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TABLE OF CONTENTS

DO	CUMENT REVISION DETAILS	1
DIS	CLAIMER	1
LIST	Γ OF ABBREVIATIONS & GLOSSARY	2
1.	INTRODUCTION	4
2.	HIGH DEMAND SPECTRUM (HDS) BANDS DESIGNATIONS	6
3.	SPECTRUM PRICING UNDER A MARKET BASIS	7
4.	NICTA CONVERSION PLAN & MARKETING PLAN	9
5.	APPLICANT INFORMATION PACKAGE	. 10
6.	WHEN & HOW TO SUBMIT WRITTEN RESPONSES	. 10
7.	REFERENCES	. 10
	nexe 1: Skeletal Draft Example Conversion and Marketing Plan (2600 MHz) – For Illustrativ poses ONLY	

DISCLAIMER

This document is *loosely* based on the ITU Radio Regulations of WRC-15, WRC-19 and provisions for ITU Region 3, as well as relevant APT recommendations.

This document must be read with all relevant references quoted to understand various details therein.

The National Information and Communication Technology Authority (NICTA) of Papua New Guinea hereby expressly disclaims any and all liability connected with or arising from any sole use of or reliance on the contents of this document alone for any purpose whatsoever.



LIST OF ABBREVIATIONS & GLOSSARY

Apparatus Licence	An apparatus licence authorises, under the National Information and Communications Technology (Radio Spectrum) Regulations, 2010, (NICT		
	Radio Regulation, 2010) the use of a particular service type, in a particular frequency range and at a particular geographic location for a period of 5 years.		
Applicant	Means a person or company who has submitted an Application for a radio frequency spectrum licence in a manner prescribed by the NICT Radio Regulations, 2010 as well as eligible to hold a spectrum licence under Section 170 of the National ICT Act 2009 (NICT Act).		
Administrative basis	Means the allocation of spectrum or issuing of licences other than on a market basis		
3GPP	3rd Generation Partnership Project is the international body responsible for the standardisation of (cellular) mobile (including broadband) telecommunications.		
700 MHz band	The frequencies covered by the 700 MHz band plan, being 703-803 MHz		
800 MHz band	A frequency arrangement and plan capturing former 3GPP band 27, being, 807-824/852 – 869 MHz and 3GPP band 26 being 814-849/859-894 MHz		
850 MHz band	The frequency band consistent with 3GPP Band 26, being 814 to 894 Mhz		
900 MHz band	The frequencies covered by the 900 MHz band plan, being 880-960 MHz.		
2300 MHz band	The frequencies covered by the 2300 MHz band plan, being 2300-2400 MHz		
2600 MHz band	The frequencies covered by the 2500 MHz band plan, being 2500-2570 MHz		
3500 MHz band	The frequencies covered by the 3500 MHz band plan, being 3400-3600 MHz		
APT	Asia Pacific Telecommunity		
Band plan	Either an administrative or legislative instrument that sets out the allocations of frequencies to services within a specific radiofrequency band.		
FDD	Frequency Division Duplex		
Guard Band	A frequency band that is either deliberately vacant or has specific operating conditions to minimise intra-band interference between the two bands on either side (analogous to a 'buffer').		
International Mobile Telecommunications: International Mobile Telecommunications (IMT) encompasses IMT-2000, IMT-Adva decomposition (30) and defines the requirements of 3rd generation (30) generation (4G), and fifth generation (5G) technologies.			

"Market-Based Spectrum Licensing in PNG"

International Telecommunications Union			
Long Term Evolution—a 3GPP technology standard for wireless			
communications including high-speed data for mobile devices			
Means the allocation of spectrum using any 'relevant allocation process'			
identified in Section 36(1)(b) of the NICTA Act of 2009.			
National Information and Communications Technology Authority			
Public Protection and Disaster Relief			
Time Division Duplex			
World Radio Conference 2019			
World Radio Conference 2023			



