GOVERNMENT GAZETTE

OF THE

REPUBLIC OF NAMIBIA

N$21.60 WINDHOEK - 17 May 2018 No. 6596

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General Notice

COMMUNICATIONS REGULATORY AUTHORITY OF NAMIBIA

No. 188 2018

SPECTRUM ASSIGMENT STRATEGY

The Communications Regulatory Authority of Namibia publishes this notice of intention to make a strategy for the assignment of spectrum, which contains the following:

1. A draft of the proposed Assignment Strategy as set out in Schedule 1.

The public may make oral submissions to the Authority on the proposed regulations at a time, date and place notified by the Authority by subsequent notice in the *Gazette.*

The public may also make written submissions to the Authority no later than 30 days from the date of publication of this notice of intention to make the strategy, in the manner set out below for making written submissions.

Reply comments to written submissions may be submitted to the Authority.

(a) no later than 15 days after the time for the making of written submissions has lapsed; or

(b) if the opportunity for the submission of reply comments is published in a subsequent *Gazette*, after the lapse of 14 days from the date of such publication.

All written submissions must-

(a) contain the name and contact details of the person making the written submissions and the name and contact details of the person for whom the written submission is made, if different; and

(b) be clear and concise.

All written submissions must be sent or given in any of the following ways:

1. By hand to the head offices of the Authority, namely Communication House, No 56 Robert Mugabe Avenue, Windhoek.

2. By post to the head offices of the Authority; namely Private Bag 13309, Windhoek, 9000;

3. By electronic mail to the following address: legal@cran.na;

4. By fax to email to: 0886550852.

The Authority herewith gives notice that it will hold a hearing regarding the proposed strategy as follows:

DATE: 5 June 2018

TIME: 09h00

VENUE: TBC

The public is invited to make comments and/or oral submissions at the hearing on the proposed strategy.

All written comments and notice of oral submissions to be made during the hearing must be submitted to the Authority on or before 24 May 2018.

All written comments and notice of oral submissions must be submitted to the Authority either physically or electronically:

1. By hand to the head offices of the Authority, namely Communications House, 56 Robert Mugabe Avenue, Windhoek;

2. By post to the head offices of the Authority namely Private Bag 13309, Windhoek;

3. By electronic mail to the following address legal@cran.na;

4. By facsimile to the following facsimile number +264 61 222 790; or

5. By fax to email to: 088642748.

Oral submissions must

1. Include a statement of the name and contact details of the person making the oral submissions and the name and contact details of the person for whom the oral submission is made, if different;

2. Be clear and concise.

F. KISHI
CHAIRPERSON OF THE BOARD OF DIRECTORS
COMMUNICATIONS REGULATORY AUTHORITY OF NAMIBIA

SCHEDULE 1

CONCISE STATEMENT OF PURPOSE

In fulfilling its mandate the Authority continuously apply itself to study and analyse regulatory trends as well as benchmark with other regulators on a regional and global level to learn from their expertise and experience in various regulatory environments and the ICT industry as well as sharing the Namibian experience with other regulatory counterparts.

Insights gained through the process provides the Authority with a basis to assess the Namibian ICT industry and develop regulatory frameworks fit for purpose to allow for the continuous expansion of the industry at all levels and creating regulatory certainty to foster investment in the ICT sector.

One such area is to maintain a spectrum regulatory framework aimed to provide licensees with equitable access to spectrum resources and to ensure that a wide array of services is made available to the public offering the latest technologies to promote socio-economic growth. To this end the Authority has developed a spectrum assignment strategy that charts the way forward for planning of spectrum resources, determination of spectrum fees and assignment of spectrum to existing licensees and new entrants going forward.

Endeavouring to provide insight into the thinking process of the Authority, the document has been developed in two parts consisting of-

(i) a research study highlighting the mandate of the Authority, the compilation of the Frequency Band Plan of Namibia and regulatory trends in relation to spectrum management, spectrum assignment methods, spectrum pricing and incorporating spectrum allocations for new technologies and/or meeting the demand for spectrum to provide specific services; and

(ii) set out the assignment strategy of the Authority going forward incorporating the various concepts and regulatory approaches contained in the study document.

SCHEDULE 2

DRAFT SPECTRUM ASSIGNMENT STRATERGY

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PART 1

1. THE MANDATE OF THE AUTHORITY

Radio spectrum is a limited national resource that is critical in providing electronic communications services on a national basis, backhaul transmission 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 legislation, strategy, regulations and procedures.

The Authority's mandate in respect of spectrum management is contained in section 99 of the Communications Act, 2009 and reads as follows-

"*(1) The Authority is vested with the control, planning, administration, management and licensing of the radio spectrum.*

(2) In controlling, planning, administering, managing and licensing the use of the radio frequency spectrum, the Authority must comply with the applicable standards and requirements of the International Telecommunication Union and its Radio Regulations, as agreed to or adopted by Namibia"

The International Telecommunications Union, as referred to in section 99(2) of the Act, convenes the World Radio Conference every four years to discuss and agree on spectrum management matters on a worldwide basis. The outcomes of every ITU World Radio Conference are published as Final Acts and holds international treaty status. The Authority is required to adhere to the outcomes of the ITU World Radio Conference as prescribed in section 99(2) of the Act and therefore review and amend as necessary the Spectrum Band Plan for Namibia setting out the allocation of spectrum bands for various radio communications services in accordance with the Final Acts of the ITU World Radio Conference every four (4) years after conclusion of the said conference as provided for in section 100 (1) and (2) of the Act stated hereunder-

"*(1) The Authority may from time to time prescribe a frequency band plan in respect of any part of the radio frequency spectrum.*

(2) A frequency band plan must –
(a) define how the radio spectrum must be used;
(b) aim at ensuring that the radio frequency spectrum is utilised and managed in an orderly, efficient and effective manner;

(c) aim at reducing congestion in the use of frequencies and at protecting frequency users from any interference or other inability to make use of the frequencies assigned to them;

(d) avoid obstacles to the introduction of new technologies and telecommunication services;

(e) aim at providing opportunities for the introduction of the widest range of telecommunication services and the maximum number of users thereof as is practically feasible."

Tasked with the control, management, planning and licensing of spectrum, the Authority has set out a regulatory framework consisting of regulations in respect of a national frequency band plan, frequency channeling plans, licensing procedures, licence conditions, fees and technical requirements to ensure the efficient and orderly use of spectrum as provided for in section 101 of the Act as highlighted below-

"101(2) *The Authority may issue a licence conferring on the licensee the right to use, or to cause any person in his or her employ or under his or her control to use a transmitter for any prescribed purpose or to use any radio frequency or group of radio frequencies or radio receiver for any purpose and in the manner prescribed or determined in the licence concerned.*

(5) The procedures for the application for licences, certificates and authorities referred to in this section and the information to be supplied for the consideration of applications must be prescribed.

(6) A spectrum licence is required as provided in subsection (2) in addition to any licence to operate a network or to provide telecommunications service or a broadcasting service issued under this Act, where the operation of the network or the provision of the service or the use thereof entails the use of radio waves as contemplated in that subsection.

(13) The Authority may amend a spectrum licence issued under subsection (2) –

(a) to implement any frequency band plan or in the interest of orderly frequency management, if the amendment will not cause substantial prejudice to the licensee."

Further to the above regulations the Authority has also published regulations setting out spectrum bands for utilisation, without a spectrum licence subject to the technical requirements and type approval of radio apparatus and equipment, to be utilised as provided for in terms of section 101(16) of the Communications Act, 2009 (Act No. 8 of 2009) that reads as follows -

"(16) The Authority may prescribe –

(a) categories of radio apparatus, the use or possession of which; or

(b) the circumstances in which the use or possession of radio apparatus, does not require a licence, certificate or authority in terms of this section or a permit in terms of section 102."

