DRAFT Agreed Minutes
of The 4th Joint Technical Committee
on Coordination and Assignment of Frequencies
along Thailand – Myanmar Common Border Meeting (JTC-4)

Virtual Meeting, Hosted by Thailand
31 August – 1 September 2022

1 Introduction

1.1 The 4th Joint Technical Committee on Coordination and Assignment of Frequencies along Thailand – Myanmar Common Border Meeting (JTC-4) was held virtually and hosted by Thailand from 31 August to 1 September 2022.

1.2 The Thai Delegation was led by Mr. Saneh Saiwong, Principal Engineering Expert, Office of The National Broadcasting and Telecommunications Commission (NBTC) and the Myanmar Delegation was led by Mr. Zar Ne Aung, Deputy Director General, Posts and Telecommunications Department (PTD), Ministry of Transport and Communications. The list of delegates appears in Doc.JTC-4/T-02.

2 Opening Remarks

2.1 In the opening session, Mr. Saneh Saiwong, Head of Thai Delegation, warmly welcomed the Myanmar Delegation to the JTC-4 Meeting.

2.1.1 He drew attention to the fact that this was the first time the JTC Meeting was held virtually, and although the COVID-19 pandemic might restrict traveling and physical activities, it did not limit work in ensuring the use of spectrum and operation of radiocommunication services along common border areas were in order.

2.1.2 He stressed the importance of the JTC Meeting as the forum for mutual bilateral cooperation in ensuring that spectrum was used efficiently and protected from harmful interference along the border areas.

2.1.3 He drew attention to the items for consideration at this Meeting which included interference cases, frequency coordination procedure, band plan and coordination parameters for telecommunication services, broadcasting services, as well as common frequency for use during emergency situations.

2.1.4 He also wished for a fruitful discussion and a successful JTC Meeting.

2.1.5 The full text of the Welcome Address appears in Doc.JTC-4/T-03.

2.2 In his Reciprocal Address, Mr. Zar Ne Aung, Head of Myanmar delegation, expressed his sincere appreciation to NBTC for hosting and organizing a virtual JTC-4 Meeting.

2.2.1 He stressed that this Meeting was meaningful and important, as it would bring both sides together to share updated information and discuss on ways to reduce existing harmful interference, as well as plans to prevent interference in the future.

2.2.2 He hoped that at this Meeting, both sides would find the best solutions to achieve the utmost benefit of the use of spectrum resources for sustainable development of the telecom industry.

2.2.3 He wished all participants a fruitful meeting.

2.2.4 The full text of the Reciprocal Address appears in Doc.JTC-4/T-04.

3 Adoption of Agenda and Working Arrangement

3.1 The Meeting adopted the Agenda and Working Arrangement as appeared in Doc.JTC-4/T-05 and Doc.JTC-4/T-06, respectively.

4 Exchange of Information

4.1 Thailand presented a paper on “Thailand Information Update” as appeared in Doc.JTC-4/T-07, which could be summarized as follows:

4.1.1 NBTC Policy Update

(i) NBTC informed that 5 new NBTC commissioners were appointed on 13 April 2022 for 6-year term with Clinical Professor Dr. Sarana Boonbaichaiyapruck serving as the Chairman. Two additional positions for the commissioners were still in the selection process by the parliamentary committees.

(ii) NBTC informed that since JTC-3 Meeting, NBTC had issued a number of notifications relating to spectrum planning, licensing, and technical standards as well as the revision of the Spectrum Management Master Plan.

(iii) NBTC also introduced several studies conducted by the Spectrum Management team during the past years with the aim to support spectrum policy decision such as the studies on the share use of frequency for TV

White Space (TVWS), policies for private 4G/5G, the use of 6 GHz frequency band, and the use of 450-470 MHz/1427-1518 MHz for IMT.

4.1.2 Telecommunication Update

(i) NBTC informed that in January 2020, the state-owned telecommunication operators CAT Telecom and TOT had merged to form a new operator called "National Telecom" or NT.

(ii) In February 2020, Thailand had successfully held a multiband auction for the 700 MHz, 1800 MHz, 2.6 GHz, and 26 GHz frequency bands for IMT using the sequential clock auction scheme with the aim to facilitate 5G implementation. The llicenses were awarded to 4 mobile operators namely AWN, NT, TUC and DTN. The total spectrum assigned for IMT in Thailand now stood at 3.2 GHz.

(iii) To ensure the implementation of 5G in many areas, the auction of the 2600 MHz in 2020 also included the network rollout obligation with the requirement to cover 50% of the smart cities area within 2023 and 50% of EEC area within 2021. 5G was now deployed using the 700 MHz and 2600 MHz frequency bands while in the 26 GHz frequency band, 5G was in a pre-commercial trial phase.

(iv) After the auction, new regulations had been introduced to promote the development of 5G application including the Area-based Regulatory Sandbox. Thailand also formed the National 5G Development Committee in May 2020 to determine 5G directions and strategies, support re-farming policy and appoint necessary task force to assist with this task. The Thai government also supported 5G infrastructure pilot projects and funding in different applications throughout the country, especially in the Eastern Economic Corridor (EEC) and Bang Sue Grand Station in Bangkok.

(v) NBTC also highlighted the status of the telecommunication market in 2021. For the mobile broadband access, the nationwide network coverage for 3G and 4G were at 96.12% and 97.96% respectively. While for 5G, the network coverage as of March 2022 stood at 51.2% nationwide, and 99.92% for the Bangkok and vicinity areas.

(vi) In 2022, NBTC had subsidized the village broadband internet project or Net Pracharat through the NBTC's USO Net project with the latest phase covering 40,432 villages in the remote (Zone C) area and 3,920 villages in the border (Zone C+) areas.

4.1.3 Broadcasting Update

<u>Digital Television Broadcasting</u>

(i) NBTC Notification on DTTB Frequency Plan was published in the Government Gazette on 25 November 2019. Afterward, all 6 Analog TV Broadcasters completed their analog switch-off (ASO) since 25 March 2020, and all 147 sites that needed DTT frequency re-stacking had completed their frequency re-stacking process. As a result, the 700 MHz band had been available for IMT since 15 January 2021.

(ii) The feasibility study and trial for 4K television broadcasting were as follows:

- In 2020, reports on the feasibility study of 4K television broadcasting regarding the review of 4K standards and technology, and 4K experiment using DVB-T2 (in cable) were released and a survey of digital TV broadcasters and network operators in Thailand to collect information on 4K preparation, readiness, and interest was conducted.
- In 2021, report on technical aspects of 4K television broadcasting, including technical regulatory assessment was released. A focus group meeting with stakeholders was held, and a survey of TV manufacturers to collect information on 4K technology and standards in TV brands and models selling in Thailand was conducted.
- In 2022, NBTC notification on Technical Guidelines for Assessing the Proposals of 4K Trial Project was published.
- NBTC plans to examine the specifications and compatibility of 4K equipment for trial, develop the test plans, 4K television broadcasting trial in closed area, and prepare the technical report.

<u>Analog Sound Broadcasting</u>

(iii) There were 3 types of FM radio according to Thailand's radio frequency plans: Main FM radio with a total of 313 radio frequencies, which includes public and commercial services; Low power FM radio, which includes public and community services; and Trial FM radio, which includes public, commercial and community services.

