Radio Altimeters and 5G Deployment

Stakeholder Outreach

Federal Aviation Administration

Date: January 31, 2022

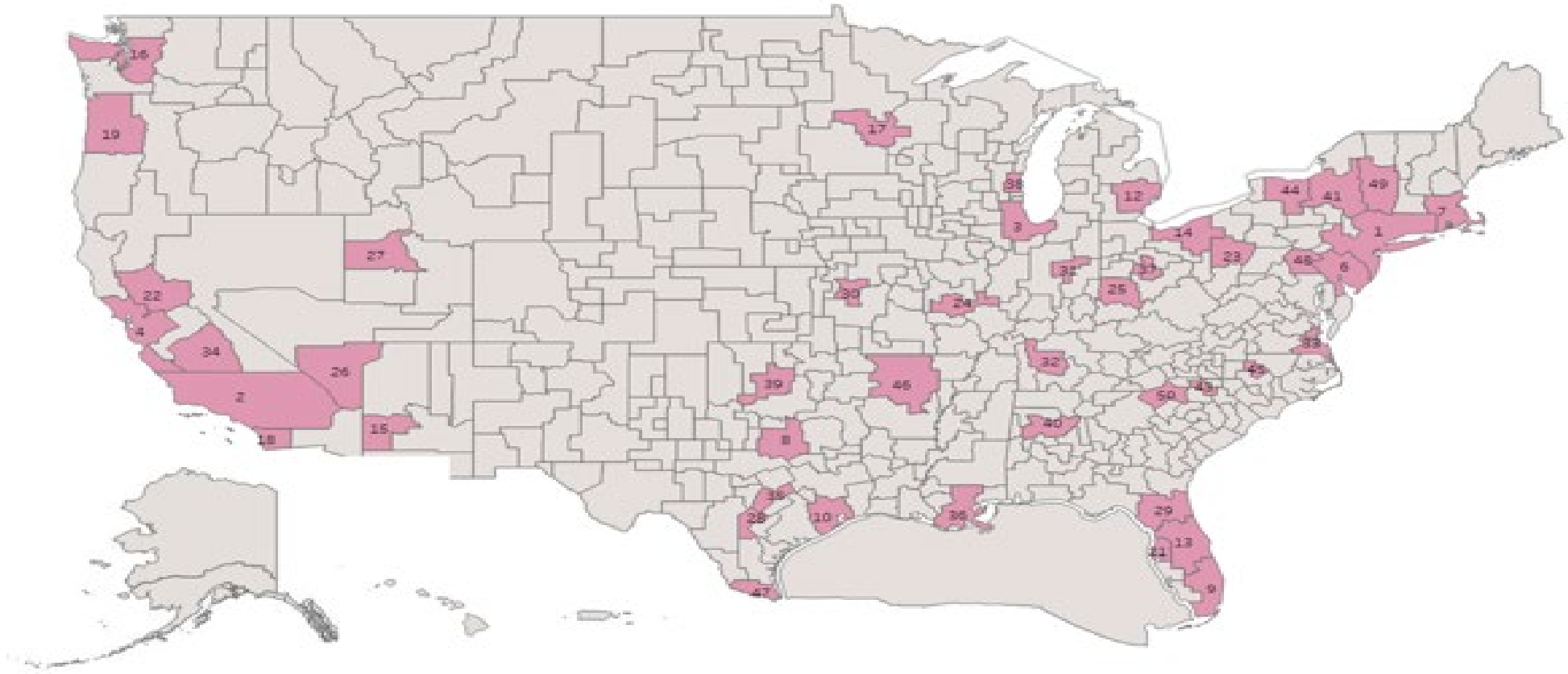
Discussion Topics

- Intra-Agency and Industry Coordination
- 5G C-Band Wireless Broadband Deployment
- Update on Airworthiness Directives (AD)
- Update on Notices to Air Missions (NOTAM)
- Update on Alternative Methods of Compliance (AMOC)
- Update on Runway Safety Model
- FAA Website

Intra-Agency and Industry Coordination

- The Federal Aviation Administration (FAA) believes the expansion of 5G C-band and aviation will safely co-exist.
- The FAA continues to work closely with the Federal Communications Commission (FCC), National Telecommunications and Information Administration (NTIA), and wireless companies, as we make progress toward safely implementing the 5G C-band expansion.
- We are confident that all parties are committed to ongoing collaboration, and we will reach this shared goal.

