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CONTENTS

Page

GENERAL NOTICE

No. 390 Communications Regulatory Authority of Namibia: Spectrum Assignment Strategy 2022 to 2024 1

General Notice

COMMUNICATIONS REGULATORY AUTHORITY OF NAMIBIA

No. 390

2022

SPECTRUM ASSIGNMENT STRATEGY 2022 TO 2024

The Communications Regulatory Authority of Namibia herewith publishes its Spectrum Assignment Strategy 2022 to 2024, as set out in **Schedule 1** below:

H. M. GAOMAB II
CHAIRPERSON OF THE BOARD OF DIRECTORS
COMMUNICATIONS REGULATORY AUTHORITY OF NAMIBIA

SCHEDULE 1

SPECTRUM ASSIGNMENT STRATEGY 2022 TO 2024

1. FOREWORD

As per section 99 of the Communications Act, 2009 the Authority is vested with the control, planning, administration, management and licensing of the radio frequency spectrum. The Authority deems it prudent to keep abreast of the latest regulatory trends and technology developments to ensure the efficient use of spectrum as a limited resource, taking into account that spectrum forms the basis for development of the ICT sector.

To this end, the Authority has developed a spectrum assignment strategy setting out the Authority's objectives for spectrum management and providing clarity in respect of the Authority's approach to the control, planning, administration and licensing of radio frequency spectrum.

2. OBJECTIVES

Radio frequency spectrum is a limited, finite national resource that is critical in providing backbone, distribution, and last mile solutions for commercial, civil, public, community, security, and personal communication services. It therefore requires prudent management to ensure equitable access and efficient utilisation to meet the communication needs of all stakeholders. Spectrum management takes place within a regulatory framework comprised of policies, legislation, regulations and procedures.

The Authority will fulfil its role in the management of spectrum with the following objectives in mind -

- i) Facilitate the availability of spectrum to be used as a tool to develop communications services and access to ICT infrastructure as a basis for social and economic development to benefit from the digital transformation and opportunities presented by the 4th industrial revolution (4IR);
- ii) Promote competition through minimisation of constraints on spectrum use within a service and technology neutral license regime allowing similar services to be offered on different technology platforms;
- iii) Promote the effective and efficient use of spectrum within the digital divide, and to address gaps in communications services and access to ICT networks and utilisation of these services;
- iv) Set conditions for spectrum use to ensure efficient use of a scarce resources and prevent anti-competitive practices such as hoarding of spectrum;
- v) Promote and if necessary enforce freeing up spectrum space for assignment to emerging technologies and service by phasing out ageing technologies;
- vi) Ensure fair distribution of spectrum between market players to provide services in conjunction with the category of service licences awarded;
- vii) Set fees for spectrum use through an appropriate fee system that support the activities of the Authority in a sustainable manner and ensure efficient use of spectrum; and
- viii) Monitor, investigate and enforce adherence to the spectrum management regulatory framework as set out by the Authority.

3. FREQUENCY BAND PLAN OF NAMIBIA

The International Telecommunication Union (ITU) divided the world into three regions with Africa forming part of Region 1 together with mainly Western Europe and the Russian Federation. The Authority will allocate radio spectrum in line with regulations and guidelines issued by the ITU for Region 1 and the Frequency Band Plan for Namibia as published in the *Gazette* from time to time.

The Frequency Band Plan for Namibia sets out what radio services can use which frequencies as well as the pre-conditions of use as applicable. The Authority is vested with the power to prescribe a frequency band plan in respect of any part of the radio frequency spectrum (Section 100 (1) of the Communications Act, 2009). The Authority will review the frequency band plan, at least every four (4) years based on the outcomes of the ITU World Radio Conference and subsequent ITU regulations. The Authority will amend frequency band allocations and regulations as required, following due regulatory process.

Where spectrum licensees are required to migrate to new frequencies, as a result of a new Frequency Band Plan coming into effect, the Authority will address each migration on a case-by-case basis in accordance with the Regulations Setting out Spectrum Licencing Procedures.

The Authority has published the National Frequency Band Plan aligned to the outcome of the ITU WRC-19 in Government Gazette No. 7617, General Notice No. 448 on 31 August 2021. The said frequency band plan is also aligned with the SADC Radio Frequency Band Plan 2020 to ensure regional harmonisation in the use of radio frequency spectrum. Subsequently, the Authority reviewed the table detailing licence exempt spectrum as published in Government Gazette No. 7613, General Notice No.446 on 30 August 2021. This table sets out the radio frequencies to be used without a spectrum licence, subject to the technical conditions set out in the regulations. The radio frequency spectrum identified for licence exempt use is aligned with the SADC table of frequency for spectrum licence exempt use.

4. SPECTRUM AVAILABILITY FOR EMERGING TECHNOLOGIES

The characteristics of different spectrum bands determine what services can be deployed in which spectrum band and whether spectrum bands can be utilised for rural, urban or for both rural and urban network and service deployment. Applications and use cases also have different spectrum requirements.

In addition to taking into consideration the aforementioned requirements, the Authority will make spectrum available for Internet-of-Things, WiFi-6E, WiGiG, IMT and HAPS. This approach will strike a balance in supporting the rollout of networks and services to support digital transformation and industrialisation in line with 4IR objectives whilst providing for expansion of services in rural areas.

4.1 International Mobile Telecommunications (IMT)

4.1.1 Low-band spectrum (below 1 GHz)

Spectrum below 1 GHz is suitable for providing indoor and outdoor coverage over wide areas in urban and rural environments.

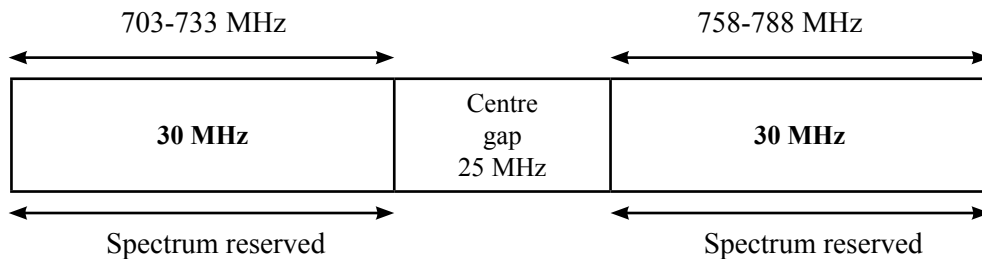
The **700 MHz (703-733 MHz paired with 758-788 MHz)** spectrum band is earmarked for implementation of IMT services and applications as well as public protection and disaster relief services (PPDR) when required in rural areas. The frequency channelling plan has been finalised and published in *Government Gazette* No. 7613, General Notice No. 444, dated 30 August 2020.

However, it should be noted that the Namibian Broadcasting Corporation (NBC) is still operating analogue television transmitters within this spectrum band at Nkurenkuru, Rundu, Shamvuru and Gibeon although all analogue transmitters had to be replaced with digital television transmitters by 17 June 2015. This will cause interference to any IMT services being rolled out in the aforementioned areas. The

Authority is engaging NBC to address the discontinuation of analogue television services utilising these legacy broadcasting transmitters in the four geographical locations.

In future this spectrum band will be considered for assignment on a FDD basis. Spectrum availability in the **700 MHz** band as shown in Figure 1 below -

Figure 1: 700 MHz spectrum availability

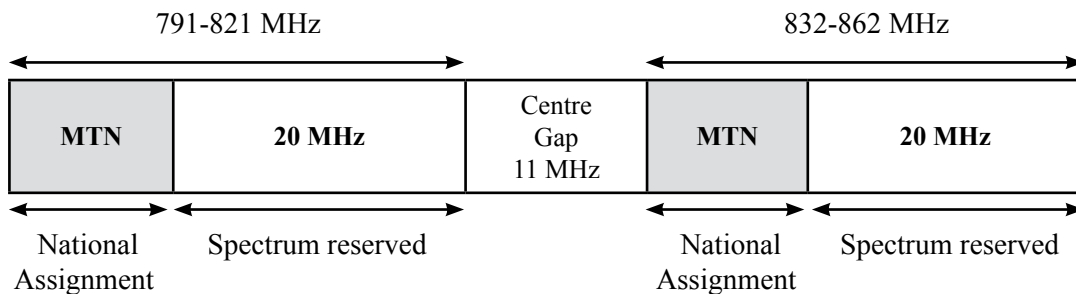


The **700 MHz** spectrum band is reserved until such time that Authority publishes a regulatory notice for assignment in the *Gazette*. The notice will be published as per the timeline set out in this strategy.