(iv) Thailand's FM radio licensing process, which began in November 2021 was as follows:

- In December 2021, NBTC called for commercial FM broadcasters to participate in the spectrum auction, which was held in February 2022. NBTC also called for the public and low-power radio broadcasters to apply for their respective licenses;
- In February 2022, NBTC announced the spectrum auction winners for commercial radio. Commercial and public broadcasters' service license applications were evaluated and announced in March 2022, which

allowed their services to commence in April 2022. However, the license applications for low power radio still has been under evaluation; and

- The 500 W TX Power trial broadcasters were expected to cease their services in April 2022. However, a temporary extension allowed them to continue their services until the end of 2024.

Digital Sound Broadcasting.

(v) According to trial digital radio plan, NBTC allowed the use of frequency in 9 provinces (10 sites) in Bangkok, Chonburi (Pattaya and Sriracha), Chiang Mai, Prachuab Khiri Khan, Khon Kaen, Nakhon Ratchasima, Nakhon Sri Thammarat, Phuket and Songkhla.

(vi) For trial projects in Thailand, the 1st trial project in Bangkok area was funded by NBTC. The 2nd trial project in regional area (Central & East, North, Northeast and South) was funded by the Broadcasting and Telecommunications Research and Development Fund for Public Interest (BTFP). Current work for the Bangkok trial project includes changing antenna type and pattern to avoid shadowing effects of the high-rise building clutter, setting up VPN to transmit the uncompressed audio signal from the studios to the head-end for better signal quality, and further outdoor/indoor field and feature testing. Current work for the regional project includes finishing transmitters, receivers, and antenna installation, setting up a VPN network, and drafting a receiver distribution plan.

4.2 Myanmar presented a paper on “Myanmar Regulatory Update” as appeared in Doc.JTC-4/T-08, which could be summarized as follows:

4.2.1 PTD informed the Meeting of the current status of mobile technology penetration in Myanmar. PTD also informed the Meeting about the change of ownership of Telenor Myanmar Limited and updated that its name had changed to “ATOM Myanmar Limited” starting from 30 May 2022.

4.2.2 PTD provided the information on IMT spectrum assignment to the Nationwide Mobile Operators and Regional operators. In addition, PTD also provided future Spectrum Allocation in Myanmar with band plans of 700 MHz, 2300 MHz, 2600 MHz, and 3.5 GHz (C-Band).

4.2.3 In preparation for 5G, PTD informed the Meeting that 5G testing have been done in the 3.5 GHz (C-Band) and 2600 MHz frequency bands with the purposes of testing spectrum sharing between IMT and existing FSS, testing user experience, and network performance, and related interference matters.

4.2.4 PTD also provided information of Fixed Monitoring Stations locating throughout the country.

4.3 Myanmar presented a paper on “Digital Terrestrial TV Broadcasting of Myanmar” as appeared in Doc.JTC-4/T-20, which could be summarized as follows:

4.3.1 There were two main broadcasters in Myanmar namely Myanmar Radio & Television (MRTV) under the Ministry of Information, and Myawady Television (MWD) under the Ministry of Defence.

4.3.2 MRTV is State Owned National Broadcaster. MRTV started Television Broadcasting using NTSC standards and transmitted in color since 1980. The total number of retransmitting TV and FM stations was 258 with population coverage of 92.7%. Among the 258 stations, 85 stations were FM broadcasting with population coverage of 78.84%. MRTV also started digital transmission in 2013 with a current number of stations totaling 153 in digital mode with a population coverage of 88.7%.

4.3.3 For MRTV’s DTT transmission, there were 18 channel programs in free-to-air (FTA) mode. There were two private broadcasters namely Forever Group Co., Ltd and Shwe Than Lwin Media Co., Ltd joint venture with MRTV. Both of them had been transmitting on terrestrial and DTH platforms.

4.3.4 There were also nine private FM broadcasters joint venture with MRTV namely Mandalay FM (9), Pyinsawaddy (7), Shwe (17), MIR (3), Cherry (20), Padamyar (17), Bagan (13), City FM (1), and Thazin FM (52).

4.3.5 Myanmar uses VHF and UHF frequencies for FM analog transmission, and UHF for digital broadcasting.

4.3.6 MRTV also launched MRTV News Channel since 1 December 2021 and also used a new transmission platform in DTH broadcasting since 1 February 2022 with a total of 23 channels in FTA mode.

4.3.7 MWD started broadcasting since 1995. At present, 8 sites were transmitting MWD channel while another 14 sites were transmitting MWD Documentary and MWD Shopping channel in analog format. Digital transmission started in 2012. There were 35 digital transmitting stations in total and there was a plan to implement 151 stations with estimated population coverage of 85%.

4.3.8 All migration processes for ASO-DSO plan are already completed and would be followed by the guidance and policy of the government.

4.3.9 For the Kyaington Interference case, MRTV had replaced the transmitter with a channel number of 518-524 MHz and requested the Meeting to consider closing this case.

5 Interference cases

5.1 Thailand's air traffic control (AEROTHAI)

5.1.1 PTD presented a paper as shown in Doc.JTC-4/T-09.

5.1.2 PTD informed the Meeting that PTD already proposed the alternative frequencies for use by interfering parties to comply with the national table of frequency allocation of Myanmar.

5.1.3 The Meeting took note of the presentation from PTD.

5.1.4 AEROTHAI informed the Meeting that the source of the interference signal in 130-170 MHz was no longer found at the Three Pagodas area and proposed to temporarily close the interference case for this issue, and revisit, if necessary.

5.1.5 The Meeting took note of the information provided by AEROTHAI and agreed to temporarily close the interference case for this issue, and revisit, if necessary.

5.2 Thailand's Provincial Electricity Authority (PEA)

5.2.1 Thailand presented a paper as shown in Doc.JTC-4/T-10.

5.2.2 Thailand informed the Meeting that PEA was no longer affected by the interference signal in 171.25 MHz at the location specified by Thailand at JTC-1 and PEA would like to temporarily close this interference case, and revisit, if necessary.

5.2.3 Thailand also invited Myanmar to update plan with MRTV on the change of frequency to prevent possible interference in future.

5.2.4 PTD presented a paper as shown in Doc.JTC-4/T-09.

5.2.5 PTD informed the Meeting that MRTV already reduced the transmit power and installed new analogue UHF transmitter using channel J-21 (518-528 MHz) which was already reflected in MRTV's presentation as indicated in 4.3.9.

5.2.6 The Meeting took note of both sides' presentations.

5.2.7 The Meeting agreed to close the interference case for this issue.

5.3 Interference Cases on 850 MHz band

5.3.1 Interference Case on NT (850 MHz)

(i) NT presented a paper on “Interference Case on NT 850 MHz” as shown in Doc.JTC-4/T-11.

Non-cellular interference case

- NT informed the Meeting that from the statistic monitoring results, NT was affected by high level non-cellular interference at Mae Sai border area and the service using F3 frequency (869-874 MHz for some stations had been turned off.
- NT also informed that NT still monitored the interference source.

Cellular interference case

- NT informed the Meeting that, from the statistic monitoring results, NT was affected on downlink interference from Myanmar (800 MHz) and uplink interference from Mytel (900 MHz) at Mae Sai border area (Point 1 and Point 2).
- NT also informed that NT was affected on uplink interference from Mytel (900 MHz) at Golden Triangle area (Point 3).
- NT invited MPT and Mytel to adjust the signal level as agreed at JTC-2

(ii) The Meeting took note of the presentation from NT and agreed that further discussion was required on this issue.

