



March 4, 2022

## WHAT YOU NEED TO KNOW ABOUT 5G and Aviation Safety

### PRO POINTS

- **Mobile phone companies AT&T and Verizon have spent billions** on the spectrum needed to operate 5G wireless service across the U.S., and have been activating towers on a monthly basis, following months of intense discord over whether the signals will interfere with aircraft equipment and make it unsafe to land airplanes in 5G service zones. The strife has involved not just the two tech companies, but airlines, airports, the White House, FAA and FCC.

- **The wireless service, which enables internet service** up to 100 times faster than its 4G predecessor, eventually went live in January with stringent mitigations in place for aircraft operating in key zones where the services could disrupt air traffic or cause widespread cancellations or delays. Concern that the signals could foil altimeters, which measure how far an aircraft is off the ground, forced months worth of delays before the service was switched on.

- **With 5G's launch, the FAA has been rapidly issuing approvals** and instructions for planes to land safely in the event of bad weather within 5G zones, but not every kind of model is covered, and some kinds of equipment may never be compatible. AT&T and Verizon additionally have protections in place in some airport zones over the next six months. But many rolling variables on the issue remain, including whether all aircraft will ever be cleared to fly in adverse conditions, and who should foot the bill to upgrade aging altimeters.

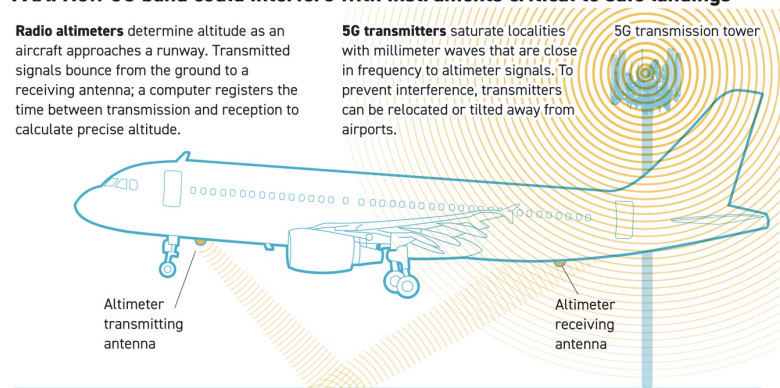
### HOW WE GOT HERE

Even with the FCC's blessing on the project, weeks before the original Dec. 5, 2021 activation, the FAA published warnings on potential interference with aircraft equipment mid-flight; the aviation industry rebuffed its implementation entirely, claiming adequate steps were not taken to protect aircraft from signal disruption. AT&T and Verizon had voluntarily offered to pause the rollout for 30 days until the disagreements could be resolved.

#### FAA: New 5G band could interfere with instruments critical to safe landings

**Radio altimeters** determine altitude as an aircraft approaches a runway. Transmitted signals bounce from the ground to a receiving antenna; a computer registers the time between transmission and reception to calculate precise altitude.

**5G transmitters** saturate localities with millimeter waves that are close in frequency to altimeter signals. To prevent interference, transmitters can be relocated or tilted away from airports.