The Authority assigned a portion of the **800 MHz (791-821 MHz paired with 832 MHz-862 MHz)** spectrum band for implementation of IMT services on a FDD basis via spectrum auction on 07 August 2020 subject to rollout obligations of broadband services in line with the National Broadband Policy's targets.

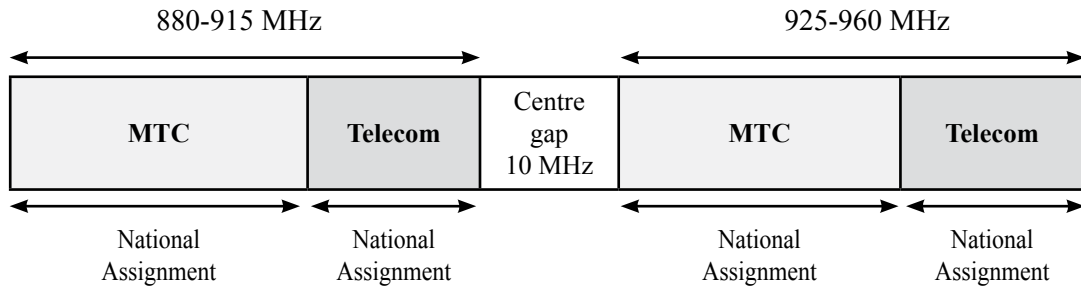
Spectrum availability in the **800 MHz** band is shown in Figure 2 below:

Figure 2: 800 MHz spectrum availability



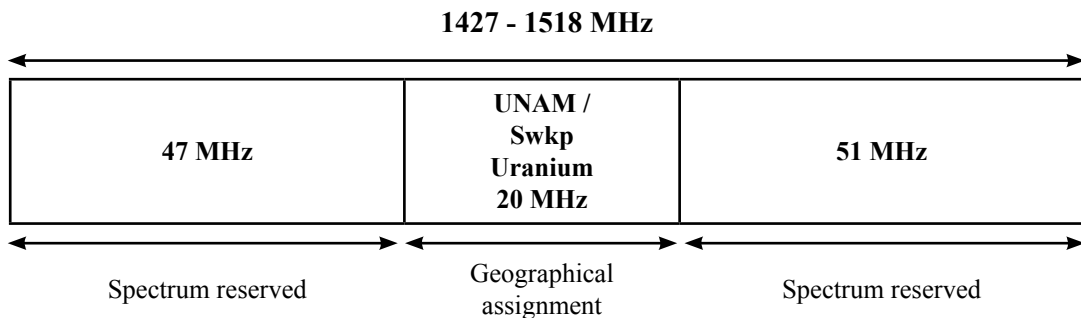
The remainder of this spectrum band is reserved until such time that the Authority publish a regulatory notice for assignment in the *Gazette*. The notice will be published as per the timeline set out in this strategy.

It should be noted that the **900 MHz (880-915 MHz paired with 925-960 MHz)** spectrum band is fully assigned on a FDD basis to Telecom Namibia Limited and Mobile Telecommunications Limited for implementation of mobile services. There is thus no spectrum available in this band as shown in the Figure 3 below.

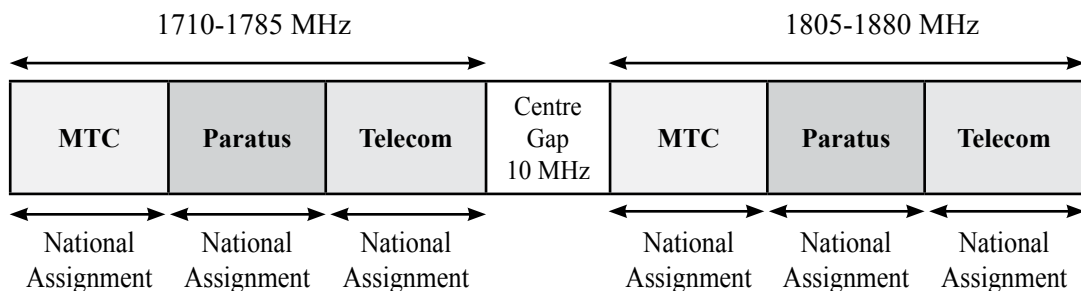
Figure 3: 900 MHz spectrum availability

The **1400 MHz (1427-1518 MHz)** spectrum band is reserved for assignment on a TDD basis to allow for implementation of IMT services and applications. Assignments are to be done on a geographical basis allowing for licensed shared access to spectrum for small licensees. Historically, the 1400 MHz spectrum band was not allocated to mobile services on a primary basis and thus the available spectrum is shared with fixed, space operation (Earth-to-space) and broadcasting satellite services, which services are already allocated on a primary basis. Spectrum for IMT services will only be considered in geographical areas where no assignments have been made available to any of the aforementioned services.

Spectrum availability in the **1400 MHz** spectrum band is shown in Figure 4 below.

Figure 4: 1400 MHz spectrum availability

It should be noted that the **1800 MHz (1710-1785 MHz paired with 1805-1880 MHz)** spectrum band is fully assigned on a FDD basis to Telecom Namibia Limited, Paratus Telecommunications (Pty) Ltd and Mobile Telecommunications Limited for implementation of IMT services. There is no spectrum availability in this band as shown in the Figure 5 below.

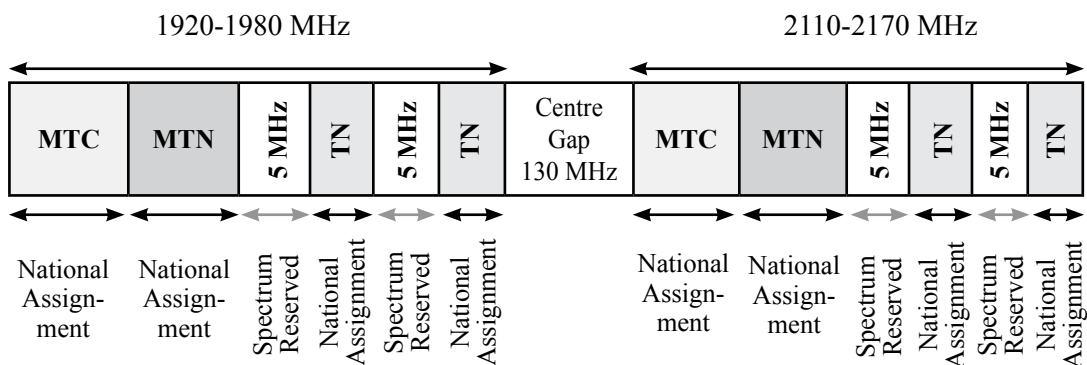
Figure 5: 1800 MHz spectrum availability

4.1.2. Mid-band spectrum (between 2 - 5 GHz)

Mid-band spectrum refers to the 2100 MHz, 2300 MHz, 2600 MHz and 3300-3600 MHz spectrum bands and is suited for urban and rural network rollout.

The **2100 MHz (1920-1980 MHz paired with 2110-2170 MHz)** spectrum band is assigned on a FDD basis to Telecom Namibia Limited, MTN Business Solutions (Namibia) (Pty) Ltd and Mobile Telecommunications Limited for implementation of IMT services. There is limited spectrum available in this band as shown in Figure 6 below.

