5G - Impact to Aviation

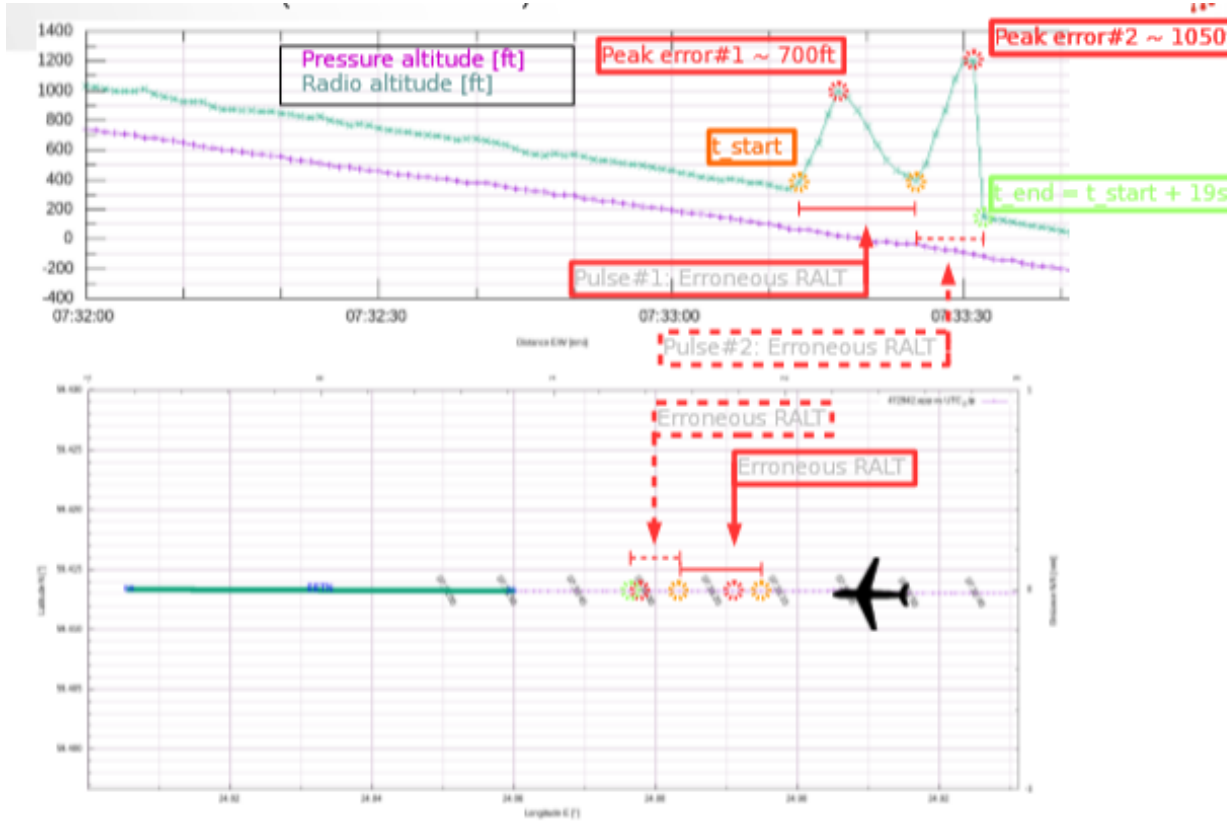
AME Introduction, Awareness, Action

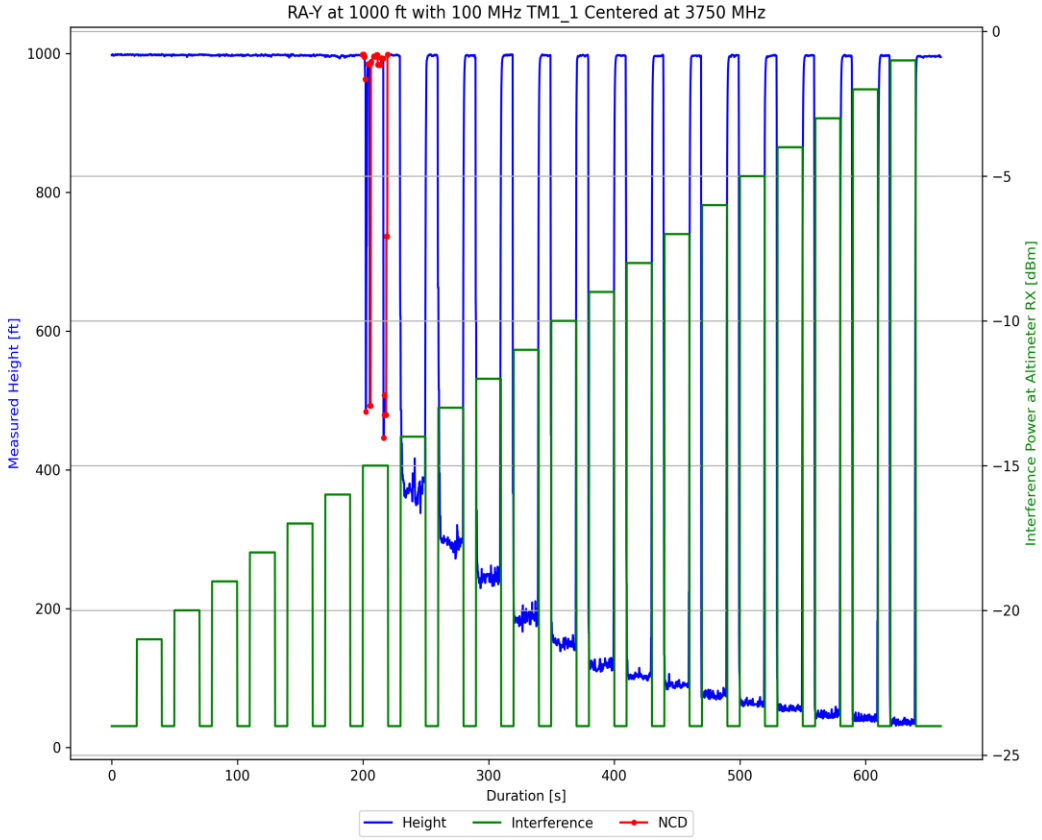
Source: Boeing

LAN/TWLU - Terminal Wireless Local Area Network (LAN) Unit
ATC/TCAS - Air Traffic Control/Traffic Collision and Avoidance System
DME - Distance Measuring Equipment
RA - Radio Altimeter
GPS - Global Positioning System
TCS - Terminal Cellular System
ADF - Automatic Direction Finder
CWLU - Crew Wireless LAN Unit
ELT - Emergency Locator Transmitter
HF - High Frequency Radio
VOR VHF - Omnidirectional Ranging

The Radar Altimeter in Action – Low Visibility

Examples of altimeters being interfered