The control and management of spectrum utilisation requires the monitoring, investigation and enforcement of the aforementioned regulatory framework as set out by the Authority and are provided for in terms of section 102 and 114 to 127 of the Communications Act, 2009 (Act No.8 of 2009) that not only allows for the issuance of regulatory summonses but also the issuance of fines in the form of penalties and confiscation of equipment.

2. THE NATIONAL FREQUENCY BAND PLAN AS THE FOUNDATION OF SPECTRUM MANAGEMENT

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.

The International Telecommunication Union (ITU) divided the world in three regions with Africa forming part of Region 1 together with mainly Western Europe and the Russian Federation. The allocation of spectrum is decided upon by all ITU member states at the World Radio Conference held every four years after conclusion of technical studies to ensure inter-operability between services and technologies and consensus being reached on a worldwide basis prescribing utilisation of the various spectrum bands. Further thereto, SADC sets out is own frequency allocation plan to ensure harmonisation in the utilisation of spectrum in the region. Therefore the Authority allocates radio spectrum as contained in the frequency band plan of Namibia in line with regulations, final acts and recommendations issued by the ITU for Region 1 and the frequency allocation plan for SADC. The national frequency band plan for Namibia is published in the Government Gazette from time to time.

The national frequency band plan forms the foundation of spectrum management as a whole and sets out what radio services can use which frequencies as well as the pre-conditions for use of each spectrum band as applicable. The Authority reviews the national frequency spectrum band plan at least every four years following the outcomes of the ITU World Radio Conference to ensure alignment with development in technology, the Namibian economic and social environment, ITU regulations and regional harmonisation. If deemed necessary the Authority may also amend its strategy regulations, licensing conditions and fees following due regulatory process to ensure alignment with the national frequency band plan.

In reading the frequency band plan of Namibia[1], the following meaning is attached to the five (5) columns:

(a) First Column: ITU Region 1 Allocations and Footnotes

This column is an exact replica of the frequency allocations for ITU Radio Region 1 as contained in the Radio Regulations (edition 2016). All ITU footnotes, whether relevant to SADC countries or not, are therefore also included in this column. Frequency sub-bands are aligned with ITU Radio Regulations Article 5. The ITU philosophy for reflecting radiocommunication services in terms of primary and secondary, placing of footnotes and using French alphabetical order, therefore, also applies. Of particular importance is to note the following:

(i) PRIMARY services are printed in capitals;

(ii) SECONDARY services are printed in lower case;

(iii) The order of listing in each frequency band does not establish priority (listed alphabetically according the French language);

(iv) Where a footnote is printed next to a service that footnote applies only to that service; and

(v) Where a footnote is printed at the bottom of a frequency band that footnote applies to more than one service or all services allocated to the particular frequency band.

[1] Frequency Band Plan, Government Gazette No. 6160, General Notice No. 424 dated 28 October 2016

(b) Second Column: SADC Common Allocation/s and Relevant ITU Footnotes

This column denotes those radiocommunication service or services selected from the ITU allocations, which are recommended for common use within SADC countries. A "common" allocation is generally where nine (9) or more countries support a particular allocation. However, this column reflects all ITU listed services where there is no clear single "common" use or where the sub-band in question is not widely used within SADC countries. This will apply, for example, to the science services and the higher frequency bands where applications within the ITU allocations are not yet evident or mainstream.

ITU footnotes, contained in the national frequency band plan, which are underlined (e.g. 5.70) indicates that one or more SADC member country name is reflected in the particular footnote.

(c) Third Column: SADC Proposed Common Sub-allocations / Utilisation

Common utilisation of a particular frequency band or sub-band is reflected in this column. It could also limit an application to a smaller sub-band where needed or could indicate a broader sub-allocation where the application extends over more than one ITU frequency band. Where no sub-band is contained within this column it implies that the band limits, as used in columns 1 and 2, also apply to this application.

This column therefore contains more detail in terms of the common application or applications that are used within the band and is a clear indication of the main use of a particular frequency band. Although it is still possible to use a band for a purpose other than the common use, it means that such use is not prevalent in many countries (i.e. generally less than 9 countries).

Limitations in the use of a particular frequency band, according to the ITU Radio regulations, are also reflected in this column.

(d) Fourth Column: Namibian Allocation and relevant ITU footnotes

This column denotes those radio communication service or services selected from the ITU allocations that will be allocated in the Republic of Namibia.

The ITU philosophy for reflecting radiocommunication services in terms of primary and secondary, placing of footnotes and using French alphabetical order, therefore, also applies. Of particular importance is to note the following:

(i) PRIMARY services are printed in capitals;

(ii) SECONDARY services are printed in lower case;

(iii) The order of listing in each frequency band does not establish priority (listed alphabetically according the French language);

(iv) Where a footnote is printed next to a service that footnote applies only to that service; and

(v) Where a footnote is printed at the bottom of a frequency band that footnote applies to more than one service or all services allocated to the particular frequency band.

(e) Fifth Column: Additional Information

References to additional information are contained in this column, for example, references to relevant ITU Radio Regulations Articles and Appendices, ITU-R Recommendations, etc.

Technical limits applicable to one of more service or application are also added in this column where needed.

It should be noted that this column does not to include all relevant ITU provisions and technical parameters in this column and the relevant ITU provisions should therefore continue to be consulted.

As an outflow of the national frequency band plan the Authority publishes regulations setting out licence exempt spectrum indicating 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.

The use of radio apparatus within licence exempt spectrum bands must comply to the following conditions[2]-

(a) All radio apparatus must be type approved by the Authority in accordance with type approval regulations published in the Government Gazette from time to time;

(b) 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;

(c) The radio apparatus must be operated within, and not exceed, the technical parameters set out in the spectrum licence exempt regulations published in the *Gazette* from time to time;

(d) 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;

(e) The radio apparatus must not cause interference to any person issued with a spectrum use licence by the Authority; and

(f) The use of the radio apparatus in the licence exempt frequency spectrum operates on non-interference and zero protection bases for interference.

3. INTERNATIONAL SPECTRUM UTILISATION AND MANAGEMENT TRENDS

Development of wireless technologies and the utilisation of said technologies are dependent on how regulators manage spectrum going forward. Regulatory frameworks need to enable implementation of new platforms for broadband services leveraging on new network architectures and development of new applications based on new business models transforming available services and consumer demand. This study document considers the impact of fifth generation mobile networks, development in satellite technologies and the advent of internet-of-things.

[2] Regulations regarding Licence Exempt Spectrum, Government Gazette No. 4839, General Notice No. 395 dated 25 November 2011

3.1 Fifth Generation (5G) Mobile Networks

The continuing increase in demand for data services require further development of current mobile networks to provide for greater mobility and higher data rates and lower latency to support more users, connected devices and applications. The advent of IMT-2020, commonly referred to as 5G, will allow for the deployment of networks that provide for-

(i) An increase in data capacity and peak data rates

(ii) An decrease in latency;

(iii) An decrease in energy consumption;

(iv) More efficient utilisation of spectrum; and

(v) A significant increase in the number of applications supported by the advancement in technology.

The deployment of 5G networks will rely on the creation of ecosystems making use of different cell sizes and combining different technologies to allow for variances in coverage requirements, augment overall network capacity to provide ubiquitous services indoor and outdoor to users living in rural and urban areas.

Studies are underway to specify standard and performance criteria as well as technical studies to consider the allocation of spectrum at the upcoming ITU World Radio Conference to be held in 2019. The following spectrum bands, as listed hereunder, are under consideration for allocation to IMT services under the agenda points for WRC-19-

(i) 24.25-24.75 GHz
(ii) 31.33.4 GHz,
(iii) 37-40.5 GHz,
(iv) 40.5-42.5 GHz,
(v) 42.5-43.5 GHz,
(vi) 45.5-47 GHz,
(vii) 47-50.2 GHz,
(viii) 50.4-52.6 GHz,
(ix) 66-76 GHz; and
(x) 81-86 GHz.