5G C-Band Wireless Broadband Deployment



Wireless broadband deployment will occur in phases in 46 markets beginning January 5, 2022. The FCC defines these areas as Partial Economic Areas (PEAs) 1-4, 6-10, 12-19, 21-41, and 43-50.

Update: Airworthiness Directives (AD)

- On December 9, 2021, FAA issued two ADs (transport category airplanes and helicopters) prohibiting certain operations in the presence of 5G (3.7-3.98 GHz C-Band) emissions.
  - The unsafe condition is defined as unreliable radio altimeters in the presence of 5G C-Band.
  - Notices to Air Missions (NOTAMs) were issued to limit the impact of the AD to areas and airports where 5G C-Band will be deployed.
- Three aircraft specific ADs have been issued to date:
  - Boeing 787 (AD 2022-02-16) published on January 19, 2022.
  - Boeing 747/Boeing 777 (AD 2022-03-05) published on January 27, 2022.
  - Boeing 737 MAX (AD 2022-03-20) published on January 31, 2022.
  - Manufacturers continue to assess the impact of 5G C-Band wireless interference to all systems integrated with the radio altimeter.

Update: Notices to Air Missions (NOTAM)

- Current NOTAM totals *(as of January 31 and subject to change)*
  - Airspace: 52 areas
  - Aerodrome: 1,348 (includes 5 heliports and 17 VFR airports)
  - Instrument Approach Procedures (IAP):
    - 85 Public IAP NOTAMs
    - 52 Special IAP NOTAMs

Additional Guidance

- Special Airworthiness Information Bulletin (SAIB): AIR-21-18
  - Issued November 2, 2021.
  - Provides recommendations for radio altimeter manufacturers, aircraft manufacturers, and operators and pilots.
- SAIB: AIR-21-18R1
  - Issued December 23, 2021.
  - Provides a website for operators to report radio altimeter anomalies: https://www.faa.gov/air_traffic/nas/RADALT_reports/
- Safety Alert for Operators (SAFO): 21007
  - Issued December 23, 2021.
  - Provides information and guidance to operators regarding the risk of potential adverse effects on radio altimeters when operating in the presence of 5G C-band wireless broadband signals.
  - Provides the role of NOTAMs in identifying the geographic areas where certain operations requiring a radio altimeter are prohibited in the presence of 5G signals.
  - Provides a list of possible affected systems that rely on radio altimeter data.

Update: Alternative Methods of Compliance (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.

