

Comments

On

Spectrum Roadmap

By

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1 Introduction

The Union of Myanmar has successfully implemented a far-reaching reform of the telecommunications sector that brought economic growth and benefit to Myanmar people. We are very pleased to be part of this journey. PTD has been doing many great jobs releasing various communication licensing schemes and issuing several licenses that resulted in exponential development of telecom sector as well as enormous impact to socioeconomic development in Myanmar.

We welcome the Ministry's public consultation on this spectrum roadmap proposal. This is an important opportunity to engage with PTD that will be crucial for the development of the country's ICT services in Myanmar going forward. The consultation process itself marks an important step and commitment by the Ministry to engage in an open and transparent dialog with industry.

We are also very pleased to be informed that inputs provided will be evaluated as key considerations to shaping the midterm ICT development in Myanmar.

We are also very encouraged by the following Roadmap Consultation Objectives;

- Facilitate spectrum access
- Promote efficient use of our national spectrum resource,
- Improved MCIT/PTD services
- Ensure spectrum is available to those that need it for the creation of advanced competitive services to the people of Myanmar and to support and advanced economy

We have organized our comments into the following sections

- General Comments
- Comments to Questions Listed in the Roadmap Document

2 General Comments

2.1 Drivers for Constant Change and Update in Spectrum Regulations

Internet being one major phenomenon of this century, the world economy has been more and more reliance to ICT infrastructure. Every country's socioeconomic development is directly proportionate to its ICT infrastructure development. Spectrum is a finite resource for each country and plays a critical role in ICT infrastructure; every country has realized that efficient spectrum regulations are required. Moreover, rapidly changing wireless technology development in data communications is also contributing to the regulatory bodies to quickly adopt and amend its existing regulations and framework. It is very encouraging to learn that Myanmar Government acknowledged that wireless sector is a key government priority to enable the economic growth of a country like Myanmar.

We welcome the MCIT's aim of establishing an independent regulatory body to monitor the trends in the industry and engaging more with the industry stakeholders in regular basis. We also welcome, PTD taking approach of becoming the facilitator allowing access to the nation scarce spectrum resources, through clear policies, and frameworks with full transparency.

In this knowledge economy age, countries are adopting rapidly to the dynamism of wireless technology allowing more innovations and racing to play major roles in Global village. It is a pleasant surprise to see Myanmar is not left behind in this dynamic rapidly changing world. The major advantage would be that Myanmar does not have much legacy infrastructure to maintain and consider for backward compatibility. This gives a unique opportunity to Myanmar to leapfrog and catch up with the rest of the rapidly advancing world.

We would also like to request the following regulatory initiatives be prioritized so that the wireless broadband data services can be implemented and offer swiftly by small and innovative service providers without much concerns over regulatory compliance or disputes with others.

- Record all frequency assignments/register
- Spectrum Policy, clear objectives for decision making
- Framework for equipment standards and compliance program
- Framework for license exempt spectrum users
- Bilateral/multi-lateral agreements

2.2 Critical Role of License Exempt Spectrum

Our observation of the proposed roadmap indicates that license exempt spectrums are merely considered as SRD. Contrary to that, we strongly believe license exempt spectrums play a critical role in nationwide broadband penetration according to latest technological trend around the world, especially in rural areas of developing countries.

We acknowledge the role of SRD plays in governing consumer electronics and other short range applications such as RFID, NFC, alarm systems, remote controls, sensors and automation but we feel that the roadmap has inadvertently ignored a large and vibrant class of usage of the license exempt band for delivering broadband services.

Although the roadmap document recognized and acknowledged WiFi offload, it is a very cellular centric usage of license exempt band. All mentions of broadband access have been quite cellular / IMT centric (typical, as the industry has influenced standard bodies).

The Wireless Internet Service Provider industry is a thriving industry that provides highly competitive, innovative and affordable broadband services to both enterprises and mass consumers. **In the United States, WISPA has recorded over 3 million WISP subscribers via over 3000+ providers.** This, despite having a large selection and availability of alternative communications infrastructure, is made possible by removing the barriers of access to spectrum, which in turn brought down barriers to access to technology.