3.2 Satellite Technologies

Satellite services are utilised to provide mainly data services in remote areas to complement terrestrial networks. Technological advancement has impacted on cost, capacity and capabilities of larger geostationary satellites whilst new innovations provides for quicker deployment of smaller satellites at lower cost.

(i) Geostationary High-throughput satellites

Legacy geostationary satellite systems are limited by power, capacity and transmission delays in providing communications services. These limitations are addressed by geostationary high-through put satellites utilising enhanced solar power systems and on-board processing for efficient use of spectrum for deployment of hybrid satellite/ terrestrial deployment and diversion of latency-sensitive services over shorter terrestrial transmission routes.

The said satellites are dependent on availability of spectrum in the Ku and Ka spectrum bands. Regulators should in planning for future spectrum needs consider whether these spectrum sources should be protected for satellite services or if it could be shared with other services to ensure optimal spectrum utilisation. In addition thereto regulators will need to review licensing regimes to allow for more competitors entering the market and provision of services in unserved rural areas

(ii) Non-geostationary satellites

Historically, non-geostationary satellites were deployed to support space science and earth exploration. However new class of commercial non-geostationary satellites are under development with the aim of providing broadband services and internet services directly to the consumer in unserved areas. Taking into account that these satellites operate at relatively low altitude it is foreseen that these networks will provide low latency comparable to terrestrial fibre networks, high capacity and wide coverage areas.

ITU-R is currently reviewing the satellite regulatory framework for filing of intended satellite launches, notification to ITU member states and coordination procedures to determine if any changes will be required as part of its preparatory work for WRC-19.

(iii) Nanosatellites

Nanosatellites, based on their innovative design, lightweight and low cost of deployment, are utilised by research institutions, governments and various industries for a wide variety of applications such as data imaging, tracking and earth exploration. As per the outcomes of WRC-15 it was determined that no review of current satellite regulatory regimes are required to make provision for utilisation of nanosatellites.

3.3 Internet-of-Things(IoT)

In a large number of use cases the devices that allow for IoT are based on machine-to-machines services which is an improvement on legacy services historically provided in the fleet management and manufacturing sectors. Technological development has resulted in innovative new services allowing for the interconnection of these devices through machine-to-machine and machine-to-person applications, big data analytics and improved cloud services. The aforementioned services is ultimately linked to IMT-2020, common standards and new delivery platforms.

As such these services will directly impact on regulatory frameworks in so far as licensing, standards, spectrum management, competition and privacy are concerned.

4. SPECTRUM ASSIGNMENT MODELS

National regulatory authorities tasked with licensing of spectrum consider various models to assign spectrum[3] and ensure efficient use of spectrum. These models are however not mutually exclusive and in most instances spectrum management regimes implement a combination of available models directed by the demand for spectrum within a specific country. Three spectrum licensing models is highlighted hereunder-

[3] J Aleden & c Schroeder: 2015: New Frontiers in Spectrum Licensing: Trends in Telecommunications Reform, ITU

(i) The *Administrative Licensing* model is commonly implemented when the demand for spectrum can be handled on a first-come-first-serve basis charging annual fees to licensees to cover spectrum management costs or to reflect the value of spectrum. This model is mostly adopted when the demand for spectrum is relatively low;

(ii) The *Flexible-Rights-of-Use* model follows an inherently economic perspective on spectrum licensing allowing the market to determine the value of spectrum by assigning spectrum through auctions thereby offering licensees the flexibility to use spectrum in the most economical rational way or assigning flexible rights of use for a set period of time subject to licence conditions. This model is mostly adopted when the demand for spectrum is higher than the amount of spectrum resources available; and

(iii) The *Licence-Exempt* model treats spectrum as a public commons taking advantage of technical characteristics utilised in these spectrum bands such as low power and short-range transmitters. It should be emphasised that this licence model does not imply that unlicensed devices can operate in an unrestricted way and are not regulated. All devices must comply to a set of detailed technical and operational specifications and are subject to type approval for use within the borders of the Republic of Namibia in order to ensure compatible use of a spectrum band by the same or different devices and services.

The aforementioned spectrum assignment models commonly referred to a "individual licensing" models allow for application of different assignment strategies for different types of uses, attaching the proposed economic value to spectrum enabling licensees to make rational decisions on how to use this scarce resource most effectively and efficiently and provide regulatory certainty to licensees to develop business models with the necessary predictability that they need to make long term investments in capital-intensive networks. The application of individual licensing models furthermore provides the Authority with information in respect of the utilisation of spectrum bands and allow for the establishment of a national database which is utilised for interference management and prevention of unauthorised or abusive use of spectrum. Going forward such spectrum databases may also represent a critical element for dynamic spectrum access technologies.

The Authority has followed an administrative licensing approached for all spectrum bands to date. However, the increasing demand for spectrum to provide electronic communications and broadcasting services necessitates the Authority to consider other licensing methods going forward.

In contradiction to earlier command-and-control service licensing regimes prescribing exactly what services could be offered, Namibia's service licensing regime is service and technology neutral providing flexibility in that it allow for consideration of a spectrum licensing regime allowing for technology neutrality, service neutrality, unified licensing or a combination of the three aforementioned licensing approaches as well as provisions for spectrum sharing mechanisms in addition to the current administrative licensing regime.

Implementation of a combination of the aforementioned approaches and assignment models will allow the Authority to stay abreast of changes in spectrum allocation and rollout of new services or replacement of legacy services.

4.1 Spectrum Auctions

One assignment option available to the Authority is spectrum auctions, as provided for under section 22(1)(g) of the Act, in the case of the spectrum bands with a high market value or high demand as may be the case based on the spectrum band under consideration and whether telecommunications or broadcasting services are to be provided.

Taking account of assignment methods employed by regulators across the world, utilising spectrum auctions[4] to assign spectrum best support regulatory objectives for both technical and market efficiency provided that local market conditions permit competitive bidding between licensees.

Auctions are well suited for assigning high value and high demand spectrum in that it-

(i) Allows licensees themselves to set the spectrum price rather than the regulator even though the regulator is responsible to set the auction method and reserve price for the spectrum licence under consideration;

(ii) Pricing set at auctions is comparatively free of political influence and collusion;

(iii) Spectrum auctions as a quicker method of assigning spectrum licence that other assignment methods available;

(iv) Spectrum licences are assigned to licensees that value it the most result in investment following sound economic principles;

(v) Promote rapid rollout of services in that licensees want to launch services as soon as possible to generate revenue to offset the price paid at auction;

(vi) Licensees with extensive financial resource may inflate prices during bidding process resulting in licensees with limited financial resources not being able to acquire spectrum and

(vii) Support competition in the market.

The regulator is responsible for determination of the reserved price tag attached to each spectrum block intended to be auctioned as well as the auction method to be followed. Various factors are considered during the planning phase such as-

(i) The number of spectrum licences that will be offered;

(ii) Whether licences will be offered on a national or regional basis;

(iii) Imposition of network rollout obligations;

(iv) Size of spectrum blocks attached to each spectrum licence to be auctioned;

(v) Whether the spectrum blocks to be auctioned will be limited to one spectrum band or a combination of spectrum bands;

(vi) Payment obligations;

(vii) Impositions of spectrum caps to address market power concerns;

(viii) Special conditions to encourage new entrants or smaller licensees to take part in the auctions; and

(ix) Designing the auction process and rules to prevent collusions and ensure transparency.

