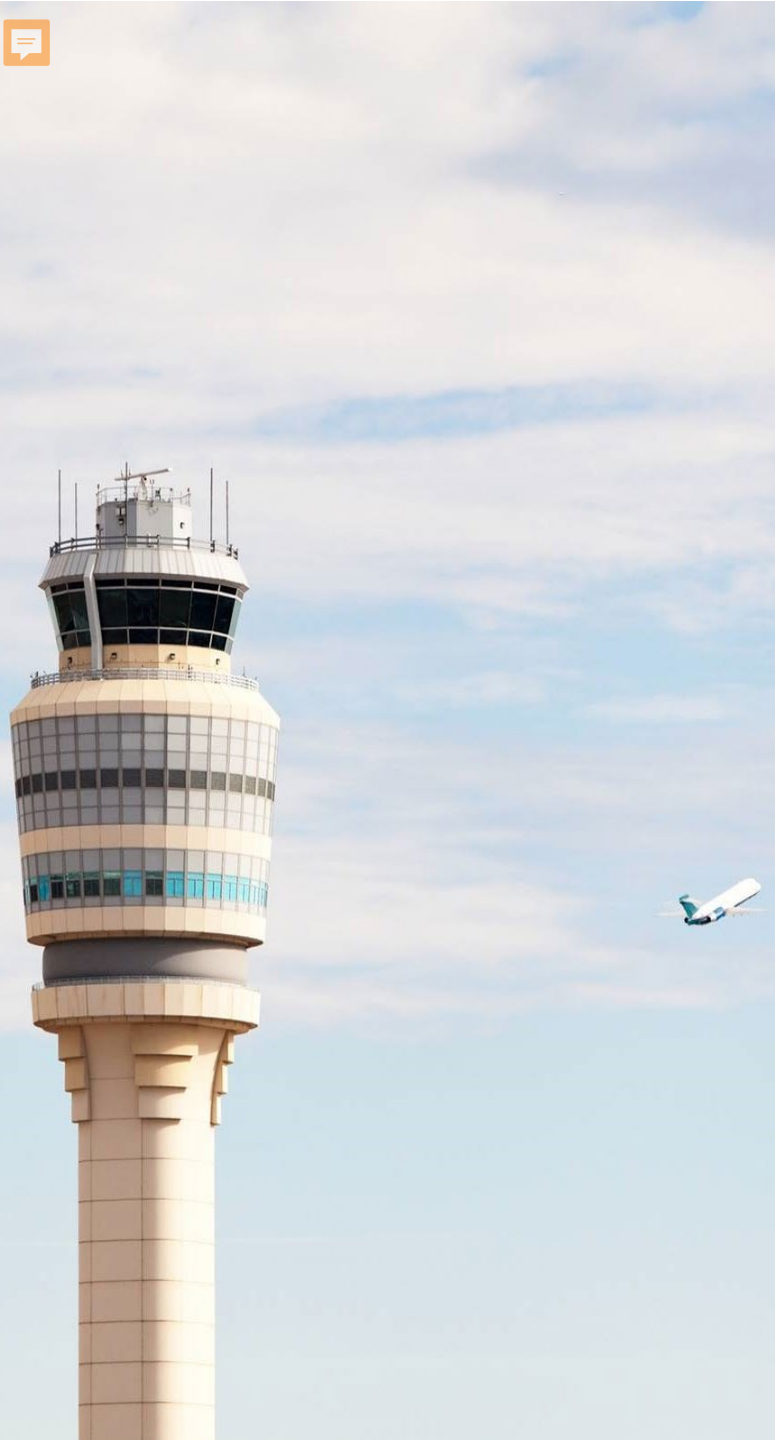
2028

ITU WRC-27 Agenda Item 1.7



AGENDA 1.7

"To consider studies on sharing and compatibility and develop technical conditions for the use of International Mobile Telecommunications (IMT) in the frequency bands **4400-4800MHz**, 7125-8400 MHz (or parts thereof), and 14.8-15.35 GHz taking into account existing primary services operating in these, and adjacent, frequency bands, in accordance with Resolution **256 (WRC-23)**."



