

## 10. Fixed services

Backhaul facilities form an essential part of the infrastructure backbone that facilitates mobile and broadband networks. Backhaul systems are also used to link a broad range of telecommunications requirements between sites.

In Myanmar, wireless microwave solutions are more prevalent [due to the limited availability of fibre as a solution] for backhaul infrastructure in urban as well as remote and rural areas. Backhaul is a critical component for the deployment of mobile networks in that it enables fast deployment of cell sites.

The focus of this Roadmap discussion revolves around the “mobile first” initiative and back haul to support these growing networks. However, we should not lose sight of the fact that as other industries continue to grow, a broad range of users in these industries, as well as government will also require wireless connectivity to support their internal operations.

### 10.1. Demand for backhaul in Myanmar

The suggestions and comments from the Master Plan consultations are considered and accepted:

*“Industry is in need of clean spectrum, in addition spectrum should be made available commercially. The areas/topics in need of urgent attention are fibre deployment, spectrum and competition.”*

The demand for microwave backhaul continues to increase. Without appropriate spectrum planning, backhaul will become a bottleneck to the deployment of Commercial services, as well as impeding other users of the spectrum.

The key trends driving the rapid increase in the spectrum requirements for commercial mobile services are as follows:

- Growth in connections and the number and types of mobile devices,
- Consumer demand for faster data rates to support traffic intensive applications and,
- Networks increasing geographic coverage.

As networks grow in coverage and capability, demand is expected to grow further with a consumer expectation for instant fast reliable service everywhere. This all translates into more cell sites and correspondingly, more wireless microwave infrastructure with increased capacity.

#### International Forecasts of Future Backhaul Demand<sup>51</sup>

In 2011, a consortium of Aegis Systems Ltd., Ovum Consulting and dB Spectrum Services Ltd. provided the UK regulator, Ofcom, with a report that outlined the drivers of wireless backhaul demand.<sup>52</sup> The study indicated that although there is sufficient spectrum to meet

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<sup>51</sup> Industry Canada, Commercial mobile spectrum outlook, March 2013

<sup>52</sup> See the full *Frequency Band Review for Fixed Wireless Service* report (<http://stakeholders.ofcom.org.uk/binaries/consultations/spectrum-review/annexes/report.pdf>).

anticipated needs in the frequency bands above 20 GHz, additional spectrum might be required in the lower and medium frequency bands (3 GHz to 20 GHz frequency range).

Similarly, the Australian Communications and Media Authority (ACMA) has identified continued pressure within lower frequency bands (1.5-8 GHz), while sufficient spectrum exists to accommodate demand in the higher frequency bands.

In 2011, the United States' FCC made additional spectrum available for backhaul use in bands below 13 GHz, and provided additional flexibility to facilitate the use of backhaul in rural areas with the release of its Wireless Backhaul Report and Order(R&O).

We believe these international forecasts are reflective of similar requirements expected in Myanmar.

## **10.2. Other countries framework for assigning spectrum and licensing backhaul**

In other countries, Microwave fixed systems support the operation of a host of industries including commercial telecom, utilities, broadcasting and government.

PTD considers it useful to review and factor the spectrum utilization plans of neighbouring countries when developing plans for Myanmar. Harmonization assists in developing frequency sharing arrangements in border areas and the coordination of individual systems to minimize interference.

IDA - Singapore's regulator, has adopted the ITU frequency plans in their Radio Frequency Master Plan. They have also sub-allocated certain bands for specific services.

Malaysia has developed SRSPs for frequency bands<sup>53</sup> assigned. The SRSPs describe the technical requirements for systems in these bands.

## **10.3. Current spectrum assignments and licensing framework for backhaul in Myanmar**

According to the Myanmar Spectrum Rules, PTD may authorize Persons to establish fixed communications systems by means of fixed Radio Apparatus for the purpose of providing communications services to itself or for sale to another Person. Frequencies for fixed services are assigned according to the National Table of Frequency Allocations. Fixed licenses will generally be granted on a first-come, first-served basis<sup>54</sup>. If necessary, an auction or tender process may be used.

In Myanmar, backhaul in support of Commercial networks is in high demand. Wireless backhaul networks are designed employing a diverse range of frequency bands. The selection of a particular frequency band is primarily dependent on a variety of technical

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<sup>53</sup> <http://www.skmm.gov.my/Spectrum/Standard-Radio-System-Plan-Resources/Standard-Radio-System-Plan/List-of-current-SRSPs.aspx>

<sup>54</sup> Throughout this document we recognize the need to for detail channel arrangements and technical requirements in al bands as well as utilization plans providing greater precision over the NFAT.

requirements (e.g. long-, medium-or short-haul capacity), design characteristics, operational practicalities and the availability of spectrum.

Wireless service providers' microwave backhaul networks are typically designed using a range of frequency bands. The size and scale of these networks depend on the specific operator's business needs. Depending on the application some networks may consist of only a few links, whereas the deployment of mobile networks is comprised of hundreds of links that span the entire country. While there are a host of frequency bands allocated to the fixed service and available for backhaul, the following traditional bands are highlighted by PTD as being primarily utilized by wireless service providers in their networks: 6,7,8, 11,13, 15,18,19,23 GHz.

While backhaul spectrum has historically been authorized for the use of MPT rather than licensed. In developing the Spectrum Rules, PTD have made progress for planning and licensing of back haul. However, there are further steps are required to develop a best practice framework.

It is noted that Myanmar's Spectrum Rules provide that:

- Applicants may request exclusive use of a frequency or frequencies only in the bands 11.13,15,18,23 and 26 GHz
- Allows point-to-point, and point-to-multipoint
- Maybe used for portable applications such as ENG or nomadic applications.
- Various operational conditions of licence (CoLs) including minimum path lengths

The Spectrum Rules do not specify band limits, minimum efficiency standards, or antenna performance requirements or specify band arrangements.

As it is in Myanmar's interests that a best practices framework for band limits and arrangements be adopted on a priority basis, in the table below, we provide ITU Recommendations concerning radio-frequency (RF) channel arrangements for high-capacity fixed wireless systems (FWSs) for each of the bands allocated for assignment in the Spectrum Rules. Also included in the table are radio allocations that are co-primary with Fixed services (as indicated in the NFAT) – an important consideration when making assignments to Fixed services. And finally, the table lists the path length in km based on Spectrum rules:

- < 11 GHz are used for long-haul links.  
These frequencies should be considered along certain corridors to reach areas where other backhaul options may be cost-prohibitive.
- 11-23 GHz typically are used for medium-haul links
- > 23 GHz are generally used for short-haul links

Spectrum, in higher ranges, is ideally suited to address the needs of operators for additional backhaul capacity in dense urban areas. Thus, the combination of small cell sites, spectrum in this frequency range and the latest technologies used in commercial mobile deployments can provide an efficient solution in order to support the deployment of broadband applications. This would provide for a large increase in short-haul spectrum availability is expected to address the demand for short-haul, high-capacity links both in and around urban areas.

