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Aviation Subcommittee Hearing

"5G Deployment and its Effects on the U.S. Aviation Industry."

U.S. House of Representatives Committee on Transportation and Infrastructure

February 3, 2022

Chairman DeFazio and Ranking Member Graves, my name is Captain Joe DePete, and I am the president of the Air Line Pilots Association, Int'l (ALPA). I am proud to say that I represent 62,000 pilots flying for 38 airlines in the United States and Canada. The airline pilots flying the line today are literally on the front lines of aviation safety, working in very challenging circumstances that have been created by the deployment of 5G mobile wireless in the C-Band of radio spectrum.

For ALPA pilots, safety is nonnegotiable. It's not about politics or profit. On every flight, our customers—including members of this committee—entrust us with their lives and livelihoods. For that reason, it was an affront to airline pilots when the Federal Communications Commission (FCC) sold and licensed a section of the C-Band spectrum to wireless companies without heeding—or even acknowledging—our concerns about potential interference with the radar altimeters we use to safely navigate our aircraft. Their stove-piped policymaking process and single-minded focus on doing the bidding of the telecom industry not only put the public at risk, but it has also forced pilots to perform extensive workarounds to ensure the safety of flight—workarounds that we expect will be needed for the foreseeable future.

This is no way to run a railroad, and it's certainly no way to operate the world's safest air transportation system.

We have been tracking the potential interference that mobile wireless transmissions in the C-Band could have on aircraft radar altimeters for years. Our first written submission to the FCC docket was on May 29, 2018, less than 30 days after the FCC opened the docket for comments. At that time, ALPA expressed concerns about the proposal and encouraged the FCC to work with the Federal Aviation Administration (FAA) and aviation industry representatives to mitigate the potential interference concerns. Radar altimeters are the only sensor onboard a civil aircraft which provides a direct measurement of the clearance height of the aircraft over the terrain or other obstacles. In addition to pilots' use of radar altimeters during a flight, many other aircraft systems utilize the data they generate, to properly function.

The situation we find ourselves in has taken the complexity of an already intricate operation to a new level. The current system of preflight planning and dispatch of an airline flight—which already includes fuel planning; review, minimum equipment list, and status of all aircraft systems; review of weather at departure point; monitoring weather and systems en route; and monitoring weather at the destination airport while planning for contingencies along the way—now includes additional risk. Flight crews are now expected to know the type of radar altimeter the aircraft is equipped with, applicable airworthiness directives, whether that airframe/altimeter combination has been issued an alternate method of compliance (AMOC) for the intended destination airport and runway, and whether the alternate airport is still legal. This added complexity reinforces what everyone in this room knows: The most important safety feature on every airline flight is two highly experienced, well trained, and rested pilots on the flight deck.

Anyone who believes that this process can be automated, flight deck crew reduced, or required experience levels shortened seriously needs to go on the line and attempt this operation for themselves.

Two full weeks of 5G interference with radar altimeters have gone by. Incidents of radar altimeter anomalies have occurred. Pilots operating in today's 5G-induced chaos have had significant burdens added to each and every workday. Meanwhile, flights have been canceled and delayed, costing families money while introducing unwelcome delays in the supply chain for businesses large and small. Here are some of the new steps and considerations that each pilot faces when they go fly.

Notices to Air Missions

Pilots must review Notices to Air Missions (NOTAMs) published by the Federal Aviation Administration (FAA) to understand how each flight they make is affected by 5G interference with their radar altimeters. Frequently, the print-out for all the NOTAMs on a domestic flight between two large cities can be many pages, discussing items such as unlit obstructions, changes to procedures, taxiway closures, and other important flight data. Some of this data is static and does not change.

The 1,851 5G-related NOTAMs that were published by the FAA are unique in that the NOTAMs change with the ongoing 5G deployment. This requires pilots to find and then carefully review them each time, even if they have seen them before. There may be differences for this flight than what they flew to the same airport, even if it was yesterday.

Airworthiness Limitations on the Aircraft—Airworthiness Directives and AMOCs

Pilots are now required to know and follow the details regarding 5G's effects on aircraft airworthiness. Every aircraft has a new limitation due to 5G. An airworthiness directive (AD) published by the FAA in December 2021 limits aircraft approach and landing operations during periods of low clouds and visibility when NOTAMs are published for 5G interference. However, the FAA has subsequently approved alternate methods of compliance that provide relief from the 5G AD for certain aircraft types and radar altimeter combinations. Pilots now need to evaluate the aircraft to determine which of two 5G airworthiness scenarios applies each time they are dispatched an aircraft to fly.

If the aircraft is operated with reduced capabilities as described in an AD and activated by the 5G interference NOTAMs, pilots must plan accordingly. The AD mandates changes to the minimum weather conditions acceptable for landing. The AD requires the evaluation of weather conditions at the departure, destination, and alternate airports and makes sure that they can safely conduct the flight with the reduced capabilities as stipulated in the AD. The AD requires pilots to continuously monitor weather conditions while en route to the destination

and alternate airport weather more closely, so that if the need to divert arises, they can select a diversion airport that has weather conditions suitable for the aircraft capabilities.

