

NIGERIAN COMMUNICATIONS COMMISSION

COMMERCIAL FREQUENCY MANAGEMENT POLICY,

ADMINISTRATIVE PROCEDURES

AND

TECHNICAL GUIDELINES

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FREQUENCY MANAGEMENT OBJECTIVES:

1. To control and encourage the use of spectrum as an instrument for developing telecommunication (being) which is an essential infrastructure for stimulating the economic growth and social development of the nation.
2. To promote competition in the assignment of frequency in order to ensure innovative and efficient use of the radio spectrum (as a scarce resource).
3. To achieve optimum pricing of spectrum in order to discourage wastage or speculative acquisition of the scarce resource.
4. To generate moderate revenue for government.
5. To ensure equitable and fair allocation of spectrum to benefit the maximum number of users.

MANAGEMENT FUNCTIONS

To achieve the above objectives, NCC will perform the following functions

1. Spectrum Planning

Plan the spectrum under NCC's control in order to make adequate provision for various services based on their relative importance to Nigeria's socio- economic goals and also make forecast for future requirements.

2. **Frequency assignment**

Evolve fair, equitable and transparent procedures and conditions for the allocation and assignment of spectrum.

3. **Spectrum Farming**

Continually and systematically phase out ageing technologies in order to free up new spectrum space for allocation to emerging technologies and new services.

4. **Licensing**

Develop effective rules, operational procedures/guidelines for the purpose of regulating the use of spectrum in order to encourage sharing and ensure minimum interference with other users.

5. **Technical Specifications**

Define technical utilization rules and specifications for radio frequency equipment and also administer equipment type approval and authorizations.

6. **Enforcement**

Impose fines, penalties and sanctions for any violation of spectrum rules in order to maintain discipline in the use of spectrum.

7. **Monitoring**

Monitor the use of spectrum for interference and occupancy levels in order to take corrective actions when necessary and to provide

information feedback for planning, management control and decision-making.

8. Consultation

Hold regular consultation with experts in the industry including consultants and members of the academia in order to draw from their wealth of field experience and research findings in the area of spectrum management.

9. Liaison

Maintain close liaison with all stakeholders in the industry including operators, other regulating bodies, Manufacturers, MOC, ITU, Professional Groups, security agencies and the general public in the spirit of participatory regulation.

10. Tariff and Pricing

Determine fees payable for spectrum and evolve effective machinery for its collection.

FREQUENCY MANAGEMENT POLICY

1. (a) **Use-or-lose** conditionality will apply to all frequency licenses. Any frequency license that is not put to use within the time stipulated in the license will automatically lapse.
- (b) An existing (subsisting) operator who goes out of service for 24 months continuously will automatically lose its frequency license even if renewal fees have been paid.

2. In order to optimize the use of spectrum, frequency sharing among services and users will be encouraged in accordance with ITU guidelines
3. In order to encourage efficient use of spectrum, any request for a large quantity of spectrum to meet the requirement of spectrum inefficient technologies will not be encouraged.
4. A license cannot be transferred to a third party either in whole or in part without the approval of NCC.
5. A license does not confer a monopoly of the assigned frequency in all parts of Nigeria
6. **Harmful Interference**
Any operator whose emission interferes with another operator will have sanctions imposed on it if the cause of the interference is, in the opinion of NCC, within the reasonable control of the interfering operator.
7. A service will not be allocated more bandwidth than necessary even if the operator is ready to pay for it
8. Applicants for frequency may be subjected to security clearance before frequency is assigned

9. FREQUENCY PRICING POLICY

- 9.1 All users of frequency for commercial purposes must pay a fee, including government agencies except when a waiver is granted.
- 9.2 The more you use the more you pay: In a given band, the price to be paid for spectrum will be dependent on the size of spectrum occupied.
- 9.3 Spectrum fees will NOT be based on turn over, capital invested or subscriber base in order to encourage innovative use of spectrum.
- 9.4 Differential pricing will be used as a regulatory instrument to encourage migration to less congested spectrum bands or to discourage speculative acquisition of frequency spectrum in congested urban areas.
- 9.5 The price to be charged for spectrum will be proportional to the derivable benefits and level of usage based on the following parameters
 - (a) Size of spectrum assigned
 - (b) Coverage area of license such as national, state or regional coverage
 - (c) Proportion of time for which usage is desired e.g Number of Hours, days or months per year (duration)
 - (d) Number of users sharing the frequency

- (e) Administrative overhead cost associated with monitoring and frequency management
- (f) Level of competition and demand-supply equilibrium
- (g) Incentive or disincentive factor

The above factors will also be put into consideration when determining reserved prices in the case of auctions and sealed bids.

