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The Executive Vice Chairman
Nigerian Communications Commission (NCC)
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Re: DSA Comments on the Deployment of Fifth Generation (5G) Mobile Technology in Nigeria

Dear Prof. Umar Danbatta,

The Dynamic Spectrum Alliance ("DSA"[1]) respectfully submits the following comments on the Deployment of Fifth Generation ("5G") Mobile Technology in Nigeria published in August 2020.

The DSA celebrates the Commission's leadership opening this consultation and especially highlights the reference to unlicensed spectrum in the reference document, indicating that consideration would be given to the use of unlicensed spectrum to complement 5G deployments in the 5/6 GHz and 60 GHz bands for the implementation of Wi-Fi and Wi Gig. This contribution will provide some updates about the advantages of this approach, the maturity of the technology and the current regulatory status in different regions. The decision of dedicating more spectrum to Wireless Access Systems under unlicensed frameworks will benefit Nigerian citizens immediately with better Wi-Fi services, and access to affordable unlicensed wireless devices.

The DSA respectfully suggest NCC to consider initiating a national consultation specially addressing unlicensed access to spectrum in the 57-71 GHz and 6 GHz bands. The DSA is available to discuss these comments and any additional requirement the Commission might have.

Respectfully submitted,

Martha SUAREZ
President,
Dynamic Spectrum Alliance

[1] The Dynamic Spectrum Alliance (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. A full list of DSA members is available on the DSA's website.

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DSA COMMENTS ON THE DEPLOYMENT OF FIFTH GENERATION (5G) MOBILE TECHNOLOGY IN NIGERIA

The NCC published in August 2020 the Consultation Document on the Plan for 5G Deployment in Nigeria, providing a background into the benefits of 5G technology and outlining the Commission's plans and strategies for a successful implementation of 5G in Nigeria. This Plan intends to take into account the expectations of all the stakeholders in the communications industry in Nigeria. In that sense, the DSA would like to share its comments and invites NCC to consider some specific actions in the 6 GHz and 60 GHz bands for the development of Wi-Fi 6E and other innovative use cases in Nigeria in favor of its citizens. This step is fundamental to improve Wi-Fi connectivity in homes, companies, government and public institutions and to complement 5G deployments in the country.

The DSA promotes a balanced regulatory approach between licensed, unlicensed, and lightly licensed, to enable making unused spectrum available for broadband. An unbalanced approach may create artificial scarcity, which rises the cost of broadband access. In this sense, the DSA believes that licensed and unlicensed spectrum bands will both play important and complementary roles in the delivery of 5G services and that coordinated shared spectrum should be considered in spectrum planning. As part of spectrum planning, the DSA also supports spectrum sharing innovation that will lead to the more efficient utilization of spectrum and foster innovation and affordable connectivity for all.

Under the WRC-19 decision, the 66-71 GHz band is technology neutral and will support mobile applications such as multi gigabit wireless systems and IMT. NCC indicated in the reference document that the 66-71 GHz band is part of the Spectrum Plan for Second Phase of 5G Deployment. This second phase shall consider the release of all or some parts of the band, based on New Radio support, maturity and device availability. Due to the propagation characteristics of the 66-71 GHz band, the overwhelming trend globally is to allow technology neutral and de-licensed operation. Both IMT and multigigabit wireless systems are able to share the band in an

unlicensed regime. In other jurisdictions, identifying IMT in the band has created market uncertainty and delayed product introduction. The DSA therefore recommends against a specific IMT designation. In fact, the DSA recommends that NCC de-licenses the entire 57-71 GHz frequency band, thereby allowing Nigerian consumers and businesses to benefit from the unique capabilities of commercially available multigigabit wireless systems.