Source: ICAO FSMP/11 IP06 by ATR

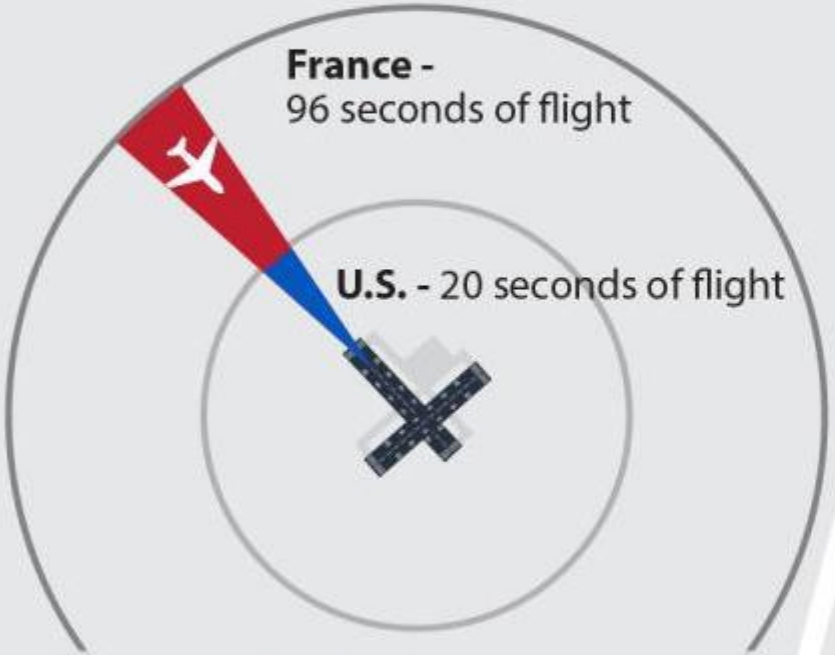
Technical Impacts and Operational Implications

Possible Operational Implications

- **Limitation/Suspension of precision approach and landing capabilities –** This limitation/suspension will reduce airlines access to airports in low-visibility conditions.
- **Limitation/Suspension of night operations**, particularly for airports with challenging terrain – The radio altimeter is critical for the terrain awareness and warning system which is mandatory for all air transport aircraft.
- **Issue of State regulations mandating retrofits and re-certification** of aircraft radio altimeters and other related functions.

