

REGULATORY GUIDELINES FOR DEPLOYMENT OF BROADBAND SERVICES ON THE 5.2-5.7 GHz BAND

PREAMBLE

The Nigerian Communications Commission is in the process of opening up the band 5.2 – 5.7 GHz for services in the urban and rural areas of the country. Given the development of services and the increased availability of equipment for these bands, it has become apparently necessary to set guidelines for deployment of Wireless Access System in the band.

INTRODUCTION

Considerable development in terms of service portfolio, standardization and equipment manufacture has happened since the conclusion of the WRC-03 in the occasion of which the allocations were concluded and especially the allocation to mobile except aeronautical mobile for the deployment of Wireless Access Systems (WAS), as per Resolution 229.

“Wireless Access Systems (WAS) are defined by ITU as end-user radio connections to public or private core networks”. “Technologies in use today for implementing wireless access is also noted by ITU to include cellular, cordless telecommunication, and wireless local area network systems”.

Powerful implementation of various wireless access technologies like Wi-Fi and WiMax sprang up in 2005 alone. These technologies are able to operate not only on the Industrial, Scientific and Medical (ISM) bands of 2.4 and 5.8 GHz bands but other bands like 2.0, 3.5, 5.0, 5.2, 5.3 and 5.4 GHz etc. Each of these promises access to broadband internet services at cheap and affordable rates.

This band can be deployed to provide WiMax, Wi-Fi, Campus Local Area Network, public access, mass market and other related services.

Consequent upon the above, the NCC is hereby providing draft regulatory guidelines to facilitate access to spectrum in the 5.2 – 5.7 GHz band for the implementation of these new and innovative wireless services in urban and rural areas of the country.

PURPOSE OF REGULATION

The purpose of this set of guidelines is:

- To harmonize use of frequency bands, set up: Technical and operational parameters, specific national procedures for deployment and market access for broadband wireless possibilities in the stated frequency band.
- To ensure easy market entry, interference free operation, and guaranteed quality and grade of service.

OPERATIONAL GUIDELINES

- (a) To ensure efficient use of spectrum, a mixture of license exempt and licensed spectrum will be made available for broad band roll out.
- (b) The 5.47 – 5.725 GHz band shall be licensable, while the 5.25-5.35 GHz and 5.725 – 5.875GHz bands shall be license exempt.
- (c) In order to accommodate all categories of operators and users, some segment of the spectrum has been identified for commercial use and others set-aside for private use.

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- (d) The commercial operators should be licensed to enable them have exclusive rights to allocated spectrum which will enable a more predicable and stable provision of services. A licensed solution for commercial operations will also reduce interference issues and facilitate large coverage.
- (e) Operators/Licensees will have maximum possible flexibility in determining the services they will offer and the technologies they will employ, within the spectrum allocation. The NCC policy on technology neutrality shall be maintained to allow the greatest flexibility for fixed wireless access (FWA) opportunities.
- (f) All categories of operators (commercial and private) will be guided by the same technical specifications and operational restrictions.
- (g) All equipment to be deployed in this band must be type approved by the commission prior to importation in compliance with section 132 of the Nigerian Communications Act 2003.

BANDS UNDER CONSIDERATION

The bands considered under this regulation are:

- 5.3 GHz band = 5.25 - 5.35 GHz
- 5.4 GHz band = 5.47 - 5.725 GHz
- 5.8 GHz band = 5.725 - 5.85 GHz

TYPES OF SERVICES PERMITTED

The three bands will be available for Wireless Access Service (WAS) of the many types that are or will become available on the world markets

The 5.4 GHz band is designated for unshared, coordinated and protected use of WAS
The 5.3 and 5.725 – 5.875bands are designated for the shared, uncoordinated and unprotected use of wireless access systems (WAS).