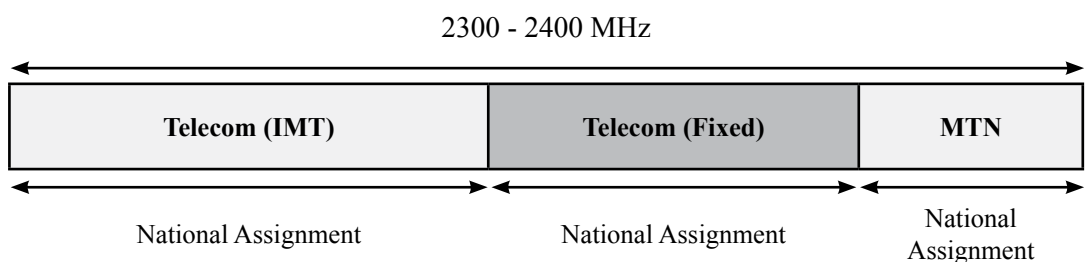
Figure 6: 2100 MHz spectrum availability



The remainder of this spectrum band is reserved until such time that the Authority publish a regulatory notice for assignment in the *Gazette*. The notice will be published as per the timeline set out in this strategy.

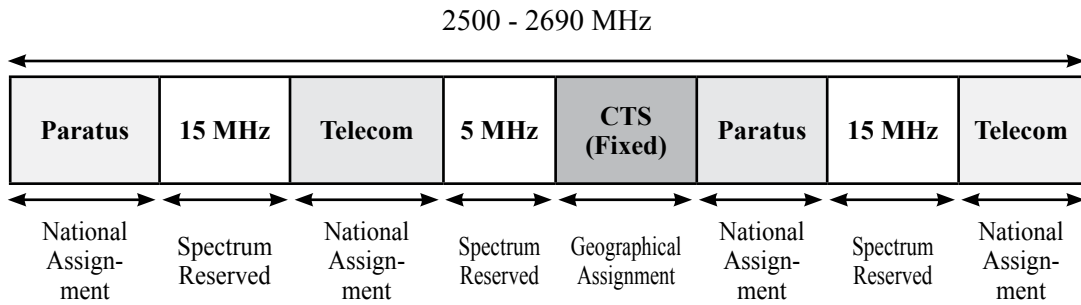
The **2300 MHz (2300-2400 MHz)** spectrum band is assigned to Telecom Namibia Limited and MTN Business Solutions (Namibia) (Pty) Ltd for implementation of IMT services on a TDD basis. The 2300 MHz spectrum band was not historically allocated to mobile services on a primary basis, and thus the available spectrum is shared with fixed services, which services are also allocated on a primary basis. Telecom Namibia also holds a spectrum license for fixed services in this band. There is no spectrum available in this band as shown in Figure 7 below:

Figure 7: 2300 MHz spectrum availability



The **2600 MHz (2500 -2690 MHz)** spectrum band is assigned to Telecom Namibia Limited and Paratus Telecommunications (Pty) Ltd for implementation of IMT services on a TDD basis. The 2600 MHz spectrum band was not historically allocated to mobile services on a primary basis, and thus the available spectrum is shared with broadcasting satellite services and fixed services, which services are also allocated on a primary basis. Converged Telecommunications Solutions (Pty) Ltd holds a geographical spectrum assignment for the Khomas region to provide fixed services in this band.

Spectrum availability in the **2600 MHz** spectrum band is shown in Figure 8 below.

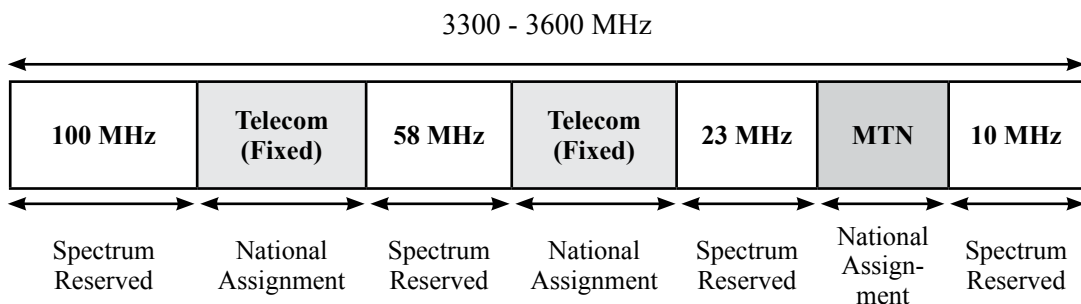
Figure 8: 2600 MHz spectrum availability

The remainder of this spectrum band is reserved until such time that the Authority publishes a regulatory notice for assignment in the *Gazette*. The notice will be published as per the timeline set out in this strategy.

Some African countries has already authorised the 2600 MHz band for IMT-2020 deployment.

The **3500 MHz (3300-3600 MHz)** spectrum band is assigned to Telecom Namibia Limited providing fixed services, and MTN Business Solutions (Namibia) (Pty) Ltd for implementation of IMT services on a TDD basis. The 3500 MHz spectrum band, was not historically allocated to mobile services on a primary basis, and thus the available spectrum is shared with fixed satellite services and fixed services, which services are also allocated on a primary basis.

Spectrum availability in the **3500 MHz** spectrum band is shown in Figure 9 below:

Figure 9: 3500 MHz spectrum availability

The 3500 MHz spectrum band has emerged as a primary band for IMT-2020 deployment in that it is near-globally harmonised and allows for assignment of large (80-100 MHz) contiguous blocks of spectrum on a TDD basis, as per the frequency channelling arrangements contained in ITU-R M.1036-6.

The remainder of this spectrum band is reserved until such time that the Authority receives authorisation for deployment of IMT-2020 (5G) networks as per Cabinet Decision No. 10TH 21.07.20/006.

The **4800 MHz (4800-4990 MHz)** spectrum band has been allocated for implementation of IMT services as per footnote 5.441B at WRC-19. However, in Namibia this spectrum band is reserved for government use and thus Namibia is not included in footnote 5.441B. The band is currently licensed to government entities for deployment of fixed services.

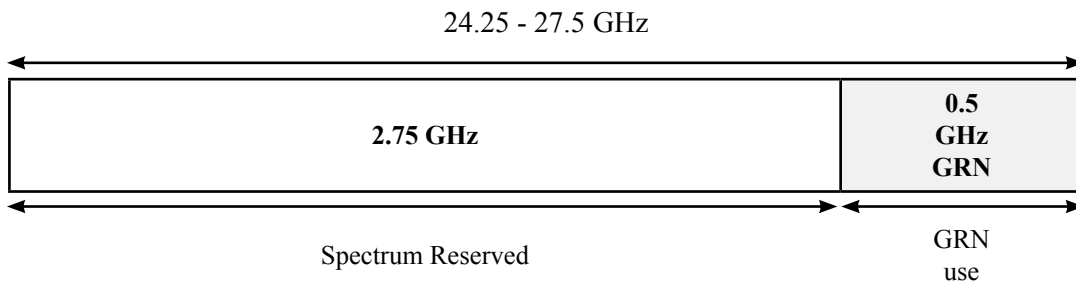
4.1.3 High-band spectrum (above 24 GHz)

The spectrum bands above 24 GHz, as allocated at WRC-19 for deployment of IMT-2020, is suitable for transmission of high volumes of data in urban areas, because it only has the ability to cover small areas.

Spectrum assignments in these spectrum bands for IMT-2020 will consist of 800-1000 MHz per licensee, as recommended by the Africa Telecommunications Union (ATU) to support services and applications deployed therein.

The **26 GHz (24.25-27.5 GHz)** spectrum band was not historically allocated to mobile (IMT) services on a primary basis, and thus the available spectrum is shared with fixed services, fixed satellite (Earth-to-space) services, earth exploration satellite (space-to-Earth) services, inter satellite services and space research, which services are also allocated on a primary basis. It should be noted that 27-27.5 GHz is reserved for government use and no spectrum assignments for commercial use will be considered in this spectrum band. Spectrum availability in the **26 GHz** spectrum band is shown in Figure 10 below:

Figure 10: 26 GHz spectrum availability



The 26 GHz spectrum band has emerged as a primary band for early IMT-2020 deployment. Going forward this spectrum band will be considered on -

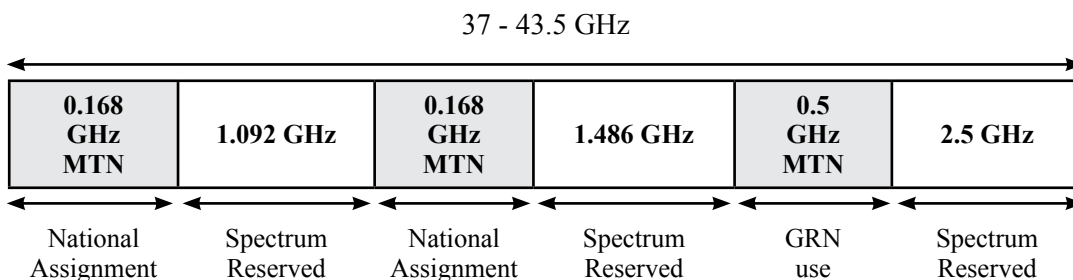
- (i) An exclusive or licensed shared access basis with other service allocations, depending on the IMT-2020 use case presented to the Authority for consideration; and/or
- (ii) A national or geographical spectrum assignment depending on the IMT-2020 use case presented to the Authority for consideration.