Common Misconceptions:

RADALT operational characteristics

Misconception

Interference of 5G emissions with RADALT is a national issue

Reality

Commercial aircraft operate internationally across multiple national jurisdictions and need to comply with stricter requirements for international operations. Aircraft with non-compliant RADALT (5G C-Band-tolerant) could face operational restrictions.

Loss of Low-Visibility Operations

Increased Operating Costs

Diversions

Flight Delays and Cancellation

Certification Challenge

Safety Risk

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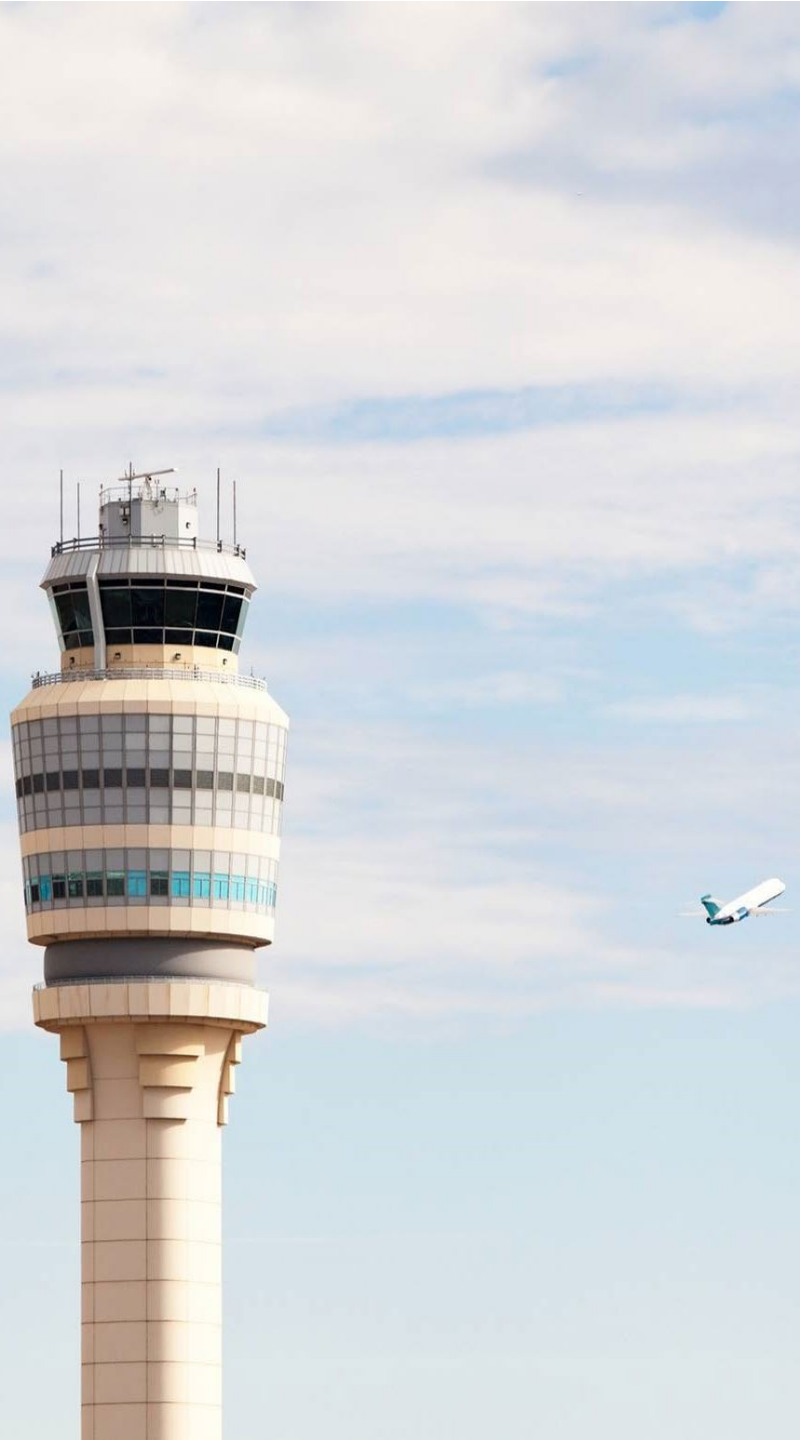