(iii) For the non-cellular interference case, the Meeting agreed to set up a joint measurement between NBTC, PTD and NT in September 2022 to resolve this interference issue.

(iv) For the cellular interference case, NT, MPT, MECTel and Mytel had a discussion and agreed on the action plan as shown in **Annex 1**.

5.3.2 Interference Case between OML (900 MHz) and DTN (850 MHz)

(i) DTN informed the Meeting that DTN had turned off 850 MHz service since 2020, and the migration from 850 MHz to 900 MHz had been completed.

(ii) DTN proposed to close the interference case for this issue.

(iii) The Meeting took note of the information provided by DTN and agreed to close the interference case for this issue.

5.3.3 New Interference Cases on 900 MHz, 1800 MHz, and 2100 MHz bands

Interference Case on DTN (900 MHz)

(i) PTD presented a paper on “Kawthaung Interference Case-Myanmar” as shown in Doc.JTC-4/T-13.

(ii) PTD informed the Meeting that, following a request from NBTC informing that DTN network on 900 MHz was affected by interference from Myanmar side, PTD performed the investigation twice but the source of interference was not found at Kawthaung.

(iii) DTN informed the Meeting that DTN found the external non-cellular interference (900 MHz at Kawthaung and Mae Sai – Tachileik) and the source of interference could not yet be verified.

(iv) DTN informed the Meeting that there had not been a major impact to DTN sites from that interference but DTN would like to confirm with OML which also used the same frequency band as DTN whether OML also received similar interference at its sites.

(v) OML informed the Meeting that OML also found the external non-cellular interference (900 MHz) at Kawthaung and Mae Sai – Tachileik.

(vi) NBTC regional office informed the Meeting that from the monitoring result, the external interference found at Kawthaung was likely to be from electronic devices operating in regular interval daily.

(vii) The Meeting took note of information provided by DTN, OML and NBTC regional office and agreed that this interference case was not between mobile operators, but rather from external interference source.

(viii) The Meeting also proposed to have an information exchange between DTN and OML and report the result back to NBTC and PTD, and set up a joint measurement, if necessary.

Interference Case on 900 MHz, 1800 MHz, and 2100 MHz

(i) TUC presented a paper on “New Interference Case on 900 1800 and 2100 MHz bands” as shown in Doc.JTC-4/T-12.

(ii) TUC informed the Meeting on the current frequency and technology arrangement for 900 1800 and 2100 MHz bands and also reported the

measurement results at Mae Sai, Mae Sot and Ranong areas where high level signal from Myanmar operators could still be found.

(iii) TUC informed the Meeting on the following interference issues;

Interference Case between TUC and MPT (900 and 2100 MHz)

- TUC informed that MPT was affected by interference signal from TUC (900 and 2100 MHz) at Mae Sai – Tachileik, Mae Sot – Myawaddy, and Ranong – Kawthaung in May 2022 but TUC had already optimized and reported the result back to MPT in June 2022.
- TUC also presented that TUC was affected on UL interference by signal from MPT (900 and 2100 MHz) at Mae Sai – Tachileik, Mae Sot – Myawaddy, and Ranong – Kawthaung.
- TUC already informed MPT of this issue on 1 August 2022 and still waited for the optimization result.

Interference Case between TUC and AML (Formerly TML) (1800 MHz)

- TUC informed that AML was affected on interference by signal from TUC (1800 MHz) at Mae Sai – Tachileik on 9 August 2022 but TUC already optimized and reported the result back to AML on 16 August 2022.
- TUC also presented that TUC was affected on UL interference by signal from AML (1800 MHz) at Mae Sai – Tachileik.
- TUC already informed to AML of that issue on 8 August 2022 and AML already optimized on 22 August 2022.

(iv) The Meeting took note of TUC's presentation.

(v) MPT presented a paper on "JTC-4 Industry Updates by Myanmar Mobile Network Operators" as shown in Doc.JTC-4/T-24 on behalf of 4 Myanmar mobile operators.

(vi) The summary of Cross Border Interference Coordination status was as follows:

AML:	•78 cells from Tachileik (Mae Sai) submitted to AWN, TUC and NT •TUC already completed optimization and results under verification by AML
MPT:	•121 cells from Tachileik (Mae Sai) and Kawthoung (Ranong) submitted to AWN, TUC and DTN: actions taken for all; under verification by MPT •Received 50 cells from TUC in Tachileik (Mae Sai), Myawaddy (Mae Sot) and Kawthoung (Ranong); action plan in progress
Mytel:	•Identified new cases in Tachileik (Mae Sai) and Myawaddy (Mae Sot)

	•Ongoing drive tests in Kawthoung (Ranong) and Hpayarthonesu (Three Pagodoas) •Request to update 1800 MHz allocation in THA
OML:	•28 new cells from Tachileik (Mae Sai) and Kawthoung (Ranong) submitted to AWN and DTN •10 cells pending from previous requests

(vii) Mobile operators from both sides agreed to further discuss and report the summary of the discussion to the Plenary.

(viii) After the discussion, Mobile operators from both sides agreed to update the coordination status for the 900, 1800, and 2100 MHz bands in the online document, available at this URL and through the following QR-code:

(ix) Mobile operators from both sides can access and update the interference case and coordination status, as necessary.

(x) The Meeting agreed on the result of the discussion for this agenda item and took note that the current status of the interference cases as shown in **Annex 2**. The coordination status table should be updated and presented at every JTC Meeting.

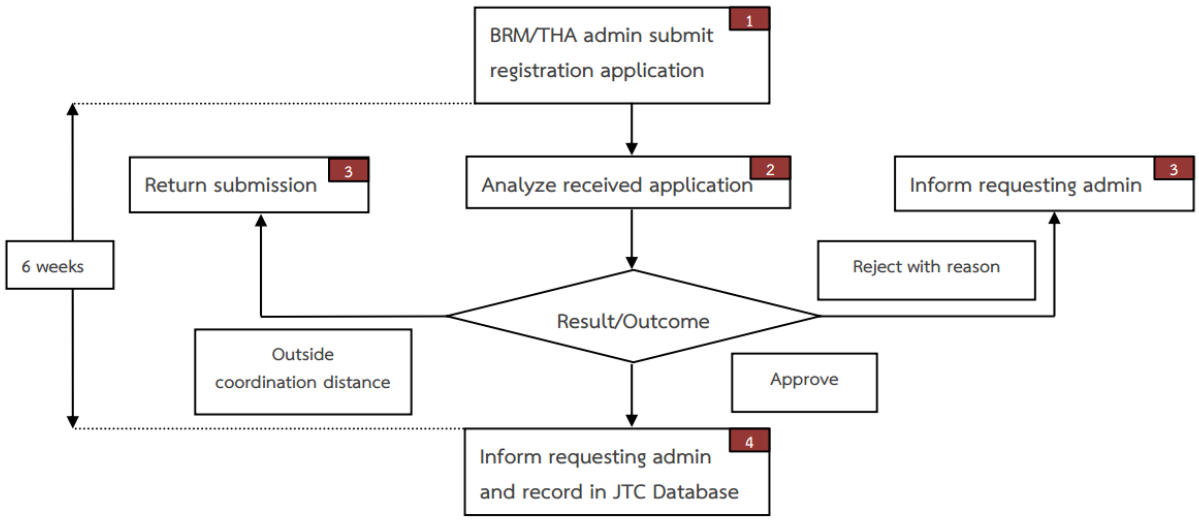
6 Frequency registration and notification

6.1 Thailand presented a paper on “Frequency registration and notification” as shown in Doc.JTC-4/T-14, which could be summarized as follows:

6.1.1 Thailand introduced the concept of frequency coordination, which consists of frequency registration and frequency notification.

