

THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF TRANSPORT AND COMMUNICATIONS

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Spectrum Roadmap : Facilitate the Sustainable Growth of Industry

(Final Draft)

December, 2021

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1. INTRODUCTION

1.1 Background

On 8 April 2016, following extensive public and industry consultation then Ministry of Transport and Communications released a “*Spectrum Roadmap: Meet the Needs Over the Next 5 Years*” (“2016 Spectrum Roadmap”).

Post and Telecommunications Department (‘PTD’) concerned that it is important to assess its appropriateness of the 2016 Spectrum Roadmap going forward and what changes (if any) are needed especially in relation to IMT spectrum.

On 8 March 2019, the PTD released a Consultation Paper “*Review of IMT Aspects of Myanmar’s Spectrum Roadmap*” and PTD also sought the public comments by issuing consultation paper entitled Myanmar’s IMT and 5G Spectrum Roadmap preliminary positions on 25th June, 2019 which is taking moves as to release more spectrum for future Broadband Services in Myanmar. The PTD is pleased to advise that some 17 responses were received including mobile network operators (MNOs), regional wireless broadband providers, other Ministries, vendors and other industry stakeholders. Prior to this the PTD released a paper in January 2019 on the *Spectrum Optimization of the 850 MHz band* in respect of which public comments were due 28 February 2019. Responses on the 850 MHz band were folded into the broader IMT Spectrum Roadmap Consultation process as some of the responses covered the same issues.

PTD’s overall view is that the very high proportion of smartphone penetration in Myanmar and the continuing challenges to deploy fixed network infrastructure in Myanmar arguably means that the PTD needs to release more spectrum for future Broadband Services in comparative terms in order to underpin the country’s digital economy and improve connectivity.

We also note the demand for the release for more spectrum for future Broadband Services from a number of key industry stakeholders. While it is not possible to meet all of those demands given the competing needs of spectrum users, we have attempted to balance those requests. The PTD’s objectives include support for a competitive market for IMT services, the promotion of innovation in Myanmar by continuing to embrace technology neutrality and ensuring cross-border co-ordination with our neighbouring countries.

1.2 Scope of IMT and 5G Spectrum Roadmap

The scope on the IMT Spectrum Roadmap follows the following order, namely:

- i. Release of more IMT spectrum in Myanmar (see section 2);
- ii. The special case of the change of band plan for the 2.6 GHz band (see section 3);
- iii. Approach to the Unlicensed spectrum bands (see section 4)
- iv. Spectrum for PPDR and Governmental Organizations in Myanmar(see section 5)

2. RELEASE OF MORE IMT SPECTRUM IN MYANMAR

2.1 Current IMT spectrum released and ITU Region 3 comparisons

The 2016 *Spectrum Roadmap* envisaged the release of a number of IMT spectrum bands in Myanmar during the first four years of the Roadmap, including the 2.6 GHz, 1800 MHz, and 700 MHz bands and the optimization of the 850/900 MHz band.

As at April 2019, Myanmar has released almost 400 MHz in IMT spectrum (See Exhibit 1), however, a number of ASEAN markets (especially Thailand, Indonesia, Malaysia and Vietnam) are in the process or seeking to release significantly more IMT spectrum in the next 12 months. Also, Myanmar's total IMT spectrum allocations are lower than ASEAN exemplars in the Philippines, Malaysia and Singapore as well as northern Asian exemplars such as South Korea and Japan.

Exhibit 1: Current Status of IMT Spectrum Allocation in Myanmar

Sr.	Frequency Band	Frequency (MHz)	Bandwidth (MHz)
1.	450MHz	453.35-457.10/463.35-467.10	7.5
2.	850MHz	825-827.5/870-872.5 and 828.75-832.50/873.75-877.5	12.5
3.	900MHz	882.8-915/ 927.8-960	64.4
4.	1800MHz	1710 – 1785/ 1805 –1880	150
5.	2100MHz	1920 – 1980/ 2110 –2170	120
6.	2600MHz	2575-2595 and 2595-2615	40
Total			394.4

Globally all major markets are releasing significant blocks of 5G pioneer band spectrum in *inter alia* the 3.5 GHz and mmWave bands and planning for the release of additional spectrum to support IMT services and their respective digital economies. High proportion of smart phone penetration and data usage in Myanmar means that the PTD needs to encourage deploying fixed network infrastructure and releasing more IMT spectrum in comparative terms in order to underpin the country's digital economy and strengthen its global connectivity.