Sources: FAA, FCC, CTIA, Airlines for America

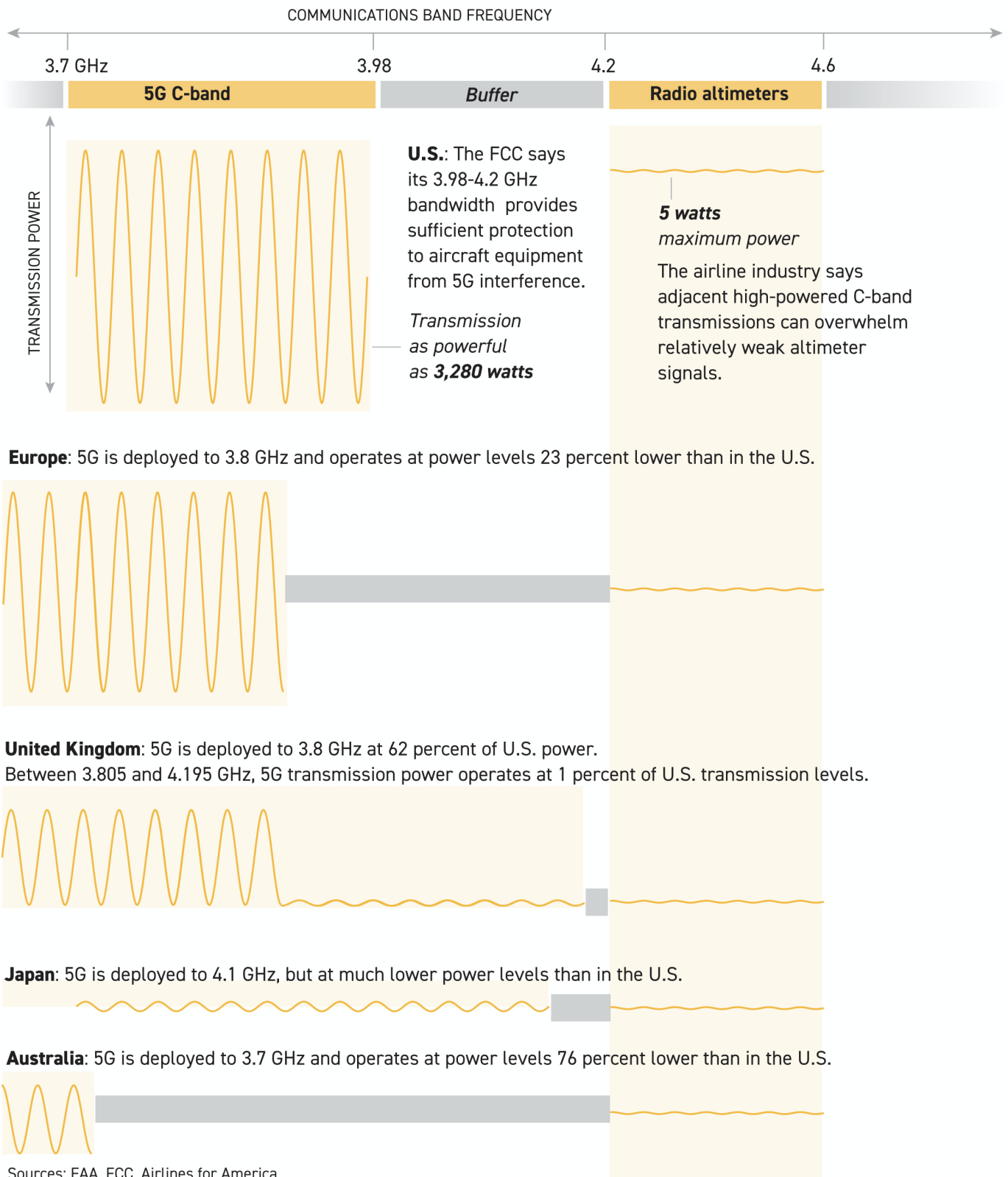
In 2018, the FCC began to debate whether to grant 5G companies access to the so-called "C-band frequency" in the first, significant attempt to launch a generation of fast wireless service throughout the United States and to catch up to global rivals like China leapfrogging Americans on the ubiquitous tech.

The aerospace industry, including pilots, said its warnings pre-date even those deliberations, but the FCC asserted the research behind stalling or limiting 5G services was unconvincing, with officials signing off on the venture.

At the center of the dispute for the airlines is whether their aircraft can perform low-visibility landings at some airports where clouds descend to a point that pilots rely heavily on instrumentation. The FAA said the companies' 5G broadcast strength within the C-band — or the 3.7 to 3.98 GHz frequency range — is significantly more powerful than what's been used or proposed in Europe, with increasing prospect the signals waded into the nearby frequency where aircraft electronics typically reside.



## U.S. C-band crowds altimeters compared with overseas configurations





With the new activation date now set for January, AT&T and Verizon then agreed to another two-week delay before ultimately conceding to limit 5G signals near key airports at the Department of Transportation's request.

Since then, the FAA has imposed limits on certain aircraft models and/or landings in zones where 5G has been deployed, with bouts of isolated diversions from aircraft operating in the zones. A handful of foreign airlines, for example, canceled some of their flights to the U.S., on fears that their airplanes and crew could be stranded here.

While 5G hasn't caused sweeping problems for large airlines, regional airlines, which account for roughly 40 percent of U.S. passenger flights, await a comprehensive solution for many of their altimeters, which cannot withstand as much interference. That said, some larger aircraft aren't without their own challenges once they're in a 5G zone. For example, the FAA said 5G has the potential to delay the control of the Boeing 787 aircraft's thrust reversers upon landing, increasing the risk of running off the runway.

The FAA has yet to clear business jets or helicopters for low-visibility flights. It continues to test what equipment upgrades are needed to make altimeters impenetrable to 5G signals while additional mitigations remain in place for six months around airports where the potential for interference is greatest.

