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Assunto: Contribuição da DSA à Consulta Pública nº 79

Prezado Senhor Superintendente,

The DSA appreciates the opportunity to provide comments in response to ANATEL's Public Consultation No. 79 (Consultation) that seeks input on the implementation of automated frequency coordination (AFC) systems to allow the use of the 5.925-7.125 GHz band (6 GHz Band) in outdoor environments in Brazil.[1]

The DSA applauds ANATEL for its prior decision to make the entire 6 GHz Band available for low-power indoor (LPI) access points and very low power (VLP) devices that can operate in both indoor and outdoor environments. This important decision benefits Brazilian businesses and consumers by providing sufficient Wi-Fi capacity for data intensive video applications, AR/VR, and 4G and 5G (data) offloading in dense deployments, and for allowing users to take full advantage of the new applications enabled by the large channel sizes available with the new Wi-Fi 6E and Wi-Fi 7 generations of equipment.

The DSA further commends ANATEL for initiating the process in this Consultation to authorize higher-power Standard Power access points under the management of an AFC system, which will protect incumbents from receiving harmful interference by these new license-exempt devices. Standard Power devices can operate at higher power than LPI and VLP, enable outdoor uses cases, and can support connectorized antenna applications. As highlighted in our 6 GHz report, "[S]tandard Power use cases are particularly important to a number of deployment types and settings, including manufacturing, logistics, agriculture, rural broadband, higher education,

[1] The DSA is a global, cross-industry, not for profit organization advocating for laws, regulations, and economic best practices that will lead to more efficient utilization of spectrum, fostering innovation and affordable connectivity for all. Our membership spans multinationals, small-and medium-sized enterprises, as well as academic, research and other organizations from around the world all working to create innovative solutions that will benefit consumers and businesses alike by making spectrum abundant through dynamic spectrum sharing. A full list of DSA members is available on the DSA's website at www.dynamicspectrumalliance.org/members.

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hospitality, healthcare, and municipal."[2] In addition, other important Standard Power use cases are large public venues (e.g., stadiums), enhanced indoor broadband (both business and residential), and corporate campuses. The DSA encourages ANATEL to review Intel's ecosystem tracker (available at: https://wifinowglobal.com/news-and-blog/intel-says-wi-fi-6e-device-count-passes-1200-more-apple-iphone-15-wi-fi-6e-rumours/) to see the latest information regarding available Wi-Fi 6E equipment, including Standard Power devices.

Given the myriad public and private use cases for Standard Power operations, the DSA recommends that ANATEL permit Standard Power devices to operate in the 6 GHz Band under the management of an AFC system in ***both*** indoor and outdoor environments. Throughout the remainder of our comments herein, we will use the term Standard Power to refer to license-exempt devices intended for operation ***both*** indoors as well as outdoors.

DSA Responses to ANATEL Consultation Questions

1. On operating conditions and protection criteria

1.1. In which bands or channels should the use of outdoor access points be *allowed*?

The DSA encourages ANATEL to permit Standard Power access points across the entire 6 GHz Band (5.925-7.125 GHz). In the United States, the Federal Communications Commission has authorized Standard Power operations in two 6 GHz sub-bands - 5.925-6.425 GHz (U-NII-5) and 6.525-6.875 GHz (U-NII-7) – under the management of an AFC system to ensure protection of incumbent fixed point-to-point microwave systems and fixed satellite service (FSS) links. The FCC has decided to consider authorizing AFC-managed Standard Power devices at a future time in U-NII-6 (6.425-6.525) and U-NII-8 (6.875-7.125) where mobile Broadcast Auxiliary Services are authorized. In Canada, the Innovation, Science and Economic Development department has authorized Standard Power operations under AFC system management in the same two sub-bands as well as in the 100 MHz between, making a contiguous block of 950 MHz available (5.925-6.875 GHz). Other countries, including the Kingdom of Saudi Arabia and South Korea also adopted the entire 1200 MHz for licensed exempt devices and are planning to permit Standard Power operations under AFC management across the entire band.

