

**Agreed Minutes
of The 3rd Joint Technical Committee
on Coordination and Assignment of Frequencies
along Myanmar- Thailand Common Border Meeting (JTC-3)**

**Bagan, Myanmar
14-16 January 2020**

1 Introduction

- 1.1 The 3rd Joint Technical Committee on Coordination and Assignment of Frequencies along Myanmar-Thailand Common Border Meeting (JTC-3) was held in Bagan, Myanmar from 14 to 16 January 2020.
- 1.2 The Myanmar Delegation was led by Mr. Myo Swe, Director General of Posts and Telecommunications Department (PTD), Ministry of Transport and Communications and Thai Delegation was led by Air Marshal Thanapant Raicharoen, Ph.D, Deputy Secretary General, Office of the National Broadcasting and Telecommunications Commission (NBTC). The list of delegates appears in Doc.JTC-3/M-02.

2 Opening Remarks

- 2.1 In the opening session, Mr. Myo Swe, Director General of Posts and Telecommunications Department (PTD) welcomed the Thai delegation to Bagan for the JTC-3 Meeting. He highlighted that the meeting promoted bilateral cooperation that contributed to the effective assignment of frequencies along Thailand – Myanmar common border. Due to the other pressing commitment, he delegated the task to Mr. Zar Ne Aung to led the Myanmar Delegation.
- 2.2 The full text of the Welcome Address appears in Doc.JTC-3/M-03.
- 2.3 In response, Mr. Saneh Saiwong, Executive Director of Spectrum Management Bureau Office of the National Broadcasting and Telecommunications Commission, on behalf of the Head of Thai delegation, expressed his appreciation to Myanmar for hosting the JTC-3 Meeting in Bagan. He highlighted the remarkable results of the last JTC-2 Meeting and wish the delegations would have a very successful Meeting.
- 2.4 The full text of the Reciprocal Address appears in Doc.JTC-3/T-04.

3 Adoption of Agenda and Working Arrangement

The Meeting adopted the Agenda and Working Arrangement as appeared in Doc.JTC-3/M-05 and Doc.JTC-3/M-06, respectively.

4 Exchange of Information

- 4.1 Myanmar (PTD) presented a paper on "Regulatory update of Telecom Sector and Spectrum Management" as appeared in Doc.JTC-3/M-07, which could be summarized as follows:
- 4.1.1 Myanmar presented about the overview of the institution reform of the telecom sector. The bill which is required to establish the Independent Myanmar Communications Commission (MCC) is being discussed in the parliament. The law for MPT Corporatization was enacted and yet to come into effect. MPT is currently in joint operation with Sumitomo and KDDI from Japan.
- 4.1.2 The new regulation and policy are updated as follows;
- Drafting the Guideline on Mobile Virtual Network Provider (MVNP) in Myanmar
 - Drafting the Regulation on Right of Ways (RoW)
 - White Paper-Facilitating Faster Broadband and 5G Adoption in Myanmar
 - Adoption of Universal Service Strategy (As a pilot project, implementation of basic telecommunications services in Minbya and Ann Townships in Rakhine State)
 - Adoption of "Rule for the establishment of Universal Service Fund, USF".
- 4.1.3 Currently, the total Number of Licences are more than 200 (December, 2019) which included 4 License categories: NFS(I), NS, NFS(C) and AS.
- 4.1.4 PTD provided the information on IMT spectrum allocation to the nationwide mobile operators and regional operators.
- 4.1.5 For Mobile technology penetration, the number of subscribers for 2G, 3G and 4G are 16.4 Million, 23.8 Million and 37.7 Million respectively and with regard to 4G penetration, Myanmar reached 38 Million users in 2019 which is increased from 8.4 Million users in 2018. PTD allowed the temporary spectrum for 5G testing to Telecom International Myanmar Co.,Ltd in C Band and to Ooredoo Myanmar Limited in C Band and 2600 MHz Band.
- 4.1.6 According to the tentative timeline for IMT spectrum release which was mentioned in Spectrum Roadmap review (2019), PTD is now considering to release 2600 MHz, 2300 MHz, 3.5 GHz spectrum in 2020 and for the optimization of 850 MHz will be done in 2020 and to release 700 MHz spectrum in 2021.

- 4.1.7 PTD informed the smart phone penetration in Myanmar for the future IMT spectrum and updated about the spectrum recall in 700 MHz Band by the amendment of Technical Specifications for Short Range Devices (SRD).
- 4.1.8 PTD shared the information on the use of PPDR frequency in Myanmar and proposed the common PPDR frequency in the frequency range of 694-894 MHz and 406-430 MHz between Thailand- Myanmar.
- 4.1.9 PTD provided the information on the location of fixed monitoring stations.
- 4.2 Myanmar (Myanma Radio and Television-MRTV) presented a paper on "Myanmar Broadcasting Industry Status" as appeared in Doc.JTC-3/M-08, which could be summarized as follows:
- 4.2.1 MRTV provided the overview of the Broadcasting sector and there are four television broadcasters namely; Myanma Radio and Television (MRTV, national broadcaster), Myawady Television (MWD) under the Ministry of Defense and two private broadcasters (Forever Group and Skynet) which is joint venture with MRTV. Broadcasting law was enacted in 2015 and the amendment of the broadcasting law has been already issued and related rules are still being drafted.
- 4.2.2 MRTV provided the Digital migration plan of MRTV and MWD.
- 4.3 Thailand presented a paper on "Thailand Information Update" as appeared in Doc.JTC-3/T-09, which could be summarized as follows:
- 4.3.1 NBTC Policy Update
- (i) NBTC informed the Meeting that NBTC's new organization structure had been effective since October 8, 2019. Currently, six NBTC commissioners oversee all telecommunication and broadcasting policies. The secretary general manages the office of NBTC with four deputy secretary generals overseeing five clusters namely broadcasting, strategic and internal affairs, administration, regional affairs, and telecommunication clusters. Five new positions of assistant secretary generals were also formed.
- (ii) With the new structure, the Spectrum Management Bureau, which is under

the administrative cluster, is now responsible for all international coordination on spectrum issues including JTC coordination.

4.3.2 Telecommunications Update

- (i) NBTC informed the Meeting that in 2019, NBTC had published the spectrum roadmap for mobile communication in Thailand (5-year plan) which outlined the plan for the bands 700 MHz, 1500 MHz, 1800 MHz, 2600 MHz, 3400-3700 MHz, 26 GHz and 28 GHz from 2019 to 2023. The plan included the timeline for the notification drafting process, refarming and relocation process as well as tentative periods for spectrum auction.
- (ii) In addition to the roadmap, NBTC also provided update on the recalling process for the bands 700 MHz and 2600 MHz. The 700 MHz band was currently occupied by digital TV operators, which would be replanned to 470-694 MHz band. The 2600 MHz band was currently used by fixed services. The recalling process for both bands is expected to be completed by the year 2020/2021.
- (iii) NBTC had also issued Notification on Regulatory Sandbox which is an area-based special zone where regulation is loosen during the phase of R&D and pre-commercial stage. The area must be managed in order not to cause harmful interference outside the sandbox. The purpose of this regulation is to allow for flexible and innovative use of spectrum in order to pave ways for 5G growth with vertical industries. Currently, two universities (Chulalongkorn and Kasetsart) had been granted regulatory sandbox licenses.
- (iv) In 2020, NBTC will also hold a multiband spectrum auction for the bands 700 MHz, 1800 MHz, 2600 MHz and 26 GHz. In total, 2.99 GHz of spectrum will be available during this auction which is scheduled for February 16th, 2020. All the licenses granted will be a national license and the method use during this auction is sequential clock auction method. With this auction, NBTC aimed to provide new low-band, mid-band and high-band frequencies for future IMT implementation.

4.3.3 Broadcasting Update

- (i) NBTC provided update on the refarming process for DTTB which included the release of the 470 MHz band for digital TV and the 700 MHz band for IMT. The process included five steps: analog switch off, refarming of the 470 MHz band, relocation of frequencies for wireless microphone, DTT frequency re-planning and the implementation of DTT networks. With this process, 2x30 MHz of the 700 MHz band will be available by October 2020 and another 2x15 MHz will be available by April 2021.
- (ii) NBTC also informed the Meeting that the Notification on DTTB frequency plan was published in the Government Gazette in 2019 and NBTC had also approved the rules and regulation for compensation as well as DTT network implementation plan.
- (iii) NBTC also updated the Meeting on the frequency plan for digital radio in Thailand. The Plan includes 10 trial stations located in Bangkok, Chiang Mai, Chonburi (Pattaya and Sriracha), KhonKaen, Nakhon Ratchasima, Nakhon Sri Thamarat, Phuket, Prachuap Khiri Khan and Songkhla. The first trial digital radio station was implemented in Bangkok since April 2019.

5 Result from Joint Drive Test for Interference

5.1 Myanmar presented a paper on "Results of Joint Frequency Measurement Test" as appeared in Doc.JTC-3/M-10, which could be summarized as follows:

- 5.1.1 PTD informed the meeting that, the Joint frequency measurement team accompanied with CAT engineers performed the frequency scanning test at eight points and along the routes in Tachileik city on October 6, 2019. Although narrowband signals were found in 850MHz band, no wideband signal (780-835) MHz was found as the interference signal reported by CAT.
- 5.1.2 PTD informed the meeting that, the Joint frequency measurement team had done a frequency scanning test at Natali village on October 7, 2019 to find the source of 171.25 MHz signal which interfered with PEA repeater station. The 171.25 MHz signal was not found at the reported location. The measurement team then moved to ArDee village which is bordering with BanPhaMee village, Chiang Rai Province, Thailand. According to the result, the 171.25MHz and 175.75 MHz signals are being used by MRTV, Myanmar, at the station which is located more

than 80km from the border line.

- 5.1.3 The Meeting took note of result from the joint measurement and agreed to further discuss the results under the next agenda item.

6 Interference Cases

6.1 Thailand's air traffic control (AEROTHAI)

- 6.1.1 PTD presented a paper on "Interference Cases on AEROTHAI and PEA" as shown in Doc.JTC-3/M-11.
- 6.1.2 PTD informed the meeting of measurement result, 131.25, 134.40, 137.50 MHz signal was found on the reported area where Myanmar ethnic group stay.
- 6.1.3 AEROTHAI reported to the Meeting that there still are interference occurred intermittently in the aeronautical frequency band, in particular 133.1 and 133.6 MHz and requested PTD to take this information into consideration
- 6.1.4 Ministry of Transport and Communications officially communicated with NRPC (Nation Reconciliation and Peace Center) that ethnic group need to change the frequency usage which comply with National Table of Frequency Allocation of Myanmar. PTD already proposed the alternative frequencies and will update NBTC when PTD receives the responses from NRPC.
- 6.1.5 PTD informed that the proposed alternative frequencies will not be in the aeronautical band of Myanmar NFAT.
- 6.1.6 The Meeting took note of the information provided by PTD and AEROTHAI and the Meeting welcome any further update on this issue at future JTC meeting.

6.2 Thailand's Provincial Electricity Authority (PEA)

- 6.2.1 PTD informed the Meeting that, the Joint frequency measurement team had done a frequency scanning test at Natali village on October 7, 2019 to find the source of 171.25 MHz signal which interfered with PEA repeater station. The 171.25 MHz signal was not found at the reported location. The measurement team then moved to ArDee village which is bordering with BanPhaMee village, Chiang Rai Province. The team which included NBTC personnel found that 171.25MHz and 175.75 MHz signals are being used by MRTV, Myanmar.

- 6.2.2 PTD is discussing with MRTV on possible solutions including changing of frequency to resolve that interference and will update on the progress accordingly.
- 6.2.3 NBTC suggested to have more concrete plan to resolve that interference issue and PTD responded that PTD will work closely with MRTV on that issue.
- 6.2.4 The Meeting took note of the discussion from both sides and welcome any further update on this issue at further JTC Meeting.

6.3 Interference case on 850 MHz band

6.3.1 Interference Case on CAT 850 MHz

- (i) PTD presented a paper on "Interference Case on CAT Telecom's 850 MHz" as shown in Doc.JTC-3/M-12.
 - For Non-cellular interference case,
 - i. PTD and NBTC had conducted a joint measurement on 6-8 October 2019 concerning the interference case in the 850 MHz band at the proposed locations near Tachileik.
 - ii. According to the joint measurement result, narrowband interferences were found at 4 locations near the border and there was no wideband interference in the 850 MHz band.
 - iii. As those signals were narrowband and not continuous, it was not possible to find the location of the signal at this stage.
 - For Cellular interference case,
 - i. PTD explained the Meeting about the usage of 850 MHz Band in Myanmar.
 - ii. PTD suggested that MPT and CAT should discuss on the possible solutions such as antenna reorientation, antenna down-tilt or BTS power reduction for sites/sectors facing toward the border area and on the coordination parameters.
- (ii) CAT Telecom presented a paper on "Interference Signal in the 850MHz band along Thailand – Myanmar common border" as shown in Doc.JTC-3/T-13 which could be summarized as follows:

- For Non-Cellular Interference (UMTS 850 MHz and Narrowband),
 - i. According the results of Joint Test Measurement, narrowband signal interference was found in 4 points.
 - ii. CAT proposed to PTD to investigate interference source in Tachileik, Myanmar.
 - For Cellular Interference (UMTS 850 MHz and CDMA 850 MHz),
 - i. CAT explained about the additional test results from Universal Radio Network Analyzer that CDMA 850 signal from Myanmar was still too high.
 - ii. CAT found 3 interference channels on CDMA 850 MHz (873.45, 875.97, 877.23 MHz).
 - iii. CAT proposed to Myanmar CDMA operator to perform antenna re-orientation, antenna down-tilt and BTS power reduction.
- (iii) The Meeting took note of both sides' presentations and agreed that further discussion was required for this issue.
- (iv) For the Non-Cellular interference case, PTD, NBTC and CAT had a discussion and the result were as follows:
- i. As the exact location of the interference source cannot yet be verified, all parties agreed that it is not necessary to have joint measurement test at this stage.
 - ii. CAT will further investigate the interferences sources and inform NBTC and PTD on the progress by April 2020.
 - iii. NBTC and PTD will take the information into consideration and setup joint measurement if necessary.
- (v) (v) For the Cellular Interference case, CAT and MPT had a discussion and agreed on the action plan as shown in **Annex 1**.

6.3.2 Interference Case between CAT and Mytel

- (i) CAT and Mytel discussed on Interference Case on between CAT 850 MHz and Mytel 900 MHz.
- (ii) In the discussion, Tachileik L900 (EGSM) case was mutually discussed and it was agreed that Mytel will collect additional information to follow up.

6.3.3. Interference Case between OML& DTN

- (i) DTN presented a paper on “850/ 900 Interference Update” as shown in Doc.JTC-3/T-14.
- (ii) OML informed the Meeting that the cooperation has been good so far.
- (iii) OML and DTN agreed that 22 cases from OML that exceeded 120 days will be prioritized by DTN by migrating sites from 850 to 900 MHz. For the time being, DTN will continue applying existing mitigation techniques to reduce interference levels.

7 Band Plan and Coordination Parameters

7.1 900, 1800 and 2100 MHz

7.1.1 MPT, on behalf of Myanmar Mobile Operators, presented a paper on “Industry Update by Myanmar Mobile Network Operators” as shown in Doc.JTC-3/M-15.

- (i) MPT informed the meeting on the activities from MPT, OML, TML and Mytel. MPT informed that some interference issues had been mitigated as follows:

MPT: 83 Cells (actions taken for 24)

Mytel: 5 Cells (1 Partially improved, rest pending)

OML: 66+ 30 Cells (26 Closed, rest pending)

TML: 28 Cells (2 improved, rest pending)

- (ii) Even though the actions were taken for the reported coordination cases of existing networks, further discussion is required among MNOs of both countries to find more effective ways to handle interference cases in the future.
- (iii) MPT also informed the Meeting that further discussion is required among the Myanmar and Thai MNOs on the coordination parameters in Three Pagodas area.

7.1.2 DTN, on behalf of Thai Mobile Operators presented a paper on “Coordination Parameters for 900, 1800 and 2100 MHz at Hpayarthonesu and Three Pagodas Pass” as shown in Doc.JTC-3/T-16.

- (i) Thai Mobile Operators recapped the agreed coordination parameters from JTC-2 Meeting of the new reference lines for signal level coordination at Hparyarthonesu-Three Pagodas border area and both Myanmar and Thai Mobile Operators aimed to finalize a suitable solution at JTC-3 Meeting.
- (ii) Thai Mobile Operators explained their proposal for coordination Parameters for 900, 1800 and 2100 MHz at Hparyarthonesu and Three Pagodas Pass.
- (iii) Thai Mobile Operators invited the Meeting to finalize a suitable agreement for coordination Parameters at Hparyarthonesu and Three Pagodas Pass.

7.1.3 The Meeting took note of both sides' presentations and agreed that further discussion was required for the coordination parameters in Hparyarthonesu border area and for a more effective handling of interference cases.

7.1.4 After discussion, mobile operators from both sides agreed on the coordination parameters in Hparyarthonesu border area as described in **Annex 2**.

7.1.5 Mobile operators from both sides also reached an agreement on the idea to improve efficiency and effectiveness of coordination activities as shown in **Annex 3**.

7.1.6 The updated SPOC (Single Point of Contact) list for Mobile operators of both sides is as follows.

Name	Organization	Contact Number	Email
Mr. Pyae Min Naing	MPT	+959423008507	pyae minnaing@mptjo.com.mm
Mr. Kyaw Htet	TML	+959791000530	kyawhtet@telenor.com.mm
Ms. May Su Pan	OML	+959973331313	mpan@ooredoo.com.mm
Ms. Ei Phyothan	Mytel	+959687959083	eiphyothan@mytel.com.mm
Mr. Aung Tun Han	MECTel	+959340043558	aungtunhanmec@gmail.com
Mr. Thana Oonsombat	AWN	+66818113339	thanao@ais.co.th
Mr. PairojPansa	CAT Telecom	+66813500009	Pairoj.p@cattelecom.com
Mr. AtipKeeratipish	DTN	+66814246071	atip@dtac.co.th
Mr. AmnardRiyasu	TOT	+66819847324	amnard@tot.co.th
Ms. BoonrutaiKruekaew	TUC	+66891067293	Boonrutai kru@truecorp.co.th

7.2 2300 MHz

7.2.1 PTD informed the Meeting that currently the 2300 MHz band had not been assigned in Myanmar.

7.2.2 The Meeting took note of the situation and agreed to revisit this issue at the upcoming meetings when Myanmar has assigned the 2300 MHz band, if necessary.

7.3 2600 MHz

7.3.1 Thailand presented a paper on "Band Plan and Coordination Parameters for 2600 MHz Band" as appeared in Doc.JTC-3/T-17.

(i) Thailand gave the summary of the NBTC's proposal letter dated 29 November 2019 as follows:

- a) Depending on the 2600 MHz band plan Myanmar decided to use, there may be 2 cases for coordination: only TDD-TDD (if Myanmar decides to use band 41 (all TDD) and both TDD-TDD and TDD-FDD (if Myanmar maintains band 7 and band 38).
- b) Thailand proposed the coordination parameters for TDD-TDD case as follows:

Frequency Band (MHz)	Technology	Coordination Parameters	
		Signal Level	Defined distance from the border
2600 (2500-2690 MHz)	LTE/NR (synchronized)	-80.6 dBm/5 MHz measured at 3 m above ground level	0 km
		-96.6 dBm/5 MHz measured at 3 m above ground level	6 km
	LTE/NR (without synchronized)	-114.4 dBm/5 MHz measured at 3 m above ground level	0 km

- c) Thailand also proposed the following methods for network synchronization:

- i. Synchronize clock signal of base stations along the common border areas with the Global Positioning System (GPS) or other systems' signal that can be converted to GPS time scale.
 - ii. Use a common frame structure (TD-LTE Configuration 2).
- d) Thailand also proposed 3 possible options for TDD-FDD case as follows:

Options	Reference	Coordination Parameters	
		Signal Level	Defined distance from the border
1	Apply the coordination parameters from TDD-TDD case (without synchronized)	-114.4 dBm/5 MHz measured at 3 m above ground level	0 km
2	Example of a multilateral agreement between Austria, Croatia, Hungary and Slovenia	10.5 dB μ V/m/5 MHz (-134.9 dBm/5 MHz) measured at 3 m above ground level	0 km
3	A case study from an operator in China coordinated with Hong Kong	-116 dBm/5 MHz	At interfered base station

- e) Thailand invited Myanmar to consider the possible coordination parameters and network synchronization methods for TDD-TDD case and, if applicable, the possible coordination parameters for TDD-FDD case.
- (ii) Thailand further informed the Meeting as follows:
- a) Thailand had changed the band plan to all TDD since 28 December 2019;
 - b) The 2600 MHz band will be auctioned on 16 February 2020; and
 - c) The Office of the NBTC had issued a regulation regarding network synchronization methods for Thai Mobile Operators on 13 January 2020.

7.3.2 PTD presented a paper on "Information Exchange on 2600 MHz Band" as shown in Doc.JTC-3/M-18.

- (i) PTD informed the Meeting that Myanmar changed the band plan of 2600 MHz spectrum and adopts the band 41 (All TDD) and the frame structure.
- (ii) For the coordination parameters for 2600 MHz Band, PTD will make the stakeholder consultation and will update accordingly at the upcoming JTC meeting.

7.3.3 The Meeting took note of both sides' presentations and agreed on the followings:

- (i) as both sides now use band plan 41, only the coordination parameters for TDD-TDD case is necessary;
- (ii) the coordination parameters and network synchronization methods can be discussed and agreed on, as necessary, when both sides assign further frequency in this band;
- (iii) NBTC will notify PTD when there are mobile operators in the 2600 MHz band and PTD will also notify NBTC when there are further allocations in this band.

8 Broadcasting Service

8.1 Television Broadcasting Service

8.1.1 Myanmar presented about Television Broadcasting Service a paper on "Digital Terrestrial TV Broadcasting" as shown in Doc.JTC-3/M-19.

- (i) MRTV informed the Meeting that Myanmar uses frequency spectrum in VHF Band II 87.5 - 108 MHz for FM sound broadcasting, Analogue TV broadcasting use VHF Band III 174 - 230 MHz and UHF Band IV & V in the frequency range of 470 - 686 MHz. For the digital transmission, PTD allowed UHF Band IV & V in the spectrum of 470 - 686, in which 470 - 606 MHz for MRTV and 638 - 686 MHz to MWD.
- (ii) The Meeting was informed that the migration from Analogue to Digital Broadcasting has been done phase by phase from fiscal year (2012-2013) to (2017-2018). Currently, the total numbers of Digital TV station are 151

with the coverage of 88.87%. Myanmar plans for Analogue Switch Off tentatively in 2020.

- (iii) MRTV informed the Meeting about current DTTB transmission parameters of MRTV and MWD and FM frequency usage as follows:

MRTV	MWD
Gi	1/16, 112 μ sec,
Modulation	64 QAM
Bandwidth	8 MHz (Extended)
Bit Rate	32 Mbps
Required Raw C/N	15.5 dB
PLP	Single PLP
Code Rate	4/5
FFT Length	16k
Frequency usage	Multi frequency Network (MFN)
Gi	1/8
Modulation	64 QAM
Bandwidth	8 MHz
Bit Rate	26 Mbps
Required Raw C/N	12 dB
PLP	Single PLP
Code Rate	3/4
FFT Length	8k
Frequency usage	Multi frequency Network (MFN)

FM Frequency Usage

- VHF Band II ; 87 ~ 108 MHz
- Channel Bandwidth; 300 KHz
- FM broadcasters are MRTV, Thazin FM , City FM, Mandalay FM, Pyinsawaddy FM, Cherry FM, Shwe FM, Padamyar FM, FM Bagan.
 - MRTV FM 84 Stations
 - Thazin FM 50 Stations
 - City FM 1 Station (Only in Yangon)
 - Mandalay FM 9 Stations
 - Pyinsawaddy FM 7 Stations
 - Shwe FM 17 Stations
 - Cherry FM 20 Stations
 - Padamyar FM 17 Stations
 - FM Bagan 13 Stations

- (i) Myanmar shared current frequency usage, future frequency, location and output power (ERP) of 17 retransmitting stations which are located within 30Km from the border line. Detailed technical parameters also have been

presented in presentation. For the TV broadcasting, MRTV and other private broadcasters use the same station with site sharing. But only MWD broadcast in same area but different location. Within this coordination area, Thazin FM has 5 FM stations.

- (ii) MRTV informed the Meeting that digital transition was implemented since 2013. After that, migration process was carried on until now, there are total of 151 Digital retransmitting stations have already installed. Among of 258 retransmitting stations, 107 stations were left to transform to digital.

8.1.2 Thailand presented a paper on “Television Broadcasting Service” as appeared in Doc.JTC-3/T-20.

(i) The Meeting was informed on the following items:

- i. Steps to release 470 MHz for DTTB and 700 MHz for IMT in Thailand, including the tentative timeline of relevant processes;
- ii. 700 MHz spectrum assignment for IMT; and
- iii. Current status of the following items:
 - a) New Radio Frequency Plan for DTTB (470 - 694 MHz)
 - b) Compensation for 700 MHz Reframing
 - c) Implementation Plan

(ii) Thailand further informed that, new NBTC Notification on DTTB Frequency Plan to release 700 MHz has been published in the Government Gazette since November 25, 2019. The location, antenna characteristics, and transmitting power of the stations located along common border area between Thailand and Myanmar were not changed. The only change in the new DTTB Frequency Plan was frequency channel.

(iii) The overview of the new DTTB Frequency Plan could be summarized as follows:

- i. Frequency Plan of 168 DTV sites, consists of 39 main sites and 129 additional sites;
- ii. Use frequency channels 21-48 (470 – 694 MHz);
- iii. Channel Bandwidth is 8 MHz;

- iv. Infrastructure sharing between all MUXs; and
- v. DTTB Coverage is approximately 95.6% of households.

(iv) The new DTTB frequency plan and technical characteristics of 20 DTTB sites which are located along Thailand – Myanmar Common Border Area (30 km from the border line) are as follows:

No	Name	Type	Long	Lat	ht(m)	#1	#2	#3	#4	#5	Max ERP (kW)
1	Sai Yok (Khao Pa Ham)	A	99.158136	14.125748	80	33	37	41	30	27	0.5
2	Thong PhaPhum	A	98.670663	14.751217	70	38	42	46	34	24	0.5
3	SangkhlaBuri	A	98.444913	15.13977	100	38	42	46	34	24	2
4	Prachaub Khiri Khun	M	99.801300	11.90594	60	46	24	42	34	38	20
5	Thap Sakae	A	99.588250	11.41896	84	29	43	45	48	25	5
6	Chai Prakan	A	99.144830	19.62848	19	32	44	36	26	40	2
7	WiangHaeng	A	98.724010	19.52128	30	32	44	36	26	40	2
8	Mae Ai	A	99.342276	20.024309	45	47	31	35	28	39	0.5
9	Mae Hong Son (Doi Kong Mu)	M	97.957950	19.29755	64	37	41	27	30	33	1
10	Mae Hong Son (Huai Nang Pu)	A	98.034777	19.1065	50	37	41	27	30	33	1
11	Mae Sareang	A	97.944614	18.169806	82	47	31	35	28	39	1
12	Mae Fa Luang	A	99.667220	20.238833	25	47	31	35	28	39	0.5
13	Mae Sot	A	98.566522	16.732602	100	31	35	39	28	47	5
14	PhopPhra	A	98.695559	16.397134	70	31	35	39	28	47	0.5
15	Tha Song Yang	A	98.225902	17.226641	98	32	44	36	26	40	0.2
16	ThaSae	A	99.215555	10.835377	98	28	47	31	35	39	0.5
17	Sa Wi	A	98.931172	10.227609	55	28	47	31	35	39	0.5
18	PhaTo	A	98.775730	9.793820	52	27	30	37	41	33	0.5
19	Ranong	M	98.669486	10.028664	123	27	30	37	41	33	15
20	KraBuri	A	98.894400	10.481900	10	28	47	31	35	39	0.5

Note: ht(m) = Antenna height above ground level in meters

#1 -#5 =Channel for Multiplex#1 to Multiplex#5

8.1.3 Both Thailand and Myanmar agreed to confirmed the contact persons for television broadcasting service as exchanged in JTC-2 as shown below:

Myanmar	Mr. Bo Bo Tun Myanma Radio and Television Ministry of Information Email: kokyinaing@gmail.com Mr. Oakar Phy (Spectrum matters) Resource Management Division Posts and Telecommunications Department Email: oakarphyo89@gmail.com
Thailand	Mr. Supatrasit Suansook Broadcasting Technology and Engineering Bureau Office of NBTC Email: supatrasit.s@nbtc.go.th

8.1.4 Both sides agreed as follows:

- (i) Myanmar will submit information of coordinate of the TV stations in common border area (30 km from the border line);
- (ii) Both sides will determine the coordination area and coordination criteria as proposed in JTC-2 Meeting; and
- (iii) Both sides will report the results from the above mentioned actions to the JTC-4 Meeting.

8.2 Sound Broadcasting Services

8.2.1 Myanmar presented about Sound Broadcasting Service detailed in 8.1.1.

8.2.2 Thailand presented a paper on "Sound Broadcasting Services (Thailand)" as appeared in Doc.JTC-3/T-21.

- (i) Thailand informed the Meeting of current number of both main FM stations and trial FM stations located within 30 km from the borderline between Myanmar and Thailand. In summary, there are 15 main FM stations and 150 trial FM stations. The details are shown in the Tables below.

Main FM stations and their technical characteristics

No.	Station Name	Lat (N)	Long (E)	Freq. (MHz)	ERP (kW)	Ht (m)
1.	Chiang Rai-5	20.109242	99.886826	100.25	4	120
2.	Chiang Mai-2	19.940712	99.221855	89.25	4	80
3.	Mae Hong Son-1	18.168565	97.944550	90.50	4	50
4.	Mae Hong Son-2	19.106007	98.035717	99.50	4	55
5.	Mae Hong Son-3	19.292893	97.957134	102.00	4	40
6.	Mae Hong Son-4	19.106524	98.034692	104.00	4	60
7.	Tak-4	16.732457	98.566309	103.75	4	102
8.	Kanchanaburi-2	15.139853	98.444931	94.25	4	100
9.	Prachuap Khiri Khan-1	11.835090	99.800775	89.25	3	120
10.	Prachuap Khiri Khan-5	11.830301	99.779749	100.25	2	120
11.	Prachuap Khiri Khan-6	11.835333	99.800833	102.25	3	120
12.	Prachuap Khiri Khan-7	11.908539	99.796559	106.75	4	60
13.	Ranong-1	10.028333	98.670192	100.50	4	48
14.	Ranong-2	10.023910	98.668675	105.75	4	30
15.	Ranong-3	10.023910	98.668675	107.25	3.6	100

Note: Lat (N) is latitude in degree North

Long (E) is Longitude in degree East

Freq. (MHz) is frequency in MHz

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 m.

