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Attention
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RE: Draft National Radio Frequency Plan 2021

Facebook, Inc. ("Facebook") is pleased to submit these comments in response to the Independent Communications Authority of South Africa (ICASA) call for public submissions on the Draft National Radio Frequency Plan 2021.[1]

Connectivity is at the heart of Facebook's mission to give people the power to build community and bring the world closer together. As of January 2021, South Africa's internet penetration stood at 64%. That means millions of South Africans, many of whom live in rural areas, still do not have access or use the internet.[2] Among those that have connectivity, many are under connected. It will take a mix of technical solutions to bring connectivity to all South Africans. An essential element to both fixed and wireless broadband connectivity will be access to spectrum on both a licensed and license-exempt basis.

To this end, Facebook respectfully recommends that ICASA consider the following general principles as it finalises its National Radio Frequency Plan (:

- *Ensure a timely and abundant supply of spectrum is available*. A timely and abundant release and supply of spectrum in low (sub 1 GHz), medium (1-12 GHz) and high (above 12 GHz) frequency bands will reduce service providers' barriers to entry and increase competition and innovation across a wide range of broadband use cases

- *A mix of license-exempt, lightly licensed, and licensed spectrum*. License-exempt, lightly licensed, and licensed spectrum allocations are critical to the expansion of wireless infrastructure. Ensuring sufficient unlicensed spectrum is available drives innovation and investment in a range of technologies that can complement and support networks and expand broadband access at low cost.

- *Promote flexible use*. Spectrum policy should promote flexible use of spectrum and sharing across users and platforms, such as mobile, satellite, and new technologies like

[1] https://www.icasa.org.za/legislation-and-regulations/draft-national-radio-frequency-plan-2021
[2] https://datareportal.com/reports/digital-2021-south-africa.

high-altitude solar aircraft. It will take a mix of technical solutions to bring connectivity to all.

- *Enhance both the capacity and coverage of networks*. Promote policies that not only enhance network capacity but also expand their coverage to underserved areas and populations.

Given these principles, Facebook offers the following specific comments:

(1) ICASA should proceed with making the lower 6 GHz band (5925 MHz-6425 MHz) license-exempt to support technologies like Wi-Fi, which will be integral to supporting both 5G networks as well as fixed broadband. This recommendation is in line with ATU-R Recommendation 005-0. ICASA should also consider and study the benefits of making the upper 6 GHz band (6425-7125 MHz) license-exempt, either immediately or in the context of the preparation of WRC-23.

(2) Second, ICASA should consider authorising license-exempt devices in the full 60 GHz band (57-71 GHz) in order to support a wide variety of use cases, including IMT in 66-71 GHz, in line with decisions of other regulators in Region 1. Should ICASA favour another regulatory approach in 66-71 GHz, it should at least open 57-66 GHz to license-exempt devices, in line with ATU-R Recommendation 005-0.

1) The 6 GHz Band (5925 MHz-6425 MHz and 6425 MHz-7125 MHz)

a) Licensed-exempt spectrum (5925-6425 MHz) is needed urgently to support both fixed and wireless broadband and to enable innovative technologies.

More licence-exempt spectrum is necessary as demand for licence-exempt spectrum continues to grow. The expansion of 5G networks will require next generation Wi-Fi over the full 6 GHz band. Wi-Fi is a key enabler of both 5G and fixed high-capacity broadband. Today, roughly half of global mobile data is offloaded onto Wi-Fi, and by 2022, nearly 60 percent of global mobile data traffic is projected to be offloaded onto the fixed network through Wi-Fi or femtocells.[3] Wi-Fi is also the final link to connect consumer devices to fibre networks. Essentially, as the 2.4 and 5 GHz Wi-Fi bands become congested through heavy demand and the increasing number of connected devices, Wi-Fi access can become a "bottleneck" preventing consumers from reaching the speeds that fixed broadband networks are intended to enable. Moreover, as hospitals, schools, and businesses increasingly rely on Wi-Fi for telehealth, remote learning, and remote work, robust Wi-Fi is essential to maintaining a good user experience.