1.2. With respect to calculations to check channel availability:
a) Should the AFC system consider in its calculations only the maximum power of the *outdoor access point* or should it consider lower powers for defining the possible channels to be used?

[2] Dynamic Spectrum Alliance, 6 GHz License Exempt: Why the full 1200 MHz and why now?" at 13.

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The DSA recommends that ANATEL permit AFC systems to determine the availability of different size channels at a variety of power levels so that Standard Power access points may select the optimal available channel and transmit power level combinations for its location. In the United States and Canada, AFC systems must be capable of determining the available frequencies in steps of no greater than 3 dB below the maximum permissible Equivalent, Isotropically Radiated Power (EIRP) of 36 dBm, and down to at least a minimum level of 21 dBm.[3]

(b) In the event that the calculation performed by the AFC system considers powers below the maximum allowed, how could the AFC system ensure that the access point is operating according to the maximum power calculated for a given channel?

During testing and certification of AFC systems and AFC-managed Standard Power access points, ANATEL should verify that the access point does not operate in excess of the maximum transmit power limit for its location as calculated and provided to it by the AFC system.

1.3. What should be the maximum power allowed for operation of the outdoor access *points*? Can the AFC system enable the access point to decrease power? Can there be different categories of *outdoor access point*?

In order to benefit from global economies of scale and speed time-to-market, the DSA recommends that ANATEL adopt transmit power limits for Standard Power access points that are the same as those adopted by other countries, including the United States and Canada. Both the United States and Canada have adopted rules that allow Standard Power access points to operate at an EIRP of 36 dBm and with a maximum power spectral density (PSD) of 23 dBm/MHz.[4]. The DSA recommends that ANATEL adopt the same limits, which will expedite the availability of Wi-Fi 6E access points and provide operators with sufficient transmit power to meet a variety of indoor and outdoor connectivity needs.

1.4. Should the protection criterion to be adopted to ensure adequate protection for terrestrial services in the range of 5,925-7,125 MHz be established in terms of the desired signal-to-interference signal (C/I) ratio or in terms of the interfering signal-to-noise power (I/N) ratio? What is the appropriate value for protection of incumbent terrestrial services in the range of 5,925-7,125 MHz, or parts thereof?

[3] See FCC rule 47 CFR 15.407(k)(2) (available at https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15) and ISED rules DBS-06 Issue 1 (available at https://ised-isde.canada.ca/site/spectrum-management-telecommunications/en/devices-and-equipment/radio-equipment-standards/database-specifications-dbs/dbs-06-automated-frequency-coordination-afc-system-specifications-6-ghz-5925-6875-mhz-frequency-band).
[4] See FCC rule 47 CFR 15.407(a)(4) (available at https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15) and ISED rules RSS-248 (available at https://ised-isde.canada.ca/site/spectrum-management-telecommunications/en/devices-and-equipment/radio-equipment-standards/radio-standards-specifications-rss/rss-248-radio-local-area-network-rlan-devices-operating-5925-7125-mhz-band}.

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The DSA recommends that ANATEL adopt the same protection requirements adopted by other countries, including the United States and Canada, for licensed terrestrial fixed microwave links operating in the 6 GHz Band. Both the United States and Canada have adopted a protection criterion of I/N ≤ -6 dB for licensed terrestrial fixed microwave links.

1.5. Which propagation model should be used to verify compliance with the protection criterion to be defined? Should different propagation models be used, depending on the separation distance between the ground stations of the incumbent ground services and the *outdoor access point*?

