MINISTRY OF TRANSPORT AND COMMUNICATIONS
POSTS AND TELECOMMUNICATIONS DEPARTMENT

CONSULTATION PAPER
Spectrum Optimization of the 850 MHz Band 2019

1. INTRODUCTION

1.1 Background

Following (i) the allocation of release of the 1800 MHz spectrum band which has been fully allocated to licensees, (ii) the successful launch of the third private mobile operator in Mytel and regional 2600 MHz licensees in early 2018, (iii) the successful E-GSM spectrum licensing process, and (iv) the cross-border interference discussions with Thailand, the PTD is now turning its attention to other key spectrum issues.

Internally the PTD has decided that the 850/900 MHz spectrum Optimization project timetabled in the *MCIT Spectrum Roadmap* for later in 2019 will be brought forward to now. This is due to a range of reasons including proposals for different uses of the CDMA Band, the need to maximise the usable spectrum and the harmonisation of other LTE Bands in the 800-900 MHz spectrum bands. This review will also consider *inter alia* whether spectrum for public safety mobile broadband should be reserved in this part of Myanmar's Spectrum Band Plan.

For the purposes of this Consultation Paper by "***850 MHz band"*** we are referring to the frequency spectrum between 806 MHz and 880 MHz in Myanmar. Decisions about the GSM Band (ie 880 MHz to 960 MHz) have been locked in for at least the next 5 years.

1.2 MCIT Spectrum Roadmap

The *MCIT Spectrum Roadmap* 2016 made a number of comments concerning the 850 MHz band including:

- The complexity of the global / regional arrangements in the 850 MHz (824-849/869-894) and 900 band (880-915/925-960) – can result in orphan spectrum in domestic usage as well as increased complexity to coordinate, potential interference, particularly in border areas (page 45);
- The impacts of this global/regional complexity in spectrum in Myanmar [in this band] include a mix of 850 MHz (824-849/869-894) and 900 MHz band (880-915/925-960);
- 850 MHz reconfiguration could result in improved utilization [of spectrum], possible options included utilising a range of different 3GPP Bands including Band 5, 8, 26, 27 and 28 (page 51);

- 806-825 +835-870 are unassigned. According to Ministry/PTD Spectrum Rules, 54 MHz of spectrum is available (page 61); and
- 850/900 MHz Optimization planned by the Ministry/PTD for 2019 (page 62).

1.3 Existing Spectrum usage in 850 MHz Band

The existing spectrum usage in the 850 MHz band in Myanmar are few and are best summarised in Exhibit 1 and Exhibit 2 below.