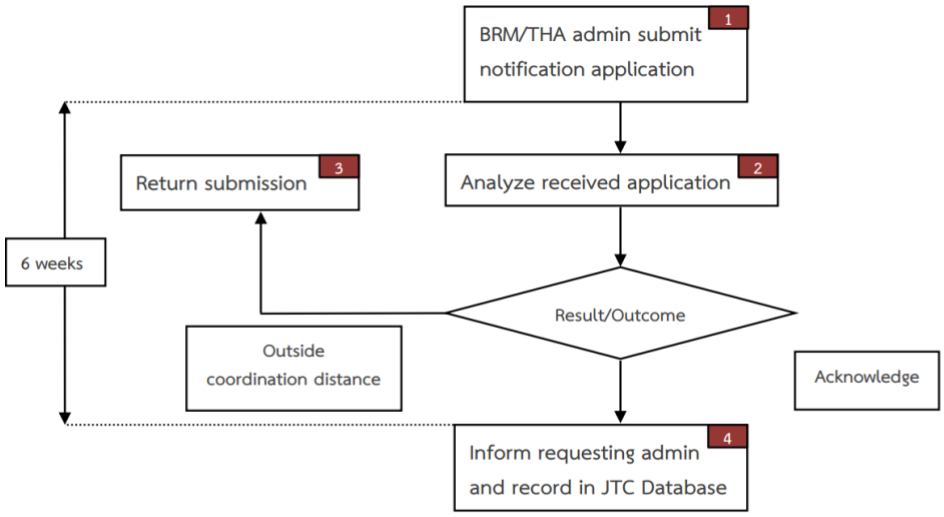
6.1.2 Thailand also presented the frequency coordination procedure for frequency registration and frequency notification as follows:

Frequency registration procedure



Remark: If there is no response to the submission within 6 weeks, such records will be deemed 'approved'.

Frequency notification procedure



Remark: If there is no response to the submission within 6 weeks, such records will be deemed 'acknowledged'.

6.1.3 Thailand also presented frequency registration and frequency notification format.

6.2 Thailand invited Myanmar to consider and agree on the 2 frequency coordination types namely Frequency registration and Frequency notification as proposed by Thailand.

6.3 The Meeting took note of Thailand's presentation and agreed in principle the concept of Frequency notification procedure and the frequency notification format.

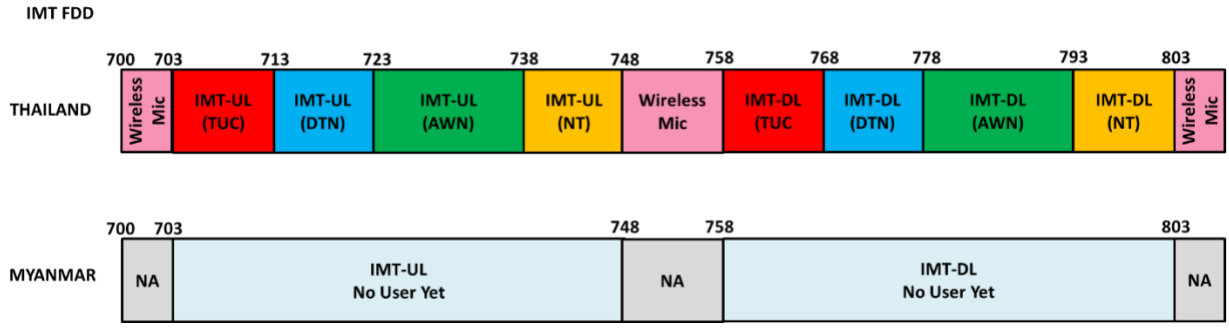
6.4 On the issue of frequency registration, the Meeting agreed to discuss this issue at the next JTC Meeting.

7 Band Plan and Coordination Parameters for Telecommunication services

7.1 Coordination parameters for 700 MHz band

7.1.1 Thailand presented a paper on "Band plan and Coordination parameters for 700 MHz band" as appeared in Doc.JTC-4/T-15.

(i) Thailand informed the Meeting that after JTC-3, Thailand had successfully auctioned the 700 MHz in February 2020 and the current assignment compared with Myanmar as shown below:



(ii) In October 2021, NBTC sent a letter to PTD proposing for the consideration of the 700 MHz coordination parameters.

(iii) Thailand also proposed coordination parameters for 700 MHz based on LTE technology agreements as follows:

Technology	Signal Strength Threshold Values for all other border areas as agreed at the JTC-2 Meeting	Signal Strength Threshold Values for Kawthoung – Ranong as agreed at the JTC-2 Meeting	Signal Strength Threshold Values for Hpayarthonesu – Three Pagodas as agreed at the JTC-3 Meeting
LTE	-94 dBm @ (0) km -114 dBm @ (N) km (N = 4)	-94 dBm @ (0) km -114 dBm @ (N) km (N = 6)	-87 dBm @ (0) km -114 dBm @ (N) km (N = 4)

(iv) Thailand invited Myanmar to exchange current information regarding the 700 MHz band and the current configuration as well as any future plan for assignments.

(v) Thailand also invited Myanmar to consider the proposed coordination parameters to prevent possible interference cases along the border in the future.

7.1.2 Myanmar presented a paper on "Band plan and Coordination parameters for 700 MHz band" as appeared in Doc.JTC-4/T-25.

(i) Myanmar informed the Meeting that PTD had not yet assigned the 700 MHz band.

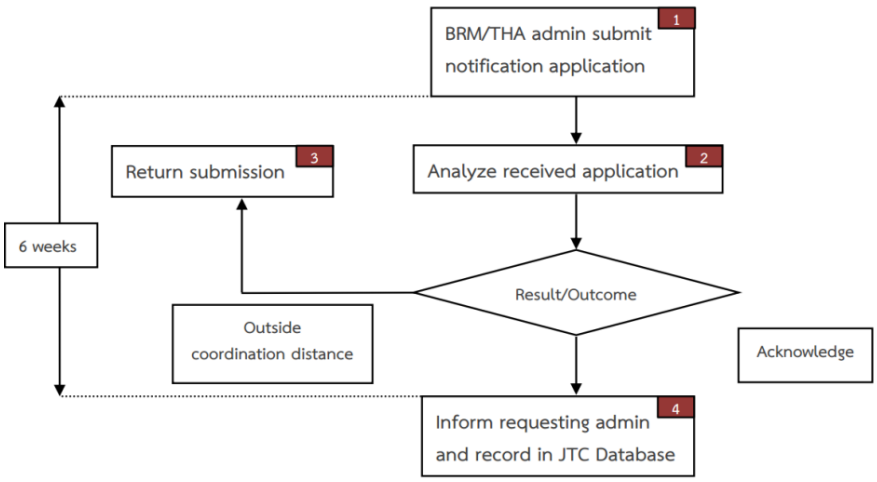
(ii) PTD would like to discuss the coordination parameters after assignment of this spectrum.

