GUIDELINES FOR THE USE OF 60 GHz LICENCE- EXEMPT BAND FOR MULTI GIGABIT WIRELESS SYSTEMS

January 2026

Table of Contents

List of Tables

1. Introduction

The use of licence-exempt Spectrum for wireless broadband and last mile access allows home-based users to have access to varieties of IP-based services thereby enhancing universal service objectives. The Nigerian Communications Commission (Commission) hereby issues the Guidelines for the use of the 60 GHz Spectrum band for Wi-Fi access, Wireless Gigabit (WiGig), 5G offload and related technologies to ensure rapid expansion of services and accelerated increase in Internet penetration in Nigeria at affordable prices to all categories of users.

The Commission, therefore, sets out rules on unlicensed basis in the 60 GHz spectrum (57 – 66 GHz) band to achieve the following:

(a) To allow wider coverage distances for unlicensed 60 GHz to deliver Multi-gigabit Wireless System (MGWS) services such as Wireless Personal Area Network (WPAN), Wireless Access Service (WAS), Radio Local Area Network (RLAN) and Fixed Wireless Services (FWS) etc. to support broadband service provision in Nigeria.

(b) To complement other licence-exempt bands from congestion due to higher bandwidth.

(c) To enable wireless broadband technology that can meet backhaul requirements of modern communication systems.

(d) To ensure equipment complies with the technical specifications in section 5 of these Guidelines.

(e) Enabling small business, enterprise, and campus-level connectivity thus enabling innovation that supports service delivery.

2. Objectives of these Guidelines

The main objectives of these Guidelines are to ensure interference-free operation of the 60GHz band and to ensure that a "best-effort" Quality of Service is available to the users.

3. Operational Conditions

To assist with the planning of links/hotspots, a "self-coordination" approach similar to the "light licensing", will be applied where a simplified set of conventional mechanisms and attributes will be defined. This planning will be delegated to the operators.

This process requires each commercial service provider to record the following set of simple criteria for each deployed link or hotspot and submit the data to the Commission:

i. Date of deployment.

ii. Transmit and receive centre frequencies and occupied bandwidth.

iii. Equipment type, specifying relevant transmitter/receiver parameters.

iv. Link/Hot spot location (geographic coordinates, height/direction of antenna, etc…);

v. The antenna gains and radiation pattern.

Subject to the above conditions set by the Commission, it is left to the operators to conduct any compatibility studies or coordinate as necessary to ensure that harmful interference is not caused to existing links registered in the database.

For such protection to be established, the Commission defines a set of conditions as follows:

(a) Access to the spectrum will be on shared basis. There will be no exclusive assignment to any individual or organization, whether for private, public or commercial use.

(b) All private and commercial service providers will be guided by the same technical specifications and operational restrictions, with respect to WAS/RLAN systems.

(c) All equipment to be deployed must be type approved by the Commission prior to importation and deployment in compliance with Section 132 of NCA 2003

(d) Users of WAS which have been Type-Approved by the Commission shall not Operate outside of the 60 GHz frequency range. In the event of any alteration

by a User, such Operator shall be sanctioned as appropriate pursuant to Part XI of the Type Approval Regulations 2024, published by the Commission.

(e) Commercial users of the 60 GHz band are required to notify the Commission upon deployment of services on this band using the template on the Commission's website via the link with the heading "License Exempt Spectrum Registration Form".

(f) The use of the 60 GHz band shall be permitted for both indoor and outdoor use.

4. Licensing Conditions

(a) All commercial Wi-Fi Hotspot/ Point-to-Point link service providers shall possess an operational Licence from the Commission.

(b) All equipment to be deployed must be type-approved by the Commission.

(c) Users of the 60 GHz band are required to notify the Commission upon deployment of services on this band using the template on the Commission's website via the link with the heading "License Exempt Spectrum Registration Form. Existing users are equally required to submit data on utilization of the frequency on a biannual basis or upon request by the Commission.

(d) All customer premises equipment deployed by the operator shall conform to the items listed in the **"Technical Specifications"** section.

5. Technical Specifications

S/N	Parameter	Specifications
1.	Operating Frequency:	60 GHz
2.	Operating Frequency Range:	57 – 66 GHz
3.	Authorization:	Licence-exempt
4.	Data Rate:	20 ~ 30 Gbps Ethernet Systems
5.	Multiple Access Method:	Spread Spectrum/ OFDM/(CSMA/CS)
6.	Digital Modulation Scheme:	CCK, BPSK, QAM, etc.
7.	Media Access Protocol:	Collision Avoidance Technique

Table 1: Basic Specifications: (Industry open standard)

(a) Operational Features:

An additional limit on the transmit output power density (-10dBm/MHz) in the 57 – 66 GHz can be implemented to support the deployment of wideband systems (i.e. bandwidth higher than 100 MHz) by consequently limiting the maximum transmitter output power for narrow band systems (i.e. bandwidth lower than 100 MHz) below that of the maximum (+10dBm) allowed in the 57 - 66 GHz band. This limit will not apply if the Commission wishes to implement narrowband systems in the band.