This latter point is worth stressing because it is one of the key reasons that drove WiFi to its huge success today where we find WiFi technology being used in everything from SRDs, to smart phone which all have embedded WiFi, to the awe-inspiring and impressive WiFi radios that connect terrestrial broadband links at world-record lengths of over 380 km long. **The highly competitive environment has brought down equipment prices 10x to 100x cheaper than any other comparable equipment operating in licensed bands**, and the WiFi Alliance and IEEE standards bodies have continue to push advances in WiFi to support multi-gigabit speeds. The availability of Open Source interfaces to equipment operating in the unlicensed bands allow more technically-capable WISPs to customize their product and to integrate/adapt with emerging Big Data, Cloud-based Mobile Services and IoT (Internet of Things) technologies much more rapidly than the incumbent players who dominate the licensed-spectrums.

While inviting foreign carriers and adopting conservative standards commonly used throughout Europe and Asia would help Myanmar catch up with the rest of the world on its broadband infrastructure, we strongly believe that there is a very real potential and a great opportunity to not only catch up but to *leap frog and surpass* our peers by aggressively expanding and liberating the use of License Exempt band, allowing the combination of open access to both spectrum and technologies to thrive. A positive side effect of a policy to open unlicensed spectrum is that it can help accelerate the growth of a local ICT industry. The open access to technology and spectrum creates an opportunity for the Myanmar ICT industry to help customize and build its own communication services infrastructure and unleash new ways of integrating powerful open software solutions to this infrastructure to help meet the needs of the consumers and capture opportunities that are unique to Myanmar.

The role that unlicensed spectrum plays for spurring broadband infrastructure growth in developing nations has long been recognized by the UN with a long list of literature and references citing its effectiveness. Below we include two quotes to help illustrate and support our position:

"It is precisely in places where no infrastructure exists that WiFi can be particularly effective..."
– **Kofi Annan, former UN Secretary General**

"... the cost for a ten square mile WiFi network is approximately US\$ 150,000 or more. This is sufficient to cover many metropolitan areas, and is affordable by many municipal governments. In contrast, cellular service providers cannot deploy small networks because of the type of technology relied upon. Cellular coverage for a small area using a small part of a network may cost \$10 million, let alone the larger much more expensive network."

– ***"Information Communication Technologies for Employment Creation and Poverty Alleviation," UN Economic and Social Commission for Western Asia, Oct 2003***

In United States, FCC has been very proactive in releasing more and more license exempt spectrum for Wireless Broadband Service Providers. The approach has been proven correct and effective allowing smaller innovative service provider coming into market and increasing broadband penetration in U.S especially in rural areas.

Myanmar is a green field when it comes to wireless broadband Internet access since it does not have to be concerned much about legacy networks and spectrum already in used compare to

developed countries. **Also taking into consideration for limited resources PTD has, our general comment on spectrum roadmap is PTD to adopt the US's FCC rules mostly when it comes to license exempt spectrum and their related equipment specifications.** The key reasons for adopting the FCC rules are as follows:

1. The US's FCC rules are time-tested and those rules serve as the beacons in advancing the global digital divide especially in the rural areas by significantly promoting the license exempt bands; the results in the US has been astonishing-- WISPA has recorded over 3 million WISP subscribers via over 3000+ providers in the US, many of which are rural service providers. In contrast, the rules used by EU countries are somewhat outdated as EU have to consider "harmonization" issues that cross their border countries and each country has their own specific need. Myanmar does not need to suffer from EU's woes as we are one country and we can pick the rule that fits our need—the FCC rules.
2. FCC is very active in identifying the areas where the allocation of spectrum, especially in the license exempt bands, would benefit the people and bridge the divide. Examples include the release of additional 100MHz of 5GHz spectrum to allow outdoor, high power usage in March of 2014 and the recommendation of increasing unlicensed spectrum in the 5350-5470 and 5850-5925 GHz range were included as part of Middle Class Tax Relief and Job Creation Act of 2012, which recognizes "unlicensed wireless broadband systems have become critical complements to licensed commercial mobile networks and to fixed wireline networks."¹
3. The US FCC permits much higher effective radiated power limits up to 200W for point-to-point applications in certain frequency bands. This allows 4x to 6x greater link distance or 1.5x to 200x greater capacity. **According to 2006 study by UK Ofcom, the economic benefit of raising allowable radiated power limits to 200W was estimated to be greater than 288 million pounds. Other countries that have adopted FCC radiated power limits in the License-Exempt Spectrums include Canada, Australia, Brazil, New Zealand, South Africa and Japan (limited).**

Although interference can become a challenge in license exempt band, it is mostly a result of not having enough license exempt spectrum available under the current regulations. For example, the entire UNII-1 and UNII-2 bands have been omitted from the license exempt list. And the demand is quickly getting higher over time which means there is strong urgency to open up more license exempt spectrum. Additionally, the FCC regulations permit higher radiated powers in proportion to the antenna's ability to confine radiated energy "beam width" within a narrow volume, thus reducing interference for neighboring devices not within its physical transmission path. Devices that are certified under FCC 15.407 have the capabilities to enforce the prescribed radiated power limits.