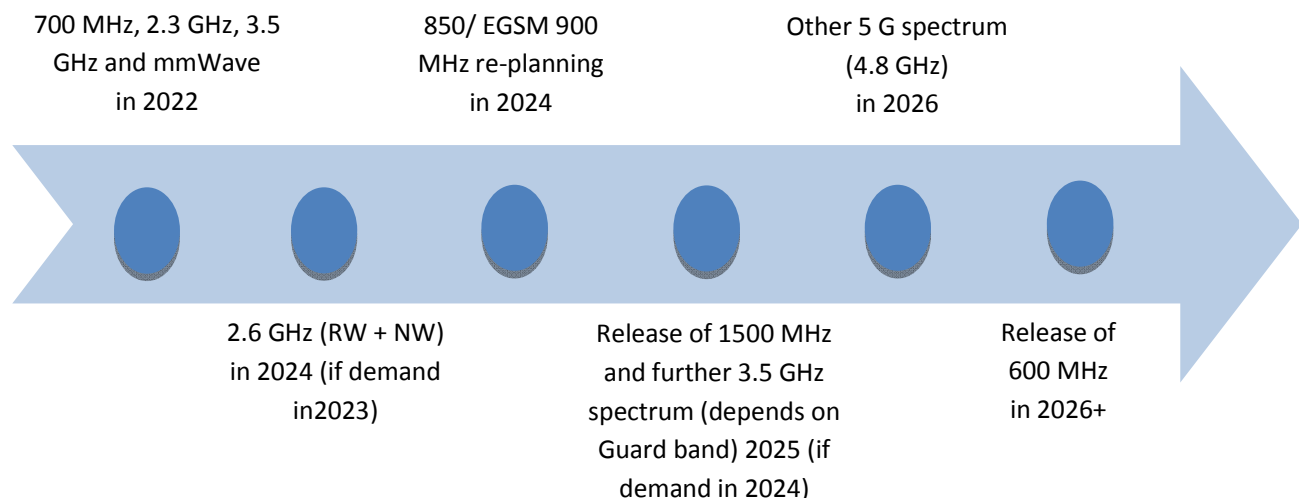
2.2 Timing for the release of additional IMT spectrum in Myanmar

In 2022, the challenge is to release IMT spectrum in Myanmar at reasonable prices in a way which reflects the new spectrum management paradigm that:

- (i) larger contiguous blocks of IMT spectrum are needed with release of 5G NR;
- (ii) in overall terms, the total of IMT spectrum needed by an individual mobile network operator (MNO) and the market in overall terms will significantly rise; and
- (iii) MNO need to have confidence to make long term investments in digital infrastructure in the knowledge that they have sufficient IMT spectrum to support both 4G and 5G service offerings.

It is also critically important for Myanmar's spectrum allocations to be harmonized and timed regionally so that Myanmar consumers are able to acquire affordable smart phones and other devices. With these factors in mind, subject to industry demand, the PTD preliminary proposed release schedule for available IMT spectrum in Myanmar is shown in Exhibit 2 below.

Exhibit 2: Proposed Release Schedule of additional Spectrum



The proposed release schedule for available IMT spectrum in Myanmar should be finally endorsed by the Ministry then 400 MHz of IMT spectrum¹would be released to the market in 2022 (of capacity spectrum which is more useful in urban areas). In essence, IMT spectrum availability in Myanmar by end of 2022 would about double to approximately 800 MHz (if all of the spectrum was allocated) allowing industry to make the necessary investments in Myanmar's digital future.

In overall terms, such a release of IMT spectrum would be consistent with the ITU *Guidelines for the Preparation of National Wireless Broadband Masterplans for Asia Pacific Region*, October 2012, which recommended that the minimum spectrum allocated and in use for cellular mobile services should be at least 760 MHz by 2022 and preferably 840 MHz.² However, it would be lower than the targets set in ITU Report ITU-R M.2290-0. That report prepared in advance of WRC-15,³defined the future spectrum requirements estimate for cellular mobile services below 6 GHz as 1,340 MHz for lower user density settings and 1,960 MHz for higher user density settings.

