National Information and Communications Technology Authority

Channelling plan for 2.6Hz & Proposed TDD Synchronisation

Papua New Guinea

Document Ref. XXX.2023

© Copyright of NICTA, 2023
This document may be downloaded from the NICTA website at http://www.nicta.gov.pg and shall not be distributed without written permission from NICTA.

DOCUMENT REVISION DETAILS

Revision	Date	Who	Details
1	Feb 2023	Badui, M	First Draft
2	Feb 2023	Josiah, V	Second Draft after Reviews and consolidating on TDD Synchronisation Guidelines
3			
4			
5			
6			
7			
8			
9			
10			

Table of Contents

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.

Definitions and Abbreviations

ETSI	European Telecommunications Standards Institute is a European Standards Organisation (ESO) for Telecommunication, Broadcasting and other electronic networks and services
GPS	Global Positioning System
ITU-T	A sector of the International Telecommunications Union (ITU) that develops and updates standards, known as Recommendations for the telecommunication and ICT industry
Network Synchronization	A generic concept that depicts the way of distributing a common time and/or frequency to all elements in a network
PRC	Primary Reference Clock
Time	Is used to specify an instant (time of the day) or as a measure of time interval

1. Executive Summary

1.1 The 2500 - 2690 MHz band, also known as 2.6 GHz spectrum, was identified for International Mobile Telecommunications (IMT) in all regions in the Radio Regulations (RR) of International Telecommunication Union (ITU).

1.2 In this document, NICTA, Papua New Guinea is releasing a finalized band plan for 2600MHz Band.

1.3 The plan accepts and confirms a TDD channelling arrangement for the 2.6 GHz spectrum band. This follows the consultation of the 19th of March 2021 - in accordance with the NICTA Act 2009 – in which NICTA published a consultation document on the "Draft 2.6GHz band Plan"[1].

1.4 In this document, NICTA also confirms that TDD Network Synchronization rules will be binding on ALL 2.6 GHz licensees.

1.5 Hence, in another document references and attached to this consultation, NICTA proposes for comments a Network Synchronization framework and set of guidelines to prevent interference between operators, and that supports the implementation of the TDD policy across the entire TDD arrangement in 2.6 GHz spectrum without the use of guard bands.

1.6 This is because for TDD use of spectrum, Network Synchronization is an effective way to prevent interference between networks of different operators in the same frequency band, without the need to use guard bands.

1.7 This frequency arrangement (i.e. finalised channel plan and synchronisation guidelines) applies to all operators that will be licensed in 2.6 GHz spectrum.

1.8 NICTA invites comments on this document along with the attached and linked NICTA Draft Guidelines for TDD Synchronisation. 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.

[1] https://www.nicta.gov.pg/2021/03/pcn-0-43/

2. Introduction

2.1 The introduction of digital circuit-switching has driven the need for network synchronization since the late 70s and early 80s. Since then, telecommunication providers have set up synchronization networks to synchronize their switching and transmission equipment. Network synchronization has since gained increased importance in digital telecommunication as new network systems and services were introduced overtime.

2.2 Synchronization of telecommunication networks is very important for inter-network operability and effective transfer of relevant time used information between networks and the processing of information by each network.

2.3 The 2500 - 2690 MHz band, also known as 2.6 GHz or 2600 MHz spectrum, was identified for International Mobile Telecommunications (IMT) in all regions since the World Radio Conference 2007 (WRC-07), as stated in the Radio Regulations (RR) footnote 5.384A. The frequency bands 1 710-1 885 MHz, 2 300-2 400 MHz and 2 500- 2690 MHz, or portions thereof, are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution 223 (Rev.WRC-15).

2.4 Possible frequency arrangements in 2.6 GHz spectrum can be Frequency Division Duplex (FDD) and Time Division Duplex (TDD), FDD only, or flexible FDD/TDD, as described in the ITU-R Recommendations "Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications (IMT) in the bands identified for IMT in the Radio Regulations (RR) (ITU-R M.1036-5)".

2.5 NICTA is obliged to ensure that requirements on network synchronization are complied with by telecommunications networks in Papua New Guinea (PNG).

3. Channelling Plan of 2.6GHz Spectrum Band

3.1 The frequency band 2500-2690MHz provides a total bandwidth of 190 MHz for the IMT service. Channel arrangements are indicated in ITU Recommendations: Rec. ITU-R M. 1036-5.

3.2 The ITU recommends a list of possible channel arrangement shown next.

Frequency arrange-ments	Paired arrangements					Un-paired arrangement (e.g. for TDD) MHz
	Mobile station transmitter (MHz)	Centre gap (MHz)	Base station transmitter (MHz)	Duplex separation (MHz)	Centre gap usage	

C1	2500-2570	50	2620-2690	120	TDD	2570-2620 TDD
C2	2500-2570	50	2620-2690	120	FDD	2570-2620 FDD DL external
C3	Flexible FDD/TDD					

Table 1 – ITU Recommended Channel arrangements for the 2.6GHz Band (Source: ITU Recommendations: Rec. ITU-R M. 1036-5)

3.3 On the 19th of March 2021 - in accordance with the NICTA Act 2009 – NICTA published a consultation document on the "Draft 2.6GHz band Plan"[2] with the ITU recommended options of Table 1.

