Nigerian Communications Commission

REGULATORY GUIDELINES FOR THE USE OF 2.4 GHz ISM BAND FOR COMMERCIAL TELECOM SERVICES

Introduction

The use of broadband for last mile access or for final distribution to end users will open up new possibilities and enable a wider range of enriched services to be provided to subscribers. It will also allow home-based users to have access to a variety of IP-based services thereby enhancing universal service objectives. Wireless Fidelity technology will ensure the attainment of the above objectives quickly and at an affordable cost to all categories of users. The Nigerian Communications Commission is hereby providing guidelines for the approved Commercial use of the ISM frequencies in Nigeria employing the Wi-Fi technology in order to ensure rapid expansion of services and accelerated increase in Internet penetration.

Purpose of Regulation

The main objectives of this set of guidelines is to ensure interference-free operation by all users of the band and to ensure that a guaranteed grade of service is available to the subscribers through established quality of service benchmarks, and consumer code of practice.

1. OPERATIONAL GUIDELINES

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

(b) All users, both private and commercial service providers will be guided by the same technical specifications and operational restrictions, with respect to Wi-Fi hotspots deployment

(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. Existing

ISM band operators who wish to adapt their present equipment for Wi-Fi deployment must seek approval from the Commission.

(d) All sites in which commercial Wi-Fi hotspots are to be provided must be registered with the Commission.

(e) ISM band will be permitted for both indoor and outdoor use.

(f) Wide area deployment will not be allowed on the ISM bands, coverage or transmission distance from a single hotspot must be within the distance stipulated in the technical specification. Transmit power, antenna height and gain must be selected in order to keep emission within stipulated distances.

2. LICENSING CONDITIONS

2.1 All Wi-Fi Hotspots must be registered and authorised by the Commission. Such authorisation shall be renewable annually.

2.2 All commercial Wi-Fi Hotspot operators shall possess an ISP License.

2.3 Tariffs of operators must be displayed within the operator's premises and registered with the Commission.

2.4 A reliable customer billing system must be installed.

2.5 All equipment to be deployed must be type approved by the Commission.

2.6 Each Hotspot shall maintain a log book for its day to day transactions. The log book shall be produced for inspection on demand by any accredited representative of the Commission.

2.7 All customer premises equipment supplied by the operator must conform with the items listed in the section **TECHNICAL SPECIFICATIONS**.

3. TECHNICAL SPECIFICATIONS

3.1 Basic Specifications: IEEE802.11b (Industry open standard)

(a)	Operating Frequency:	2.4 GHz (2,400-2,483 MHz)
(b)	Maximum Data Rate:	11/54 MBps
(c)	Multiple Access Method:	Spread Spectrum/OFDM
(d)	Digital Modulation Scheme:	CCK, BPSK, QAM, etc.
(e)	Maximum Coverage Distance:	200 meters indoor/outdoor
(f)	Media Access Protocol:	Collision Avoidance Technique

(g) Wi-Fi deployments must be IEEE 802.11a, b, and g, and newer versions must be backward compatible with 802.11b and g.

3.2 Operational Features:

Transmitter parameter limits

Transmitter Power Limits (EIRP) 1w

The peak power spectral density should not exceed 17dB in any 1MHz

(i) Equipments using FHSS modulation < -10 dBW (100 mW) per 100 KHz EIRP

(ii) Other types of modulation < -20 dBW (10 MW) per MHz EIRP.

3.3 Automatic Transmit Power Control (ATPC)

ATPC feature should be declared with the ranges and the related tolerances and subject to tests.

3.4 Dynamic Frequency Selection/Adaptive Frequency Hopping Technique

The equipment should have the capability for dynamic frequency selection from the range of hopping frequencies. The number of hopping channels should not be less than 75. Occupancy on any frequency should not be more than 0.4s in any 30s period

3.5 Bandwidth and Carrier Separation

Carrier frequencies must be separated by at least 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

Maximum bandwidth must not exceed 1 MHz.

3.6 Modulation

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

3.7 Adaptive Frequency Hopping/Adaptive Dynamic Polling

All systems must be capable of Adaptive Frequency Hopping/Adaptive Dynamic Polling to enable dynamic allocation of hopping channels.