In specific terms, the PTD would note that:

- Coverage spectrum (namely the 700 MHz band (n28)), capacity spectrum (namely the 2.3 GHz (n40), 3.5 GHz and mmWave spectrum are considered to release in 2022.
- Coverage spectrum (namely the 700 MHz band (n28)) has been timed for 2022 following the likely regional release and usage of this band in a number of ASEAN markets, namely Thailand and Vietnam. The launch of APT 700 services in these other ASEAN markets will greatly accelerate the availability of affordable Band 28 smart phones and other devices in Myanmar. In addition, the release of this IMT band in 2022 will allow the MNOs who successfully secure this spectrum to decide whether to deploy 4G and/or 5G services in this band;
- 200 MHz of 3.5 GHz spectrum (namely 3400 to 3600 MHz, with a conservative guard band at this time of 25 MHz with existing satellite service) has been prioritised for release in 2022 for the deployment of 5G services. This spectrum will

¹Plus any mmWave spectrum allocations if in demand.

² Available at www.itu.int/ITU-D/tech/broadband_networks/WirelessBDMasterPlans_ASP/Masterplan%20guidelines%20EV%20BAT1.pdf See page 45.

³ITU-R, M.2290-0 (01/2014), *Future spectrum requirements estimate for terrestrial IMT*, Geneva

be very useful in urban areas,⁴ can substitute for traditional fixed line services and will provide certainty to MNOs to make network and infrastructure investment for future 5G services;

- By 2024 (if demand in 2023), the 2.6 GHz (RW + NW) could be released and the 850 and 900 MHz spectrum bands can be replanned in 2024;
- 1500 MHz band and further 3.5 GHz spectrum could be released post of 2025 (will release in 2024 if demand); following the likely determination of the optimal guard band in the C-Band given studies now being undertaken by the GSMA, GSA and ASEAN regulators such as the NBTC (in Thailand) and the ARFM (In Vietnam);
- Other 5G spectrum i.e. the 4.8 GHz band (n79), this would be undertaken in 2026; and
- Lastly, decisions about the release of 600 MHz would be post of 2026 Myanmar undertaking its analogue to digital television switchover etc.

The PTD considers that it is critical that Myanmar acknowledge that the long term move from 2G/3G services to 4G/5G services requires a rethinking in relation to the optimal spectrum allocation processes for IMT spectrum. While 5G NR technology supports bandwidths 10, 15, 20, 30, 40, 50, 60, 70, 80, 90 and 100 MHz, dual connectivity and carrier aggregation, larger block sizes are preferred to obtain the maximum benefit from the technology. Myanmar as it has not yet allocated a number of spectrum bands should therefore take such factors into account rather than following the traditional approach which resulted in MNOs each having fragmented IMT spectrum holdings over a number of bands. This is inefficient and means more costly capex and opex.

Therefore, the PTD also considers that it should allocate capacity spectrum in larger block sizes in order to take advantage of new technologies.

2.3 Release of 700 MHz, 2.3 GHz, 3.5 GHz and mmWave in 2022

As the release of key IMT spectrum needs to be considered in demand terms, 700 MHz (2 x 10 MHz is reserved to allocate for government use), the 2.3 GHz (20 MHz in 2.3 GHz is reserved to allocate for government use), 3.5 GHz and mmWave will be auctioned (or

⁴This includes Yangon, Mandalay, Nay Pyi Taw, Taunggyi, Mawlamyine, Bago, Myitkyina, Monywa, Patheingyi and Pyaw. As well as Yangon and Mandalay, some of these markets are experiencing very rapid growth (eg Myitkyina, Taunggyi, and Bago).

offered by a beauty contest with price being a criterion depending on the level of demand).

700 MHz band (n28) has been timed for 2022 following the likely regional release and use of this band in a number of ASEAN markets, namely Thailand and Vietnam. The launch of APT 700 services in these other ASEAN markets will accelerate the availability of affordable Band 28 smart phones and other devices in Myanmar.⁵ And China already released 700 MHz band spectrum in 2019 this will have the effect of turbo charging device availability and affordability.

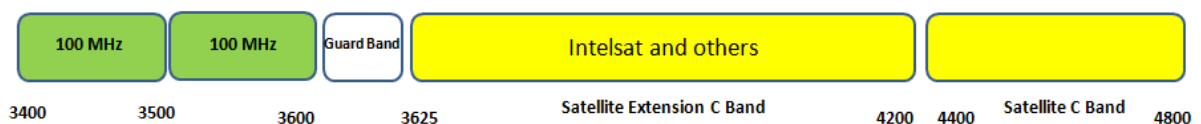
A short delay also means that MNOs can make an informed decision whether to utilise all or part of any 700 MHz acquired for 5G coverage as by late 2022 network equipment should be available for this band. While the MNOs are likely to deploy 4G initially, under Myanmar's technology neutral regime they have future options.