Table 6: Spectrum Allocations

Band Limits (assumed based on ITU)	ITU Plan	NFAT (examples Co-Primary shared services in portions of bands) <sup>55</sup>	Path length (km) <sup>56</sup>
4GHz (3800-4200)	ITU-R F.382		10
6GHz (lower: 5925-6425 MHz)	ITU-R F. 383	FIXED-SATELLITE (Earth-to-space)	10
6 GHz (upper: 6425-7125 MHz)	ITU-R F. 384		10
7 (7125-7725 MHz)	ITU-R F. 385	FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth)	9.5
8 (7725-8500 MHz)	ITU-R F. 386	FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED-SATELLITE (Earth-to-space) MOBILE	7.5
10 (10.15-10.68 GHz)	ITU-R F. 1568	MOBILE RADIOLOCATION EARTH EXPLORATION-SATELLITE (passive)	5
11 (10.7-11.7 GHz)	ITU-R F. 387	MOBILE except aeronautical mobile FIXED-SATELLITE (space-to-Earth)	5
12 (12.2-12.7 GHz)	ITU-R F. 746	FIXED MOBILE except aeronautical mobile BROADCASTING	5
13 (12.75-13.25 GHz)	ITU-R F. 497	MOBILE FIXED-SATELLITE (Earth-to-space)	5
15 (14.4-15.35GHz)	ITU-R F. 636	MOBILE FIXED-SATELLITE (Earth-to-space)	5

<sup>55</sup> Based on NTFA, Dec 23, 2013 (some allocations and associated FN may have been recently up-dated, or under review.

<sup>56</sup> Spectrum Rues

Band Limits (assumed based on ITU)	ITU Plan	NFAT (examples Co-Primary shared services in portions of bands) <sup>55</sup>	Path length (km) <sup>56</sup>
18 (17.7-19.7 GHz)	ITU-R F. 595	MOBILE except aeronautical mobile EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth)	2
23 (21.2-23.6 GHz)	ITU-R F. 637	MOBILE EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) BROADCASTING-SATELLITE EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY INTER-SATELLITE	1

### 10.3.1. Backhaul Spectrum Planning

Based on PTD information the reported users of the microwave fixed bands are MPT, Ooredoo and Telenor, MRTV and Forever.

Historical approaches to spectrum assignment involved systems primarily dedicated to Government entities and assignments were made without the benefit of a planning framework, band plans, standards or an approach to coordination domestically or internationally.

As a result of this approach assignments were made randomly made, without consideration of maximizing use of the spectrum and not properly documented.

The introduction of new competitive services requiring access to microwave spectrum for backhaul has resulted in spectrum being assigned around legacy systems. This in turn has resulted in inefficient utilization and interference in the microwave bands.

In June 2014, MPT, in concert with KDDI, began revamping their backhaul microwave network structure and management outside the government operations.

In addition, two microwave (MW) experts were provided, one by Ooredoo and one by Telenor, who were set out to undertake the identification and mapping of, formerly unrecorded data, of the current use of the MW spectrum in Myanmar. In September 2014 a Backhaul Task Force was formally implemented. Revamping the bands was a priority in order to assist PTD in the mapping and allocation of unused MW spectrum for the new competitive entrants' deployment of backhaul in the microwave bands. The Task Force members reported that bureaucracy and nondisclosure or lack of network documentation hindered the effort. The Task Force's main tasks were to manage/oversee the spectrum

clearance project and jointly mediate/mitigate interference issues nationally as well as any interference issues along the neighbouring country borders.

Specific spectrum bands were identified along with the specific links that to be cleared, retuned or replaced with new equipment. As part of a Pilot project, the Task Force agreed that (151 links) for optimizing and clearing in the Lower 6GHz, 11 GHz and the 15 GHz bands. As of November 2015, the Task Force reported clearance includes 6 GHz (6 links), 11 GHz (77 links), identified but not yet cleared 15 GHz (68 links). This initiative was a significant and major effort to clean-up spectrum assignments and band arrangements.

Recommendations for improved efficiencies:

1. The Pilot project enabled the successfully documentation of links, to the extent that sufficient information was provided to the task force. However, in most cases, technical details of each installation is not complete.
2. With the creation of the Backhaul Task force, there has been a major effort to improve coordination, to complete the database of locations, description of equipment, etc. and to improve efficiencies of backhaul bands. The Task Force has proven to be an effective forum for the new entrant Commercial operators to coordinate their efforts with the incumbent.
3. It should be recognized that refarming of bands is a normal part of spectrum management when conditions change such as changes in allocation, demand/availability or technology.
4. PTD supports and commends the approach of industry stakeholders taking a lead role in inter-user planning and coordination and suggests this as an effective way to manage the band, particularly microwave bands, where there is a high degree of expertise required and industry users have the necessary competencies to carry out this function;
5. PTD recommends and identifies as a future initiative that a comprehensive spectrum utilization plan for Fixed bands be developed, these plans would factor the accommodation of existing as well as future needs and further improve efficiencies;
6. While assigned spectrum blocks are now known, there appears to be a void of specific links licensed and the associated technical parameters authorized; this should be acquired and recorded;
7. Specific assignment information should be made publically available so that all proponents developing new plans can properly factor existing assignments in their planning and design;
8. PTD acknowledges that the reported use of illegal and/or unlicensed operations in the backhaul bands needs to be addressed through establishing a compliance program, this is identified by PTD as a going forward initiative;
9. Demands in these bands will continue to grow as systems are deployed and the required capacity of links will increase as data demand continues to increase. PTD suggests the development and implementation of minimum performance standards for new microwave systems including throughput and antennas performance. This would be undertaken with full industry consultation;
10. The reported interference between operators, including between services (FSS), these cases involve FSS and terrestrial FS. Procedures for shared use bands should be followed as well as addressed in a future satellite policy;
11. The task force was created to clean-up currently deployed spectrum, record assignments and to implement standardized channel arrangements on a pilot

basis. Recognizing that it will take some time for PTD/MCRC to build the capacity to take over microwave licensing, PTD proposes the creation of a full-time industry sponsored group to plan microwave spectrum and to manage inter-user coordination, prior to filing application for licence with PTD/MCRC.

12. PTD has agreed, at least on an interim provisional basis, that frequencies may be allocated to each operators on an exclusive basis, this should be reviewed with a view to change "exclusive" to "preferential" basis, meaning allotted frequencies may be used to also accommodate other users as appropriate.
13. Exclusive assignment of frequencies could result in under-utilization and inefficient use of the spectrum. The high reuse capabilities in the microwave bands indicate that operators don't necessarily need to be assigned the same frequencies across the nation.

#### **10.4. Going forward**

The actual backhaul capacity needed on a per microwave hop or per base station basis differs substantially, depending on target data rates and population density driving the traffic requirements. The overall network requirements are a determined by the level of maturity of the mobile broadband network and services provided. As is the case for all other communications networks as technology evolves capabilities and capacities of these networks grows. New modulation schemes, new network connectivity ecosystems, higher frequency bands as well as fibre all influence opportunities for increased network connectivity capacity. Fibre is expected to continue to expand and to become available and all service providers reported including fibre as part of their network strategy. Microwave, however, will continue to be the dominant technology used for base station network connectivity and capacities will continue to grow.

Regulatory standards and plans are necessary to ensure spectrum is being used efficiently. Spectrum utilization plans, identifying how spectrum will be used, through the publication of Spectrum utilization plans, would ensure the adoption of efficiency standards and by sub-allocating portions of the band ensure that all user groups are accommodated going forward. Standard Radio System Plans /band plans would assist in the orderly selection of frequencies and the parameters guiding the deployment of systems in the fixed bands. Standard Radio Spectrum Plans/band plans need to be developed or formalized for all bands assigned to Fixed services. PTD has identified specific objectives in this regard, these would be created in full consultation with stakeholders.

ITU Recommendations for Fixed service bands provide information concerning technical requirements to guide in the development of SRSPs/band plans. Detailed compatibilities studies should also be performed when planning to introduce new system into the existing environment, see relevant ITU recommendations for guidance.