See our publication on “Spectrum Pricing Regulation” for details.

10. MECHANISM FOR FREQUENCY ASSIGNMENT

NCC will use any of the following methods of frequency assignment, depending on the level of competition, availability of spectrum and the aggregate demand at any point in time: -

1. First-come-first-served: when there is surplus spectrum and low demand
2. Comparative qualitative evaluation of bids (beauty contest)/ sealed bids - when there is medium availability and moderate demand
3. Auction - where there is scarcity of spectrum and high demand
4. Lottery
5. Automatic assignment. - where there is unlimited sharing capability e.g. Microwave link frequencies
6. A combination of any of the above methods

11. FREQUENCY SHARING POLICY

The following methods of sharing will be allowed: -

- Time sharing
- Geographical coverage/spatial separation
- Modulation mode where practicable
- Orthogonal propagation/Polarization (microwave links)
- Antenna directivity (Microwave Links)

PART II

ADMINISTRATIVE PROCEDURES:

1. Frequency allocation will be done at regular intervals to enable applications for frequency to be processed all at once. The aggregate demand for each frequency band at any point in time will determine the method of allocation to be used. This does not apply to point-to-point microwave links.
2. There will be three categories of frequency authorizations:
 - a. Short-term license that will be valid for a maximum of 3 months.
 - b. Medium-term license that will be valid for a year but renewable yearly for a maximum of three years.
 - c. Long-term license which will be valid for either five years, ten years or fifteen years and renewable.
3. All annual frequency assignments /licenses will expire and will be subject to renewal on the 31st December of every year. All licenses not renewed by 31st of March of the following year may automatically lapse.

4. Frequency allocation for microwave transmission links will be assigned on a hop- by- hop basis, and the frequency so assigned will not be exclusive to the assignee.
5. All requests for microwave transmission link frequencies may be granted. NCC will however reserve the right to allocate whatever frequency it deems fit to any hop as dictated by frequency co-ordination requirements in that region.
6. Frequency assignment may no longer be entertained for community telephony services in urban areas.
7. Microwave link frequencies are to be shared, and hence, assignments would no longer be made on exclusivity basis.
8. NCC will adhere to the international recommendations whereby all Maritime, aeronautical, and satellite frequencies are pre-assigned and co-coordinated by international agreements. However operators will require earth station permits in order to establish such in Nigeria.
9. A table of frequency allocation to various commercial services will be published at regular intervals.
10. All frequencies in particular/designated bands will be divided into equally spaced channels to reduce risk of interference.

11. All proposed frequencies assignments would be subjected to public notice before being finally assigned to the applicant. The purpose is to enable the public make comment on the assignment, especially as it relates to possibility of interference or overlapping present assignees frequency slot. Public protests received will be based only on its technical and legal merits and will be thoroughly investigated.
12. There is no more frequency assignment for National coverage. All frequency assignments will be on State-by-State basis even when the operating license is national.

12. APPLICATION FOR FREQUENCY ASSIGNMENT

Step-by-step procedure:

- a. Obtain appropriate application form either from NCC office or from NCC website.

<u>Form No</u>	<u>Service</u>
EF1	WLL and fixed telephony services
EF2	Microwave links and V-SAT services
EF3	Private mobile radio, trunk radio and paging services

- b. Submit completed application form to NCC together with a processing fee of ₦10, 000 only. ***All fees payments should be by BANK DRAFT only.***

- c. Obtain duly signed acknowledgement form from the receiving officer for all forms submitted. Your application form may not be processed if it is not properly filled, or, if supporting documents are incomplete.

- d. The following documents are to accompany each completed application form
 - 2 passport photographs of two representatives of the company (Directors/management staff)
 - Certificate of incorporation or registration of company name if a corporate entity.
 - Detailed technical brochure of equipment to be deployed
 - EMC test certificate or type approval certificate of proposed equipment obtained from a recognized laboratory from the country of origin

13. CONDITIONS AND CRITERIA FOR FREQUENCY ASSIGNMENT

- a) NCC cannot guarantee the availability of the exact frequencies or the frequency bands requested by an applicant, hence all prospective users are advised to obtain frequency assignment before importing any equipment into the country. It will be

regarded as an offence to import frequency-dependent equipment into the country without a frequency assignment.

