National Information and Communications Technology Authority

DRAFT 600 MHz BAND PLAN PUBLIC CONSULTATION

Papua New Guinea

Document Ref. XXX.2023

DOCUMENT REVISION DETAILS

Revision	Date	Who	Details
1	12/09/2023	Gibson P	First Draft
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DISCLAIMER

Due to the continuous developments in Radiocommunication technologies and enhancement in related applications, the PNG spectrum plan covering Service Allocations and their applications may change with the outcome of each World Radio Conference (WRC).

This document is 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 sub-band plans and channeling arrangements. 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

600 MHz band	The frequencies covered by the 600 MHz band plan, being 470 – 703 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.
Apparatus licence	An apparatus licence authorises, under the *NICTA 2010 Licensing & Spectrum Regulations*, the use of a particular service type, in a particular frequency range and at a particular geographic location for a period of 5 years.
eMBB	Enhanced Mobile Broadband
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').
IMT	International Mobile Telecommunications: International Mobile Telecommunications (IMT) encompasses IMT-2000, IMT-Advanced, IMT-2020 and defines the requirements of 3rd generation (3G), 4th generation (4G), and fifth generation (5G) technologies.
ISP	Internet Service Provider
ITU	International Telecommunications Union
LTE	Long Term Evolution—a 3GPP technology standard for wireless communications including high-speed data for mobile devices
M2M	Machine to Machine Communications referring to automated applications which involve machines or devices communicating through a network without human intervention
FWA	Fixed Wireless Access
MNO	Mobile Network Operator
NICTA	National Information and Communications Technology Authority
WRC - 15	World Radio Conference 2015
WRC - 19	World Radio Conference 2019
WRC - 23	World Radio Conference 2023

1. INTRODUCTION

1.1 This document sets out NICTA's proposal to open spectrum in the sub-700 MHz UHF band (470-703 MHz) for Mobile Broadband technologies/IMT applications. NICTA intends to adopt the APT 600 MHz band plan. Hence the spectrum band 470-703 MHz will be referred to as the 600 MHz Band in Papua New Guinea.

1.2 Low-band spectrum is currently being used for 2G, 3G and 4G services for voice, MBB services and Internet of Things (IoT). The 600 MHz band is ideal for wide-area and outside-in coverage as well as for deep indoor coverage, typically required for eMBB and voice services, but also required for M2M type of communication from outside to inside the building, even in deep basements.

1.3 This consultation paper intends to seek the views of interested industry stakeholders and the general public on the allocation plan of the 600 MHz band and usage of this spectrum in Papua New Guinea.

1.4 The 600 MHz draft band plan consultation is based on Article 5 of the ITU Radio Regulations, provisions for Region 3 and consequent PNG Allocations as per updates from WRC-15 and WRC-19.

2. ALLOCATION IN THE 600 MHz BAND

2.1 In ITU Region 3 (Asia-Pacific), the whole of the frequency range 470–694 MHz has an additional Primary allocation to Fixed and Mobile services, and from 585–610 MHz has an additional Primary allocation to Radionavigation. Parts of the band (typically the bottom 30 MHz or so) are often allocated for Mobile (PMR) uses in many countries.