Licences for planned Fixed radio stations (>1GHz) should be granted after submissions are evaluated and approved by PDT (and correspondingly, the Myanmar Communications Regulatory Commission (MCRC) in the future). As a pre-requisite for this evaluation, applicants need to provide detailed, comprehensive information necessary for the assessment of environmental impact. PTD currently has limited capacity to undertake a detailed analysis of proposed networks and requires that applicants for radio licences cooperate and coordinate with other licence holders to permit reasonable and orderly sharing of the spectrum. It is recognized that Industry should form an effective part of



inter-user coordination, a proposed approach is discussed further in section 10.4.1 and PTD solicits stakeholder input in this regard.

Where fibre is available it should be considered to be the preferred solution as it provides virtually unlimited capacity, avoids wasteful duplication of infrastructure and urban blight and in most cases a more economical solution than microwave. Microwave requires the establishment of multiple links over great distances with associated costs of site acquisition, towers, radio equipment and antennas, installation and maintenance. In low density markets and areas of rough terrain, microwave may prove to be more economical than fibre and in some very remote areas where even microwave infrastructure is not feasible, licensees will need to consider satellite services for backhaul. A domestic Satellite policy would assist in the procurement of services for those areas.

When evaluating submissions and making assignments, the following guiding principles apply:

1. Consider among the wireless alternatives, the solution that provides the best combination of amongst the selection criteria of costs, environmental impacts and duplication of infrastructure;
2. Optimize the utilization of the radio frequency spectrum, use non radio alternatives where feasible;
3. Provide for the planning of the efficient and orderly growth of telecommunications network as an entire system;
4. Ensure that the public interest is served through the consideration of all relevant factors in the granting of licences for new radio transmission facilities;
5. Anticipate, analyze, and resolve harmful interference problems in the early stages of system development;
6. Consider future system expansion plans and provide for frequency protection to the extent possible; and
7. Ensure that radiocommunication systems in Myanmar conform to the provisions of the regulatory frameworks and the International Telecommunication Union (ITU) *Radio Regulations*.

### **Bands used by more than one service**

PTD notes that some bands are being shared among a variety of services and applications, and some cases of interference have been reported. To limit the potential risk to existing licensees and proponents, frequency coordination is required. Spectrum utilization plans would also assist applicants being accommodated in compatible bands.

The frequency allocations to different satellite services (e.g. FSS, MSS, BSS), mostly above 1 GHz are shared in many bands with the terrestrial services, in particular with fixed and mobile services.

For terrestrial assignments, International coordination is triggered either by station location being within a specified distance to the international border in accordance with established border sharing arrangements, or, exceeding pre-specified power flux density limits.

In some cases, fixed microwave system may use the same frequency bands as satellite systems and inter-system interference is a possibility. Radio frequency coordination



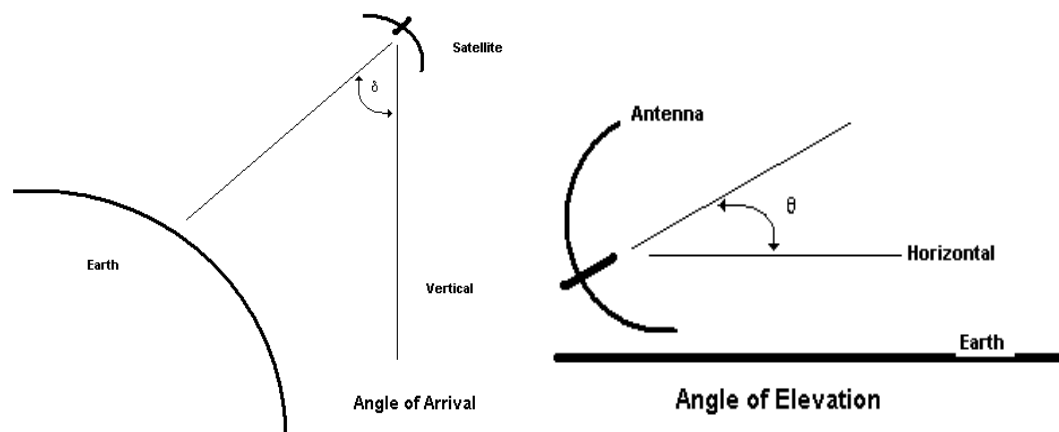
procedures for fixed microwave system and satellite systems require coordination to minimize the risk of interference.

When making assignments in bands above 1 GHz to space and terrestrial systems, due consideration should be given to the ITU requirements described in Articles 9, 13 and 21.

When frequency bands are shared between terrestrial and earth stations (ES), the potential for interference exists and increases for stations in close proximity. ITU Article 21 requires that terrestrial stations and earth stations, operating in frequency bands shared with equal rights between terrestrial radiocommunication and space radiocommunication services, shall be selected having regard to the relevant ITU-R Recommendations with respect to geographical separation between earth stations and terrestrial stations.

For the shared frequency bands by the terrestrial and space systems, Article 21 prescribes maximum equivalent isotropic radiated power (EIRP) for terrestrial and ES and requires the sites to be selected such that the direction of maximum radiation of any terrestrial system antenna will be separated from the geostationary-satellite orbit (GSO) by at least the angle (delta,  $\delta$ ) prescribed by tables provided in the Article 21 and of the ES with respect to the horizon (theta,  $\theta$ ). (See figure below).

Figure 15: Diagrams of scenarios between terrestrial and space stations



### **Other Microwave users**

Other services frequently using microwave include or other applications where the Radio Apparatus can be moved, such as, Electronic News Gathering associated with TV operations and are used to cover breaking news and special events, these systems traditionally need to be deployed quickly. Frequencies would be identified as part of a sub-allocation plan. To accommodate this requirement in designated areas, special domestic inter-user coordination on an event-by-event basis is effectively used in countries such as Canada. Given the unpredictable and itinerant nature of TV pickup operations, sharing with future backhaul systems may not be practical in geographic areas where TV operations are licensed. However, for areas without TV pickup licensees, sharing is feasible.

In time PTD plans to have in place the tools to ensure orderly spectrum development and efficient assignment and utilization.

#### **10.4.1. Institutional arrangements with Industry**

Institutional frameworks are particularly helpful in the development of Microwave Fixed services >1 GHz. As demonstrated through the pilot clean-up of microwave bands, microwave users are typically representative of user groups that are well informed, that understand the importance of spectrum management and the orderly deployment of systems. These companies frequently have staff that is technically astute in the design of networks and in undertaking electromagnetic (EMC) studies. As proposed above, PTD proposes that Industry take a lead role in inter-user coordination of networks planning. It is important that industry players be well organized, all-inclusive, and has processes and procedures in place such that systems are designed in such a manner as not to cause, or suffer, objectionable interference with other systems operating in the same or adjacent frequency bands. There must be a system in place for the coordination and assessment of individual proposed assignments between users in Myanmar. Properly developed institutional arrangements would mutually benefit users and PDT/MCRC. In this regard, PTD proposes the establishment of a permanent industry led “microwave coordination committee”.

Spectrum coordination is facilitated when there is sharing of data among users, so that accurate and up-to-date information is available to enable accurate estimates of potential interference during the system design stage, follow sound engineering practices. Radio frequency interference studies and frequency coordination are necessary not only when designing a new radio system, but also when a network planner studies the potential interference effects of other users’ radio construction proposals on existing and planned systems. Thus coordination involves the sharing of construction plans and commenting on other parties’ plans in the early stages of design. A cooperative approach around users results in a win-win outcome.