[4] ITU: Guidelines for the review of spectrum pricing methodologies and preparation of spectrum fee schedules: 2016

4.2 Assignment based on First-Come-First- Serve

Administrative assignment of spectrum on a first-come-first-serve basis is the most common approach adopted by regulators across the world. The licensing process is consequential commencing with receipt of the application, evaluation process and assignment of spectrum applied for based on the frequency available. The aforementioned assignment method is most suitable when there is no shortage of spectrum and potentially a large number of applications will be processed over a specified time period.

The Authority is currently assigning spectrum on a first-come-first-serve basis. However, based on technological development, lack of efficient use of spectrum, spectrum regulatory trends, market growth and high demand for spectrum for broadcasting and telecommunications services, the Authority is considering to utilise other spectrum assignment methods going forward.

5. SPECTRUM SHARING

Spectrum sharing[5] encompasses administrative, technical and market-based techniques taking into consideration that spectrum can be shared in several dimensions namely time, space and geography. Traditionally spectrum is assigned with the primary aim to minimize interference through specification of technical parameters and rules determining how, where, when and by whom spectrum can be used. However, the ever increasing demand for spectrum and emerging technologies has brought the need to consider economic efficiency to the fore representing one of the main challenges in spectrum management namely, the need to re-assign spectrum whilst addressing ongoing legacy use of the same spectrum band. One option available to regulators is to make provision for the sharing of spectrum.

Typically spectrum sharing allows for more than one user to share the same band of spectrum for providing different services utilising different technologies. Sharing of spectrum may be based on one or more principles as set out below-

(i) Administrative principles based on regulatory decisions in respect of where sharing should take place subject to rules, technical standards, equipment specifications and equipment type approval following one or more processes including

a. Setting assignment strategies based on market demand and establishing fair, efficient and transparent licensing processes;

b. Evaluation of existing assignments determine how much spectrum can be assigned on a shared or non-exclusive basis;

c. Identify bands where immediate changes can take place base on spectrum audits conducted by the regulator;

d. Specification of spectrum efficient technologies;

e. Consider mechanisms such as spectrum fees to provide an incentive to use less spectrum;

(ii) Economic principles to ensure that spectrum is assigned in a way that the benefits to the overall economy is the same as the benefits derived from different uses of spectrum for an equivalent incremental amount of spectrum assigned to either use; and

[5] A Foster & J Alden:2008: Spectrum Sharing: 8th Global Symposium for Regulators, ITU

iii) Technical principles to ensure efficient use of spectrum.

Sharing of spectrum in the Namibian context, to date, is allowed based on administrative and technical principles in so far that -

(i) More than one service has been allocated in the frequency band plan on a primary or secondary basis in accordance with the technical conditions attached thereto as subject to a spectrum licence awarded by the Authority; and

(ii) That the Authority has awarded a spectrum licence for a specific geographic location in accordance with the frequency band plan and applicable channelling plans.

The award of a spectrum licences as provided for in section 101(2) of the Act confers the "right to use" spectrum over a specified period of time to a licensee taking into account that spectrum is a national asset. No ownership rights to spectrum are transferred to any licensee. Licensees are therefore prohibited from entering into any form of spectrum trading as set out hereunder-

(i) Buy-back practices allow for the re-sale of spectrum to another party with an agreement that the seller will buy back the usage right at a fixed point in the future;

(ii) Leasing of spectrum through which action the usage right is transferred to another party for a defined period of time but ownership remains with the original rights holder; and

(iii) Mortgaging of spectrum by which action the usage right is used as collateral for a loan, analogous to taking out a mortgage on a house.

However, it should be noted that sub regulation 7 of the Regulations regarding Licensing Procedures for Telecommunications and Broadcasting Service Licences and Spectrum Use Licences as published in Government *Gazette* No. 4785, General Notice No. 272 dated 29 August 2011 makes provision for the transfer of spectrum licences and transfer of control of spectrum licences subject to the provisions of the said regulations and the approval of the Authority.

6. SPECTRUM PRICING

Spectrum fees[6] forms an integral part of spectrum strategy and management to ensure that licensees pay a fair value for spectrum so that radio-based technologies can be implemented and expanded by all licensees irrespective of their size. Subsequently the setting of spectrum fees is not only based on economic and market factors, but are also determined by-

(i) Technical factors such as which technologies are deployed to offer what services utilising the assigned spectrum;

(ii) The efficiency of spectrum use achieved by deploying new advanced technologies in lieu of continued operation of legacy technologies;

(iii) The quality of service offered; and

(iv) The method of assignment of spectrum to licensees and users.

[6] ITU: Guidelines for the review of spectrum pricing methodologies and preparation of spectrum fee schedules: 2016

Taking the aforementioned factors into account and the fact the spectrum is a scarce limited and critical resource to facilitate the implementation of radio communication services the following principles should be considered in determining spectrum fees -

(i) Creating regulatory certainty and ensure flexibility in how spectrum is used;

(ii) Choosing the least cost and restrictive approach to achieve spectrum management objectives;

(iii) Maintaining a balance between cost of interference and the benefits that may be achieved from greater spectrum utilisation;

(iv) Setting spectrum fees in a fair and objective manner ensuring equitable access to all spectrum licensees in a specific spectrum band;

(v) Balancing administrative simplicity against requirements to encourage efficient use of spectrum taking into account requirements in respect of coverage and bandwidth to achieve an acceptable level of quality of service;

(vi) Allocating spectrum to the highest value use in case of more than one service being allocated in the same spectrum band as indicated in the frequency band plan of Namibia; and

(vii) Putting mechanisms in place to encourage and enable spectrum licensees to move to those services that will provide the highest value of use in a specific spectrum band.

Whilst giving due regard to the aforementioned principles it is also necessary for the Authority to consider reviewing of spectrum fees at suitable intervals to provide for advancement in technologies and an increase in demand in specific spectrum bands, prevent hoarding of spectrum to deter competition or making provision for changes in economic indicators. Spectrum fees is therefore considered with the following objectives in mind-

(i) Advancing important national socio-economic objectives;

(ii) Ensuring that all cost associated with management and regulation of spectrum as well as monitoring and controlling the utilisation of spectrum by all spectrum users are recovered; and

(iii) Ensuring that spectrum fees are set at a level that promotes efficient use of spectrum by spectrum licensees.

6.1 Mechanisms for spectrum pricing

Worldwide regulators determine spectrum fees through administrative, market based or a combination of administrative and market-based methods apply the one or more mechanisms discussed hereunder.

Spectrum management and regulation includes the costs associated with planning of spectrum on a national, regional and international level, maintaining of spectrum database, issuance, withdrawal, modification and amendment of spectrum licences which is factored into the calculation of administrative spectrum fees. In addition thereto the activities of each spectrum licensee impose direct costs on the organisation mandated with spectrum management through monitoring and enforcing adherence to spectrum licence conditions as attached to spectrum licences awarded. In the case of Namibia the Authority is mandated to perform all functions related to spectrum management as set out in section 99 of the Communications Act.

The Authority may consider one or more mechanisms or approaches for setting of spectrum fees as highlighted hereunder -

(i) The application of an **administrative cost based approach** determining spectrum fees that reflect the amount of spectrum assigned to a licensee, ensure efficient utilisation of the said spectrum and is set at a level deemed sufficient to recover the cost of spectrum management as per the regulator's mandate highlighted above.

Activities in relation to spectrum management incur both direct and indirect costs associated with organisational overheads, issuance of spectrum licences, maintaining spectrum databases, monitoring and enforcement of conditions attached to spectrum licences. The aforementioned costs may be common to a specific spectrum band or service, common to a group of spectrum bands or represent an overarching cost spanning across spectrum management as a function within the organisation of the regulator;

(ii) The application of an administered incentive pricing approach setting spectrum fees at level that not only ensure efficient utilisation and reflect spectrum scarcity but is also reflective of the economic value of spectrum considered for assignment as calculated based on the opportunity cost of spectrum with the incorporation of incentives;

(iii) The application of a market-based economic approach determining the economic value of spectrum and assign such spectrum via spectrum auctions, during which process the value of the spectrum is based on the price paid by the successful bidder, which price may match or exceed the reserve price determined by the regulator prior to the auction.