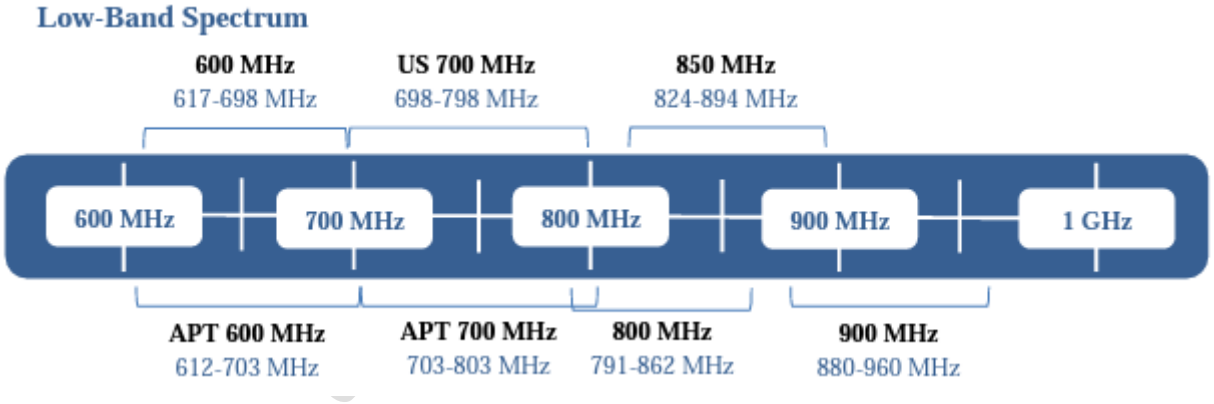

Figure 1: Low- Band and Mid-Band frequency bands that are used for Cellular Mobile Services globally

3. CHANNELLING PLAN

3.1 Adoption of APT 600 MHz band plan will lead to utilization of additional 5 MHz of paired spectrum as the APT 600 MHz band is being extended on upper side from 698 MHz to 703 MHz and on lower side from 617 MHz to 612 MHz. The proposed band plan available will be 612-652 MHz paired with 663-703 MHz.

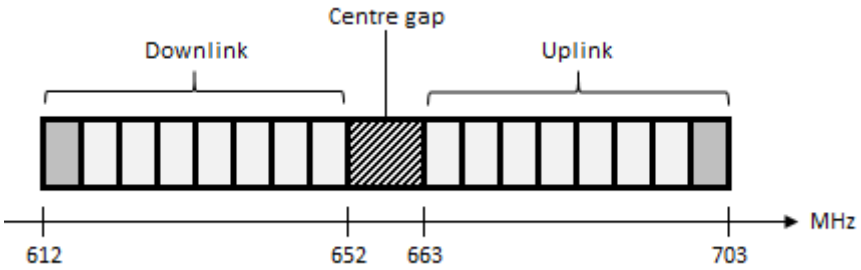

Figure 2: 600 MHz Band Plan for 470-703 MHz Band

3.2 The 600 MHz band plan is a reverse duplex arrangement of 2 x 40 MHz that fits well with the APT 700 MHz band plan (with ordinary duplex) starting at 703 MHz. See Table 1 below:

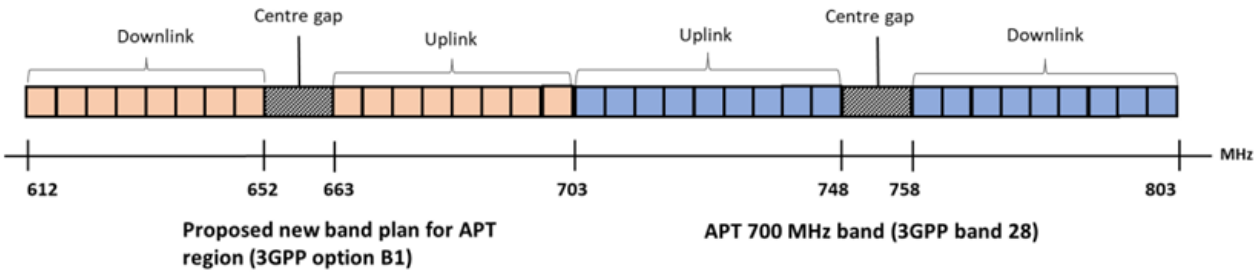

Table 1: NR operating band (option B1)

Operating Band	Uplink (UL) operating band BS receive UE transmit	Downlink (DL) operating band BS transmit UE receive	Duplex Mode
	F_{UL_low} – F_{UL_high}	F_{DL_low} – F_{DL_high}	
	663 MHz – 703 MHz	612 MHz – 652 MHz	FDD

Table 1: Frequency arrangement of proposed new band plan for 600 MHz (3GPP option B1) and 3GPP band 28

4. PRINCIPLES OF ASSIGNMENT

4.1 Authorisation to use the frequency band;

- Any license assignment for parts or portion of 600 MHz band is subject to conditions in the Operator Licensing Regulation, 2010 and Radio Spectrum Regulation, 2010.