Licenses would be expected to apply and self-coordinate among domestic users preferable through an Industry sponsored body; “the microwave coordination committee” (similar to the pilot “The Microwave Task Force”) when new systems are proposed or where modifications to existing fixed radio systems are proposed:

- Changes to the route design, including changes to station locations, or if new radio stations are to be added;
- Additional radio channels are added to a system;
- Modifications to the operating frequency of existing radio channels;
- Changes to the antenna radiated power;
- Changes to the antenna characteristics, elevation angles, or azimuths; and/or
- Modifications to the equipment characteristics such as bandwidth, modulation characteristics, or capacity.

#### **Role of PTD/MCRC and Industry**

Proper organization and governance would include both government and user groups of the microwave bands. Not all users will be equally motivated to coordinate and make room for competitors, for this reason governments would normally develop the

operational and technical criteria associated with systems in the band and the coordination requirements, in consultation with Industry.

In the case of Myanmar, pending the creation of a framework for microwave bands under the new MCRC agency (and migration of MCIT/PTD functions and staff), participation by PTD staff in the Microwave Coordination by Industry is also proposed. PTD would regularly meet with and monitor the activities of the committee. In addition, PTD would expect to only intervene in the operations of the Microwave Coordination Committee when there are impasses or when there are new users requesting access to spectrum. Detailed Terms of Reference for the Industry "Microwave coordination group" would need to be developed along with principles, procedures and service level roles and agreements.

Cross border coordination with administrations of other countries is normally the responsibility of the regulatory agency. However, it may be useful for PTD/MCRC to facilitate and promote consultation between operators in border areas to "pre-coordinate" planning of proposed networks. Coordination at the user level can be implemented as part of bi-lateral sharing agreements between countries.

A critical requirement of coordination is that every country should have a single frequency register available that lists all assignments and includes the necessary technical information allowing users to plan systems.

#### **Domestic coordination requirements**

The following makes some recommendations concerning domestic coordination among users. A process for domestic coordination would be based on standard requirements and responsibility of proponents. Such that prior to initiating a request for frequency coordination, applicants are expected to have performed their own internal studies to determine that their proposed system will not create harmful interference into existing or proposed domestic terrestrial systems and earth stations. Applicants must confirm that frequency coordination with the operators of these radio facilities has been successfully completed. Information on other spectrum users would be provided by PTD/MCRC's website, along with instructions on doing licence data searches. Where licence records are not fully disclosed due to licence security reasons, sufficient information should enable applicants to contact the protected licence holders in order to perform frequency coordination.

Requests for frequency coordination should include enough technical information for a full assessment of whether the proposed system, and any planned growth of the system, will cause harmful interference. PTD suggests the minimum information that would be included in a frequency coordination request would be:

#### **Administrative Information**

- Originating coordinator's name, address, and internal contact
- Phone number, fax number, and e-mail address
- Date coordination request sent
- Confirmation of whether this a new system or a modification to an existing licensed system
- In-service date of the proposed system

#### **Station Data**

- Site names and licence numbers (if existing)
- Latitude and longitude
- Ground level above mean sea level

#### **Radio Equipment Details**

- Equipment makes and models
- Power output (include information on ATPC if utilized)
- Transmit and receive frequencies
- Polarization
- Bandwidth and type of modulation
- Capacity

#### **Antennas**

- Makes and models
- Gains
- Radiation patterns
- Azimuths and elevation angles
- Height of each antenna centreline above ground level
- Antenna system losses between the radio antenna coupling and the antenna input

#### **Passive Reflector or Repeater (if used)**

- Latitude and longitude of passive reflector or repeater
- Ground level above sea level
- Passive reflector surface area, azimuth normal to the reflecting surface, and elevation angle
- Passive repeater antenna makes and models, gains, polarizations, and azimuths
- Height above ground level of the centre line of the reflecting surfaces

#### **System Growth (optional)**

All technical information on system growth that is to be included in the licence application must be part of the frequency coordination request and include:

- Additional RF channels and dates of implementation up to 5 years in the future;
- Bandwidths, type of modulation, and capacities of future channels; and
- For any future planned expansion of an RF channel bandwidth, the final bandwidth, capacity, and type of modulation.

#### **Additional Comments**

Any additional information that may be relevant to the frequency coordination request should be included.

#### **International coordination**

In the border areas applicants are encouraged to pre-coordinate with network licensees on the other side of the border wherever possible to help avoid unnecessary delays. Any

information regarding pre-coordination which has been completed should be included with the licence applications to PTD/MCRC.

Frequency coordination with international authorities will be carried out by the PTD/MCRC on the applicant's behalf. If coordination is unsuccessful, the PTD/MCRC will notify the applicant and provide sufficient information on the anticipated conflict in order to assist the parties involved in developing a resolution.

#### **Actions Planned by MCIT/PTD:**

1. Initiate discussion with industry concerning the development of a longer-term framework for planning and coordination of Microwave Fixed bands. Ideally this involves establishing an institutional arrangement with Industry partners by establishing an Industry-sponsored coordination body for the microwave bands, similar to the "Microwave Task Force";
2. Implement spectrum policy based on minimum throughput performance and minimum antenna performance standards;
3. Release bands of bands including 18 & 23 GHz bands as well as the higher bands >23GHz (26 70, 80, 90 GHz) for very short hops; and,
4. Due to the limited propagation and high reuse capabilities of the 70, 80, 90 GHz bands, the PTD will consult on a simplified licensing regime and a commensurate low, flat spectrum fee for these bands reflecting the economic value of the spectrum to the operators<sup>57</sup>.

**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?

Q 16 (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?

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<sup>57</sup> Bands above 40 GHz have not yet been allocated in Myanmar

## 11.Land Mobile

Land mobile systems are typically terrestrial Point-to-Area (PTA) systems comprised of fixed base-to-mobile, mobile-to-mobile, transportable base-to-mobile stations. One-way and two-way paging systems are also included in the LM category. These systems support a broad ranges of services including transportation, government, military, public safety, as well as service providers providing two-way radio communications infrastructure and applications to businesses. Land mobile systems capture a broad range of systems where there is a need to communicate to or between nomadic stations travelling in a defined coverage area. Spectrum should be made available to support sovereignty, security and public safety needs within Myanmar and many of these systems would be PTA LM.

### 11.1. Demand

As new businesses emerge and existing ones grow, there will be increased requirements for two-way radio to support business operations. These systems are typically dispatch type service offering the unique capability of one-to many communications or the placement of group calls.

As there are a number of configurations that systems may take, consideration needs to be given to the configuration and types of systems PTD would like to accommodate. Systems can be simple simplex systems consisting of a base station with associated handsets or mobiles or in some cases only mobiles. Also, possible systems may be duplex (two frequency) where a base(s) operate through a repeater and communicates with mobiles.

Systems authorized could be licensed as stand-alone private systems, where business owners operate their own system or PTD-licensed public service providers, where systems licensed by PTD would offer dispatch type services to private entities. Public service providers could be licensed on a number of radio channels and these could be conventional duplex or more efficiently as trunked radio services.

While many requirements will be met by advanced mobile service now available from Commercial operators there will be an on-going requirement for smaller stand-alone simplex, duplex and trunked radio systems. In some cases, radio systems will be centric to a particular business (Private Mobile), in other cases, there will be radiocommunications services providers (Public Mobile), such as spectrally-efficient trunked radio networks that would offer broader coverage, improved technologies and various other communications related services. In many cases, where the equipment life-cycle associated with Land Mobile systems is long, proper band planning, standards and authorization processes would improve utilization and a migration path to more efficient use over time.