Trial FM stations

No.	Province Name	No. of Trial FM Stations
1.	Chiang Rai	40
2.	Chiang Mai	26
3.	Mae Hong Son	8
4.	Tak	19
5.	Kanchanaburi	8
6.	Ratchaburi	2
7.	Phetchaburi	1
8.	Prachuab Khiri Khan	33
9.	Chumphon	3
10.	Ranong	10
Total		150

Note: Information as of January 17, 2019

8.2.3 The Meeting took note of the information presented by both sides and agreed to the following contact persons for sound broadcasting services as follows:

Myanmar	Mr. Bo Bo Tun Myanma Radio and Television Ministry of Information Email: kokyinaing@gmail.com Mr. Oakar Phyo Resource Management Division Posts and Telecommunications Department Email: oakarphyo89@gmail.com
Thailand	Mr. Uttachai Manmontri Broadcasting Technology and Engineering Bureau The Office of the National Broadcasting and Telecommunications Commission (NBTC) Email: uttachai.m@nbtc.go.th

8.2.4 Both sides agreed to have further actions as follows:

- (i) To determine the coordination area;
- (ii) To develop database template for existing FM station within the coordination area;
- (iii) To determine coordination criteria and procedure for exchanging information and conducting interference analysis for new FM station within the coordination area; and
- (iv) To report the results from the above mentioned actions to the JTC-4 Meeting.

9 New Interference Cases along Thailand-Myanmar Common Border Areas

There was no new interference case reported at this JTC Meeting.

10 Common Frequency for Thailand-Myanmar for Use during Emergency Situation

10.1 PTD presented a paper on “Common Frequency for Thailand- Myanmar for use during Emergency Situation” as shown in Doc.JTC-3/M-22.

- (i) PTD explained about the current use of PPDR spectrum in Myanmar broadband and is considering that part of the frequency range of 694-894 MHz for PPDR requirements in accordance with ITU-R Resolution 646 (Rev. WRC-15).
- (ii) PTD explained about the current status of frequency allocation in Myanmar in the frequencies which were proposed by Thailand as common frequency for use during emergency situation.
- (iii) PTD explained that Myanmar is considering HF and VHF bands for PPDR narrowband based on the current utilization, ASEAN Framework and International Practice and will update in the upcoming JTC Meeting or in other alternative means.
- (iv) PTD proposed the common frequency for Thailand- Myanmar for broadband PPDR as per ITU-R resolution 646 (Rev. WRC 15)

10.2 Thailand presented a paper on “Common Frequency for Thailand – Myanmar for Use during Emergency Situation” as appeared in Doc.JTC-3/T-23.

10.2.1 Thailand informed the Meeting of the PPDR Spectrum under International Cooperation Framework are as follows:

1. PPDR Spectrum under United Nations Framework

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

2. PPDR Spectrum under ASEAN Framework

Frequency (MHz)	Bandwidth (kHz)	Usage
3.122, 3.351, 3.815, 3.925, 3.950	2.7	Calling channel
6.314, 6.3147, 6.4501, 6.771		Communication channel
11.202, 11.217, 11.230		
14.270, 14.275, 14.293, 14.303, 14.325		

10.2.2 Thailand also shared Thailand's agreements of common frequency with neighboring countries in HF VHF and UHF band as follows:

1. Thailand – Lao PDR HF and VHF band

Frequency (MHz)	Bandwidth	Usage
3.341, 3.815, 3.825	3 kHz	Calling channel
6.314, 6.341.7, 6.450.1, 6.771		Communication channel
163.175	25 kHz	

2. Thailand – Cambodia HF VHF and UHF band

Frequency (MHz)HF	Frequency (MHz)VHF and UHF	Bandwidth	Usage
3.341, 3.815, 3.825	158.025	(2.7 kHzFor HF) (25 kHzFor VHF and UHF)	Calling channel
6.314, 6.31417, 6.4501	458.100		Communication channel
11.202, 11.217	458.175		
14.270, 14.275			

3. Thailand – Malaysia HF and UHF band

Frequency (MHz)HF	Frequency (MHz)UHF	Bandwidth (KHz)	Usage
3.122, 3.341, 3.815, 3.925, 3.950	440.9750	12.5/25	Calling channel
6.3140, 6.3417, 6.4501, 6.7710	443.9750		Communication channel
11.202, 11.217, 11.230	444.0875		
14.270, 14.275, 14.293, 14.303, 14.325			

10.2.3 Thailand invited Myanmar to consider the possibility of establishing common frequency between Thailand - Myanmar for use during emergency situation from the lists of frequency as shown in 10.2.1.

10.3 NBTC further informed the Meeting that the frequency 814-824/859-869 MHz is designated for by Broadband PPDR in Thailand and that frequency is not necessary to be a common frequency between Thailand and Myanmar.

10.4 NBTC also confirmed that the common frequency proposed by Thailand for use during emergency situation is to be reserved only for those services and not to be allocated to any dedicated agency.

10.5 The Meeting took note of the both sides' presentations and will further discuss this issue in the next JTC Meeting.

11 Any Other Matter

There is no any other matter raised at this JTC-3 Meeting.

12 Date and Venue of the Next JTC Meeting

The Meeting agreed that the next JTC meeting will be held in Thailand. The Meeting date and venue will be confirmed through correspondence.

13 Consideration and Adoption of Agreed Minutes of the Meeting

The Meeting considered and adopted the Agreed Minutes of the 3rd Joint Technical Committee on Coordination and Assignment of Frequencies along Myanmar-Thailand Common Border Meeting held in Bagan, Myanmar from 14 to 16 January 2020.



16/1/2020

Mr. Zar Ne Aung



AM. Thanapant Raicharoen, Ph.D.

Deputy Director General
Posts and Telecommunications
Department

Deputy Secretary General
Office of the National Broadcasting and
Telecommunications Commission

MYANAMR

THAILAND

Date : 16 Jan 2020
Venue : Bagan, Myanmar

Annex 1

Minutes of Meeting among Myanmar and Thai Mobile Operators

Interference Case on CAT Telecom 850 MHz

1. 850MHz interference for CAT was discussed among CAT, MPT and MECTel and agreed as follows.
 - a. It is agreed that MPT authorize MECTel to directly communicate the interference issue with CAT keeping PTD ,NBTC and MPT in the loop.
 - b. Since MECTel has only 2 sites in Tachileik, it is also agreed to address the existing case as one-off without creating a separate coordination process.
 - c. As a general process, MECTel will take actions to reduce interference for CAT. Afterwards CAT will conduct drive test to verify the outcome.
 - d. For the existing interference case, MECTel will complete 1st round of mitigation actions not later than 28/02/2020 and will inform CAT accordingly.

T.R ✓

Annex 2

Minutes of Meeting among Myanmar and Thai Mobile Operators

Coordination Zone in Hpayathonesu-Three Pagodas Border Area

1. Regarding Hpayarthonesu – Three Pagodas border, coordination parameters are agreed as follows. Coordination parameters for all other border areas remain as agreed in JTC-2.
 - a. Referring to the map below white lines serve as (0) km for Thai operators whereas red line serves as (0) km for Myanmar operators.
 - b. (N) km lines for Thai and Myanmar operators will be measured from these white lines and red line respectively. N is equal to 4 km.
 - c. Radio signal strength threshold values at (0) km are increased from the values agreed in JTC-2 whereas threshold values at (N) km are maintained as per agreed values in JTC-2. They are summarized in table below.
 - d. Agreed values may be revisited between concerned MNOs if necessary in future.



Technology	Signal Strength Threshold Values for Hpayarthonesu – Three Pagodas agreed in JTC-3	Signal Strength Threshold values for all other border areas as agreed in JTC-2
GSM	-80 dBm @ (0) km -102 dBm @ (N) km (N = 4)	-82 dBm @ (0) km -102 dBm @ (N) km
UMTS	-80 dBm @ (0) km -102 dBm @ (N) km (N = 4)	-82 dBm @ (0) km -102 dBm @ (N) km
LTE	-87 dBm @ (0) km -114 dBm @ (N) km (N = 4)	-94 dBm @ (0) km -114 dBm @ (N) km

J.R.H

Annex 3

Minutes of Meeting among Myanmar and Thai Mobile Operators

Efficiency and Effectiveness of Coordination Activities

1. Following MNOs represent respective countries in discussing this topic.

Thailand	Myanmar
AWN	MPT
DTN	Mytel
TUC	OML
CAT	TML
TOT	--

2. Coordination between OML and AWN/DTN was discussed and recorded as follows.
 - a. OML noted cooperation has been good so far. OML suggested to set up a task force with members from both sides to conduct real-time field testing and optimization.
 - b. AWN replied that it has been using such a task force approach with Laos. Approach for Myanmar is same as for Malaysia. There're pros and cons for each approach. If signal levels for 0km and 4km are provided clearly, optimization efforts can be more effective. AWN still recommend to follow existing process but with improvement in info exchange details.
3. Coordination between MPT and DTN was discussed and recorded as follows.
 - a. DTN is only using 3MHz for LTE in 1800MHz and the majored network expansion for LTE will be relied on TOT LTE 2300MHz partnership in future.
 - b. MPT and DTN agree to follow up Tachileik cases from Nov under the existing coordination process.
4. MNOs discussed how to fulfill 120-days timeline as per agreed Coordination Process in JTC-2:
 - a. OML vs AWN: It is agreed that AWN will provide more details after mitigation actions (eg, MRR, MDT). Pending cases will be grouped into three priority levels.

J.P. W

- First priority will include 16 cases beyond (N) km line. Second priority will include 13 cases exceeding 120-days aging. Third priority will include 20 new cases.
- b. TML vs TUC: There is no case exceeding 120-days aging yet. It is agreed to expedite the actions in order to fulfill the timeline.
 - c. MPT and Mytel so far have no coordination case aged for 120 days.
5. MNOs explored new ideas to improve efficiency and effectiveness of coordination activities.
- a. Use of MRR (Measurement Result Recording) data instead of conventional drive test data to identify the interferers was considered. However, it was concluded as a non-viable solution due to its practical limitations.
 - b. It is agreed to stick with the existing coordination process but to apply an updated template for better data clarity.
 - c. Updated template is given in **Annex 4**.

T.R H

Annex 4



Welcoming Address

by

Mr. Myo Swe

**Director General of Posts and Telecommunications Department,
Ministry of Transport and
Communications, Republic of the Union of Myanmar**

at

**"The 3rd Joint Technical Committee on Coordination and
Assignment of**

**Frequencies along Thailand - Myanmar Common Border Meeting
(JTC-3)"**

14 January 2020

Bagan, Myanmar

Mr. Saneh Saiwong, Executive Director, Delegates from NBTC,

Distinguished Guests Ladies and Gentlemen,

Mingalarbar.

Very Good Morning to you all.

First of all, I would like to welcome you all to the 3rd Joint Technical Committee on Coordination and Assignment of Frequencies along Thailand - Myanmar Common Border Meeting during 14 - 16 January

2020 in Bagan, Mandalay Region, Republic of the Union of Myanmar. It is my great honor to deliver the welcoming address at this important meeting.

The Bagan, heart of Myanmar is well-known for its location, the most unique Archeological Site of South East Asia.

The meeting venue, Bagan Umbra Hotel is located in Old Bagan; the Ancient capital of the Burmese Empire. Surrounded by more than 4000 ancient temples and pagodas, I am assure that you will be enchanted by its breathtaking views.

As you may be aware that Myanmar's ancient city of Bagan has been approved for inclusion on UNESCO's World Heritage on July 6, 2019 at a meeting in Baku, Azerbaijan.

This meeting provides us with an opportunity to bring together a vital cross-section of administrations and industry players committed to promote bilateral cooperation that contributes to the effective assignment of frequencies along Thailand – Myanmar common border. Sharing experiences and updating information are useful for both of us.

For the effective implementation of the 2nd JTC meeting decision, I noted that there will be detailed discussion on the technical cooperation and exchange of the updated information from both sides, specifically in the bands of 850, 900, 1800, 2100, ,2300, 2600

MHz, and to resolve the frequency interference problems along the common border areas.

In addition, I am very happy to see here today representatives from Myanmar broadcasting sector and would like to express my thanks to your team for joining this meeting. This is an appropriate time to initiate and discuss broadcasting issues between Myanmar and Thailand regard to Television broadcasting service and Sound broadcasting service. And I believe to continue to strengthen our cooperation in broadcasting sectors between the two countries.

Distinguished Guests Ladies and Gentlemen,

In the next few days, I believe that 3rd JTC meeting will find the best solutions to achieve the satisfactory results for the effective spectrum usage between the two countries. I am sure that both sides will do their best to find out the suitable technical solutions according to the agreed coordination parameters and criteria for some sites which still have interference. I wish the participants all the best for this meeting and hope this will bear fruitful discussions on the effective assignment of frequencies along Thailand –Myanmar common border.

And then, let me express my sincerely thanks to all concerned persons for the successful joint measurement for the follow up case of 2nd JTC (PEA's interference case and 850 MHz Band case). By

doing this working together, we got the useful results to be able to resolve this issue.

I strongly believe that in this meeting we will not only discuss about the interference issues but discuss also about the spectrum policy matters for the current and future to be effective and efficient spectrum usage for our two countries.

Before my conclusion, I would like to thank once again NBTC team and local secretariat team for your coordination and effort you have put for organizing and arrangement for the meeting. And then, please feel free contact to our team for your assistant and support for your work during your stay.

In conclusion, I wish you all the fruitful meeting and enjoyable time in Bagan and; I will look forward to seeing you again soon.

Thank you very much.

***The 3rd Joint Technical Committee on Coordination and Assignment of Frequencies
Along Thailand - Myanmar Common Border Meeting (JTC-3)
14th –16th January 2020, Myanmar***

Paper reference : JTC-3 / T – 05
Contribution by : Secretariat
Subject : Agenda of Plenary

1. Opening Remarks
2. Reciprocal Remarks
3. Adoption of Agenda and Working Arrangements
4. Exchange of Information
 - 4.1 Myanmar Regulatory Update
 - 4.2 Thailand Regulatory Update
5. Result from Joint Drive Test for interference investigation
6. Interference cases
 - 6.1 Thailand's air traffic control (AEROTHAI)
 - 6.2 Thailand's Provincial Electricity Authority (PEA)
 - 6.3 Interference cases on 850 MHz band
7. Band plan and coordination parameters
 - 7.1 900 1800 2100 MHz
 - 7.2 2300 MHz
 - 7.3 2600 MHz
8. Broadcasting Service
 - 8.1 Television Broadcasting Service
 - 8.2 Sound Broadcasting Services
9. New Interference Cases along Thailand-Myanmar Common Border Areas (if any)
10. Common Frequency for Thailand - Myanmar for Use during Emergency Situation
11. Any Other Matter
12. Date and Venue of the Next JTC meeting
13. Consideration and Adoption of Agreed Minutes of the Meeting
14. Signing of Agreed Minutes of the 3rd JTC Meeting
15. Closing of the 3rd JTC Meeting

***The 3rd Joint Technical Committee on Coordination and Assignment of Frequencies
Along Thailand-Myanmar Common Border Meeting (JTC-3)
14th -16th January 2020, Myanmar***

Paper reference	:	JTC-3 / T-06
Contribution by	:	Secretariat
Subject	:	Working Arrangement

Date	Time	Activities
14 January 2020 (Tue)	09:00-09:30	Registration
	09:30-10:00	Opening Session <ul style="list-style-type: none"> ➤ Welcome Address by the Head of Myanmar Delegation ➤ Reciprocal Address by the Head of Thai Delegation ➤ Adoption of Agenda ➤ Adoption of Working Arrangement
	10:00-10:30	Photography Session / Coffee Break
	10:30-12:30	Plenary Session 1 <ul style="list-style-type: none"> ➤ Exchange of Information <ul style="list-style-type: none"> • Myanmar Regulatory Update • Thailand Regulatory Update ➤ Result from Joint Drive Test for Interference Investigation ➤ Interference cases <ul style="list-style-type: none"> • Thailand's air traffic control (AEROTHAI) • Thailand's Provincial Electricity Authority (PEA)
	12:30-14:00	Lunch
	14:00-15:30	Plenary Session 2 <ul style="list-style-type: none"> ➤ Interference cases <ul style="list-style-type: none"> • Interference cases on 850 MHz band ➤ Band plan and coordination parameters <ul style="list-style-type: none"> • 900, 1800 and 2100 MHz
	15:30-15:45	Coffee Break
	15:45-17:00	Plenary Session 3 <ul style="list-style-type: none"> ➤ Band plan and coordination parameters <ul style="list-style-type: none"> • 2300 MHz • 2600 MHz

***The 3rd Joint Technical Committee on Coordination and Assignment of Frequencies
Along Thailand-Myanmar Common Border Meeting (JTC-3)***
14th -16th January 2020, Myanmar

Date	Time	Activities
Day 2 15 January 2020 (Wed)	09:00-11:00	Plenary Session 4 <ul style="list-style-type: none"> ➤ Broadcasting Service <ul style="list-style-type: none"> • Television Broadcasting Service • Sound Broadcasting Service
	11:00-11:30	Coffee Break
	11:30-12:30	Plenary Session 5 <ul style="list-style-type: none"> ➤ New Interference Cases along Thailand-Myanmar Common Border Areas (if any) ➤ Common Frequency for Thailand-Myanmar for Use during Emergency Situation ➤ Any Other Matter ➤ Date and Venue of the Next JTC meeting
	12:30-14:00	Lunch
	14:00-15:30	Preparation of Agreed Minutes of the Meeting
	15:30-15:45	Coffee Break
	15:45-17:00	Preparation of Agreed Minutes of the Meeting
Day 3 16 January 2020 (Thurs)	09:00-10:30	Plenary Session 6 <ul style="list-style-type: none"> ➤ Consideration and Adoption of Agreed Minutes of the 3rd JTC Meeting
	10:30-10:45	Coffee Break
	10:45-12:00	<ul style="list-style-type: none"> ➤ Signing of Agreed Minutes of the 3rd JTC Meeting ➤ Closing of the 3rd JTC Meeting
	14:00-17:00	Excursion

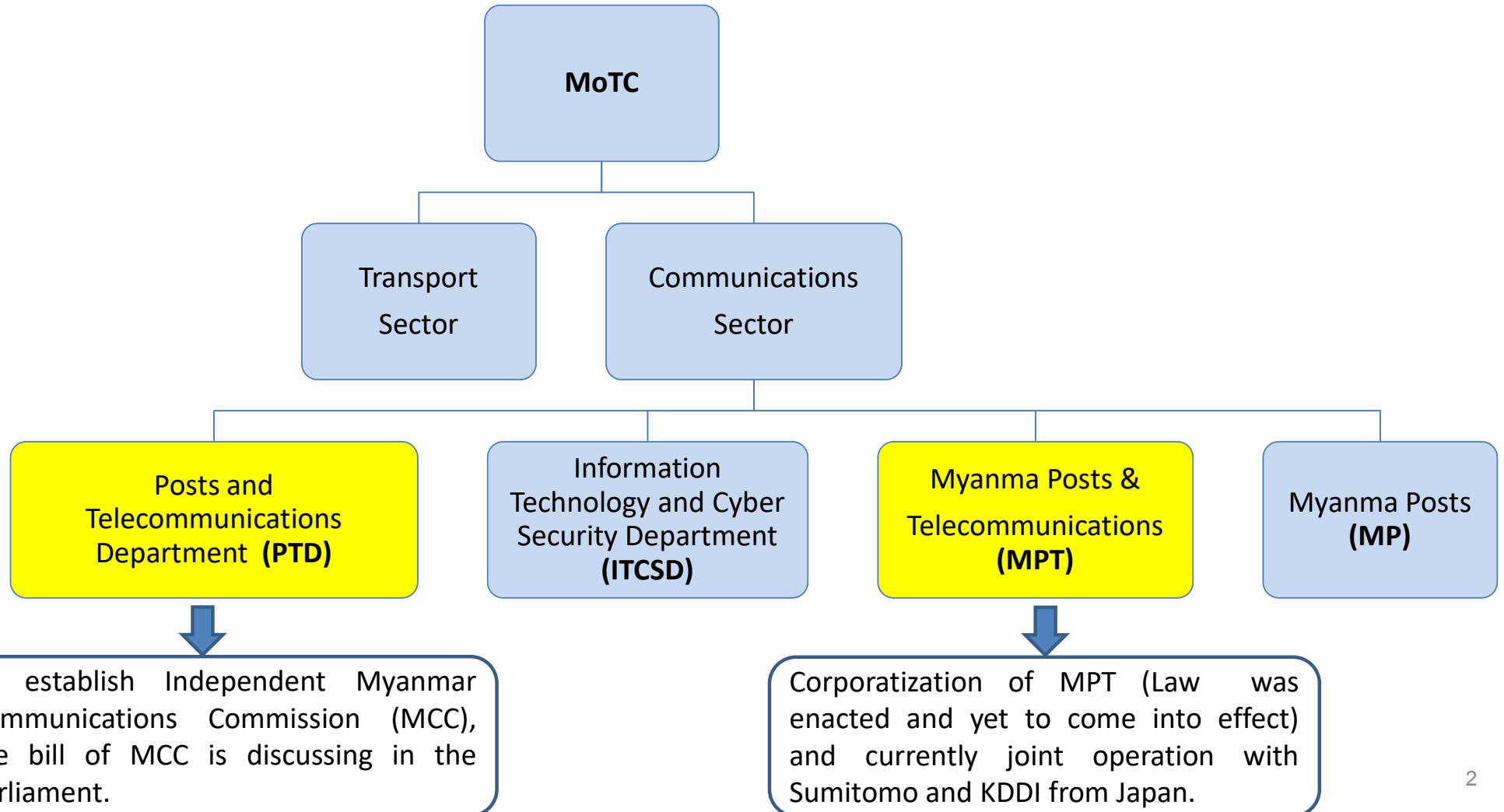


REGULATORY UPDATE

Seint Seint Aye
Director
Posts and Telecommunications Department



Institution Reform of Telecom Sector in Myanmar



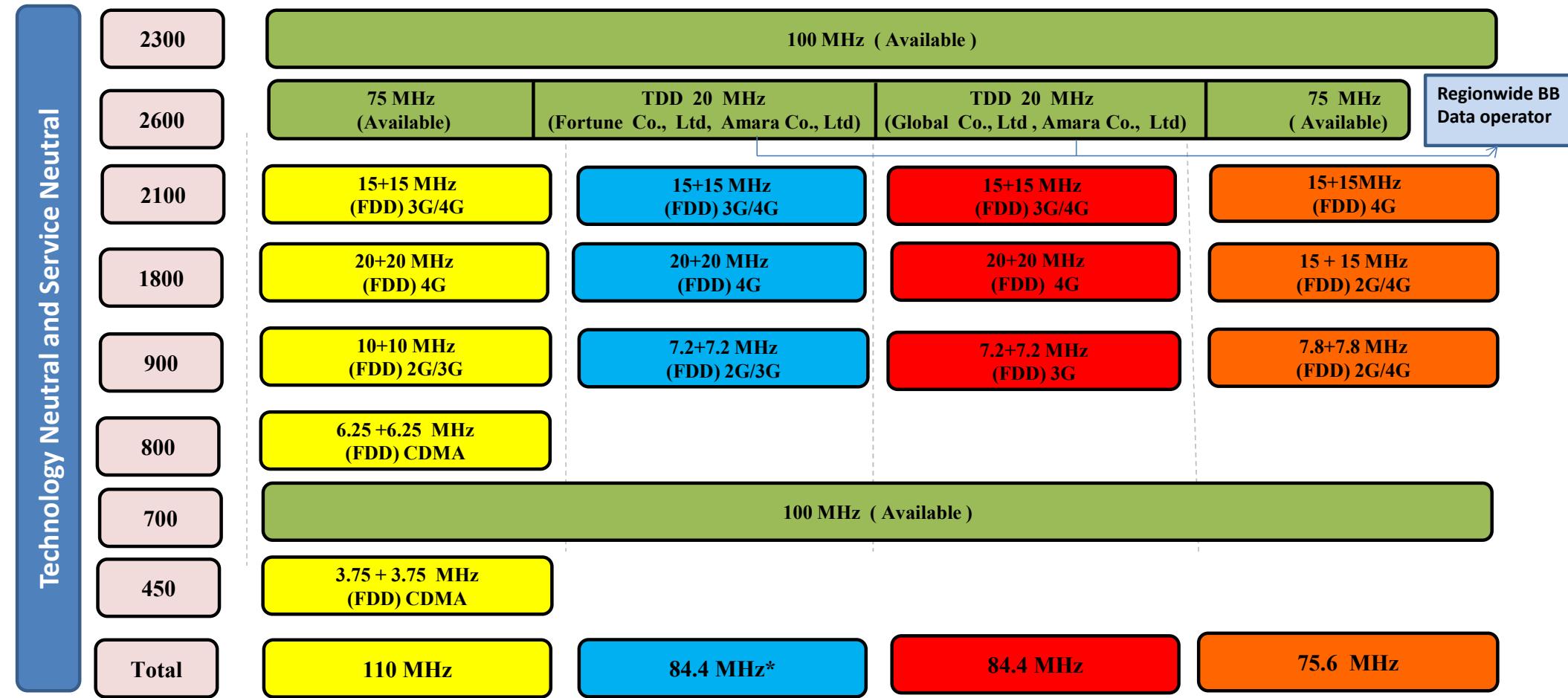
Other Regulatory Updates

- | | |
|-------------------------------------|---|
| Adoption of new rules/policy | <ul style="list-style-type: none">▪ Drafting the Guidelines on Mobile Virtual Network Provider (MVNP) in Myanmar▪ Drafting the Regulations on Right of Ways (RoW)▪ White Paper-Facilitating Faster Broadband and 5G Adoption in Myanmar▪ Adoption of Universal Service Strategy (As a pilot project, implementation of basic telecommunications services in Minbya and Ann Townships in Rakhine State)▪ Adopted “Rule for the establishment of Universal Service Fund, USF” |
| Licensing Regime | <ul style="list-style-type: none">▪ 4 license categories: NFS(I), NS, NFS(C) and AS▪ Total Number of Licences: > 200 |



MHz

Current Status of IMT Spectrum Allocation in Myanmar





Mobile Technology Penetration in Myanmar

Mobile Technology	Subscribers	Penetration Rate
2G	16.4 Million	21.07%
3G	23.8 Million	30.54%
4G	37.7 Million	48.39%
Total	77.9 Million	

4G Penetration Status

Overall : 8.4 million users in 2018
38 million users in 2019

Source : Operators reports to PTD, January 2020



5G Testing in Myanmar

No.	Operator	Frequency Band	Location	Timeline	Speed	Latency	Remark
1.	Telecom International Myanmar Co., Ltd	C Band(3300-3400 MHz)	Yangon	(1.6.2019) to (31.8.2019)	1.667 Gbps DL 0.115 Gbps UL	-	-
				(1.9.2019) to (31.12.2019)		-	-
2.	Ooredoo Myanmar Limited	C Band(3300-3400 MHz)	Yangon	(1.8.2019) to (31.10.2019)	1.775 Gbps DL 0.227 Gbps UL	3.5ms(User Plane (One-Way)) 15 ms(Control Plane)	-
		2600 MHz (2500-2570 MHz)	NayPyiTaw				
		2600 MHz (2500-2570 MHz)	NayPyiTaw	(1.11.2019) to (30.11.2019)	1.02 Gbps DL 0.15 Gbps UL	3.5ms(User Plane(One-Way)) 15 ms(Control Plane)	

PTD Consultation Papers – Spectrum Roadmap Review (2019)

Ready for 5G

4G Development

4G Enhancement and Evolution



MINISTRY OF TRANSPORT AND COMMUNICATIONS
POSTS AND TELECOMMUNICATIONS DEPARTMENT

CONSULTATION PAPER Review of IMT Aspects of Myanmar's Spectrum Roadmap 8 March 2019

1. INTRODUCTION

1.1 Background

On 8 April 2016, following extensive public and industry consultation the then Ministry of Transport and Communications released a "**Spectrum Roadmap: Meet the Needs Over the Next 5 Years**" ("2016 Spectrum Roadmap"). It is available at <https://www.motc.gov.mm/my/search/node/Spectrum%20Roadmap>.

As a little more half of this five year period the Spectrum Roadmap has passed, the Post and Telecommunications Department ('PTD') has decided that it is important to assess its appropriateness going forward and what changes (if any) are needed. Importantly there have been major technological changes affecting spectrum management including but not limited to the acceleration of widespread 4G deployment, commencement of 5G globally and the upcoming World Radio Conference (WRC-19). It is on these IMT spectrum management issues that this Consultation Paper is focused.

More generally Myanmar could advance in regional comparisons and support the development of the country's digital economy if it was to allocate additional spectrum to wireless broadband use.

An ITU study entitled *The economic contribution of broadband, digitization and ICT regulation*,¹ released in late 2018, provides additional evidence of the contribution of broadband and digital transformation to the economy and the impact of institutional and regulatory variables to the development of the digital ecosystem. The economic benefits accruing to emerging markets like Myanmar of increases in mobile broadband penetration and overall improvements in a range of sector measures (ie digitalisation²) are even greater (see Exhibit 1 over).

¹ See www.itu.int/en/ITU-D/Regulatory-Market/Documents/FINAL_1d_18-00513_Broadband-and-Digital-Transformation-E.pdf

² The digital ecosystem development index was based on 64 indicators, for 75 developed and developing countries and emerging economies and includes inter alia institutional and regulatory pillars, connectivity, infrastructure, competition, digital human capital and digital industries. See ITU study, page 19.