At this moment, it is more obvious than ever that internet access is no longer the luxury item it may have been in years gone by, but a necessity. Throughout 2020 and the Covid-19 pandemic, Wi-Fi access has allowed individuals to stay connected in a number of previously unimaginable ways. Wireless Access Systems/Local Radio Networks ("WAS/RLAN") played a critical role in enabling Nigerians to work and learn from home during the global pandemic, and furthermore, will have an important role to play in the future, offering better performance and enabling innovative use cases.

The DSA is very supportive of the projects that seek to boost national broadband penetration by allowing the delivery of public Wi-Fi services. For these projects to have a significant and lasting impact throughout the country, the NCC should consider enabling unlicensed access to the entire 5925-7125 MHz band ("6 GHz band"). The additional 1200 MHz of unlicensed spectrum will provide sufficient broadband capacity so that multiple individuals operating devices running high-bandwidth applications (e.g., high-definition video, augmented and virtual reality, interactive content for education and training) can concurrently access the Wi-Fi network at their location (e.g., residence, shops, businesses, industrial facilities, airports).

Unlicensed access will not only offer extra capacity but protect the services that are allocated to the band (such as fixed satellite, mobile and fixed services). This removes the requirement for spectrum clearance processes, that might be complex and expensive. Unlicensed access protects incumbents and at the same time enables innovation leading to very efficient spectrum use.

According to Cisco, more than half of the Internet connections start or end by a Wi-Fi connection. However, Wi-Fi networks congestion at the access point level is becoming an issue

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because access to unlicensed mid-band spectrum creates an artificial spectrum shortage: since the World Radiocommunication Conference in 2003 no new mid-band spectrum has been made available for Wi-Fi despite the exponential growth in the data traffic.[2] Furthermore, current Wi-Fi spectrum doesn't offer sufficiently wide channels for newer applications and services that are a complement for the 5G ecosystem. Wi-Fi 6E will enable new use cases for industrial IoT, smart homes and support for high-density deployments, to name a few, but access to wider channels is needed to support these new use cases.[3] Currently available spectrum in the 2.4 GHz and 5 GHz bands will not be able to absorb the amount of data expected to be provided through 5G networks and beyond in addition to the huge growth in the number of devices connected to the Internet through what is known as the Internet of Things ("IoT").

The effect of enabling additional spectrum for Wi-Fi will be relevant on launching IoT services and 5G Technology. Unlicensed access to the 6 GHz band is required to meet the unprecedented demand and enable innovative use cases. With it, comes the opportunity for more effective spectrum use allowing support for new applications and laying the foundations for innovation.[4]

The additional benefit of permitting unlicensed access throughout the 6 GHz band will be for offloading data from current 4G and future 5G wireless networks. Mobile data usage has been increasing in the last years and as indicated in the consultation document, it is estimated that by the end of the year 2020, global mobile data traffic would reach a monthly rate of 30.6 exabytes, as compared to 3.7 exabytes in 2015.

Nation's 4G networks may be experiencing increased utilization and demand during the COVID-19 pandemic, particularly in urban areas where there is a high population density. The availability of a significant amount of unlicensed spectrum allows multiple wireless carriers to share the extra spectrum capacity. Furthermore, WLAN/RLAN will carry offload from cellular 5G

[2] *See* "How to realise the full potential of 6 GHz spectrum". Whitepaper. October 2020 (link)
[3] *See* https://wballiance.com/wp-content/uploads/2019/09/WBA-AnnualIndustry-Report-2020.pdf
[4] *See* "The crucial decision of enabling better and affordable connectivity through Wi-Fi and spectrum sharing", December 2020 (link)

technologies (total data offload to unlicensed going from 74% to 79% in 2022).[5] This will lower the costs of network deployment for mobile operators and for edge investment by neutral host and third-party providers. Importantly, it will also lower costs and improve the Quality of Service ("QoS") indoor for consumers.