U.S. vs France: Big Differences

5G Airport Buffer Zones



U.S. - Six Month Temporary (50 Airports)

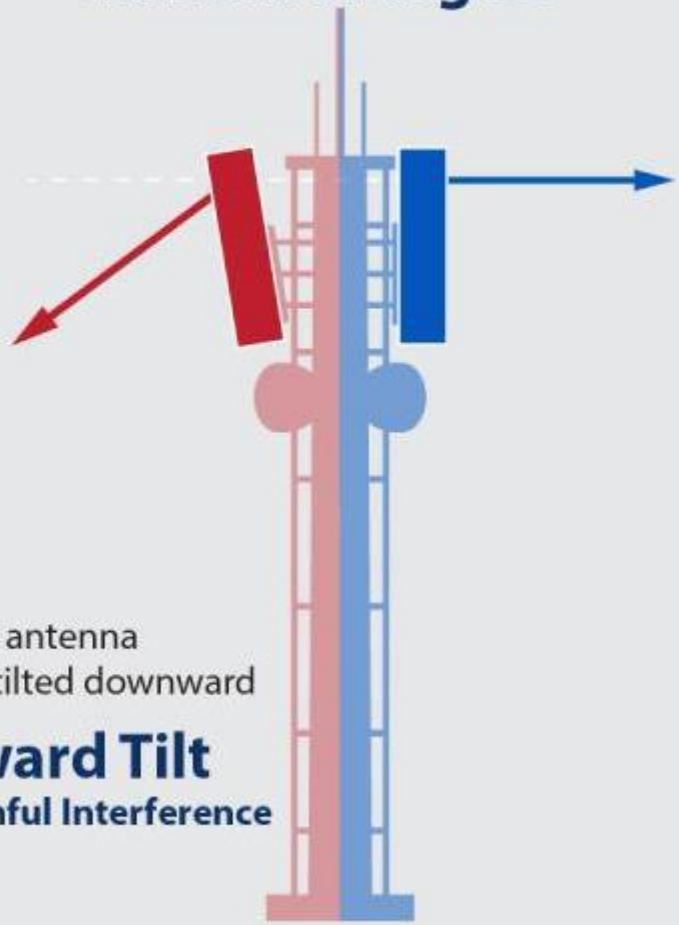
France - Permanent Safeguards

5G Power

Temporary U.S. 5G Power

2.5X Higher

Antenna Angles



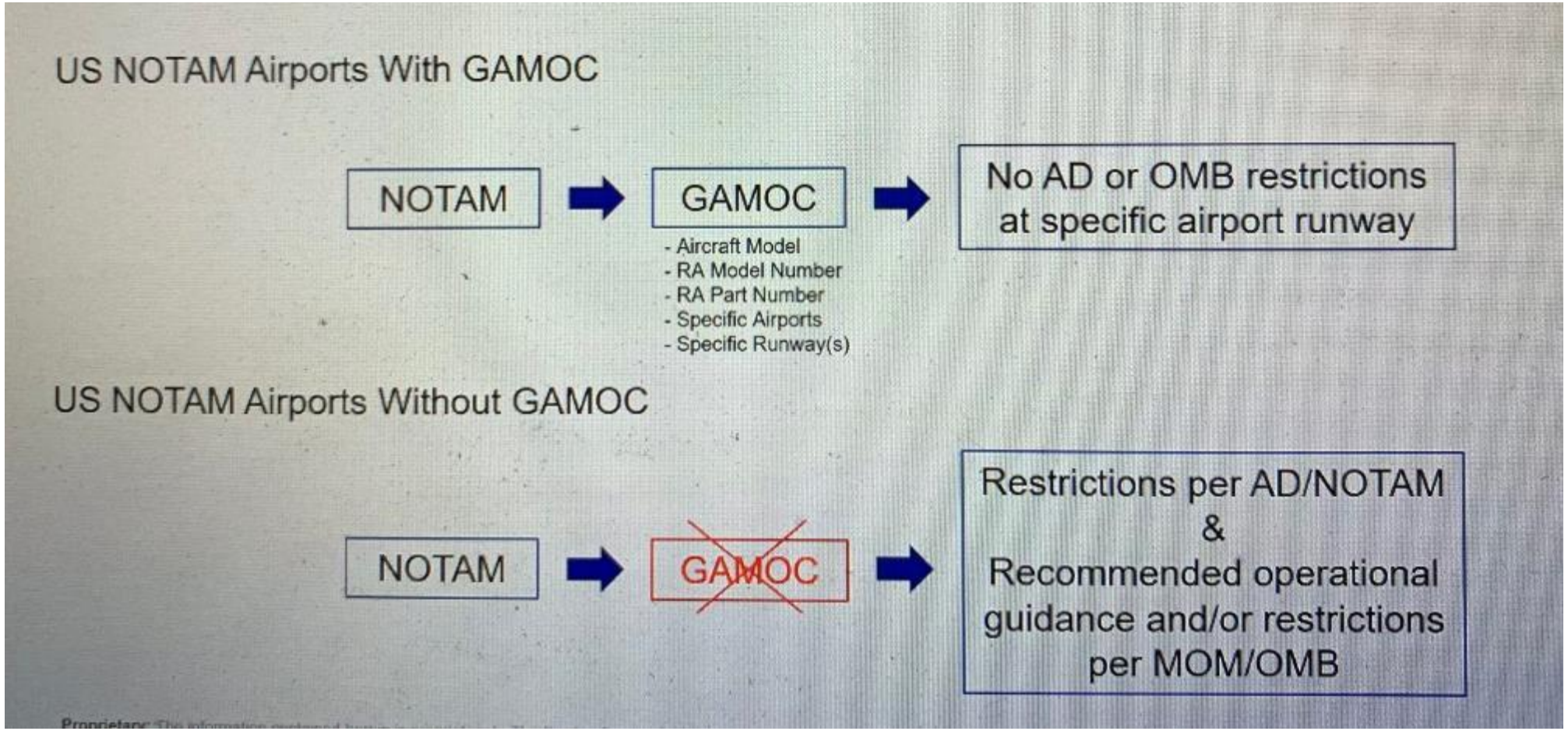
In France antenna must be tilted downward