- b) A service will not be allocated more bandwidth than necessary even if the operator is ready to pay for it. NCC will in consultation with the applicant, determine the optimum/ minimum bandwidth required for the service to be rendered. It is the duty of the applicant to justify, using empirical facts where necessary, the need for the bandwidth demanded.
- c) An applicant for commercial frequency license from NCC must hold a commercial operating license from NCC or must have submitted application for an operating license to NCC. An applicant may be given a frequency reservation pending the processing of his commercial license. However frequency license will be subject to successful approval of the commercial license
- d) An applicant for frequency may be required to make a technical presentation to NCC as part of the evaluation process.
- e) The premises and sites of an applicant for frequency may be inspected prior to assignment of frequency
- f) Presentation of false information or deliberate withholding of critical information will attract fines, sanctions or outright cancellation of license.

- g) All licenses are subject to the conditions stipulated in the WTA and/or the Telecom Act, and NCC frequency license
- h) Frequency allocation and authorizations will only be considered for applicants whose equipment channeling plan conforms with relevant ITU recommendations adopted by Nigeria and as published by NCC
- i) Equipment to be used must be tunable over the entire band by use of frequency synthesis method of frequency generation. Modulation efficiency of equipment, usage efficiency (subscribers/MHz) and power density (watt/hertz) will be considered in authorizing equipment for use
- j) All frequency allocations are by concessions and therefore not transferable without authorization from NCC.

14. FREQUENCY BAND ALLOCATION (FARMING)

Allocation of frequency band to services will be reviewed at regular intervals with the aim of freeing up spectrum previously allocated to obsolete services in favour of emerging services such as fixed wireless, wireless internet, rural telecom, WiFi, Wimax and 3G

15. SERVICES FOR WHICH FREQUENCY CAN BE ASSIGNED

- Wire Local Loop/Wireless LAN
- Fixed Wireless Access
- Rural Telecomm

- Microwave links
- Broad Band Access
- Trunk Radio
- 2-way radio communication
- Line extenders
- Paging, location-based services
- Other emerging services as the need arises.

[LIST OF FREQUENCIES AVAILABLE FOR THE ABOVE SERVICES AND CHANNELLING PLANS ARE INDICATED IN ANNEX I (TECHNICAL CONDITIONS)]

16. MICROWAVE LINK FREQUENCIES

- (1) All applications for microwave link frequencies will be honored and available frequencies assigned within 3 months of submitting completed forms and accompanying documentation.
- (2) NCC will assign frequencies to links based on the distance to be covered in accordance with the conditions stated in annex I.
- (3) No operator or applicant is allowed to change the position of his repeater/terminal station by more than 10 meters without permission from NCC.
- (4) All applications for microwave links frequency should be accompanied by a drawing showing the coordinates of

terminals stations to the nearest minute. In future, a coordination data from a microwave planning consultant approved by NCC will also be required. Private consultants will be certified by NCC to help companies perform frequency co-ordination before application is submitted for frequency assignment. Data collated by NCC, will be made available to the planning consultants.

- (5) All frequency assignments will be on link-by-link basis. Where possible, frequencies requested by the applicant may be granted. NCC will however reserve the right to allocate any frequency in the band to a hop depending on the frequency coordination condition in that particular geographical area.

17. INTERFERENCE COMPLAINT PROCEDURE:

When harmful interference is experienced by an operator the following sequence of actions should be taken:

Determine the source of interference if possible

If the source is detected follow steps (a), (b), below, if not, follow the instructions 1, 2, 3 below.

- (a) Try to immediately eliminate the harmful interference by dealing directly with the individuals or operator located at the source

- (b) If the direct action is impracticable or unsuccessful follow step (1) below

PROCEDURE FOR REPORTING INTERFERENCE TO NCC.

By January 2007, zonal monitoring stations will be functional in Lagos, Abuja and Port Harcourt.

- (1) Collect and complete an interference report form, which are available free of charge, from NCC offices scattered all over the country or download from NCC website.

The completed application form should contain the following information

- a) Name or call sign of station causing the interference (If known)
- b) Frequency measured
- c) Class of emission
- d) Bandwidth
- e) Location or bearings of station

For the station receiving interference

- a) Name/call sign
- b) Frequency assigned
- c) Geographical location and full address

- d) Dates and time of occurrence of interference
 - e) Description of harm caused by interference
- (2) Submit the complaint form to the nearest monitoring station.
- (3) In case of serious emergencies, complaint can be made by phone, but this should be promptly followed by a formal written complaint.