Wi-Fi 6, based on the IEEE 802.11ax standard, is the new generation of Wi-Fi. It allows the use of 160 MHz bandwidth channels and incorporate important new features such as the possibility of supporting more clients in dense environments, greater efficiency, flexibility, scalability and network security. Wi-Fi 6 will enable new use cases for industrial IoT, smart homes and support for high-density deployments, to name a few, but access to wider channels is needed to support these new use cases.[6] Unlike previous generations of Wi-Fi and wireless networks, 5G and Wi-Fi 6 networks can interact seamlessly with each other. Indeed, unlicensed spectrum is recognized as a fundamental enabler of the 5G ecosystem as unlicensed operations are incorporated into the standards. The IEEE has extended its 802.11ax standard to include the entire 6 GHz band (Wi-Fi 6E).

Wi-Fi chipsets for Wi-Fi 6E products are already available. Last December, the U.S. Federal Communications Commission (FCC) certified its first 6 GHz Wi-Fi device.[7] In early January of 2021, the Wi-Fi Alliance began certifying Wi-Fi 6E devices, paving the way for new gadgets that can transmit across the entire 6 GHz band.[8] Wi-Fi 6E products have being announced at this year's (virtual) Consumer Electronics Show.[9] On January 14th, Samsung announced a new mobile phone

[5] *See* Cisco Systems, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017-2022. (link)
[6] *See* https://wballiance.com/wp-content/uploads/2019/09/WBA-AnnualIndustry-Report-2020.pdf
[7] *See* "Chairman Pai Statement on FCC Authorization of First 6 GHz Wi-Fi Device" (December 7, 2020). DOC-368593A1.pdf (fcc.gov)
[8] *See* "Wi-Fi Alliance® delivers Wi-Fi 6E certification program" (January 7, 2021). Wi-Fi Alliance® delivers Wi-Fi 6E certification program | Wi-Fi Alliance (wi-fi.org)
[9] *See* "Linksys Introduces Fastest and Most Powerful Wi-Fi 6E Mesh System and Enhanced Motion Detection" (January 11,2021). https://www.prnewswire.com/news-releases/linksys-introduces-fastest-and-most-powerful-wi-fi-6e-mesh-system-and-enhanced-motion-detection-301205475.html; See "Nighthawk® Tri-Band WiFi 6E Router (up to 10.8Gbps) with new 6GHz band, NETGEAR Armor™" (January 11,2021). AXE11000 WiFi Router

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that incorporated a Wi-Fi 6E client.[10] In light of this momentum, the research firm IDC has forecast that more than 316 million Wi-Fi 6E devices will enter the market in 2021 and shipments will rise rapidly over the next three years.

DSA is convinced that opening up 6 GHz frequency band for Wi-Fi is the right move to ensure that this widely used wireless technology can deliver the necessary performance for future applications and networks. It is important to mention that unlicensed access to the 6 GHz band could enable three different operating classes:

- Very Low Power ("VLP"): devices which would be permitted to operate at very low power levels for indoor or outdoor use. They provide low latency and very high throughput over short distances. VLP portable usages are for example mobile AR/VR, UHD video streaming, high speed tethering and in-vehicle entertainment.

- Low Power Indoor ("LPI"): such as an Access Point or client device, which would be permitted to operate for indoor use only. LPI use cases include residential Multi-AP/mesh networks, multiple dwelling unit ("MDU"), single-AP networks, high-density enterprise networks, indoor public venues and industrial IoT.

- Standard Power ("SP"): unlicensed devices operating at 36 dBm EIRP that are only permitted access to spectrum under the control of an Automated Frequency Coordination ("AFC") system, which would establish exclusion zones where unlicensed devices could not operate. High throughput capabilities for outdoors and indoors. Relevant for rural connectivity.

(netgear.com); *See* "TP-Link Unveils New Networking Offerings, Bringing a Blazing-Fast, Ultra-Secure Broadband Experience to Consumers and Businesses" (January 11, 2021). https://www.tp-link.com/us/press/news/19331/ *;* .