Common Misconceptions:

RADALT operational characteristics

Misconception Interference at operational levels doesn't significantly impact radio altimeter performance at lower altitudes, and more relaxed interference tolerance thresholds should be used.

Reality *Reducing interference protections at lower altitudes could fragment this protection and could compromise aviation safety, particularly during critical phases of flight…*

Misconception Radio altimeter receivers at lower altitudes have a higher tolerance for interference

Reality *Assuming a "**higher tolerance**" without validating operational impacts undermines safety protocols. Even minor interference can lead to significant operational risks…*

IATA

Critical Flight Operational Scenarios

Normal Approach/Landing Operation

Day/Night/Mountainous Terrain

Aircraft Systems RA Dependency

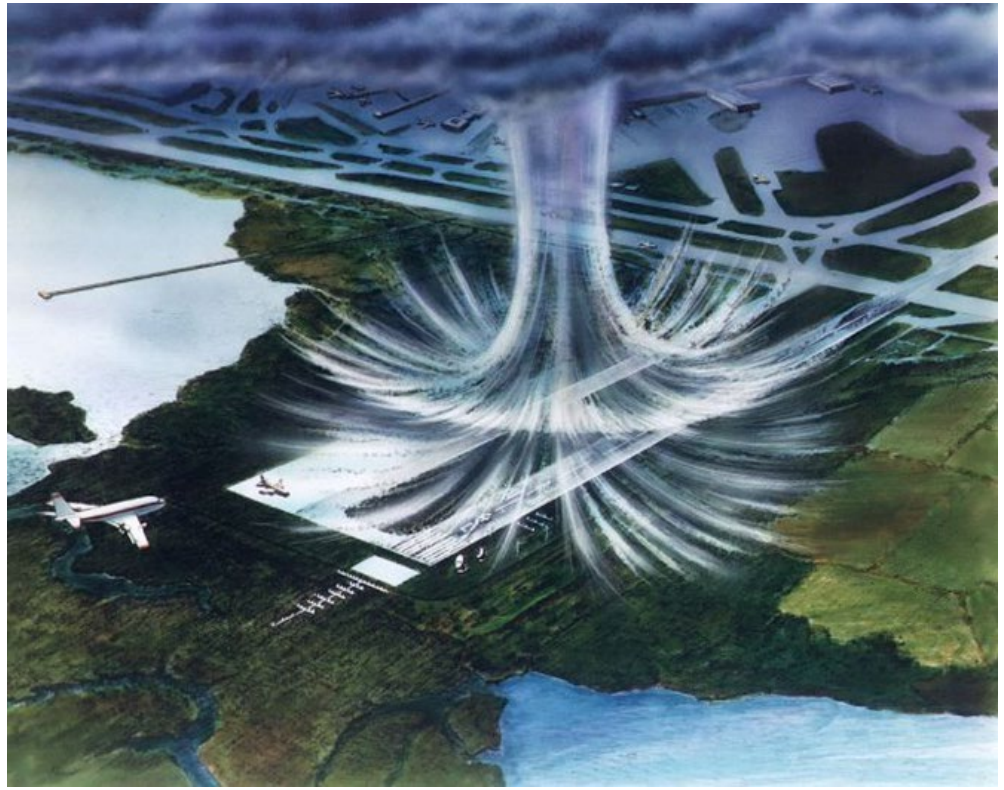
- **TCAS Alerts and Resolution Advisory Functionality**
- **Auto Throttle Functionality**
- **Heads Up Display**
- **Flight Director Functionality**
- **Tail Strike Protection**
- **Speed Brake Functionality**
- **Auto Brake Functionality**
- **Terrain Awareness and Warning System (TAWS)**