In addition, licence-exempt spectrum is necessary for new and innovative applications and services, like augmented reality and virtual reality (AR/VR), especially wearable and peripheral devices. AR/VR will rely on licensed exempt spectrum—both for indoor use cases and as a link between wearables (such as AR glasses) and a smartphone. These use cases will drive further

[3] Cisco, Virtual Networking Index: Global Mobile Data Traffic Update (2017-2022): White Paper, (Feb. 2019) at https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html#_Toc953332.

demand for both 5G services and Wi-Fi. The 6 GHz band is especially important to AR/VR use cases, which require low latency and high throughput enabled by wide channels (at least 160 MHz) that are only readily available in the 6 GHz band. Licence-exempt spectrum in this instance will therefore bring the country closer to reaping many benefits and towards the full realisation of the 4th industrial revolution.

Furthermore, robust connectivity and the innovation enabled by Wi-Fi bring economic benefits. One study estimates that in 2025 the global economic value of Wi-Fi will reach nearly $5 trillion USD.[4]

Standards are ready and equipment is available for the band. Many of the top 20 economies in the world have opened, or are in the process of opening, the 5925-7125 MHz band or parts thereof for RLAN use. Given this global momentum, many types of equipment are expected to support the band because markets like the United States, Brazil, Europe, Chile, Saudi Arabia, and Korea are enabling the band for such operations.

Opening the 5925-6425 MHz to license-exempt devices as soon as possible is critical to enable South Africa to benefit from this ecosystem, these innovations and these economic benefits.

b) ATU-R recommends opening 5925-6425 MHz to RLANs

The ATU-R recognised this opportunity in ATU-R Recommendation 005-0:

In order to foster harmonised use of the band 5925 - 6425 GHz by WAS/RLANS on a licence-exempt basis in Africa, ATU recommends Member States to adopt the following policy, regulatory, technical and operating frameworks:

1. ***Designate*** *the frequency band 5925 - 6425 MHz for use by WAS/RLAN equipment restricted to very low power (VLP) (both outdoor and indoor use) and low power indoor (LPI) use only on a non-exclusive, non-interference and non-protected basis;*
2. ***Adopt*** *the technical and operating conditions as provided in* [ATU-R Recommendation 005-0] ***Annex 3*** *and allow all compliant technologies when implementing* ***WAS/RLAN in*** *the frequency band 5925 - 6425 MHz.*
3. ***Exempt*** *WAS/RLAN equipment that comply with the technical details in* [ATU-R Recommendation 005-0] ***Annex 3*** *from individual licensing.*
4. ***Consider*** *authorizing any WAS/RLAN systems that operate in the frequency band 5925 - 6425 MHz and comply with operating conditions that are provided in* [ATU-R Recommendation 005-0] ***Annex 3****.*
5. ***Ensure*** *that WAS/RLAN equipment and devices comply with the technical and operating conditions provided in* [ATU-R Recommendation 005-0] ***Annex 3****;*

[4] Wi-Fi Alliance: Global Economic Value of Wi-Fi® (2021-2025).

6. ***Allow*** *free (seamless) cross border circulation and use of WAS/RLAN equipment/devices that comply with technical and operational conditions specified in* [ATU-R Recommendation 005-0] ***Annex 3****.*

c) The benefits of making the upper 6 GHz band (6425-7125 MHz) license-exempt should be considered either immediately or in the context of the preparation of WRC-23.

As the usage of license exempt devices in the 6 GHz increases, the full 5925-7125 MHz band will be necessary to reap the full benefits of the current Wi-Fi standard (Wi-Fi 6E), support future Wi-Fi technologies in the pipeline (like Wi-Fi 7), and provide a sufficient number of channels for new wide bandwidth applications and services (such as AR/VR).

Over the middle term, the full 6 GHz band is needed to support new, immersive services. With just 500 MHz, as consumer devices increase, more devices would contend for airtime in the same frequencies as IoT and cloud-based analytics proliferate. Users would have a very mixed experience where some applications might work in some locations, such as within certain portions of their home, and might not work well in their businesses, public areas, and venues. Inconsistent bandwidth delivery has consequences well beyond consumer unhappiness – it inhibits innovation generally and may even inhibit developers from successfully developing and delivering new applications.