On IMT Spectrum Roadmap responses from:

- MPT, Telenor, Ooredoo and Mytel
- Frontiir and Global Technology
- Intelsat, Asiasat and AVIVA
- Ericsson and Huawei
- Others



MINISTRY OF TRANSPORT AND COMMUNICATIONS
POSTS AND TELECOMMUNICATIONS DEPARTMENT

CONSULTATION PAPER Myanmar's IMT and 5G Spectrum Roadmap preliminary positions 25 June 2019

1. INTRODUCTION

1.1 Background

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

Earlier this year as three years had passed since the release of Spectrum Roadmap the Post and Telecommunications Department ('PTD') decided that it is important to assess its appropriateness of the 2016 Spectrum Roadmap going forward and what changes (if any) are needed especially in relation to IMT spectrum.

On 8 March 2019, the PTD released a Consultation Paper entitled *Review of IMT Aspects of Myanmar's Spectrum Roadmap* for which public comments were due on 8 April 2019. The PTD is pleased to advise that some 17 responses were received including mobile network operators (MNOs), regional wireless broadband providers, other Ministries, vendors and other industry stakeholders. Prior to this the PTD released a paper in January 2019 on the *Spectrum Optimisation of the 850 MHz band* in respect of which public comments were due

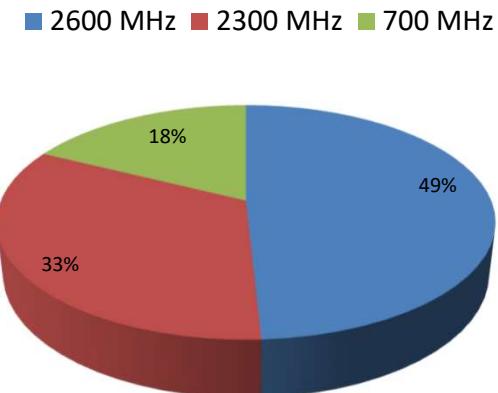


PTD's Future IMT Spectrum

- In June 2019, PTD released public consultation document for an IMT Spectrum Roadmap Review in order to review on the need for additional spectrum capacity bands including **5G candidates band**.

Frequency Band	Tentative Timeline for Spectrum Release
2600 MHz	2020
2300 MHz	2020
3.5 GHz	2020
Optimization of 850 MHz	2020
700 MHz	2021

Smart Phone Penetration of future IMT Spectrum in Myanmar



- GSMA roadmap for C Band in ASEAN (2019) mentioned that there is spectrum usage for radar and radio location services in below 3.4 GHz band.
- PTD investigated the spectrum usage in C-band with the related organizations and found that there is no usage for radar and radio location services in that band. More spectrum in Cband can be allocated.



Spectrum Recall in 700 MHz Spectrum

Amendment of Technical Specifications for Short Range Devices (SRD)

Frequency Range	Maximum Field Strength/ RF Output Power	Typical Application Types
470-806 MHz	≤ 10 mW (ERP)	Wireless Microphone



Frequency Range	Maximum Field Strength/ RF Output Power	Typical Application Types
470-702 MHz	≤ 10 mW (ERP)	Wireless Microphone
804-806 MHz	≤ 10 mW (ERP)	Wireless Microphone

- In order to allocate 700 MHz Band for mobile operators, PTD announced in the newspapers and official website that the importation of wireless microphone with the range which includes (703-803 MHz) will no longer be legal.



Common Frequency for Thailand-Myanmar for Use During Emergency Situation

PPDR Spectrum in Myanmar

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

Proposal of Common Frequency for Thailand- Myanmar for Broadband PPDR

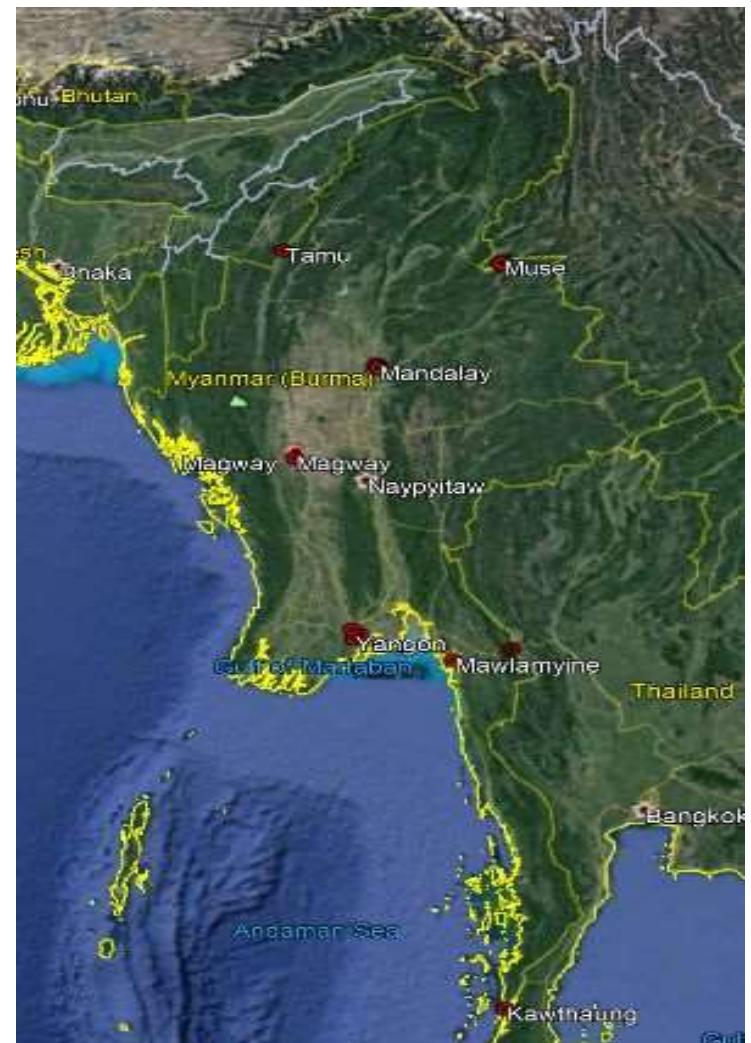
Myanmar would like to propose the common frequency for Broadband PPDR in the frequency range of 694-894 MHz and 406-403 MHz between Thailand- Myanmar.



Fixed Monitoring Stations' location in Myanmar

No	Fixed Monitoring Station
1	Yangon TypeI, Toekaungalay
2	Yangon TypeII, Ahlone
3	Yangon Type II, Shwepyithar Station
4	Mandalay Type I, Pyigyitagon
5	Mandalay TypeII, Inland Water Dept.
6	Mandalay Type II, Yinpyan Station
7	Myawaddy Type I
8	Kawthaung Type I
9	Tamu Type I
10	Mawlamyine TypeI (Ongoing)
11	Muse TypeI (Ongoing)
12	Magway TypeI(Ongoing)

Type I (9kHz to 8GHz)
Type II (9kHz to 3GHz)





Thank You



The Republic of the Union of Myanmar

Myanmar Broadcasting Industry Status

Date : 14-Jan-2020



Country profile

- Situated in the southeastern region of the Asian continent.
- Has an area of about 261,228 square miles and an estimated population of about 54 million people.
- The capital city of the country is Naypyitaw .
- Myanmar is bordered by a total of five countries, **Bangladesh , India , Laos , Thailand and China .**





TV Broadcasters



National Broadcaster; TV and Radio



MWD Broadcaster TV and Radio



Private Broadcaster joint ventured with MRTV,
TV , DTH & FM



Private Broadcaster joint ventured with MRTV,
TV, DTH & FM



Broadcasters in Myanmar

❖ MRTV

- Analogue TV terrestrial broadcasting 1980
- TV System NTSC-M in Color.
- Analogue Remote Stations 258 retransmitting stations
- Coverage 92.7% of population
- Digital TV terrestrial broadcasting 2013
- Digital Remote Stations 151 retransmitting stations
- Standard DVB-T2
- Coverage 88.7% of population.
- In 2008, DVB-T standard was adopted as National Standard



MRTV current status

- MRTV as a National Broadcaster, plan to transform digital according to the ITU and ASEAN guide lines. Ministry of Information is responsible for country's ASO projects.
- DVB-T2 standard is adopted. Transmission standard is MPEG-4 SD. Nowadays, there are 17 free to air programs, Sooner, there will be one additional education FTA program in MRTV network.
- Analogue Switch-off (ASO) has planned in 2020 according to ASEAN guidelines.
- MRTV program will be transmitted in HD format on 15th February 2020. Although among of 258 stations, 151 stations has been installed DVB-T2 transmitters , there will be left of 107 stations need to migrate to digital. MRTV is trying to get 100 % of digital coverage , the rest of the analogue stations will be migrated to digital . Otherwise, MRTV has plan to transmit in direct to home platforms to fulfill 100% of coverage.



MRTV's Digital Migration

❖ Digital Transmission

- Transition from analog to digital was implemented as follow:

▪ Fiscal Year 2012 – 2013	4 Stations
▪ Fiscal Year 2013 – 2014	22 Stations
▪ Fiscal Year 2014 – 2015	69 Stations
▪ Fiscal Year 2015 – 2016	50 Stations
▪ Fiscal Year 2016 – 2017	2 Stations
▪ Fiscal Year 2017 – 2018	4 Stations
Total	151 Stations

- ❖ Up to now, there are altogether 151 stations with the coverage of 88.7%.



MRTV's Plan

- Although among of 258 stations, 151 stations has been installed DVB-T2 transmitters , there will be left of 107 stations need to migrate to digital. MRTV is trying to get 100 % of digital coverage , the rest of the analogue stations will be migrated to digital .
- On the other hand , MRTV has plan to transmit in direct to home platforms to fulfill 100% of coverage.



Programs in MRTV

- There are 17 FTA Programs in MRTV's multiplex, namely;
- MRTV , MITV, MRTV Entertainment , NRC , Farmer , Hluttaw, MRTV Sport , MRTV-4, Channel 7, 5 Plus , MNTV, Channel 9, Mizzima TV, DVB Channel , Channel -K, Fortune TV and Ytv. Transmission Parameters for DVB-T2 network using multi-frequency are as follows;





Broadcasters in Myanmar

❖ Myawaddy Television (MWD)

- Myawaddy Television have started analog transmission since 1995. Now, 8 sites are transmitting MWD channel while another 14 sites are transmitting MWD Documentary and MWD Shopping channel in analog format.
- In 2012, Myawaddy Television also broadcasted DVB-T in which 7 Digital TV programs and one radio program from 13 remote stations.
- All migration processes for ASO-DSO plan are already done and will be followed by guidance and policy of government.
- UHF band IV & V is currently used for DVB-T transmission and migration plan from DVB-T to DVB-T2 is estimated to be done before 1st April, 2020.



MWD's Digital Migration

- Myawaddy Television have started analog transmission since 1995. Now, 8 sites are transmitting MWD channel while another 14 sites are transmitting MWD Documentary and MWD Shopping channel in analog format.
- All migration processes for ASO-DSO plan are already done and will be followed by guidance and policy of government.
- UHF band IV & V is currently used for DVB-T transmission and migration plan from DVB-T to DVB-T2 is estimated to be done before 1st April, 2020.
- Started 13 high powered stations in March, 2012. (DVB-T Standard)
- In 2012-2013 fiscal year, additional 5 low powered stations project was implemented.
- In 2013-2014 fiscal year, another 6 low powered stations were finished.
- In 2015-2016 fiscal year, another 7 transmitter stations were started on air.
- Total number of currently running digital transmitter stations – 31 Stations.
- From 2018-2019 fiscal year to 2027-2028, it will be implemented another 122 retransmitting stations and total number of digital transmitting stations will be reached up to 153. Estimated coverage area of population is 85%.



➤ Programs in MWD Digital Network



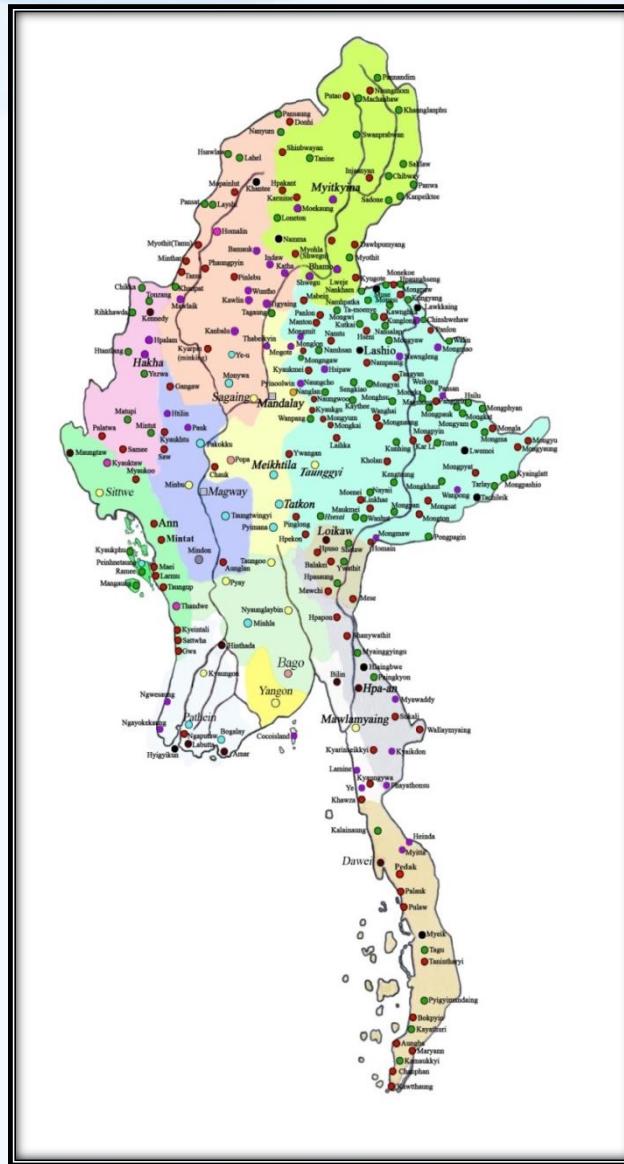
➤ Thazin FM

FM Transmission has started since March, 2014.

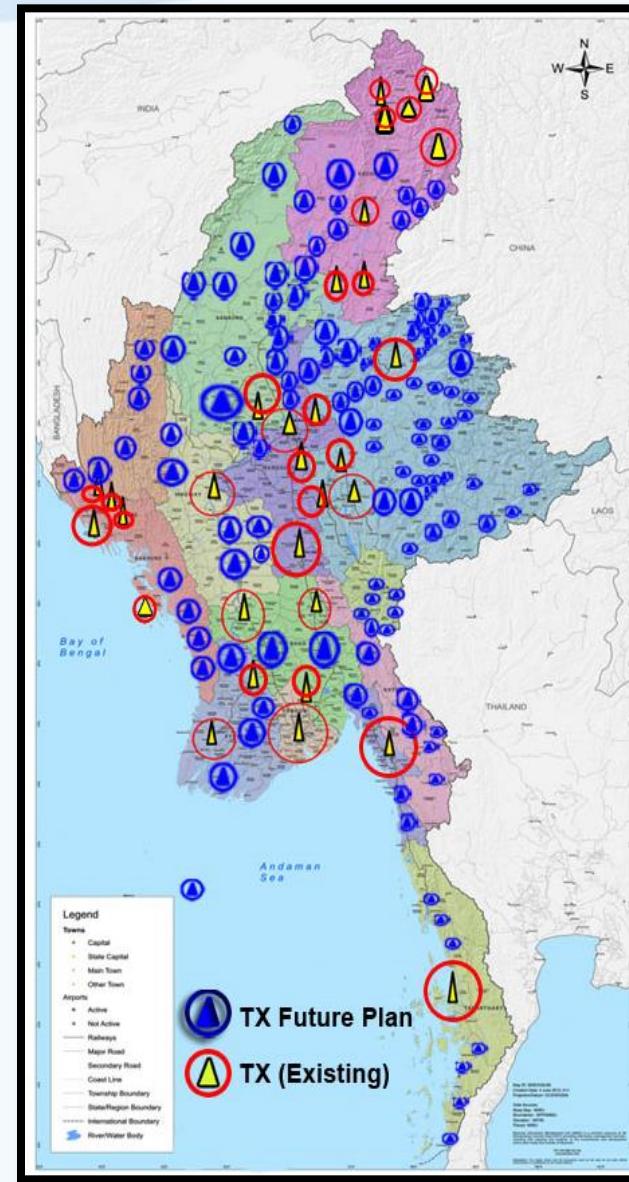
VHF Band II	-	87.6, 88.6, 89.5 and 91 MHz
Current FM Stations	-	76 Stations



MRTV Relay Stations



MWD Relay Stations





Broadcasters in Myanmar

➤ Forever Group Co.,Ltd

- In 2005, Forever Group Co., Ltd jointed ventured with MRTV, started broadcasting MRTV , MRTV-3 , MRTV-4 and 5 Network programs in Digital Video Broadcasting-Terrestrial (DVB-T).
- In 2012, Forever Group transmit about 80 programs in DTH platform .
- In 2013 ,transmitter in DVB-T are migrate to DVB-T2. Digital terrestrial and DTH transmission are in pay service. Besides , the free to air programs, MRTV-4 and Channel -7 are in 25 stations and in 13 stations.
- They also transmit Mandalay FM 9 retransmitting stations and Pyisawaddy 7 stations in FM mode.



Broadcasters in Myanmar

➤ Shwe Than Lwin Media Co.,Ltd

- Sky Net TV Channel also jointly operated by MRTV & Shwe Than Lwin Media Co., Ltd. Transmission system is Direct To Home (DTH) system.
- IT has initiated DTH broadcasting since November 2010 and launched MPS (Multi-Play Services) in February 2011. It currently transmits over 123 channels with the majority of which are international Pay-TV channels including all major football leagues such as Spain La Liga, Italia Series A, German Bundesliga, Barclays Premier League and French League 1.
- They also broadcast MNTV terrestrial Free to Air program in 12 stations and MITV terrestrial FTA program in 3 stations.
- MIR FM and Shwe FM radio broadcasting was operated by Shwe Than Lwin Media Co.,Ltd.



Broadcasting Law

- Myanmar Broadcasting Law was enacted in 2015 .The Myanmar Broadcasting Law has been amended and related rules are still being drawn up. Once the rules are enacted, a Broadcasting Council will be formed, its operation will start. After that , there will be more new broadcasters will come out and they will start implementation of radio and TV stations in different part of the country.



DVB-T2 Set Top Box Subsidization

- DVB-T2 receiver technical specification has to comply with DVB-T2 Integrated Receiver Decoder Technical Specification for ASEAN.
- 0.42 Million of DVB-T2 set top boxes had been purchased by the Government which were distributed free to low income families, community and social level (E) ,. Similarly, free set top boxes were also distributed to non-profit organizations including the state libraries, village libraries.



Radio Broadcasting

- MRTV started radio broadcasting in 1936. There are two high power radio stations , broadcasting in short wave and medium wave transmission to get the nationwide coverage.
- And also, MRTV broadcast radio program in FM mode and total of 84 FM stations established throughout the country with the coverage of 78.88 %.
- There are five regional FM broadcaster who are joint-ventured with MRTV namely Shwe FM, MIR FM, Mandalay FM, Pyinsawaddy FM, Padamyar FM, FM Bagan and Cherry FM .
- As like TV broadcasting , MRTV has plan to migrate radio broadcasting from analogue to digital. So pilot project was implemented DAB + transmission with power of 750 W in 2017 and eight radio programs was transmitted .
- MWD started radio broadcasting in short wave and medium wave transmission since 2012.



FM Radio Broadcasting

MRTV





Thank You



AGREED MINUTES FOR THE RESULTS OF
THAILAND-MYANMAR JOINT TEST
MEASUREMENT

TACHILEIK, MYANMAR(6 - 8 OCTOBER 2019)



PRESENTATION OUTLINE

- Introduction
- Participation Lists
- Complained Frequency Interference
- Measured Schedule
- Measured Points
- Measuring Results
- Agreement
- Photos Record



INTRODUCTION

- ❖ The 2nd Joint Technical Committee on Coordination and Assignment of Frequencies along Thailand – Myanmar Common Border Meeting (JTC-2) was held in Chiang Mai, Thailand from 14 to 16 May 2019

- ❖ According to the agreement on 2nd JTC meeting, Thailand-Myanmar Joint Test Measurement was held in Tachileik, Myanmar on 6 October 2019 to solve the Non-cellular interferences (CAT-HSPA 780-835 MHz) and Na Ta Li Village, Myanmar on 7 October 2019 to solve the interference signal 171.25 MHz



PARTICIPATION LISTS

❖ Delegates from Thailand

1	Mr. Saneh Saiwong	Executive Director	Spectrum Management Bureau, NBTC
2	Mr. Amporn Deelerdcharoen	Director, Division	Spectrum Management Bureau, NBTC
3	Mr. Itthipat Akkarasinyakorn	Engineering Officer	Spectrum Management Bureau, NBTC
4	Mr. Vuttilerd Chanahan	Acting Director, Division	NBTC Sub-region Office 3 (Chiang Rai)
5	Mr. Suebsakoun Kuntawong	Inspection and Operation Officer	NBTC Sub-region Office 3 (Chiang Rai)
6	Mr. Pairoj Pansa	Engineer	CAT Telecom Public Company Ltd.
7	Mr. Thanawat Norakarn	Engineer	CAT Telecom Public Company Ltd.
8	Mr. Kasemniran Suwangbut	Engineer	CAT Telecom Public Company Ltd.



PARTICIPATION LISTS (CONTINUED)

❖ Delegates from Myanmar

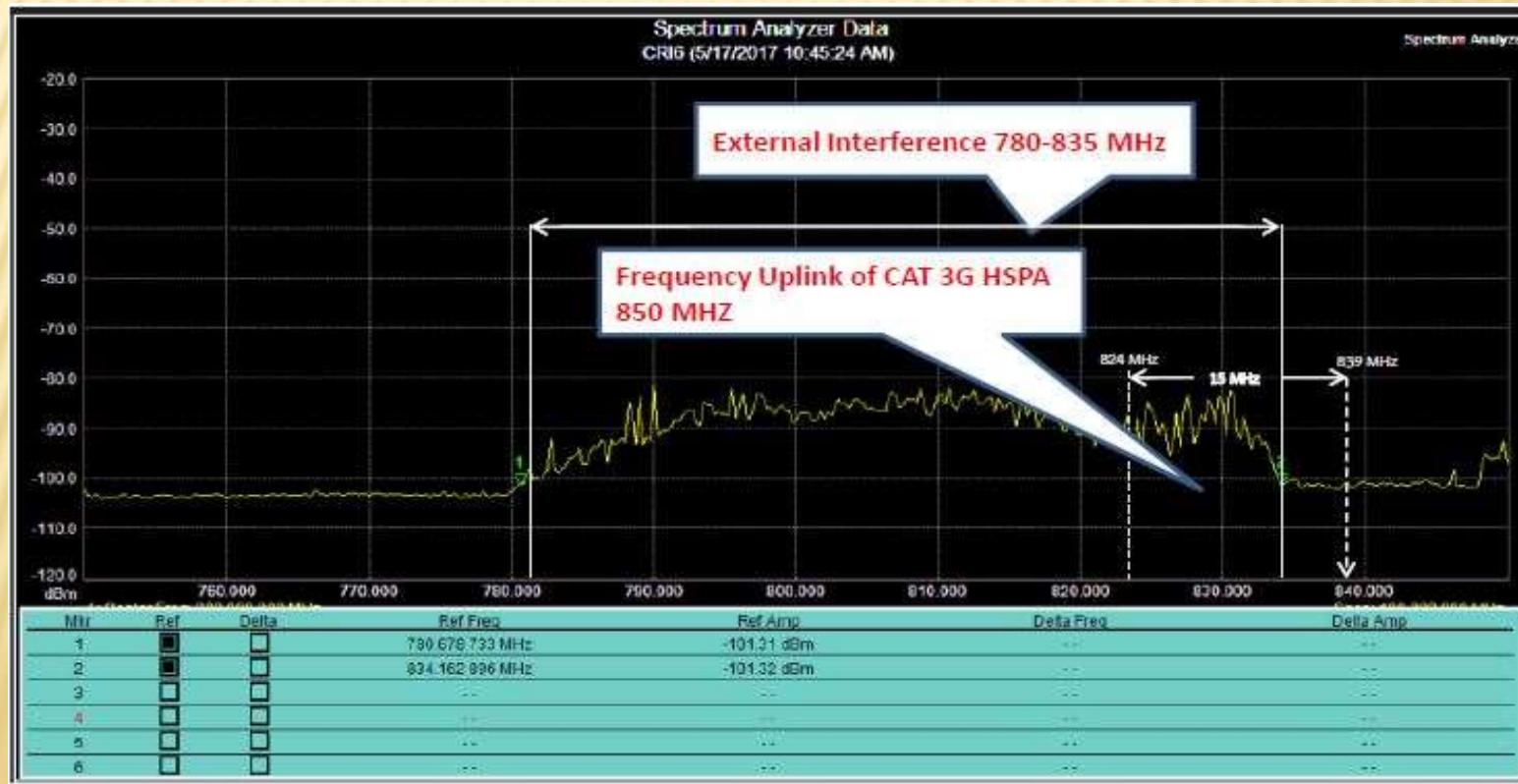
1	Mr. Tun Tun Naing	Assistant Director	Posts and Telecommunications Department
2	Mr. Sai Tho Han Naw Khay	Staff Officer	Posts and Telecommunications Department
3	Mr. Phyo Ko Ko Lin	Deputy Staff Officer	Posts and Telecommunications Department



COMPLAINED FREQUENCY INTERFERENCE

Case 1 - Non Cellular Interference

- ❖ CAT Telecom claimed that they found external interference from the frequency 780-835 MHz (Non-cellular) that affect to HSPA 850 MHz of CAT Telecom services at Mae Sai Market and the direction is from Myanmar/Tacheleik.

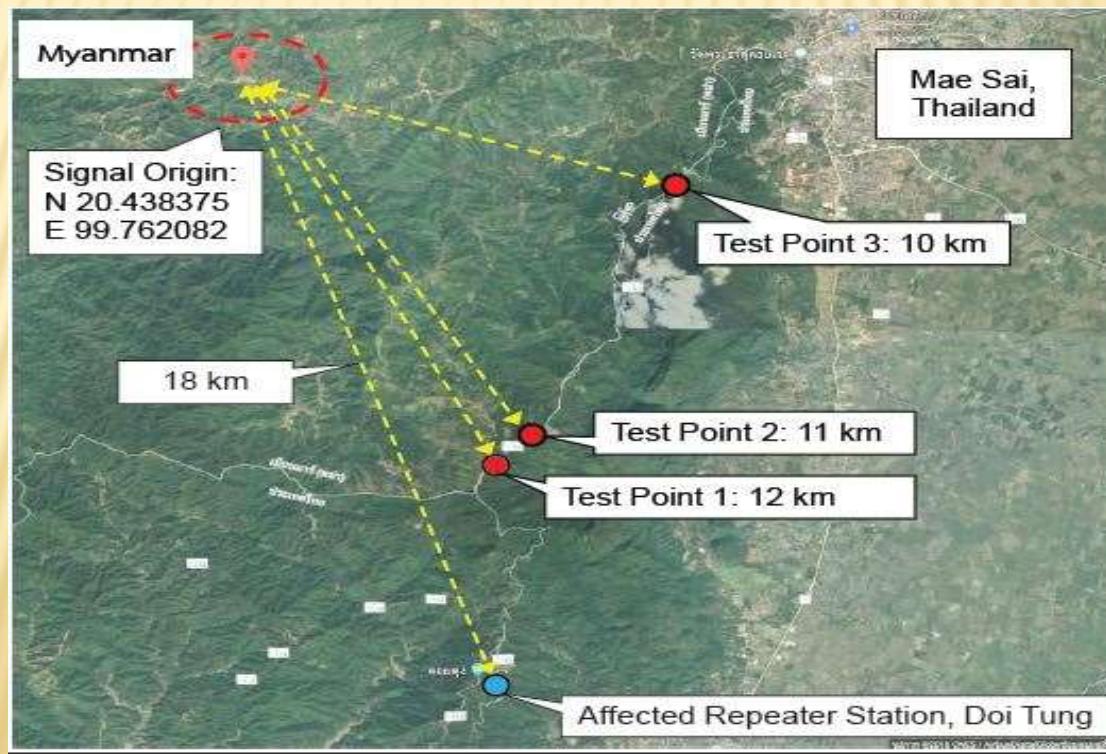




COMPLAINED FREQUENCY INTERFERENCE

Case 2 – Interference on 171.25 MHz Frequency

- ❖ NBTC claimed that they conducted a measurement test on the interference signal 171.250 MHz and founded that the signal originated from Myanmar at the location (Lat 20.438375, Long 99.762082) which is 18 kilometers from the affected repeater station.