[10] Samsung Press Release, "Samsung Galaxy S21 Ultra: The Ultimate Smartphone Experience, Designed To Be Epic In Every Way". https://news.samsung.com/global/samsung-galaxy-s21-ultra-the-ultimate-smartphone-experience-designed-to-be-epic-in-every-way

Every use case could provide important benefits in Nigeria and the Commission can decide on the specific conditions to enable these different operating classes.

The harmonization would result in major economies of scale, reducing costs for end users and allowing people all over the world to benefit from innovative new services that harness the capabilities of Wi-Fi 6E.

Authorizing unlicensed spectrum throughout the 6 GHz band, will benefit both, mobile network customers and Wi-Fi users across Nigeria. Plans for the license-exempt opening of the 6 GHz band are becoming ever-more prevalent, with final regulations already adopted by the United Kingdom, the United States, the Republic of Korea, Chile, the United Arab Emirates, Brazil and Guatemala. The European Member States are expected to designate and make available 5945-6425 MHz for the implementation of WAS/RLANs this month. Wi-Fi 6E consultations have taken or are also taking place in Mexico, Colombia, Costa Rica, Honduras, Peru, Argentina, Taiwan, Saudi Arabia and Jordan.

Last year, the United States regulator, the Federal Communication Commission (FCC), authorized unlicensed operations of indoor 'low power' devices across the 6 GHz band at Wi-Fi power levels. The FCC also authorized 'standard power' (i.e. higher power indoor and outdoor) RLAN operations in the 5925-6425 MHz and 6525-6875 MHz portions of band based on the need to protect incumbent operations specific to the United States. The FCC is currently proposing enabling VLP operations through a further notice of proposed rulemaking.[11] The FCC claims that "*Wi-Fi 6 will be over two-and-a-half times faster than the current standard and will offer better performance for American consumers. Opening the 6 GHz band for unlicensed use will also increase the amount of spectrum available for Wi-Fi by nearly a factor of five and help improve rural connectivity*."[12]

[11] *See* https://docs.fcc.gov/public/attachments/FCC-20-51A1.pdf
[12] *See* https://docs.fcc.gov/public/attachments/DOC-363945A1.pdf

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The 6 GHz band (5925-7125 MHz) is well suited to bridging the unlicensed mid-band spectrum gap and will greatly enhance the impact of next generation Wi-Fi. Harnessing the 6 GHz band will improve indoor connectivity and enable the emergence of a new generation of advanced applications and services based on the Wi-Fi 6 standard. It would support demanding personal area network applications, such as transferring data between a smartphone and an AR or VR headset to the benefit of providers of entertainment (gaming, content), industrial applications, eHealth and other services.

With access to the 6 GHz band, Wi-Fi is also set to play a pivotal role in the further automation of manufacturing plants and other parts of industry. In South Korea, Taiwan, the US and other advanced manufacturing hubs, businesses increasingly regard Wi-Fi as an effective and efficient way to both monitor and remotely control machinery and other assets. To remain competitive, companies in other parts of the world are set to follow suit once the 6 GHz band is available on an unlicensed basis.

As the 6 GHz band already has a co-primary mobile allocation[13] in the ITU Radio Regulations, no international action is needed, therefore, administrations can immediately open up the band. In ITU region 1, discussions are taking place about the future of the upper part of the 6 GHz band (6425-7025 MHz) because some countries are considering it for the use of International Mobile Telecommunications ("IMT"). This consideration is part of the World Radiocommunication Conference 2023 ("WRC-23") agenda, item 1.2. There is no certainty around this possibility yet, but by the time of the conference we will know if it is technically feasible. In Europe, the Middle East and Africa (ITU Region 1), it should be feasible to immediately open up the lower 6 GHz band (5925-6425 MHz), as extensive technical studies[14] have shown that WAS/RLANs can