3.4 Option C3 emerged as the preferred arrangement for Papua New Guinea with a complete TDD channelling arrangement for the entire 2.6 GHz spectrum band.

3.5 Therefore, NICTA hereby confirms that it has approved and changed the band plan of 2600 MHz spectrum and adopted the Band 41 (All TDD) configuration for the whole band as shown in Figure 1.

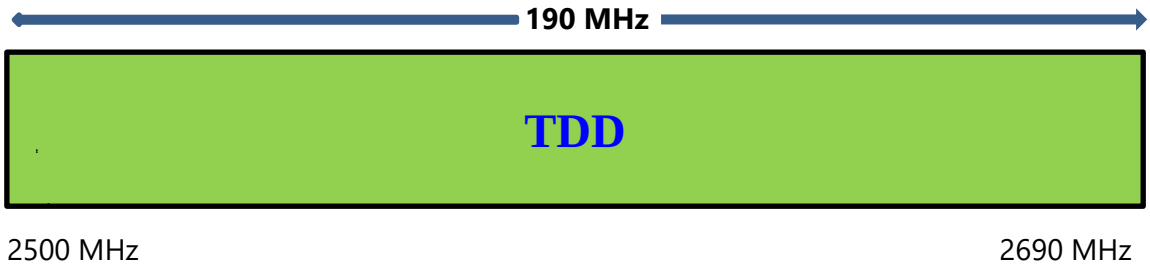

Figure 2: 2.6 GHz Frequency Arrangement for PNG

3.6 Furthermore, after WRC 2023, NICTA will proceed to update PNG's National Frequency Allocation Table (NFAT) to reflect a primary allocation in the entire 2.6GHz band to MOBILE, with Fixed only being a secondary allocation. This is as opposed to both of them being co-primary in the band in the current PNG NFAT.

[2] https://www.nicta.gov.pg/2021/03/pcn-0-43/

4. 2.6GHz TDD Network Synchronization Guidelines

TDD network licensees need to synchronize amongst themselves.

Synchronization aligns time and frequency scales of equipment clocks in a network to remain constrained to specific limits so the equipment operates at the correct time and in the correct order. Networks Synchronization deals with the distribution of synchronization reference signal over a network of clocks spread over a wider area. A synchronization network is the facility that implements network synchronization. The basic elements of a synchronization network are the nodes (autonomous and slave clocks) and the links connecting them.

4.1 Draft TDD Synchronization Guidelines

Alongside this consultation, NICTA has published a set of Draft Guidelines for TDD Synchronization that will be binding on all 2.6Ghz TDD licensees.

The objective of the Draft TDD Guidelines (NICTA Draft TDD Synchronisation Guidelines, 2023) document is:

I. to ensure that the synchronization network for all 2.6GHz incumbent and new telecommunications network and service providers in PNG is implemented and complies with internationally recognized standards and best practices,
II. to ensure that 2.6GHz telecommunication networks in PNG are synchronized for optimum performance and high availability,
III. to ensure that all telecommunication network and service providers are equipped with necessary network synchronization plan and guidelines in PNG.

4.2 All 2.6GHz Licensees must abide by the NICTA TDD Synchronization Guidelines

4.2.1 Synchronization is required to meet availability and performance requirements for digital telecommunications networks. The synchronization network distributes reference timing signals of required quality to network elements (NE)s that perform routing, switching and multiplexing to function synchronously and within stringent specifications and limits.

4.2.2 Poor network synchronization gives rise to higher counts of jitter and wander. The end result being the degradation of network performance, throughput and availability, resulting in bad quality of service and unsatisfactory consumer experience and reduction in revenue generation for the network operator.

4.2.3 Network providers must provide high quality synchronization in order to meet network performance and reliability. Good timing in a network is essential if continuous error-free performance is desired and to meet the Quality of Service (QoS) demanded by the network end users. Telecommunications network links, switching nodes and

transmissions interfaces, all entities must be synchronized.

5. Document Administration

6.1 Document Approval

This document has been approved by NICTA Board, as the technical guideline for synchronization of telecommunication networks in Papua New Guinea.

6.2 Document Amendment

NICTA shall, from time to time, alter, update or modify these technical performance requirements to suit current technologies and meeting international and/or national requirements.

6.3 Document Enforcement

This document is in force and effective from the date the NICTA Board approves it and is subject to the appropriate provisions of the NICT Act 2009 (as amended).

6.4 Publication and/or Distribution

This document once approved by the NICTA Board shall be published on the NICTA website https://www.nicta.gov.pg for general public information. The document shall also be distributed to relevant authorities for reference and compliance.

6. References

1 NICTA Draft TDD Synchronisation Guidelines (2023), See NICTA Website