7.1.3 The Meeting took note of both sides' presentations and agreed to revisit this issue once the 700 MHz band was assigned to Myanmar mobile operators.

7.2 Coordination parameters for 900, 1800 and 2100 MHz bands

7.2.1 Thailand presented a paper on "Band plan and Coordination parameters for 900, 1800 and 2100 MHz band" as appeared in Doc.JTC-4/T-16.

7.2.2 Thailand informed the Meeting on the current coordination parameters for 900 1800 and 2100 MHz bands between Thailand and Myanmar, and the concept of frequency notification procedure which was already introduced under 6.1.2.



Remark: If there is no response to the submission within 6 weeks, such records will be deemed 'acknowledged'.

7.2.3 Thailand invited Myanmar to consider and agree to use frequency notification procedure for 900, 1800 and 2100 MHz bands.

7.2.4 The Meeting took note of Thailand's presentation and agreed on the use of frequency notification procedure and format for 900, 1800 and 2100 MHz bands. The Meeting also agreed on coordination distance as follows:

(i) 6 km for Kawthoung-Ranong;

(ii) 4 km for all other border areas.

7.3 Coordination parameters for 2300 MHz band

7.3.1 Thailand presented a paper on "Band plan and Coordination parameters for 2300 MHz band" as appeared in Doc.JTC-4/T-17.

7.3.2 Thailand informed the Meeting that Thailand still maintained the proposal from JTC-2 for the coordination parameters for 2300 MHz band based on ECC Rec.(14)(4) with frame configuration 2 as follows:

System	TDD Systems with Synchronization	TDD Systems without synchronization
Recommended Field Strength at 3 m above ground	**65 dBµV/m/5MHz @ 0 km from border** 49 dBµV/m/5MHz @ 6 km from border	**30dBµV/m/5MHz @ 0 km from border**
Converted Received power	**-80.6 dBm/5 MHz @ 0 km from border** -96.6 dBm/ 5 MHz @ 6 km from border	**-114.4 dBm/5 MHz @ 0 km from border**

7.3.3 Thailand invited Myanmar to share the current status for 2300 MHz band and consider the proposed coordination parameters.

7.3.4 Myanmar presented a paper on "Band plan and Coordination parameters for 2300 MHz band" as appeared in Doc.JTC-4/T-27.

(i) Myanmar informed the Meeting that part of the 2300 MHz band was reserved for Government use. PTD had not yet assigned the 2300 MHz.

(ii) PTD would like to discuss the coordination parameters after assignment of this spectrum.

(iii) PTD also would like to propose the additional technical conditions for 2300 MHz spectrum based on CEPT Report 55 Technical Conditions for Wireless Broadband Usage of the 2300-2400 MHz Frequency Band.

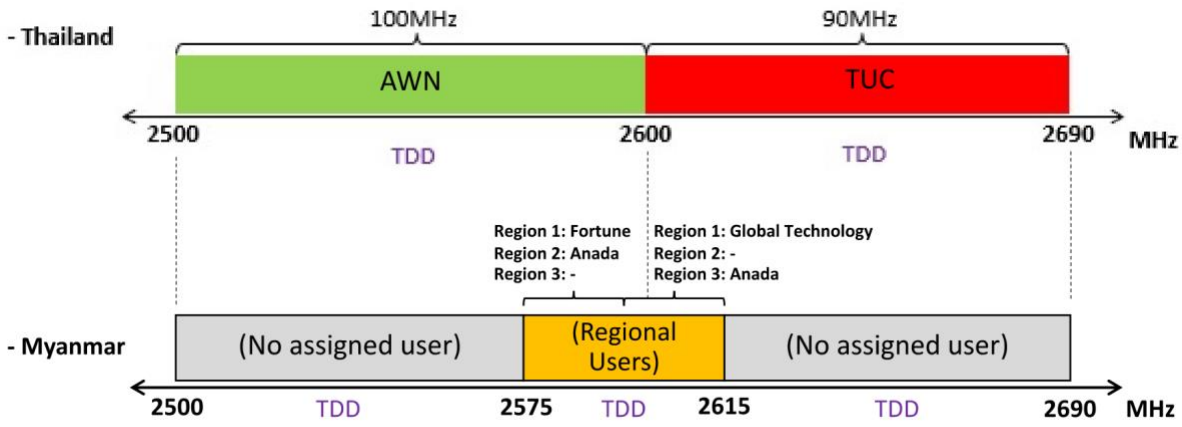
7.3.5 The Meeting took note of both sides' presentations. Thailand informed the Meeting that Thailand will study the CEPT Report 55 as proposed by Myanmar.

7.3.6 The Meeting agreed to revisit this issue once the 2300 MHz band was assigned to Myanmar mobile operators.

7.4 Coordination parameters for 2600 MHz band

7.4.1 Thailand presented a paper on “Band plan and Coordination parameters for 2600 MHz band” as appeared in Doc.JTC-4/T-18.

7.4.2 Thailand informed the Meeting that after JTC-3, Thailand had successfully auctioned the 2600 MHz in February 2020 and the current assignment compared with Myanmar’s assignment was as shown below:



7.4.3 In September 2021, NBTC sent a letter to PTD proposing for the consideration of the 2600 MHz coordination parameters and common frame structure as follows:

	ECC Rec. (11)05	ECC Rec. (14)04
System	TDD (System synchronized)	TDD (System without synchronized)
Recommended Field Strength at 3m above ground	65 dBµv/m/5 MHz @ 0 km from border	30 dBµv/m/5 MHz @ 0 km from border
	49 dBµv/m/5 MHz @ 6km from border	
Converted Received power	- 80.6 dBm/5 MHz @ 0 km from border	- 114.4 dBm/5 MHz @ 0 km from border
	- 96.6 dBm/5 MHz @ 6 km from border	

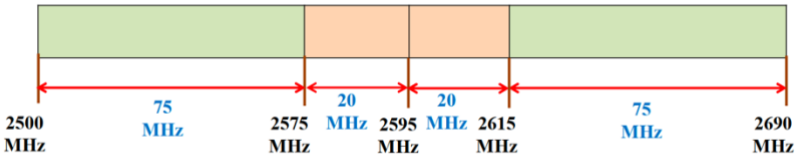
Technology	Sub-Carrier Spacing (kHz)	Sub-frame Ratio (Downlink* : Uplink)
LTE	15	4:1
NR	30	8:2

* Downlink includes special sub-frame during transition from downlink to uplink

7.4.4 Thailand still maintained the proposal from September 2021 and invited Myanmar to share the current status for the 2600 MHz band and consider the proposed coordination parameters to prevent possible interference cases along the border in the future.

7.4.5 Myanmar presented a paper on “Band plan and Coordination parameters for 2600 MHz band” as appeared in Doc.JTC-4/T-28.