This spectrum band is reserved until such time that the Authority received authorisation for deployment of IMT-2020 (5G) networks as per Cabinet Decision No. 10TH 21.07.20/006 and published a regulatory notice for assignment in the *Gazette*.

The **40 GHz (37-43.5 GHz)** spectrum band was not historically allocated to mobile (IMT) services on a primary basis, and thus the available spectrum is shared with fixed services, fixed satellite (space-to-Earth) services, earth exploration satellite (Earth-to-space) services, land mobile services, radio astronomy services and space research, which services are also allocated on a primary basis. The spectrum band 38-39.5 GHz has been identified for deployment of High-Altitude Platform Stations (HAPS) in the fixed service at WRC-19 as set out in Resolution 168. HAPS deployment in Namibia is discussed under point 4.2 in this document.

MTN Business Solutions (Namibia) (Pty) Ltd holds spectrum licences for point-to-point fixed services in this band.

Spectrum availability in the **40 GHz** spectrum band is shown in Figure 11 below:

Figure 11: 40 GHz spectrum availability

Going forward this spectrum band will be considered on -

- (iii) An exclusive or licensed shared access basis with other service allocations depending on the IMT-2020 use case presented to the Authority for consideration; and/or
- (iv) A national or geographical spectrum assignment depending on the IMT-2020 use case presented to the Authority for consideration.

This spectrum band is reserved until such time that the Authority receives authorisation for deployment of IMT-2020 (5G) networks as per Cabinet Decision No. 10TH 21.07.20/006 and published a regulatory notice for assignment in the *Gazette*.

The **66 GHz (66-71 GHz)** spectrum band was allocated for implementation of mobile (IMT) services as per footnote 5.559AA at WRC-19 on a non-interference basis. The 66 GHz spectrum band was not historically allocated to mobile (IMT) services and thus the available spectrum is shared with inter-satellite services, mobile satellite services, radio navigation and radio navigation satellite services.

Given that this is a footnote allocation, the Authority will only consider geographical spectrum licences in this spectrum band should the need arise going forward.

This spectrum band is reserved until such time that the Authority received authorisation for deployment of IMT-2020 (5G) networks as per Cabinet Decision No. 10TH 21.07.20/006 and published a regulatory notice for assignment in the *Gazette*.

4.1.4 Consideration of additional spectrum bands for mobile and/or IMT at WRC-23

The agenda for the ITU World Radio Conference 2023 has already been set. Various spectrum bands below 11 GHz will be considered for allocation to IMT services as shown below -

- (i) Agenda item 1.2: Identification of the frequency bands 3300-3400 MHz (allocated to IMT in a footnote at WRC-15), 3600-3800 MHz, 6425-7025 MHz, 7025-7125 MHz and 10.0 to 10.5 GHz for IMT on a primary basis globally;
- (ii) Agenda item 1.3: Primary allocation of the frequency band 3600-3800 MHz to mobile services within Region 1 (Namibia is part of ITU Region 1); and
- (iii) Agenda item 1.5: Review the spectrum use and spectrum needs of existing services in the frequency band 470-960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470-694 MHz (694-960 MHz is already allocated to mobile services (IMT), whilst 470-694 MHz is currently allocated to broadcasting services for digital terrestrial television (DTT).

Preparatory work in respect of the aforementioned agenda items has already commenced at SADC, Africa (ATU) and ITU levels to conduct all technical sharing and compatibility studies to assess co-existence with existing services without resulting in harmful interference between services and to determine level of current spectrum utilisation.

4.1.5 Regulatory options to ensure spectrum availability for IMT services

Although there is spectrum available for future deployment of IMT services in the low and high band spectrum allocations, as contained in the National Frequency Band Plan, the mid band spectrum allocations provide limited availability taking into account current assignments and continued use of spectrum bands for fixed services.

The Authority is considering the following options going forward prior to making spectrum available for assignment in the 2300 MHz, 2600 MHz, and 3300-3600 MHz spectrum bands for IMT-2000 and IMT-2020 -

- (a) Discuss and agree with affected licensee/s timelines and a roadmap to discontinue legacy Wimax, and Rurtel fixed networks within a specified time period and return the spectrum to the Authority for re-planning of the 2300 MHz and 3500 MHz spectrum bands. While the discontinuation timelines will be discussed with concerned licensees, the Authority's position is that legacy technologies should be discontinued as soon as reasonably possible;
- (b) Propose a roadmap to discontinue legacy 2G mobile networks within a specified time period, given that this technology do not meet minimum broadband requirements as set out in the National Broadband Policy;
- (c) Restrict spectrum utilisation for fixed satellite services to above 3800 MHz;
- (d) Amend fragmented assignments to create contiguous blocks of vacant spectrum in the 2600 MHz and 3500 MHz spectrum bands;
- (e) Cancel spectrum licences in the event that spectrum licensees are in material breach of spectrum licence conditions as set out in regulation 18 of the spectrum licensing regulations; and
- (f) Deploy any combination of the options listed above.

The aforementioned measures will ensure sufficient vacant spectrum to provide for assignment of contiguous spectrum blocks of 80-100 MHz for assignment to telecommunications licensees for implementation of IMT services. All the aforementioned actions need to be concluded prior to any consideration being given to make this spectrum available for assignment to licensees.

4.2 High-Altitude Platform Stations (HAPS)

The Authority strives to promote the objects on the Communications Act, 2009, in ensuring the optimum use of spectrum through implementation of innovative new services and technologies, taking into account spectrum allocations made at ITU World Radio Conference every four years.

ITU defines HAPS as radio stations located on an object at an altitude of 20-50 kilometres and at a specified, nominal, fixed point relative to earth. Given that the radio stations operate in the stratosphere, the platforms have the potential to provide access to telecommunications services over large geographical areas or augment capacity of telecommunications service licensees.

HAPS requires minimal ground infrastructure and it is foreseen that the technology has the potential to -

- (i) extend broadband services to end users in remote areas;
- (ii) provide fixed wireless backhaul links between mobile and core networks as well as backhaul for IoT deployments in the energy and agricultural sector; and
- (iii) provide for rapid deployment of communications in disaster situations.

Various spectrum bands have been allocated to HAPS since WRC-07 is shown in Table 1 below.

Table 1: Spectrum bands identified for HAPS

Frequency range	Service	Direction	ITU Reference
1885-1980 MHz	Mobile	Uplink	RR No. 5.388A Resolution 221(Rev.WRC-07)
2010-2025 MHz	Mobile	Uplink	RR No. 5.388A Resolution 221(Rev.WRC-07)
2110-2170 MHz	Mobile	Bi-directional links	RR No. 5.388A Resolution 221(Rev.WRC-07)
31-31.3 GHz	Fixed	Bi-directional links	RR No. 5.543B Resolution 167 (WRC-19)
38-39.5 GHz	Fixed	Bi-directional links	RR No. 5.550D Resolution 168 (WRC-19)
47.2-47.5 GHz	Fixed	Bi-directional links	RR No. 5.552A Resolution 122 (Rev.WRC-19)
47.9-48.2 GHz	Fixed	Bi-directional links	RR No. 5.552A Resolution 122 (Rev.WRC-19)

Source: ATU-R Recommendation 005-0

HAPS trials are taking place in several countries across the world. Similarly, the Authority will consider such a trial in the spectrum bands above, should a telecommunications service licensee opt to explore this technology for further use in Namibia. A temporary spectrum licence will be considered in instances where the licensee does not already hold spectrum licences in the spectrum bands identified for testing. All tests results are to be shared with the Authority.