MEASURED SCHEDULE

Date	Description	Location	Estimated Measurement Point			Remark
			Point No.	Lat	Long	
6.10.19	Interference Drive Test	Tachileik City, along with the border area of Thailand-Myanmar	Point 1	20.475135°	99.935613°	Measured for non-cellular interferences (Case 1)
			Point 2	20.467954°	99.916892°	
			Point 3	20.453865°	99.919439°	
			Point 4	20.452063°	99.901093°	
			Point 5	20.464489°	99.892938°	
			Point 6	20.482950°	99.897607°	
			Point 7	20.457441°	99.881770°	
			Point 8	20.445907°	99.877724°	
7.10.19	Interference Drive Test	Natali Village, Loi Taw Hkam Area	Point Natali	20.438375	99.762082	Measured interference in 171.25 MHz (Case 2)
		A Dee Village	Ban Pha Mee Point	20.407459°	99.846483°	
8.10.19	Discussion	Tachileik	-	-	-	Analyzed and discussed about the measurement results from the previous two days



MEASURED POINTS

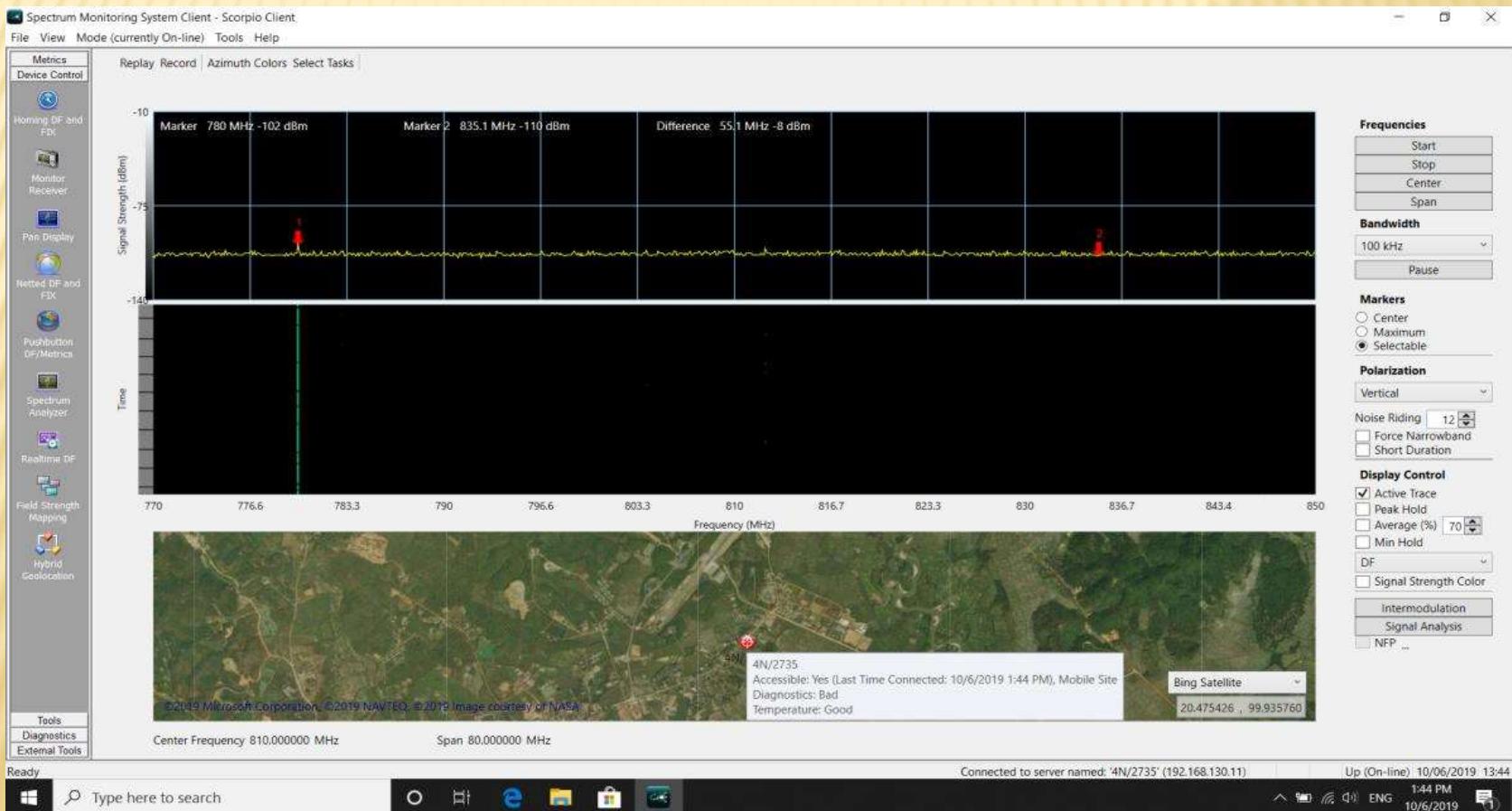




MEASURING RESULTS FOR NON-CELLULAR INTERFERENCES

Point 1

- ❖ There is no wide band interference between 780-835 MHz.

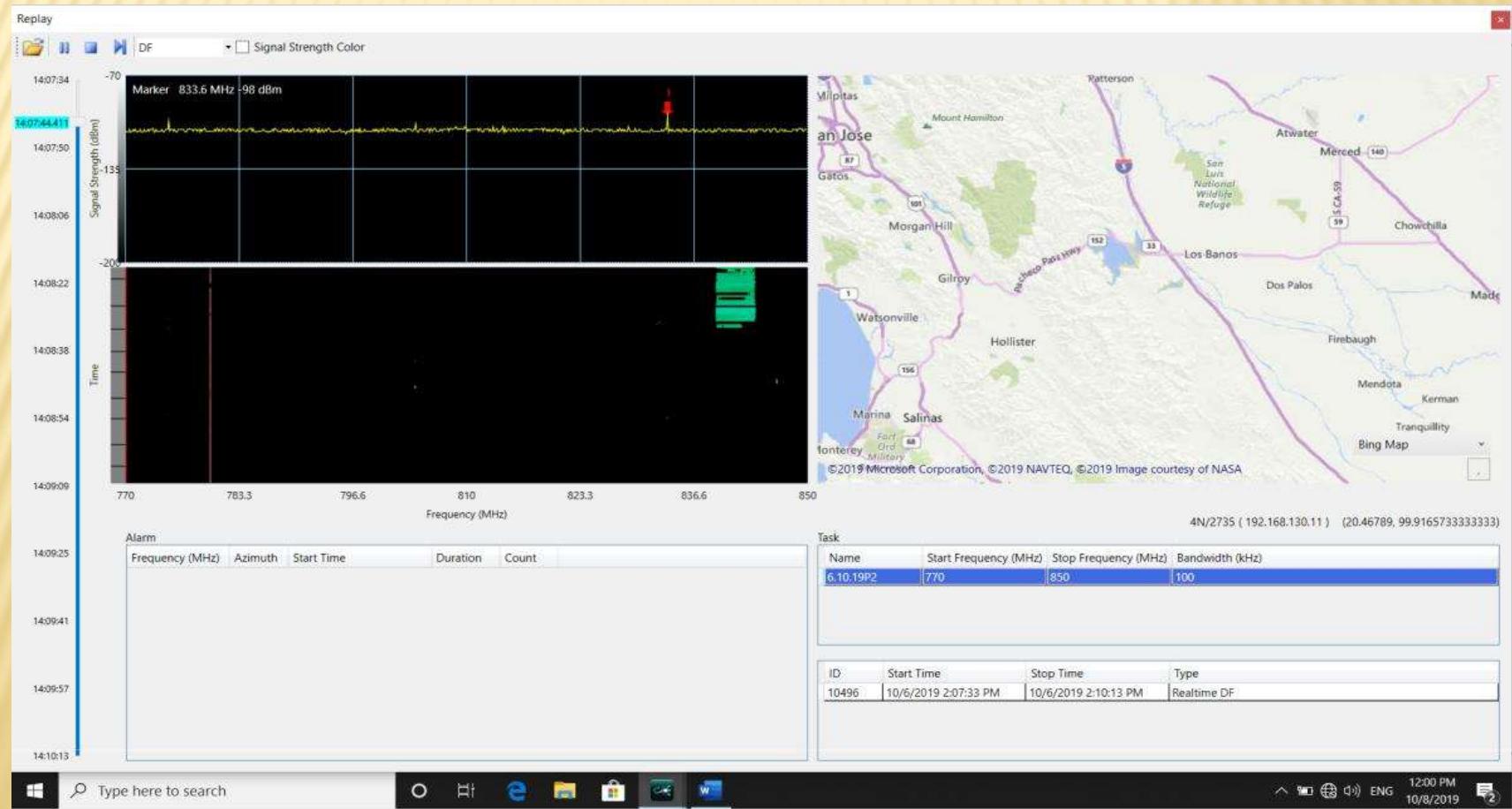




MEASURING RESULTS FOR NON-CELLULAR INTERFERENCES

Point 2

- ❖ There is no wide band interference between 780-835 MHz.
- ❖ One narrow band signal was found in 833.6 MHz with -98 dBm. However, since it is not a continuous strong signal, the location was difficult to locate and cannot be able to find.

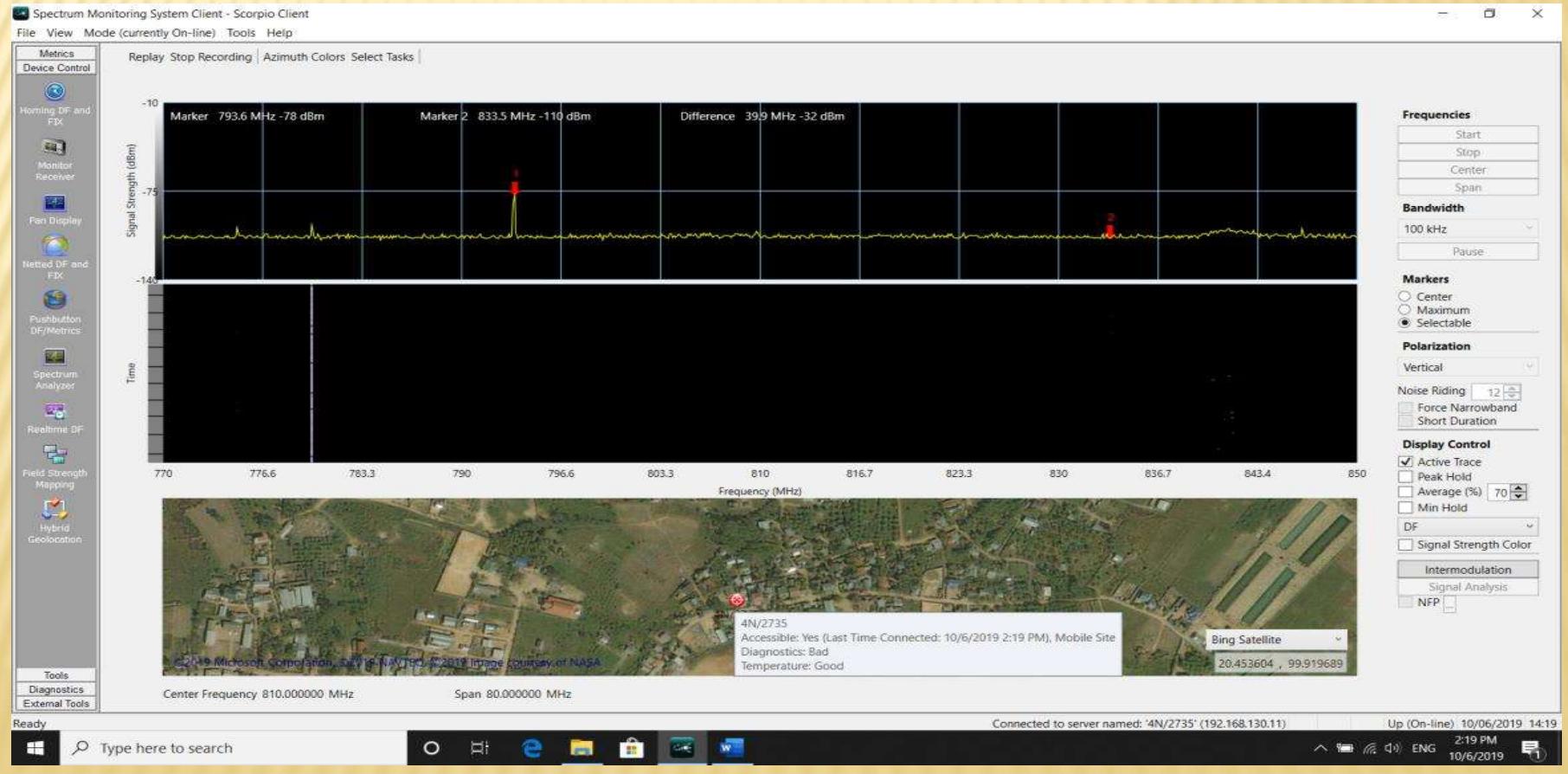




MEASURING RESULTS FOR NON-CELLULAR INTERFERENCES

Point 3

- ❖ There is no wide band interference between 780-835 MHz.
- ❖ One narrow band signal was found in 793.6 MHz with -78 dBm. However, since it is not a continuous strong signal, the location was difficult to locate and cannot be able to find.

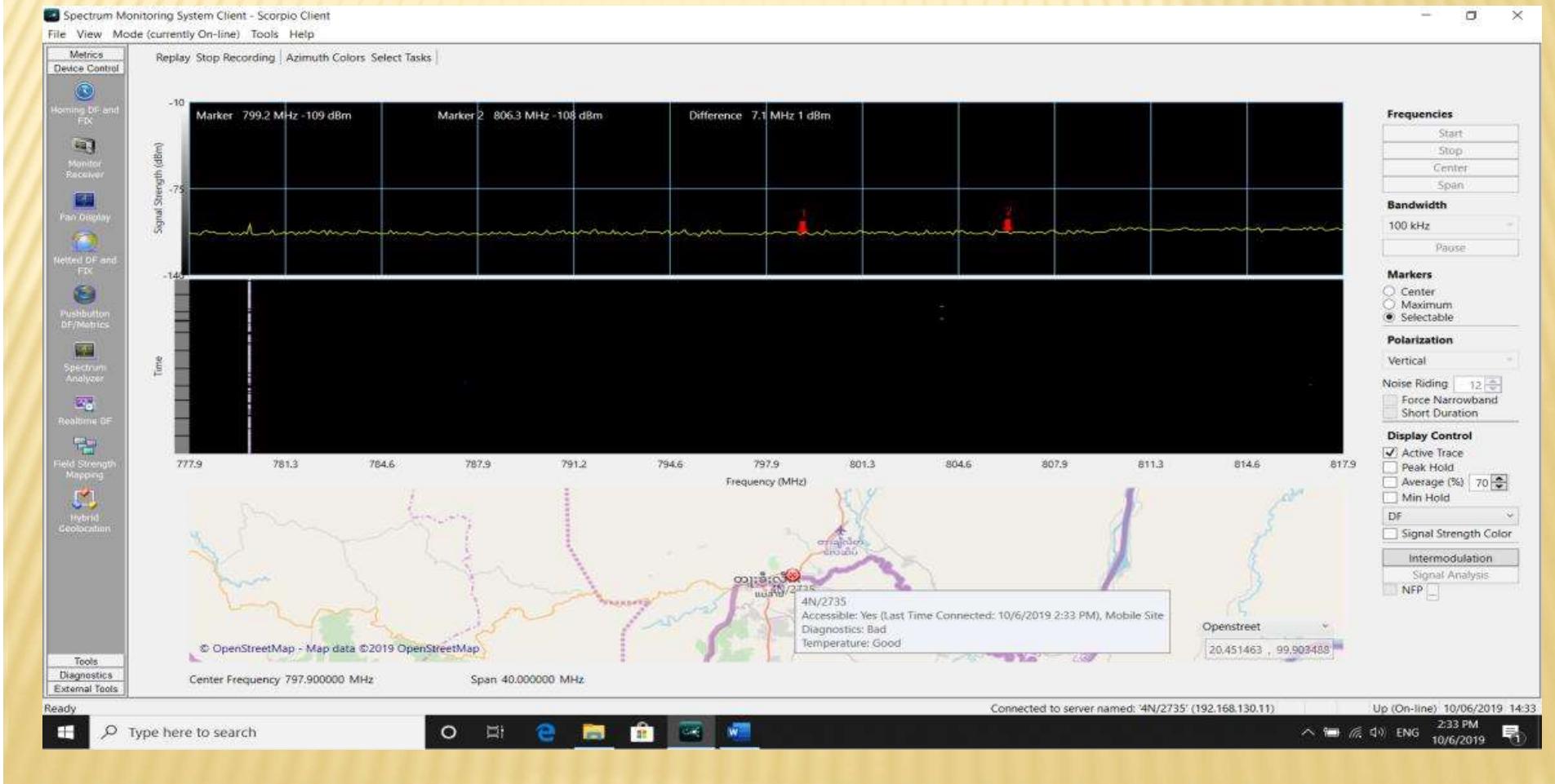




MEASURING RESULTS FOR NON-CELLULAR INTERFERENCES

Point 4

- ❖ There is no wide band interference between 780-835 MHz.

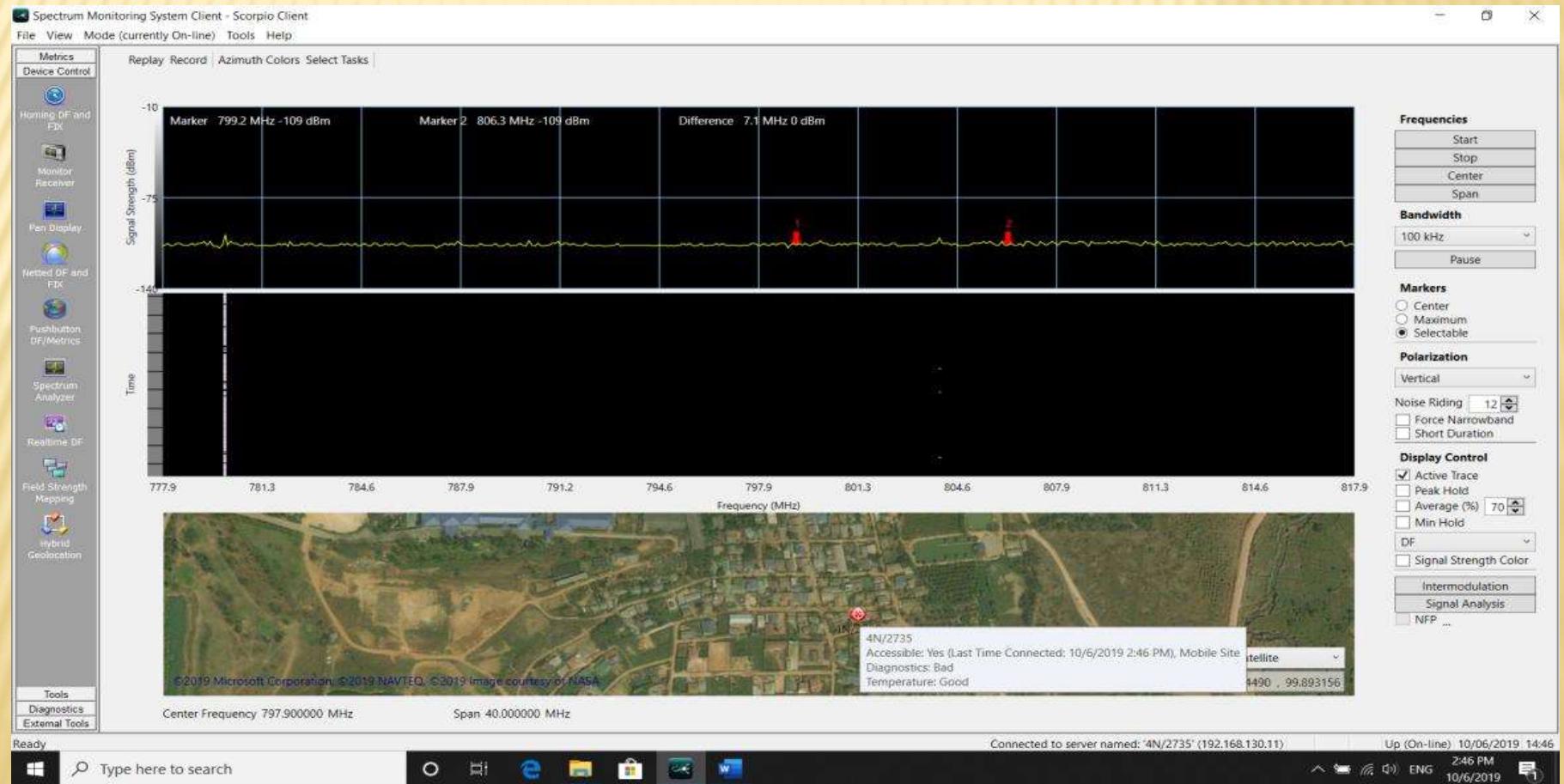




MEASURING RESULTS FOR NON-CELLULAR INTERFERENCES

Point 5

- ❖ There is no wide band interference between 780-835 MHz.





MEASURING RESULTS FOR NON-CELLULAR INTERFERENCES

Point 6

- ❖ There is no wide band interference between 780-835 MHz.
- ❖ One narrow band interference was found in 829 MHz with -78dbm. However, since it is not a continuous strong signal, the location was difficult to locate and cannot be able to find.

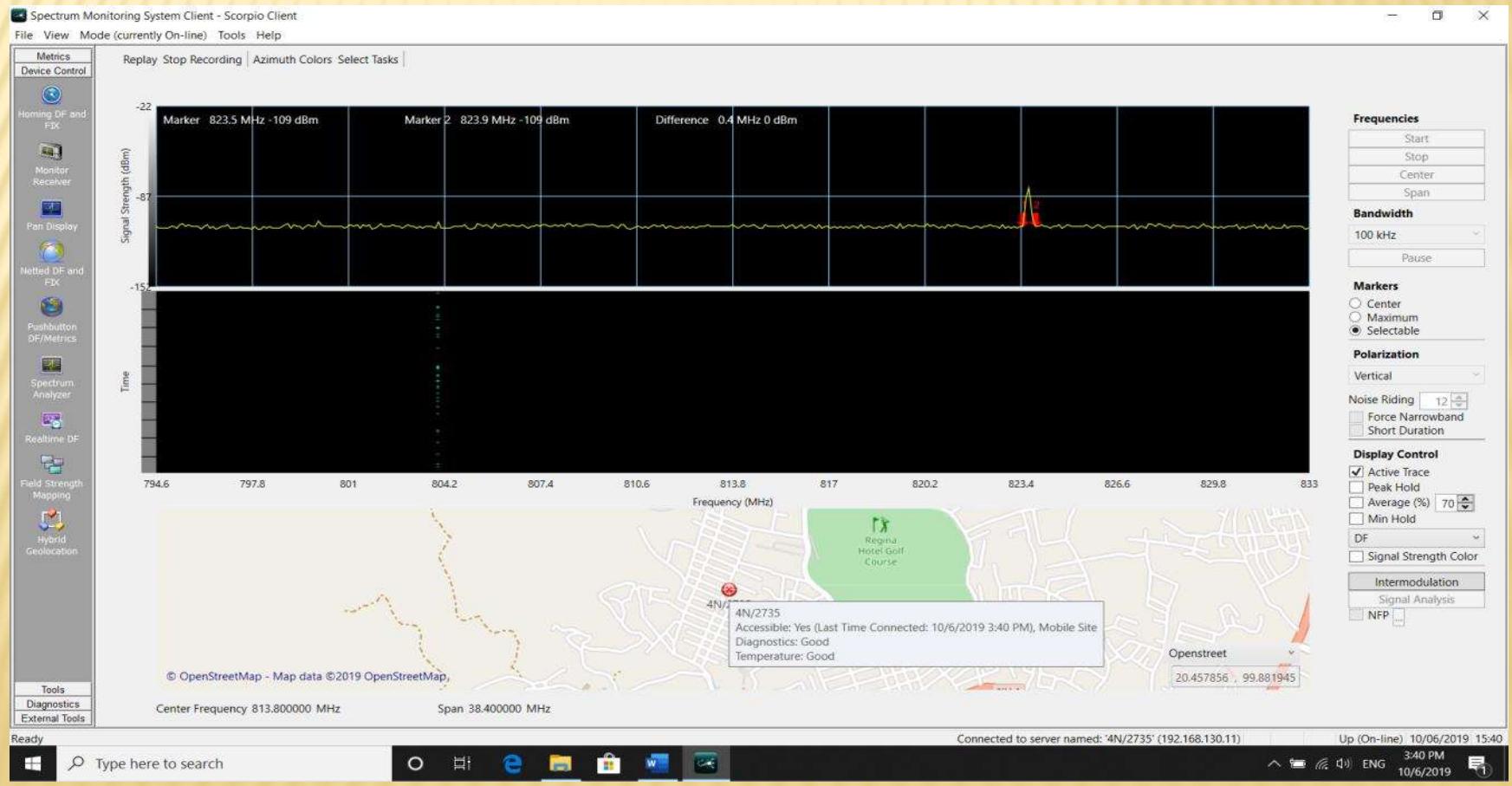




MEASURING RESULTS FOR NON-CELLULAR INTERFERENCES

Point 7

- ❖ There is no wide band interference between 780-835 MHz.
- ❖ One narrow band was found in 823.7 MHz with -79 dbm. However, since it is not a continuous strong signal, the location was difficult to locate and cannot be able to find.

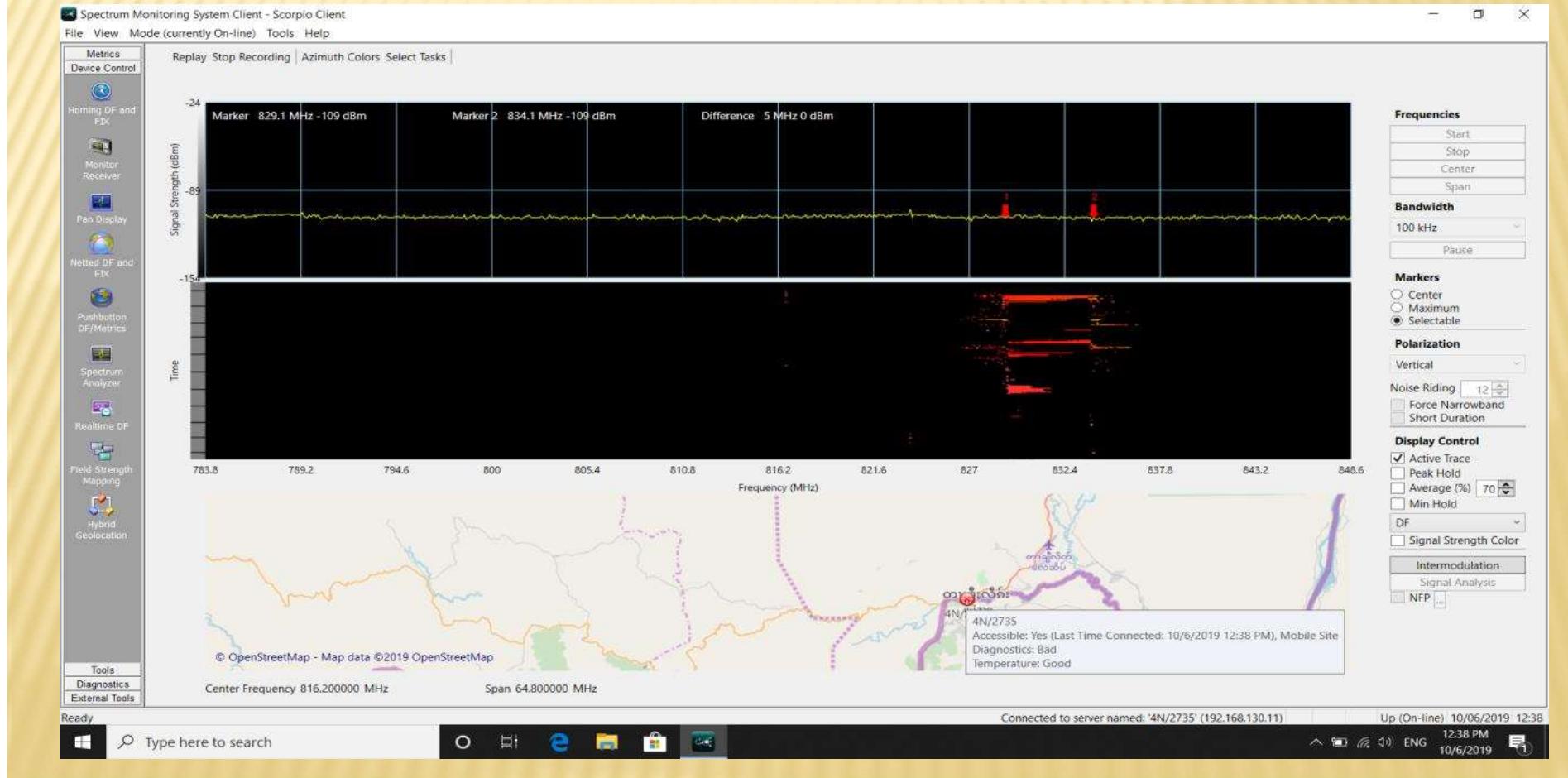




MEASURING RESULTS FOR NON-CELLULAR INTERFERENCES

Point 8

- ❖ There is no wide band interference between 780-835 MHz.
- ❖ Point 8 is the nearest point to the Thailand-Myanmar. Thus, the uplink frequency of CAT between 829-834 MHz was found sometimes.

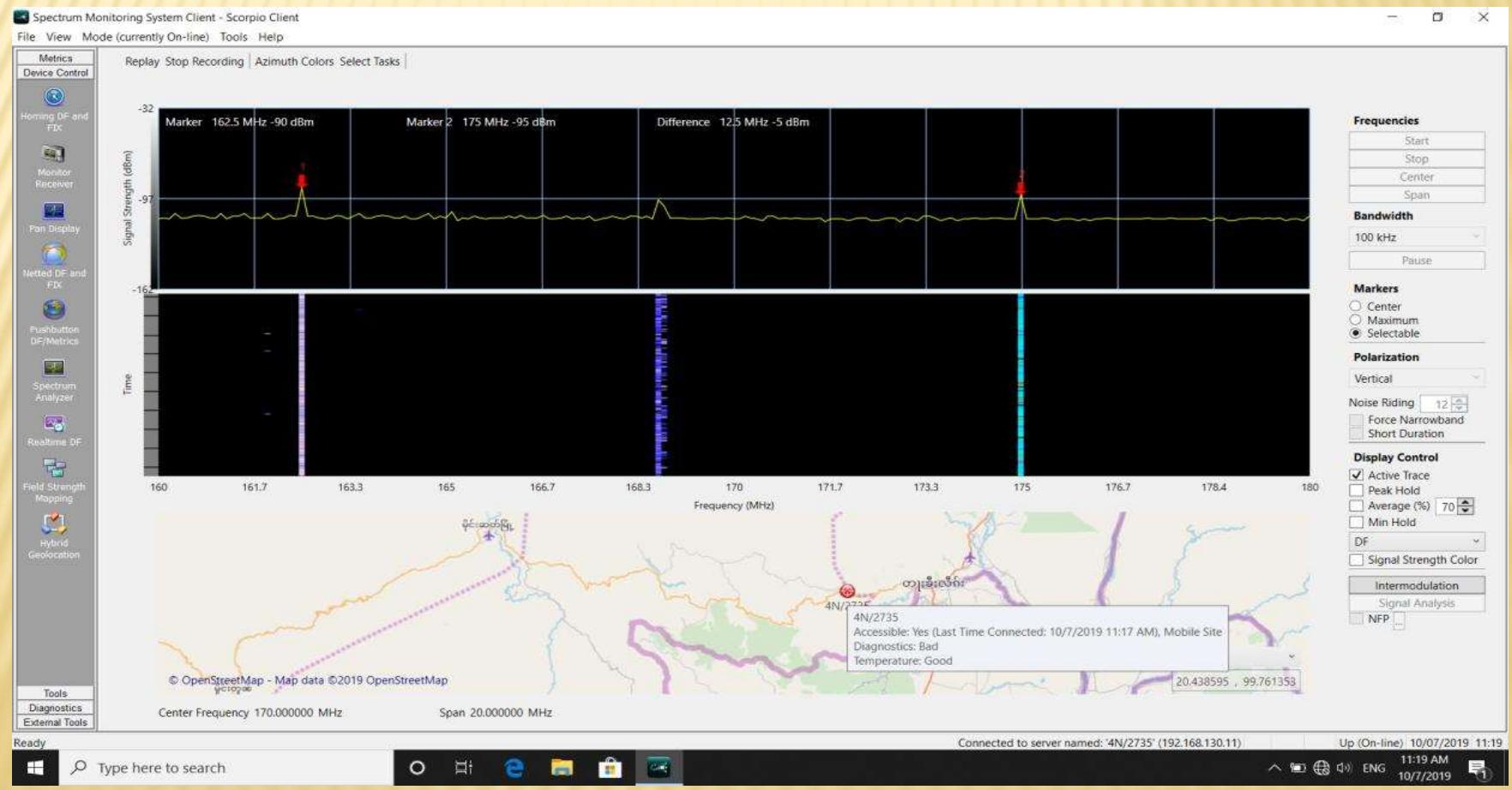




MEASURING RESULTS FOR INTERFERENCE ON 171.25 MHZ FREQUENCY

Point Natali

- ❖ No interference signal was found in 171.25 MHz.
- ❖ However, three narrow band signals were found in 162.5 MHz with -90dbm, 168.7 MHz with -95dbm and 175 MHz with -95dbm respectively.

