PROFESSIONAL AVIATION SAFETY SPECIALISTS

1200 G Street NW, Suite 750, Washington, DC 20005
Telephone: (202) 293-7277 Fax: (202) 293-7727

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ANALYSIS OF 5G DEPLOYMENT: EXECUTIVE SUMMARY

The Professional Aviation Safety Specialists, AFL-CIO (PASS), the union representing more than 11,000 Federal Aviation Administration (FAA) and Department of Defense (DoD) employees, is providing an analysis of the deployment of 5G and the potential for radio frequency interference with National Airspace System (NAS) systems and equipment. PASS utilized extensive review of various aviation and telecommunication industry white papers as well as conducting a literary review of research papers within the Institute of Electrical and Electronics Engineers (IEEE) library.

Radio frequency interference (RFI) is a well-known phenomenon in the electromagnetic spectrum.[1] It is, as defined by the FAA Spectrum Engineering & Policy department, any emission, radiation, or induction that obstructs, or repeatedly interrupts, a radio communications service operating in accordance with established regulations.

The introduction of 5G radios into the aviation band of frequencies adds to an already complex environment of the electromagnetic spectrum. Many of the traditional unintentional RFI scenarios become an area of concern due to the proximity of frequency allocation as well as the physical location of the 5G radio emitters near aviation facilities. Over the years, as more users have been introduced into a spectrum allocation block, the users—especially in non-safety of life applications—have interfered with one another and the spectrum has become very noisy and degraded due to the amount of emissions in close frequency to one another.

The 5G emissions are known to interfere with RADAR altimeters.[2] These altimeters are used by many systems on the aircraft and any interference creates significant safety risk in low visibility landing situations. RADAR altimeter is integrated into the avionics suite of many aircraft, adding necessary sensor information and data points to complete a logic sequence in the autopilot and other integrated systems computing performance calculations. Any level of interference results in a layer of safety being compromised.

The process for RFI resolution and mitigation can be a collaborative effort and should include all stakeholders to reach the best solutions. It is paramount that all aspects are considered to keep the aviation industry safe. PASS suggests the following additional solutions to safe progress:

- All manufacturers of 5G radios should send their radio to the FAA Technical Center for evaluation by the Spectrum Engineering division for testing for possible RFI scenarios.

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[1] NASA. "The Electromagnetic Spectrum," modified March 2013. https://imagine.gsfc.nasa.gov/science/toolbox/emspectrum1.html.
U.S. Department of Homeland Security, *Radio Frequency Interference Best Practices Guidebook*, February 2020.
Arecibo Observatory. "Sources of Radio Frequency Interference." https://www.naic.edu/~sondy/rfi.html.

[2] Federal Aviation Administration, "Safety Alert for Operators: Risk of Potential Adverse Effects on Radio Altimeters when Operating in the Presences of 5G C-Band Interference," December 23, 2021.
Federal Aviation Administration, AD 2021-23-12 and AD 2021-23-13.

- Different placement of antennas relative to airfields, including beam management.
- No radiation zones in the direction of airports and facilities that support aviation safety.
- Radiate the 5G radios at lower output power levels.
- Install antennas tilted downward to reduce potential interference to flights.
- Height restrictions on 5G radio towers to reduce line of sight to aviation equipment.
- Fault detection and reporting on 5G radios to assist in faster RFI resolution.
- Apply spurious emission standards utilized in Europe to 5G radios in the United States.

PASS represents specialists at the FAA who are on the front lines when it comes to locating and documenting interference issues as well as inspectors who are responsible for investigating reports of aviation incidents. The crucial work these employees perform has the potential to be impacted by the deployment of 5G and PASS appreciates the opportunity to allow our concerns to be presented. The union strongly believes that the addition of 5G without carefully mitigating risk to aviation will complicate the RFI resolution process by adding new interference potentials. It is crucial that both the Federal Communications Commission (FCC) and FAA dedicate resources specializing in 5G interference as future 5G rollouts are planned.

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