(i) Myanmar informed the Meeting that the current use of 2600 MHz band was as follows:



List of Companies Using Frequencies in 2600 MHz Band

No.	Frequency	Company Name
1.	2575-2595 MHz	Fortune International Limited
		Amara Communications Co., Ltd
2.	2595-2615 MHz	Global Technology Co., Ltd
		Amara Communications Co., Ltd

(ii) In November 2021, PTD also sent a letter to NBTC that PTD had no comment on the proposal for coordination parameters for the frequency band 2600 MHz.

(iii) PTD also informed the Meeting that only Global Technology Co.,Ltd used the 2600 MHz in the border area.

7.4.6 Thailand proposed that the Meeting adopt the coordination parameters in principle and the parameters could be revisited and reviewed in the future.

7.4.7 After discussion, the Meeting agreed to adopt the coordination parameters for 2600 MHz band as proposed by Thailand in 7.4.3 and agreed to revisit this issue once the 2600 MHz band was assigned to Myanmar mobile operators. In addition, any interference issues will be considered on a case-by-case basis.

8 Broadcasting Service

8.1 Television Broadcasting Service

8.1.1 Thailand presented a paper on “Television Broadcasting Service” as appeared in Doc.JTC-4/T-19.

8.1.2 The Meeting was informed on the following items:

(i) Timeline to release 700 MHz for IMT as follows:

- Analog TV Broadcasters had completed their ASO on 25 March 2020;

- DTT Frequency re-stacking had completed between 3 September 2020 – 14 January 2021; and
- 700 MHz had been available for IMT since 15 January 2021.

(ii) The technical characteristic of 20 DTTB sites which were located along Thailand – Myanmar Common Border Area (30 km from the border line).

8.1.3 Thailand further informed that, after JTC-3 Meeting, Thailand received the technical characteristics of TV stations in Myanmar from MRTV via e-mail on 6 February 2020. However, the information on Myawaddy TV was not completed. However, according to Doc.JTC-4/T-20, Myanmar informed the Meeting that 5 stations of Myawaddy TV were not yet in operation. Hence, the technical information was not available.

8.1.4 Thailand shared the study result and also proposed to determine the coordination area and coordination criteria.

8.1.5 The Meeting took note of the presentation from Thailand**.**

8.1.6 The Meeting agreed on the coordination area and coordination criteria to be used for Television Broadcasting Service as shown in the following table:

<table>
<tr><th>Items</th><th>Coordination area and Coordination Criteria</th></tr>
<tr><td>1. Frequency Arrangement</td><td>The frequency shall be used in equitable basis.

After Thailand and Myanmar follow the frequency notification procedure, both counties will have the technical database of DTT stations along the common border. Therefore, taking into account the technical database, the future frequency usage can avoid the interference. However, if one country cannot find the suitable frequency channels for the future use, both countries shall study and find the solution based on the equitable basis.</td></tr>
<tr><td>2. Frequency Notification</td><td>The frequency notification will be
(1) applied for only DTT
(2) begun 1 January 2023 (Before 2023, any interference would be solved on case-by-case basis.)
(3) after 1 January 2023, Analog TV shall not cause interference to Digital TV and cannot claim protection.</td></tr>
<tr><td>3. Frequency Coordination Distance</td><td>30 km from the officially agreed border line</td></tr>
<tr><td>4. Frequency Coordination Types</td><td>
<table>
<tr><th>Digital TV Transmitter Class (Band IV and V)</th><th>ERP</th><th>Frequency Coordination Type</th></tr>
<tr><td>High Power Transmitter</td><td>ERP ≥ 10 kW</td><td>Frequency Notification *</td></tr>
<tr><td>Medium Power Transmitter</td><td>250 W ≤ ERP < 10 kW</td><td>Frequency Notification *</td></tr>
<tr><td>Low Power Transmitter</td><td>ERP < 250</td><td>Frequency Notification</td></tr>
</table>
</td></tr>
</table>

	* If Thailand and Myanmar agree on the frequency registration procedure in the future, High and Medium Power Transmitters will follow the frequency registration procedure.

5. Frequency Coordination Parameters

Parameters	Value/Criteria		
Propagation Model	• ITU-R P.1546 • Wanted signal: 50% location, 50% time • Interfering signal: 50% location, 1% time		
System Variants for Digital TV **	Thailand	Myanmar	
	• DVB-T2 with 16K ext. • 64QAM • Code rate 3/5, PP2 • Guard Interval = 266µs	MRTV • DVB-T2 with 16K • 64QAM • Code rate 4/5 • Guard Interval = 56µs	MWD • DVB-T with 32K • 256QAM • Code rate 2/3 • Guard Interval = 28µs
Planning and Protection Criteria	**i. Analog TV:** • ITU-R BT.655 (protection ratio) • ITU-R BT.417 (minimum field strength) • ITU-R BT.419 (antenna discrimination) **ii. Digital TV:** • Planning criteria include protection ratio for fixed reception mode o ITU-R BT.1368 for DVB-T/H, ISDB-T, DTMB , ATSC o ITU-R BT.2033 for DVB-T2 • ITU-R BT.419 (antenna discrimination) • Signal summation method : Log normal method • Coverage probability 95%		
Field Strength Limit	• No field strength limit • Service area shall not be interfered, for more than 5% of covered population		
Terrain and Clutter Data	• Resolution Map is 200m or better		

** The system variants for Digital TV may be reviewed and updated in future JTC Meetings.

8.1.7 The Meeting further agreed that the frequency notification format for Television Broadcasting Service shall include “Maximum antenna height above ground level”.

8.1.8 When necessary, the informal meeting among the broadcasters will be held to exchange the technical information and to discuss the details of frequency planning. NBTC and PTD may attend the informal meeting as observers.

8.2 Sound Broadcasting Service

8.2.1 Thailand presented a paper on “Sound Broadcasting Services” as appeared in Doc.JTC-4/T-21.

(i) Thailand informed the Meeting of the current Thailand’s FM stations within 30 km from the borderline. The details are shown as follows:

No.	Station Name	Freq. (MHz)	Lat (N)	Long (E)	Ht (m)	ERP (kW)	Polarization
1.	Chiang Rai-5	100.25	20.109242	99.886826	120	4	Vertical
2.	Chiang Mai-2	89.25	19.940712	99.221855	80	4	Mixed
3.	Mae Hong Son-1	90.50	18.168565	97.944550	50	4	Mixed
4.	Mae Hong Son-2	99.50	19.106007	98.035717	55	4	Mixed
5.	Mae Hong Son-3	102.00	19.297550	97.957950	40	4	Mixed
6.	Mae Hong Son-4	104.00	19.106524	98.034692	60	4	Mixed
7.	Tak-4	103.75	16.564725	98.647035	32	4	Mixed
8.	Kanchanaburi-2	94.25	15.139853	98.444931	100	4	Mixed
9.	Prachuap Khiri Khan-1	89.25	11.835090	99.800775	120	3	Mixed
10.	Prachuap Khiri Khan-5	100.25	11.830301	99.779749	120	2	Mixed
11.	Prachuap Khiri Khan-6	102.25	11.835333	99.800833	120	3	Mixed
12.	Prachuap Khiri Khan-7	106.75	11.908539	99.796559	60	4	Mixed
13.	Ranong-1	100.50	10.028333	98.670192	48	4	Mixed
14.	Ranong-2	105.75	10.028664	98.669486	90	4	Mixed
15.	Ranong-3	107.25	10.023910	98.668675	100	3.6	Mixed