4.3 Wi-Fi in 6 GHz, WiGiG and 5G NR-U in 60 GHz

Both licensed and license-exempt spectrum are required to provide end-to-end wireless broadband connectivity. To this effect, radio local access networks (RLAN) and wireless access systems (WAS) are widely used to connect various devices within customer premises, whilst broadband backhaul connectivity is provided *via* fibre, fixed wireless access, mobile or satellite technologies.

Wi-Fi technology is viewed as complimentary to existing fixed, mobile and satellite technologies, allowing for the offloading of traffic from these networks. The Authority has made provision for licence exempt spectrum for WAS/RLANs subject to adherence to the technical conditions set out by the Authority and type approval of equipment as shown in Table 2.

Table 2: Licence exempt spectrum for WAS/RLAN

Frequency band	Maximum power or magnetic field strength	Additional information	Harmonised standard
2400-2483.5 MHz	100 mW e.i.r.p.		EN 300 328
5150-5350 MHz	200 mW mean e.i.r.p. The maximum mean e.i.r.p. density shall be limited to 10 mW/MHz in any 1 MHz band - Resolution 229 (Rev. WRC-19)	Indoor use only	EN 301 893
5470-5725 MHz	250 mW e.i.r.p. The maximum mean e.i.r.p. density shall be limited to 50 mW/MHz in any 1 MHz band – Resolution 229 (Rev. WRC-19)	Indoor and outdoor use	EN 301 893

Source: Government Gazette No. 7613, General Notice No. 446, dated 30 August 2021.

The Authority has considered the use of licence-exempt spectrum to lower the barrier of entry for smaller licensees focussing on the provisioning of last mile access, whilst leasing backhaul transmission from the larger players in the ICT sector. In addition, wireless access is widely used in the residential and business environment to connect a variety of devices to broadband services provided by licensees. To this end, the Authority is considering providing additional spectrum licence exempt bands to increase capacity and to allow for deployment of the latest technologies operating in these spectrum bands.

4.3.1 Wi-Fi in 6 GHz, WiGiG in 60 GHz

Wi-Fi 6E and WiGiG, based on the IEEE 802.11ax and 802.11ad/ay standards respectively, is capable of supporting high-bandwidth applications with lower latency, higher throughput and traffic offloading from mobile, fixed and satellite networks. The Authority has considered the –

- (i) Availability of multi-band CPE's capable of operating in the existing spectrum licence exempt bands as well as the lower 6 GHz (5925-6425 MHz) and 60 GHz (57-66 GHz) spectrum bands;
- (ii) Technical conditions set by other countries within ITU region 1 to allow for licence exempt use allowing for indoor use and very low power outdoor use considering that the spectrum band set out under (i) above are allocated to fixed and satellite services on a primary basis; and
- (iii) Technical conditions for spectrum licence exempt by WAS/RLAN set by the African Telecommunications Union (ATU) as contained in ATU-R Recommendation 005-0, Annexure 3 & 4, July 2021.

Based on the above considerations, the Authority will allow for spectrum licence exempt use of the lower 6 GHz and 60 GHz spectrum bands by WAS/RLANs subject to the technical conditions set out in Tables 3 and 4 below:

Table 3: Technical conditions for licence exempt use 5925-6425 MHz

Frequency Band	Application	Maximum Power or field strength	Technical Conditions	Notes
5925-6425 MHz	WAS/RLAN	23 dBm (200 mW) mean e.i.r.p*	<p>Mean e.i.r.p density for in-band emissions - 10 dBm/MHz</p> <p>An adequate spectrum sharing mechanism shall be implemented for channel access and occupation</p>	<p>Restricted to indoor use only by Low Power Indoor (LPI)</p> <p>LPI access point or bridge is a device that is supplied with power from a wired connection, has an integrated antenna and is not battery powered**</p> <p>LPI client device is a device connected to a LPI access point or another LPI client device and may or may not be battery powered.</p> <p>Outdoor use (including in road vehicles) is prohibited</p>
5925-6425 MHz	WAS/RLAN	14 dBm (25 mW) mean e.i.r.p*	<p>Very Low Power (VLP) indoor and outdoor use</p> <p>A VLP device is a portable device</p> <p>Mean e.i.r.p density for in-band emissions -1 dBm/MHz</p> <p>An adequate spectrum sharing mechanism shall be implemented for channel access and occupation</p> <p>Use on drones are prohibited</p>	

*Mean e.i.r.p. refers to the e.i.r.p during transmission burst, which corresponds to the highest power, if power control is implemented

**Including trains where metal coated windows are fitted and aircraft

Table 4: Technical conditions for licence exempt use 57-66 GHz

Frequency Band	Application	Maximum Power or field strength	Technical Conditions	Harmonised standard	Notes
57-66 MHz	WAS/ RLAN	40 dBm (10 W) mean e.i.r.p (indoor only) 23 dBm/MHz e.i.r.p density	An adequate spectrum sharing mechanism shall be implemented	WiGiG 802.11 ad EN 302 657	Fixed outdoor installations are excluded
57-66 MHz	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 port/s	An adequate spectrum sharing mechanism shall be implemented	Draft EN 303 722 Draft EN 303 753	
57-66 MHz	WAS	55 dBm (316W) mean e.i.r.p 38 dBm/MHz e.i.r.p density Transmit antennae gain \geq 30 dBi	An adequate spectrum sharing mechanism shall be implemented	Draft EN 303 722	Fixed outdoor installations

The aforementioned technical conditions are aligned with the conditions proposed by ATU to ensure harmonisation of spectrum utilisation in the African region and creation of economies of scale for equipment availability. Furthermore, it should be noted that all Wi-Fi 6E and WiGiG equipment must be type approved prior to importation as set out in the Authority's type approval regulations.

4.3.2 NR-U in 60 GHz

In accordance with ITU Resolution 241(WRC-19) and ATU-R Recommendation 005-0, the Authority is considering the deployment of 5G in the spectrum band 66-71 GHz under the provisions of RR. 5.559AA. This will be done taking into consideration co-existence with other WAS systems in the same frequency band already deployed on a spectrum licence exempt basis.

The future deployment of 5G is however subject to the Authority receiving authorisation for deployment of IMT-2020 (5G) networks as per Cabinet Decision No. 10TH 21.07.20/006 and technical conditions for spectrum licence exempt use for implementation of NR-U will be determined at that time.

5. SPECTRUM AVAILABILITY FOR BROADCASTING SERVICES

5.1 Digital sound broadcasting

The Authority developed a regulatory framework for implementation of digital sound broadcasting in 2020 in accordance with the technical standards and regulatory framework guidelines approved by the SADC ICT Ministers in September 2017.

Spectrum was made available on a first-come first serve basis for implementation of –

- (i) Digital Audio Broadcasting (DAB) technology in the VHF III band from 214-230 MHz in accordance with the ITU GE06 agreement signed by Namibia in 2007. Implementation of DAB will provide for twelve broadcasting channels on a single frequency ensuring more efficient use of spectrum and better audio quality to provide radio broadcasting services going forward; and
- (ii) Digital Audio Mondiale (DRM) technology in the 148.5-200 kHz and 535.5-1606.5 kHz spectrum bands. Implementation of DRM will provide for four broadcasting channels on a single frequency ensuring more efficient use of spectrum, better audio quality and 40-50% energy savings to provide radio broadcasting services going forward.

The frequency channelling plans for both aforementioned technologies were published in Government Gazette No. 7300, General Notice No. 320 on 7 August 2020. To date the broadcasting industry has not taken up the opportunity to apply for spectrum to implement digital sound broadcasting.

5.2 Analogue sound broadcasting (FM)

The Authority reviewed the frequency channeling plan in 87.5-108 MHz due to the high demand for frequencies to implement analogue sound broadcasting in 2020. The updated frequency channeling plan was published in Government Gazette No. 7300, General Notice No. 321 on 7 August 2020. The Authority availed the spectrum for application on a first-come-first-serve basis with the exception of Windhoek where frequencies were issued on a competitive basis.