The above alternative actions can be initiated simultaneously. Operators are advised to try and resolve interference problems among themselves while awaiting NCC intervention in order to save valuable time especially when such interference disturbs normal operation to the point of causing loss of revenue.

On receipt of interference report NCC will mobilize all necessary resources to investigate and take necessary steps to eliminate the interference.

Operators and complainants are however advised to ensure that interference complaints are genuine and are coming from outside sources. In case of a frivolous complaint, which is discovered to be as a result of internal equipment malfunctioning, the complainant may be required to pay the cost of NCC mobilization and time wasted.

Also, the interfering operator will be charged for the expenses incurred by the regulatory authority in detecting and clearing the

interference. This is in addition to fines that may be imposed as stated in the spectrum license.

See NCC Frequency Spectrum License; General Conditions for more details.

ANNEX 1
TECHNICAL GUIDELINES

FREQUENCY UTILIZATION PLAN AND
LICENSING TIME FRAME

Nigerian Communications Commission is proposing the underlisted frequency bands for allocation to various commercial services. The purpose is to guide applicants, operators and manufacturers on the frequencies available to various services so that they can select equipment that fits into the Nigerian frequency allocation plan. The plan is based on ITU-recommendations but adapted to local peculiarities and Nigeria’s frequency management policy and objectives.

However, the plans are tentative and are subject to slight modifications based on agreement with the Ministry of Communications, Nigerian Broadcasting Commission and released by the National Frequency Management Council.

1. **WIRELESS LOCAL LOOP, POINT-TO-MULTIPOINT, FIXED & MOBILE**

Band	Frequency Range	Usage and Band Plan	Licensing Status
450MHz	450 – 457 MHz Tx MHz Rx	Under consideration for Rural Telecoms	To be auction in 1 st quarter of 2007
	380 –385 MHz Tx 390– 395 MHz Rx	Reserved for Emergency Communication	Not available for commercial use
1.5 GHz	1350 – 1525 MHz Tx	Under consideration for	To be announced

	1597 – 1772 MHz Rx 1453 – 1465 MHz Tx 1501 – 1513 MHz Rx	Rural Telecoms	
	790 – 806 806 – 824 Uplink 849 – 869 Downlink	Trunk Radio Services	Available for assignment (Reserved) No licensing
	815- 820 Tx 860-865 Rx	Reserved for Emergency Communications	
800MHz	824 - 849 Tx 869 - 890 Rx	(Fixed) CDMA Duplex Separation 45MHz	- Frequency available in some States
900MHz	890 - 915 Tx 935 - 960 Rx	GSM (Mobile) 5MHz per slot	All spectrum slots occupied
	915 – 934	Variable channel plan TDD only Broadcasting	- Available for assignment - For TDD technology only
Band	Frequency Range	Usage and Band Plan	Licensing Status
1.8G	1710 – 1785 Tx 1805 – 1880 Rx	GSM/DCS1800 15MHz Per slot	All spectrum slots occupied
1.9G	1880- 1910 MHz Tx 1960 –1990 MHz Rx	- Wireless Local Loop - Point- to- multipoint - All DECT Systems in this band to be decommissioned. - 5MHz per slot - Tx/Rx 50MHz	- Mainly regional licensing - Under re-organization
IMT–2000	1910-1960 MHz Tx/Rx 1990 – 2025	- Reserved for IMT–2000 UPLINK - Reserved for 3G	Spectrum to be auction in March/April 2007
	1910 – 1915 MHz	DECT/PHS	Allocated for DECT/PHS systems on a temporary basis for a few years. To be auction in 2007
2G	2025 - 2110MHz Tx	Wireless local loop Point-to-Multipoint	On-going licensing on first-come-first served