The DSA recommends that ANATEL adopt requirements that AFC systems use the same propagation models that are required by other countries, including the United States and Canada, namely:

- For distances up to 30 meters, the AFC system should use the free space path loss propagation model;
- For distances greater than 30 meters and up to 1 kilometer, the AFC system shall use the Wireless World Initiative New Radio phase II (WINNER II) model, taking in to account the appropriate propagation scenarios to represent urban, suburban and rural paths;
- For distances greater than 1 kilometer, the AFC system should use the Irregular Terrain Model (ITM) with the point-to-point configuration combined with the appropriate clutter models defined in Recommendation ITU-R P.2108 for urban and suburban environments and in Recommendation ITU-R P.452 for rural environments.[5]

1.6. What is the appropriate resolution for the digital map used in the predictions of the propagation model? If the propagation model requires *clutter information,* what should be the minimum characteristics of this information?

The DSA recommends that ANATEL adopt the same requirements as the United States and Canada. Their rules both state that, when the distance between the Standard Power device and licensed microwave station is great than 1 kilometer and ITM is used, AFC systems are to use 1 arcsecond digital elevation terrain data. For locations where such data is not available, AFC systems must use the most granular digital elevation terrain data available. To account for the effects of clutter, such as from buildings and foliage, AFC systems should combine use of the ITM with statistical clutter model ITU-R P.2108 for urban and suburban environments and the ITU-R P.452-16 clutter model for rural environments.

[5] See FCC rule 47 CFR 15.407(l)(1) (available at https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15) and ISED rules DBS-06 Issue 1 (available at https://ised-isde.canada.ca/site/spectrum-management-telecommunications/en/devices-and-equipment/radio-equipment-standards/database-specifications-dbs/dbs-06-automated-frequency-coordination-afc-system-specifications-6-ghz-5925-6875-mhz-frequency-band).

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1.7. What minimum specifications for the geolocation data of access points, used by AFC systems in the calculations performed by the propagation models (resolution, date of data collection, others)?

The DSA recommends that ANATEL adopt geolocation requirements for Standard Power devices that have been adopted in other countries, including the United States and Canada, namely that Standard Power devices must report their geographic location and location uncertainty, with a confidence level of 95%, to an AFC system. AFC systems will incorporate this location accuracy information into their calculations and adjust channel availability reports in response to Standard Power device queries that must occur daily (once every 24 hours). AFC systems should also be required to check with ANATEL's BDTA for new information about incumbent usage once every 24 hours.

1.8. Is it necessary to adopt measures to protect satellites operating in the range of 5,925-7.125 MHz? If so, what measures could be taken?

The DSA recommends that ANATEL take the same approach toward FSS protections as the United States and Canada, namely that use of an AFC system is not necessary to protect incumbent FSS space station receivers given the maximum power level limitations. The FCC did adopt a rule for outdoor Standard Power access points to limit the maximum EIRP above a 30 degree elevation angle to 21 dBm.[6]

1.9. Can subordinate access points also be allowed for *outdoor operation*? What criteria should be adopted to ensure that subordinate access points do not cause harmful interference on incumbent services?

The DSA recommends that subordinate access points operate under the control of a Standard Power access point, which will in turn operate only on channels and at power levels authorized by an AFC system to avoid interference to incumbent services.

1.10. The information regarding the point-to-point earth stations currently available in the BDTA is as follows: Station Number, Latitude, Longitude, Transmission Frequency, Reception Frequency, Maximum Power, Emission Designation, Antenna Gain, Accessory Losses, Antenna Coast Front Ratio, Antenna Power Angle 1/2, Antenna Type, Antenna Elevation Angle, Antenna Azimuth, Antenna Height, Polarization, Transmitter Homologation Code, Transmitter Model, Antenna Homologation Code, Antenna Model. Based on this list of information, can it be stated that they are sufficient for the AFC system to determine the frequencies at which it is possible to operate *the outdoor access points*?

[6] See FCC rule 47 CFR 15.407(a)(4) (available at https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15).

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The DSA believes that the type of information collected in ANATEL's BDTA is sufficient for AFC systems to determine which channels and at what power levels Standard Power devices can be allowed to operate. However, it is important to note that AFC system results will be dependent on the accuracy of the information available in BDTA. Therefore, we recommend that ANATEL require incumbent licensees to update or affirm the information about their operations in BDTA and to predicate interference protection based on the information in BDTA provided by the incumbent licensees.