If the aircraft is operated with fewer or no restrictions because the aircraft has an approved AMOC for 5G, pilots must study the AMOC that applies to their aircraft carefully. They will need to verify that the AMOC can be applied at the airports and anticipated runways for their flight. In some cases, the AMOC applies to the departure but not the destination (or vice versa). Other possible situations are where the AMOC can be used at an alternate airport where a 5G NOTAM is published, but otherwise the flight can be conducted normally because neither departure or arrival is a 5G impacted airport.

The complexity of the situation gets worse because the FAA has issued some AMOCs that approve low-weather operations only to specific runways at certain airports. Therefore, when low-visibility conditions exist, the pilot will need to plan ahead and be sure to only utilize the runways allowed by the AMOC. When needing to access the “approved runway for the AMOC,” the flight crew will need to coordinate with air traffic control, which adds to both pilot and controller workload.

The AMOC is valid for 30 days, so the list of airports and runways that an aircraft is allowed to apply the AMOC to will change frequently. It is possible that an aircraft with an approved AMOC today, may no longer be approved the next time a pilot is assigned to that aircraft. In addition, if a pilot is rated to fly multiple types with one Type Rating, such as multiple models of the

Boeing 737 or the common type among the Airbus 319/320/321 and/or if the airline has multiple makes or models of radar altimeters installed, they will also need to stay on top of the AMOC approvals for the specific aircraft they will be flying.

Finally, as the FAA has stated, some aircraft may never be able to receive an AMOC due to the installed performance of the radar altimeter on the aircraft.

Additional Limitations Not Covered by ADs or AMOC

Some aircraft manufacturers have added additional guidance and revised certain flight deck procedures that need to be followed at airports where there is a 5G NOTAM. This is above and beyond the AD from the FAA. This means that, even on a sunny, cloudless day, the aircraft manufacturers have modified aircraft flight manuals for operating in the United States 5G environment. The pilot must now review these additional or revised procedures prior to flight and implement them when operating to or from the 5G airport.

Selecting Alternate Airports and Preflight Planning

Even more than usual, the pilot must also work very closely with airline dispatchers to ensure that alternate airports are still viable given the forecast weather and aircraft's 5G limitations. If the likelihood for poor weather is high, then the pilot and dispatcher will need to decide which alternate airport is less likely to be impacted by weather based on forecast conditions hours into the future. For some flights, there are multiple alternate airports. Once the flight plan, with alternate airport selection is finalized, pilots will then need to evaluate the fuel required for the

flight, with the necessary reserves. In some cases, pilots may need to add more fuel to account for weather forecasts or other unanticipated delays created by the 5G situation, thereby making the flight more expensive to operate and increasing our carbon footprint.

Monitoring and Addressing Radar Altimeter Issues In-Flight

The 5G deployment has also added to a pilot's in-flight workload. There is now the potential for weather to wreak havoc with the flight. For example, low clouds or low visibilities at the destination airport will more frequently force decisions to divert to the alternate airport. If the low clouds and low visibilities "go up and down" over the course of several hours, then pilots may need to enter a holding pattern in hopes that the weather will improve to acceptable conditions for landing. Or, as discussed above, they will need to coordinate with air traffic control for a specific runway that is approved as part of their AMOC. All of these scenarios add workload and complexities that flight crews now need to work through.

Pilots must also be prepared for in-flight 5G interference to result in a radar altimeter failure on the flight deck. When that happens, there may be additional failure alerts or changes in aircraft system behavior as critical safety systems are affected by unreliable radar altimeter altitude information. For example, the Traffic Alert and Collision Avoidance System (TCAS) changes its alerting behavior based on radar altitude.

Pilots will need to plan for the fact that certain systems may be unavailable in the arrival, approach, and landing phase of the flight. Although pilots pay close attention to the aircraft's operation, degraded safety systems such as terrain avoidance, certain collision warning features, and the automatic deployment of spoilers and reverse thrust are unwelcome changes in the aircraft's capabilities. The loss of these systems eliminates safety features, thereby adding risk.

If this all seems complicated—that's because it is. And to think that airline pilots may do this multiple times per day while changing aircraft resulting in new AMOCs and NOTAMs to consider is daunting and adds risk. It is not an understatement to say that every airline pilot flying in America's airspace system today has the additional burden of reading, understanding, and making contingency plans based on a full understanding of all the above for each and every flight.

What I've described above is a summary of what pilots face today. While some airlines have provided pilots with information and tools to help navigate the 5G situation, other airlines have provided only a minimal amount of guidance. It appears that the FAA might need to spend a bit more time ensuring that all operators are stepping up to consistently provide accurate data to flight crews. We are monitoring this situation very closely and listening to our pilots who are navigating this difficult situation.

Action Needed Going Forward

ALPA appreciates the productive technical discussions between the aviation industry and the wireless industry that began in early January. The discussions allowed the FAA to rapidly approve the AMOCs described earlier, which in turn has to date largely prevented a breakdown in reliable airline services for passengers and shippers.