(2.0-2.2G)	2200 - 2285 MHz Rx	3.5 MHz per slot	basis
	2059.00 – 2063.00 Tx 2222.66 – 2233.33 Rx	Satellite Up/down link	Nigerian Satellite Frequency slot
IMT-2000	2110 - 2200MHz	3.G (Third generation mobiles) IMT-2000 DOWN LINK	To be auctioned in 1 st quarters of 2007 TDD slots available
2.3G	2305- 2320 MHz Tx 2345 - 2360 MHz Rx	- Wireless Local Loop - Data Services (Wimax) - TDD & FDD	- On-going - Regional licensing only.
ISM-Bands (a) 2.4G (b) 5.8G	2.400-2.500G 5.725-5.875G	(a) Allocated for Industrial, Scientific and Medical application on primary basis. (b) Radio-communication services allowed on non-protected, non-interference and unprotected basis.	1. Licence free 2. Not for commercial use. 3. For private radio-communication network and commercial use under specified condition. (see guidelines).
Wi-Fi 5G 2.4G	5150 – 5250 MHz Tx 5250 – 5350 MHz Rx 5470 – 5752 MHz Tx 5725 – 5850 MHz Rx 2400 – 2483 MHz	Data Services and Wireless Access Systems	Licensing Procedure and Time Frame to be announced in early 2007.

2. BROAD BAND FIXED WIRELESS ACCESS

Frequency Band	Frequency Range	Usage and Channelization Plan	Licensing Status
2.5 – 2.73.5G		- Wimax - Shared with NBC for MMDS	To be available as from 1 st quarters of 2007

	3400 – 3600 MHz	- 3.5 MHz per slot - FWA - Rural Telephony	Licenses available in some States of the federation. On-going
10.5G	10.15 – 10.30G 10.50 - 10.65	- FWA LMDS/MMDS - 56 MHz/Slot	On-going
25/26G	24.5 - 26.5G	- Video on demand - Broadband Access - 56/112MHz per slot	To be announced.

Some spectrum in the 17G is being considered for FWA.

3. **SPECTRUM ALLOCATED FOR POINT-TO-POINT MICROWAVE LINKS**

All present microwave links below 7GHz will be decommissioned in the very near future. No more licensing of microwave links below 6G.

Frequency Band	Frequency Range	Channel Plan Or Usage	Minimum Hop Distance	LICENSING STATUS
900MHz	-	-	-	Phased out
1.4G	1350-1530	Used by oil companies in Niger Delta Area and Lagos.	-	- To be phased out - No more licensing.
1.5G	1452 – 1592	Satellite Broadcast Band		- Internationally reserved for Digital audio Broadcast - All Microwave links in this range to be decommissioned immediately. - Not licensable
2G	1.901-2.10	Used by NNPC		- All Microwave links in this range to be decommissioned.

	2.10-2.30 2.50-2.70	and Oil Companies		- Licensing Discontinued
		Wi-Max	-	
			-	
		Broadband Services		
4G	3.4-4.20G	TDD		Micro - A- wave links. - C – band satellite downlink Micro - a wave to be decommissioned in the near future.
6G				- Microwave links - Shared with C-band Satellite uplink
7G	7110- 7750MHz	28MHz per slot	40Km and above.	- Reserved for long-haul high- capacity interstate links. - On going - First-Come- first-Serve
8G	8.275-8.500	7MHz per slot	40Km	- On-going
10G	10.15-10.65	-	-	- No Licensing - Reserved for FWA
11G	10.7-11.70	-	-	- No Licensing
12G	11.70-12.5	Broadcast Band	-	Reserved for Direct Broadcast Satellite (Internationally)
13G	12.75-13.25	28MHz per slot	10km	- On-going - Shared with Ku-band Satellite
15G	14.4-15.35	14MHz per slot	10km	- On-going
18G	18.1-19.7G	56MHz per slot and 3.5mHz per slot	7km	- On-going - Shared with Ka-band Satellite
23G	21.2-23.6	7MHz per slot	3km	- On-going

NIGERIAN COMMUNICATIONS COMMISSION

Microwave Frequency Bands and Channel Specifications

Band	Frequency Range	Channel Spacing (Tx-Tx)	Duplex Separation (Tx-Rx)	Min. Hop Length	Ref. Channel Plan	Remarks
GHz	GHz	MHz	MHz	Km		
1.4	1,350 - 1,530	-	-	-	-	NO MORE ASSIGNMENT
2	1.70 - 2.70	-	-	-	-	
4	3.8 – 4.2	29	213	40	ITU-R. F382-6	TO BE ANNOUNCED (Heavily used by NITEL)
6 (lower)	5.925 – 6.425	29.65	252.04	40	ITU-R F383-5	
6 (upper)	6.430 – 7110	20	340	35	ITU-R F 384-6	
7	7.110 – 7.750	28	196,168	35	ITU-R 385-6 Annex 3	Available for Assignment(s)
8	8.275 – 8.500	7	126	35	ITU-R 386-4 Annex 3	
13	12.75 – 13.25	28	266	15	ITU-R .F 497-5	
15	14.4 – 15 .35	14	490	15	ITU-R F.636-3 Annex 5	
18/19	18.1 – 19.7	56				
	18.1 – 19.7	3.5	1008	10	ITU-R F595-4 Annex 3	
23	21.2 – 23.6	7	1232	5	ITU-R 637-2 Annex 1	
28	27.5 – 29.5	-	-	-	-	Reserved for future Use
38	37.0 – 39.5	-	-	-	-	
55	54.25 – 58.2	-	-	-	-	