Exhibit 1: Existing spectrum usage from 806 to 880 MHz

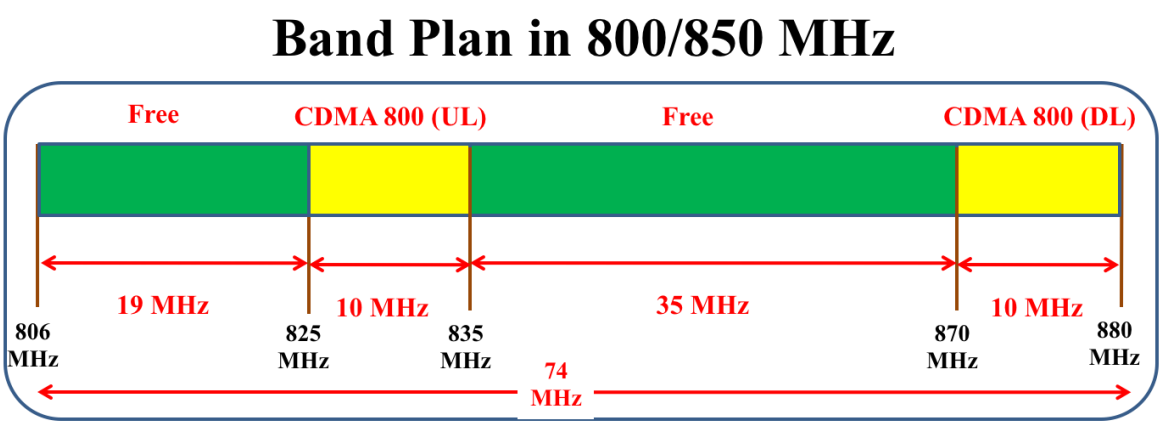
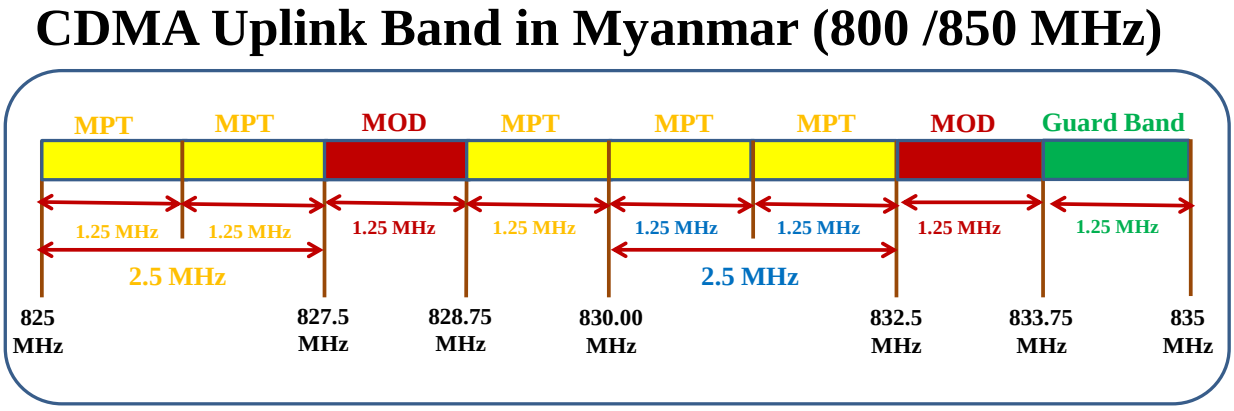
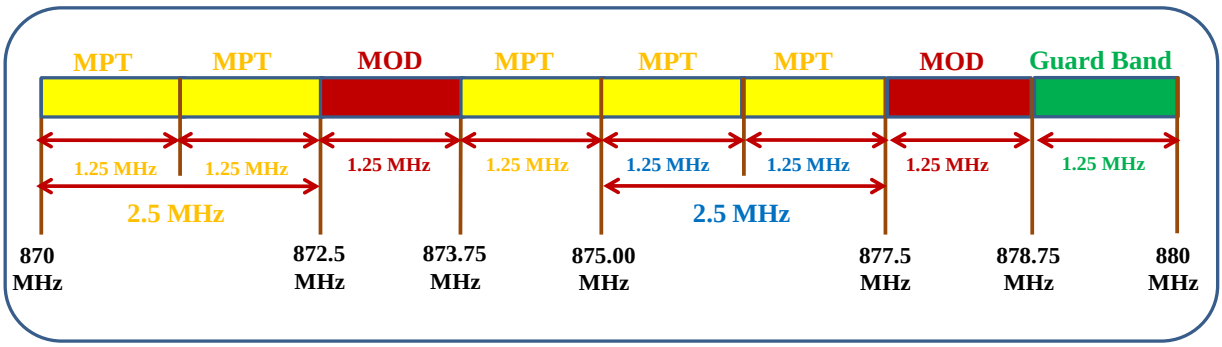