6.2 Factors to be considered when determining spectrum fees

It is necessary for regulators to weigh various factors when setting fees for spectrum assignment. These factors are not limited to technical characteristics of services to be deployed, but include socio-economic, technical and fiscal factors applicable to each spectrum band allocated to one or more services as set out in the frequency band plan as well as funding of the regulator's operations in respect of spectrum management.

The value of spectrum is affected by changing technologies, regional and international harmonisation, commercial availability and cost of equipment and consumer demand. These factors impacts on both the demand and supply of spectrum. The demand for spectrum may increase as consumer demand for services rises or decrease demand as technology development provide for migration of services to other more suitable spectrum bands, whilst spectrum supply may increase through utilisation of new technologies that allow more efficient use of the same amount of spectrum to provide more services.

Further consideration is given to issues of scarcity or non-scarcity of spectrum, demand for spectrum in a given band, ensuring that spectrum is made available to entities that place high value on the spectrum and use it optimally, assignment of spectrum based on fair and transparent principles and type and duration of spectrum licences when setting spectrum fees.

Lastly taking into consideration that the Authority is not funded by the Namibian Government, the Authority sets spectrum fees based on full recovery of costs incurred by the Authority in executing its mandate as set out in the Communications Act, 2009 in relation to spectrum management.

7. ASSESSMENT OF AVAILABLE SPECTRUM

The Authority conducted an assessment of available spectrum for the deployment of telecommunications and broadcasting services throughout Namibia based on assigned spectrum licences as on 31 January 2018.

7.1 Telecommunications services

For the purpose of this report the Authority will focus on spectrum utilised for wireless transmission networks (fixed links), fixed broadband wireless access services, fixed satellite services and international mobile communications services (IMT).

(i) Spectrum bands allocated for fixed wireless transmission networks

Spectrum in the spectrum bands listed below is available for assignment to licensees for the implementation of point-to-point fixed wireless transmission links to facilitate a wireless backhaul connection between transmitter sites-

a) 7 GHz;
b) 8GHz;
c) 10 GHz;
d) 11 GHz;
e) 13 GHz;
f) 15 GHz;
g) 18 GHz;
h) 23 GHz;
i) 26 GHz;
j) 28 GHz;
k) 32 GHz; and
l) 38 GHz.

To date the Authority has assigned spectrum in the 7GHz, 8GHz, 10 GHz, 11 GHZ, 15 GHZ, 18 GHz and 26 GHZ on a local, regional or national basis depending on the application submitted for consideration.

The aforementioned spectrum bands together with the other spectrum bands not yet assigned provides sufficient spectrum for assignment for fixed wireless transmission links going forward.

(ii) Spectrum bands allocated for fixed wireless access services via point-to-point and point-to-multipoint links

Spectrum in the spectrum bands listed below is available for assignment to licensees for the implementation of point-to-point and point-to-multipoint fixed wireless access network e.g. Wimax-

a) 2500-2690 MHz (2600 band);
b) 3300-3400 MHz (3300 band);
c) 3400-3600 MHz (3500 band); and
d) 3600-3800 MHz (3600 band).

Spectrum in the aforementioned bands are assigned on a national basis.

It should be noted that most of the spectrum in these bands were transitioned in terms of section 135 of the Act in accordance with the spectrum licence awarded by

the then Namibian Communications Commission. Telecom Namibia Limited holds licences in three of the four spectrum bands amounting to 142 MHz.

The status of available spectrum in the four (4) spectrum bands as shown above can be summarized as follows-

a) The spectrum band 2500-2690 MHz (190 MHz) is assigned to Telecom Namibia Limited (6 MHz), Paratus Telecommunications (Pty) Ltd (40 MHz) and Converged Telecommunications Solutions (Pty) Ltd (30 MHz). It should be noted that Paratus Telecommunications (Pty) Ltd have submitted an application for an amendment to the conditions attached to their spectrum licence to utilise the spectrum for IMT services replacing the Wimax services provided to date in accordance with Resolution 223 mentioned above;

b) The spectrum band 3300-3400 MHz (100 MHz) has been assigned partly to Mwireless (Pty) Ltd holding 44.5 MHz for provision of Wimax services. The remaining 55.6 MHz of available spectrum will be considered for assignment for IMT services going forward as per the outcomes of WRC-15 once the frequency channeling plan has been approved by ITU and the Authority has calculated the market value of this spectrum;

c) The majority of spectrum in the spectrum band 3400-3600 MHz (200 MHz) is assigned to Telecom Namibia Limited on a national basis amounting to 84 MHz. ; and

d) The spectrum band 3600-3800 MHz (200 MHz) has been partly assigned to Witel Service Provider (Pty) Ltd holding spectrum licences for 25 MHz. The Authority still has a total of 160 MHz of spectrum available to be considered for assignment to provide fixed broadband wireless access services.

Spectrum Band	Telecom Namibia Limited	Mwireless Namibia (Pty) Ltd	Witel Service Provider (Pty) Ltd	Converged Telecommu-nications Solutions
2600 band	1x 6 MHz	None	None	1x 30 MHz
3300 Band	None	1x 44.5 MHz	None	None
3500 Band	1x 84 MHz	None	None	None
3600 Band	None	None	1x 25 MHz	None

As per Resolution 223 contained in the Final Acts from WRC-15 the spectrum bands 2500-2690 MHz, 3300-3400 MHz and 3400-3600 MHz have been allocated on a co-primary basis to IMT services to facilitate the implementation of LTE (4G) and 5G networks for fixed and mobile broadband services. The Authority therefore no longer consider applications in the spectrum bands for point-to-point and point-to-multipoint links to provide fixed wireless access

(iii) **Spectrum bands allocated for fixed satellite services**

Spectrum in the spectrum bands listed below is available for assignment to licensees for the implementation of fixed satellite services e.g. VSAT -

a) 3900-4200 MHz (C-Band);
b) 11.68-13.25 GHz (Ku-Band);
c) 13.40-13.65 GHz (Ku-Band);

d) 13.75-14.80 GHz (Ku-band);
e) 15.43-1563 GHz (Ku-Band); and
f) 17.3-21.2 GHz (Ku-Band).

Fixed satellite deployments in Namibia has mainly been done in the Ku-Band with a few deployments in the C-band given that these satellites provides the best coverage across the entire Namibia. These deployments are utilised to provide backhaul for sites in rural areas and to provide data and voice services to customers at various geographical locations throughout Namibia. Spectrum is therefore assigned on a national basis and the Authority has sufficient spectrum available in all aforementioned bands for the future needs of licensees to deploy fixed satellite services.

The Authority has assigned fixed satellite spectrum to Telecom Namibia Limited, Mobile Telecommunications Limited, Paratus Telecommunications (Pty) Ltd, Mwireless (Pty) Ltd t/a Africa Online and MTN Business Solutions (Pty) Ltd.

(iv) **Spectrum bands allocated for international mobile telecommunications (IMT) services**

Spectrum in the spectrum bands listed below is available for assignment to licensees for the implementation of IMT services and networks e.g. 2G, 3G, LTE (4G), 5G and IoT providing voice, data and machine-to- machines services -

a) 694-790 MHz (700 band);
b) 790-862 MHz (800 band);
c) 880-915 MHz paired with 925-960 MHz (900 band)
d) 1427-1518 MHz (1500 band);
e) 1710-1785MHz paired with 1805-1880 MHz (1800 band);
f) 1920-1980 MHz paired with 2110-2170 MHz (2100 band);
g) 2300-2400 MHz (2300 band);
h) 2500-2690 Mhz (2600 band)
i) 3300-3400 MHz (3300 band)
j) 3400-3600 MHz (3500 band)

Spectrum in the aforementioned bands is assigned on a national basis. These spectrum bands allocated to IMT services are regarded as “high demand” bands for deployment of fixed and mobile broadband services.