Also the PTD notes that the release the 700 MHz band will facilitate additional coverage in Myanmar as part of the Government's universal service obligation (USO) strategy⁶ but importantly until affordable devices are available then there will be few customers for such extended coverage. The delay until 2022 will provide time to PTD to assess whether any of the 700 MHz spectrum band should be reserved for PPDR broadband or other Government uses.

And 3.5 GHz (PTD's preliminary plan is as shown in Exhibit 3) and mmWave spectrum will be auctioned (or offered by a beauty contest with price being a criterion depending on the level of demand).

Exhibit 3: Release of spectrum in the C-Band/3.5 GHz band in 2023/24

200 MHz to be allocated for 5G, and initial 25 MHz guard band



⁵ This follows the launch of APT700 LTE services in the Philippines in June 2016. Furthermore, the release of 700 MHz in these larger ASEAN markets will also see the release of this band in smaller ASEAN markets in Lao PDR and Brunei Darussalam. The release of this band in Indonesia and Cambodia may be some way off. See GSMA, *Securing the digital divide across the entire ASEAN: A report on the status of the implementation of the APT700 band for ATRC*, August 2018

⁶ The release of 700 MHz spectrum, would if deployed extend using existing sites the current mobile coverage by a couple of percentage points given the greater cell size of 700 MHz versus 900 MHz spectrum.

2.4 Release of 2.6 GHz 2023/2024

The PTD's preliminary position of 2.6 GHz spectrum release is as shown in [Exhibit 4](#) below.

Exhibit 4: Proposed 2.6 GHz Spectrum for release



From the PTD's perspective, all successful bidders of 2.6 GHz would be able to use the spectrum for both 4G/5G almost immediately given the current availability of network equipment which supports this TDD Band 41. Further, 2.6 GHz spectrum allocations will be subject to a condition that reconfiguration may be required to ensure contiguous spectrum allocations in this band.

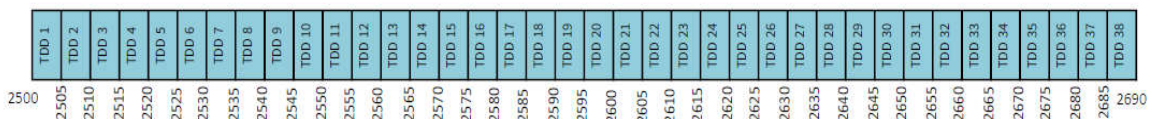
Recently, the PTD has been made aware that its neighbour Thailand is also supporting Band 41 which should make the process of co-ordination easier on that joint border. Likewise China, another of Myanmar's neighbouring countries, also uses TDD Band 41.

The PTD's view is therefore that Myanmar changed its band plan for 2.6 GHz from the previous band plan articulated in the *Framework for 2600 MHz Spectrum Auction* to Band 41 (also known as n41). In markets like Myanmar where the pioneer 5G spectrum band (ie 3.5 GHz) – is not fully available in the near term – because it is currently allocated to satellite services, the 2.6 GHz band is an excellent alternative 5G band.

While the PTD will engage in specific consultation with the 2.6 GHz regional licensees, our current thinking is that:

- (a) To be able to effectively usage of 2.6 GHz spectrum band, the regional licensees would be encouraged to shift their current spectrum allocation according to the new band plan (Band 41).
- (b) The synchronization of the 2.6 GHz regional licensee would also need to be broadened to include any new 2.6 GHz spectrum licensees. The proposed band plan would be set out in Exhibit 5 below.

Exhibit 5: The new band plan for the 2.6 GHz band (Band 41)



2.5 Other proposed spectrum releases in 2024 and beyond

As detailed in section 2.2 above the PTD envisages that:

- By 2024, the 850 and 900 MHz spectrum bands can be replanned prior to the expiry of the current E-GSM licences and the switch-off of legacy CDMA networks;
- If there is demand then further capacity band spectrum (namely the 1500 MHz, 4.8 GHz spectrum) could be offered to the market in 2024 and 2026 respectively. In addition, further 3.5 GHz spectrum could be released in 2025 (and will not be released any earlier in order to give earlier bidders greater confidence to make investments) following the likely determination of the optimal guard band in the C-Band given studies now being undertaken by the GSMA, GSA and ASEAN regulators such as the IMDA (in Singapore), NBTC (in Thailand) and the ARFM (In Vietnam);
- Other 5G spectrum including the 4.8 GHz band would be undertaken in 2026; and
- Lastly, decisions about the release of 600 MHz (n71) would be post 2026 undertaking its analogue to digital television switchover etc.