Exhibit 2: Existing spectrum usage in the CDMA800 UL and DL

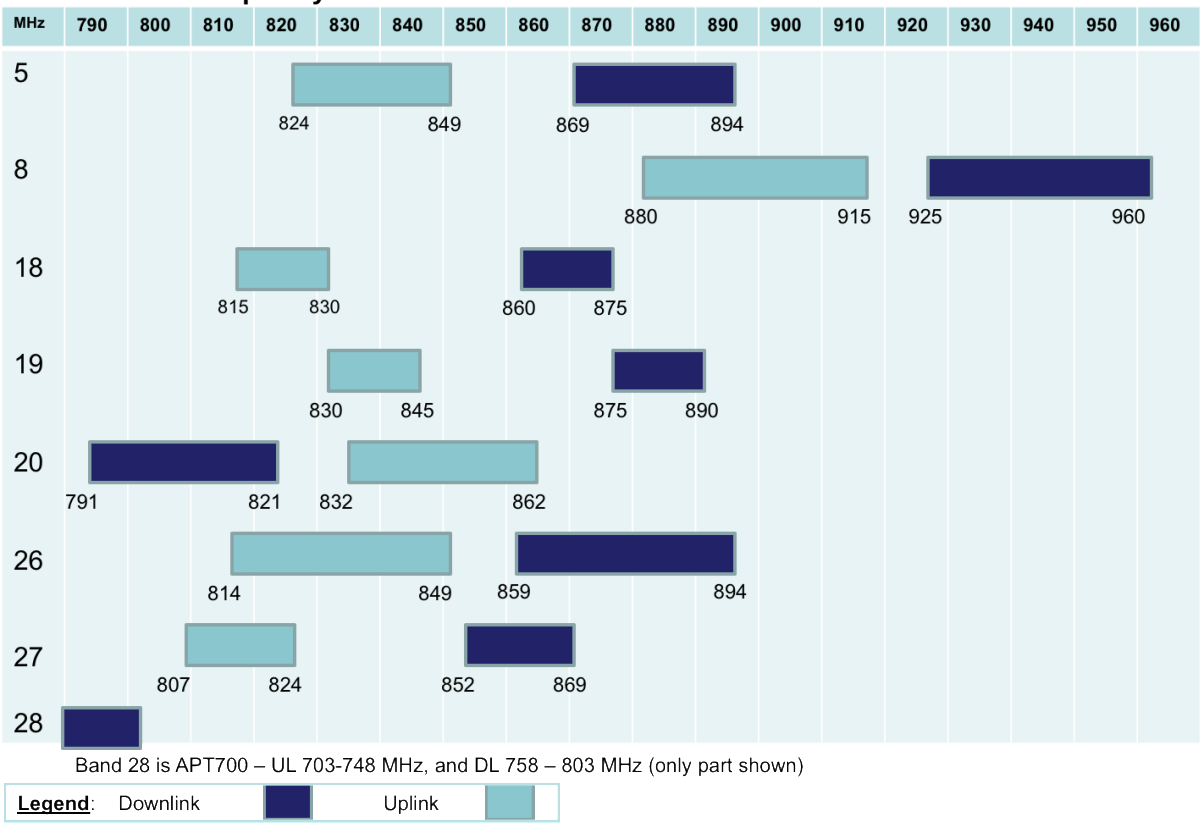




1.4 Harmonised spectrum allocations

In the context of the discussion about optimising the 850 MHz band there are a number of harmonised 3GPP band allocations with various uplink and downlink configurations which need to be taken account of. These are summarised in Exhibit 3 below.

Exhibit 3: Frequency Bands 3GPP – 800-900 MHz Band



More broadly, 3GPP Release 15 has frozen the specification for 5G NR (New Radio) and TS 38.104 section 5.2 provides the list of bands in which NR can operate (see Exhibit 4). Globally it is expected given the demand from *inter alia* AT&T in the United States and Telstra in Australia that 5G capable handsets will be available for n5 by the end of 2019.