### 11.2. Other Countries

It is useful to examine the spectrum development and utilization plans of neighbouring countries that shows how the regulator agencies have allocated and assigned spectrum to meet the need of conventional simplex, duplex and trunked land mobile services.<sup>58</sup>

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<sup>58</sup> In some cases, PTD may consider leveraging band plans from other countries where considered appropriate.

The radio Spectrum Management Plan of IDA Singapore has allocated the following bands for land mobile systems including Trunked Mobile services:

Table 7: Bands Allocations for land Mobile Systems in Singapore

Frequency Range	Existing/Planned Systems	Status
380-400 MHz	TETRA	Mostly assigned
400-410 MHz	Land Mobile Radio	Mostly assigned
410-430 MHz	Digital Trunked Radio	Fully assigned
440-450 MHz	Land Mobile Radio	Mostly assigned
806-823 MHz/851-868 MHz	Digital Trunked Radio	Mostly assigned

Source: IDA, Singapore

In Malaysia, the regulator (Malaysian Communications and Multimedia Commission) publishes Standard Radio Spectrum Plans (SRSPs).<sup>59</sup> These SRSPs - following best practices of other developed countries, these plans spell out how spectrum is assigned for various services. With respect to land mobile trunked radio services, spectrum is assigned in the bands 380-399.8 MHz, 410-430 MHz, and 800 MHz. The SRSPs provide information on the minimum requirements for the use of a frequency band as described in the Spectrum Plan. Information is provided on technical characteristics of radio systems, frequency channelling plans and, coordination initiatives in order to maximise the utilization, minimise radio frequency interference and optimise the usage of the spectrum. The intent is to apply the SRSPs in order to enable efficient regulation of spectrum usage and not cover detailed equipment standards, as this is a separate activity.

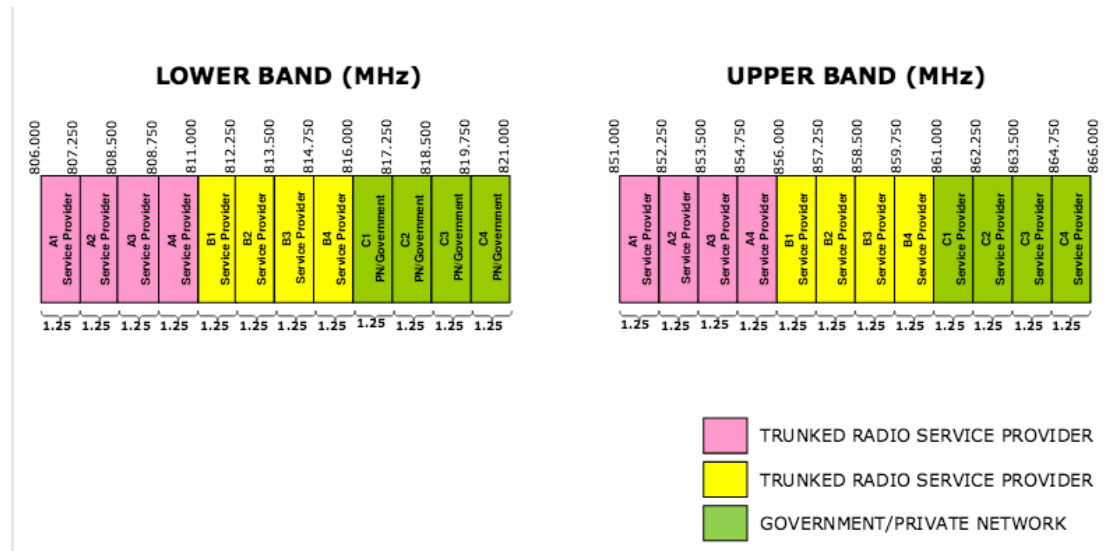
An example of the SRSP band plan for 800 MHz (806-821/851-866 MHz) is shown below:

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<sup>59</sup> <http://www.skmm.gov.my/Spectrum/Standard-Radio-System-Plan-Resources/Standard-Radio-System-Plan/List-of-current-SRSPs.aspx>

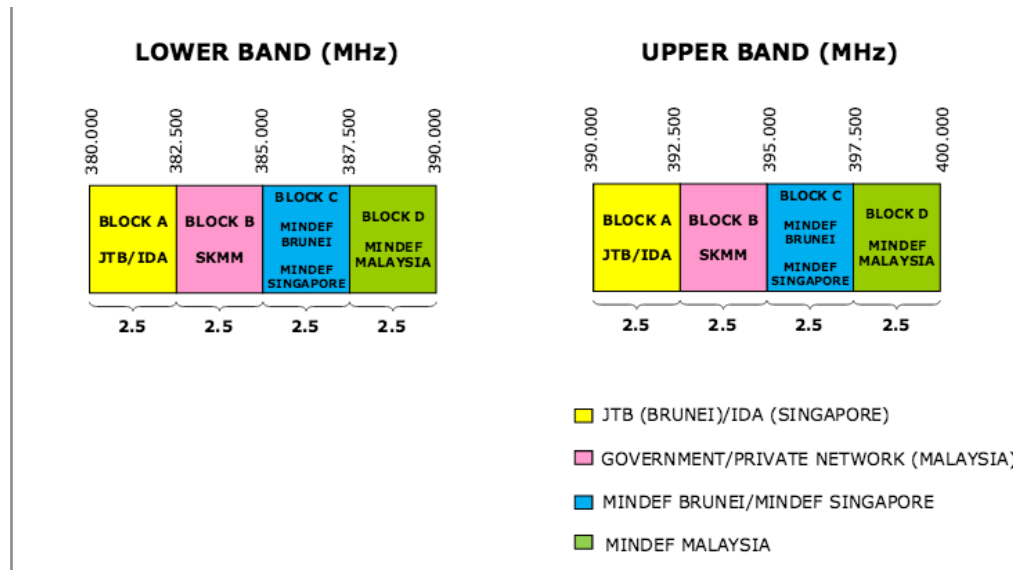


Figure 16: Spectrum Allocation Trunked Radio in Band 806 MHz and 851 MHz to 888 MHz



Similarly, in the 400 MHz range, the following allocated bands are made available to meet the needs of trunked radio services:

Figure 17: Spectrum Allocation Trunked Radio in Band 380 MHz to 400 MHz



### 11.3. Current Assignments

The NFAT indicates that there is a very high demand for radiofrequency spectrum in the VHF band and the NFAT allocates 410-420 MHz and 420-430 MHz for use by Trunked radio systems. The Spectrum rules make provision for the authorization of terrestrial Radio Apparatus for the purpose of providing two-way communications services amongst users within companies (e.g., between a company's base station and the associated vehicular or

hand-held portable units). Licensing would generally be on a FCFS basis, except in situations where Demand exceeds supply.

Currently in Myanmar, upon request from another government authority of the Union Government, the Department may authorize the use of frequencies to provide all forms of government services.

### 11.3.1.Spectrum Planning

PTD proposes that the following factors be considered, allowing for development of services that will rely on these bands:

1. Map existing users and coverage areas
2. Define bands that are harmonized with neighbouring countries
3. Develop band plans, align with neighbour countries
4. Develop technical standards for systems (e.g. maximum for height, power, emission)
5. Negotiate sharing arrangements/MOU in border areas securing future access to the spectrum

### 11.4. Going forward

As noted above, Myanmar can expect demand to meet the needs of conventional simplex and duplex as well as trunked dispatch type services that support both government and public/private operations. Facilitating access would result in benefits to users and industry supplying equipment and radio installation and maintenance services.