IMPORTANT:

Henceforth, frequency assignments for intra-city links will not be allowed in the 8GHz and lower frequencies.

INTERNATIONAL MOBILE TELECOMMUNICATION, IMT-2000

The following frequency bands have been allocated internationally for providing mobile service on a global basis.

806 – 960 MHz

1710 – 1885 MHz

1885 – 2025 MHz

2110 – 2200 MHz

The frequencies include portions for terrestrial services and satellite component.

Nigeria is yet to decide which spectrum to use for IMT-2000 but any of the above frequencies can be adopted after due consultation. Some services in these bands will have to be relocated in order to clear enough spectrums for 3G. A reasonable notice will, however, be given whenever the decision is taken.

LICENCE-FREE ISM BANDS

ISM BANDS:

In line with ITU recommendations, certain frequency bands have been reserved for certain equipment whose operation depends on the generation and manipulation of radio frequencies even though they are not radio communications equipment.

These frequencies are licence-exempted in Nigeria but their operation is subject to certain technical conditions and specifications.

The frequencies are reserved on primary basis for use in Industrial, Scientific and Medical equipment, which include the following:

- Gastronomy (Microwave oven – 2.4GHz)
- Medical diathermy equipment
- Industrial heating equipment
- Cyclotron and Gyrotron
- Radio astronomy.

ISM equipment are subject to the underlisted technical conditions

- a) They are only allowed to be operated in specified or approved frequency band.
- b) The frequency stability must be maintained within specified tolerance limits.

The underlisted frequencies have been recommended for use as ISM frequencies by ITU in accordance to specified frequency stability criteria.

ISM FREQUENCY (REGION 1)

Frequency Band	Frequency Range	Frequency Tolerance Limit
67 KHz band	6765 – 6795 KHz	
13 MHz Band	13.553 – 13.567 MHz	
27 MHz Band	26.957 – 27.283 MHz	
40 MHz Band	40.66 – 40.70 MHz	
2.4G Band	2.400 – 2.5000 GHz	

5.8Gband	5.725 – 5.875GHz	
24 GHz Band	24.00 – 24.25GHz	
61GHz Band	61.0 – 61.5 GHz	
122 GHz Band	122 – 123 GHz	
245 GHz Band	244 – 246 GHz	

PROHIBITION OF IMPORTATION AND OPERATION OF EQUIPMENT BASED ON 915 MHz ISM BAND IN NIGERIA

It has been observed that some vendors import and distribute long-range cordless telephone sets that operate in the American ISM Band (902 – 918 MHz) and therefore are capable of causing serious harmful interference to GSM operations in Nigeria. The frequency range 902 – 918 MHz is an ISM Band in ITU Region II (USA, North & South America) while in Nigeria, which is part of ITU Region I, this frequency band is allocated to mobile services (GSM).

The importation, sale and operation of any ISM-based, non-GSM communication equipment in the frequency range 902 – 918 MHz, directly contravenes all existing Communication laws in the land.

APPROVAL OF ISM FREQUENCIES

Nigeria may adopt all or some of the above frequency bands for use as licence-free ISM applications in Nigeria. The National Frequency Management Council (NFMC) will announce the final decision.

CONDITIONS FOR USE OF ISM EQUIPMENT

- a) The energy radiated and the bandwidth of emission shall be curtailed and as much as possible be contained within the equipment itself and within the allowed frequency band respectively.
- b) All harmonics and spurious radiations from the equipment, which is outside the allocated frequency band, must be suppressed to the extent that the field strength does not exceed 25uv/m at a distance of 200 metres from the equipment.
- c) Use of all ISM Equipment is subject to conditions specified in ITU Radio Regulations RR. S5.138

2.4G, 5.8G AND 24G ISM BANDS.