Exhibit 4: Extract 5G NR Frequency Range (bands below are currently in use in Myanmar)

NR FR1 Band	Band Alias	Uplink (UL) Operating Band BS Receive / UE Transmit F_{UL_low} – F_{UL_high}	Downlink (DL) Operating Band BS Transmit / UE Receive F_{DL_low} – F_{DL_high}	Bandwidth	Duplex Mode
n1	2100	1920– 1980 MHz	2110– 2170 MHz	60 MHz	FDD
n3	1800	1710– 1785 MHz	1805– 1880 MHz	75 MHz	FDD
n5	850	824– 849 MHz	869– 894 MHz	25 MHz	FDD
n8	900	880– 915 MHz	925– 960 MHz	35 MHz	FDD
n38	TD 2600	2570– 2620 MHz	2570– 2620 MHz	50 MHz	TDD

Source: 3GPP and http://niviuk.free.fr/nr_band.php. Updated to 12 September 2018. It should also be noted NR has introduced a new notation for band which starts with "n" e.g. Band 20 is noted as n20 where in LTE it was termed as B20.

Q1.	Do you have any general comments on the PTD undertaking the 850 MHz band Optimization review now?
Q2.	Is there any new technology and/or 3GPP harmonisation, new 3GPP Band proposals which the PTD should be aware of and ought to be taken into account in its 850 MHz band review?

2. OPTIONS FOR 850 MHz BAND

Given the above, what are the options for the PTD and Myanmar in relation to the future of spectrum planning in 850 MHz Band? The PTD is currently motivated by ensuring that scarce sub-1 GHz frequency spectrum should be put to its most effective and efficient use in order to help achieve national objectives. We recognise that this is best achieved by harmonising its approach with global standards where network equipment and user devices are the most affordable. Adopting harmonised regional standards for the 850 MHz Band will also ensure that harmful interference with neighbouring countries will be minimised.

There are four major issues which the PTD would like to explore in this Consultation Paper in order to secure the input of key stakeholders including industry. These are:

(i) What 3GPP Bands should Myanmar adopt in the 850 MHz band?

(ii) How should the CDMA800 allocations be treated in terms of transition?

(iii) Should Myanmar reserve 850 MHz Band spectrum for PPDR Broadband?

(iv) To what uses should the unallocated spectrum in the 850 MHz band post the adoption of the preferred 3GPP Bands be put?

2.1 What 3GPP Bands should Myanmar adopt in the 850 MHz Band?

Examining Exhibit 1, Exhibit 2 and Exhibit 3 above, effectively the current CDMA800 band currently falls within LTE Bands 5 and 26 while the rest of the 850 MHz band is vacant. In addition, the MNOs have been allocated spectrum in LTE Band 8, while in the future LTE Band 28 (APT700) will be allocated.[1]

Consistent with the *MCIT Spectrum Roadmap* 2016, since the PTD has already indicated its support for the allocation of all of LTE Band 28 (APT700) and has already allocated LTE Band 8 (the current GSM band) there are two major options to consider for the 850 MHz band. These are namely:

(a) ***OPTION A:*** Adopt a partial allocation of 3GPP LTE Band 26 (namely 814-834/859-879 MHz); or

(b) ***OPTION B:*** Adopt a partial allocation of 3GPP LTE Band 5 (namely 824-834/869-879 MHz) plus adopting 3GPP LTE Band 27 (namely 809-824/854-869).[2]

[1] The Council of the European Union ('EU') in April 2017 adopted a decision to ensure the release of the 700 MHz band in all EU Member states in order to drive the roll-out of 5G technology. As a result of this decision, MNOs will obtain exclusive access to the 700 MHz band by 30 June 2020.

[2] Note the PTD is only proposing allocating 2 x 15 MHz rather than 2 x 17 MHz from LTE Band 27 as the additional 2 x 2 MHz would not be usable by the LTE equipment and hence can be utilised for other services.