Note:
Freq. (MHz) is frequency in MHz
Lat (N) is latitude in degree North and Long (E) is Longitude in degree East
ERP (kW) is maximum total effective radiated power in kW
Ht (m) is the antenna height measured between the ground level and the middle of antenna in meter

(ii) Thailand proposed the followings:

- Defining the coordination area as the area within 30 km from the borderline;

- Developing database template for existing FM stations within the coordination area, in which Thailand presented a database consists of Thailand's 15 existing FM stations within the coordination area;
- Developing frequency coordination criteria and frequency registration parameters by (1) applying frequency coordination and frequency registration to stations with ERP > 1 kW and (2) discussing frequency coordination criteria and frequency registration parameters needed; and
- Updating of contact persons, in which Thailand updated Thailand's contact person as follows:

  Mr. Atiwat Aimdilokwong
  Broadcasting Technology and Engineering Bureau
  The Office of the National Broadcasting and Telecommunications Commission (NBTC)
  Email: atiwat.a@nbtc.go.th

8.2.2 Myanmar informed the Meeting as follows:

(i) The borderline should be worded as "the officially agreed borderline";

(ii) Myanmar agreed on developing the database for existing FM stations within the coordination area;

(iii) Frequency registration should be replaced by frequency notification; and

(iv) There was no change in Myanmar's contact person.

8.2.3 The Meeting agreed on the following items:

(i) Defining the coordination area as the area within 30 km from the officially agreed borderline;

(ii) Developing database template for existing FM stations within the coordination area using the format as follows:

No.	Field Name	No.	Field Name
1	Admin	7	TX FREQ
2	Client	8	RX FREQ
3	Station Name	9	Bandwidth
4	Location	10	TX Power
5	Latitude	11	EFF Radiated Power
6	Longitude	12	Max Antenna Height Above Ground*

* The antenna height measured between the ground level and the middle of antenna

(iii) Applying frequency notification procedure to stations with ERP > 1 kW and

(iv) Discussing coordination parameters in the next JTC Meeting.

8.2.4 Thailand requested additional information regarding Myanmar's broadcasting service as follows:

(i) T-DMB broadcasting station information such as location, frequency usage, power, antenna height, etc;

(ii) Band III analog TV station information such as analog switch off plan, station location, frequency usage, transmitting power, effective radiated power, antenna heigh, coverage area, etc.

(iii) FM future use frequency information such as future use plan, assignment status, broadcasting status, broadcasting start date, etc.

8.2.5 In response, Myanmar informed the Meeting as follows:

(i) T-DMB broadcasting stations were not in the coordination area; and

(ii) Myanmar would send the information regarding Band III analog TV stations and FM future use frequencies via email.

9 Common Frequencies for Thailand-Myanmar for Use during Emergency Situation in HF, VHF and UHF bands

9.1 Thailand presented a paper on "Common Frequency for Thailand-Myanmar for Use during Emergency Situation" as appeared in Doc.JTC-4/T-22.

9.2 Thailand still maintained the proposal on the Common Frequency for Thailand-Myanmar for Use during Emergency Situation from JTC-3 and invited Myanmar to consider the frequency in the proposal as follows:

HF Bands (ASEAN framework)

Frequency (MHz)	Bandwidth (kHz)	Usage
3.122, 3.351, 3.815, 3.925, 3.950	2.7	Calling channel/ Communication channel
6.314, 6.3417, 6.4501, 6.771		
11.202, 11.217, 11.230		
14.270, 14.275, 14.293, 14.303, 14.325		

VHF and UHF bands (UN framework)

Frequency (MHz)	Bandwidth (kHz)	Usage
158.025	12.5/25	Calling channel/ Communication channel
163.175		
458.100		
458.175		

9.3 Myanmar presented a paper on “Common Frequency for Thailand-Myanmar for Emergency” as appeared in Doc.JTC-4/T-29.

9.4 PTD informed the Meeting that the current spectrum for PPDR in Myanmar was as follows:

Frequency (MHz)	Bandwidth (kHz)
380-400	12.5/25
406-430	

9.5 PTD was also considering HF and VHF band for PPDR based on the current utilization, and to reserve the 406-430 MHz band for narrowband PPDR with channel spacing 12.5 kHz. PTD also followed ITU-R Resolution 646 (Rev.WRC-15) and considered parts of the frequency range of 694-894 MHz for meeting its PPDR requirements.

9.6 The Meeting took note of the presentations from both sides.

9.7 After discussion, the Meeting agreed on the Common Frequency for Thailand-Myanmar for use during Emergency situation in HF band as follows:

Frequency (MHz)	Bandwidth (kHz)	Usage
3.122, 3.351, 3.815, 3.925, 3.950	2.7	Calling channel/ Communication channel
6.314, 6.3417, 6.4501, 6.771		
11.202, 11.217, 11.230		
14.270, 14.275, 14.293, 14.303, 14.325		

9.8 The Meeting also agreed to study further on additional frequency bands to accommodate PPDR use in the future.

10 Any Other Matter

10.1 Compilation of Agreed Band Plans, Coordination Parameters, and Coordination Procedure (Compilation Handbook)

10.1.1 Thailand presented a paper on “Compilation of Agreed Band Plans, Coordination Parameters, and Registration Procedure (Compilation Handbook)” as appeared in Doc.JTC-4/T-23.

(i) Thailand informed the Meeting that there had been many agreements since the first JTC Meeting and in order to reduce the difficulty in searching for information of JTC agreements, Thailand proposed to have a compilation handbook which would compile all the agreements of the past JTC Meetings into a single document.

(ii) The compilation handbook was intended to provide information of the JTC agreements between Thailand and Myanmar with respect to frequency

coordination and assignment along common border area and covers agreed band plans, coordination parameters and registration and notification of frequency assignments for both telecommunication and broadcasting services.

(iii) Portions of the document would be revised from time to time as a result of agreement from JTC Meetings.

10.1.2 Thailand invited Myanmar to consider the proposal to have a Compilation of Agreed Band Plans, Coordination Parameters, and Coordination Procedure (Compilation Handbook).

10.1.3 Myanmar informed the Meeting that Myanmar had replied NBTC email regarding the "Proposal for new agenda item for the next JTC-4 Thailand-Myanmar" that Myanmar would like to adopt the Handbook at the 5th JTC Meeting in 2023.

10.1.4 The Meeting agreed on the concept of the Compilation Handbook using the name "Compilation of Agreed Band Plans, Coordination Parameters, and Coordination Procedure", and the Compilation Handbook itself would be presented for adoption at the next JTC Meeting.