Aircraft Low Visibility Approach RA Dependencies

- **Normal Approach RA Dependencies apply**
- **Autopilot Autoland functionality**

Critical Flight Operational Scenarios

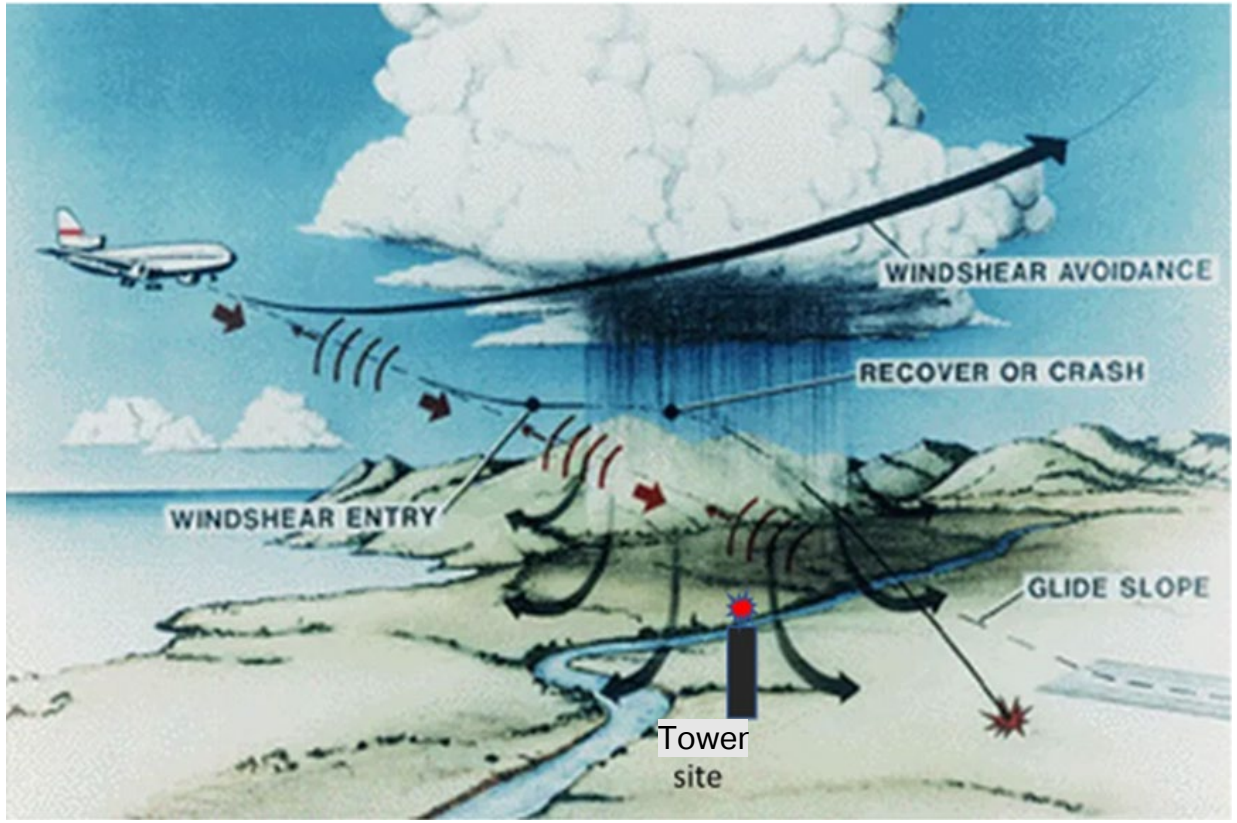
Convective Weather



- **Flight Operations are routinely conducted at Airports where Convective Weather is a consideration**
- **Flight Crews employ Aircraft Safety Systems to detect and make real time decisions to delay or continue approach to landing or takeoff operations**
  - **Predictive Windshear System (PWS), dependent on RADALT input**
  - **Terrain Alerting and Warning System (TAWS), dependent on RADALT input**
  - **Aircraft Weather Radar Systems**
- **Flight Crew safety decisions are dependent on continuity of operation of all aircraft safety systems in all phases of flight**