Additionally, 500 MHz is not enough to reliably support high throughput and low latency applications in all environments where those applications need to perform. The full 6 GHz band offers contiguous spectrum blocks to accommodate seven 160 MHz channels, and three 320 MHz channels. A 500 MHz allocation limits these wide bandwidth channels and the new applications and services that would rely on them. The next Wi-Fi standard in the pipeline, Wi-Fi 7, is based on 320 MHz channels. When this standard is complete in about three years, countries that have only designated 500 MHz will have just a single 320 MHz channel, which will severely restrict the ability to utilize Wi-Fi 7 applications in areas with more than one user.

Making the full 6 Ghz band available allows incumbents to continue to operate in the full band. Rather than taking on the delay and expense of relocating incumbent users to designate the band, or part of the band, for licensed use, making the full band available for licence-exempt use will allow incumbents to remain in the band and put the band to use to support broadband connectivity right away. This will strengthen the country's digital infrastructure and allow for the development of a robust digital economic sector that will aid in South Africa's economic recovery.

By opening the full band for licence-exempt use, more types of licensed-exempt technologies could be deployed in the band. This supports technology neutrality and enables easier sharing of the band amongst the different users beyond Wi-Fi, such as 5G New Radio Unlicensed (5G NRU).

Given that the band is being studied in the context of WRC-23 in Region 1, **ICASA should investigate the economic and societal benefits of each option in the band**, not limiting itself

to IMT but also studying the benefits of license-exempt technologies in the band. This would place ICASA in the best position to determine its national position ahead of WRC-23.

2) The 60 GHz Band (57-71 GHz)

a) Use Cases of 60 GHz

The 60 GHz band opens new opportunities for innovative services because of its unique characteristics in combining wide bandwidth channels and small wavelength:

- Wide bandwidth enables communications services with high throughput, high capacity and low latency. Wide bandwidth enables a fine time resolution for radar applications.

- Small wavelength enables implementation on a small footprint of antenna arrays capable of creating narrow beams.

Two main families of emerging applications that are leveraging the unique characteristics of the 60 GHz band:

- Communication applications at multi-gigabit throughout with low latency and low power. Communications applications in the 60 GHz band include Radio Local Area Networks and Personal Area Networks (e.g., WiGig) and Fixed Wireless Access/Fixed Backhauling (e.g., Terragraph). Terragraph is a technology that operates on the 60 GHz band delivering fiber-like speeds for Fixed Wireless Access and Fixed Backhauling. In markets where fiber access to consumers is very expensive, difficult, and slow to deploy due to factors such as permitting and trenching, Terragraph can be a better alternative to provide fiber-like connectivity at a significantly lower cost. It is also quick and relatively easy to rollout, with deployments to market occurring in a matter of weeks.

- Sensing and radar applications with fine time and spatial resolution.

60 GHz technologies are also critical to Augmented Reality (AR) and Virtual Reality (VR) applications. The best wireless, immersive user experience requires low latency and multi-gigabit speed to support massive data exchange and high-resolution content, and 60 GHz band technologies are well-suited to this purpose. VR has enormous potential to transform how we play, work, learn, communicate, and experience the world around us. It is already positively impacting the way companies do business and changing the face of education and professional training in healthcare and beyond. While modern-day VR headsets fully immerse people in 3D virtual environments, augmented reality takes computer-generated images and overlays them on your view of the world.

There are currently 18 Virtual Reality start-ups in South Africa. They're all working to find solutions for aviation pilot training, safety training, marketing, telehealth, gaming, education in subjects such as mathematics and physical science, and many other skills that the workforce of the future will require.

Therefore, the opportunities presented by a licence exempt 60Ghz band will directly benefit the growing community of content creators, enthusiasts, creatives, developers, and technologists who are excited about making a difference with Augmented and Virtual Reality in South Africa and who want to position the country and the continent as creators, not just consumers of technology in the 4th industrial revolution.

b) The license-exempt status of the 60 GHz band (57-71 GHz) is attracting investment in a range of WiGig-based technologies.