It should be noted that most of the spectrum in these bands were transitioned in terms of section 135 of the Act, as it was already assigned by the Namibian Communications Commission for fixed wireless broadband access. It should be noted that not all of the aforementioned bands are available for assignment given that these bands are newly assigned to IMT services by ITU.

As per Resolution 223 contained in the Final Acts from WRC-12 and WRC-15 respectively, the spectrum bands 2500-2690 MHz, 3300-3400 MHz and 3400-3600 MHz have been allocated on a co-primary basis to IMT services to facilitate the implementation of LTE (4G) and 5G networks for fixed and mobile broadband services.

The status of available spectrum in the ten (10) spectrum bands as shown above can be summarized as follows-

a) The spectrum band **694-790 MHz (700 band)** has been allocated to IMT services at WRC-15. The utilisation of the aforementioned spectrum for IMT services requires the migration of analogue television broadcasting services to the spectrum band 470-694 MHz allocated for digital terrestrial television (DTT) broadcasting services. The Authority has made the spectrum band 470-694 MHz available for migration to DTT since 2013. The Namibian Broadcasting Corporation still need to migrate three (3) transmitters located in the Kavango region out of the 694-790 MHz (IMT) spectrum band to the 470-694 MHz (DTT) spectrum band prior the assignment of spectrum to telecommunications service licensees.

The Authority has finalised the initial frequency channeling plan in accordance with the ITU approved frequency channeling plans and is currently in the process of determining the market value of this spectrum band to publish spectrum fees as well as the assignment method to be used for consideration of spectrum assignments to telecommunications service licensees. In the interim a moratorium has been place on the band as per the board meeting held 9 September 2016 to allow the Authority time to complete the aforementioned processes.

This spectrum band will provide 60 MHz of spectrum to be considered for IMT services and implementation of TDD (time division duplex) LTE networks going forward.

b) The spectrum band **790-862 MHz (800 band)** has been allocated to IMT services at WRC-12. The utilisation of the aforementioned spectrum for IMT services requires the migration of analogue television broadcasting services to the spectrum band 470-694 MHz allocated for digital terrestrial television (DTT) broadcasting services. The Authority has made the spectrum band 470-694 MHz available for migration to DTT since 2013. All analogue television spectrum previously assigned in the band has been withdrawn. The Authority is in the process of facilitating the migration of broadcasting studio links to an appropriate spectrum band prior the assignment of spectrum to telecommunications service licensees.

The Authority has finalised the initial frequency channeling plan in accordance with the ITU approved frequency channeling plans and is current in the process of determining the market value of this spectrum band to publish spectrum fees as well as the assignment method to be used for consideration of spectrum assignments to telecommunications service licensees. In the interim a moratorium has been place on the band as per the board meeting held 9 September 2016 to allow the Authority time to complete the aforementioned processes.

This spectrum band will provide 60 MHz of spectrum to be considered for IMT services and implementation of FDD (frequency division duplex) LTE networks going forward.

c) Mobile Telecommunications Limited and Telecom Namibia Limited holds spectrum licences for 2x 18 MHz and 2x 12 MHz of spectrum respectively, providing 2G and 3G services in the spectrum band **880-915 MHz paired with 925-960 MHz (900 band)** on a national basis. The Authority still has 4.8 MHz of spectrum available in this band for assignment should an application in this regard be received taking into account that a guard band of 0.2 MHz must remain vacant to prevent possible interference with the adjacent spectrum band.

d) The spectrum band **1427-1518 MHz (1500 band)** has been allocated for IMT services at WRC-15. Harmonised frequency channeling plans are currently being developed at SADC level for the deployment of TDD LTE networks and will be

submitted to ITU for approval on completion thereof at the Radio Assembly prior to WRC-19. The Authority is also in the process of determining the market value of spectrum to set spectrum fees.

This spectrum band will provide 90 MHz of spectrum to be considered for IMT services by 2020.

e) The spectrum band **1710-1785 MHz paired with 1805-1880 MHz (1800 band)** is fully assigned to Mobile Telecommunications Limited (2x 35.2 MHz), Telecom Namibia Limited (2x 20 MHz) and Paratus Communications (Pty) Ltd (2x19.8 MHz) for implementing FDD LTE networks providing 4G services on a national basis.

There is no spectrum available for further assignment.

f) Mobile Telecommunications Limited, MTN Business Solutions Namibia (Pty) Ltd and Telecom Namibia Limited holds spectrum licences for 2x 20 MHz each in the spectrum band **1920-1980 MHz paired with 2110-2170 MHz (2100 MHz)** for implementation of mobile telecommunications networks providing 3G services.

There is no spectrum available for further assignment.

g) MTN Business Solutions (Pty) Ltd holds a spectrum licence for 10 MHz in the spectrum band 2300-2400 MHz (2300 band) to implement a TDD-LTE network providing 4G data services and machine-to-machine service utilising IoT technologies.

h) The spectrum band **2500-2690 MHz (2600 band)** has largely been re-farmed for the deployment of TDD-LTE to provide IMT services. Telecom Namibia Limited holds spectrum licences for 86 MHz to implement TDD-LTE networks. Paratus Telecommunications (Pty) Ltd has submitted an application for amendment of its current spectrum licence of 40 MHz to allow for implementation on TDD-LTE. The said application is pending publication in the *Gazette* for public comments.

i) Mwireless (Pty) Ltd holds spectrum licences (44.5 MHz) in the spectrum band 3300-3400 MHz (3300 band) for implementation of a fixed wireless broadband access network providing broadband data services utilising Wimax technology. These spectrum licences not been awarded on a national basis and is applicable for Windhoek and Okahandja only as per the assignments initially done by the then Namibian Communications Commission.

The spectrum band 3300-3400 MHz has been assigned for IMT services at WRC-15. Harmonised frequency channeling plans are currently being developed at SADC level for the deployment of TDD LTE networks and will be submitted to ITU for approval on completion thereof at the Radio Assembly prior to WRC-19. The Authority is also in the process of determining the market value of spectrum to set spectrum fees.

This spectrum band will provide and additional 100 MHz of spectrum to be considered for IMT services by 2020.

The spectrum band 3400-3600 MHz has been allocated to IMT services at WRC-12 on a co-primary basis with fixed services. ITU has also approved a frequency channeling plan for assignment of spectrum in this band for TDD-LTE networks.

The Authority has assigned 20 MHz of spectrum to MTN Business Solutions Namibia (Pty) Ltd in this band for the implementation of a TDD-LTE (4G) network and 5G going forward to provide IMT services.

A further 110 MHz of spectrum is available for assignment to IMT services should an application in this regard be received by the Authority.

A summary of current spectrum licences awarded in the aforementioned IMT spectrum bands is shown in Table 1 -

Table 1: Spectrum Licences awarded to provide IMT services

Spectrum Band	**Mobile Telecommunications Limited**	**Telecom Namibia Limited**	**Paratus Telecommunications (Pty) Ltd**	**MTN Business Solutions Namibia (Pty) Ltd**
900 Band	2x 18 MHz (FDD)	2x 12 MHz (FDD)	None	None
1800 Band	2x 35.2 MHz (FDD)	2x 20 MHz (FDD)	2x 19.8 MHz (FDD)	None
2100 Band	2x 20 MHz (FDD)	2x 10 MHz(TDD)	None	2x 20 MHz (FDD)
2300 Band	None	None	None	1x 10 MHz (TDD)
2600 Band	None	1x 86 MHz (TDD)	1x 40 MHz (TDD) application under consideration	None
3500 Band	None	None	None	1x 20 MHz (TDD)

7.2 Broadcasting services

It should be noted that broadcasting spectrum is assigned for specific geographical areas based on the power output and geographical location of transmitters. The Authority focussed on radio and television broadcasting spectrum although broadcasting services licensees also utilise fixed wireless and satellite spectrum for backhaul transmission to broadcasting studios.