10.2 Mobile Operators' Single Point of Contact (SPOC) Update

10.2.1 The Meeting agreed to update the contact point for the Mobile operators from both sides as follows:

Thailand Mobile Operators

Name	Organization	Contact Number	Email
Mr. Supakit Wongsawangtham	AWN	+66 819593335	supakitw@ais.co.th
Ms. Boonrutai Kruekaew	TUC	+66 891067293	boonrutai_kru@truecorp.co.th
Mr. Atip Keeratipish	DTN	+66 814246071	atip@dtac.co.th
Ms.Jomjai Bumrungrat	NT	+66 81232-0067	jomjai.b@nc.ntplc.co.th
Mr. Amnard Riyasu	NT	+66 819847324	amnard@nt.ntplc.co.th

Myanmar Mobile Operators

Name	Organization	Contact Number	Email
Mr. Kyaw Htet	AML	+959 791000530	kyawhtet@atom.com.mm
Mr. Pyae Min Naing	MPT	+959 423008507	pyaeminnaing@mptjo.com.mm pyaeminnaing@gmail.com.mm

Mr. Aung Tun	Mytel	+959 691050864	rnpo@mytel.com.mm aungtun@mytel.com.mm
Ms. Myat Aye Saw	OML	+959 973331288	msaw1@ooredoo.com.mm
Mr. Aung Htun Han	MECTel	+959 424264052	aungtunhanmec@gmail.com

11 Date and Venue of the Next JTC Meeting

The Meeting agreed that the next JTC Meeting would be hosted by Myanmar and tentatively be held virtually during the period of August to September 2023.

12 Consideration and Adoption of Agreed Minutes of the Meeting

The Meeting considered and adopted the Agreed Minutes of the 4th Joint Technical Committee on Coordination and Assignment of Frequencies along Thailand – Myanmar Common Border Meeting held virtually and hosted by Thailand from 31 August to 2 September 2022.

Mr. Saneh Saiwong	Mr. Zar Ne Aung
Principal Engineering Expert Office of the National Broadcasting and Telecommunications Commission	Deputy Director General Posts and Telecommunications Department
THAILAND	MYANMAR

Date : 2 September 2022
Venue : Virtual Meeting, Hosted by Thailand

Annex 1

Interference Case on NT (850 MHz)

1. Following the cellular and non-cellular interference report from NT in Doc.JTC-4/T-11, a discussion was held among NT, MPT, MECTel and Mytel to address the cellular interference cases.
2. In the above document, NT applied the coordination parameters bilaterally agreed between NT and Mytel in JTC-2 (ref: Annex 1 of Agreed minutes of JTC-2).
3. MPT instead proposed to apply the same coordination parameters as for UMTS since the technology-based coordination parameters and process have been agreed among all Thai and Myanmar cellular operators in JTC-2 (ref: Annex 3 of Agreed minutes of JTC-3).
4. After discussion, NT as well as MECTel and Mytel have agreed with MPT's proposal.
5. MPT, MECTel and Mytel have agreed to take optimization actions to resolve the cellular interference cases reported by NT in accordance with the agreed coordination process.
6. NT has agreed to provide the interference Cell ID and DT map to Mytel in the agreed information exchange format from JTC-3 (ref: Annex 4 of Agreed minutes of JTC-3) to facilitate their optimization actions

Operator Name	PLMN	Frequency Band	Technology	Channel GSM : BCCH ARFCN UMTS : UARFCN-DL LTE : EARFCN-DL	Identity [1] GSM : BSIC UMTS : PSC LTE : PCI	Identity [2] GSM : CI UMTS : Cell ID LTE : eNodeB ID	Level from Drive Test (dBm)@ 0 km GSM : Rx_Level UMTS : RSCP LTE : RSRP	Level from Drive Test (dBm) @ 4 or 6 km GSM : Rx_Level UMTS : RSCP LTE : RSRP	Action plan	Date of action plan execution (DD/MM/YYYY)
This fields are filled by operators who suffered from interference									*e filled by operators who are the sources of*	
					w					

Annex 2
Coordination Status for the interference cases between Thailand and Myanmar Mobile Operators (as of JTC-4 Meeting)

Summary of Coordination Cases in 900 MHz, 1800 MHz and 2100 MHz

Affected	Source	Band	Technology	Location	Interferring	Open	Close Date	Status	Comments
AML	AWN	900	LTE	Tachileik	7	9/Aug/22		Pending	AWN will inform AML about completed actions
AML	AWN	1800	LTE	Tachileik	22	9/Aug/22		Pending	AWN will inform AML about completed actions
AML	TUC	1800	LTE	Tachileik	21	9/Aug/22		Pending	AML will confirm the results of completed
AML	NT	2100	UMTS	Tachileik	21	10/Aug/22		Pending	NT will inform AML about completed actions by
AML	AWN	900	GSM	Tachileik	5	9/Aug/22		Pending	AWN will inform AML about completed actions
MPT	AWN	2100	LTE	Tachileik	8	23/May/22	4/Jul/22	Close	
MPT	TUC	900	LTE	Tachileik	9	23/May/22		Pending	MPT plans to confirm the results tentatively by
MPT	AWN	1800	LTE	Tachileik	28	23/May/22	4/Jul/22	Close	
MPT	DTN	1800	LTE	Tachileik	11	23/May/22		Pending	MPT plans to confirm the results tentatively by
MPT	TUC	2100	UMTS	Tachileik	42	23/May/22		Pending	
MPT	TUC	900	LTE	Kawthoung	2	16/May/22		Pending	MPT plans to confirm the results tentatively by
MPT	AWN	1800	LTE	Kawthoung	2	13/May/22		Close	
MPT	DTN	1800	LTE	Kawthoung	4	1/Sep/22		Open	MPT will re-send the excel template on 1 Sept
MPT	TUC	2100	UMTS	Kawthoung	15	16/May/22		Pending	MPT plans to confirm the results tentatively by
MYTEL	NT	850	LTE	Myawaddy	6	31/Aug/22		Open	Waiting MYTEL send back the Excel file to NT
MYTEL	DTN	2100	LTE	Myawaddy	35	31/Aug/22		Open	Waiting MYTEL send back the Excel file to DTN
MYTEL	DTN	2100	LTE	Myawaddy	42	31/Aug/22		Open	Waiting MYTEL send back the Excel file to DTN
MYTEL	AWN	900	GSM	Myawaddy	9	31/Aug/22		Open	Waiting MYTEL send back the Excel file to AWN
MYTEL	DTN	2100	LTE	Tachileik	34	31/Aug/22		Open	Waiting MYTEL send back the Excel file to DTN
MYTEL	DTN	2100	LTE	Tachileik	34	31/Aug/22		Open	Waiting MYTEL send back the Excel file to DTN
MYTEL	AWN	900	GSM	Tachileik	9	31/Aug/22		Open	Waiting MYTEL send back the Excel file to AWN
OML	AWN	2100	UMTS	Kawthoung	7	31/Aug/22		Open	Shared report to AWN
OML	AWN	2100	UMTS	Tachileik	30	31/Aug/22		Open	Shared report to AWN
TUC	AML	1800	LTE	Mae Sot	7	8/Aug/22		Pending	Under Verification after AML already optimized
TUC	MPT	2100	UMTS	Mae Sot	8	1/Aug/22		Open	MPT plans to complete optimization actions
TUC	MPT	900	LTE	Mae Sot	13	1/Aug/22		Open	MPT plans to complete optimization actions
TUC	MPT	900	UMTS	Mae Sot	8	1/Aug/22		Open	MPT plans to complete optimization actions
TUC	MPT	2100	LTE	Ranong	1	1/Aug/22		Open	MPT plans to complete optimization actions
TUC	MPT	2100	UMTS	Mae Sai	5	1/Aug/22		Open	MPT plans to complete optimization actions
TUC	MPT	2100	LTE	Mae Sai	25	1/Aug/22		Open	MPT plans to complete optimization actions
TUC	MPT	900	LTE	Mae Sai	12	1/Aug/22		Open	MPT plans to complete optimization actions