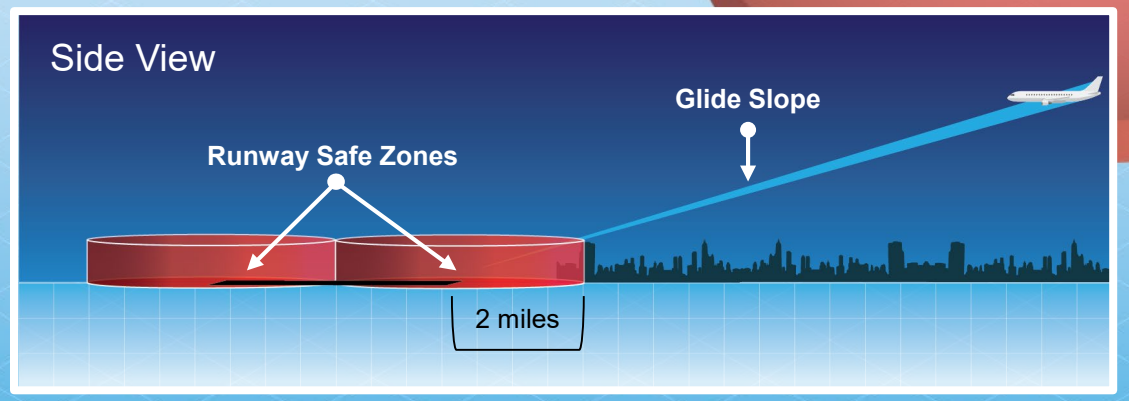
Update: Runway Safety Model

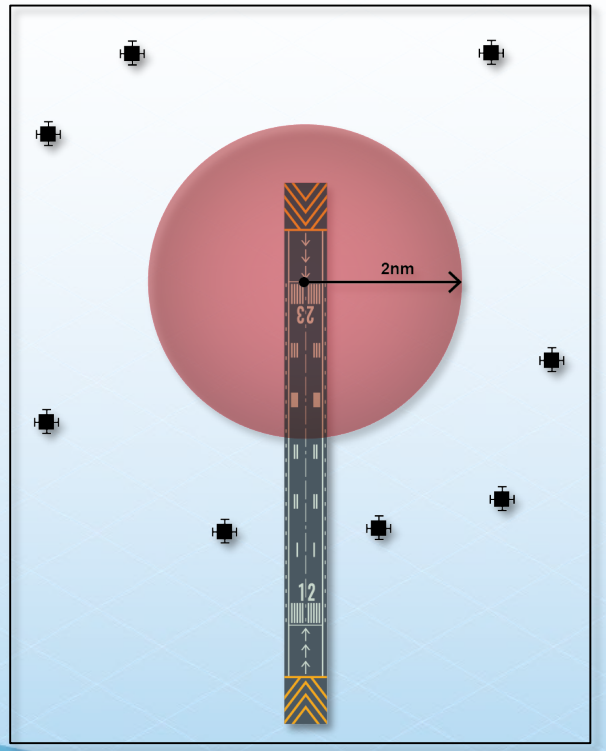
- **Runway Safety Zone (RSZ)** – FAA's determination of the safety area around a runway. The safety area is defined as the area where unreliable Radio Altimeter function can lead to a catastrophic outcome. Acceptance criteria: The Radio Altimeter must function accurately and reliably in 100% of the RSZ.

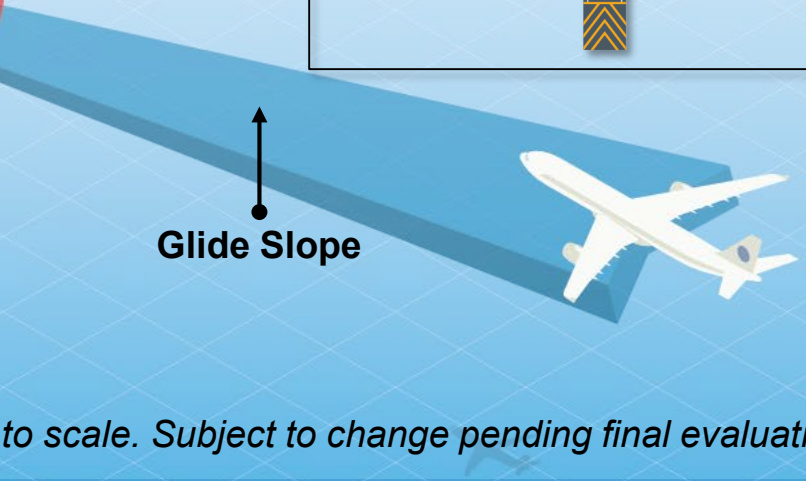
- **Performance Buffer (PB)** – FAA AMOCs are issued based on the performance capabilities of the Radio Altimeter. The current method is to determine the minimum distance away from a 5G antenna the aircraft needs to be to meet the acceptance criteria for the RSZ. This is described as a radius from a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

Runway Safety Zone (v 1.0)

Overhead View







Not to scale. Subject to change pending final evaluations

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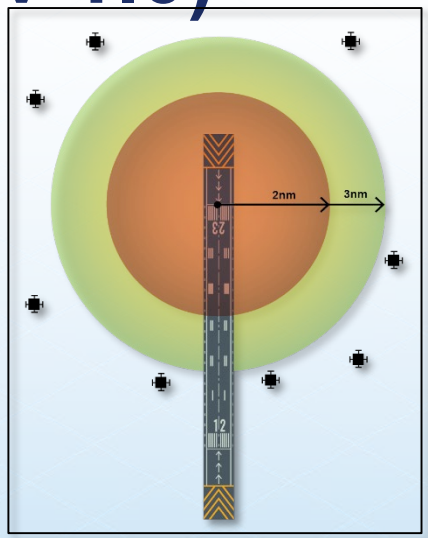
Runway Safety Zone with Performance Buffer (v 1.0)