In addition, intelligent technical solutions that allow dynamic switching of channels and power can be used to deploy in license exempt spectrum.

¹ EVALUATION OF THE 5350-5470 MHZ AND 5850-5925 MHZ BANDS PURSUANT TO SECTION 6406(b) OF THE MIDDLE CLASS TAX RELIEF AND JOB CREATION ACT OF 2012, U.S. Department of Commerce, January 2013.

We also believe Myanmar can recognize broad worldwide trends of opening up more license exempt spectrum and plan for a similar roadmap with the highest priority and aggressiveness and adopt FCC-type policies (more aggressive than European Res. 229).

Therefore, our recommendation for MCIT/PTD as follows:

1. **Promote the use of license exempt bands as the highest priority item on par with nationwide licensed bands** as the devices using license exempt bands are cheapest and most ubiquitous (almost all devices shipped today has WiFi) and innovations happen faster than cellular's (each "G" generation of cellular takes 12 years whereas WiFi advances much faster). Without making a priority to promote and liberalize license exempt bands, the digital access in small cities and rural areas will be delayed.
2. **Fully adopt US FCC's band plans, transmit power and emission limits for 2.4 GHz, 5GHz, and 24GHz.** By fully adopting it, PTD leverages the time-tested rules without additional overhead. Canada, Australia, Brazil, New Zealand, South Africa and Japan (limited) are countries that adopt FCC rules for the most part.
3. **Recognize FCC Certifications and allow FCC-certified equipment to import without any additional import license for each freight.** FCC-certified devices have the highest adoption rate due to the US's sheer size and its leading status.
4. **For high powered use of unlicensed bands, adopt industry-led model for managing a deployment registration database and resolving interference issues**
 - a. Let industry volunteers set up a registration database that is publicly accessible
 - b. Require that all high-power outdoor equipment > 4W EIRP operating in any of the License Exempt bands shall be registered on this database
5. **Open up UNII-1 and UNII-2 bands for license exempt use as most countries in the world has done.**
6. **Enact the above recommendations with the highest priority.**
7. **Designate 3.5 GHz and 11GHz bands for backhaul wireless access with a limited regulatory requirements**

We believe our recommendations are relatively straightforward to adopt and friendly to the resource constraints currently faced by MCIT/PTD.

In the table below, we list the set of key criteria that we think is needed to complete the Myanmar regulatory framework for the license exempt bands to promote license exempt bands use and help bridge the digital divide.

Recommendation

Frequency	FCC Power Limit (PTmP)	FCC Power Limit (PTP)	Certification	Recommendation
2.400 - 2.4835 GHz	4 Watt	155 Watt	FCC 15.247	Adopt FCC Power Limit; FCC Certified devices do not need license
5.150 - 5.250 GHz	4 Watt	200 Watt	FCC 15.407	Adopt FCC Power Limit; FCC Certified devices do not need license
5.250 - 5.350 GHz	1 Watt	1 Watt	FCC 15.407	Adopt FCC Power Limit; FCC Certified devices do not need license
5.470 - 5.725 GHz	1 Watt	1 Watt	FCC 15.407	Adopt FCC Power Limit; FCC Certified devices do not need license
5.725 - 5.850 GHz	4 Watt	200 Watt	FCC 15.407	Adopt FCC Power Limit; FCC Certified devices do not need license
24.0 - 24.250 GHz	disallowed	2 Watt	FCC 15.249	Adopt FCC Power Limit; FCC Certified devices do not need license

3 Questions and Comments

We have listed our answers to the questions asked from the roadmap documents in the following paragraphs.

Question 1 (Drivers of the Spectrum Roadmap):

Q1 (a): Do you agree that these are the primary drivers for the roadmap?

Q1 (b): Are there other drivers that should be considered?

Our Comment:

Favorable policies that consider availability of open source radio equipment or the emergence of market-disruptive vendors/technologies that can spur innovative usage of spectrum and new applications. Licensed band are primarily dominated by a few vertical players who control the market, creates a barrier to entry for smaller players.