1. INTRODUCTION

- 1.1 Demand for Mobile Broadband Access continues to increase, thus creating the need for more radio frequency spectrum. The sub-1GHz Band Low-bands (e.g., 600, 700, 800, 900 MHz) are well recognised as essential spectrum resource with perfect radio transmission characteristics essential for coverage. On the other hand, the mid-band frequencies are essential for providing the capacity layers, i.e. both the Lower mid-bands (e.g., 1500MHz, 1800MHz, 2100MHz, 2300MHz, 2600 MHz) and the Upper mid-bands (e.g., 3.3-4.2, 4.5-5, 5.925-7.125 GHz)¹.
- 1.2 The National Information and Communications Technology Authority (NICTA) is always striving to ensure Operators in Papua New Guinea are in possession of adequate spectrum for coverage and capacity in order to meet the continued exponential increase in data consumption that the digital data age has ushered in. In this vein, NICTA is always striving to assign more coverage and capacity spectrums to the market. Section 164 (b)(ii) of the National Information and Communications Technology Act, 2009² hereinafter "the Act" stipulates NICTA to make "adequate provision of the spectrum for use by public or community services".
- 1.3 On the 19th of March 2021, with regard to making adequate provision of spectrums for mobile in PNG pursuant to Section 169 of the Act, NICTA published a consultation document on several draft band plans. They included the 'Draft 800 MHz Band Plan³, the 'Draft 2.6GHz band Plan³⁴, and other "Spectrum Identified for IMT 2020 (5G) in Papua New Guinea" (March 2021)⁵. NICTA published the draft plans in the interest of PNG, and in particular its ICT sector promising to finalize the plans considering feedback from this process. As of the date of publication of this consultation, NICTA is currently reviewing and finalizing the IMT band plans.
- 1.4 Under Section 10(1) of the National Information and Communication Technology (Radio Spectrum) Regulations, 2010⁶ herein "Radio Spectrum Regulations or RSR", NICTA "may allocate spectrum by issuing a spectrum licence either on a market basis or on an administrative basis and shall use the process that, in NICTA's opinion, would allocate spectrum more efficiently" [Italics are NICTA emphases for the purpose of this consultation].
- 1.5 To date NICTA since its inception has only assigned spectrum to operators in Papua New Guinea on an administrative first-come-first-served (FCFS) basis.
- 1.6 NICTA has come to the view that this *administrative-only* approach is no longer realizing the outcome of maximizing "by ensuring the efficient allocation and use of the spectrum, the overall public benefit derived from using spectrum" as Section 164 (a) of the Act⁷ stipulates.
- 1.7 This is evidenced by that fact that some operators with key coverage and capacity spectrum holdings in Papua New Guinea who have been issued spectrums on such an administrative basis are *hardly* providing mobile services to PNG consumers and citizens. This is according to NICTA's records and spectrum usage measurements to

¹ https://www.gsma.com/spectrum/wp-content/uploads/2021/07/Estimating-Mid-Band-Spectrum-Needs.pdf

² https://www.nicta.gov.pg/legislative/acts/

³ Draft Band Plan for 800MHz, NICTA, https://www.nicta.gov.pg/2021/03/cp-0-11-2-2/, March 2021

⁴ https://www.nicta.gov.pg/2021/03/pcn-0-43/

⁴ Pag

⁵ SPECTRUM IDENTIFIED FOR IMT 2020 (5G) IN PAPUA NEW GUINEA - National Information & Communications Technology Authority (nicta.gov.pg)

⁶ Radio Spectrum Regulations - National Information & Communications Technology Authority (nicta.gov.pg)