1.11. Should outdoor access *points* have a height limit for installation? What should be this limit?

The DSA recommends that ANATEL refrain from adopting an antenna height limitation on Standard Power access points. AFC systems can calculate the impact of antenna height in their calculations of available channels and power levels while ensuring incumbent protection. The FCC rules require antenna height information to be provided to the AFC system either automatically by the device, or manually by the installer or operator of the device. Standard Power access points that provide this information automatically to an AFC system must describe and demonstrate the method and accuracy during the equipment authorization process.

2. On communication between the AFC system and the outdoor access point

2.1. What information must the outdoor access point provide to the AFC system?

The DSA recommends that ANATEL require Standard Power access points to provide AFC systems with their horizontal location along with uncertainty (e.g., a point and a radius) as well as vertical location along with uncertainty (e.g., their minimum and maximum heights) with a 95% confidence level. Additionally, identifying information, such as their certification ID and serial number, should be provided to the AFC system. The Wi-Fi Alliance "AFC System to AFC Device Interface Specification" Section 4, which includes a set of parameters that must be communicated by a Standard Power access point to an AFC system, may be instructive to ANATEL.[7]

2.2. Should the operation of the access point be conditional on the provision of the equipment approval code to the AFC system?

Yes, the DSA recommends that ANATEL require Standard Power devices to provide an AFC system with its equipment approval or authorization code. AFC systems can use this information to authenticate devices and ensure that no rogue devices are operating in the band and to

[7] Available at https://www.wi-fi.org/downloads-registered-guest/AFC_Specfications_and_Test_Plans_01232023.zip/38132.

facilitate interference mitigation and resolution by identifying the device if harmful interference were to occur.

2.3. Should the access point be able to provide geolocation data manually (geographical coordinates and antenna height) at the time of installation? Under what conditions?

Yes, the DSA recommends that ANATEL provide flexibility for Standard Power access points to use different methods for determining geolocation and providing this requisite information to an AFC system. Geolocation determination technology and capabilities are an evolving area of development. We encourage ANATEL to allow equipment vendors to demonstrate how they can meet its geolocation and confidence requirements.

2.4. According to current regulations, outdoor access points must be registered in ANATEL's Technical and Administrative Database (BDTA). What are the advantages and disadvantages of this registration? Should ANATEL review this obligation? Should registration information be submitted to the AFC?

The DSA recommends against requiring Standard Power access points to be registered in BDTA, which would impose additional costs on device manufacturers, vendors, and consumers.

2.5. Should the AFC system provide the outdoor access point with a list of allowed channels or a list of prohibited channels?

The DSA recommends that ANATEL permit Standard Power devices and AFC systems to follow the above-referenced Wi-Fi Alliance "AFC System to AFC Device Interface Specification," which states that AFC systems shall provide list of available frequencies and associated maximum power levels for use by a Standard Power device at a specific geographic location.

2.6. How often should outdoor access points consult the AFC to check the frequencies at which operation is possible? Should a procedure be adopted in the event that the outdoor access point is not able, for some reason, to consult the AFC within the minimum period set?

As described above in response to Question 1.7, the DSA recommends that ANATEL require Standard Power access points to check with an AFC system once every 24 hours for a list of available frequencies and associated maximum power levels at a specific geographic location. Consistent with the rules in the United States and Canada, should the access point be unable to check with an AFC system at the end of the 24-hour period, an access point that cannot contact an AFC system during any given day should be allowed to continue to operate until 11:59 p.m. of the following day at which time it must cease operations until it reestablishes contact with the AFC system and re-verifies its list of available frequencies.

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2.7. What requirements must be adopted to ensure the security of communication between the outdoor access points and the AFC system?