Question 2 (Independent Regulator):

What stakeholder benefits would you hope to see materialize from the creation of the new independent regulator?

Our Comment:

Balancing and protection of small vs. large operators regulation/programs to promote local ISPs vs. Cellular operators.

Question 3 (Frequency Registration):

Do you agree that completing a frequency register is a high priority and beneficial to spectrum users?

Our Comment:

Yes. Myanmar should setup with support from PTD/MCIT a centralized database where all industrial players and government agencies can register their spectrum use together with link locations. The database should be also publicly accessible so that every spectrum users can plan ahead without disrupting others.

Question 4 (Spectrum Policy Framework):**Q4 (a):**

Do you agree that it would be beneficial for MCIT/PTD to articulate a Spectrum Policy that establishes a framework providing objectives, procedures and standards and guidelines to manage the radio frequency spectrum?

Our Comment:

Yes. MCIT/PTD can quickly adopt most of the Spectrum Policy Framework from FCC first then collect feedback from industry and amend it accordingly as and when required. This approach shall allow various innovations for small players rather than adopting more restrictive approach from EU where most policy are dominated by large operators.

Q4 (b):

Do you agree that there needs to be clarification of spectrum policy concerning the roles of authorizing ministries when it comes to spectrum for broadcasting?

Our Comment:

Yes. More public consultations should be engaged specifically for this so that all stakeholders can participate and contribute in details.

Question 5 (National Table of Frequency Allocation):

Do you support the changes made by PTD in the recently published and updated NTFA?

Our Comment:

In general, we would encourage MCIT/PTD to setup more public consultation and clarification sessions with all relevant stakeholders and have minor adjustment as and when necessary.

Question 6 (Equipment Standards):

PTD invites comments concerning the establishment of a framework for equipment certification and approval for permitted equipment in Myanmar.

(Note: Respondents should factor the limited capacity within PTD as well as the time necessary to operationalize the independent regulator. Ideas may include a transitory approach to a full certification and approval process.)

Our Comment: Considering the limited capacity and resources available in PTD, we strongly recommend to adopt FCC regulation on equipment specifications framework first. PTD can then monitor and collect feedback from industry and adopt or amend the framework to fit Myanmar ICT landscape over time. For license exempt bands, we propose a transitory approach before MRA is established. Permit equipment that complies with FCC Part 15.247, 15.249, or 15.407.

Question 7 (Spectrum Plan):

Q7 (a):

Fixed microwave bands are under intensive pressure, given their use by cellular service operators' backhaul. Should detailed plans be created first in these bands?

Q7(b):

If the response to Q7(a) is a 'No', what bands should be considered first?

Our Comment:

Yes. To be fair and transparent, fixed microwave licensed bands allocations plan for backhaul should be registered and published. For license exempt bands, simple registration on public database should be adequate.

Questions 8 (Band Plan):

Detailed channel plans constitute a fundamental requirement for the development of the spectrum. The lack of these band plans has resulted in ad-hoc assignments and the need to realign deployed systems. While the PTD is in the process of developing formalized band plans, no formalized band plans are currently available. These band plans would have to be developed in consultation with stakeholders. Microwave users have provisionally adopted ITU band plans. What bands do you consider to be a priority for band planning?

Our Comment:

We strongly believe FCC band plans for License-Except Spectrum should be adopted as high priority, followed by 3.5GHz and 11GHz bands..

Question 9 (Compliance):

We invite comments from stakeholders concerning compliance issues that are impacting spectrum use today.

Our Comment:

Myanmar has been practicing a very restrictive approach when it comes to compliance for importing equipment that use radio frequency. Approval is required from PTD for most radio spectrum equipment import although PTD has very limited resources and capacity. This created inefficiency for deployment and rollout for many players both large and small. We recommend, PTD to simply adopting FCC compliance standards first and then monitor and collect feedbacks from industry.

Question 10 (International Activities):

In many countries, stakeholders play an important part in preparing for, and participating in international spectrum planning conferences. We are interested in your views on how Industry might contribute internationally to further the interests of spectrum planning and development in Myanmar.

Our Comment:

PTD is on the right track by transparently and openly engaging with public on spectrum policy and roadmap. We should focus on getting first version of policy framework that is more relaxed and build a culture of participation and providing feedback within the ICT industry in Myanmar.

Question 11 (Assignment Approaches):

Q11 (a):

Does Myanmar have the right balance between the three spectrum assignment approaches viz. the traditional approach, the market-based approach and the commons approach?