Possible allocations to meet the needs of Land Mobile radio are identified in the updated NFAT. Below are bands for consideration.

Lower frequency bands in the VHF and UHF bands would be preferred for systems serving users in topographic areas with hills and valleys, due to more favourable propagation in these areas.

*Table 8: Possible Allocations for Land Mobile in Myanmar*

Possible allocations for LM (Frequency Range)	Comments regarding utilization and channelling plan
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Possible allocations for LM (Frequency Range)	Comments regarding utilization and channelling plan
<p><b>VHF</b></p> <p>Myanmar NTFA allocates various bands for LM service allowing FX and ML. Careful consideration should be paid to Foot Notes that may limit utilization.</p> <p><b>137-138</b></p> <p><b>138-144</b></p> <p><b>144-145.8</b></p> <p><b>146-148</b></p> <p><b>148-149.9</b></p> <p><b>150.05-156.7625</b></p> <p><b>156.8375-174</b></p>	<p>Channelling plans commonly accommodated are 6.25, 12 or 25 kHz, however, for broader channelling, minimum spectrum voice channel efficiencies should be specified.</p> <p>Standard Radio System Plan should be developed for bands identified for LM services and band planning should consider the allocations and assignments made in neighbouring countries. Band plans should also be subject to frequency sharing arrangements with neighbouring countries for the use of frequencies in border areas.</p> <p>Shared allocations should be considered and Consideration should be given to neighbouring country spectrum utilization plans noting that harmonization within the region will simplify border sharing, minimize interference and increase access to affordable equipment and services.</p>
<p><b>UHF</b></p> <p><b>406-410</b></p> <p><b>410-420</b></p> <p><b>420-430</b></p> <p><b>440-450</b></p> <p><b>450-456</b></p> <p><b>456-459</b></p> <p><b>459-460</b></p> <p><b>460-470</b></p>	<p>The Frequency Rules - Annex D for Public Land Mobile Spectrum only show 467.475-470 MHz for the use of walkie-talkie equipment users (construction companies). No associated band plan is identified.</p>
<p><b>800/900 MHz</b></p>	<p>806-960MHz, below 806 is broadcasting.</p> <p>In concert with internationally harmonized domestic spectrum utilization policies, it is useful to refer to the existing channelling plans in neighbouring countries.</p>

### 11.4.1.Planned Release

PTD proposes the development of Standard Radio System Plans in order to meet the needs of systems wishing to operate in the VHF, UHF and 800/900 MHz bands. LVHF bands should be assigned on an FCFS basis and coordinated appropriately.

PDT/MCRC may consider first developing band plans to accommodate trunked radio systems in the 400 MHz and 800 MHz range.

### **Actions Planned by MCIT/PTD:**

- 1) Identify the Land mobile spectrum to be made available to for Private as well as Commercial LM dispatch type operations. This exercise should include separate identification of spectrum available for simplex, duplex and trunked radio systems;
- 2) Develop band plans that leverage existing band plans of neighbouring countries in order to ensure harmonization and spectral efficiency; and
- 3) Negotiate border sharing arrangements.

#### **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 neighbouring countries?
- iii) Pursue border agreements?

Q17 (b): Comments are invited on the bands proposed for Land mobile systems.

Q 17 (c): What other initiative(s) concerning land mobile do you feel should be considered?

## **12.Licence Exempt**

Around the world a growing number of consumers use a special category of radio equipment, referred to as **licence-exempt** radiocommunication devices or Short Range Devices (SRDs). There are many different types of short-range devices, and different devices in different frequency bands require specific technical standards. These devices are of low power and operate on designated frequencies. In most jurisdictions only approved devices, meeting prescribed technical specification are permitted. Permitted equipment meeting the prescribed specifications radiocommunications is *authorized* to operate in these bands without the need to apply for a licence. Any equipment proposed outside of the prescribed specification requires a licence. PTD resource constraints have limited progress developing and releasing standards. A standard for licence exempt equipment is anticipated in the near future.

The benefit and convenience of not requiring a licence also has limitations. Licence exempt equipment share common spectrum and operate on a no interference/ no protection basis, meaning equipment is usually designed such as to have inherent interference mitigation techniques.<sup>60</sup> Licence exempt equipment commonly encounters

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<sup>60</sup> Examples of protocols and standards are: 1) Orthogonal frequency division multiplexing (OFDM): is the modulation and multiplexing of Wi-Fi 802.11a and g; 2) Coded Orthogonal Frequency Division Multiple Access (COFDM) is used in Wi-Fi 5GHz (IEEE 802.11.a) as signal modulation technique; 3) Direct-sequence spread spectrum (DSSS) is used at Wi-Fi IEEE 802.11b and ZigBee IEEE 802.15.4; 4) Frequency-hopping spread spectrum (FHSS) is used for Bluetooth IEEE 802.15.1;

various forms of radio interference, this may be the result of many users sharing the band in the same general area or interference may be encountered from licensed users. Interference can result in degradation to system performance.

### 12.1. Demand

Common uses of licence exempt equipment are cordless telephones, baby monitors, walkie-talkies, remote garage door openers, or wireless local area networks such as wireless LANs or Wi-Fi devices. These same bands are frequently used for WiFi hotspots, Blue tooth connections.

Licence exempt bands and standards are not necessarily common in all countries. Devices manufactured for licence-exempt use in other countries may not meet domestic regulatory or technical standards and may cause or receive radio interference. Only approved equipment that complies with applicable technical standards, operational and regulatory licence exempt requirements, is permitted for sale and use in Myanmar.

Industrial Scientific and Medical (ISM) is another category of equipment that shares the same spectrum, although they are not communications devices. Examples of ISM equipment are radio-frequency process heating (use in Industrial manufacturing), microwave ovens, and medical diathermy machines. These devices offer another source of potential interference.

Access to the Internet is a key enabler to information access and communications. Learning, e-commerce and social media are all facilitated through the Internet connectivity. Connection to the Internet through the use of Licence exempt devices is a predominant mode of access. Technically, it could be argued that the common use of spectrum by licence exempt systems is more spectrally efficient when compare to dedicated licensed systems. Many services are now offered using licence-exempt spectrum and this enables the availability of broadband access. Hotspots are used for laptop, tablet and WiFi-enabled smart phones to connect to the web.

Licence exempt spectrum is now also a factor in the deployment of Commercial mobile systems. Around the world, licensed commercial service providers are increasingly turning to licence-exempt spectrum to meet the bandwidth requirements for mobile data. WiFi hotspot deployments were predicted to rise 350% by 2015. 58% of operators - including 47% of mobile operators Wi-Fi hotspots are either very important or crucial to enhance their customers' experience; offload busy mobile broadband networks; and provide a value-added services platform.<sup>61</sup> AT&T in the United States supports approximately 45,000 hotspots, which provide Wi-Fi access for the company's wireless customers.<sup>62</sup>

There is an increasing demand for, and use of SRDs for a wide variety of applications throughout the world, many different applications provided by these devices, such as, telecommand, telemetry, voice and video, detecting system, broadband radio local area networks, railway applications, road transport and traffic telematics, alarms, model control, inductive applications, radio microphones, RFID systems, ultra-low power active medical

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<sup>61</sup> Wireless Broadband Alliance [http://www.wballiance.com/wba/wp-content/uploads/downloads/2012/07/16\\_WBA-Industry-Report-2011-Global-Developments-in-Public-Wi-Fi-1.00.pdf](http://www.wballiance.com/wba/wp-content/uploads/downloads/2012/07/16_WBA-Industry-Report-2011-Global-Developments-in-Public-Wi-Fi-1.00.pdf)

<sup>62</sup> <http://www.att.com/gen/general?pid=5949>

implant, RF level gauges, etc. Harmonization of frequency bands and equipment standards should be pursued to the extent possible.