The DSA encourages ANATEL to require secure methods for communication between AFC systems and Standard Power devices and for AFC systems to adopt security measures to prevent unauthorized access to AFC system operations or customer data. However, the DSA does not recommend that ANATEL prescribe what such security methods must be.

2.8. Can outdoor access points be able to communicate only with one of the Enabled AFC systems or must they be able to communicate with all afc systems that may be enabled in Brazil?

The DSA recommends that ANATEL not impose a requirement for Standard Power devices to be able to communicate with multiple AFC systems. There is no need for interoperability among AFC systems to protect incumbent services. Each AFC system can update its list of protected incumbents with the BDTA independently. It would be unduly burdensome (increased costs and product and system design limitations) to require Standard Power devices to demonstrate interoperability with more than one AFC system. Furthermore, such a requirement risks stifling innovation in the market for AFC system services. If industry adopts standard interfaces for communications between Standard Power access points and the AFC system that follow the Wi-Fi Alliance's "AFC System to AFC Device Interface Specification," it will allow Standard Power device operators the option to switch AFC operators and permit a smoother transition if an AFC operator decides to exit the market.

2.9. Should outdoor access points be allowed in areas near the border with other countries? If so, should outdoor access points be made possible to communicate with AFC systems approved/[used] by other administrations? If there are no AFC systems in the other administrations, can the AFC system enabled in Brazil allow the operation in these cases?

The DSA notes that AFC systems are capable of to taking into account incumbent operations in the bordering countries. This is an issue that has come up in the U.S-Canadian border context. The DSA recommends that ANATEL works with the countries bordering Brazil to determine the best way for AFC systems to obtain information about incumbent operations in the adjacent countries – either directly or through ANATEL.

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2.10. Can Enabled AFC systems serve only part of the outdoor access points or must they be able to communicate with any outdoor access point that meets the operating requirements?

The DSA recommends that ANATEL not require AFC systems to serve all Standard Power access points. Should the Standard Power access point follow the above-referenced Wi-Fi Alliance (WFA) "AFC System to AFC Device Interface Specification," all certified AFC systems should be capable of communicating with all WFA-certified Standard Access points. However, given the industry's business model in countries adopting AFC systems, including the United States and Canada, the DSA recommends that ANATEL allow AFC system operators to charge fees for the services that they provide to their customers that are registered with their AFC system under contractual arrangements.

2.11. Should procedures be defined for maintaining the operation of outdoor access points in the event of critical failure in an AFC system?

As described above in response to Question 2.6, the DSA recommends that ANATEL adopt a grace period of what is essentially 48 hours for Standard Power access points to continue to operate on previously authorized channels without connecting to an AFC system (one check-in required per 24 hours with a grace period until 11:59 p.m. of the following day if a connection cannot be established).

3. On the enabling and functioning of a FCA system

3.1. Should companies that provide AFC systems be mandatorily established in Brazil?

The DSA recommends that ANATEL requires all AFC system operators to comply with its regulations and Brazil's laws. However, the requirement to establish a Brazilian entity may impose unnecessary costs on AFC system operators, which will lead to higher fees charged to vendors or users and may stifle competition and deployment of Standard Power devices. We strongly encourage ANATEL to reduce barriers to entry for AFC system providers.

3.2. Should AFC systems have server infrastructure located in Brazil?

For the same reasons explained above in response to Question 3.2, the DSA recommends that ANATEL not require AFC system operators to locate their server infrastructure in Brazil. Providing AFC system operators with flexibility to innovate their AFC capabilities, which will lead to greater economies of scale, reduce costs, and encourage advancements in AFC system performance.

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3.3. Should Anatel allow the enabling of only one AFC system or multiple systems? In the case of multiple AFC systems, should the entities responsible for these systems exchange some kind of information with each other?

The DSA urges ANATEL adopt simple, flexible, ends-oriented rules that allow diverse AFC system implementations to address a broad range of use cases and business models. Such rules will facilitate the creation of multiple, third-party AFC system operators and the establishment of a competitive marketplace for AFC systems and services.