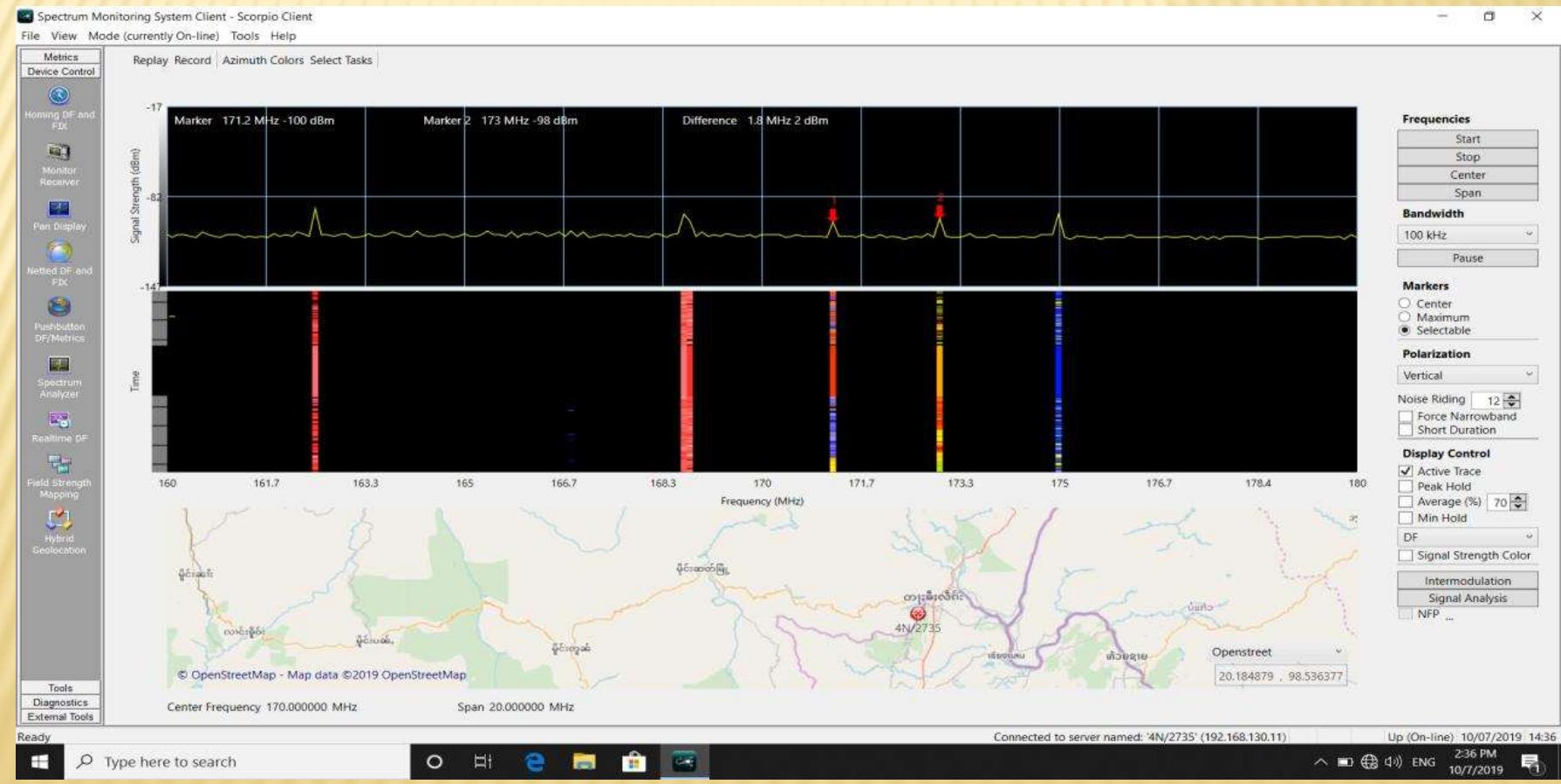




MEASURING RESULTS FOR INTERFERENCE ON 171.25 MHZ FREQUENCY

Point Ban Pha Mee

- ❖ Five narrow band signals were found in 162.5 MHz, 168.7 MHz, 171.2 MHz, 172 MHz and 175 MHz. NBTC claimed that 171.2 MHz was an interference signal and PTD suspected that 171.2 MHz signal is a broadcasting signal from MRTV.





AGREEMENTS

- ❖ According to the results of the measurement for CAT-HSPA 780-835 MHz, wide band interference signal which is claimed to interfere to CAT was not found in Tachileik City, Myanmar.
- ❖ But instead, narrowband signal interference was found in 4 points and CAT will seek for further information to solve that case.
- ❖ After that, CAT will send an official result to PTD via NBTC before JTC-3 meeting to make further consideration in JTC-3 meeting.
- ❖ Regards with the interference signal 171.25 MHz of PEA, the joint-measurement team found an interference broadcasting signal at A Dee Village, Myanmar (which is opposite to Ban Pha Mee Village, Chiang Rai Province) and that signal is affected to PEA's frequency usage, 171.25 MHz in Thailand. Thus, the joint-test meeting agreed to report this result to JTC-3 meeting for further consideration.



PHOTOS RECORD





THANK YOU !



Interference Cases

Seint Seint Aye
Director
Posts and Telecommunications Department





Interferences cases on AEROTHAI and PEA



Interference case of AEROTHAI

- PTD sent the follow up letter to NBTC for frequency interference case in the aeronautical bands (130-130)MHz which were agreed on 2nd JTC meeting.
- According to PTD investigations, PTD found only the usage on (131.25,134.40,137.50)MHz signals at the reported locations. The 131.25 MHz signal has a stronger signal strength than other two signals.
- The source of frequency usage at 131.25 MHz is located within the region where the ethnic groups stay.
- In this regard , Ministry of Transport and Communications officially communicated with NRPC (National Reconciliation and Peace Center) that ethnic group need to change the frequency usage to comply with the National table of frequency allocation of Myanmar. PTD already proposed the alternative frequencies and will update after confirmation the frequency changes.



Interference Case of Thailand's Provincial Electricity Authority (PEA)

- PTD sent the follow up letter to NBTC for Non Cellular Interference in 171.25 MHz along the Myanmar – Thailand common border which were agreed on 2nd JTC-MT.
- PTD & NBTC have done the activities of taking joint measurement on 6-8 October 2019 concerned with the interference case for PEA's issue at the proposed locations near Tachileik.
- According to the joint measurement at point Natali, no interference signal was found in 171.25 MHz. However, three narrow band signals were found in 162.5 MHz.
- According to the joint measurement at point A Dee Village, five narrow band signals were found and 171.2 MHz was an interference signal and that signal is a broadcasting signal from MRTV.
- PTD is discussing with MRTV for the possible solution to resolve that interference and will update on the progress accordingly.



Thank You



Interference Cases

Seint Seint Aye
Director
Posts and Telecommunications Department





Interferences cases on CAT Telecom's 850 MHz



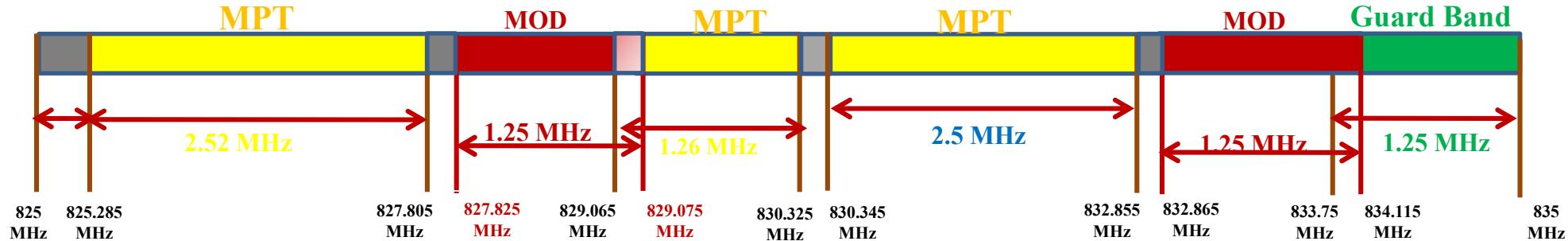
Case 1: Non Cellular Interference Case

- ❑ PTD sent the follow up letter to NBTC for Cellular Interference in the 850 MHz Band along the Myanmar – Thailand common border as agreed in 2nd JTC-MT.
- ❑ PTD & NBTC have done joint measurement on 6-8 October 2019 concerned with the interference case in the frequency usage of (824-839) MHz at the proposed locations near Tachileik.
- ❑ According to the joint measurement result, narrow band interferences were found at 4 points of location near the border and there is no wide band interference in 850 MHz band.
- ❑ As those signals are narrow band and not continuous, it is not possible to find the location of the signal.
- ❑ PTD would like to understand the concerns of CAT regarding those narrow band signals.

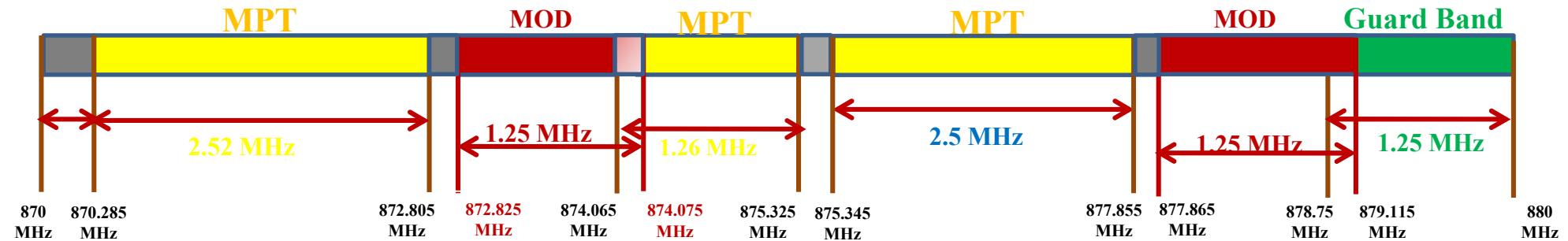


Case 2: Cellular Interference Case

CDMA Uplink Band in Myanmar (800/850 MHz)



CDMA Downlink Band in Myanmar (800/850 MHz)



- To solve this issue, PTD suggests that MPT and CAT should discuss on the possible solutions (such as antenna reorientation, antenna down-tilt or BTS power reduction for sites/sectors facing toward the border area and on the coordination parameters).



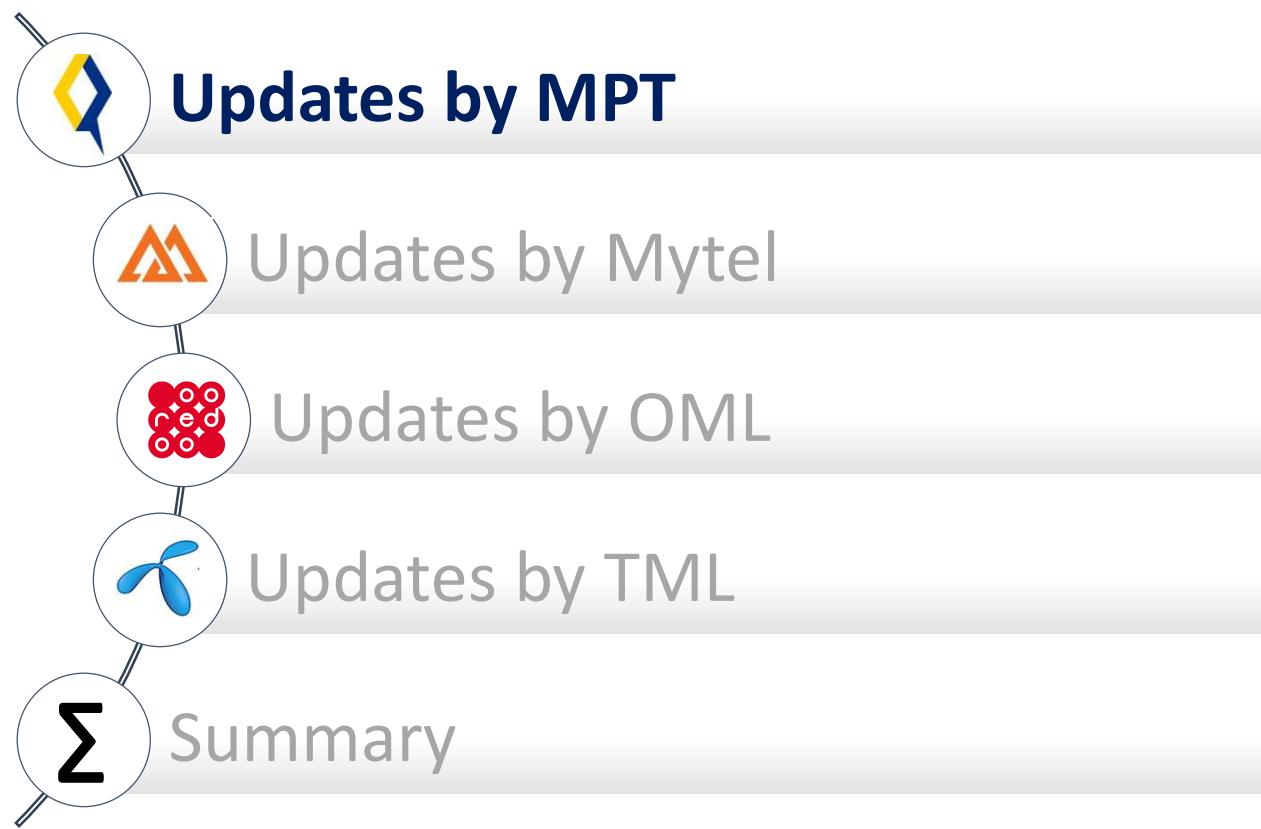
Thank You

Industry Updates by Myanmar Mobile Network Operators [Jun – Dec 2019]

Third Joint Technical Committee on Coordination and
Assignment of Frequencies along Myanmar – Thailand Border



Contents



Information Update

Spectrum

- Continuing LTE rollout in 2100 MHz band
- Currently both 5 MHz and 10 MHz bandwidths for LTE are co-located with UMTS within 2100 MHz band.

Cross Border Coordination

- New round of drive test was conducted in Tachileik in Oct.
- 83 cells violating the coordination criteria as agreed in JTC-2 were submitted to AWN (26 cells), TUC (46 cells) and DTN (11 cells) on Nov 15.
- Improvement results for 24/26 cells received from AWN on Dec 18 and are currently under review. Waiting for status of remaining 2 cells.
- Received acknowledgement from TUC on Dec 19 and waiting for action plan
- Agreed with DTN on Dec 20 to discuss further in JTC-3
- Testing in other border towns in progress

Tachileik (Oct'19 Status)

Depending on available road access, approx. lines for 0 km and 4 km are drawn to determine coordination criteria violations.



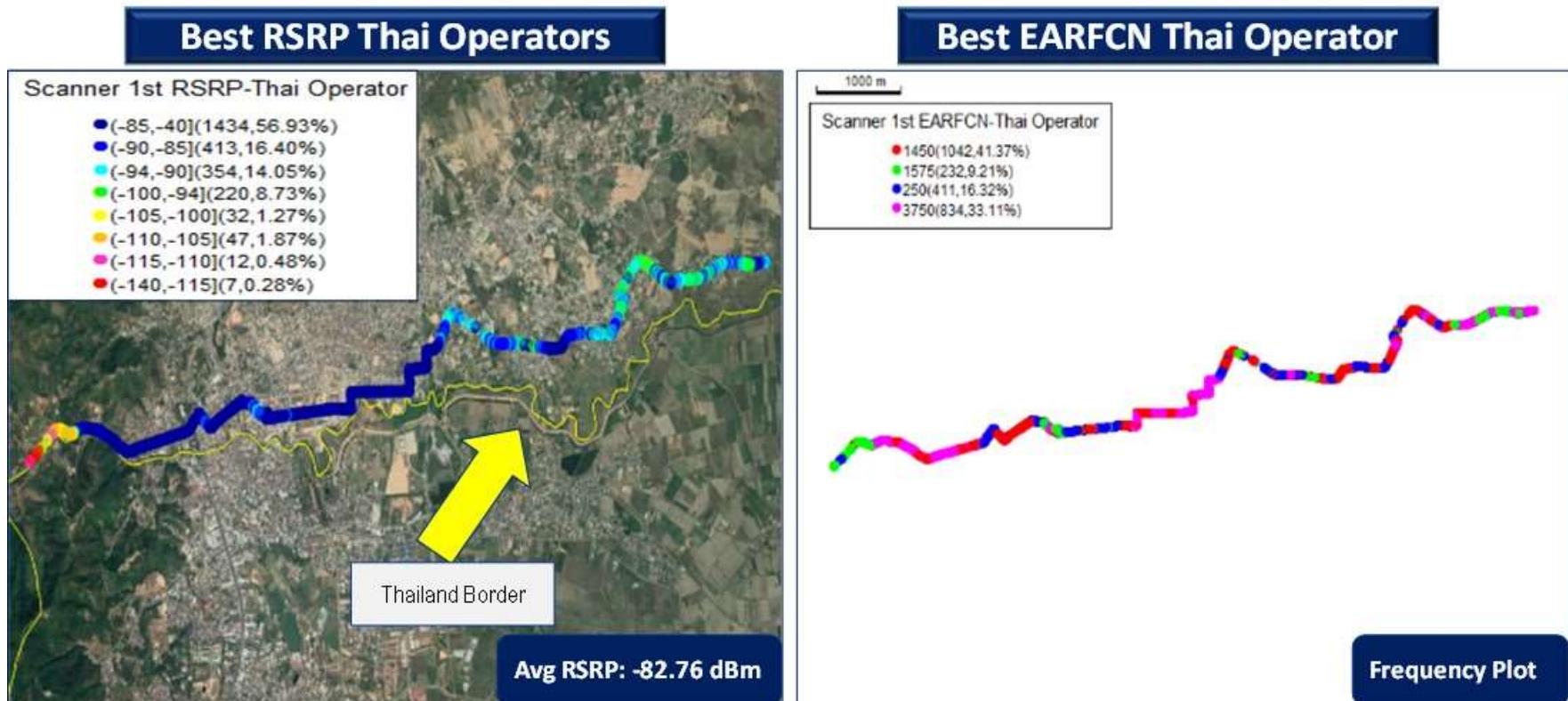
@ 0 km
from
Border ➤

Technology	Operator	Band	ARFCN	Signal Strength	Coordination Criteria	Violating vs Total Data Points	Violating Ratio
LTE	TUC	2100	250	RSRP	-94 dBm	1539/2237	68.80 %
	TUC	900	3750	RSRP	-94 dBm	1597/1947	82.02 %
	AWN	1800	1450	RSRP	-94 dBm	1825/2354	77.53 %
	DTN	1800	1575	RSRP	-94 dBm	1098/1944	56.48 %
UMTS	TUC	2100	10638	RSCP	-82 dBm	1735/2081	83.37 %

@ 4 km
from
Border ➤

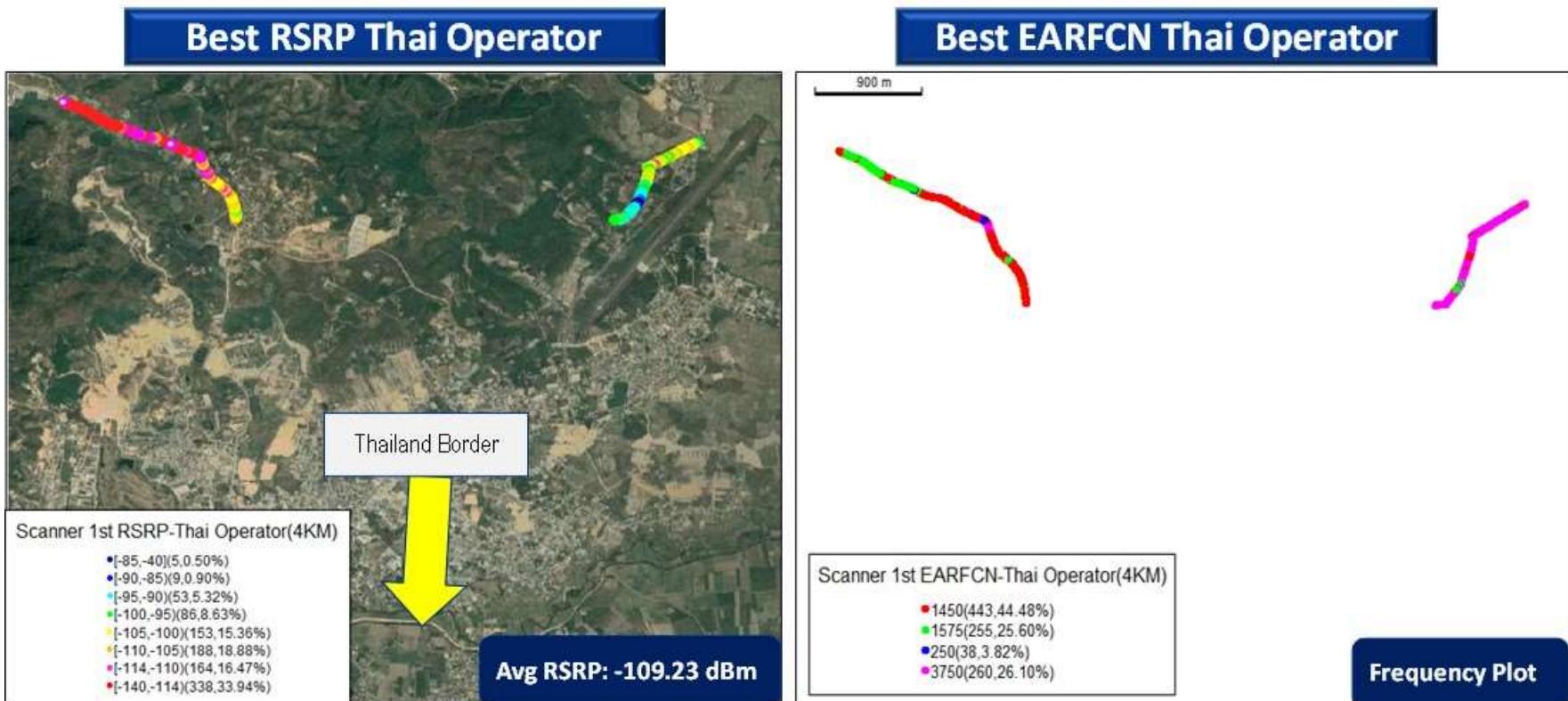
Technology	Operator	Band	ARFCN	Signal Strength	Coordination Criteria	Violating vs Total Data Points	Violating Ratio
LTE	TUC	2100	250	RSRP	-114 dBm	243/668	36.38%
	TUC	900	3750	RSRP	-114 dBm	284/287	98.95%
	AWN	1800	1450	RSRP	-114 dBm	602/996	60.44%
	DTN	1800	1575	RSRP	-114 dBm	381/996	38.25%
UMTS	TUC	2100	10638	RSCP	-102 dBm	203/269	75.46%

Tachileik in Oct'19: LTE Signals of Thai MNOs @ 0 km



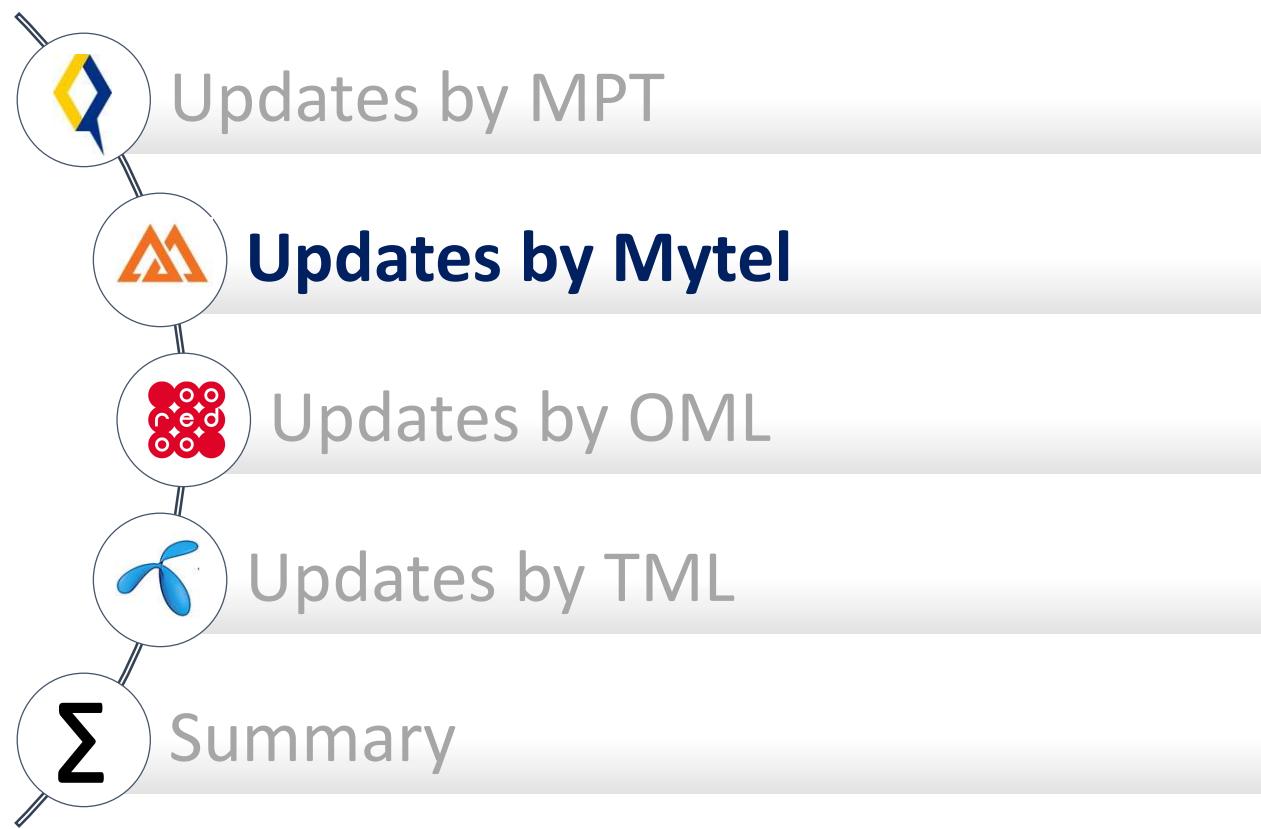
Technology	Operator	Band	ARFCN	Serving vs Total Data Points	Serving Ratio (%)
LTE	AWN	1800	1450	1042/2519	41.37
	DTN	1800	1575	232/2519	9.21
	TUC	2100	3750	834/2519	33.11
	TUC	900	250	441/2519	16.32

Tachileik in Oct'19: LTE Signals of Thai MNOs @ 4 km



Technology	Operator	Band	ARFCN	Serving vs Total Data Points	Serving Ratio (%)
LTE	AWN	1800	1450	443/996	44.48%
	DTN	1800	1575	255/996	25.60%
	TUC	2100	3750	260/996	26.10%
	TUC	900	250	38/996	3.82%

Contents



Impact of Interference

Impact on L900

Township	Reason	Total cells
Myawaddy	Extreme High RTWP	12

As drive testing result, voice service can use very well on G900 but have some interference. Mytel have only four sites which have L900 around Myawaddy border, extremely high RTWP from Thailand border.