Runway Safe Zone

Runway 2 mile
C-band exclusion zone

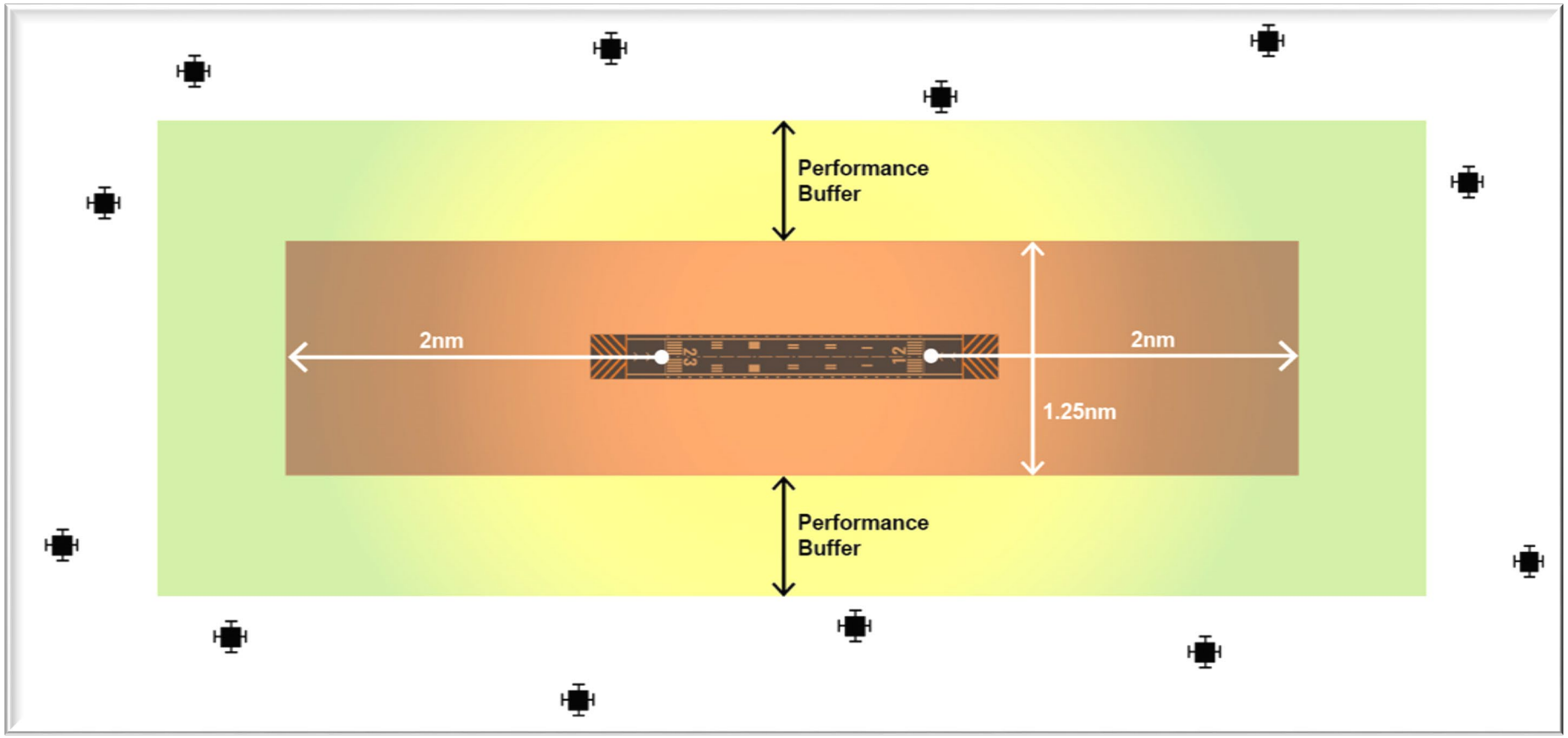
Runway Safe Zone

Glide Slope

C-Band Emitter

Not to scale. Subject to change pending final evaluations

Runway Safety Zone with Performance Buffer (v 2.0)



FAA Website

- FAA Statements on 5G: https://www.faa.gov/5g
- DOT and FAA Letters
- Airworthiness Directives (AD)
  - AD 2021-23-12 (transport and commuter category aircraft)
  - AD 2021-23-13 (various helicopters)
- Special Airworthiness Information Bulletin (SAIB) AIR-21-18R1
- Safety Alert for Operators (SAFO) 21007
- FCC Partial Economic Areas (PEA)
- Questions and Answers

Questions