Downward Tilt

Limits Harmful Interference

France United States

Global Alternative Mean Of Compliance (GAMOC) & Operational Restrictions



Review Cycle

- AMOC approved on the basis of
  - Proximity to 5G antenna to US airports/RWYs
  - Filtering characteristics of each radio altimeters
  - Aircraft integration and operational considerations

- Second round of AMOC evaluation is completed.

- AMOC and NOTAM will be updated most likely monthly
  - New locations for 5G antenna
  - Enhancement of AMOC process/calculation.

Current AMOC Evaluation Method

Update: Runway Safety Model

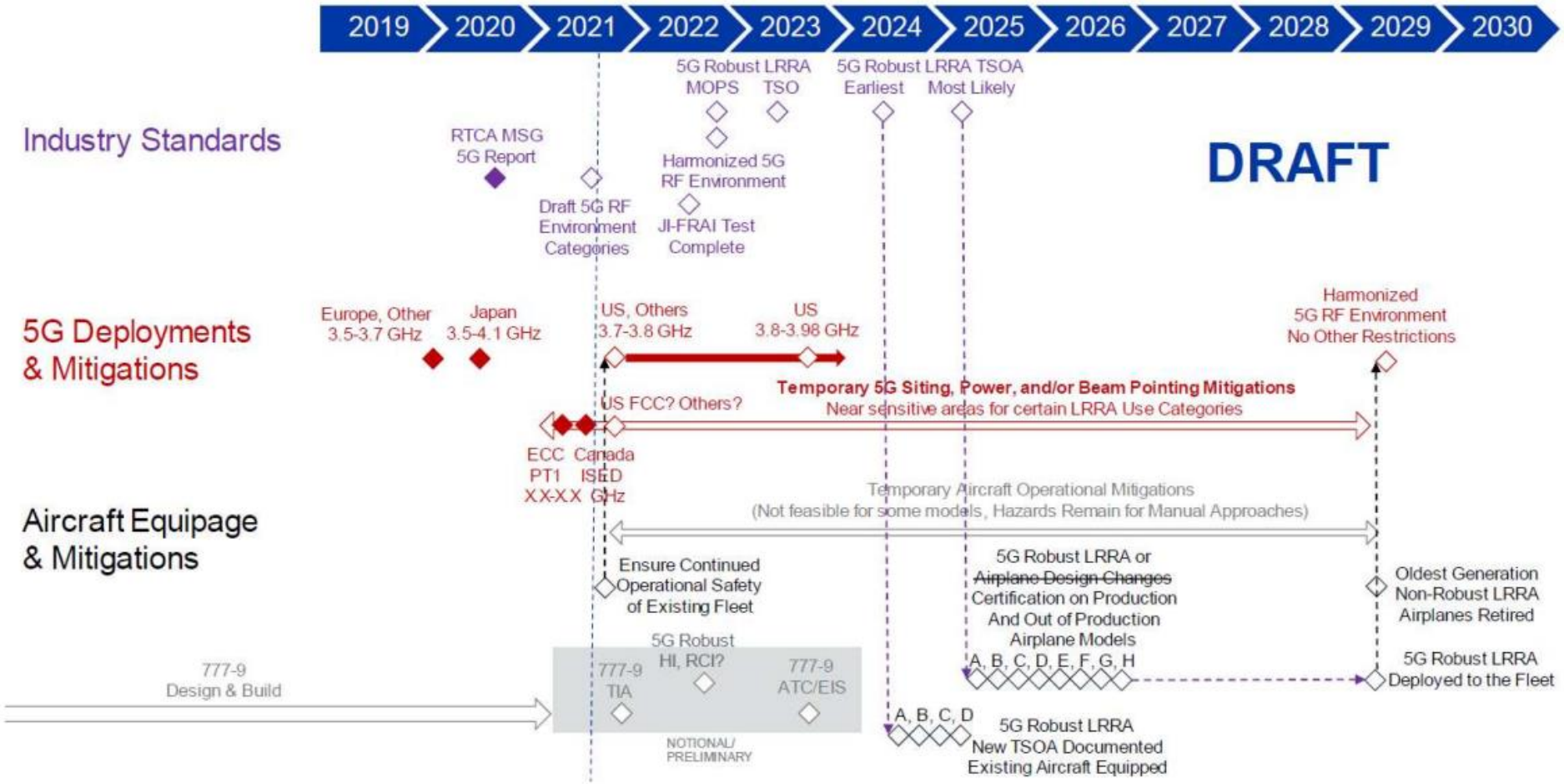
- **Runway Safety Zone (RSZ)** – FAA's determination of the safety area around a runway. The safety area is defined as the area where unreliable Radio Altimeter function can lead to a catastrophic outcome. Acceptance criteria: The Radio Altimeter must function accurately and reliably in 100% of the RSZ.