Q11 (b):

When demand exceeds supply, do you agree that the default process be market based, with comparative spectrum assignment processes only being used in exceptional cases?

Our Comment:

Myanmar is on the right track to balance three approaches. However, when the demand exceeds supply, we do agree that the default process be market based. Although it is inevitable to have some exceptional cases, we recommend these exceptional cases should be fully transparent.

Question 12 (Redeployment/Re-farming):

Do you agree that there is a need for a re-farming policy that would provide guiding principles concerning spectrum recovery and redeployment?

Our Comment:

Yes. The re-farming policy may have challenges in some cases but the policy shall provide guiding principles for spectrum recovery and redeployment so long as there is a transparent public consultation with adequate time before publishing these policies.

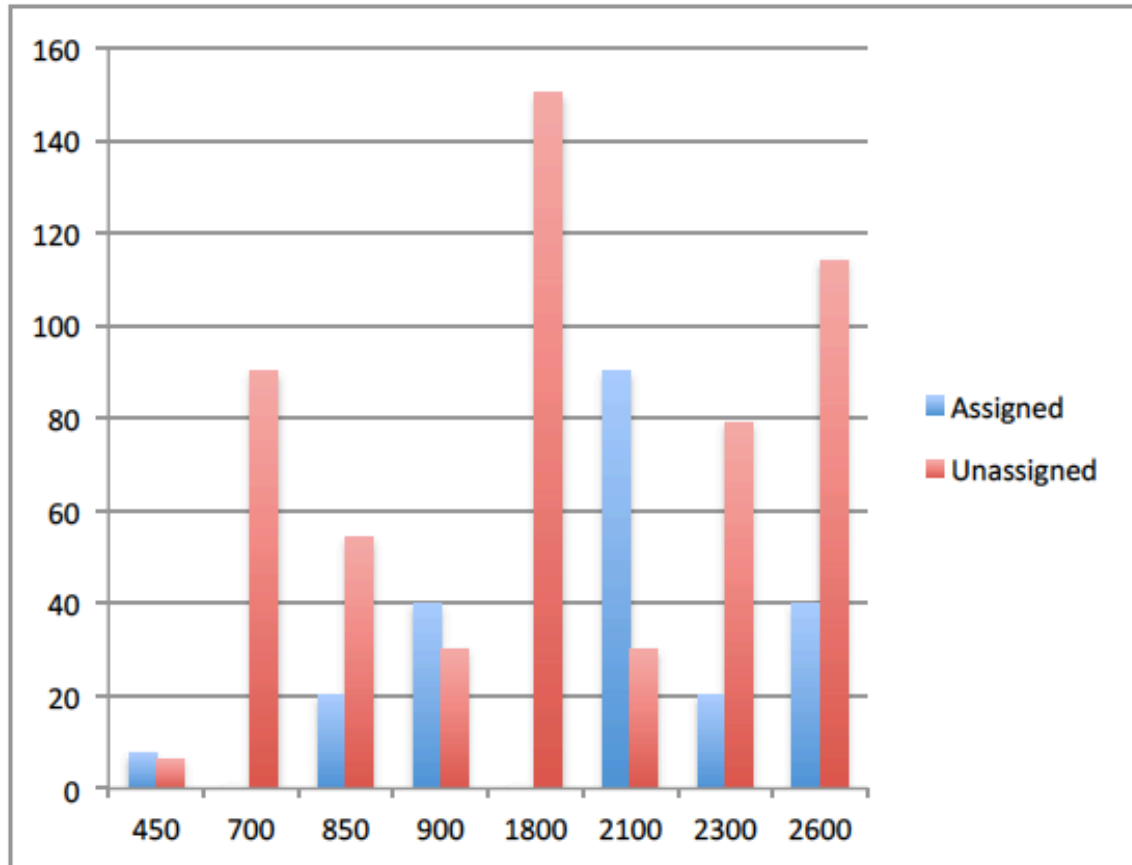
Question 13 (850/900 MHz Re-alignment):

Figure 1: Assigned/Unassigned Commercial Spectrum (MHz) - Reference Figure 11 of Page 59

While the release of 850 and 900 MHz and any associate band arrangements would be part of a separate consultation, we invite your preliminary views on options presented in Figure 11, page 59 of “Roadmap for Consultation” document.

Our Comment:

The figure illustrated that almost every bands has been assigned. However, the assignments are not clearly described in details. Publishing these assignment transparently to the public will be a good first step before the public consultation.