3.4. Should Anatel allow the enabling of AFC system providers with regional coverage?

The DSA encourages ANATEL to allow AFC system operators to develop, and for consumers to choose among, different compliant AFC approaches that are reflective of geography, market sector, and user needs. For example, consumers, enterprises, educational institutions, hospitals, municipalities, and military users will expect different capabilities and be willing to spend greater or lesser sums of money on access points. The geographic coverage needs of these user classes will differ, as will their proximity to incumbent users. Consequently, some may prefer sophisticated, professionally installed AFC implementations that account for details like the precise height of their devices in order to increase the number of available channels. Others might prefer simpler and lower-cost implementations that do not account for factors such as device height, even if that means sacrificing potentially available frequencies or power levels. By providing AFC operators with flexibility to determine their own business models, including geographic coverage, ANATEL can foster innovative, competitive approaches.

3.5. What are the requirements to be established for a particular entity AFC system to be enabled?

In order to maximize economies of scale and reduce costs, the DSA encourages ANATEL to adopt an AFC system model that is harmonized to the maximum extent possible with the AFC system model being implemented in the United States, Canada, and other countries. The DSA also encourages ANATEL to rely on industry-led standard development organizations, such as the Wi-Fi Alliance, to establish interoperability requirements for Standard Power devices and AFC systems. While each AFC system operator should be required to demonstrate its compliance with ANATEL's requirements, the Wi-Fi Alliance and the Wireless Innovation Forum have developed a set of developed a set of specifications, test plans, test cases, test harnesses and other elements by which AFC systems and devices may be assessed. We recommend that ANATEL consider these documents and rely to the greatest extent possible on this industry-led standards work.

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3.6. Must the qualification be given for a certain period? If so, what would be the right time frame? Would the deadline be extended? What measures should be taken at the end of the licence deadline or in the event of withdrawal by the AFC entity?

The DSA recommends that ANATEL follow other countries, including the United States and Canada, by establishing a five-year, renewable term for AFC system operators. Should the AFC system operator withdraw from the market, DSA recommends that ANATEL adopt a rule that would require Standard Power devices to either migrate to another AFC system, cease operation in the 5.925-7.125 GHz band, or switch to low power indoor only mode.

3.7. How can an entity responsible for an AFC system fund its operation? Could she determine an amount to be paid for each query to her database, charge a monthly fee, or take some other approach?

As mentioned above in response to Question 3.4, the DSA recommends that ANATEL provide AFC system operators with flexibility to determine their own business models, which will lead to innovative, competitive approaches.

3.8. How often should AFC systems access Anatel's BDTA for technical information on licensed earth stations in the range of 5,925-7,125 MHz, or parts thereof? Should a procedure be adopted in the event that the AFC system is not able, for some reason, to consult Anatel's BDTA within the minimum period set?

As mentioned above in response to Question 1.7, the DSA recommends that ANATEL require AFC systems to access BDTA at least once every 24 hours to access the latest information about licensed incumbent systems. And, as described in response to question 2.11, the DSA recommends that ANATEL adopt a rule that allows Standard Power access points to continue to operate on previously authorized channels without connecting to an AFC system for a grace period of 48 hours (until 11:59 p.m. of the following day if a connection cannot be established).

4. Other input not previously foreseen

4.1. It is requested to inform other inputs that were not provided for in the previous questions, with due justification.

Given the myriad public and private use cases for Standard Power operations, the DSA recommends that ANATEL permit Standard Power devices to operate in the 6 GHz Band under the management of an AFC system in ***both*** indoor and outdoor environments. We also encourage ANATEL to permit AFC system to account for building entry loss when computing channel and power availability for Standard Power access points operating indoors. Finally, we encourage ANATEL to harmonize its rules with other countries to the greatest extent possible

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and minimize country-specific requirements so that Brazil's citizens and enterprises may more easily benefit from global economies of scale.

Sincerely,

Martha SUAREZ
President
Dynamic Spectrum Alliance