## 12.2. Other Countries

Licence exempt bands are not common in all countries. To better understand the frequency bands that have been opened up for SRD operations, APT published a report and result of a survey among APT-member countries on the technical and procedural regulations of Short-Range Devices (SRDs). The objective of the survey on the technical regulations is to determine, among other technical requirements, the operating specifications of SRDs across different types of applications. For procedural regulations, the key focus is on the type approval process, MRA arrangement, licensing requirements, operating parameters as well as future policies.<sup>63</sup>

Most countries have standards for SRDs. A number of countries have in place Mutual Recognition Agreements (MRA) for Conformity Assessment of Telecommunications Equipment. MRAs are frequently used by many countries to provide for recognition of test reports and allow for recognition of certification for product approvals. Looking at neighbouring countries such as Malaysia, Thailand and Vietnam, we summarize below specific requirements.

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<sup>63</sup> APT survey *Report on OPERATION OF SHORT-RANGE DEVICES (SRDs)*. No. *APT/AWG/REP-07* (Rev. 3). Edition: March 2015. Adopted by The 18th APT Wireless Group Meeting, 9 – 13 March 2015, Kyoto, Japan

Table 9: Country-Specific Requirements for the Regulation of SRDs

Country	Type approval/Certification	Mutual Recognition Agreements	SRD Licensing	Future regulatory changes
<b>Malaysia</b>	- Generally have some type approval process.	Yes, with Singapore	Class Licence	Nil planned
<b>Singapore</b>	Equipment registration shall be based on the submission of the Supplier's Declaration of Conformity (SDoC) to signify that the supplier has carried out conformity assessment on the equipment to IDA's Technical Specifications.	Yes, with Australia, Brunei, Canada, Chinese Taipei, Hong Kong, India, Indonesia, Japan, Malaysia and United States	Generally, low powered SRDs operating within IDA's technical specifications are licence-exempted.	SRD licensing framework will be reviewed periodically, with the aim to streamline licensing processes and relax technical conditions where appropriate.
<b>Thailand</b>	-Type approval process	No	Some SRDs licensed. L.E. are must comply with certain technical conditions such as maximum transmit power limit and compliance with technical standards	Regulations define only for license-exempt equipment, but do not have explicit definitions of unlicensed spectrum or "spectrum commons." Thailand will incorporate the concept of "spectrum commons" into modification of future NBTC Regulations in order that, in general, SRDs would be able to use unlicensed bands or spectrum commons.
<b>Vietnam</b>	Type approved SRD allowed for use	Vietnam has entered into MRA with Korea, USA, Canada and Singapore. The test reports from designated laboratories of those countries should be recognized.	All the SRDs operating within technical specifications of Ministry of Information and Communications (MIC) are exempted from a radio license in Vietnam.	Nil Planned



List of APT countries with regulatory frameworks covering short-range devices (SRDs) that can operate on licence-exempt basis is shown in the table below.

Figure 18: List of Countries with Regulatory Frameworks covering SRDs that operate on licence-exempt basis

Frequency band	Remarks	AUS	BRU	CTN	CHN	J	KOR	LAO	MLA	MMN	Macao	PNG	RMI	SNG	THA	VTN
9-148.5 kHz		Y	P	Y	Y	N	Y	Y	Y	N	Y	N	N	Y	P	P
148.5-315 kHz		N	N	U	P	N	P	N	Y	N	N	U	N	N	N	N
3 155-3 400 kHz	RR No.5.116	Y	Y	U	Y	P	Y	Y	Y	N	N	U	N	N	N	N
6 765-6 795 kHz	RR No.5.138	U	Y	Y	Y	Y	U	U	Y	N	N	U	N	N	N	N
7 400-8 800 kHz		Y	Y	Y	P	N	P	N	U	N	N	U	N	N	N	N
13.553-13.567 MHz	RR No.5.150	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	U	N	Y	Y	Y
26.957-27.283 MHz	RR No.5.150	Y	Y	Y	Y	Y	P	Y	Y	Y	Y	U	N	Y	P	Y
40.66-40.7 MHz	RR No.5.150	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	U	N	Y	P	Y
312-315 MHz		Y	Y	N	P	Y	N	N	Y	Y	N	U	N	Y	Y	Y
433.05-434.79 MHz		Y	Y	Y	Y	P	P	Y	Y	N	N	U	[P]	Y	Y	Y
401-402 MHz		Y	N	U	N	N	U	Y	U	N	N	U	N	Y	Y	Y
402-405 MHz		Y	N	U	N	Y	Y	Y	Y	N	N	U	N	N	Y	[P]
405-406 MHz		Y	N	U	N	N	U	Y	Y	N	N	U	N	N	Y	Y
862-875 MHz		N	P	P	N	N	N	Y	Y	N	N	U	U	P	N	P
875-960 MHz		N	P	P	P	P	P	N	Y	N	N	N	[P]	P	P	P
2 400-2 483.5 MHz	RR No.5.150	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	U	N	Y	Y	Y
5 150-5 350 MHz		Y	P	Y	N	Y	Y	Y	N	Y	N	U	[P]	Y	Y	Y
5 470-5 725 MHz		Y	P	Y	N	Y	P	Y	N	Y	N	U	[P]	Y	Y	Y
5 725-5 875 MHz	RR No.5.150	Y	Y	Y	Y	Y	P	Y	Y	Y	P	U	[P]	Y	P	P
24.00-24.25 GHz	RR No.5.150	Y	Y	Y	Y	Y	P	Y	Y	N	N	U	[P]	Y	P	Y
61.0-61.5 GHz	RR No.5.138	Y	N	Y	N	Y	Y	Y	Y	N	N	U	N	Y	U	N
76-77 GHz		Y	Y	Y	Y	Y	Y	N	Y	Y	N	U	N	Y	Y	N
122-123 GHz	RR No.5.138	U	U	Y	N	Y	U	Y	Y	N	N	U	N	N	N	N
244-246 GHz	RR No.5.138	U	U	Y	N	Y	U	Y	Y	N	N	U	N	N	N	N

Y: Yes, implemented already P: Partially implemented U: Under implementation N: Not [available or undecided]

### 12.3. Current use of licence-exempt spectrum in Myanmar

According to the Spectrum Rules section:

#### 8. Unlicensed/License-exempt Spectrum

a) The following bands, which are identified by the ITU (Section 5.150 of Volume 1 of the Radio Rules) for use by industrial, scientific and medical equipment, may be used by Radio Apparatus without the need for obtaining a License under Part IV of these Rules:

- 13 553-13 567 kHz (centre frequency 13 560 kHz),
- 26 957-27 283 kHz (centre frequency 27 120 kHz),
- 40.66-40.70 MHz (centre frequency 40.68 MHz),
- 2400-2500 MHz (centre frequency 2 450 MHz),
- 5725-5875 MHz (centre frequency 5 800 MHz), and
- 24-24.25 GHz (centre frequency 24.125 GHz)

b) The Ministry may identify additional frequency bands that can be used by Radio Apparatus that are exempt from licensing.

c) Per Section 30 of the Computer Science Development Law, services provided using Radio Apparatus authorized by this Section do not need an Associated Operating License unless the services are being provided to End Users in return for monetary

remuneration.

d) The provisions of Section 35 apply to the Radio Apparatus authorized under this Section.

e) To ensure that License-exempt Radio Apparatus does not cause interference:

i. License-exempt Radio Apparatus may not cause Harmful Interference to any individually-licensed Radiocommunication Service and must accept interference from those services as well as from other License-exempt Radio Apparatus.

ii. Additional regulations may be issued from time-to-time by the Department or Ministry in order to address power levels, operating characteristics and limitations, out-of-band emission criteria, and other technical details.