(i) **Spectrum band allocated for digital terrestrial television (DTT) broadcasting services**

The Authority published its frequency channeling plan for digital terrestrial television in the spectrum bands 174-230 MHz and 470-694 MHz after completion of cross border frequency interference coordination and ITU approval on 29 May 2013. The frequency channeling plan makes provision for the operation of four (4) multiplexers in eighty six (86) geographical locations.

The Namibian Broadcasting Corporation (NBC) was designated as the common signal distributor with the objective that community and commercial television broadcasters will be carried on the multiplex owned and operated by the NBC making the broadcasting channels of the aforementioned broadcasting licensees available as part of the channel bouquet available on NBC's set-top boxes/decoders on a national basis. At present One Africa Television (Pty) Ltd and Trinity Broadcasting Namibia (TBN) are carried on the NBC multiplexer. The Authority assigned spectrum to NBC on the first multiplexer to allow for the migration of all television broadcasting licensees from analogue television services to digital terrestrial services. To date only thirty five (35) transmitters have been implemented by NBC providing digital television broadcasting services to 72% of the population.

Multichoice Namibia (Pty) Ltd has been assigned spectrum on the second and third multiplexer to accommodate the GoTV bouquets in the geographical areas of Windhoek, Swakopmund, Walvis Bay, Oshakati and Rundu. The rest of Namibia is served via satellite television services via the various DSTV bouquets. One Africa Television (Pty) Ltd and NBC are carried on all DSTV and GoTV bouquets.

Considering the limited rollout of digital terrestrial television the Authority deems that there is sufficient spectrum available should spectrum application be submitted for consideration by new television broadcasting licensees.

(ii) **Spectrum band allocated for analogue radio broadcasting services**

To date the Authority has assigned spectrum in 88-108 MHz to twenty-nine (29) radio broadcasting licensees, excluding NBC, in various geographical areas throughout Namibia. It should be noted that although NBC has not been awarded a public broadcasting service licence pending the enabling of section 93 of the Act by the Authority, NBC holds spectrum licences to allow for the provision of radio broadcasting services as per their mandate as public broadcaster.

NBC holds spectrum licences for 70% of analogue radio broadcasting spectrum available for assignment in the 88-108 MHz spectrum band. The status of available spectrum for analogue radio broadcasting services can be summarized as follows in different geographical areas-

a) **Windhoek, Rehoboth & Okahandja** – The FM analogue radio spectrum band is fully assigned with the exception of the frequency revoke based on the non-renewal of NCBC's broadcasting service licence. At present the

Authority has a waiting list of eight (8) applications. Given that the licensing procedure regulations require the assignment of spectrum on a-first-come-first basis the Authority will consider the application received at the earliest date for assignment of this frequency;

b) **Rössing Mountain, Walvis Bay, Swakopmund, Henties Bay** – The Authority is currently considering the last two frequencies for possible assignment to analogue radio broadcasting service licensees in this geographical area. Going forward no further spectrum will be available until such time that a spectrum licence is withdrawn or cancelled by the Authority;

c) **Oshakati, Ondangwa** – available spectrum is limited to two frequencies that can be considered for assignment depending on envisaged transmitter output should an application in this regard be submitted to the Authority;

d) **Keetmanshoop** - available spectrum is limited to two frequencies that can be considered for assignment dependent on envisaged transmitter output should an application in this regard be submitted to the Authority;

e) **All other geographical areas**- There is sufficient spectrum available in all other geographical areas throughout Namibia for assignment especially in southern and northwestern regions that are underserved by the commercial broadcasting licensees and NBC.

(iii) **Spectrum allocation for future digital radio broadcasting services**

The SADC ICT Ministers approved the regulatory framework guidelines for digital radio broadcasting services at in meeting held in September 2017 for implementation by the regulatory authorities in all SADC member states.

Four (4) spectrum bands namely 214-230 MHz, 5.95-26.1 MHz, 148.5-200 kHz and 535.1-1605 kHz has been identified for implementation of digital radio broadcasting. The aforementioned spectrum bands have already been allocated to broadcasting services in the frequency band plan of Namibia as per the final acts of WRC-15.

Digital radio broadcasting implementation is aimed at enhancing the quality of sound broadcasting and introduction of infotainment services and providing additional spectrum capacity to foster further market development in the broadcasting industry without discontinuing analogue sound broadcasting. It should be noted that a target of 100% geographical coverage for digital radio broadcasting is contained in both the Harambee Prosperity Plan and draft National Broadband Policy by 2020.

The Authority together with all other SADC regulators will commence with development of frequency channeling plans and cross border frequency coordination in 2018 to allow for the release of the aforementioned spectrum band for digital radio broadcasting in 2020.

The Authority will also need to review is broadcasting regulatory framework and amend licence conditions, spectrum fees and licensing procedures to allow for issuance of spectrum and broadcasting service licences going forward.

8. DEFINITIONS

"**Act**" means the Communications Act, 2009 (Act No. 8 of 2009)

"Allocation" means an entry into the spectrum band plan of a given frequency band for the purpose of its use by one or more terrestrial or space radio communication services or the radio astronomy service under specified conditions

"Assignment" means the authorisation given by an administration/regulator for a radio station to use a radio frequency or radio frequency channel under specified conditions

"**Authority**" means the Communications Regulatory Authority of Namibia established in terms of section 4 of the Act

"eLTE-IoT" means e-Longterm Evolution – Internet of Things

"FAP" means Frequency Allocation Plan

"**ITU"** means the International Telecommunication Union

"IMT" means International Mobile Telecommunications

"LSA" means Licensed Shared Access

"PPDR" means Public Protection and Disaster Relief

"Radio Apparatus" means any equipment or interconnected system or subsystem of equipment (both transmission and reception) that is used to communicate over a distance by modulating and radiating electromagnetic waves in space without artificial guide

"Radio Frequency Spectrum Migration" means the movement of users or uses of radio frequency spectrum from their existing radio frequency spectrum location to another

"SADC" means Southern African Development Community

"SRD" means short range device

"WRC" means World Radio Conference

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PART 2

SPECTRUM ASSIGNMENT STRATEGY

INDEX

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 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 the 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 spectrum.

The said strategy will form the basis for review of the Authority's spectrum regulatory framework in accordance with regulatory processes allowing for public consultation during the review process.

2. OBJECTIVES

Radio Frequency Spectrum is a limited 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 strategy, legislation, regulations and procedures.

Authority will fulfil its role in 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;

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 dividend to address gaps in communications services and access to ICT infrastructure;

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 licence 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 regulatory framework as pertaining to spectrum management as set out by the Authority.

3. FREQUENCY BAND PLAN OF NAMIBIA

The International Telecommunication Union (ITU) divided the world in three regions with Africa forming part of Region 1 together with mainly Western Europe and the Russian Federation. Thus 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* will be based on the spectrum allocations of ITU Region 1.

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.

4. FREQUENCY CHANNELING PLANS TO BE DEVELOPED BY THE AUTHORITY UNTIL 2020

The Authority has commenced with development of frequency channeling plans in accordance with the Final Acts of WRC-15 for telecommunications services for IMT and PPDR implementation and the SADC ICT Minister's decision in respect of implementation of digital sound broadcasting.

4.1 Telecommunications services using IMT technologies

4.1.1 The spectrum band 694-790 MHz (700 band)

The spectrum band **694-790 MHz (700 band)** has been allocated to IMT services as per Resolution 223 at WRC-15. In addition thereto, member states are required to reserve spectrum in the aforementioned band for PPDR services using IMT technologies in terms of Resolution 646 (Rev. WRC-15).