This current situation was avoidable. If FCC and the wireless industry had been willing to talk to the FAA and aviation industry experts in 2019, prior to the FCC report and order, or even prior to the auction in 2020, we are certain that a better technical solution to this issue could have been worked out without the rancor expressed in public, and that the mobile wireless industry could have bid on the spectrum with a more complete understanding of the future operating environment and without the threat to aviation safety. We have seen other countries address 5G in the C-Band much more successfully.

One of my fellow witnesses testifying at this hearing today is the president of CTIA, the mobile wireless trade association. They have been fond of saying that 5G works in 40 other countries, why not here? Well, I can tell you that if the FCC had adopted the 5G C-Band rules that are currently used in Japan, for example, we wouldn't even need to be here today.

The maximum power level permitted in Japan is two percent of the maximum power authorized in the FCC Order for the U.S.[1] And even with this significantly lower power, Japan *still* restricts the siting of 5G transmitters away from aircraft flight paths. CTIA simply can't have it both ways.

We can further contrast what happened in the U.S., with what happened in Canada and in France. In both countries, when the issue of radar altimeter interference was raised by the aviation safety regulator, they collaborated with each countries' spectrum regulator to put in place restrictions around airports before the 5G signal broadcasts began.

In Canada authorities placed zones around each of the 26 most critical airports that prohibit deployment of 5G transmitters, and further place power limits in a protection zone that covers up to 1000' above ground. Canada has also put in place a national antenna down tilt requirement to further reduce the power of the 5G signals that are seen by aircraft, including for helicopter operations like medevac, which routinely must operate at low altitudes and away from predefined heliports and landing zones.

[1] Japan Macro-cell limits are 63 watts (48 dBm/Mhz), while US rural power limits are 3280 watts (65 dBm/MHz). See ICAO Frequency Spectrum Management Panel paper FSMP-WG11-WP30.

Action by Congress is needed. A detailed analysis of the risk mitigation strategy for 5G in the C-Band should have been completed by the FAA, the FCC, the aviation industry, and the wireless industry much earlier in the process. With millions of air travelers' lives on the line, a federal agency with no foundational knowledge of our aviation system should not be the final arbiter of spectrum decisions.

There are more hurdles for aviation as the 5G rollout in the C-Band continues. The expansion of the 5G network and the expiration of certain temporary mitigations requires immediate action. Failure to reach a data-driven solution that does not needlessly introduce additional risk to the national air space and costs to the aviation industry will result in the same chaotic and inefficient situation we find ourselves in today.

The FAA's use of an AD and NOTAMs to ensure airline safety was the right step to take, and we fully support that action. The U.S. airline industry's safety record did not reach the current levels of performance without significant expertise and dedication by frontline employees including pilots, air traffic controllers, aviation maintenance technicians, flight attendants, and air traffic system maintenance personnel. ALPA and aviation labor in partnership with the FAA and the airlines have assembled risk-predictive, data-driven safety analysis systems and methodologies that have resulted in documented safety levels far above any other mode of transportation. Going forward, we welcome and should demand ongoing and detailed information-sharing with other stakeholders in government and the private sector.

Action is needed, and a process needs to be established to ensure that in the future, the FCC shares information and data that allows airlines to fully engage our risk analysis and safety data reviews before spectrum decisions are finalized. The FCC should be required to be forthcoming with as many details as possible on the transmitting specifications that they are proposing when issuing a new or revised spectrum approval, and they should work collaboratively when other regulators are involved in approving safety-related matters. In our view, the norm should be for FCC to defer to the federal safety regulators of the FAA or other agencies charged with safety oversight. I urge you and others on the committee to insist going forward that we require the use of a collaborative process as other countries successfully utilized.

Legislation is also needed to allow FAA to share critical information needed for safety analysis and risk mitigations that affect aircraft operators. This is information approved as part of any applications or petitions and should be publicly shared with key aviation stakeholders. In the current situation, the FAA should be allowed to share certain information about the approved alternative methods of compliance to ensure that a consistent understanding of rapid-changing circumstances is happening in real-time. This could be accomplished, for example, by having the applicant include a draft statement for public release upon approval of an application or petition, which requires inclusion of equipment make and model, and other critical information such as airports where an approval will be effective.

The FAA should also be funded and charged to stay better informed and included as a key stakeholder in any national spectrum strategies, including mobile wireless (5G or future) radio spectrum strategies. The FAA should be empowered to interact directly with FCC when required and not be limited in coordination by relying on another federal agency that does not understand aviation's carefully designed and very robust safety risk mitigation strategy.

Lastly, the FAA should be granted the authority to reject new or expanded FCC spectrum applications that affect aviation until safety can be ensured.

Mr. Chairman, we thank you and the committee for holding this timely and important hearing. The ongoing challenges that airline pilots are facing due to 5G interference with radar altimeters does not appear to be just a short-term issue, and there does not appear to be an end game defined, which means that your continuous monitoring of this situation is very much required and appreciated.

On behalf of the more than 62,000 ALPA pilots working every day to safely arrive at their destination with passengers and cargo, I thank you for the opportunity to share our perspectives with you today.