Option A secures 2 x 20 MHz of spectrum for use in the 850 MHz band (40 MHz in total) while Option B secures 2 x 25 MHz of spectrum (50 MHz in total). It should be noted that Option A has the advantage of being adopted by some of Myanmar's neighbours, but this option means 20 percent less usable 3GPP spectrum. In contrast, Option B has the advantage of more usable spectrum but the disadvantage that LTE Band 27 networks seem to have been rarely or never deployed globally.

There would also seem to be considerable value as part of the transition under either Option A or Option B that the CDMA800 allocations (825-835/870-880 MHz) should be downshifted by 1 MHz, to align with LTE Band 26 and to be directly frequency-adjacent to the new 850 MHz expansion band (LTE Band 27) if Option B was selected. Importantly, downshifting by 1 MHz would allow 2 x 20 MHz of LTE Band 26 to be utilised or for 2 x10 MHz of LTE Band 5 plus 2 x 15 MHz of LTE Band 27. We understand that similar downshift is occurring in Australia, albeit to spectrum which is currently being used by W-CDMA networks.[3]

With the downshift and either Option A or B being adopted, the PTD notes that the current guard band of 3.75 MHz between the two inter-band adjacent carriers in the 850/900 MHz band fall by 0.25 MHz to 3.5 MHz (ie 879-880 MHz + 880-882.5 MHz). However, a guard band of 3.5 MHz would still be higher than the suggested edge to edge separation recommended by the APT under a range of different technology options.[4]

Q3.	Do you prefer Option A or B or alternate option in relation to adoption of 3GPP Bands in the 850 MHz Band?
Q4.	Do you agree with the downshift of the current CDMA800 Band to align with LTE Band 26? What complications do you foresee? When should this take place?
Q5.	Do you foresee any complications of reducing the current guard band for the reverse duplex between LTE Bands 5 and 8 to 3.5 MHz from 3.75 MHz?

2.2 How should the CDMA800 allocations be treated in terms of transition?

As indicated in Exhibit 2, the existing spectrum usage in the legacy CDMA800 band follows the standard CDMA channel allocations of 2 x 1.25 MHz. Currently, there are two CDMA users namely MPT and Ministry of Defence. MPT is using 2 x 6.25 MHz (non-contiguous allocations with 2 lots) and the Ministry of Defence is using 2 x 1.25 MHz of CDMA800 spectrum.

While the PTD will consult inside Government, we would seek the views of stakeholders on a range of issues associated with these legacy spectrum usage and associated networks including:

- How should these legacy spectrum usage should be transitioned?
- How will consumer interests be protected in any transition/switch-off?
- How will usable contiguous spectrum blocks of sufficient usable size be created?
- Should there be a time limit for the turning off of the CDMA networks in Myanmar? What is their existing useful life?

[3] See ACMA, *ACMA's long-term strategy for the 803-960 MHz band, Decision Paper,* November 2015
[4] APT, *APT Report on Migration Strategy of GSM to Mobile Broadband, APT/AWG/REP-53, September 2014*, page 24

- Should existing CDMA800 band users be required to return their spectrum to the Government? If not, should a fee be payable to convert the legacy spectrum usage to alternative uses? How should that fee be calculated?
- Should there be a mechanism to fund the migration of certain users from the 850 MHz spectrum band in order to free up this band?