The license-exempt status of the 60 GHz band in many countries has attracted considerable investment leading to innovation, development, and deployment of advanced services and applications ranging from outdoor wireless links that extend the reach of fiber networks to personal networking technologies based on the WiGig standards IEEE 802.11ad and 802.11ay that deliver multi-gigabit speeds between devices. IEEE 802.11ad enables data rates up to 8Gbps on 2.16 GHz channels. IEEE 802.11ay extends the 11ad capabilities to 200 Gbps on channels up to 8.64 GHz. The Wi-Fi Alliance has an ongoing WiGig certification programme and is working on the certification of 60 GHz Fixed Wireless products. 3GPP with broad industry participation are also moving forward with development for 5G NR for 60 GHz unlicensed.[5]

For example, since 2016 when Facebook announced its Terragraph solution, a low-cost high-throughput (multi-gigabit) multi-node mesh wireless network that operates in the 57-71 GHz band, deployments of this technology have been announced in several locations globally.[6] Terragraph is designed to meet the growing demand for reliable, high-speed internet access in urban and suburban environments.[7]

The mobile backhaul use case of 60 GHz solutions is of great interest to operators who are keen to leverage these solutions for capacity augmentation and cell densification.

c) Although the upper part of the 60 GHz band has been identified for IMT, this designation does not preclude license-exempt WiGig use cases.

Although at WRC-19, the upper part of the 60 GHz band (66-71 GHz) was designated for IMT-2020, Footnote 5.559AA makes clear that the IMT designation does not preclude making the band license-exempt for WiGig use cases. It states, "This identification does not preclude the use of this frequency band by any application of the services to which this frequency band is allocated

[5] *See*, Qualcomm Technologies, Inc., What can we do with 5G NR Spectrum Sharing that isn't possible today? (Dec. 13 2017) *at* https://www.qualcomm.com/media/documents/files/new-3gpp-effort-on-nr-in-unlicensed-spectrum-expands-5g-to-new-areas.pdf.

[6] https://www.ignitenet.com/news/general/

[7] Terragraph: Solving the Urban Bandwidth Challenge (2018) *at* https://terragraph.com/#terragraph.

and does not establish priority in the Radio Regulations. Resolution 241 (WRC-19) applies."[8] Therefore, ICASA may pursue opening the upper part of the band for license-exempt use.

d) Coexistence studies and the proposed regulatory framework

The European Conference of Postal and Telecommunications Administrations (CEPT) studied the coexistence between the Fixed service, Fixed Wireless Access and Short Range Devices in ECC Report 288. CEPT issued a recommendation to allow fixed wireless access (FWA) (outdoor usage) in the 60 GHz band and further recommended that this framework be applied across the whole 57 – 71 GHz band.[9] CEPT's recommendation was adopted by the European Commission in August 2019 as a mandatory measure for EU member states.[10]

One regulatory framework, several product categories.

The ECC Report 288 did also underline that different mitigation techniques are effective for the different use cases (RLAN, FWA, Fixed Service). As a result, the updated Short Range Device regulatory framework for the 57-71 GHz band[11] covers three different categories of devices with associated interference mitigation mechanisms. Though the three categories correspond to different use cases, they can all coexist with each other - and with other services in the band - even though they are all assumed to be deployed on a licence-exempt basis.

Detailed EU SRD regulatory framework update.

The EU SRD regulatory framework update includes adding two new usage opportunities for wideband data transmission devices in 57-71 GHz with maximum 40 dBm EIRP for unrestricted outdoor usage and 55 dBm EIRP for fixed outdoor applications. See Table 1 below, which shows the technical parameters in the EU decision.

[8] World Radiocommunications Conference 2019 (WRC-19) Final Acts *at* https://www.itu.int/dms_pub/itu-r/opb/act/R-ACT-WRC.14-2019-PDF-E.pdf

[9] *See* ERC Recommendation 70-03, Annex 3 https://www.ecodocdb.dk/download/25c41779-cd6e/Rec7003e.pdf

[10] *See* Commission Implementing Decision (EU) 2019/1345 of 2 August 2019 amending Decision 2006/771/EC updating harmonised technical conditions in the area of radio spectrum use for short-range devices (notified under document C(2019) 5660) (Text with EEA relevance.) C/2019/5660 adopted on 2 August 2019 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1567676305871&uri=CELEX:32019D1345

[11] Commission Implementing Decision (EU) 2019/1345 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1567676305871&uri=CELEX:32019D1345