⁷ https://www.nicta.gov.pg/legislative/acts/

- date. The spectrums are thus being inefficiently used, with minimal "public benefit derived from using spectrum", as Section 164 (a) of the Act stipulates.
- 1.8 New entrants *arguably* would potentially make better use of these hitherto administratively assigned spectrums.
- 1.9 The current Spectrum Pricing formula of Schedule 2 of the 2010 Radio Spectrum Regulations is stipulated as follows: Annual Variable Spectrum Fee for Spectrum and Apparatus Licences using a formula of Annual variable fee payable = V x (2600 / F) x B x T x L. V is the Standard baseline value; F is the Frequency in MHz; B is the total Bandwidth in MHz; T is the type of service licenced but specifically looking at opportunity cost; L is for Location.
- 1.10 This formula has come under severe strains due to the emergence of higher mmWave frequencies like 28GHz, 66GHz, etc. which renders it practically unusable. Therefore, NICTA will propose and consult on new formulae later on in the 2023 year.
- 1.11 NICTA has a duty to advise the Minister to make adjustments to the value of V, for example. However, as noted just earlier, NICTA is more minded to review the entire formula wholesale and to also set spectrum fees for high-demand spectrums differently going forward to reflect opportunity costs.
- 1.12 Therefore, in summary, NICTA is most *actively* considering market-based assignments and market-based (or quasi-market-based) spectrum pricing going forward for certain spectrums in Papua New Guinea in order to reduce the risks of such inefficient allocation and assignments of spectrums in Papua New Guinea going forward. This is best practice in spectrum management all over the world.
- 1.13 NICTA realizes that this would be a significant departure from the way it has ever assigned and priced spectrum to operators and Government using spectrums in PNG today.
- 1.14Hence, this public consultation both (i) aims to be clear on how NICTA would proceed with market-based assignments of the spectrum and market-based spectrum pricings, and (ii) seeks the written views from ICT licensees and other stakeholders [including Government] on NICTA's direction of travel to start issuing and pricing licences for certain bands on a market basis under Section 10(1) of the Radio Spectrum Regulations.
- 1.15 This public consultation on Market-Based Spectrum Assignments & Pricing in Papua New Guinea is being carried out under the October 2014 'Revised Guidelines on the Submission of written comments to public consultations and public inquiries'. These guidelines have been made by NICTA under Section 218 of the Act to provide guidance to ICT licensees regarding their submission of written comments and documents to any public consultation conducted by NICTA under section 229 of the Act.

^{5 |} Pag

2. HIGH DEMAND SPECTRUM (HDS) BANDS DESIGNATIONS

- 2.1 In order to commence issuing spectrum licences on a market basis in Papua New Guinea, NICTA "shall use the process that, in NICTA's opinion, would allocate spectrum more efficiently", as Section 10(1) of the Radio Spectrum Regulations9 stipulates.
- 2.2 The principle and process that, in NICTA's opinion, meet this standard is that of the concept of identifying and designating High Demand Spectrum (HDS).
- 2.3 NICTA defines High Demand Spectrum (HDS) band as EITHER
- a. where there is likely to be insufficient spectrum available, in the estimation of NICTA, to accommodate the demand for the said spectrum band, i.e., demand is more than likely to exceed supply
- b. OR spectrum bands whose opportunity costs in inefficient use [by the incumbent licensee] are judged by NICTA to be of a quantum prejudicial to the interests of PNG. For example, some bands are currently judged to be extremely inefficiently used by the current incumbent licensees with very high opportunity costs to PNG because new entrant licensees would make much better use of them.
- 2.4 Such bands would hereafter be designated as High Demand Spectrum Bands in PNG.
- 2.5 It is proposed that such licences for designated HDS spectrums going forward once agreed at the close of this consultation – would be both issued and/or renewed on a market basis ONLY.
- 2.6 NICTA proposes that any HDS spectrum that comes up for renewal would or may be subject to relicensing on a market basis, subject to competition checks.
- 2.7 NICTA's proposed provisional designated High Demand Spectrum (HDS) bands are all the popular IMT bands but also one VHF Band too, including:
 - a. 450MHz (3GPP Band 31)
 - b. 600MHz (3GPP Band 71)

 - c. 700 MHz (3GPP Band 28) d. 850 MHz (3GPP Band 5), e. 850 MHz 'Expansion band' (3GPP Band 27)
 - f. 900MHz (3GPP Band 8)
 - g. 1800MHz (3GPP Band 3)
 - h. 2100MHz (3GPP Band 1)
 - i. 2300 MHz (3GPP Band 40)
 - 2600 MHz (3GPP Band 41),
 - k. 3500 MHz (3GPP Band 42 or Band 78), and
 - I. VHF Band III with just 8 channels for DAB and Digital TV in PNG.

Issues for Consultation (Question 1)

Do you agree on the principle and process of designating High Demand Spectrum (HDS) bands? Kindly justify your response. 6 | Pag

⁹ Radio Spectrum Regulations - National Information & Communications Technology Authority (nicta.gov.pg)

Issues for Consultation (Question 2)

Do you agree with NICTA's proposed definition of HDS spectrum? Kindly justify your response.