In Nigeria the ISM bands 2.4G, 5.8G and 24G are allowed for Radio Communications application on a secondary, non-protected, non-interference, and non-exclusive basis and subject to the underlisted conditions.

- a) Self-provision of telecommunications services intended only for private use. These include branch networking, wireless LANS, wireless PABX, WAN, MAN, HIPERLAN, etc. It must not be used for providing services to third parties either free of charge or on commercial or fee-paying basis.

- b) The provision shall be on a non-protected, non-interference basis. NCC will not entertain complaints of interference.
- c) All networks in which ISM frequency is deployed shall be registered with NCC for information purpose only.
- d) All equipment to be used for provision of the telecommunication system must be typed-approved by NCC. The user, manufacturer or distributor can process the equipment type approval with NCC.

All ISM equipment to be used for telecommunications services must meet the following technical specifications and operating conditions.

- 1) Frequency tolerance: 5ppm
- 2) Maximum power output (EIRP at antenna): 100mW
- 3) Modulation: Spread Spectrum only (Direct Sequence or Frequency Hopping)

STANDARD ALPHABETICAL BAND DESIGNATIONS

<u>BAND</u>	<u>FREQUENCY RANGE (G)</u>
L	1.12 – 1.70
R	1.70 – 2.60
S	2.60 - 3.95
H	3.95 – 5.85
C	5.85 – 8.20
<hr/>	
W	7.05 – 10.00
X	8.20 – 12.4
Ku	12.4 – 18.0
K	18.0 – 26.0
Ka	26.5 – 40.0
<hr/>	
Q	33.0 – 50.0
U	40.0 – 60.0
V	50.0 – 75.0
E	60.0 – 90.0
<hr/>	
W	75.0 – 110.0
F	90.0 – 140.0
D	110 – 170G
G	140 - 220

SATELLITE FREQUENCY BANDS

Frequency Band	Frequency Range (GHz)	Service	User/System in Operation
L.Band 1.5/1.6	1.530-1.544 Down 1.6265-1.6455 Up	Maritime Mobile (Ship + Land Mobile)	Tx/Tx 5KHz EIRP= 14abw Inmarsat G/T= 7d B/K
Mss	1.544-1.599 Down 1.6455-1.6465Up	Mobile (Distress & Safety)	INMARSAT
1616 -1626.5	1610-1621.15	Mobile	ODYSSEY
	1610-1624.35	Mobile	GLOBALSTAR
	1.545-1.599 Down 1.6465-1.6605Up	Aeronautical Mobile	INMARSAT
	1621.35-1626.5	Mobile	IRIDIUM
	1.452-1592 downlink	Digital Audio Broadcast	World Space
	2.500-2.690 downlink	Sound Broadcast shared with Terrestrial MMDS	
	1980-2010 2170-2200	Mobile IMT-2000	ICO
	2483.5-2500	Mobile	ODYSSEY
C.- Band 4/6G FSS Extended C- band FSS	3600-4200 Down 5850-6650 Up 4510-4750 Down 6735-6975 Up	Shared with fixed Links. <i>Most systems fall within the 3.7 to 4.2</i>	INTELSAT INTELSAT (Planned)
	6484-6541.5	Mobile	Globalstar
Ku-band	10.70-10.75Down	Shared with Terrestrial links	
	10.95-11.20 Down	Shared	INTELSAT
	11.20-11.45 Down	Shared with Broadcasting on secondary basis	
	11.45-11.70 Down	Shared	
	11.70-12.50Down	Direct Broadcast TV Only (BSS)	
	12.50—12.75Down		
	12.75-13.25Up	Shared with other services. Feeder links	
	13.75-14.50Up	“	INTELSAT, PANAMSAT
	13.75-14.50Up	“	

	14.00-14.50Up	“	INTELSAT
	1400-1480Up	“	
	17.8-18.6 18.8-19.3	Mobile	Teledesic
	17.30-1810Up	DECT Broadcast TV (Feeder Link)	
	18.10-19.70		
Ka-band 30/20G	17.70-20.20Down 20.20-21.20 Down	Fixed Mobile	
	27.50-30.00Up 30.00-31.00Up	Fixed Mobile	
	19.4-19.6 23.18-23.38	Mobile	IRIDIUM
	19.7-20.2	Mobile Telephony	ODYSSEY

DEFINITIONS

3G - Third generation mobiles capable of handling video, pictures and data at speeds up to 2Mbits/second.