Impact on L1800

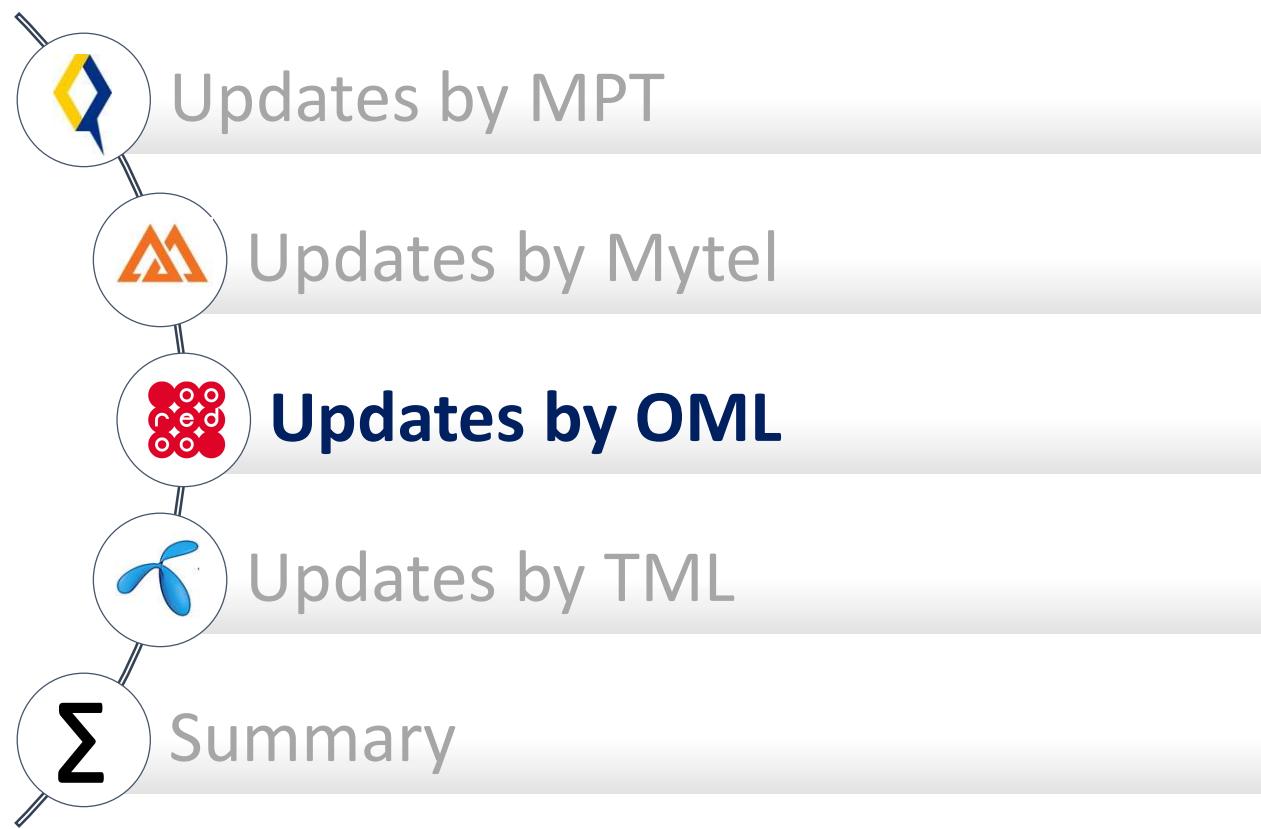
Township	Reason	Total cells
Myawaddy	Extreme High RTWP	48

As drive testing result, voice service can use very well on G1800 but have some interference. Around 48 cells of L1800 have high interference around -90dBm from Thailand border. Mytel throughput is good mostly but weak in some places.

Actions for Overlapping between CAT and Mytel

City	Frequency band	Total Cells	Action by Mytel	Feedback from CAT	Results
Myawaddy	GL900	12	Already tested	Already take action	Improved

Contents



Border Interference Status Update

Latest Drive test was done on 2nd week of December

➤ DTAC for U900

Townships	Total Escalated Cells	Escalation Date	Action Done By DTAC	First Reminder	Second Reminder	Third Reminder	Status by Latest Drive Test		
							Closed	Open	New Cells
Tachileik	18	19-Jun-19	850MHz mitigation plan	16-Aug-19	26-Aug-19	13-Sep-19	11	7	
Myawaddy	20	19-Jun-19	850MHz mitigation plan	16-Aug-19	26-Aug-19	13-Sep-19	5	15	6
Kawthoung	7	19-Jun-19	850MHz mitigation plan	16-Aug-19	26-Aug-19	13-Sep-19	7		4
Hpayarthonesu	4	19-Jun-19	850MHz mitigation plan	16-Aug-19	26-Aug-19	13-Sep-19	-	-	-

➤ AIS for U2100

Townships	Total Escalated Cells	Escalation Date	Action Done By AIS	Status by Latest Drive Test		
				Closed	Open	New Cells
Tachileik	6	19-Jun-19	Reduce CPICH Power & Down tilting	2	4	7
Myawaddy	9	19-Jun-19	Reduce CPICH Power & Down tilting	1	8	9
Kawthoung	1	19-Jun-19	Reduce CPICH Power & Down tilting		1	4
Hpayarthonesu	1	19-Jun-19	Reduce CPICH Power & Down tilting	-	-	-

➤ Interference Impacted Cells in U900

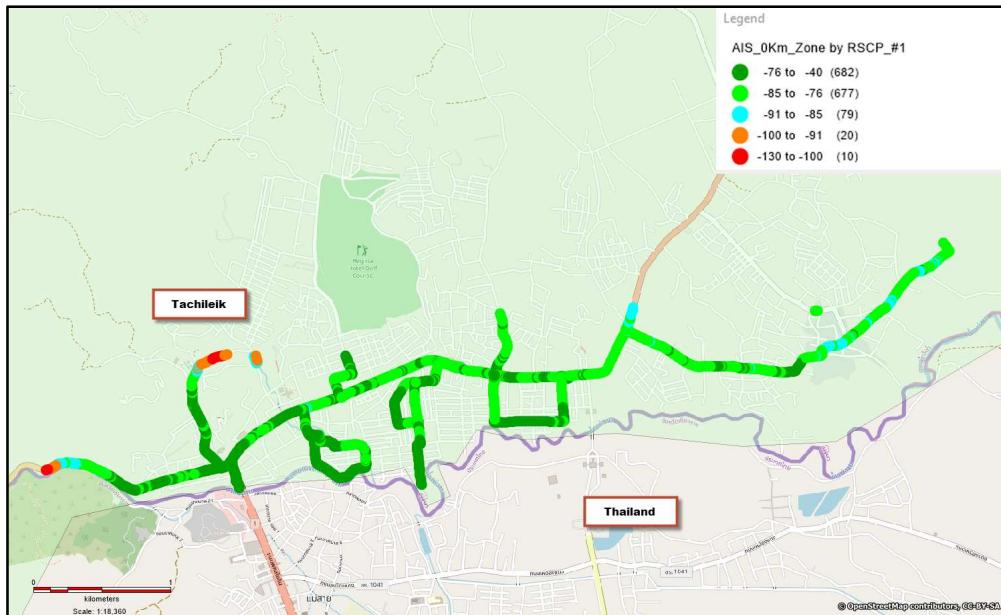
Border Cities	Blocked due to Extreme RTWP	High RTWP
Myawaddy	5	8
Kawthoung		
Tachileik	24	7
Hpayarthonesu	1	2

➤ Interference Impacted Cells in U2100

Border Cities	Blocked due to Extreme RTWP	High RTWP
Myawaddy	2	3
Kawthoung		3
Tachileik	22	3

Interference Scanning : Tachileik Border

0~4 km Radius Serving and Coverage



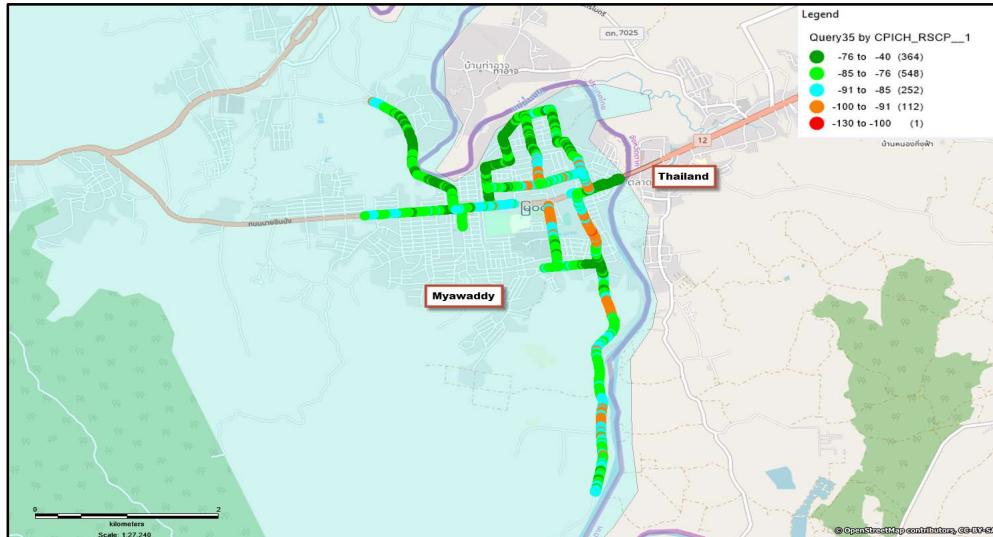
AIS coverage at 2100 Band (10762)

0Km Zone				
Cell ID	UARFCN	RSCP Max	RSCP(Ave)	Escalation Date
13846	10762	-69.30	-71.67	
22481	10762	-59.60	-70.40	
22483	10762	-65.60	-75.31	
22991	10762	-58.80	-72.38	19/June/2019
23021	10762	-54.20	-63.47	
24071	10762	-57.30	-73.47	19/June/2019
24076	10762	-70.00	-77.41	19/June/2019
24101	10762	-60.70	-77.82	19/June/2019
24133	10762	-63.20	-77.55	
4Km Zone				
Cell ID	UARFCN	RSCP Max	RSCP(Ave)	Escalation Date
10361	10762	-75.70	-91.70	
24076	10762	-89.00	-92.00	
22994	10762	-74.20	-90.31	

DTAC coverage at 850 Band (4433)

0Km Zone				
Cell ID	UARFCN	RSCP Max	RSCP(Ave)	Escalation Date
40012	4433	-45.00	-72.37	19/June/2019
40013	4433	-47.40	-74.21	19/June/2019
42095	4433	-45.10	-63.44	19/June/2019
4Km Zone				
Cell ID	UARFCN	RSCP Max	RSCP(Ave)	Escalation Date
40021	4433	-68.90	-86.44	19/June/2019
40029	4433	-82.40	-92.50	19/June/2019
42100	4433	-57.70	-83.67	19/June/2019
48390	4433	-64.10	-84.72	19/June/2019

Interference Scanning : Myawaddy Border



0~4 km Radius Serving and Coverage

AIS coverage at 2100 Band (10762)

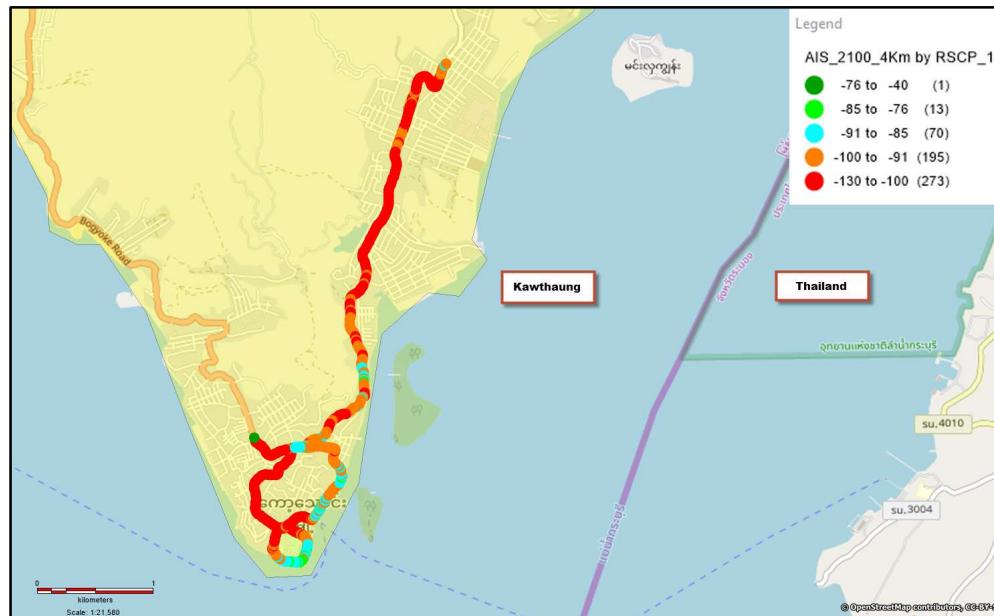
0Km Zone				
Cell ID	UARFCN	RSCP Max	RSCP(Ave)	Escalation Date
42612	10762	-66.60	-75.87	19/June/2019
42613	10762	-64.90	-75.91	19/June/2019
42614	10762	-64.40	-78.65	
42615	10762	-65.30	-73.72	
42764	10762	-69.30	-82.80	19/June/2019
42794	10762	-72.90	-79.14	
43392	10762	-70.10	-82.36	19/June/2019
44532	10762	-72.00	-79.92	19/June/2019
60134	10762	-71.40	-79.23	19/June/2019
4Km Zone				
Cell ID	UARFCN	RSCP Max	RSCP(Ave)	Escalation Date
42764	10762	-99.40	-99.93	
44533	10762	-78.50	-87.41	19/June/2019
45493	10762	-89.20	-98.47	
39824	10762	-68.10	-83.56	19/June/2019
39823	10762	-76.20	-83.14	
42793	10762	-63.90	-83.88	
44531	10762	-89.90	-92.90	
45162	10762	-72.80	-84.75	

DTAC coverage at 850 Band (4433)

0Km Zone				
Cell ID	UARFCN	RSCP Max	RSCP(Ave)	Escalation Date
2705	4433	-67.60	-80.15	19/June/2019
4086	4433	-80.10	-82.63	
4088	4433	-62.90	-77.33	19/June/2019
6806	4433	-64.80	-69.03	19/June/2019
6807	4433	-69.20	-73.76	19/June/2019
40371	4433	-57.10	-70.76	19/June/2019
40381	4433	-73.30	-82.88	19/June/2019
43579	4433	-54.70	-64.44	
43613	4433	-52.50	-71.47	19/June/2019
43614	4433	-61.80	-77.69	19/June/2019
43615	4433	-69.40	-71.97	19/June/2019
43644	4433	-67.60	-76.18	19/June/2019
43687	4433	-62.60	-67.94	19/June/2019
43688	4433	-54.30	-75.79	19/June/2019
43704	4433	-68.70	-78.43	19/June/2019
43705	4433	-72.40	-81.18	19/June/2019
45816	4433	-66.00	-71.32	
48777	4433	-68.60	-78.71	19/June/2019
4Km Zone				
Cell ID	UARFCN	RSCP Max	RSCP(Ave)	Escalation Date
42764	10762	-99.40	-99.93	
44533	10762	-78.50	-87.41	
6426	4408	-90.10	-90.10	

Interference Scanning : Kawthaung Border

0~4 km Radius Serving and Coverage



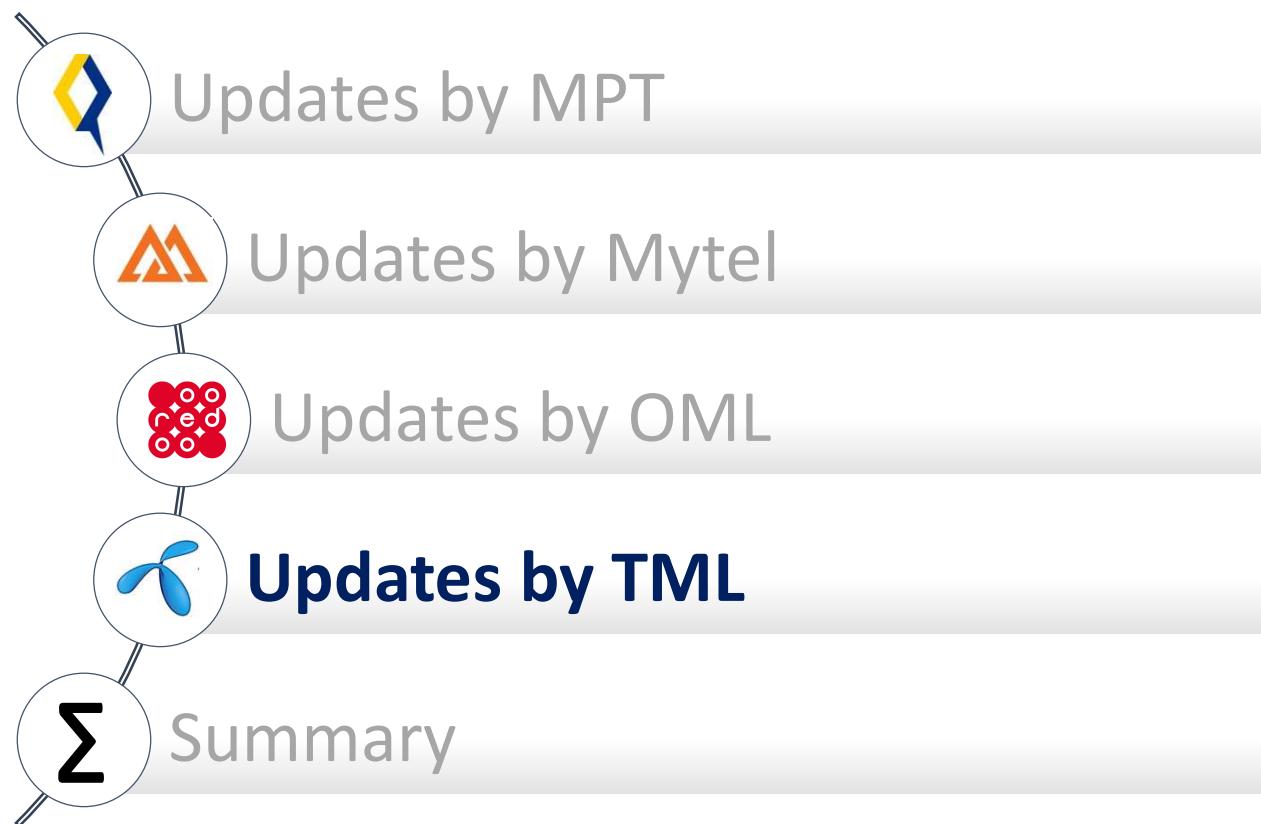
AIS coverage at 2100 Band (10762)

6Km Zone				
Cell ID	UARFCN	RSCP Max	RSCP(Ave)	Escalation Date
29693	10762	-91.10	-98.92	
29694	10762	-87.80	-101.81	19/June/2019
30125	10762	-93.00	-96.63	
31214	10762	-79.60	-98.77	
32334	10762	-81.90	-95.49	

DTAC coverage at 850 Band (4433)

6Km Zone				
Cell ID	UARFCN	RSCP Max	RSCP(Ave)	Escalation Date
35814	4433	-79.90	-92.05	
35856	4433	-83.80	-98.24	
35950	4433	-92.40	-95.18	
35990	4433	-77.00	-88.76	

Contents



Actions for JTC-2 Agreement

- Agreed to use separate ARFCN allocation in Tachileik-Mae Sai and Myawaddy-Mae Sot for G900 – AWN (26-33) and TML (34-49) : Done
- TML Exchange interference case with AWN and TUC. : Done
- Action on interference case with AWN. : Work In Process
- Action on interference case with TUC. : Work In Process

Actions on Interference Cells and TML's Feedback

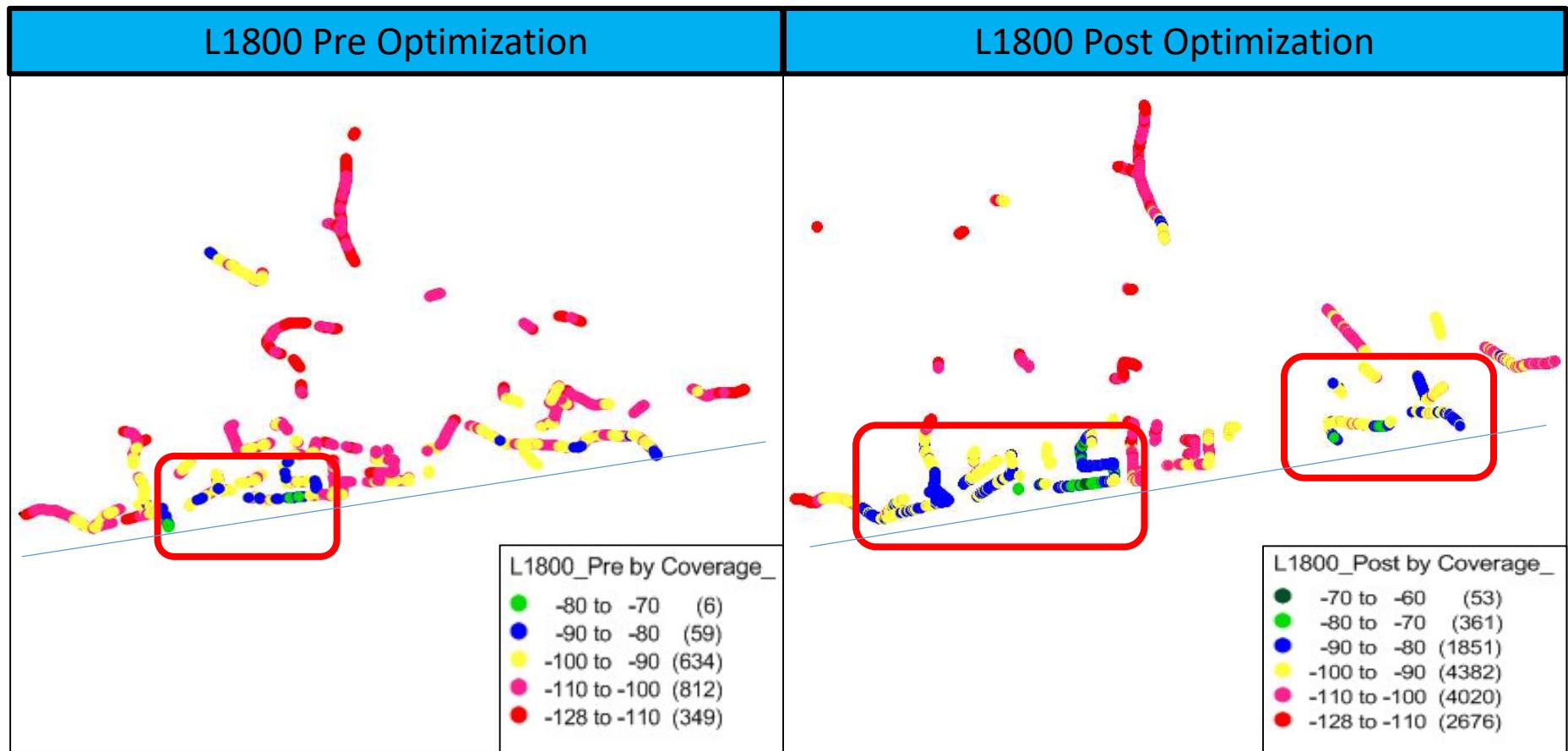
- TUC raised to TML for interference cells and it is under verification process of TML. TML has done required and optimization in Dec 2019 and informed to TUC.
- TML raised to TUC and AWN for interference cells and optimization has been done by TUC and AWN.
- Followings are pre & post optimization result status and TML's feedback for TUC and AWN.

Operator Name	Frequency Band	Technology	City	Coverage Alignment On JTC-2 Agreed Threshold Value (Yes/No)		TML's Feedback
				Pre Optimization Status	Post Optimization Status	
TUC	1800	LTE	Tachileik	No	No	Further optimization needs from TUC.
AWN	1800	LTE	Tachileik	No	No	Further optimization needs from AWN.

Pre & Post Optimization Status for TUC in Tachileik City

DT has been done by TML DT team.

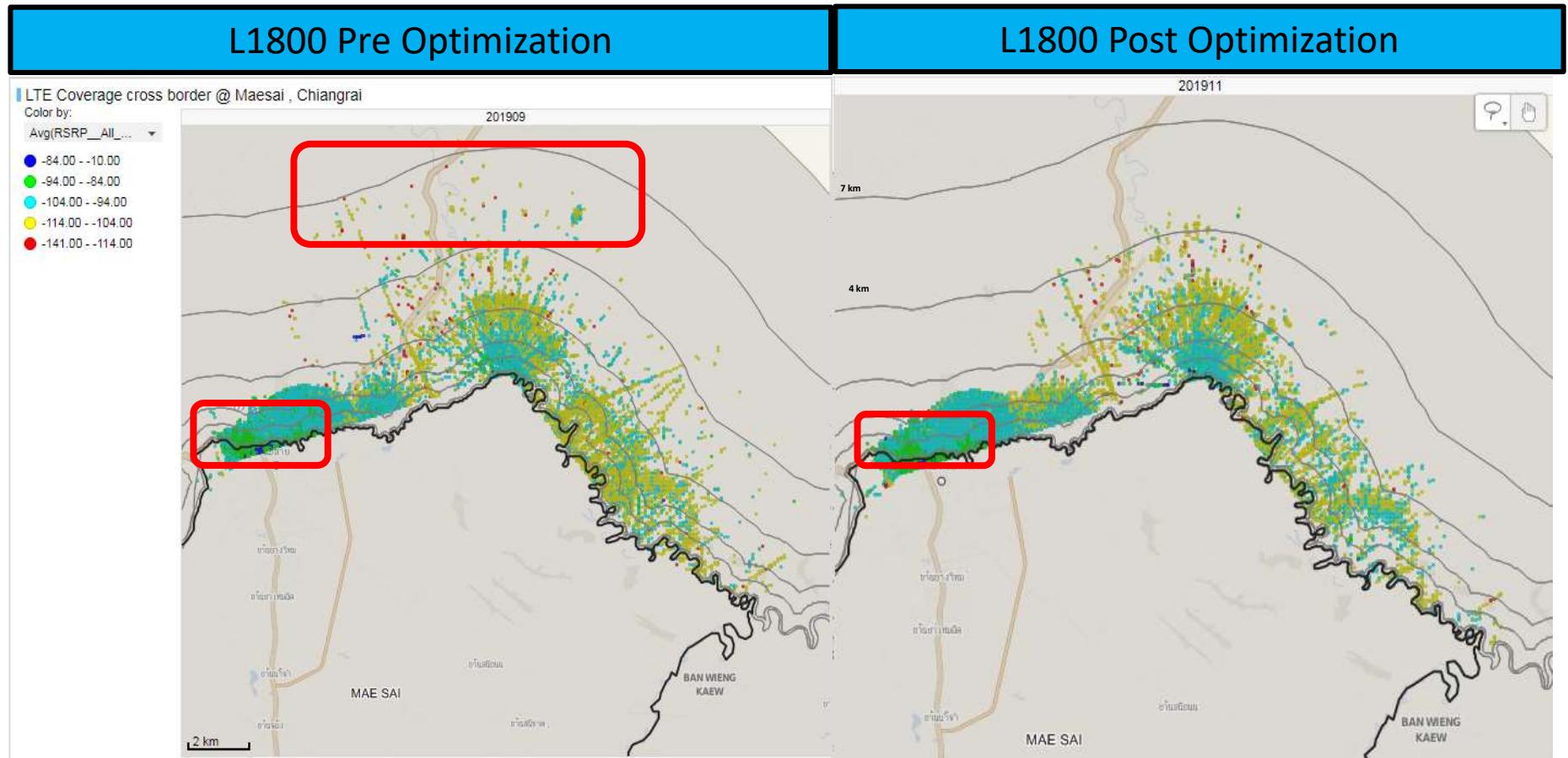
TML's Feedback: Need more optimization from TUC



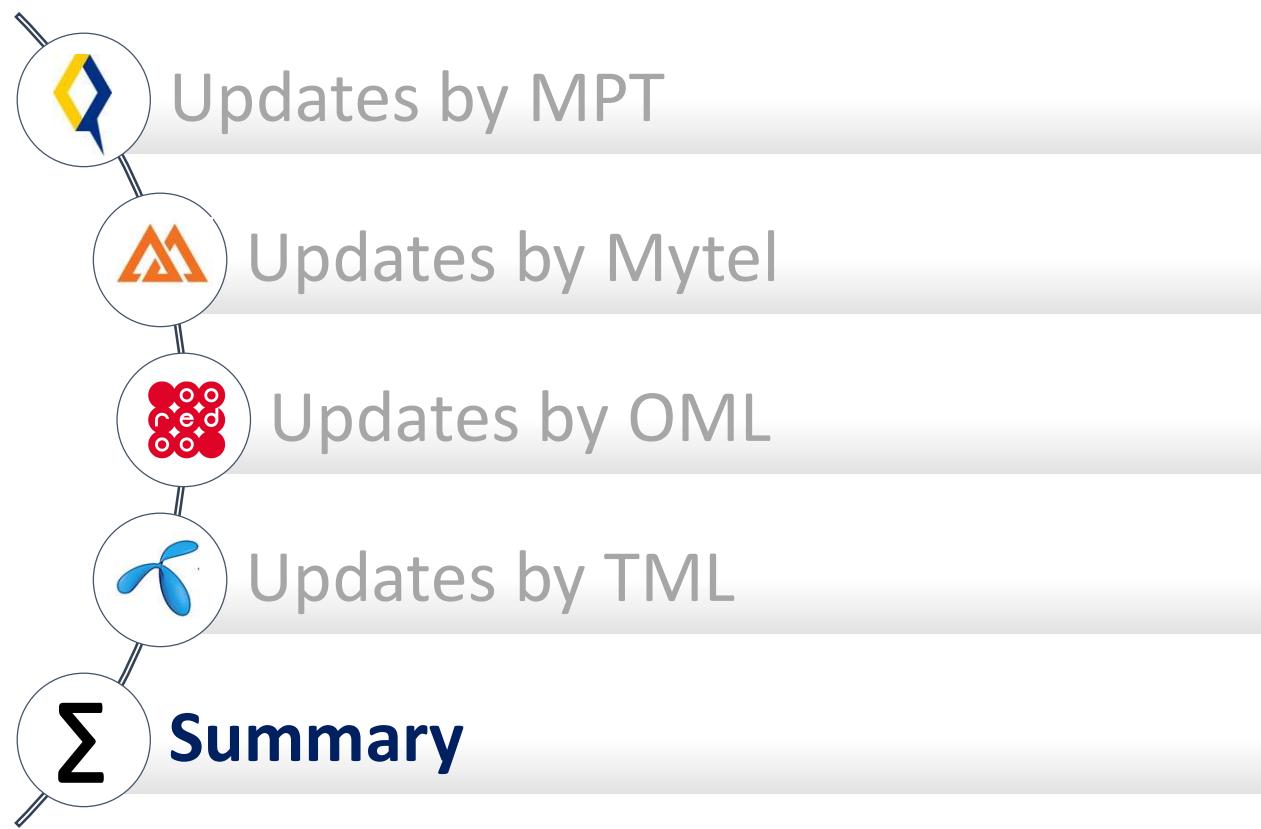
Pre & Post Optimization Status for AWN in Tachileik City

Coverage simulation shared by AWN. TML DT is on-going.