Question 14 (Commercial Spectrum Release):

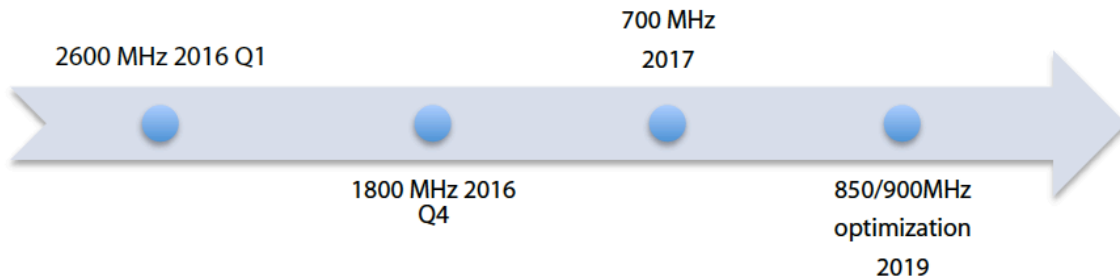


Figure 2: Proposed Release Schedule – Reference Figure 13 of Page 63

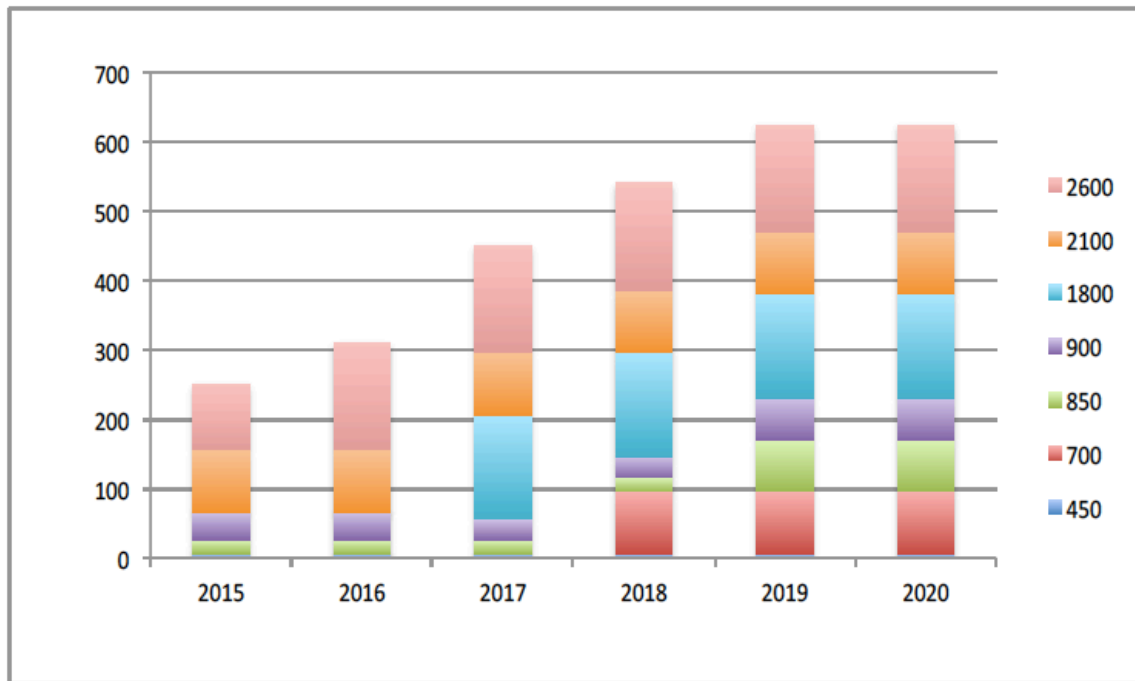


Figure 3: Current and Expected Spectrum Release Plans - Reference Figure 14 of Page 64

Note:

Figures 13 of page 63, “Roadmap for Consultation” document, and Figure 14 of page 64, “Roadmap for Consultation” document, above show the bands selected for release and as well as the sequence of such release.

Q14 (a):

Please comment whether the targeted bands are the priority bands for release.

Q14 (b):

Please comment on the sequence of the release of the selected bands.

Q14 (c): Please comment on the overall timing of release.