4.2 Required types of Radiocommunications Licences are;

i. **Spectrum Licence** is needed for the operation of a device or devices within a defined spectrum space (geographic area and frequency band) on the condition that the device(s) operate with accordance to their licence conditions and terms that were set by NICTA for that specific spectrum. This licence is issued for a period of five (5) to fifteen (15) years and fees paid annually.

ii. **Apparatus Licence** is needed for the operation of a device or type of devices at specific locations with specific operating conditions set by NICTA in order to provide an approved service. Apparatus Licences are intended to be directed at certain categories of 'Transmitting' and 'Receiving' apparatus. This licence is issued for a period of five (5) years.

NICTA intends to make the 600MHz Band available to small ISPs and MNOs who are interested to extend connectivity to unserved and underserved localities.

5. INVITATION TO COMMENT

NICTA invites the industry and interested parties to comment on the matters stated in the above paragraphs and any other related issues not covered in this consultation document but which are considered to be relevant to the formulation of 600 MHz band plan. Following the end of the consultation period, NICTA will publish the 600 MHz Band Plan possibly by the end of second quarter 2024.

6. REFERENCES

1 APT Report on Frequency Arrangements for IMT in the band 407-703 MHz

2 ITU Radio Regulations Articles Edition of 2020

3 ITU NRFAT-2016-Rev 2

4 ITU-R Recommendation M.2003-2 (1/2018)

5 Papua New Guinea Table of Frequency Allocations 2020

Annex A: Extract of Article 5 - ITU Radio Regulation 2020

Table 2: ITU-R frequency allocation to services

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>460-470</td><td colspan="2">FIXED
MOBILE 5.286AA
Meteorological-satellite (space-to-Earth)
5.287 5.288 5.289 5.290</td></tr>
<tr><td rowspan="6">470-694
BROADCASTING

5.149 5.291A 5.294 5.296
5.300 5.304 5.306 5.312</td><td>470-512
BROADCASTING
Fixed
Mobile
5.292 5.293 5.295</td><td rowspan="2">470-585
FIXED
MOBILE 5.296A
BROADCASTING

5.291 5.298</td></tr>
<tr><td rowspan="2">512-608
BROADCASTING
5.295 5.297</td></tr>
<tr><td rowspan="2">585-610
FIXED
MOBILE 5.296A
BROADCASTING
RADIONAVIGATION
5.149 5.305 5.306 5.307</td></tr>
<tr><td rowspan="2">608-614
RADIO ASTRONOMY
Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)</td></tr>
<tr><td rowspan="7">610-890
FIXED
MOBILE 5.296A 5.313A 5.317A
BROADCASTING

5.149 5.305 5.306 5.307
5.320</td></tr>
<tr><td rowspan="2">614-698
BROADCASTING
Fixed
Mobile
5.293 5.308 5.308A 5.309</td></tr>
<tr><td rowspan="2">694-790
MOBILE except aeronautical mobile 5.312A 5.317A
BROADCASTING
5.300 5.312</td></tr>
<tr><td rowspan="2">698-806
MOBILE 5.317A
BROADCASTING
Fixed

5.293 5.309</td></tr>
<tr><td rowspan="2">790-862
FIXED
MOBILE except aeronautical mobile 5.316B 5.317A
BROADCASTING
5.312 5.319</td></tr>
<tr><td rowspan="2">806-890
FIXED
MOBILE 5.317A
BROADCASTING

5.317 5.318</td></tr>
<tr><td>862-890
FIXED
MOBILE except aeronautical mobile 5.317A
BROADCASTING 5.322

5.319 5.323</td></tr>
</table>

ITU RR footnotes referred to in the above extract are listed below:

5.149 In making assignments to stations of other services to which the bands: 13 360-13 410 kHz, 25 550-25 670 kHz, 37.5-38.25 MHz, 73-74.6 MHz in Regions 1 and 3, 150.05-153 MHz in Region 1, 322-328.6 MHz, 406.1-410 MHz, 608-614 MHz in Regions 1 and 3, 1 330-1 400 MHz, 1 610.6-1 613.8 MHz, 1 660-1 670 MHz, 1 718.8-1 722.2 MHz, 2 655-2 690 MHz, 3 260-3 267 MHz, 3 332-3 339 MHz, 3 345.8-3 352.5 MHz, 4 825-4 835 MHz, 4 950-4 990 MHz, 4 990-5 000 MHz, 6 650-6 675.2 MHz, 10.6-