OPERATIONAL GUIDELINES

- Operators will be advised to provide services whose operational parameters can be flexible enough to accommodate all classes of users based on the followings:
 - (a) Flexible class of service per subscriber
 - (b) Configurable up/down link data rate
 - (c) Configurable RF channel separation
 - (d) Dynamic bandwidth allocation to subscriber station based on demand
 - (e) Remote software download
 - (f) Automatic channel search for subscriber stations
- All users, both private and commercial service providers will be guided by the same technical specifications and operational restrictions.
- 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.
- There is no coverage restriction imposed on services deployed on the bands under consideration; however every technical restriction provided in this guideline must be strictly adhered to.

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TECHNICAL CONDITIONS

Technical Parameters

In the three bands

- Indoor and outdoor operations permitted
- Maximum mean e.i.r.p. allowed EIRP is 1W.
- Mean eirp refers to eirp during the transmission burst which corresponds to the highest power, while using APC
- Maximum allowed mean e.i.r.p.. density is 50mW/MHz in any 1 MHz out outdoors ..
- An elevation mask, as defined below, must be used for all stations :

-13	dB(W/MHz)	for $0^\circ = ? < 8^\circ$
-13 -.716 (? - 8)	dB(W/MHz)	for $8^\circ = ? < 40^\circ$
-35.9 - .1.22 (? -40)	dB(W/MHz)	for $40^\circ = ? = 45^\circ$
-42	dB(W/MHz)	for $45^\circ < ?$

Where ? is the angle above the local horizontal plane (of the earth)

- Systems deployed in any of the shared bands shall employ transmitter power control (TPC), but if TPC is not used, the maximum mean e.i.r.p. and maximum mean e.i.r.p. density must be halved.
- Dynamic frequency selection (DFS) shall be implemented in systems operating in any of the shared bands
- Coordination criteria set out in Recommendations ITU-R M.1638 and ITU-R SA.1632. (WRC-03) for coordination with other services with primary allocation shall be observed
- In the three bands, the mitigation measures found in annex 1 to recommendation ITU-R M 1652 shall be implemented by systems deployed to ensure compatible operations with radio determination systems.
- Systems operating in any of the three bands must meet the systems characteristics and interference criteria as stated in ITU Recommendation ITU-R SA. 1632 for protection against EESS (Active) and SRS (active)
- The peak power spectral density should not exceed 17 dBm/MHz e.i.r.p. The hopping channels should be at least 75.
- Occupancy on any frequency should not be more than 0.4 seconds in any 30 seconds period.
- In the band 5.47-5.725 GHz maximum allowed transmitter power is 250Mw.
- For systems operating in any of the three bands, in addition to DFS and TPC, the mitigation techniques shall ensure that the probability of selecting a given channel will be the same for all available channels. The intention is to provide, on average, a near-uniform spread of the loading of the spectrum.
- The Radio equipment should have capability to choose within the range of hopping frequencies, a channel or frequency optimized for the desired service.

Modulation Schemes

- The modulation type shall be flexible digital modulating schemes such as CDMA, FDMA, OFDMA, SOFDMA, etc to increase system’s overall performance.

Automatic Transmit Power Control (ATPC)

- ATPC implementation should be declared and applied without exceeding the assignment criteria.
- Dynamic Frequency Selection may be obligatory in shared bands.

IEEE Protocols

- The equipment should have capability for providing services using flexible protocols such as 802.11 a, b, and g; 802.16 – 2004; 802.16 e; 802.16 d etc.