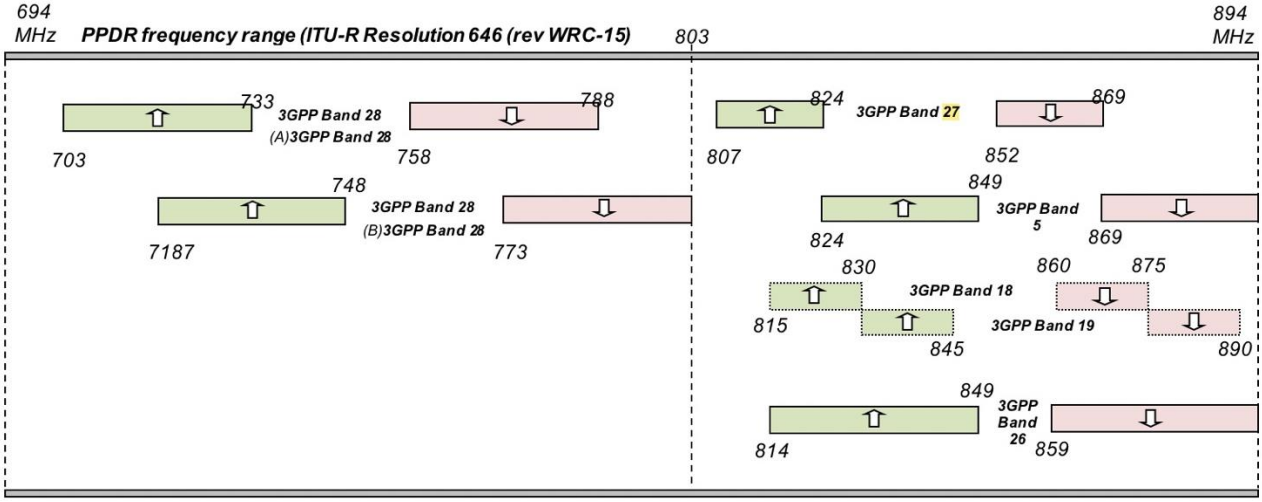
Q6.	How should these legacy spectrum usage be treated in terms of transition of the 850 MHz band? What is your position on the range of issues identified? Are there other issues which need to be addressed?

2.3 Should Myanmar reserve 850 MHz Band spectrum for PPDR Broadband?

The ITU in a series of Recommendations has sought to promote global and regional harmonization of frequency bands for public protection and disaster relief ('PPDR'). In January 2018, it released ITU Recommendation ITU-R M.2015-2 entitled *Frequency arrangements for public protection and disaster relief radiocommunication systems in accordance with Resolution 646 (Rev.WRC-15)*.

Resolution 646 (Rev.WRC-15) encouraged administrations including the PTD in Myanmar to consider parts of the frequency range of 694-894 MHz for meeting their PPDR requirements. The 3GPP frequency arrangements (applicable to Region 3) fall within the PPDR frequency range designated by ITU-R Resolution 646 (Rev.WRC-15). See Exhibit 5 below. They could therefore be considered for use by administrations in relation to deployment of broadband wireless PPDR systems.

Exhibit 5: 3GPP bands falling within the PPDR frequency range 694-894 MHz



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

The ITU Recommendation followed the Asia-Pacific Telecommunity Wireless Group ('APT-AWG') unanimous approval for a new recommendation to harmonise 700–800 MHz for LTE-based public protection and disaster relief (PPDR). This occurred at the 21st meeting of the APT-AWG in Bangkok on 3-7 April 2017. This decision includes the LTE Band 28 (APT700 MHz) and the LTE 800 MHz band 26, which are the two most commonly adopted public safety (PS)-LTE bands in Asia. This move took into consideration the growing communication needs of public protection agencies and organisations that are vital to the maintenance of law and order, protection of life and property, disaster relief and emergency response.

The APT-AWG recommendation also takes note of ITU Recommendation M.2009, which identifies radio interface standards applicable to PPDR operations including TETRA, P25 and LTE, and ITU Report M.2291, which provides details of the capabilities of LTE to meet the requirements of applications supporting broadband PPDR operations. Globally and regionally a number of countries have allocated frequency spectrum for PPDR-Broadband as shown in Exhibit 6 below.