Work is currently in progress at CRASA and SADC level to propose frequency channel arrangements to include PPDR services using IMT technologies in the 700 band for consideration at an international level at the ITU Radio Assembly scheduled for November 2019(RA-19).

The Authority is participating in the process and is cognisant of any possible impact on the assignment of spectrum in the 700 band prior to the outcomes of RA-19.

4.1.2 The spectrum band 1427-1518 MHz (1500 band)

The spectrum band **1427-1518 MHz (1500 band)** has been allocated to IMT services as per Resolution 223 at WRC-15. Work is currently in progress at CRASA and SADC level to propose frequency channel arrangements for consideration at an international level at the ITU Radio Assembly scheduled for November 2019(RA-19).

The Authority will commence with a public consultation process for assignment of the aforementioned spectrum, licensing procedures and spectrum fees in 2020 based on the outcomes of RA-19.

4.1.3 The spectrum band 3300-3400 MHz (3300 band)

The spectrum band **3300-3400 MHz (3300 band)** has been allocated to IMT services as per Resolution 223 at WRC-15 contained in footnote 5429A. Work is currently in progress at CRASA and SADC level to propose frequency channel arrangements for consideration at an international level at the ITU Radio Assembly scheduled for November 2019(RA-19).

The Authority will commence with a public consultation process for assignment of the aforementioned spectrum, licensing procedures and spectrum fees in 2020 based on the outcomes of RA-19.

4.2 Broadcasting services

4.2.1 The spectrum band 87.5-108 MHz (FM analogue broadcasting)

The Authority is planning a review of the current frequency channeling plan in 87.5-108 MHz due to the high demand for frequencies to implement analogue FM radio frequencies. The aforementioned process will be concluded after public consultation on the impact of the new frequency channeling plan on current spectrum licensees, cross border frequency coordination and ITU approvals.

The Authority will commence with a public consultation process for assignment of the aforementioned spectrum, licensing procedures and spectrum fees in 2019 based on the outcomes of aforementioned processes.

4.2.2 The spectrum band 174-230 MHz (digital sound broadcasting)

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

To Authority intends implementation of the Digital Audio Broadcasting (DAB) technology in the VHF III band from 174-230 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.

The frequency channeling plan will be finalised following a public consultation process in respect of available frequencies for assignment, licensing procedures, licence conditions and spectrum fees.

4.2.3 The spectrum bands 148.5-200 kHz and 535.5-1606.5 kHz (digital sound broadcasting)

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

To date the Authority has not awarded any spectrum licences to provide short wave or medium wave analogue broadcasting services. The aforementioned spectrum bands are therefore unutilised to date.

Authority intends implementation of the Digital Audio Mondiale (DRM) technology in the 148.5-200 kHz and 535.5-1606.5 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 channeling plan will be finalised following a public consultation process in respect of available frequencies for assignment, licensing procedures, licence conditions and spectrum fees.

5. SPECTRUM BANDS TO BE RELEASED FOR ASSIGNMENT BY 2019

The Authority has published the frequency channeling plans for **694-790 MHz (700 band) and 790-862 MHz (800 band)** in Government Gazette No. 6160, General Notice No. 423 dated 28 October 2016.

The Authority intends to make the aforementioned spectrum bands available for telecommunications services using IMT technologies after conclusion of its review of regulations in respect of spectrum licensing procedures, spectrum licence conditions and spectrum fee for the aforementioned bands. It is foreseen that these spectrum bands will be considered for assignment in blocks of 2 x 10 MHz to ensure equitable spectrum distribution between telecommunications service licensees in the 800 and 700 band respectively The abovementioned spectrum bands will be open for application following the publication of a formal notice in the *Gazette* in 2019.

6. 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 and Regulations in respect of Type Approval and Technical Standards for Telecommunications Equipment as published in the Government from time to time;

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 in regard to network infrastructure and services to the Authority for information purposes on a bi-annual basis.

CRASA and SADC is current considering the inclusion of SRDs to provide eLTE-IoT services in the 865-868 MHz spectrum band on a spectrum licence exempt basis subject to imposition of technical conditions in respect of power output, maximum occupied bandwidth and spectrum access and mitigation requirements. A final decision will be made in this regard after WRC-19.

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 Act to prevent usage of such radio apparatus.

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.

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 with the aim 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. 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 migration 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 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 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 conductive to efficient spectrum use and the objects of the Act. The Authority shall not tolerate 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 channeling 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;

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 CRAN Board of Directors;

vi) Regulations and/or notices in regard to spectrum licences are published in the *Gazette* following pre-described regulatory processes and public consultations as and when required. The purpose is to enable the public to submit comment on the spectrum licence under consideration by the Authority. Public comments received by the Authority will be taken into consideration based only on its technical and legal merits;

vii) Applications for spectrum licences submitted by entities that does 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 as published by the Authority from time to time;

viii) Application for spectrum licences by service licences to be utilised for provision 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 to consider the spectrum licence 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 is set out in the Regulations Setting Out Spectrum Licensing Procedures as published by the Authority from time to time;

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. 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.

9. 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.

Going forward the Authority will base 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 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.

9.1 Spectrum Application Fees

In order to limit the administrative burden for both the Authority and entities applying for spectrum licences, 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.

9.2 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 Government 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.

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.

9.3 Incentive-based Spectrum Fees

The Authority will apply an incentive-base approach in setting spectrum fees in respect of all spectrum not subject to a flat fee as set out in 7.2. The application of incentive-based spectrum pricing will allow to 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.

9.4 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.

10. RE-ASSIGNMENT AND RE-FARMING OF SPECTRUM

10.1 Re-assignment

Spectrum licences are awarded on a "right-to-use" basis in accordance with the Communications Act and therefore the Authority reserves the right to re-assign spectrum based on-

(i) Changes to allocations of international spectrum bands as agreed within the International Telecommunications Union related to worldwide technological development requiring re-alignment of the National Frequency Plan to international standards;

(ii) Efficient use of spectrum by license holder in terms of actual frequency usage and occupancy; and

(iii) To ensure the fair and equitable distribution of spectrum between telecommunications service licensees providing similar services through the imposition of spectrum caps. Spectrum caps will limit the amount of spectrum assigned to a single telecommunications service licence to allow for the promotion of competition and efficient use of spectrum by the aforementioned licensees.

10.2 Re-Farming of spectrum to deploy latest technologies

The Authority has implemented a service and technology neutral service licence regime that allow licensees to provide services utilising a variety of technologies without the need to amend their existing service licence or apply for an additional service licence.

Spectrum licences are awarded in accordance with the frequency band plan and subject to the conditions attached to each spectrum licence. Thus the operator may re-farm its existing use of a frequency band to ensure higher efficiency in spectrum usage or occupancy to the

benefit of the end user by implementing new technologies to provide new services provide that -

(i) The change in service and/or technology complies with the spectrum allocations as set out in the frequency band plan of Namibia; and

(ii) That the licensee has applied for amendment of the licence conditions attached to its spectrum licence and approval from the Authority in this regard prior to deployment of the new service and/or technology.

The Authority will charge spectrum fees in direct correlation with the utilisation of the spectrum licence. For example when spectrum is re-farmed and fixed links are replace with international mobile communications (IMT) such as LTE the Authority will charge spectrum fees as applicable for IMT services as from the date the amendment of spectrum licence reflecting a change in licence conditions is approved.

11. 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 two 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 licensing procedures

(ii) Spectrum licence conditions; and

(iii) Spectrum fee regulations

The Authority will consider the review of the frequency band plan of Namibia and spectrum licence exempt regulations after conclusion of the next ITU World Radio Conference (WRC-19) to be held in November 2019. Such a review will be based on the Final Acts of WRC-19.

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