Issues for Consultation (Question 3)

Do you agree that HDS spectrum licences and renewals going forward would be issued on a market basis ONLY? Kindly justify your response.

Issues for Consultation (Question 4)

Do you agree with the proposed bands that NICTA has provisionally designated as HDS spectrum bands? Kindly justify your response.

3. SPECTRUM PRICING UNDER A MARKET BASIS

- 3.1 As noted in the last section, in order to commence issuing spectrum licences on a market basis in Papua New Guinea, NICTA "shall use the process that, in NICTA's opinion, would allocate spectrum more efficiently", as Section 10(1) of the Radio Spectrum Regulations¹⁰ stipulates. The previous section of this consultation has proposed a process based on HDS designations.
- 3.2 HDS-designated spectrums would clearly, going forward, be subject to non-administratively determined spectrum fees, i.e. on a market basis.
- 3.3 The latter is clearly consistent with Section 6(1) of the Radio Spectrum Regulations¹¹ which states:
 - That the fees payable in respect of a spectrum licence can be issued
 - a. "On a market basis" and may be structured to include (i) an annual spectrum fee component and (ii) a price component "set by the relevant allocation process". This regulation allows NICTA significant latitude to implement market-based spectrum fees in the PNG, particularly for high-demand IMT spectrums.
 - b. "On an administrative basis" which shall be (i) a non-refundable application fee set out in Schedule 4 or (ii) an annual variable spectrum fee calculated abiding by Schedule 2.
 - Section 6(1) (a) and (b) clearly allows NICTA to determine market-based or administrative cost-based spectrum fees in the PNG.
- 3.4 Section 164(c) of the NICTA Act places a duty on NICTA to "provide a responsive and flexible approach to meeting the needs of users of the spectrum". This duty to "provide a responsive and flexible approach to meeting the needs of users of the spectrum..." speaks clearly to market-based Spectrum Pricing particularly for the designated HDS spectrums. The value of spectrum bands changes over time due to technological evolution and/or ecosystem changes. Some former "2G only bands" can

¹⁰ Radio Spectrum Regulations - National Information & Communications Technology Authority (nicta.gov.pg)

¹¹ <u>Radio Spectrum Regulations - National Information & Communications Technology Authority (nicta.gov.pg)</u>

now be used for 2G, 3G, 4G and even 5G or 6G. This means the band is now more valuable, and therefore the "pricing" of the said band has appreciated markedly. Market-based spectrum pricing allows for a "responsive and flexible approach" to managing such changes in spectrum valuations over time.

- 3.5 Section 164(e) of the Act stipulates: "provide an efficient, equitable and transparent system of charging for the use of spectrum, taking account of the value of both commercial and non-commercial use of spectrum". This duty and factor is more self-evident, and needs less interpretation. It clearly speaks to the "charging for the use of spectrum". The factor is obviously the aspect of "taking account of the value of both commercial and non-commercial use of spectrum". Periodically, all the spectrum bands in PNG must be reviewed for their true opportunity costs, i.e., ascertaining the costs to the next best alternative user/use of that spectrum band to ensure the current user pays (at least) this opportunity cost as spectrum fees for that band. This clearly speaks to market-based spectrum pricing.
- 3.6 Therefore, designated High-Demand Spectrum bands in PNG would henceforth be subject to market-based spectrum fees, not administrative cost-based spectrum fees.
- 3.7 The market-based fees would be derived from one or a combination of the following:
 - a. Relevant actual PNG spectrum auctions and/or spectrum tenders
 - b. Relevant PNG spectrum beauty contests or first/second price sealed bid auctions
 - c. Benchmarking from other carefully chosen auctions or tenders from other countries
 - d. Administered Incentive Pricing (AIP) set to reflect opportunity cost, i.e. a pricing signal for efficient use of spectrum that seeks to mimic market where fully effective market mechanism is not yet present. AIP is an approach used internationally where spectrum is scarce (in excess demand) and set to reflect the long term (marginal) cost of spectrum
 - e. Annual Licence Fees (ALFs): these are fees set on HDS spectrum already administratively assigned necessary to promote spectrum efficiency. They could be set at full market value drawing from relevant spectrum auctions or much more conservatively.