10.68 GHz, 14.47-14.5 GHz, 22.01-22.21 GHz, 22.21-22.5 GHz, 22.81-22.86 GHz, 23.07-23.12 GHz, 31.2-31.3 GHz, 31.5-31.8 GHz in Regions 1 and 3, 36.43-36.5 GHz, 42.5-43.5 GHz, 48.94-49.04 GHz, 76-86 GHz, 92-94 GHz, 94.1-100 GHz, 102-109.5 GHz, 111.8-114.25 GHz, 128.33-128.59 GHz, 129.23-129.49 GHz, 130-134 GHz, 136-148.5 GHz, 151.5-158.5 GHz, 168.59-168.93 GHz, 171.11-171.45 GHz, 172.31-172.65 GHz, 173.52-173.85 GHz, 195.75-196.15 GHz, 209-226 GHz, 241-250 GHz, 252-275 GHz are allocated, administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 4.5 and 4.6 and Article 29). (WRC-07)

5.295 In the Bahamas, Barbados, Canada, the United States and Mexico, the frequency band 470-608 MHz, or portions thereof, is identified for International Mobile Telecommunications (IMT) – see Resolution 224 (Rev.WRC-19). This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. Mobile service stations of the IMT system within the frequency band are subject to agreement obtained under No. 9.21 and shall not cause harmful interference to, or claim protection from, the broadcasting service of neighbouring countries. Nos. 5.43 and 5.43A apply. (WRC-19)

5.296A In Micronesia, the Solomon Islands, Tuvalu and Vanuatu, the frequency band 470-698 MHz, or portions thereof, and in Bangladesh, Maldives and New Zealand, the frequency band 610-698 MHz, or portions thereof, are identified for use by these administrations wishing to implement International Mobile Telecommunications (IMT) – see Resolution 224 (Rev.WRC-19). This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. The mobile allocation in this frequency band shall not be used for IMT systems unless subject to agreement obtained under No. 9.21 and shall not cause harmful interference to, or claim protection from, the broadcasting service of neighbouring countries. Nos. 5.43 and 5.43A apply. (WRC-19)

5.305 *Additional allocation:* in China, the band 606-614 MHz is also allocated to the radio astronomy service on a primary basis.

5.306 *Additional allocation:* in Region 1, except in the African Broadcasting Area (see Nos. 5.10 to 5.13), and in Region 3, the band 608-614 MHz is also allocated to the radio astronomy service on a secondary basis.

5.307 Additional allocation: in India, the band 608-614 MHz is also allocated to the radio astronomy service on a primary basis.

5.308A In the Bahamas, Barbados, Belize, Canada, Colombia, the United States, Guatemala and Mexico, the frequency band 614-698 MHz, or portions thereof, is identified for International Mobile Telecommunications (IMT) – see Resolution 224 (Rev.WRC-19). This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. Mobile service stations of the IMT system within the frequency band are subject to agreement obtained under No. 9.21 and shall not

cause harmful interference to, or claim protection from, the broadcasting service of neighbouring countries. Nos. 5.43 and 5.43A apply. (WRC-19)

5.313A The frequency band, or portions of the frequency band 698-790 MHz, in Australia, Bangladesh, Brunei Darussalam, Cambodia, China, Korea (Rep. of), Fiji, India, Indonesia, Japan, Kiribati, Lao P.D.R., Malaysia, Myanmar (Union of), New Zealand, Pakistan, Papua New Guinea, the Philippines, the Dem. People's Rep. of Korea, Solomon Islands, Samoa, Singapore, Thailand, Tonga, Tuvalu, Vanuatu and Viet Nam, are identified for use by these administrations wishing to implement International Mobile Telecommunications (IMT). This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. (WRC-19)