FHSS modulation

Number of channels	> 75
Channel separation	= separated by channel bandwidth as measured at 20 dB below peak power
Dwell time per channel	< 0.4 seconds

DSSS and other forms of modulation

3.8 Spectrum Mask

(i) (fH) = the frequency furthest above the frequency of maximum power where the output power drops below the level of -80 dBm/Hz e.i.r.p. spectral power density (-30 dBm if measured in a 100KHz bandwidth)

(ii) (fL) = the frequency furthest below the frequency of maximum power where the output power drops below the equivalent level to -80 dBm/Hz e.i.r.p. spectral power density (-30 dBm if measured in a 100KHz bandwidth)

3.9 Spurious emissions

The spurious emissions of the transmitter shall not exceed the values in tables 1 and 2 in the indicated bands.

Frequency range	Limit when operating	Limit when in standby
30 MHz – 1 GHz	- 36 dBm	- 57 dBm
Above 1 GHz – 12.57 GHz	- 30 dBm	- 47 dBm

Table 2: Transmitter limits for wideband spurious emissions

Frequency range	Limit when operating	Limit when in standby
30 MHz – 1 GHz	-80 dBm/Hz	- 107 dBm/Hz
Above 1 GHz – 12.75GHz	- 80 dBm/Hz	- 90 dBm/Hz

3.10 Unwanted emissions

Emission outside the Band should be less than -27dB.

3.11 Coverage Diameter

The Distance for outdoor/indoor use should not exceed 200 m.

3.12 Media Access Protocol

This shall be based on Collision Avoidance Technique. Duty cycle should be listen before talk.

3.13 Data Rate

The data rate should be adjustable to a maximum of 11 Mbps for the case of IEEE802.11b and a maximum of 54 Mbps for IEEE802.11a/g. Automatic Data Rate Selection: variable from 1 – 54 MBits/sec in steps of 1 – 6 MBps.

3.14 Frequency stability

The frequency stability shall be better than 10ppm.

4 QUALITY OF SERVICE

4.1 Interference

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

4.2 Availability of Connection

The Service provider is to guarantee 95% availability of its service to its subscribers.

4.3 Security

The provider should take adequate measure to protect the data traffic to uphold the subscriber's right to privacy, as entrenched in the constitution of the Federal Republic of Nigeria. Minimum Standard specified by Wired Equivalent Privacy (WEP) /WPA benchmarks must be met.

4.4 After-sale Support and Maintenance

There shall be adequate support system to the subscriber in terms of repairs of equipment, upgrade facilities and other service failure reports on mutually acceptable terms and conditions.

4.5 Service Agreement

The Service Agreement between the provider and subscriber shall be subject to approval by the Commission.

4.6 Bit Error Rate

BER objective: 10^{-5} Max.

4.7 Hotpots

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

5 TYPE APPROVAL

5.1 All equipment must be type-approved by the Commission before commissioning.

5.2 Manufacturers can type approve equipment on behalf of the vendors.

5.3 Where necessary the vendor may be required to make a presentation to the Commission on the service to be provided with the equipment.

5.4 The time frame for the type approval will be a maximum of 4 months after application.

6. 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, the under-listed point-to-point backhaul methods will be permitted.

6.1 Exclusive (FWA) Backhaul Frequency

FWA licensees or other operators with frequency licenses consisting of multiple channels/slots are free to reserve one of the slots for Point-to-Point backhaul links. This can be used to backhaul their Wi-Fi hotspot traffic or to service ISPs and cyber-cafés. The rest of the slots can then be used for Point-to-Multipoint broadcast channels.

6.2 Microwave Backhaul Frequencies

Operators requiring secured high-capacity backhaul links are free to apply for additional microwave link frequency license under the same conditions applicable to telephone network backhaul in the 15 GHz band.

6.3 Satellite Backhaul

Operators with existing domestic satellite licenses can use satellite backhaul to concentrate Wi-Fi hotspot traffic.

6.4 Leased Backhaul Links

Operators, private individuals or organizations can lease bandwidth from Long Distance Operators or from domestic satellite providers for the purpose of linking their hotspot to internet access points or for concentrating hotspot traffic.

7. APPLICABLE INDUSTRY STANDARDS

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

Dated 12th of May, 2004.

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