Critical Flight Operational Scenarios

Convective Weather



- **Windshear Microburst**
  - Dry Air mass can make detection difficult
  - Windshear encounters have resulted in **non normal** descents below planned approach or departure paths
  - Depending on severity of microburst and location, aircraft can be pushed **below** the Obstacle Clearance Surface (OCS) on its approach or takeoff paths
- **Windshear Recovery Procedure**
  - Aircraft Safety Systems will provide pitch guidance to the Flight Crew to maneuver the aircraft away from the ground with critical inputs from the RADALT
  - RADALT indications provide clear indication to flight crew of height above terrain and vertical trajectory trend of aircraft
  - RADALT will confirm effectiveness of Flight Crew actions during recovery procedure
  - Flight Crew recovery procedure is not trained with RADALT that produces no data or misleading data

Critical Flight Operational Scenarios

Controlled Flight Into Terrain (CFIT)

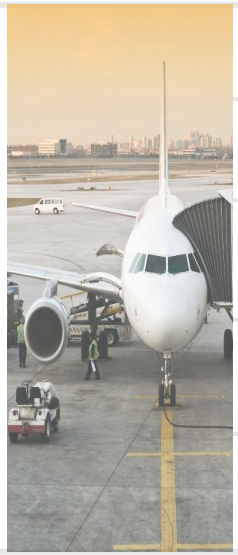
- Flight Operations routinely conducted at Airports where varying terrain is a consideration with low visibility weather and or nighttime environment
- Flight Crews employ Aircraft Safety Systems to detect and make real time decisions as to non normal terrain closure during approach to landing or takeoff operations
- Terrain Alerting and Warning System (TAWS) RADALT dependent
- Flight Crew safety decisions dependent on continuity of operation of all aircraft safety systems in all phases of flight
- CFIT Recovery Procedure
  - Aircraft Safety Systems will provide pitch guidance to the Flight Crew to maneuver the aircraft away from the ground with critical inputs from the RADALT
  - RADALT indications provide clear indication to flight crew of height above terrain and vertical trajectory trend of aircraft
  - RADALT can confirm effectiveness of Flight Crew actions during recovery procedure
  - Flight Crew recovery procedure is not trained with RADALT that produces no data or misleading data

Critical Flight Operational Scenarios

Engine Failure on Takeoff

- **Aircraft Certification requirement**
  - **RADALT is a Design Assurance Level (DAL) A system**
    - **Target failure rate must meet assurance $1x10^{-9}$ /Flight Hour**
  - **ICAO** *"The aeroplane shall be able, in the event of a critical engine failing, or for other reasons, at any point in the take-off, either to discontinue the take-off and stop within the accelerate-stop distance available, or to continue the take-off and clear all obstacles along the flight path by an adequate vertical or horizontal distance…"* Ref ICAO Annex 6 Part I, 5.2.8
  - **FAA "adequate vertical or horizontal distance"**
    Vertical Clearance of 35ft ref: 14CFR 121.189(d)(2)
  - **EASA "adequate vertical or horizontal distance"**
    Vertical Clearance of 50ft ref: EASA eRules Appendix IV, Chater 3,CAT.POL.A.310.a
  - **Meeting compliance standard should not compromise RADALT functionality**

Balancing Innovation & Safety

Telecommunications advances rapidly			Aviation meticulously regulated
Modern connectivity and economic growth			Aviation-safety is paramount
Profitability and market expansion			Extensive validation, testing, and approval
Acknowledge the immense economic value			Cornerstone of global transportation and trade
Value technological innovation			Respect time and diligence required to maintain safety

Instead of prioritizing rapid telecom expansion at the expense of aviation safety, **balanced approach is needed**

Ensure sustained success of both industries –
Without compromising flight safety

To continue the conversation | Please contact

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