FIERCE Wireless

Rational decisions needed on C-band and altimeters – Industry Voices: Rysavy

by Peter Rysavy | Nov 17, 2021

On Nov. 2, the FAA issued a Special Airworthiness Information Bulletin (SAIB), informing the aviation industry that C-Band 5G networks would soon begin operating and noting the possibility of interference with altimeters. This was among the latest steps in an ongoing dispute between the aviation and wireless industries that, for the past several years, has seen both sides submitting reports and counter reports.

Wireless industry representatives insist that the FCC was correct in its March 2020 order on the C band, which found 220 MHz of separation adequate to protect altimeters in the 4.2-4.4 GHz band, and say that the aviation industry has conducted a faulty analysis. They add that, if the FCC were to adopt mitigation measures based on such faulty analysis, U.S. 5G network capability could be severely, and unnecessarily, compromised.

At issue is a report issued by RTCA (originally referred to as the Radio Technical Commission for Aeronautics) in October 2020, titled, "Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter Operations." This report purports to prove that mid-band 5G will harmfully interfere with altimeters.

However, a number of problems exist with this report, say both the wireless industry and the FCC, which analyzed a similar study from the Aerospace Vehicle Systems Institute (AVSI). The FCC in 2020 concluded "that the AVSI study does not demonstrate that harmful interference would likely result under reasonable scenarios (or even reasonably 'foreseeable' scenarios …)."

Specific concerns about the aviation industry studies include the following.

First, RTCA and AVSI, by not providing the detailed test results associated with the RTCA report, have not acted transparently and have not allowed for their results to be replicated. For example, the RTCA report aggregated test results, which makes it impossible to discern the exact source of potential problems, such as whether specific altimeters are more sensitive than others and under what conditions. The report does not even list the specific altimeters used in the testing and subsequent worst-case theoretical analysis. This is counter to a sound scientific process in which all interested parties can examine data to independently verify that conclusions are based on real-world conditions.

Second, RTCA and AVSI used questionable assumptions in their analysis. They added a six dB safety margin for the 4.2-4.4 GHz altimeter band, which is inconsistent with other aviation co-existence studies of the same band; applied an aircraft roll of twenty degrees at extremely low altitudes at which such rolls would not normally occur; placed aircraft at unrealistic distances from cell towers operating in unlikely orientations; and used different reflecting ground surfaces for interfering sources versus altimeter operation, which at the same location would presumably be the same.

Third, AVSI, when evaluating interference, is using different assumptions for 5G versus one of its own technologies. The aviation industry is developing a new system, called Wireless Avionics Intra Communications (WAIC), that uses wireless communications on board an aircraft to replace wires for control functions. To determine whether interference might adversely affect operation, AVSI applied a six dB cable loss value for the scenario of 5G interfering with altimeters but did not account for such loss in its assessment of proposed WAIC operation. The cable loss difference of six dB plus a greater test margin of four dB for 5G plus the previously mentioned RTCA safety margin of six dB adds up to a massive sixteen dB — a forty-times power factor — bias against 5G.

Fourth, reasons exist to believe that altimeters, built to decades-old specifications and lacking any filtering in adjacent bands (or in this case, 220 MHz away), are driving the AVSI test results and interference analysis. Well-designed equipment with reasonable filtering should not be adversely affected by other equipment operating in adjacent bands — or hundreds of MHz away.

Based on the modeling assumptions RTCA and AVSI are using, other systems, even in the absence of 5G, would be interfering with altimeters today. For example, Navy radar, such as the AN/SPN-43 radar, operates in mid-band frequencies at extremely high power with ground transmitters pointing at aircraft in geographical areas where U.S. planes operate. Such potential interference, however, has not been a problem in the real world.

Legitimate issues linger about the testing and analysis performed by the aviation industry, which needs to address some serious questions about its methodology. For example, over what percentage of aircraft landing approaches does the poor reflecting terrain that AVSI used in its modeling actually represent? How might the RTCA modeling results have differed if realistic distances and orientations had been assumed between aircraft and cell towers?

Also significant is that mid-band frequencies are in use globally for cellular networks, with no reported issues. Use of wireless networks, including WiMAX, in mid-band globally date back to

2008. The FAA bulletin itself states, “There have not yet been proven reports of harmful interference due to wireless broadband operations internationally, although this issue is continuing to be studied. In the United States, there has been wireless broadband deployment in the 3.65-3.7 GHz band since 2007.”

Nearly forty countries already use C-Band for 5G deployments. Both France and Norway conducted specific flight tests of 5G coexistence with altimeters to determine if harmful effects might exist and found none.

Note also the wide 220 MHz of separation between U.S. planned 5G operation in 3.70-3.98 GHz and the 4.2-4.4 GHz band used by these altimeters. In Japan, cellular networks operate to 4.1 GHz. Japan has imposed some mitigation measures for altimeters, but only in 4.0-4.1 GHz, with no restrictions below 4 GHz.

After a detailed technical review based on all information available at the time, the FCC made a sound decision in crafting rules for C-Band. Monitoring the situation for adverse effects is sensible. The dispute between the aviation industry and wireless industry has now gone on for more than two years, and closure is imperative. Mid-band frequencies are absolutely critical for the success of 5G. Derailing C-Band use in the long term based on poor scientific reasoning would result in a huge cost to the wireless industry, the economy, and society.

Peter Rysavy, president of Rysavy Research, has been analyzing and reporting on wireless technologies for twenty-seven years. See https://www.rysavy.com.

Originally posted at: https://www.fiercewireless.com/5g/rational-decisions-needed-c-band-and-altimeters-industry-voices-rysavy