In setting any such market-based fees, NICTA would adopt a conservative pricing approach, as it has no duty to raise significant fees for spectrum for fee's sake. Rather, its duty is towards the efficient use of HDS spectrum in PNG.

Issues for Consultation (Question 5)

Do you agree or not with the rationale for spectrum pricing on a market basis for designated HDS spectrums?

Issues for Consultation (Question 6)

Do you agree with NICTA's proposed approaches to conservatively derive the market-based spectrum fees? Any further comments?

4. NICTA CONVERSION PLAN & MARKETING PLAN

- 4.1 Section 11(1) of the Radio Spectrum Regulations stipulates that where NICTA proposes to allocate spectrum on a market basis, "which will affect any apparatus licence or existing radiocommunications licence it shall prepare a conversion plan", as set out in Sections 11(2) and 11(3).
- 4.2 NICTA notes that Section 4.1 above only applies for bands that have already been licensed and which when renewed would be renewed on a market basis going forward.
- 4.3 Section 11(2) stipulates that "a conversion plan shall set out the procedures and timetable for issuing new spectrum licences to replace any apparatus licence or existing radiocommunications licence which is affected by the proposed allocation of spectrum". Section 11(3) stipulates that "the conversion plan may require a spectrum licence to be issued for the whole or any part of the spectrum or geographic area to which the conversion plan applies". The band plans that NICTA has already been publishing clearly form part of the conversion plan. However, NICTA proposes to ensure that that the requirements of the conversion plan shall be set out and include in the Information Package for applicants to any spectrum.
- 4.4 Section 12(1) of the Radio Spectrum Regulations stipulates that "where NICTA proposes to allocate any spectrum on a market basis, it shall prepare a marketing plan", and must publish it on its public register [Section 12(4)].
- 4.5 Section 13(1) of the Radio Spectrum Regulations stipulates that NICTA shall prepare an *information package* for applicants containing the Marketing Plan and any Conversion Plan.
- 4.6 NICTA hereby confirms that the Marketing Plan for any spectrum it assigns on a market basis would abide by Section 12(2) of the Radio Spectrum Regulations, and shall consist of the following:
 - a. The relevant market-based process NICTA proposes to employ, e.g. an auction, a tender, commercial negotiations or another market-based process, e.g. first or second price sealed bid, or a modified beauty contest;
 - b. NICTA will specify the methods, procedures and timetable that would be followed for issuing the licence in connection with the relevant spectrum;
 - c. NICTA will detail the spectrum lots and the number of lots to be licenced;
 - d. NICTA will detail the percentage of the spectrum band or of each spectrum band that will be reserved for public and community services;
 - e. NICTA will specify any conditions that would be tied with the spectrum licence issued, e.g. spectrum coverage obligations, reserve prices for spectrum lots; Use it or Share it obligations, relevant published band plans, etc;
 - f. As per Section 12(4) of the Radio Spectrum Regulation, NICTA will specify whether the spectrum band would be licenced in its entirety, and whether pan a geographical basis; and
 - g. NICTA will detail any other matters as the regulator considers necessary for the market-based process, e.g. the term of the licence which NICTA proposes would

be between 5 to 15 years as specified in Section 15(1) of the Radio Spectrum Regulations. NICTA will also detail how the market-based monies would be paid by the successful bidders, e.g. a one-off payment or a schedule of payments, and to what account the monies will be paid.

- 4.7 However, Section 12(3) stipulates that before NICTA can finalise the marketing plan, NICTA must
 - a. Publish on its public register a draft of the plan; and
 - b. Engage in public consultation in accordance with Section 229 of the Act.
 - c. NICTA will abide by the both prescriptions above.
- 4.8 Annexe 1 provides one such draft marketing plan for illustrative purposes ONLY.

Issues for Consultation (Question 7)

Do you have any comments on how NICTA proposes to proceed on the Conversion and/or Marketing plans consistent with the Radio Spectrum Regulations? Kindly justify your response.

5. APPLICANT INFORMATION PACKAGE

- 5.1 Section 13(2) of the Radio Spectrum Regulations specifies what the Information Package may address.
- 5.2 NICTA will develop an Information Package containing the Marketing Plan and any Conversion Plan (as illustrated in Annexe 1), and other Eligibility Requirements conforming to Section 13(1) of the Radio Spectrum Regulations.