ITU opened the GE84 plan for review at the request of ATU member states. These processes allowed African member states to conduct cross-border coordination with neighboring countries to expand the available frequencies for analogue sound broadcasting services upon agreement between countries and availability of spectrum in these areas. This process has concluded at the end of January 2022.

The Authority will review the frequency channeling plan for analogue sound broadcasting in 87.5 to 108 MHz to include all frequencies agreed upon during the aforementioned period. The spectrum will be made available for assignment upon finalisation of the review process.

5.3 Digital terrestrial television broadcasting services

The Authority implemented a regulatory framework for implementation of digital terrestrial television (DTT) broadcasting services in 174-230 MHz and 470-694 MHz in accordance with the ITU GE06 agreement signed by Namibia in 2006. Spectrum was made available on a first-come-first-serve basis.

The implementation of DTT has fallen short of expectations to date and the spectrum availed is thus not optimally utilised. Subsequently the Authority is not considering a review of this frequency channeling plan.

The spectrum band 470-694 MHz is furthermore under consideration for assignment to mobile (IMT) services in addition to broadcasting services under Agenda Item 1.5 for WRC-23. The future use of this spectrum band is thus dependent on the outcomes of WRC-23.

6. SPECTRUM AVAILABILITY FOR SATELLITE SERVICES

Given the topography of Namibia, satellite plays an important role in providing services to remote rural areas and is utilised as backhaul transmission by broadcasters and telecommunications service licensees as well as providing electronic communications services to mines, lodges, etc.

Delivery of telecommunications and/or broadcasting services via satellite technologies requires a services licence in terms of section 37 and 83 of the Communications Act, 2009, as may be applicable. Spectrum licences for delivery of satellite services are awarded in conjunction with service. Given that satellite services share spectrum bands with other terrestrial services, the aforementioned approach provides the Authority with the necessary control over spectrum resources to mitigate interference and to provide for orderly spectrum management. All satellite equipment are subject to type approval prior to importation into Namibia.

Given that there is no scarcity of satellite spectrum at present, the Authority has published a regulatory 4(1) notice inviting applications for spectrum on a first-come-first serve basis, in Government Gazette No. 6982, General Notice No. 322, dated 30 August 2019. Namibian licensees have favoured deployment of satellite services in Ku-band to date.

To foster the implementation of high throughput satellite technologies for the provision of broadband services, the Authority implemented formula base spectrum fees, based on bandwidth during the previous strategic period (2018-2021) resulting in a significant decrease in spectrum fees for licensees.

6.1 Consideration of additional spectrum bands for satellite services at WRC-23

The agenda for the ITU World Radio Conference 2023 has already been set. Various spectrum bands will be considered for allocation to satellite services as shown below -

- (i) Agenda item 1.15: Operation of earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service in the frequency band 12.75-13.25 GHz (Earth-to-space);
- (ii) Agenda item 1.16: Use of the frequency bands 17.7-18.6 GHz, 18.7-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service; and
- (iii) Agenda item 1.18: To consider studies relating to spectrum needs and potential new allocations to the mobile-satellite service for future development of narrowband mobile-satellite systems, in accordance with Resolution **248 (WRC19)**.

Preparatory work in respect of the aforementioned agenda items has already commenced at SADC, Africa (ATU) and ITU level to conduct all technical sharing and compatibility studies to assess co-existence with existing services without resulting in harmful interference between services offered in the same spectrum band.

6.2 Future use of satellite

Going forward satellite technologies will form part of the 5G ecosystem in providing continuity, ubiquity and scalability of services. Work is currently underway to develop and include satellite network specifications for integration of non-terrestrial networks in 3GPP release 17 and 18 for IMT-2020 to support implementation of enhanced mobile broadband (eMBB), massive machine-type communications (mMTC) and ultra-reliable low latency communications (UrLLC).

7. SPECTRUM ASSIGNMENT

Harmonisation in the use of radio spectrum is crucial to ensure amongst others, interoperability between systems and networks, facilitating frequency coordination between countries and establishing international systems.

7.1 Strategic considerations for utilisation of spectrum

The Authority, assumes full responsibility for spectrum assignment based on the principles of independent decision-making and is thus impartial with respect to all market players. The Authority's primary and legislative objective is to promote competition, to ensure that sufficient spectrum is available to provide services highly valued by end users and meet public safety and security requirements and enforce the efficient use of a scarce resource.

To this end, the Authority adopted a holistic approach in determining a roadmap for the release of spectrum for the period 2022 to 2024 to provide licensees with regulatory certainty as to what spectrum will be made available for use to facilitate telecommunications and broadcasting network rollout and implementation of emerging technologies, platforms and applications to the benefit of the end user.

The Authority holds the view that ICT plays a vital role in socio-economic development and going forward the digital transformation of Namibia as well as the attainment of a Fourth industrial revolution. To this end, the Authority will make spectrum available and impose licence conditions to attain the following strategic objects -

- (i) allow for the implementation of new technologies to promote innovation and availability of a wide array of high-quality services to all Namibians as per the objects of the Communications Act;
- (ii) Set spectrum licence conditions to ensure access to broadband networks and ensure that these services can be utilised by Namibians in line with the targets set out in national policies;
- (iii) Ensure that spectrum is utilised to provide broadband services in unserved and underserved areas through implementation of the Universal Access Fund; and
- (iv) Ensure that spectrum is utilised to foster digital transformation beyond the delivery of broadband through implementation of e-education, e-health, e-agriculture and other use cases to realise the true benefits of new technologies.

7.2 Assignment methodology

Assignment of spectrum will be conducted as set out below -

- i) Any spectrum band which is vacant or has become vacant as a result of withdrawal of a spectrum licence or migration of services to other spectrum bands at the instruction of the Authority, will not be open for application until so designated by the Authority. The Authority will issue a public notice in the *Gazette* informing all stakeholders that the spectrum band is being opened up for use, set out the method for awarding of spectrum licences in the said spectrum band and state all applicable spectrum fees;
- ii) A spectrum licence is awarded on a right-to-use basis in accordance with the Communications Act, 2009, and does not confer ownership rights to the recipient of a spectrum licence;
- iii) No service licensee will be assigned more spectrum than necessary and the Authority may impose caps on the amount of spectrum to be assigned to a single licensee to ensure fair and equitable assignment of spectrum to all service licensees. Hoarding of spectrum and speculative acquisition of spectrum are not conducive to efficient spectrum use and the objects of the Communications Act, 2009. The Authority shall not allow these practices at any time and will cancel such spectrum licences after giving due notice to the licensee in question;
- iv) The award of spectrum licences will be done in strict adherence to the Frequency Band Plan of Namibia and associated frequency channelling plans published by the Authority from time to time. The Authority will not accept any application that does not comply with the Frequency Band Plan of Namibia or any Channelling Plan issued for the respective band;
- v) All proposed spectrum licences, except service licence exempt service licence categories, will be published for public comments before being awarded to the applicant subject to approval by the Authority;
- vi) Regulations and/or notices in regard to spectrum licences are published in the *Gazette* following prescribed regulatory processes and public consultations as and when required. The purpose is to enable the public to submit comments on the spectrum licence under consideration by the Authority. Public comments received by the Authority will be taken into consideration based only on technical and legal merits.
- vii) Applications for spectrum licences submitted by entities that do not require a telecommunications or broadcasting service licence, will be considered on a first-come-first-serve basis in accordance with the regulatory process set out in the Regulations Setting out Spectrum Licensing Procedures.
- viii) Application for spectrum licences for provisioning of telecommunications and broadcasting services, will be considered through the application of a hybrid model allowing the Authority to follow an administrative and/or flexible-rights of use approach. Applications will be considered based on the spectrum band applied for, the conditions to be attached to the spectrum licence, the duration of the spectrum licence and the market value of the spectrum. The relevant regulatory processes are set out in the Regulations Setting Out Spectrum Licensing Procedures.

- ix) The Authority may award a spectrum licence limiting the utilisation thereof to a specific geographical area or to implement licensed shared access allowing for sharing of spectrum, when more than one service has been allocated on a co-primary basis in the same spectrum band as per the Frequency Band Plan of Namibia.