Our Comment:

We would like to propose to release 700MHz and 1800MHz band in Q4-2017 at the same time. We believe mobile operators in Myanmar are not ready to deploy these bands for LTE implementation as well as consumers in Myanmar cannot afford LTE mobile handsets for now. Releasing both 700MHz and 1800MHz at the same time will create level playing field between large mobile operators and innovative WISP, giving them equal opportunity of time to market. Besides, within this time frame, there can be a lot of disruptive technology emerged and change the LTE landscape in Myanmar.

Question 15 (Spectrum Demand):**Q15:**

Is the amount of spectrum proposed for release over the next 5 years adequate? If not, please provide detailed rationale supporting the need for more commercial spectrum in Myanmar.

Our Comment:

Yes. We believe the amount of spectrum proposed for release over the next 5 years is adequate considering currently available technology. As repeatedly stated in our comments from various sections, relaxing and opening up more license exempt band shall allow PTD to retain the spectrum for future use in case of new technology emerged.

Question 16 (Fixed Bands):

(Note: The MCIT/PTD Action Plan (above) includes the creation of an industry-led committee for the inter-user coordination of fixed spectrum.)

Q16 (a):

Do you support the idea of establishing an industry-led committee for the inter-user coordination of fixed spectrum?

Note: According to the same Action Plan, all new policies, standards would be developed in consultation with industry:

Q16 (b):

Do you agree that there is a need to establish utilization policies, in consultation with industry, to ensure all users are accommodated and establishing minimum technical standards for systems in these bands?

Q16 (c):

Do you support the need to release a policy and band plan providing for more spectrum in higher bands for short and very short hops?

Q16 (d):

Do you agree, given limited propagation and possibilities for spectrum with nearby systems in the upper bands, that a simplified licensing approach for these bands would be appropriate? Bands above 40 GHz have not yet been allocated in Myanmar.

Our Comment:

A simple regulatory requirement of mandatory registration on fixed band utilization with details of link locations on centralized database and publishing it for public access shall be a great start to establish inter-user coordination.

Question 17 (Land Mobile):**Q17 (a):**

Please comment on the proposed actions planned by MCIT/PTD over the next 5 years to:

- i) Identify LM spectrum for private and commercial type dispatch systems?
- ii) Creation of band plans, possibly following the approach of neighboring countries?
- iii) Pursue border agreements?

Q17 (b):

Comments are invited on the bands proposed for Land mobile systems.

Q17 (c):

What other initiative(s) concerning land mobile do you feel should be considered?

Our Comment:

No comment.

Question 18 (License Exempt):**Q18 (a):**

Do you agree with the MCIT/PTD's action items as proposed for a license exempt framework?

Q18 (b):

What other action(s) would you propose for consideration as part of a license exempt framework initiative?

Our Comment:

Yes. We agreed with MCIT/PTD's action items for license exempt framework.

We would like to propose the following actions for consideration as part of license exempt framework initiative:

- 1) Adopt FCC regulation 15.407 which defines the Unlicensed National Information Infrastructure which operations within the range of 5.150-5.350GHz, 5.470-5.850GHz to support Broadband Radio Access Networks, PtP, and PtMP applications.
- 2) Adopt FCC regulations 15.247 and 15.249 for 2.4GHz, 5GHz, and 24GHz License-Exempt bands.
- 3) Distinguish SRD applications from Broadband Radio Access and reconsider mix use of licensed and license exempt in 2.4GHz and 5GHz bands.
- 4) Permit licensed commercial operators to use high effective radiated power limits as specified in FCC 15.247, 15.249, 15.407 for Broadband Radio Access Network applications. The FCC regulations permit higher radiated powers in proportion to the device's ability to limit radiated energy "beam width" within a narrow volume, thus reducing interference for neighboring devices not within its physical transmission path. Devices that are certified under FCC 15.407 have the capabilities to enforce the prescribed radiated power limits.
- 5) Form an inclusive license exempt band coordination committee for commercial uses of license exempt band and interference resolution.

The following tables described the Power Limits applied and several countries.