TML's Feedback : Need further optimization from AWN



Contents



Summary

Coordination cases of existing networks

- MPT: 83 cells (actions taken for 24)
- Mytel: 60 cells (12 improved, rest pending)
- OML: 66+30 cells (26 closed, rest pending)
- TML: 28 cells (2 improved, rest pending)
- To discuss further among MNOs to find ways for more effective handling in future

Other Topics in JTC-3

- Reviewed Three Pagodas proposal from Thai MNOs for further discussion
- Reviewed 2600 MHz coordination parameters proposal from NBTC for further discussion



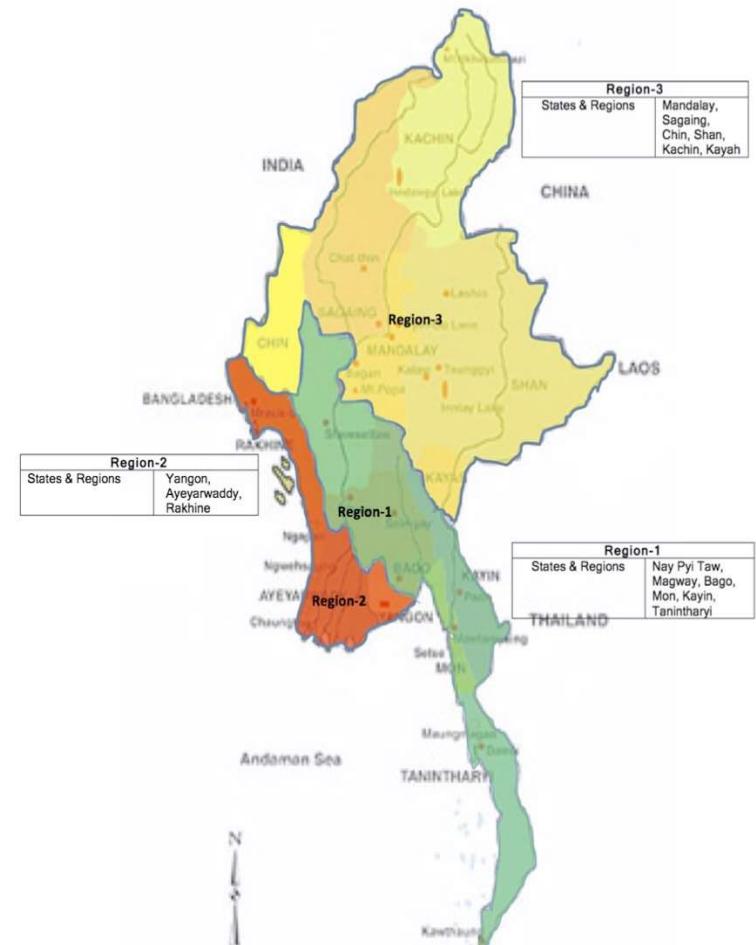
INFORMATION EXCHANGE ON 2600 MHZ BAND

14th January 2020

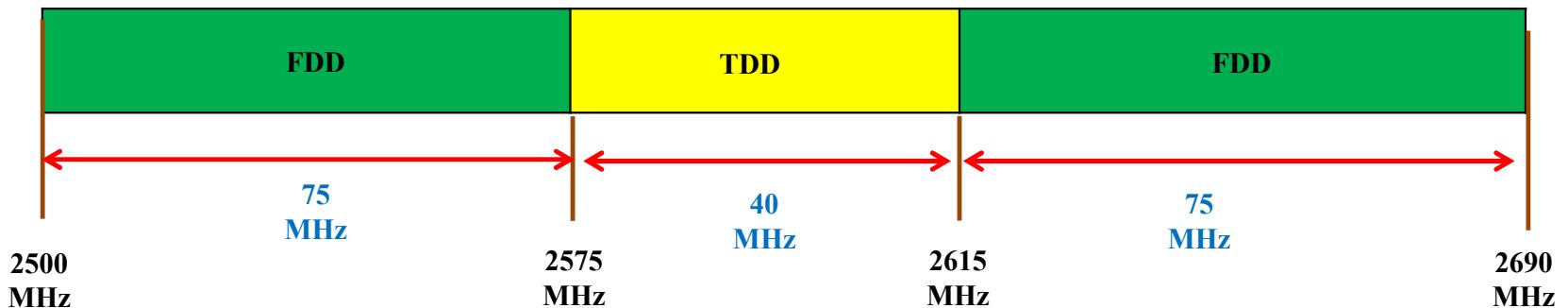
3rd Joint Technical Committee along Myanmar-Thailand Common Border

2600 MHz Spectrum Allocation in Myanmar

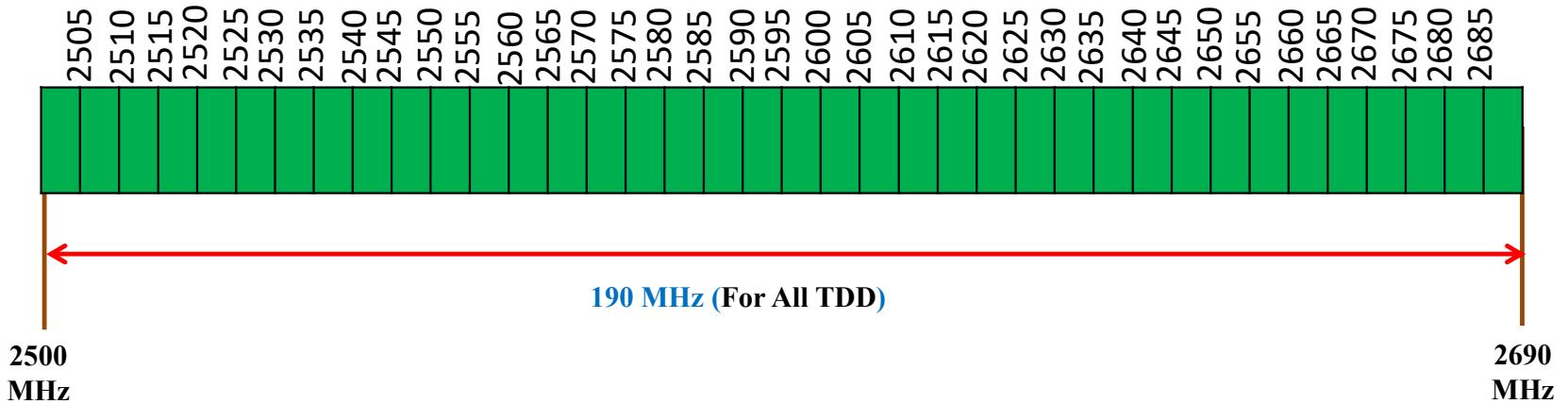
Successful spectrum auction of regional 2.6 GHz spectrum in 2016



Previous Band Plan of 2600 MHz Band in Myanmar



PTD adopts the Band Plan (Band 41) as follow;



Network Synchronization

As Thailand proposed, Myanmar also adopts the following Frame Structure for the 2600 MHz Band.

Technology	sub-carrier spacing (kHz)	DL/UL ratio
LTE	15	4:1
NR	30	8:2

Coordination Parameters for 2600 MHz Band

- As per Thailand's Proposal on coordination parameters for 2600 MHz, Myanmar will make the stakeholder consultation and will update in the upcoming meeting.
- As a conclusion, the meeting is invited to take note of this presentation.

Thank You

Digital Terrestrial TV Broadcasting of The Republic of the Union of Myanmar



Frequency Usage

➤ Analogue Transmission

- VHF Band III 174 ~ 230 MHz
- UHF Band IV & V 470 ~ 686 MHz
- Bandwidth 6 MHz
- Standard NTSC- M

- VHF Frequencies are used MRTV, Forever Group & Shwe Than Lwin Media Co.,Ltd joint ventured with MRTV and Myawaddy Television.
- Based on station location and nature of analogue mode, usage of channel frequency will have to start with 2nd Adjacent and so on.

J-6

J-7

J-8

J-9

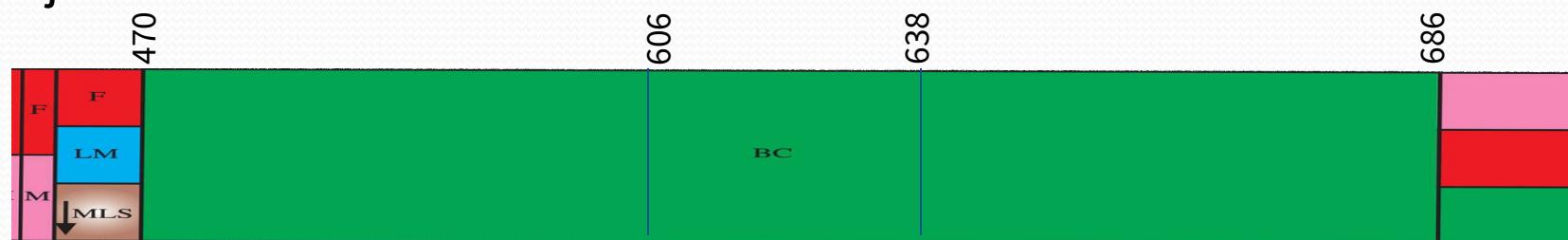
J-10

J-11

J-12

Frequency Usage

- Digital Transmission
 - UHF Band IV & V 470 ~ 686 MHz
 - Standard DVB-T/T2,Bandwidth 8 MHz
- PTD allowed 470 ~ 606 MHz for MRTV and 638 ~ 686 MHz to MWD TV.
- 470 ~ 606 MHz are used MRTV, Forever Group, Shwe Than Lwin Media Co., Ltd joint ventured with MRTV



- Based on allowed spectrum 136 MHz by PTD to MRTV , MRTV divided “Even” and “Odd” numbers and these are assigned to our existing stations.

Station-A	E-21	E-23	E-25	E-27	E-29	E-31
Station- B	E-22	E-24	E-26	E-28	E-30	E-32

MRTV Television Broadcasting

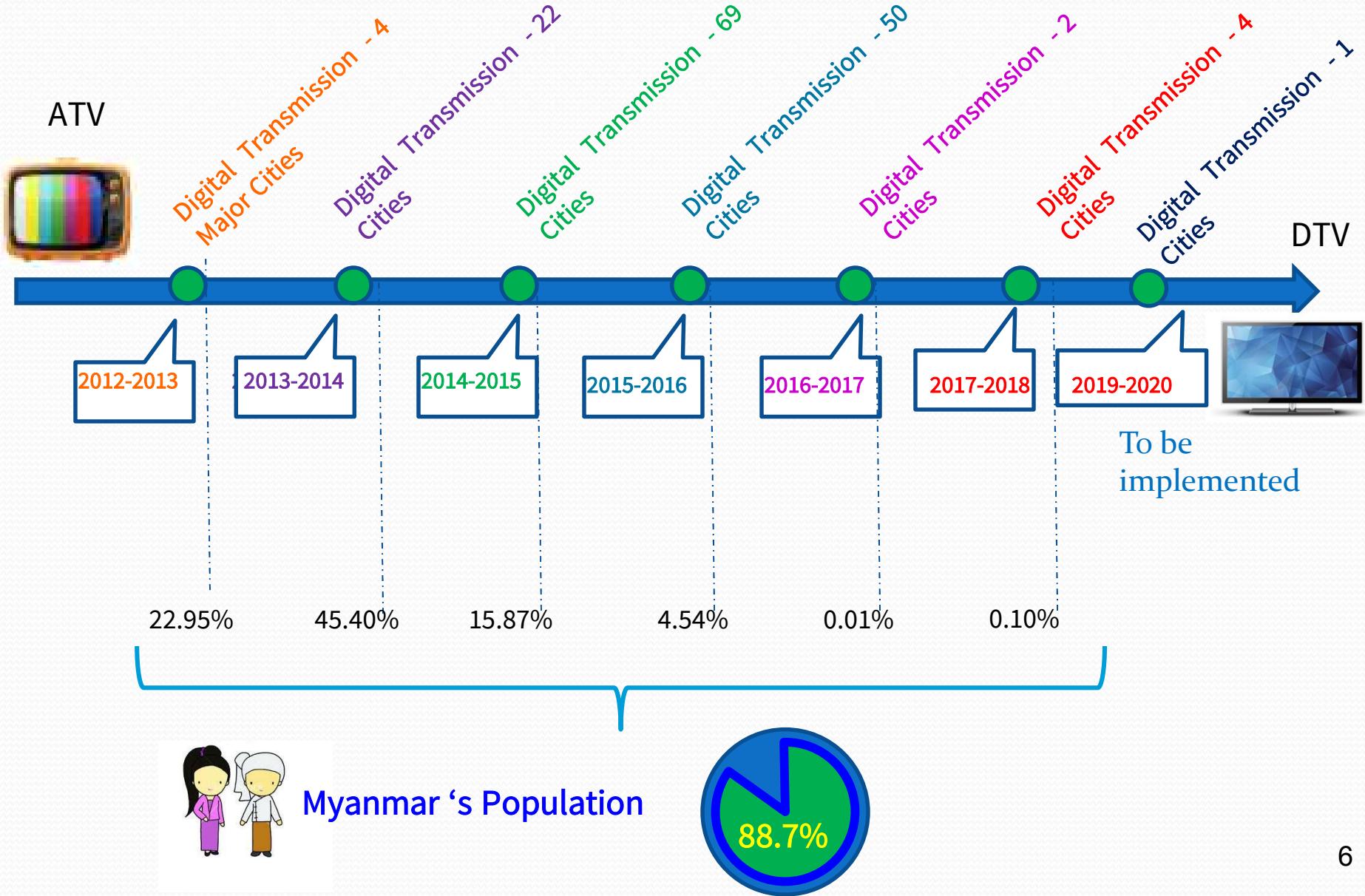
- MRTV started TV terrestrial broadcasting in 1980 with NTSC in Color.
- Retransmitting stations 258 Nos.
- Population Coverage 92.7%



Migration of Analog to Digital Broadcasting

- In 2008, DVB-T standard was adopted as National Standard.
- ITU and ASEAN mandated ASEAN countries to migrate Digital Broadcasting and to switch off Analog transmission in 2020 .
- In 2005, Forever Group Co., Ltd jointed ventured with MRTV, started broadcasting MRTV , MRTV-3 , MRTV-4 and 5 Network programs in Digital Video Broadcasting-Terrestrial (DVB-T) .
- In 2012, Myawaddy Television also broadcasted DVB-T in which 6 Digital TV programs and one radio program from 13 remote stations.

Digital Transition Process



Phase by phase Migration

- As in the first phase. in physical year (2012-2013), MRTV started broadcasting of DVB-T2 with MRTV | MITV | NRC | Hluttaw & Farmer Channels.
- Up to now, total numbers of 17 channels are transmitted .
- Transition to DVB-T2 implementation was based on Economic Development, Population Density, Available of City Power and also to get involve in equal ratio of state and division.
 - (a) In fiscal year (2012-2013) , the four main cities, Yangon, Sagaing and Pyinmana (Naypyitaw) and Tatkon was digital switch on. Population coverage is 22.95%.

Phase by phase Migration

- Second Phase FY (2013-2014), 22 stations was implemented and population coverage was 45.40% .
- Third Phase, FY (2014-2015), 69 stations was implemented and population coverage was 15.87 % .
- Fourth Phase, FY (2015-2016), 50 stations was implemented and population coverage was 4.54 % .
- Fifth Phase, FY (2016-2017), 2 stations was implemented and population coverage was 0.01 % .
- Sixth Phase, FY (2017-2018), 4 stations was implemented and population coverage was 0.10 % ..
- Total of 151 Digital TV stations with the coverage is 88.87%

Transmission Parameter

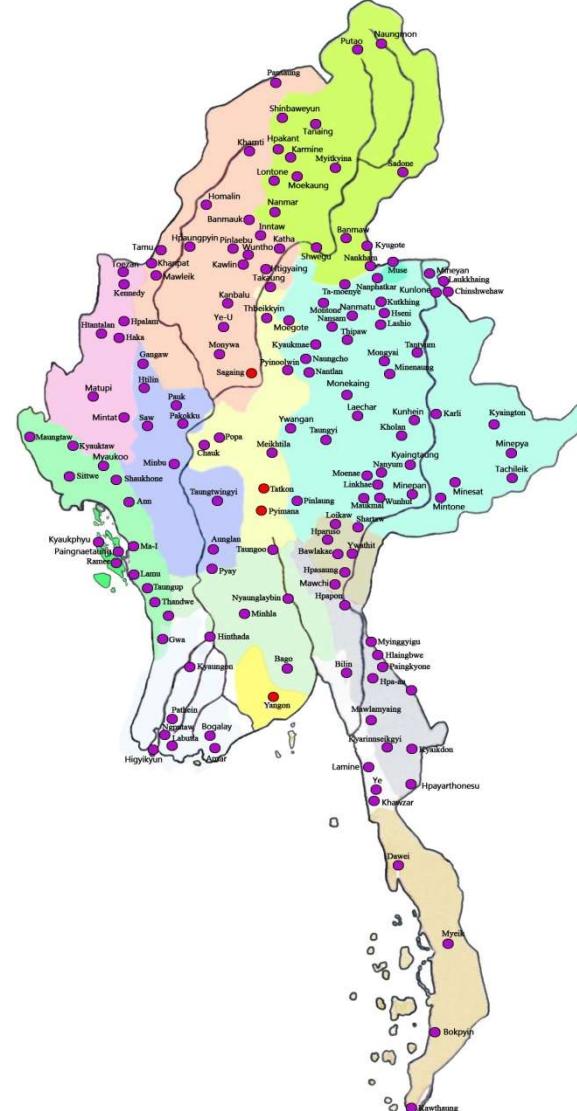
➤ MRTV

Gi	1/16, 112 μ sec,
Modulation	64 QAM
Bandwidth	8 MHz (Extended)
Bit Rate	32 Mbps
Required Raw C/N	15.5 dB
PLP	Single PLP
Code Rate	4/5
FFT Length	16k
Frequency usage	Multi frequency Network (MFN)

➤ MWD

Gi	1/8
Modulation	64 QAM
Bandwidth	8 MHz
Bit Rate	26 Mbps
Required Raw C/N	12 dB
PLP	Single PLP
Code Rate	3/4
FFT Length	8k
Frequency usage	Multi frequency Network (MFN)

Phase by phase Migration



FM Frequency Usage

- VHF Band II ; 87 ~ 108 MHz
- Channel Bandwidth; 300 KHz
- FM broadcasters are MRTV, Thazin FM , City FM, Mandalay FM, Pyinsawaddy FM, Cherry FM, Shwe FM, Padamyar FM, FM Bagan.
 - MRTV FM 84 Stations
 - Thazin FM 35 Stations
 - City FM 1 Station (Only in Yangon)
 - Mandalay FM 9 Stations
 - Pyinsawaddy FM 7 Stations
 - Shwe FM 17 Stations
 - Cherry FM 20 Stations
 - Padamyar FM 17 Stations
 - FM Bagan 13 Stations

FM Frequency Usage

- VHF Band II ; 87 ~ 108 MHz
 - Channel Bandwidth; 300 KHz
 - The first channel started with 88.0 MHz and with the channel spacing of 300 KHz, the channel numbers are assigned as follows;
- | | | | | | |
|------|----------|------|----------|------|----------|
| CH-1 | 88.0 MHz | CH-2 | 88.3 MHz | CH-3 | 88.6 MHz |
| CH-4 | 88.9 MHz | CH-2 | 89.2 MHz | CH-3 | 89.5 MHz |
- Assigning Channels
 - At the same station, 1.2 MHz of channel spacing .
 - At the same coverage area, channel spacing will be at least 800 KHz.(3rd Adjacent CH, 4th Adjacent Channel).
 - This plan is former assignment frequency planning , most of the broadcasters are still using this plan.

FM Frequency Usage

- VHF Band II ; 87 ~ 108 MHz
- Channel Bandwidth; 100 KHz
- The first channel started with 87.6 MHz and with the channel spacing of 100 KHz,
the channel numbers are assigned as follows;

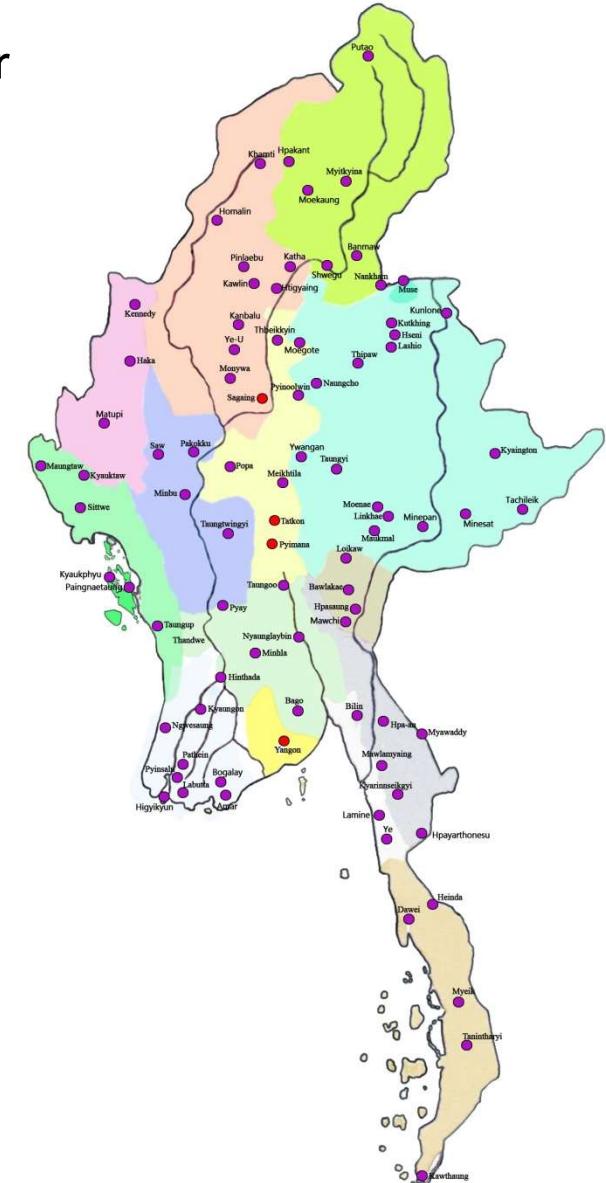
Block	F ₁	F ₂	F ₃	F ₄
1a	87.6	92.6	97.6	102.6
2a	87.7	92.7	97.7	102.7
3a	87.8	92.8	97.8	102.8
4a	87.9	92.9	97.9	102.9

Block	F ₁	F ₂	F ₃	F ₄
1b	90.1	95.1	100.1	105.1
2b	90.2	95.2	100.2	105.2
3b	90.3	95.3	100.3	105.3
4b	90.4	95.4	100.4	105.4

- The channel numbers are assigned at 258 retransmitting stations through out the country .
- All FM Broadcasters as well as MRTV will have to migrate new FM plan.

MRTV FM Radio Broadcasting

- FM Radio Broadcasting - 2004 Year
- FM retransmitting stations - 84 Nos.
- Population Coverage - 78.84 %
- ❖ National Races Channel - 30 Nos.
Only for two hours



Private Broadcasters

- Forever Group Co., Ltd broadcasting from 2015 to till now, broadcasts 4 SD, 2 HD and 2 Radio as in FTA programs from their 25 remote stations.
- MRTV-4 Analogue FTA channel is broadcasted in all of its 25 stations and Channel-7 FTA Programs as in 13 of 25 stations.
- Shwe Than Lwin media Co., Ltd firstly broadcasted MNTV,MITV, MRTV Entertainment Analog FTA programs since 2015 and MNTV FTA Programs in 12 remote stations since 2016.

MWD Television

- Myawady Television have started analog transmission since 1995. Now, 8 sites are transmitting MWD channel while another 14 sites are transmitting MWD Documentary and MWD Shopping channel in analog format.
- In 2012, Myawady Television also broadcasted DVB-T in which 6 Digital TV programs and one radio program from 13 remote stations.
- All migration processes for ASO-DSO plan are already done and will be followed by guidance and policy of government.
- UHF band IV & V is currently used for DVB-T transmission and migration plan from DVB-T to DVB-T2 is estimated to be done before 1st April, 2020.

Programs in MRTV digital network

- Users was easily to tune their tube TV with analog antenna in Analog mode.
- To receive to digital, users will have to use Digital TV build in DVB-T2 tuner or Set to Box (Digital to Analogue Converter) connected with UHF receiving antenna.
- There are 17 FTA Programs in MRTV's multiplex, namely; MRTV , MITV, MRTV Entertainment , MRTV Sport , MRTV-4, Channel 7, 5 Plus , MNTV, Channel 9, Mizzima TV, DVB Channel , Channel -K, Fortune TV and YTV.
- Depending on the remote station' location , public can access other 8 FTA programs including of MRTV 's 17 FTA programs.

Challenges for Analogue Switch Off

- ❖ Myanmar, country's ASO target is in 2020.
- ❖ Till now, Transmission is in simulcast mode. More over, also private broadcasters transmit still in analogue FTA channels.
- ❖ So the following preparations would be needed ;
 - public awareness (TV, radio, Newspaper, Social websites)
 - Have to make policy and regulations for ASO and DSO.
 - Establishment of ASO commission
 - Planning of ASO (region by region or station by station)
 - To provide duty concessions for hardware imports (Set top box, DTV)

FM Frequency Coordination

No	Name	Frequency	Future usage	Max E.R.P (KW)	GPS	Border Distance	Ht(m)		
1	Wan Pone	J-10(2-7-11)(A)	E30,E32 E26,E34	0.08	20°24'32.54"N	2.05 Km	30		
			87.8,92.8,97.8,102.8,90.3,95.3,1 00.3,105.3	5	100° 6'6.81"E				
2	Tachileik	E-27(2-2-15)(D)	E27,E29 E31,E33 E-44,45	0.93	20°27'0.53"N	6 Km	30		
		J-6(2-4-03) (A)							
		93.3 (28-5-04)	89,89.5,94,96.5,99,101.5,104,10 7.8	20	99°52'44.86"E				
		89.8 (23-2-10)							
		89.5							
3	Ponpar Kyin	J-9(17-5-02)(A)	E30,E32 E26,E34	0.01	19°53'24.38"N	9.17 Km			
			89.3,94.3,99.3,104.3	5	98° 56'21.43"E				
4	Homein	J-7(4-3-97)(A)	E26,E28 E30,E32	0.04	19°45'40.39"N	6Km	30		
			87.6,88.6,89.5	5	97°58'46.99"E				
			90.2,95.2,100.2,105.2						
5	Myawaddy	E-23(4-1-15)(D)	E23,E25 E22,E28 E42,43	0.54	16°40'51.73"N	0.7 Km	30		
		J-7(28-6-96)(A)							
		E-21(FG)							
		89.0 (6-5-2004)	88,93,98,103,90.5,95.5,100.5, 105.5	5	98°30'31.92"E				
		89.8(12-11-09)							
		89.5							

FM Frequency Coordination

No	Name	Frequency	Future usage	Max E.R.P (KW)	GPS	Border Distance	Ht(m)		
6	Hpayarthonesu	E-21(2-1-16)(D)	E21,E24 E22,E28	0.08	15°18'18.16"N	1.05 Km	30		
		J-6(8-9-96)(A)							
		88.3 (2-1-2016)	88.4,93.4,98.4,103.4,89.6,94. 6,99.6, 104.6	5	98°22'40.56"E				
7	Kawthaung	E-22(14-1-16)(D)	E21,E22 E35,E36 E42,43	0.45	9°59'23.00"N	10 Km	30		
		J-6(25-4-93)(A)							
		88 (10-7-2015)							
		89.8(14-8-10)	89.1,94.1,99.1,104.1,91.6,96. 6,101.6,106.6,88.6	20	98°33'7.48"E				
		88.6							
8	Khamaukgyi	J-8(18-7-05)(A)	E26,E30 E32,E34 E-44,E45	0.01	10°20'2.92"N	14 Km	30		
			89.7,94.7,99.7,104.7	5	98°37'12.53"E				
			87.6,88.6,89.5						
9	Mese	J-6(4-7-00)(A)	E26,E28 E30,E32 E42,43	0.04	18°38'31.64"N	12 Km	30		
			90.6,95.6, 100.6,105.6	5	97°39'3.89"E				