8. ROADMAP FOR SPECTRUM ASSIGNMENT

In developing this roadmap, the Authority has considered the following -

- (i) The spectrum needs submitted by licensees in response to the Authority's request herein in 2021;
- (ii) Spectrum already available for application;
- (iii) Broadcasting spectrum to be released for application on a first-come-first-serve basis;
- (iv) Mobile spectrum in 800 MHz and 2100 MHz will be released for application via spectrum auction based on the high demand for this spectrum. Licences awarded will be subject to rollout obligations in line with the gap analysis conducted by the Authority;
- (v) IMT-2000 and IMT-2020 spectrum in 700 MHz, 2300 MHz, 2600 MHz and 3500 MHz will be released for application via spectrum auction given the limited availability of spectrum and high demand for this spectrum. Licences awarded will be subject to rollout obligations, technical spectrum licence conditions and other conditions spectrum to the utilisation of the said spectrum including licensed share access;
- (vi) IMT-2020 spectrum in the spectrum bands above 24 GHz will be released for application on a first-come-first-service basis in that there is sufficient availability of spectrum to meet demand. Licences awarded will subject to the applicant submitted a business case for the intended use of the spectrum to support digital transformation of the Namibian economy. Consideration may also be given to geographical licenses and licensed shared access of spectrum.

The Authority will make spectrum available for telecommunications and broadcasting services for the period 2022 to 2024 as set out in Table 6 below:

Table 6: Timetable for release of spectrum for application 2022 to 2024

Service	Spectrum Band/s	Time Frame	Additional Information
Spectrum already available for application			
Analogue Sound Broadcasting	87.5-108 MHz	Open for application on first-come-first-serve basis.	FM frequency channelling plan applies. Frequencies available for application has been published in Government Gazette No. 7312, General Notice No. 344 on 19 August 2020.
Digital Sound Broadcasting	214-230 MHz	Open for application on first-come-first-serve basis.	DAB frequency channelling plan applies. Frequencies available for application has been published in Government Gazette No. 7300, General Notice No. 320 on 7 August 2020.

Digital Sound Broadcasting	148.5-200 kHz 535.5-1606.5 kHz	Open for application on first-come-first-serve basis.	DRM frequency channelling plan applies. Frequencies available for application has been published in Government Gazette No. 7300, General Notice No. 320 on 7 August 2020.
Fixed services	Various spectrum bands	Open for application on first-come-first-serve basis.	Frequency channelling plan indicated in national frequency band plan applies. Spectrum bands available for application has been published in Government Gazette No. 6982, General Notice No.323 on 30 August 2019.
Satellite services	Various spectrum bands	Open for application on first-come-first-serve basis.	Spectrum bands available for application has been published in Government Gazette No. 6982, General Notice No.322 on 30 August 2019.
Spectrum to be released for application 2022 to 2023			
Mobile services	1920-1980 MHz paired with 2110-2170 MHz	Quarter 2 of 2022 to Quarter 3 of 2022 to be awarded <i>via</i> spectrum auction.	2 x 10 MHz FFD national spectrum assignment subject to rollout obligation/ use cases set by the Authority. The rollout obligations will be based on the gap analysis as determined by the Authority.
IMT services	791-821 MHz paired with 832-862 MHz	Quarter 3 of 2022 to be awarded <i>via</i> spectrum auction	2 x 20 MHz FFD national spectrum subject assignment subject to rollout obligation set by the Authority. The rollout obligations will be based on the gap analysis as determined by the Authority. NB: No IMT-2020 (5G) rollout or type approval of 5G network equipment shall be allowed until such time that the Authority receives authorisation for deployment of IMT-2020 (5G) networks as per Cabinet Decision No. 10 TH 21.07.20/006; Dynamic spectrum sharing between 4G and 5G will be encouraged going forward.
IMT services	1427-1518 MHz	Quarter 2 of 2022 on first-come-first-serve basis.	TDD assignment on geographical and licensed shared basis to support specific use cases presented to the Authority as time of application
IMT services	24.25-27.5 GHz	Quarter 2 of 2022 to Quarter 3 of 2022	TDD assignment to support specific use cases from IMT-2020 (5G) presented to the Authority at time of application NB: No IMT-2020 (5G) rollout or type approval of 5G network equipment shall be allowed until such time that the Authority received authorisation for deployment of IMT-2020 (5G) networks as per Cabinet Decision No. 10 TH 21.07.20/006; and The assignment method will be determined at the time of intended release of spectrum for application.

IMT services	37-43.5 GHz	Quarter 2 of 2023 to Quarter 3 of 2023 on first-come-first-serve basis.	TDD assignment on geographical and licensed shared basis to support specific use cases presented to the Authority as time of application. NB: No IMT-2020 (5G) rollout or type approval of 5G network equipment shall be allowed until such time that the Authority received authorisation for deployment of IMT-2020 (5G) networks as per Cabinet Decision No. 10 TH 21.07.20/006.
Spectrum to be released once dependencies has been resolved			
IMT services	694-790 MHz	Quarter 1 of 2023 to Quarter 2 of 2023 <i>via</i> spectrum auction	Release of spectrum for application is dependent on the adherence of NBC to cut-off date for migration of legacy analogue TV transmitters by 31 December 2022. Spectrum awarded for analogue television broadcasting to be returned to the Authority by 31 December 2022. 2x 30 MHz FDD national spectrum subject assignment via spectrum auction subject to rollout obligations and specific use cases set by the Authority. NB: No IMT-2020 (5G) rollout or type approval of 5G network equipment shall be allowed until such time that the Authority received authorisation for deployment of IMT-2020 (5G) networks as per Cabinet Decision No. 10 TH 21.07.20/006. Dynamic spectrum sharing between 4G and 5G will be encouraged going forward.
IMT services	2300-2400 MHz	Quarter 1 of 2023 to Quarter 2 2023 <i>via</i> spectrum auction	Release of spectrum for application is dependent on sunset date for discontinuation of Rurtel fixed service to be agreed with licensee after a consultation process. Spectrum awarded for fixed services to be returned to the Authority. TDD national spectrum subject assignment via spectrum auction subject to rollout obligation set by the Authority.
IMT services	2500 -2690 MHz	Quarter 3 of 2023 to Quarter 4 2023	Spectrum will be released upon completion of the re-planning of this spectrum band to address fragmented availability of spectrum in cooperation with licensees that already hold spectrum licenses in this spectrum band. The Authority will determine the method of assignment of this spectrum upon completion of the re-planning exercise.

IMT services	3300-3600 MHz	Quarter 3 of 2023 to Quarter 4 2023	<p>Release of spectrum for application is dependent on the sunset date for discontinuation of legacy WiMax/ fixed services technology to be agreed with licensee after a consultation process. Spectrum awarded for fixed services to be returned to the Authority.</p> <p>Spectrum will be released upon completion of the re-planning of this spectrum band to ensure the availability of contiguous blocks of 80-100 MHz considering existing spectrum licences awarded for IMT services in this spectrum band</p> <p>Spectrum will be released for TDD national spectrum assignment subject assignment via spectrum auction subject to rollout obligations and specific use cases set by the Authority.</p> <p>NB:</p> <p>No IMT-2020 (5G) rollout or type approval of 5G network equipment shall be allowed until such time that the Authority received authorisation for deployment of IMT-2020 (5G) networks as per Cabinet Decision No. 10TH 21.07.20/006.</p> <p>Dynamic spectrum sharing between 4G and 5G will be encouraged going forward.</p>
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It should be noted that this roadmap does not include spectrum bands under consideration at WRC-23. The Frequency band plan will be updated to incorporate the outcome of WRC-23 conference in 2024 upon publication of the Final Acts of the said conference.

The Authority will not accept any pre-emptive applications for spectrum bands listed in Table 6. Applications will only be accepted after publication of the applicable appropriate regulatory notice in the *Gazette* as per the assignment method set out in the specific notice.

9. UTILISATION OF SPECTRUM LICENCE EXEMPT FREQUENCIES

The utilisation of licence exempt frequencies is subject to the Regulations regarding Licence Exempt Spectrum as published in the *Gazette* by the Authority from time to time. These regulations indicate spectrum bands, types of devices, maximum radiated power of field strength limits and channel spacing as well as relevant standards and any additional requirements for use of radio apparatus within these spectrum bands.