Table 1: License Exempt Band Power Limit and Several Countries

Region	2.4-2.5GHz	5.725-5.875GHz	24-24.25GHz	Unwanted Emission
US / FCC	1W/30dBm (SRD) 4W/36dBm (PtMP) 200W/53dBm (PtP)	4W/36dBm (PtMP) 200W/53dBm (PtP)	2W/33dBm (PtP)	-100x/-20dB FCC Part 15.247
Indonesia / MCIT	500mW/27dBm (Indoor) 4W/36dBm (Outdoor)	4W/36dBm		
Australia / ACMA	4W/36dBm	4W/36dBm 200W/53dBm		
South Africa / ICASA		4W/36dBm 200W/53dBm (PtP)		
Europe / ETSI	100mW/20dBm (Indoor WLAN) EN 300 328	4W/36dBm EN 302 502		-100x/-20dB@ 3MHz -750x/-28dB@ 11MHz -10000x/-40dB@ 21MHz EN 302 502
Hong Kong / OFTA	4W/36dBm	4W/36dBm		EN 302 502
ASIA / Various	Varies upto 4W/36dBm	Varies upto 4W/ 36dBm	Varies upto 1W/ 30 dBm	

- *Need to accommodate for SRD as well as Wireless Broadband Access (longer range)*
- *2.4/2.5 GHz: many countries allow up-to 4W to accommodate PtMP, PtP, Indoor and SRD*
- *5GHz: almost all countries allow up-to 4W*
- *24 GHz: many countries allow up-to 2W; some are still revisiting the regulation*

The following table shows the comparison of Typical Effective Radiated Power (ERP) vs. FCC Limits

Table 2: Typical Transmit Power vs. FCC Limit

Device Type	Typical Effective Radiated Power (ERP)*	FCC Limits
Television (UHF)	150,000W	500kW (FCC 47.73.614)
FM Radio Tower	1W – 100,000W	100kW (FCC 47.73.211)
AM Radio Tower	250W – 50,000W	50kW (FCC 47.73.21)
Cellular Base Stations	8W – 1000W (Typical: 40-80W)	500W (FCC 47.22.913) 1000W Rural (FCC 47.22.913)
Cellular Phones	GSM: up to 8W (per Spec) UMTS/3G: up to 2W (per Spec) Apple iPhone 6: 1.79 W (max) Samsung Galaxy S5: 0.73W (max)	7W (FCC 47.22.913.a.2)
Wireless Backhaul (Outdoor, Long Range)	500mW to 100W	200W (5 GHz) 158W (2.4GHz) (FCC 47.15.247, 47.15.407)
WiFi (Outdoor Hotspots)	400mW to 2W	4W (FCC 47.15.247, 47.15.407)
WiFi (Indoor)	50mW to 400mW Apple iPhone 6 WiFi: 323mW	4W (FCC 47.15.247, 47.15.407)

**ERP includes the antenna gain of directional/sector antenna typically installed on the respective systems*

The following table shows “**High Power Limits for License Exempt Devices**” from Office of Communications (Ofcom), July 2006.

Table 3: UK’s Ofcom 2006 Study on Modeling Economic Benefit vs. Transmit Power Limit

Frequency	Scenario	Cell radius	Net benefit (GBP, million)
2.4	1W EIRP	3.50	188
2.4	10W EIRP	7.25	443
2.4	80W EIRP	16.50	539
5.8	4W EIRP	4.25	85
5.8	25W EIRP	7.25	238
5.8	200W EIRP	16.50	288

Table 4.2 Net benefit (NPV of consumer surplus for 2005-2010)

- 4.6 The increase in consumer surplus is greatest for the highest power scenario at 2.4GHz. This is because it allows the largest cells to be deployed.

Question 19 (Broadcasting):

Q19 (a):

Do you agree with the above proposed action items?

Q19 (b):

What other broadcast initiative(s) should be considered by the MCIT/PTD?

Our Comment:

No comment.

Question 20 (Satellite):

Q20 (a):

(Note: MCIT/PTD is currently pursuing the provision of domestic satellite services.)

Do you agree that MCIT/PTD should, in consultation with stakeholders, develop a policy and licensing guideline for the provision of satellite services in Myanmar?

Q20 (b):

Please comment on the proposed features of the policy and licensing guideline as set out below:

- i) Authorization process of foreign satellite service providers.
- ii) A published list of authorized foreign satellite providers ensuring the operation of their systems comply with Myanmar's table of frequency allocations and spectrum utilization plans proposed for all bands.
- iii) Procedure to be used when submitting license applications for fixed earth stations operating in any space radio communication service.
- iv) Procedures for the licensing of operators of satellite news gathering (SNG) earth stations, including foreign operators.
- v) Requirements for the coordination of proposed assignment with other existing domestic assignments.

Q20 (c):

What other considerations should be factored into a policy and licensing procedure for satellite services?

Q20 (d):

What changes should be considered to the current Spectrum Rules concerning Spectrum License requirements?

Our Comment:

No comment.

Annex 1: FCC Reference Documents

Please see attached PDF Files.