Frequency Band	Application	Maximum Radiated Power of Field Strength Limits	Technical Conditions	Additional Information	Relevant Standards/ Additional Requirements
(57 – 66) GHz	SRD WAS RLAN	• 40 dBm (10 W) mean e.i.r.p. (indoor only) • 23 dBm/MHz e.i.r.p density	Adequate Spectrum Sharing mechanism shall be implemented	Fixed outdoor installations are excluded	• WiGig IEEE 802.11ay standard • ETSI standard: EN 302 567 • ERC Recommendation 70-03
	SRD WAS	• 40 dBm (10 W) mean e.i.r.p. (indoor only) • 23 dBm/MHz e.i.r.p density maximum transmit power of 27 dBm at the antenna ports or ports	Adequate Spectrum Sharing mechanism shall be implemented		• ETSI standard: EN 303 722 • ETSI standard: EN 303 753 • ERC Recommendation 70-03
	SRD WAS	55 dBm (316 W) mean e.i.r.p. 38 dBm/MHz e.i.r.p density transmit antenna gain ≥ 30dBi	Mean e.i.r.p. for indoor band emissions - 38dBm/MHz and transmit antenna ≥ 30dBi Adequate Spectrum Sharing mechanism shall be implemented	Applies only to fixed outdoor installations	• ETSI Standard: draft EN 303 722 • ERC Recommendation 70-03

Table 2: Wi-Fi deployments shall be compatible with IEEE 802.11 standards.

(b) Automatic Transmit Power Control (ATPC):

ATPC feature shall be declared with the ranges and the related tolerances.

(c) Dynamic Frequency Selection/Adaptive Frequency Hopping Technique:

The equipment shall have the capability for dynamic frequency selection from the range of hopping frequencies.

(d) Modulation:

The Modulation type shall be wideband digital modulation system, using spread spectrum techniques to transmit and receive.

(e) Spectrum Mask:

The Spectral mask is set to establish clear boundaries between adjacent licensees. The spectral mask shall apply to 60 GHz band according to the Recommendations in the ITU-R M.2003-2 and ITU Radio Regulations.

6. Channel Bandwidth

(a) Each channel shall have a bandwidth of 2160 MHz for single channels.

(b) Concatenation of single channels shall be allowed in line with ITU channelization standards.

(c) Centre frequencies for single channels are recommended to be at 58.32, 60.48, 62.64 and 64.80 GHz.

(d) For concatenated channels, center frequencies depend on how many single channels are aggregated but shall be uniformly spaced with respect to the single channel center frequencies.

7. Quality of Service

(a) Interference:

No interference shall be caused to any systems operating in any of the primary allocations in the band (e.g. FSS and Radiolocation).

(b) Availability of Connection:

Commercial Service provider shall guarantee service availability in accordance with the Commission's Quality of Service Regulations and Legal Business Rules Quality of Service 2024.

(c) Security:

The provider shall take adequate measures to protect the data traffic to ensure the subscriber's

right to privacy, as entrenched in the constitution of the Federal Republic of Nigeria.

(d) Bit Error Rate (BER):

BER objective: 10^{-6} Max

(e) Hotpots:

The number of permissible hotspots in any given area will take cognizance of acceptable quality of service, and the interference factor.

8. Type Approval

All equipment to be deployed must be Type-Approved by the Commission prior to importation and deployment in compliance with Section 132 of NCA 2003, Type Approval Regulations 2024 and its Business Rules published by the Commission before it can be sold or utilized in Nigeria.

An application for Type Approval shall be made using the standard Type Approval application form which may be obtained from the Commission on request or downloaded from its website – www.ncc.gov.ng.

All equipment subject to these Guidelines shall only be supplied or sold to any user if such devices or systems have satisfied the technical provisions stated in these Guidelines on use of 60 GHz band.

9. Backhaul Frequencies

For the purpose of connecting Wi-Fi hotspots to the nearest switch/router for onward connection to the internet or other global/national networks, industry recognized backhaul methods will be permitted.

10. Applicable Industry Standards

The above specifications are broadly based on ITU recommendations, ETSI, IEEE standards and Wireless Ethernet Compatibility Alliance (WECA) Framework.

11. Definitions

In these Guidelines, terms defined in the Act shall have the same meanings as in the Act, and in addition to the following:

(A) "Band": A defined range of frequencies that may be allocated for a particular radio service or shared between radio services.

(B) "Coordination": This term refers to the process under which a new user seeks the agreement of existing users to share access to a particular range of frequencies while avoiding harmful interference.

(C) "dBm" – decibels of power referenced to one milliwatt

(D) "ETSI" – European Technical Standards Institute

(E) "GHz" – Gigahertz: a unit of frequency equal to 1000 million Hz or cycles per second.

(F) "Interference": The effect of unwanted signals upon the reception of a wanted signal in a radio system, resulting in degradation of performance, misinterpretation or loss of information compared with that which would have been received in the absence of the unwanted signal.

(G) "WiGig" – Wireless Gigabit or 802.11ay is a high-speed wireless technology operating in the 60 GHz frequency band, designed for multi-gigabit data transfer rates. It is a technology that enables ultra-fast wireless communication for various applications, including VR/AR, wireless docking, and high-definition multimedia streaming.

(H) "MHz" – Megahertz: a unit of frequency, equal to 1,000,000 (1x106) Hz or cycles

per second.

(I) "BER" – Bit Error Rate

(J) "NCA" – Nigerian Communications Act

(K) "Hotspot" – a physical location or a device that provides internet access to nearby devices (such as laptops, tablets, and smartphones) via Wi-Fi, using a wireless local area network (WLAN)

(L) "IEEE" – Institute of Electrical and Electronics Engineering

(M) "ERC" – European Research Council

These Guidelines may be cited as the Guidelines for the use of 60 GHz License-Exempt Band Multi Gigabit Wireless System, 2026.

Issued this……. day of……2026.

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