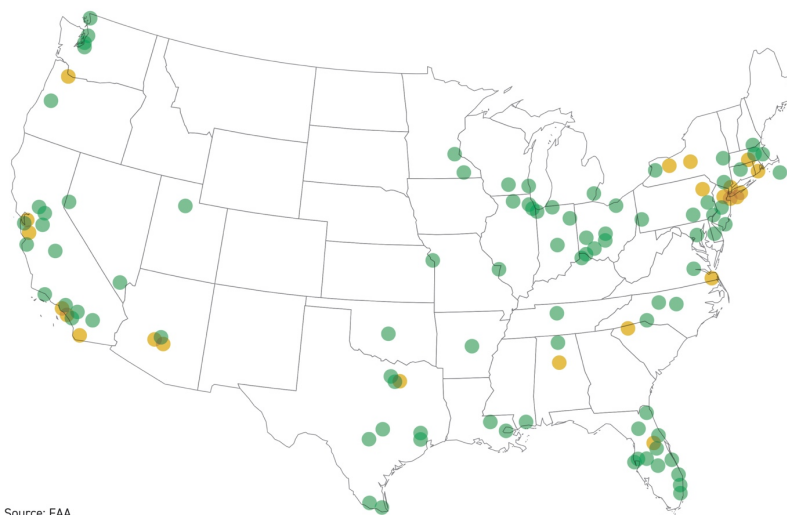
### WHAT'S NEXT

Outgoing FAA chief Steve Dickson in February revealed the FAA is in the process of developing new standards for radio altimeters writ large after engineers gather and analyze data on their performance. Once the standards are developed, officials will determine if existing radio altimeters align with new standards, or whether upgrades are necessary to safely fly. While no formal timeline is set, Dickson hinted the new airworthiness standards could come by early 2023.

#### FAA approves some low-visibility landings within 5G deployment areas

##### Airports affected by 5G deployment

- Greater than 90 percent of aircraft models approved to land (88 airports)
- 50-89 percent of aircraft models approved to land (25 airports)  
Includes Phoenix Sky Harbor (Ariz.); Los Angeles, Oakland and San Diego (Calif.); Orlando-Sanford (Fla.); Newark (N.J.); La Guardia and JFK (N.Y.); Portland (Ore.); Rhode Island Green (R.I.); Dallas Love Field (Texas); and Norfolk (Va.) airports.



Source: FAA



Neither the FAA or FCC have proposed who should retrofit aircraft for those that will have no choice but to upgrade their altimeters. The ballpark cost to modify or install new aircraft altimeters — including labor cost, cost of aircraft time out of service — could range between \$100,000-\$150,000 per plane, depending on the aircraft type, according to an assessment from the Air Line Pilots Association.

The FCC and National Telecommunications and Information Administration have pledged to improve their coordination on spectrum management going forward, especially as T-Mobile is on schedule to greenlight its C-band licenses next year.

#### POWER PLAYERS

- **AT&T, Verizon:** The two carriers were among 107 winning bidders in February 2021 to gain access to the spectrum as part of an \$80 billion deal: Verizon paying \$45.45 billion across 3,511 licenses, and AT&T spending \$23.41 billion for 1,621 licenses, and were among the first to activate at this stage of the spectrum plan. The companies hope to use those C-band licenses to deploy meaningfully faster 5G service for consumers after a yearslong marketing effort to promote that the tech would speed up cell phone service, telemedicine and internet-connected cars. The companies are providing data to the FAA as the agency tests altimeter equipment performance. CTIA, which represents the telecom industry, has worked to reinforce the carriers' interests.
- **FCC:** While the 5G spectrum sale began under the leadership of former Chair Ajit Pai, the current FCC chair, Jessica Rosenworcel, helped oversee the plan's execution. In the last few months, Rosenworcel has expressed confidence in the wireless carriers' proposal to work through any concerns, and has been in active talks with other federal officials to resolve lingering setbacks.
- **FAA & DOT:** FAA Administrator Steve Dickson and Transportation Secretary Pete Buttigieg went public over the last several months to convey 5G's risks, cautioning its deployment would prompt the airlines to divert or delay flights, or institute mass groundings without a formal solution from the wireless industry. The FAA has issued operating instructions to airlines and aircraft operators as it moves toward a long-term solution to co-exist alongside 5G technologies.
- **Pilot and aviation industry:** Prior to piecemeal mitigations in place from the FAA and telecom companies, pilots and trade associations for the airlines sounded the alarm that they anticipated the 5G activation would wreak havoc with flight schedules and make flying unsafe in some conditions. The groups offer their perspective to the FAA as needed.