Use of radio apparatus within these bands must at all times comply with the following conditions -

- i) All radio apparatus must be type approved by the Authority in accordance with section 80 of the Communications Act, 2009, and Regulations in respect of Type Approval and Technical Standards for Telecommunications Equipment;
- ii) The frequencies, transmitting power and external high-gain antenna of the radio apparatus must not be altered without a new type approval certificate being issued by the Authority;

- iii) The radio apparatus must be operated within, and not exceed, the technical parameters set out in the Table of Radio Frequency Spectrum Licence Exemptions as contained in the Regulations regarding Licence Exempt Spectrum;
- iv) The antenna of the radio apparatus must not be higher or above average ground level than the lowest point of the place where the radio apparatus operate effectively;
- v) The radio apparatus must not cause interference to any person issued with a spectrum licence by the Authority; and
- vi) The use of the radio apparatus in the licence exempt frequency spectrum operates on non-interference and zero protection basis from interference.

All telecommunications and broadcasting service licensees operating within the spectrum licence exempt spectrum bands shall provide information regarding network infrastructure and services to the Authority for record purposes on a bi-annual basis.

Licence exempt spectrum bands in Namibia comply with ITU Region 1 regulations. Any operation of radio apparatus operating in breach of the said regulations constitutes a regulatory offense, as this equipment is capable of causing harmful interference to licensed services in Namibia. The Authority will take all measures as provided for by section 102 of the Communications Act, 2009, to prevent usage of such radio apparatus.

10. SPECTRUM LICENCE CONDITIONS

All spectrum licences awarded by the Authority will be subject to conditions as set out in the licensing conditions attached to the spectrum licence. The aforementioned conditions may include but is not limited to -

- (i) Efficient use of spectrum;
- (ii) Duration of spectrum licence;
- (iii) Spectrum licence area;
- (iv) Technical Conditions;
- (v) Exclusive or shared utilisation of spectrum;
- (vi) Payment of spectrum fees;
- (vii) Roll Out Obligations;
- (viii) Prohibition of trading or sub-leasing of spectrum licences;
- (ix) Prohibition of hoarding of spectrum;
- (x) Universal Access and Service obligations;
- (xi) Reporting, monitoring and compliance matters in respect of the spectrum licence awarded;
- (xii) Regulatory offenses and penalties;
- (xiii) Amendment, renewal or modification of spectrum licences; and

(xiv) Revocation of spectrum licences

Any breach of the said conditions will constitute a regulatory offense leading to imposition of penalties or the cancellation of the spectrum licence by the Authority.

11. SPECTRUM PRICING

The Authority is cognisant of the fact that spectrum is a limited resource and that the value of spectrum is affected by a combination of technical, socio-economic and fiscal factors as applicable to each spectrum band allocated to one or more services in the frequency band plan.

The Authority set spectrum fees taking into consideration -

- (i) The availability or scarcity of spectrum for assignment in a specific spectrum band;
- (ii) The market value of spectrum made available for assignment by the Authority;
- (iii) Utilise spectrum pricing to enforce the efficient use of spectrum through deployment of more spectrally efficient equipment by licensees;
- (iv) The level of demand for spectrum in a given spectrum band;
- (v) Consumer demand for services;
- (vi) Impact of inflation based on annual consumer price indexes as published from time to time;
- (vii) Prevention of spectrum hoarding resulting in a negative impact on the competition and growth of the ICT sector; and
- (viii) Full cost recovery of costs incurred by the Authority in executing its mandate as set out in the Communications Act, 2009, given that the Authority is not funded in any way by the Namibian Government.

In the event that spectrum is assigned through a spectrum auction the applicable spectrum fees will be determined through the outcome of the bidding process.

11.1 Spectrum Application Fees

The Authority will not charge any application fees in respect of spectrum licences.

The Authority will apply a recurring annual spectrum fee, payable in advance, in respect of all spectrum licences.

11.2 Administrative Spectrum Fees

The Authority will apply an administrative approach in setting spectrum fees in respect of amateur radio services, aeronautical services, maritime services and Inmarsat satellite services.

Spectrum licences in respect of the aforementioned services will be charged annually at a flat fee, as set out in the spectrum fee regulations as published in the *Gazette*. These spectrum fees will be subject to inflationary increases as determined by the Authority from time to time, upon regular review of the spectrum fee regulations. Kindly refer to section 12 of this document for more information on the next spectrum fee review.

Further thereto, the aforementioned spectrum fees will be payable in advance for each calendar year. Non-payment of spectrum fees by the due date as indicated on the spectrum invoices will result in revocation of the spectrum licence by the Authority.

11.3 Incentive-based Spectrum Fees

The Authority will apply an incentive-based approach in setting spectrum fees in respect of all spectrum not subject to a flat fee as set out in 11.2 above. The application of incentive-based spectrum pricing will allow the Authority to set spectrum fees based on factors such as -

- (i) Bandwidth assigned to a licence;
- (ii) Increasing or decreasing coverage areas;
- (iii) High demand or low demand for spectrum band;
- (iv) Reflect the physical characteristic of different frequency bands;
- (v) Exclusive or shared utilisation of spectrum assigned;
- (vi) Duration of the spectrum licence;
- (vii) Rural or urban utilisation of assigned spectrum; and
- (viii) Transmitter effective radiated power.

The Authority will apply an incentive-based pricing approach to radio communication services, mobile services, fixed services, broadcasting services and land mobile services. The applicable spectrum fee in respect of the service to be provided will be formula based as set out in the spectrum fee regulations.

The Authority is of the opinion that the introduction of incentive-based spectrum pricing will provide the necessary incentives to facilitate efficient use of spectrum by licensees.

11.4 Spectrum Auctions

In the event that the Authority determines that spectrum will be assigned to interested licensees through an auction process, the applicable spectrum fees will be determined by the outcome of the bidding process.

12. CONCLUSION

The spectrum assignment strategy as presented by the Authority will be implemented through the review of the Authority's current spectrum management regulatory framework during the course of next three years. Stakeholders will be able to provide input to the review of regulations during the rulemaking process which will commence with the publication of reviewed regulations in the *Gazette* inviting public comments.

To this end the Authority will undertake a review of the following regulations -

- (i) Spectrum fee regulations;
- (ii) Frequency channelling plan for FM analogue broadcasting; and

(iii) Licence Exempt Spectrum (Annexure B to the Spectrum Licensing Regulations).

The Authority will consider the review of the Frequency Band Plan of Namibia after conclusion of the next ITU World Radio Conference (WRC-23) be held in November to December 2023. Such a review will be based on the Final Acts of WRC-23.

This document should be read together with the Authority's IMT-2020 strategy documents as far as it pertains to the implementation of 5G technologies going forward.

GLOSSARY

4G	Fourth Generation
5G	Fifth Generation
ATU	Africa Telecommunications Union
CPE	Customer Premises Equipment
DAB	Digital Audio Broadcasting
DRM	Digital Audio Mondiale
DTT	Digital Terrestrial Television
e.i.r.p	Equivalent Isotropic Radiated Power
eMBB	Enhanced Mobile Broadband
FDD	Frequency Division Duplex
GHz	Gigahertz
HAPS	High Altitude Platform Stations
ICT	Information and Communications Technology
IMT	International Mobile Telecommunications
IoT	Internet-of-Things
ITU	International Telecommunications Union
kHz	Kilohertz
LPI	Low Power Indoor
MHz	Megahertz
mMTC	Massive Machine Type Communications
NR-U	New Radio Unlicensed
PPDR	Public Protection and Disaster Relief
RLAN	Radio Local Access Network
SADC	Southern Africa Development Community
TDD	Time Division Duplex
UrLLC	Ultra-reliable Low Latency Communications
VLP	Very Low Power
WAS	Wireless Access Systems

WiFi-6E	WiFi Ver 6 Extended
WiGiG	When-its-Gone-its-Gone
WRC-07	World Radio Conference 2007
WRC-19	World Radio Conference 2019
WRC-23	World Radio Conference 2023