Table 1 Commission Implementing Decision (EU) 2019/1345

Band no	Frequency band	Category of short-range devices	Transmit power limit/field strength limit/power density limit	Additional parameters (channelling and/or channel access and occupation rules)	Other usage restrictions	Implementation deadline
75	57-71 GHz	Wideband data transmission devices	40 dBm e.i.r.p. and 23 dBm/MHz e.i.r.p. density	Requirements on techniques to access spectrum and mitigate interference apply [7].	Fixed outdoor installations are excluded.	1 January 2020
75a	57-71 GHz	Wideband data transmission devices	40 dBm e.i.r.p., 23 dBm/MHz e.i.r.p. density and maximum transmit power of 27 dBm at the antenna port or ports	Requirements on techniques to access spectrum and mitigate interference apply [7].		1 January 2020
75b	57-71 GHz	Wideband data transmission devices	55 dBm e.i.r.p., 38 dBm/MHz e.i.r.p. density and a transmit antenna gain ≥ 30 dBi	Requirements on techniques to access spectrum and mitigate interference apply [7].	This set of usage conditions is only available to fixed outdoor installations.	1 January 2020

The three SRD categories for 57-71 GHz can be understood as follows:

- Category 75 enables RLAN and PAN applications such as AR/VR,
- Category 75a enables FWA and Fixed Backhauling with panel antennas,
- Category 75b enables FWA and Fixed Backhauling with directional antennas with gain >30dBi.

All 3 categories can operate under a licence-exempt regime without interference to each other or to Fixed Service applications operating in the band (See ECC Report 288).

Harmonised standards

ETSI is revising and drafting harmonised standards to guarantee product compliance with the EU regulatory framework. In particular:

- ETSI EN 302 567 defines requirements for Multiple-Gigabit/s radio equipment operating in the 60GHz band (i.e., RLAN and PAN products, Category 75),
- Draft ETSI EN 303 722 defines requirements for Wideband Data Transmission Systems (WDTS) (i.e., fixed networks, categories 75 and 75b),
- Draft EN 303 753 defines requirements for Wideband Data Transmission Systems (WDTS) for Mobile and Fixed radio equipment (i.e., FWA products, Category 75a).

e) ATU-R recommends opening 57-66 GHz to WAS/RLANs

The ATU-R recognised this opportunity in ATU-R Recommendation 005-0:

In order to foster harmonised use of the band 57 – 66 GHz by WAS/RLANS on a licence-exempt basis in Africa, ATU recommends Member States to adopt the following policy, regulatory, technical and operating frameworks:

i. ***Designate*** *the frequency band 57 - 66 GHz for use by WAS/RLAN such as WiGig and 5G NR-U on a non-exclusive, non-interference and non-protected basis.*
ii. ***Adopt*** *the ATU harmonised operating conditions as provided in* [ATU-R Recommendation 005-0] ***Annex 4*** *and allow all compliant technologies, when implementing WAS/RLAN in the frequency band 57 - 66 GHz,*

iii. ***Exempt*** *WAS/RLAN equipment that comply with the technical details in* [ATU-R Recommendation 005-0] ***Annex 4*** *from individual licensing;*

iv. ***Consider*** *authorizing any WAS/RLAN systems that operate in the frequency band 57 – 66 GHz and comply with operating conditions that are provided in* [ATU-R Recommendation 005-0] ***Annex 4****.*

v. ***Ensure*** *that WAS/RLAN equipment and devices comply with the technical and operating conditions provided in* [ATU-R Recommendation 005-0] ***Annex 4****.*

vi. ***Allow*** *free (seamless) cross border circulation and use of WAS/RLAN equipment/devices that comply with technical and operational conditions specified in* [ATU-R Recommendation 005-0] ***Annex 4****.*

3) Recommendations

Facebook encourages ICASA to proceed with making the lower 6 GHz band (5925 MHz-6425 MHz) license-exempt in line with ATU-R Recommendation 005-0, to support technologies like Wi-Fi, which will be integral to supporting both 5G networks as well as fixed broadband. ICASA should also consider and study the benefits of making the upper 6 GHz band (6425-7125 MHz) license-exempt, either immediately or in the context of the preparation of WRC-23.

Facebook encourages ICASA to open the 57-71 GHz band to license-exempt devices and align its technical conditions with those in categories 75, 75a or 75b of Commission Implementing Decision (EU) 2019/1345. cases, including IMT in 66-71 GHz, in line with decisions of other regulators in Region 1. Should ICASA favour another regulatory approach in 66-71 GHz, it should at least open 57-66 GHz to license-exempt devices, in line with ATU-R Recommendation 005-0.

Respectfully submitted by:

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