- **Performance Buffer (PB)** – FAA AMOCs are issued based on the performance capabilities of the Radio Altimeter. The current method is to determine the minimum distance away from a 5G antenna the aircraft needs to be to meet the acceptance criteria for the RSZ. This is described as a radius from a 5G antenna.

Current AMOC

- The FAA reissued and/or updated the airport list for the commercial fleet on January 29, 2021.
  - AMOCs are aircraft make/model and radio altimeter specific, and they are the property of the requestor.
  - The FAA does not have the authority to share them.
  - AMOCs were sent to Airbus, ATR, Boeing, De Havilland, Embraer, MHI RJ Aviation with an expiration date of February 28, 2022.
  - Manufacturers distributed the information to operators of their aircraft.
  - The AMOCs open up specific runways at many of the airports most directly affected by 5G C-band interference.
- The FAA will review requests for additional AMOCs as they are submitted.

Long Term Solution - 'Future Proof'



IATA Engagement

Focus under four strategic pillars including:

1. Safe and uninterrupted airline operations - civil aviation should not be negatively impacted by any spectrum deployments.
2. Cooperative coordination - government agencies should plan spectrum deployments collaboratively together with industry stakeholders.
3. Protection of civil aviation spectrum resources and establishment of predictable global spectrum environment
4. Robust aircraft and avionics design with clear and cost-effective migration path

Practical Measures

Measures that have been codified in national telecommunication regulations and successfully deployed include:

1. Ensure through testing sufficient spectrum separation between 5G C-band deployments and 4.2-4.4 GHz frequency band used by existing radio altimeters
2. Clearly codify and enforce the maximum power limit for 5G C-band transmission and downward tilting (electronically or mechanically) of 5G C-band antennae
3. Establishment of sufficient 5G C-band prohibition and pre-cautionary zones around airports

IATA has developed a website that includes the Global 5G C-Band status Dashboard and be accessed at:

https://www.iata.org/en/programs/ops-infra/air-traffic-management/5g/

IATA 5G Centralized Operational, Tactical and Technical Support –

Established to ensure operators, members and working groups, have a single point to address operational, tactical and technical support related to operating in 5G globally and in particular, ongoing 5G deployment in the USA,

The IATA Liaison desk at the **FAA Command Center** is where all questions should be forwarded to which will then be reviewed and answered by designated SMEs.

Please use the following email address for this purpose iatafaa

Regional Engagement / Actions

Regional SME (SFO) Focal Point appointed: Jehad Faqir

County/Relationship Managers | Environment & Sustainability Team (MER):

- Awareness
- Attention to discussions at GOVT/Ministerial level
- Info Sharing to Regional Focal Point
- Airlines to register to ITOP

- **Corporate Communications:**
  - Propose Regional Awareness Campaign

Thank You