Spectral Masks

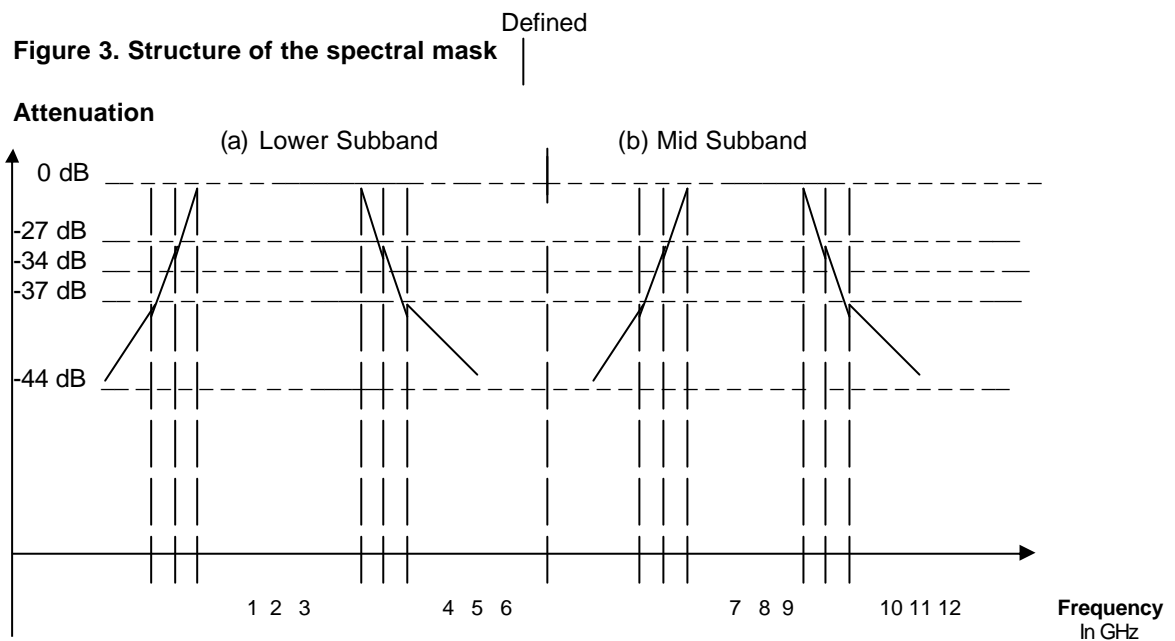


Figure 3. Spectral masks for the lower and mid sub bands

Notes the numbers on the frequency axis:

- | | |
|----------|-----------|
| (1) 5.13 | (7) 5.23 |
| (2) 5.14 | (8) 5.24 |
| (3) 5.15 | (9) 5.25 |
| (4) 5.25 | (10) 5.35 |
| (5) 5.26 | (11) 5.36 |
| (6) 5.27 | (12) 5.37 |

Spectrum sharing

- Operators are to optimize spectrum usage and ensure protection of other licensed users by avoiding harmful interference.

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Configurable Equipment

- The Radio equipment should possess configurable RF channel width and Bandwidth to allow the system to fit available spectrum, data transmission requirements and other changing circumstances.

LICENSING CONDITIONS

- The 5.47 – 5.725GHz band shall be subject to licensing regime
- The 5.25 – 5.35GHz and 5.725 – 5.875GHz bands shall be subject to a license exempt regime.
- All sites deploying license exempt bands shall be registered with the Commission.
- Licensees would only require frequency authorization (i.e. frequency assignment) that will enable licensees deploy appropriate technologies to meet their business requirements.
- A reliable customer billing system must be installed and guaranteed
- Licensees will be encouraged to deploy any appropriate technology within the spectrum allocation and assignment.
- All equipment to be deployed must be type approved by the Commission.
- All customers premises equipment supplied by the operator must conform to the items listed in the section TECHNICAL SPECIFICATION.

QUALITY OF SERVICE

- Subscribers will be given opportunity to choose the type of service they wish to subscribe to depending on the quality of service and data speed they can afford. Operators will be able to offer different levels of guaranteed QoS and data rates.
- Frequency coordination would be required between operators/licensees in adjacent service areas in order to avoid interference at all levels
- Operators may be required to use mitigation techniques such as antenna discrimination, polarization, frequency offset and power control to facilitate co-existence with systems of other service providers.

This is a draft regulation and comments are welcomed from manufacturers, operators and the general public on or before 30th June, 2007. The Commission will thereafter come out with the final regulation.

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