Exhibit 6: Selected Countries allocation of spectrum for PPDR Broadband

Country	PPDR Broadband Allocation
Australia	Will allocate 2 x 5 MHz rising to 2 x 10 MHz in the extended 850 MHz band (ie LTE Band 27)
Canada	Allocated 10MHz in the upper 700MHz band for public-safety broadband use in 2012
France	Allocated 2 x 5 MHz and 2x3MHz in 700MHz for PS-LTE.
Hong Kong	Hong Kong Police Force has undertaken two LTE trials (at 700MHz & 400MHz).
India	TRAI has recommended 2 x 10 MHz in the 800 MHz Band for BB-PPDR.[5]
Malaysia	Allocated spectrum in the 800MHz LTE Band 26 for PS- LTE.
Qatar	Allocated dedicated spectrum for PS-LTE in the 800MHz band.
Singapore	Allocated spectrum in the 800MHz LTE Band 26 for PS-LTE.
South Korea	Allocated 2 x 10MHz in 700 MHz for PS-LTE.
Thailand	Allocated dedicated spectrum for PS-LTE - 2x10MHz in 800MHz LTE Band 26
United Arab Emirates	Allocated 2x10 MHz for PPDR application in 700 MHz with additional 5 MHz for direct mode operation in 2013
United States	Allocated dedicated spectrum for PS-LTE namely 2x10MHz in US 700MHz band.

Source: WPC analysis from industry sources, June 2018

The PTD supports the ITU Recommendation and the APT-WG recommendation and is inclined to support the reservation of 2 x 10 MHz for PPDR Broadband in the 800 MHz band.[6] This is notwithstanding there would seem to be strong arguments that a nationwide narrowband first responder network (using say P-25 technology) which could be deployed quicker in Myanmar at much lower cost. Reserving key spectrum now provides, however, options for the future.

The PTD would therefore seek the views of stakeholders and industry on the timing of a PPDR Broadband spectrum reservation and related issues.

Q7. Do you agree that the PTD should reserve 2 x 10 MHz of spectrum for PPDR Broadband use in Myanmar? Is that sufficient? Too much?

Q8. Do you support the reservation of such PPDR Broadband spectrum in the 800 MHz Band? If not, which band do you prefer? If you do support the spectrum allocation for PPDR Broadband in the 800 MHz, do you prefer LTE Band 26 or 27 or another LTE Band? Please provide reasons for your preference.

Q9. What other considerations should inform the PTD's approach to future PPDR Broadband spectrum issues? For example, should such a network ideally be a partnership or collaboration with a commercial operator/MNO?

[5] TRAI, *Recommendations on Next Generation Public Protection and Disaster Relief (PPDR) communication networks,* 4 June, 2018

[6] The PTD has not yet assessed whether higher frequencies such as those in the 4.4-5.0 GHz band should also be reserved for PPDR Broadband.

2.4 To what uses should the unallocated spectrum in the 850 MHz band post the adoption of the preferred 3GPP Bands be put?

Even after optimising the usable spectrum in the 850 MHz band, depending on whether Option A or B or some other option is adopted the PTD notes there will also be spare spectrum in the band (eg 806-809 or 814 MHz and 834-854 or 859 MHz). It is understood that such spectrum could be used for professional mobile radio services, cognitive radio, two frequency fixed services, single frequency fixed services etc. The PTD would seek the views of industry and stakeholders on the optimal use of such spectrum going forward.

Q10.	To what uses should the unallocated spectrum in the 850 MHz band post the adoption of the preferred 3GPP Bands be put? How should it be allocated? Or should it merely be reserved and left vacant at this time?

3. REQUEST FOR COMMENTS

Consistent with the Law, and the *Spectrum Rules 2016*, the Ministry is pleased to provide key stakeholders with an opportunity to comment on any aspect of this *Spectrum Optimization of the 850 MHz Band Consultation Paper*.

While the PTD would appreciate receiving detailed written responses to the 10 specific questions contained in this Consultation Paper responders are also welcome to make additional comments or suggestions on any aspect of 850 MHz band spectrum planning.

Comments must be received in writing via email to resource@ptd.gov.mm by ***5pm on 28 February 2019.***

- END -