6. WHEN & HOW TO SUBMIT WRITTEN RESPONSES

- 6.1 NICTA invites comments on this entire seminal consultation on Market-Based Spectrum Assignments in PNG and Market-Based Pricing.
- 6.2 Written representations or enquires may be in sent in writing or via email directed to: spectrum@nicta.gov.pg by no later than 5 pm on 11th April 2023.

7. REFERENCES

- 1 2010 NICTA Radio Regulations
- 2 2010 NICTA Licensing Regulations
- 3 2009 NICTA Act

Annexe 1: Skeletal Draft Example Conversion and Marketing Plan (2600 MHz) – For Illustrative Purposes ONLY

- 1.1 Section 13(1) of the Radio Spectrum Regulations stipulates that NICTA shall prepare an information package for applicants containing the Marketing Plan and any Conversion Plan. NICTA will also include a sample Spectrum Licence in a final Information Package.
- 1.2 2600 MHz is used to illustrate such a Skeletal Draft Example Marketing Plan.
- 1.3 It is NOT meant to be comprehensive or exhaustive only illustrative.
- 1.4 Therefore, no [detailed] comments are expected of stakeholders for this section.

Lots

- 1. NICTA has the following consideration of the Policy on High Demand Spectrum and has determined that the spectrum available for assignment in this process will be as follows:
 - 1.1 The assignment approach will be a Multiple Round Auction (MRA) or a First or Second Price Sealed-Bid Auction
 - 1.2 1 x 120MHz in the 2600MHz band (2500 2690MHz) would be auctioned as 1 x 10MHz lots
 - 1.3 20 MHz of the spectrum would be retained as an Innovation Reserve for 'new' entrant Community (ISP) Licensees and which would be assigned on a regional basis.
 - 1.4 Therefore 20 MHz of the 120 MHz to be assigned, i.e. 16.7% would be reserved for Community Services whilst the rest would be for Public Services.
 - 1.5 The spectrum will be awarded on a national and regional basis covering the entire territory of PNG
 - 1.6 Applicants are eligible to bid for any of the Lots. However, the 20 MHz Innovation Reserve would be reserved only for new entrants.
 - 1.7 The reserve price for each Innovation Reserve TWO 1x10 Lots is different from the remaining TEN 1 x100 MHz. The reserve prices and spectrum available for award is packaged as follows:

Lot category	Lot size	Number of lots available	Reserve price per lot
2.6 GHz	1 x 10 MHz	13	To be determined

Spectrum Caps

- 1.8 A Spectrum cap is a limit placed on the amount of spectrum a Bidder can bid for in each bid round in an auction. An Applicant will be allowed to bid up to the following spect**fuln** daps:
- 1.9 Sub-1GHz safeguard cap of 2xXX MHz (including existing sub 1-GHz spectrum holdings); and
- 1.10 An overall spectrum cap of [YY MHz] (including existing spectrum holdings).

Duration

- 1.11 A Licence is valid for fifteen (15) years from the date of issue as per the 2010 NICTA Spectrum Regulations, i.e. Section 15(1) of the Radio Spectrum Regulations.
- 1.12 A Licence renewable on an annual basis upon payment of the prescribed annual licence fee in accordance with the new HDS regulations

Technologies to be allowed

1.13 All licences will be technology-neutral and service-neutral.

Spectrum Fees

1.14 The spectrum licences will be exempt from the Spectrum Fees Regulations published by NICTA.

Technical Conditions

1.15 The conditions of use must be in accordance with the rules for services as stipulated in the 2010 Radio Spectrum Regulations or the Issued Licence.

Payment of Auction or Tender Fees

- 1.16 The market-based monies will be paid by the successful bidders, either as a one-off payment or a schedule of payments.
- 1.17 The payment account shall be the Consolidated Revenue Account. This will be confirmed with the Final Information Package.

Obligations

- 1.18 The following obligations will form part of the licence conditions for the licence....
 - 1.18.1 All spectrum lots would be subject to Use-It-or-Share-It obligations
 - 1.18.2 There would be matching an obligation to roll out ONE (1) specified Rural Site for every X Urban Sites clearly defined by NICTA for national licences.
 - 1.18.3 Geographically-based coverage obligations would apply to this spectrum specified by NICTA.