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5G and Aviation Safety in Brazil

By Ricardo Barretto Ferreira and Sylvia Werdmüller von Elgg Roberto

The availability of mobile telephony services with the 5th generation (5G) technological standard in several countries, which will undoubtedly bring significant advances for the population and for the most diverse fronts of the economy, raised, on the other hand, concerns on the part of the global air transport sector.

In the second half of January 2022, after a period of deferral, the operators Verizon and AT&T began launching their 5G services in the United States of America (USA). However, according to alerts, the respective mobile networks could cause interference in certain instruments used by aircraft, such as, for example, radio altimeters (which operate in the 4.2 to 4.4 GHz band), and this could pose risks in situations such as landings in low visibility conditions.

It is important to note that the 5G services provided by Verizon and AT&T make use of the 3.7 GHz to 3.98 GHz band. However, not only this band is used to make 5G available in the USA. T-Mobile, another relevant North American mobile telephony operator, makes use of the 600 MHz and 2.5 GHz radio-frequency bands to provide services and, in these spectrums, no concerns related to aviation safety were raised.

Unlike what happens with Verizon and AT&T services in the USA, in Brazil the C-band frequency used for 5G technology corresponds to 3.3 to 3.7 GHz and, in countries where such spectrum is allocated to the same purposes, there was no evidence of harmful interference with air transport. Therefore, this implies that, in Brazil, there is an interval of at least 500 MHz between the 5G frequencies and those used by radio altimeters.

Due to the scenario of possible deleterious effects to the aviation, the Federal Aviation Administration (FAA) chose to create 5G exclusion zones around 50 airports, as occurred, for example, in the international airports of New York, Los Angeles, Miami, and Chicago. In a conservative approach, Canada has also imposed restrictions on the installation of 5G signal antennas near certain airports, although in that country the 3.5 GHz band has been allocated to the aforementioned telecommunications technology.

It is interesting to note that, in the European Union, 5G services were launched without problems, also due to the use of spectrums different from those used in the North Amer-

rican territory. But even so, French authorities chose to implement service restrictions at some French airports.

The International Air Transport Association (IATA), an organization that represents, leads, and serves the sector, having as members more than 290 companies in 120 countries (among which the main Brazilian airlines, Azul, Gol, and Latam), also spoke on the matter, expressing that, while recognizing the importance of the use of spectrum for mobile telephony services, maintaining the safety levels of passengers, flight crews, and aircraft is crucial for aviation, and the safe coexistence of 5G and aviation must be a top government priority.

In Brazil, the National Telecommunications Agency (ANATEL) was also concerned about the possibility of interference caused by 5G services in the operation of radio altimeters, having held a public consultation on the issue in the first half of 2022. In addition, ANATEL discussed the matter with the National Civil Aviation Agency (ANAC).

It is worth mentioning that ANAC conducted a comprehensive analysis on the subject, which relied on information obtained from various sources, such as the FAA, the Canadian spectrum regulator Innovation, Science and Economic Development (ISED), and the Radio Technical Committee for Aeronautics (RTCA, a North American organization that issues technical performance standards for compliance with regulations of FAA and other aviation regulatory authorities), as well as manufacturers of both aircraft and radio altimeters, an analysis that resulted in a recommendation to ANATEL.

The public consultation carried out by ANATEL received contributions from not only the largest Brazilian telecommunications service providers Claro, Telefônica, and TIM, but also from the Brazilian aircraft manufacturer Embraer and from Concessionária Aeroporto Rio de Janeiro S.A. (which operates the international airport of Rio de Janeiro), in addition to other companies and entities.

As a result of the respective administrative process, on July 04, 2022, ANATEL published Act No. 9064/2022.

According to the regulation, at aerodromes specified in the aforementioned Act and which depend on radio altimeters in low visibility approach procedures, ANATEL determined, on a provisional and precautionary basis, that the main beams of antennas used in base, nodal, or repeater stations operating in the 3300 to 3700 MHz sub-bands and whose installation is located in areas close to the listed aerodromes, must have “their targeting limited between the horizon line and below”, with this limit being applicable to AAS and non-AAS antennas.

The areas close to the aerodromes were defined as the rectangle comprised in the distances of 2100 meters from the ends of

the landing and take-off runway, and 910 meters on each side of the central axis of the runway. Furthermore, Act No. 9064/2022 clarifies that the "location of a base, nodal, or repeater station must be referenced from the geographic coordinate of the base of the antennas' support infrastructure".

In addition, according to the aforementioned Act (and in line with the recommendation of ANAC), for the base, nodal, or repeater station that is installed in the aforementioned areas, the maximum power (e.i.r.p.), by polarization, must be limited to 67 dBm/100 MHz when operating in the sub-band from 3300 MHz to 3600 MHz; or 65 dBm/100 MHz if operating in the sub-band above 3600 MHz.

The restrictions imposed by ANATEL, it is worth mentioning, are applicable to the busy airports of Brasília (in the Federal District), Pampulha and Confins (in Minas Gerais), Congonhas, Campinas, and Guarulhos (in São Paulo), Galeão (in Rio de Janeiro), and Afonso Pena (in Paraná), among others.

It is also interesting to note that, reflecting the Agency's caution on the matter, it was foreseen that Act No. 9064/2022 must be revised by December 31, 2022, considering the evolution of the matter both at the national and international levels, so that there may be a change in the aforementioned restrictions in the future.

Following the results of the spectrum auction held in November 2021, 5G services using the radio-frequency band of 3.5 GHz have already started to be implemented in Brazil. The first city in which the technology was activated was Brasília, the country's capital. Until now, Belo Horizonte, João Pessoa, Porto Alegre, and São Paulo (the largest Brazilian city) also have the service, but it is expected that very soon other state capitals will join the list.

The adoption, by regulatory authorities, of measures aimed at preserving aviation safety in the national territory, similarly to what happens worldwide, implies not only greater tranquility for service users, but also a scenario of great importance for the increase of economic activities related to the sector.

In this sense, it should be noted that the Brazilian air market has shown very interesting economic results. For example, in the first quarter of 2022 alone, according to data published by ANAC, the aforementioned Brazilian airlines showed a positive net result of BRL 4.5 billion, a relevant growth after the drop caused by the Covid-19 pandemic. Guarulhos airport, located in the state of São Paulo, is the busiest in the country, through which 5.81 million passengers passed between January and February 2022 alone. In June of this year, in the domestic market, 6 million passengers used air transport and 35.8 thousand tons of cargo were transported; in international travels, in the same month, 1.2 million passengers were transported, as well as 82.9 thousand tons of cargo. These

indicators reflect the country's magnitude.

Given these numbers, it is easy to infer that the measures published by ANATEL will certainly play an important role, both for the transport of people and cargo. Regarding this last item, ANATEL itself predicts that the cargo logistics sector in general will be strongly impacted by the availability of 5G services in Brazil, for example, with the implementation of autonomous vehicles, online monitoring, digitalization of documents, and also with the use of the Internet of Things (IoT). In addition, according to the Agency, there is an expectation that 5G will bring relevant economic benefits to the country, generating a value of BRL 1.2 trillion by 2035.

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