In Myanmar there are currently no associated radio standards or regulations for equipment operating in allocated Licence exempt and Industrial Scientific and Medical (ISM) bands.

### **12.3.1. Spectrum issues in the use of licence-exempt equipment**

PTD has identified regulatory issues concerning the deployment of equipment in unlicensed bands. PTD notes the use of high power equipment in bands identified for Licence exempt equipment, normally used by low power operations. Currently, there are no radio standards or regulations specifying the technical criteria for the operation of equipment in this band. In some countries, bands used for unlicensed equipment may also be authorized for higher power stations; however, only stations meeting radio standard specification for exemption may operate without licence.

The identification of bands for licence-exempt operation along with the absence of radio standards specifying when licensing is, or is not required, has resulted in deployment of systems operating under a mix of technical operating parameters. Without radio standards and effective import control, equipment will likely be imported from various countries.

Most countries have radio equipment standards, equipment certification and labelling requirements for equipment approved for licence exempt operation. There is a broad range of applications and types of equipment that countries permit for operation on a licence exempt basis, some with strict operating conditions.

Myanmar is experiencing a high degree of reported interference in the 2.4 GHz and 5.8 GHz range.

While it is possible to authorize both licensed and unlicensed equipment in a shared band, radio standards along with operating conditions and appropriate licensing procedures are necessary to minimize the risk of radiofrequency interference. PTD recommend not mixing licensed and unlicensed systems in the same frequency bands.

### **12.4. Going Forward**

Many SRD applications and the frequency bands in which they are deployed are described in Report ITU-R SM.2153. ITU-R SM.1896 provides recommendations on Frequency ranges for global or regional harmonization of short-range devices. However, the report cautions: Further studies may need to be undertaken in ITU R to determine whether global or regional harmonization of

these ranges, or portions thereof, is feasible, given that there are many SRD applications, such as those operating across national borders, that would benefit from worldwide harmonization.

Table 10: Possible frequency bands for harmonization of SRD within Asia-Pacific region<sup>64</sup>

Frequency band	Typical Application	Remarks
402-405 MHz	Medical Implant	<a href="#">APT REC-05</a>
433.05-434.79 MHz	RFID	<a href="#">APT REP-07</a>
862-960 MHz	RFID	<a href="#">APT REC-03</a>
5150-5350 MHz	WLAN	<a href="#">APT REC-06</a>
5470-5725 MHz	WLAN	
76-77 GHz	Vehicle Radar	<a href="#">APT REP-07</a>

Myanmar will continue to harmonize spectrum allocated to LE spectrum allocations as well as to develop equipment standards (see footnote 65 below) for equipment that may be used in these designated bands and pursue MRAs. As can be seen in the above table comparing countries, many countries have regulated a number of SRD frequency bands in a common manner. A review of technical criteria for equipment permitted also show many similarities.

**Actions Planned by MCIT/ PTD:**

- 1) Develop a Framework for Licence-exempt bands and equipment;
- 2) Publish consumer education information for users providing direction with a list of equipment approved; and,
- 3) Pursue discussion with border agencies in order to prevent importation of equipment that does not meet the standards of recognized standards setting bodies by listing equipment banned from operation.

**Question 18** (Licence Exempt):

Q18 (a): Do you agree with the MCIT/PTD’s action items as proposed for a licence-exempt framework?

Q18 (b): What other action(s) would you propose for consideration as part of a licence-exempt framework initiative?

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<sup>64</sup> APT REPORT on THE FREQUENCY BANDS FOR HARMONIZED USE OF SHORT-RANGE DEVICES (SRDS), No. APT/AWG/REP-35, Edition: March 2013

<sup>65</sup> Establish an appropriate and harmonized regulatory framework for LE bands and equipment standards

## 13. Broadcasting

### 13.1. Current TV broadcasting in Myanmar

Ministry of Information is currently responsible for broadcasting matters. MCIT/PTD is responsible for spectrum management, NFAT allocation and spectrum utilization matters including broadcast bands.

#### 13.1.1. Terrestrial broadcasting:

- Analog TV
  - VHF band III 174 – 230 MHz
- Digital TV
  - UHF band IV 470 – 686 MHz

Today there are four TV Broadcasters in Myanmar.

- Myanmar Radio & Television (MRTV)
- Myawaddy (MWD)

#### 13.1.2. Satellite TV:

DTH services are provided by multiple broadcast entities with services provided via foreign satellite. There is no satellite policy concerning which satellite providers can offer service in Myanmar.

#### 13.1.3. Spectrum Issues

Broadcasting spectrum allocation and use is changing globally with most notably with spectrum being reallocated to mobile services. As well, various new wireless telecommunications applications have been developed for the television (TV) broadcasting bands using TV 'white spaces'.

### 13.2. Going forward

The Roadmap for the transition from analogue to digital terrestrial television broadcasting has been jointly developed by an ITU expert and the National Roadmap Team (NRT) of Myanmar. The Roadmap lays out a phased approach to transition and the deployment of DTTV.

DSO and ASO has been spread over seven years, the final analogue switch-off for Myanmar will be 31<sup>st</sup> December 2020.

- a) A DTTB frequency plan needs to be drawn up for the whole of Myanmar. This frequency plan needs to include UHF channels and take note of neighbouring country assignments and assignments to players within the country.
- b) Incorporate the frequency plan in the NSP.
- c) Publicize the NSP and revise it, if necessary with public feedback.

The Spectrum Rules for Broadcasting show Television channels VHF channels 7-13, 174-223 (High VHF band); UHF channels 14-32, 470-585 (UHF band). All channels are 6 MHz spacing.

Analogue TV in Myanmar is now using channels in Band III. Based on the DTV transition Roadmap, it was suggested that DTTB/MTV (mobile TV) operations be moved to the UHF band in order to take advantage of the 8 MHz bandwidth. The VHF Band III frequencies that are made available (upon complete or partial implementation of ASO) could subsequently be auctioned to generate necessary funds for the DSO and ASO strategy.

The DTTB plan appears to not yet be developed.

Broadcasters are planning to propose a wide range of new services in unused broadcast bands. The MCIT/PTD, based on some stakeholder comments, identified the need to clarify spectrum policy with respect to broadcast bands not used for broadcasting.

### **Actions Planned by MCIT/PTD:**

- 1) Clarify the roles and responsibilities of MCIT/PTD and the Ministry of Information and make these known to stakeholders;
- 2) Identify current channels allotted to Broadcasting and the transition channels for DTV in the broadcast allotment plan;
- 3) Clarify the spectrum utilization plan by showing the frequency bands that are allotted to broadcast and the spectrum that is being allotted for future mobile use;
- 4) Develop a clear policy concerning the use of unassigned broadcast band for new services;
- 5) Clarify for stakeholders the policy and procedures for the reallocation of channels to Mobile; and,
- 6) Develop a policy for broadband services in unused broadcasting spectrum.

#### **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?