Assigned Frequency - Frequency at the center of the assigned bandwidth of a channel (Also see 'carrier frequency')

Assigned Frequency band - Necessary bandwidth plus twice the frequency tolerance. The width of the band symmetrical around the center frequency within which the sideband emissions are to be contained.

Assignment - Authorization given to a particular station to use a radio channel.

Authorized Bandwidth - Necessary bandwidth

Carrier Frequency – The frequency at the center of bandwidth of a radio communication channel whose properties are varied (modulated) in response to information signal.

Carrier Power - Average power supplied to the antenna transmission line during one cycle when there is no modulation.

Class of Emission - The set of characteristics of an emission designated by standard alphanumeric symbols denoting modulation scheme, modulating signal, type of information transmitted etc.

Deep Space - Space beyond 2×10^6 Km from the earth.

Earth Station - A station located on the surface of the earth (or atmosphere) intended for communication with one space station or another earth station via a transceiver located in space.

EIMP – The product of Power supplied to antenna and antenna gain relative to a short vertical antenna.

EIRP – The product of Power supplied to antenna and antenna gain relative to isotropic antenna.

ERP – The product of Power supplied to antenna and gain relative to half-wave dipole in a given direction.

Electromagnetic Compatibility (EMC) - The prevailing condition under which a telecommunication equipment is capable of operating under its specified performance range in a common electromagnetic environment without causing or suffering unacceptable degradation in performance due to unintentional electromagnetic radiation to or from other equipment within the same environment.

Emission - Intentional radiation produced, or the production of wanted radiation by a radio transmitting station.

Emission Mask – A diagrammatic representation of the maximum levels of sideband signal emissions expected from a radio communication station relative to the carrier within and immediately outside the assigned frequency band of the channel.

FDD – Frequency Division Duplex

Feeder Link - A radio link from an earth station at a given location to a space station or vice versa conveying information for a space radio communication service

Frequency Shift - Maximum permissible departure of the center frequency of the frequency band occupied by the emission from the assigned frequency

FWA - Fixed Wireless Access.

Harmful interference - Interference that endangers the functioning of a radio navigation service or seriously degrades, obstructs or repeatedly interrupts a radio station.

Interference - The effect of unwanted signal energy due to emissions, radiations or inductions upon the reception of a radio station manifested by any performance degradation, misinterpretation, loss of information or distortion of wanted information.

LMDS - Local Multi-point Distribution System

Mean Power - The average power supplied to antenna transmission line by a transmitter during an interval of time much larger than the lowest frequency in the modulating signal taken under normal modulating condition.

MMDS - Multimedia Multipoint Distribution Systems

Necessary Bandwidth (Channel Width) - The least bandwidth that permits satisfactory transmission of a signal.

Necessary Bandwidth - The width of the band that is just sufficient to ensure transmission of information at the rate and quality required under specified conditions.

Occupied Bandwidth - The bandwidth symmetrical around the assigned frequency within which 99% of the radiated power is contained. The width of the band between upper and lower frequency limits such that the mean radiated power outside these limits is equal to or less than 0.5% of the total mean power of the emission.

Out-of-band Emissions - Unwanted emission radiated just outside the necessary bandwidth.

Peak Envelope Power - Average power supplied to the antenna transmission system during one cycle at the crest of the modulating envelope

Permissible Interference - Observed or perceived interference that is within the qualitative limits set by the regulation for sharing frequencies

Protection Ratio - The minimum value of wanted to unwanted signal ratio (dB) at the receiver input such that a specified reception quality of the wanted signal is achieved at the receiver output.

Radio determination - The determination of the position, velocity and/or other characteristics of an object by means of the propagation properties of radio waves.

Radio Location - A radio determination service used for purposes other than those of radio navigation.

Radio navigation - A radio determination service used for the purpose of navigation, including obstruction warning.

Radio telemetry - Telemetry by means of radio waves

Satellite Link - One uplink and one downlink.

Service Link:

Spurious Emission - Energy of an emission whose frequency lies beyond 2.5 times the necessary bandwidth relative to the center frequency of the emission

Station (Radio) - One or more transmitters or/and receivers, including accessory equipment necessary at one location for carrying on a radio communication service.

Tele-command - The use of telecommunication for the transmission of signals to initiate, modify or terminate the function of remote equipment.

Telemetry - The use of telecommunication for automatically indicating or recording measurements at a distance from the measuring instrument.

Wi-Fi - Wireless Fidelity

WiMAX – Wireless interoperability for Microwave Access