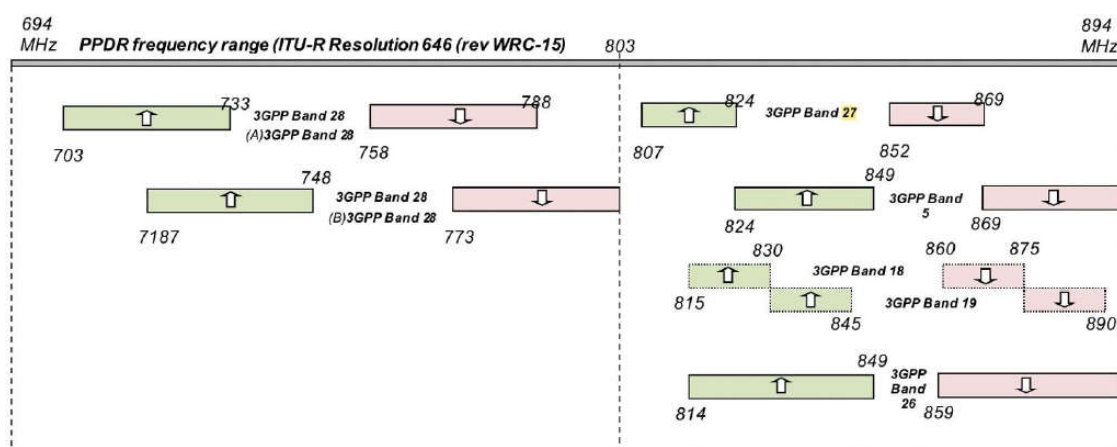
3. APPROACH TO THE LICENCE-EXEMPT BANDS IN THE 5 GHz BAND

Globally, the 5 GHz spectrum band is typically personal used for Wi-Fi connectivity (along with the 2.4 GHz band). As indicated in the first Consultation Paper, Myanmar's allocation for license-exempt usage in the 5 GHz band is only 5.725 to 5.875GHz(now considering to change the frequency range to 5.725 to 5.850 GHz), amounting to 150 MHz in total. This is a significantly smaller allocation compared to many other countries – including ASEAN markets – which have total bandwidth allocated in this band exceeding 500 MHz. Therefore, PTD is considering to open 5.470 to 5.725 GHz for license-exempt usage with output power limitations.

The PTD's preliminary view is that 3GPP bands are commercial use and not exempt from spectrum license while it has some sympathy for expanding the licence-exempt band in this band, given there was no consensus of responders to the Consultation Paper. Other bands like 6 GHz may consider to open for unlicensed band subject to the demand of the industry.

4. Spectrum for PPDR and Governmental Organizations in Myanmar

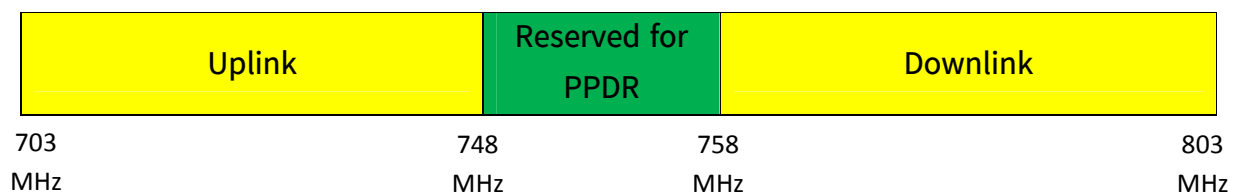
The ITU in a series of Recommendations has sought to promote global and regional harmonization of frequency bands for public protection and disaster relief (“PPDR”). Resolution 646 (Rev.WRC-15) encouraged administrations including the PTD in Myanmar to consider parts of the frequency range of 694–894 MHz for meeting their PPDR requirements. The 3GPP frequency arrangements (applicable to Region 3) fall within the PPDR frequency range designated by ITU-R Resolution 646 (Rev.WRC-15).



Source: APT, *APT Report on Harmonization of frequency ranges for use by Wireless PPDR Applications in Asia-Pacific Region*, No. APT/AWG/REP-73(rev.1), edition: September 2017, page 28

For Wideband PPDR

The department is considering to reserve 748~758 MHz for wideband PPDR as follow;



For narrowband PPDR

The department is considering to reserve 406~430 MHz for narrowband PPDR with channel spacing 12.5 kHz.

PPDR	Frequency Band
Wideband	The frequency 748~758 MHz with bandwidth 10 MHz is reserved for wideband PPDR
Narrowband	406~430 MHz with channel spacing 12.5 kHz