[13] Meaning it can be used by IMT and other wireless connectivity services.
[14] Studies by the European Conference of Postal and Telecommunications Administrations (CEPT) and in the US have found LPI and VLP outdoor Wi-Fi/RLAN networks are very unlikely to interfere with incumbent fixed radio services. Published in May 2019, the ECC 302 report found that it would be feasible for LPI Wi-Fi (200/250 mW EIRP-23/24 dBm) and VLP portable Wi-Fi (25 mW EIRP-14dBm) to coexist with fixed radio links in the lower 6 GHz band with minimal interference. Although that study looked at long-term interference, Draft ECC 316 has concluded that these power limits should also satisfy the short-term interference criterion (@140 seconds per year).

operate in this band without adversely impacting incumbents' operations. 6 GHz networks have similar propagation characteristics allowing reuse of 5 GHz network coverage maps and metrics, and existing backhaul infrastructure. The additional 6 GHz mid-band spectrum would allow for 160 MHz and eventually 320 MHz channels, which can support exciting new services based on Wi-Fi 6 and enable 5G to offload demanding services, which would otherwise consume limited cellular network resources.

To realise the full potential of the upper 6 GHz band (6425-7125 MHz), administrations need to maintain as much flexibility as possible and that flexibility would be reduced if the next WRC-23 identifies the upper 6 GHz band (6425-7125 MHz) for IMT. Administrations should be aware that if IMT networks are deployed in the upper 6 GHz band in ITU Region 1, there is a risk that they could interfere with fixed and fixed satellite links currently operating in that band due to the IMT outdoor high power requirement for cellular coverage.[15] Studies within the ITU-R are just starting and administrations should remain open minded when undertaking coexistence and sharing studies based on justifiable technical characteristics and realistic and agreed propagation characteristics.

Many other mid-band frequencies have been already identified for IMT in Nigeria and the Commission has established an ambitious strategy that will enable the deployment of 5G Technology in such a manner that will be most beneficial to the Nation and the end users. In the first phase of 5G deployment in Nigeria, all/some parts of the 2100 MHz, 2300-2400 MHz, 2600-2690 MHz, 3300-3400 MHz, 3500-3600 MHz, 3600-3700 MHz, 4800-4990 MHz, 24.25-27.5 GHz and 37.0 – 43.5 GHz bands are prioritized for release, recovery, re-farming and/or re-planning in line with global trends. The DSA believes that the 6 GHz band can offer a higher value for the nation immediately if it is destinated for WAS/WLAN under a license-exempt framework.

In the US, the FCC's rules (released in April 2020) allow low power indoor for unlicensed use across the whole 6 GHz band with a maximum EIRP of 30 dBm. The FCC said: "We find that fixed microwave receivers will be protected from harmful interference from unlicensed indoor low power devices operating at the power levels we are authorizing." The FCC is also consulting on very low power use, both indoor and outdoor, in the entire 6 GHz band.

[15] *See* "How to realise the full potential of 6 GHz spectrum". Whitepaper. October 2020 (link)

The 5G strategy goes beyond assigning high-band, mid-band and low-band spectrum for licensed access. The 5G Fast Plan[16] in the United States recognizes that unlicensed spectrum will be important for 5G, and that new opportunities for the next generation of Wi-Fi in the 6 GHz and above 95 GHz band should be created.

In conclusion, unlicensed access will be a complement for 4G and 5G[17] and from the DSA perspective, it is important that the Commission complements the licensed mobile access with enough spectrum for unlicensed access. Users will have a better broadband experience in combination to the 5G mobile broadband services by using the 6 GHz band for license-exempt access; Furthermore, operators can also benefit of the 5G New Radio specification for unlicensed spectrum, called 5G NR-U, because 3GPP Release 16 includes the 6 GHz band for unlicensed access. From the DSA perspective, cellular and Wi-Fi spectrum are powerful complements, not rivals.

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[16] *See* The FCC's 5G FAST Plan (link)
[17] *See* Enterprises building their future with 5G and Wi-Fi 6, Deloitte's Study of Advanced Wireless Adoption (link)