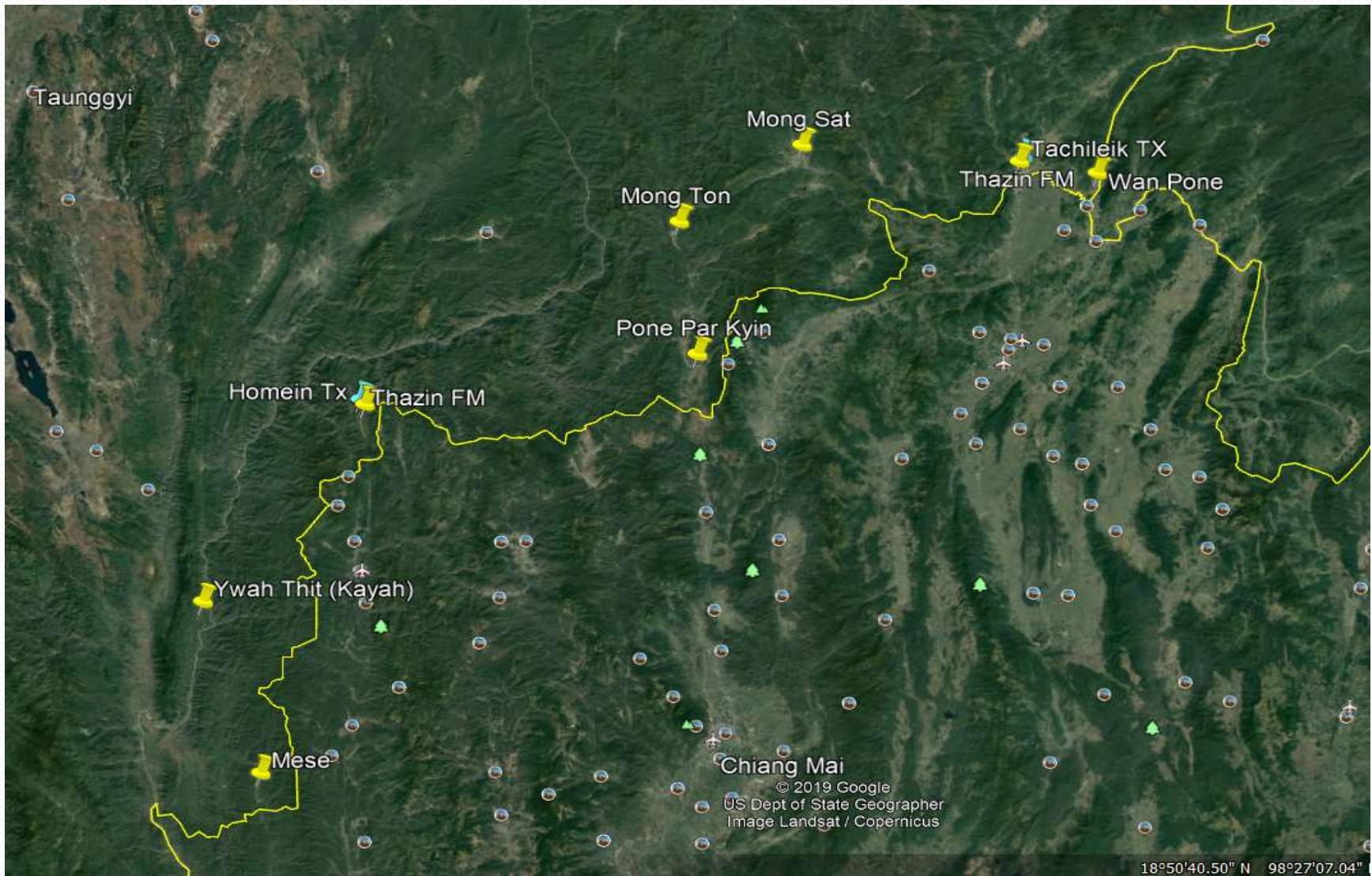
FM Frequency Coordination

No	Name	Frequency	Future usage	Power	GPS	Border Distance	Ht(m)
10	Maryan	J-6 (15-9-04) (A)	E27,E29 E31,E33	0.04	10°24'29.13"N	1.2 Km	30
			88.0, 90.5, 93.0, 95.5, 98.0, 100.0, 103.0, 105.5	5	98°45'56.20"E		
11	Minesat	E-22, J-10 89.2	E30,E32 E26,E34 E42,E43	0.08	20°31'4.53"N	25.32	30
			90.0,95.0,100.0,105.0	5	99°15'19.84"E		
12	Mongtone	J-8	E30,E32 E26,E34	0.04	20°17'37.94"N	29	30
			82.7,92.7,97.7,102.7	5	98°53'47.53"E		
13	Shanywarhit	J-13(21-1-2014)	E30,E32 E26,E34	0.04	17°25'24.11"N	15	30
			88.4,93.4,98.4,103.4	5	97°53'5.06"E		
14	Kyaikdon	J-9(11-7-97)	E30,E32 E26,E34	0.15	16° 0'15.36"N	18	30
		E-21(9-1-16)	90.0,95.0,100.0,105.0	5	98°23'37.41"E		

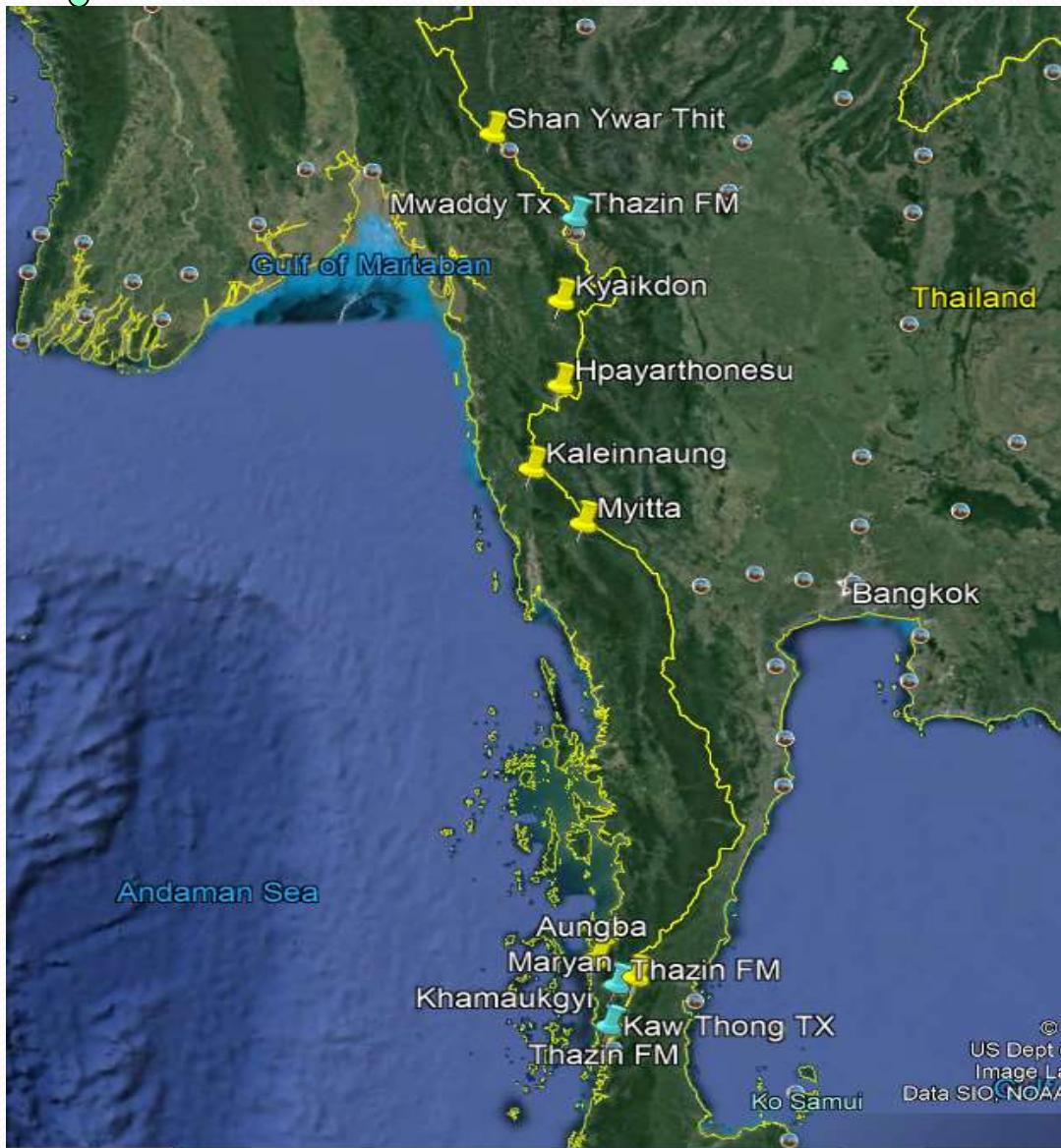
FM Frequency Coordination

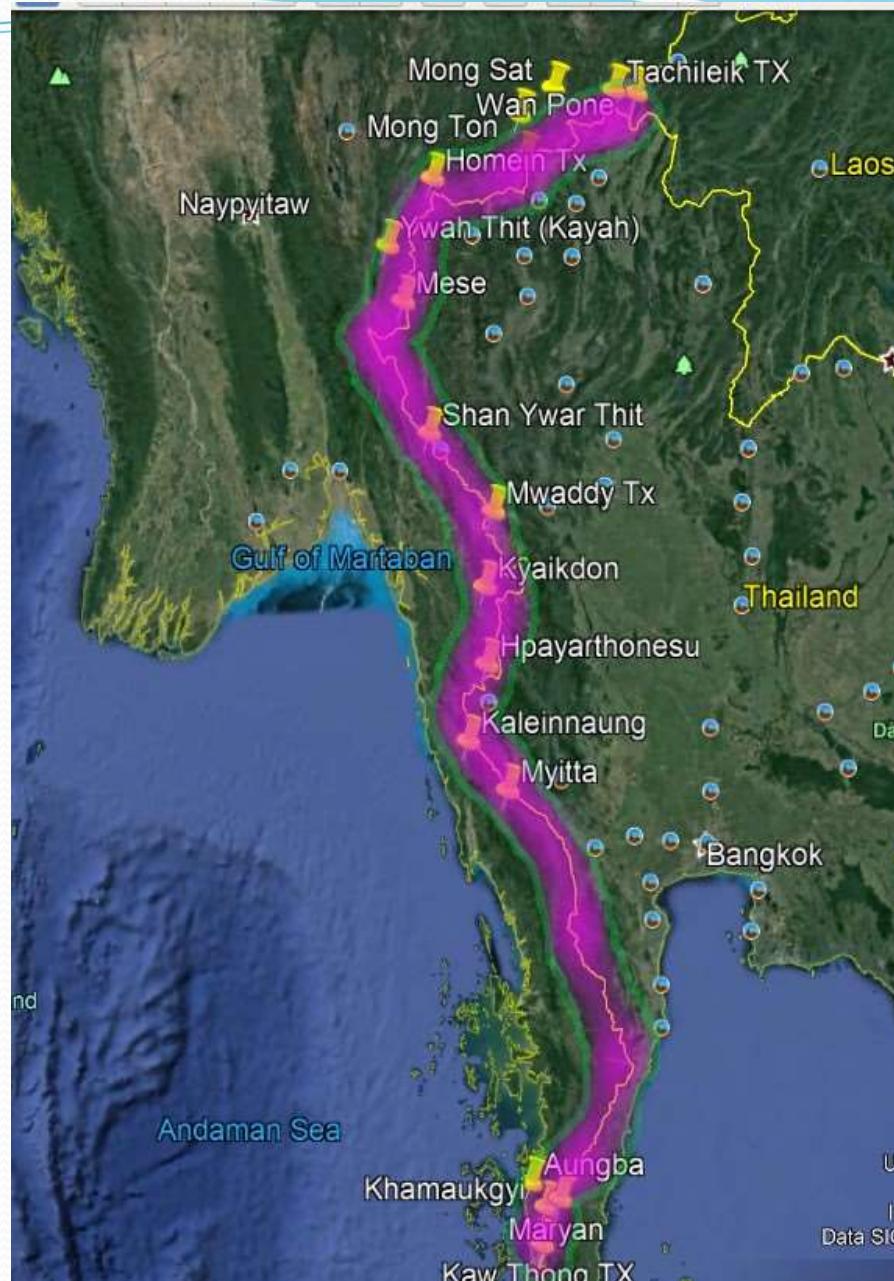
No	Name	Frequency	Future usage	Power	GPS	Border Distance	Ht(m)
15	Kaleinaung	J-12(2-7-94)	E27,E29,E31,E33	0.04	14°37'28.06"N	20	30
			90.9,95.0,100.9,105.9	5	98° 9'10.86"E		
16	Myitta	J-8(8-7-05)	E27,E29 E31,E33	0.08	14° 9'51.05"N	21	30
			91.9,96.9,101.9,106.9	5	98°31'13.46"E		
17	Aungba	J-6(2-10-96)	E27,E29 E31,E33	0.04	10°34'3.20"N	36	30
			88.3,93.3,98.3,103.3	5	98°29'10.43"E		

FM Frequency Coordination

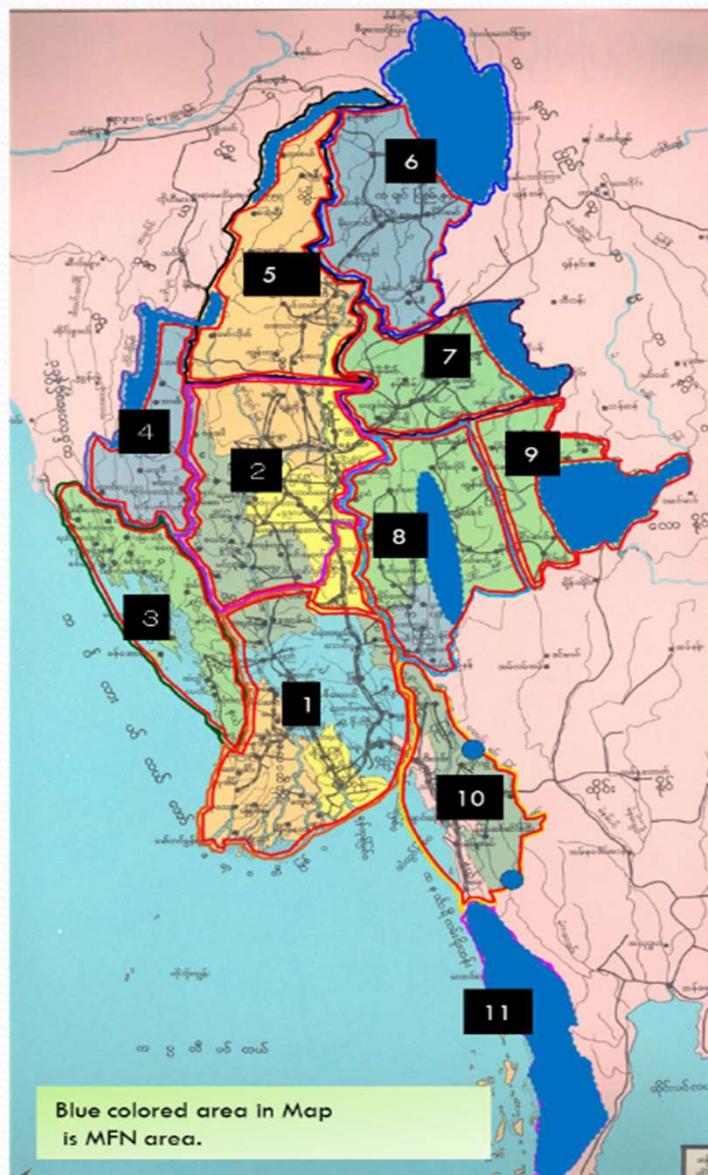


FM Frequency Coordination





Broadcasting Zones



Map of broadcasting zones	
Zone	Regions/States
1	Yangon, Bago, Ayeyarwaddy
2	Sagaing (Southside), Magway, Mandalay
3	Rakhine
4	Chin, Sagaing (two stations in Westside)
5	Sagaing(Northside)
6	Kachin
7	Shane North
8	Shane South, Kayah
9	Shan East
10	Mon, Kayin
11	Tanin Tharyi

Border Stations

No	Station Name	State/Region	Channels		Type	Max ERP (kW)	Max H (ant) (meters)
1	Wanpon	Shan(East)	J-10	E30,E32 E26,E34	MFN	0.08	30
2	Tarchileik	Shan(East)	J-6, E-27	E27,E29 E31,E33 E-44,45	MFN	0.93	25
3	Ponparkyin	Shan(East)	J-9	E30,E32 E26,E34	COM	0.01	30
4	Minesat	Shan(East)	J-10, E-22	E30,E32 E26,E34 E42,E43	SFN	0.08	30
5	Mong Tone	Shan(East)	J-8	E30,E32 E26,E34	COM	0.04	30
6	Ho - Maing	Shan(South)	J-7, E-23	E26,E28 E30,E32	MFN	0.04	30
7	Mese	Kayah	J-6	E26,E28 E30,E32 E42,43	MFN	0.04	30
8	Shanywathit	Kayin	E-21	E30,E32 E26,E34	SFN	0.04	30
9	Myawaddy	Kayin	J-7, E-21	E23,E25 E22,E28 E42,43	MFN	0.54	50
10	Kyaikdon	Kayin	J-9, E-21	E30,E32 E26,E34	SFN	0.15	30

Border Stations

No	Station Name	State/Region	Channels		Type	Max ERP (kW)	Max H (ant) (meters)
11	Hpayarthon esu	Kayin	J-6,E-21	E21,E24 E22,E28	MFN	0.08	30
12	Kaleinaung	Tanin Tharyi	J-12	E27,E29E31, E33	MFN	0.04	30
13	Myitta	Tanin Tharyi	J-8	E27,E29 E31,E33	S-M	0.08	30
14	Aungba	Tanin Tharyi	J-6	E27,E29 E31,E33	MFN	0.04	30
15	Marang	Tanin Tharyi	J-6	E27,E29 E31,E33	MFN	0.04	30
16	Kamoukyi	Tanin Tharyi	J-8	E26,E30 E32,E34 E-44,E45	MFN	0.01	30
17	Kawthaung	Tanin Tharyi	J-6,E-21	E21,E22 E35,E36 E42,43	MFN	0.45	30



Thank You



Common Frequency for Thailand-Myanmar for use during Emergency Situation

Seint Seint Aye
Director
Posts and Telecommunications Department





PPDR Spectrum in Myanmar

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

- PTD is considering part of the frequency range 694-894 MHz for PPDR in accordance with ITU-R Resolution 646 (Rev.WRC-15).



Frequency Allocation of Services in Myanmar

HF Bands (ASEAN framework)

Frequency (MHz) (Thailand Proposal)	National Frequency Allocation of Services in Myanmar	Myanmar Current Assignment
3.122, 3.351, 3.815, 3.925, 3.950	FIXED, MOBILE, AERONAUTICAL MOBILE (OR)	Not Assign (FIXED, MOBILE, AERONAUTICAL MOBILE (OR), AMATURE)
6.314, 6.3147, 6.4501, 6.771	FIXED, MARITIME MOBILE	Assigned (MARITIME MOBILE)
11.202, 11.217, 11.230	AERONAUTICAL MOBILE (OR)	
14.270, 14.275, 14.293, 14.303, 14.325	AMATEUR	

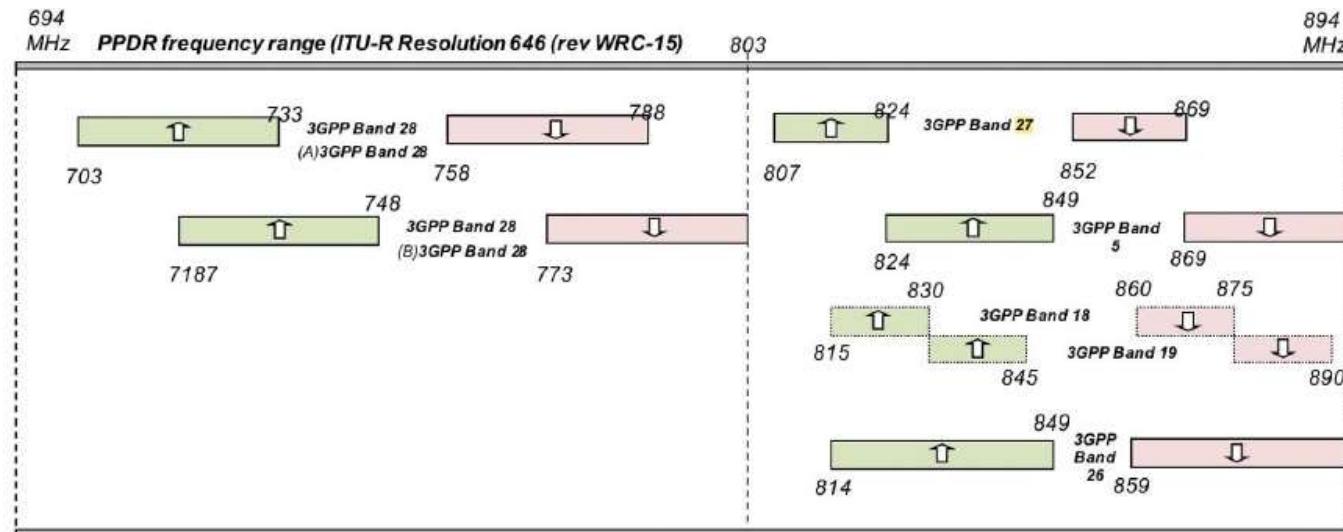
VHF and UHF Bands (UN framework)

Frequency (MHz) (Thailand Proposal)	National Frequency Allocation of Services in Myanmar	User
158.025	FIXED, MOBILE except aeronautical mobile	None
163.175	FIXED, MOBILE	
458.100	FIXED, MOBILE	
458.175	FIXED, MOBILE	



3GPP bands within the PPDR frequency range 694-894 MHz

PPDR frequency range (ITU-R Resolution 646 (rev WRC-15))



- 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).
- The decision of the 21st meeting of the APT-AWG includes the **LTE Band 28 (APT 700 MHz)** and the **LTE 800 MHz band 26** which are the two most commonly adopted public safety (PS)-LTE bands in Asia.



Myanmar Proposal of Common Frequency for Thailand- Myanmar for PPDR

PPDR	Proposed Frequency as common frequency between Myanmar-Thailand
Wideband	Part of LTE Band 26 (LTE 800) with bandwidth 2x10 MHz
Narrowband	406-430 MHz with channel spacing 12.5KHz

- Myanmar is considering HF and VHF band for PPDR based on the current utilization, ASEAN Framework and international practice. Myanmar will update for that issues in the upcoming JTC meeting or in alternative means.



Thank You



Reciprocal Address

By

Mr. Saneh Saiwong

Executive Director, Spectrum Management Bureau

**The Office of the National Broadcasting and Telecommunications Commission,
Thailand**

at

**“The 3rd Joint Technical Committee and Assignment of Frequencies along
the Myanmar-Thailand Common Border Meeting”**

14 - 16 January 2020, Bagan, Myanmar

Mr. Mayo Swe, Director General, Head of Myanmar Delegations

Delegates from Posts and Telecommunications Department, Distinguished Guests

Ladies and Gentlemen,

A Very Good Morning,

On behalf of the Deputy Secretary General, AM Thanapant Raicharoen, Head of Thai Delegations, who could not be here with us today but will join us later. I would like to express my sincere appreciation to Mr. Mayo Swe for welcoming all of us to Bagan, a sacred and historic city, which is known for its unique and beautiful

landscape. I would also like to thank PTD for its effort and the excellent arrangements to organize this third Joint Technical Committee on Coordination and Assignment of Frequencies along Myanmar-Thailand Common Border Meeting (or JTC-MT) here in Bagan.

We are grateful for the outcomes of 2nd JTC-MT meeting which was held in Chiang Mai, Thailand last year and we know that both sides have been working very hard to implement the agreed items of the 2nd JTC meeting. It is indeed my pleasure to see all familiar faces of friends and colleagues, and we sincerely hope that we will continue to work closely in the field of the radio frequency coordination, in particular, to reduce existing harmful interferences and to prevent any possible harmful interference that may also occur in the future.

We are committed to do our best not only on the interference issues but also on the sharing of the latest spectrum policy during this meeting and upcoming JTC meetings so that, together, we can keep up with the current technological trend especially with the pace of 5G development today.

Once again, I would like to express my profound thanks and sincere appreciation to PTD and the Myanmar delegations for the great hospitality and for being an excellent host for this 3rd JTC meeting.

I wish this meeting to be a very productive one.

Thank you very much.



THAILAND INFORMATION UPDATE

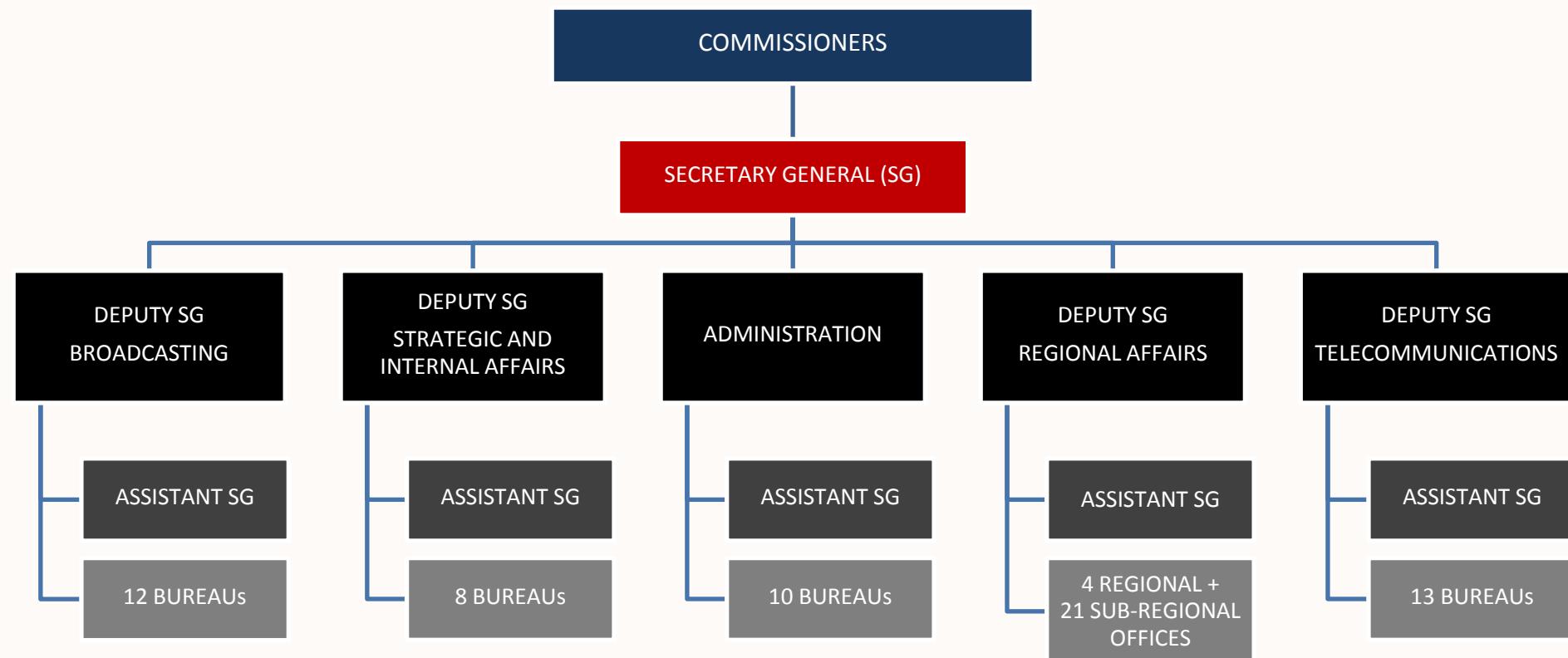
3rd Joint Technical Committee on Coordination and Assignment of Frequencies
along Myanmar-Thailand Common Border Meeting

14-16 January 2020
Bagan, Myanmar

- + NBTC Policy Update
- + Telecommunication Update
- + Broadcasting Update

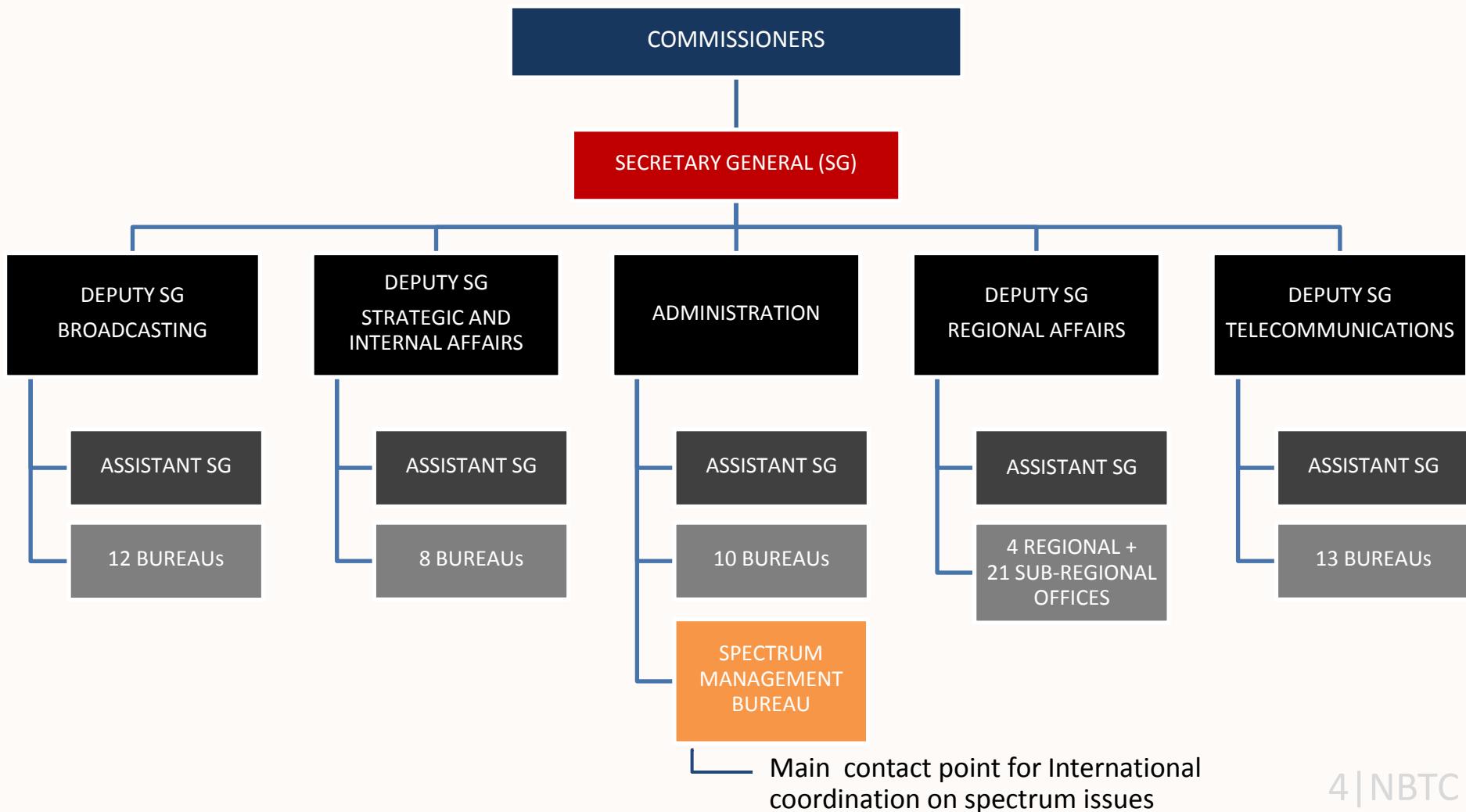


NBTC New Organization Structure



Effective Date: 8 October 2019

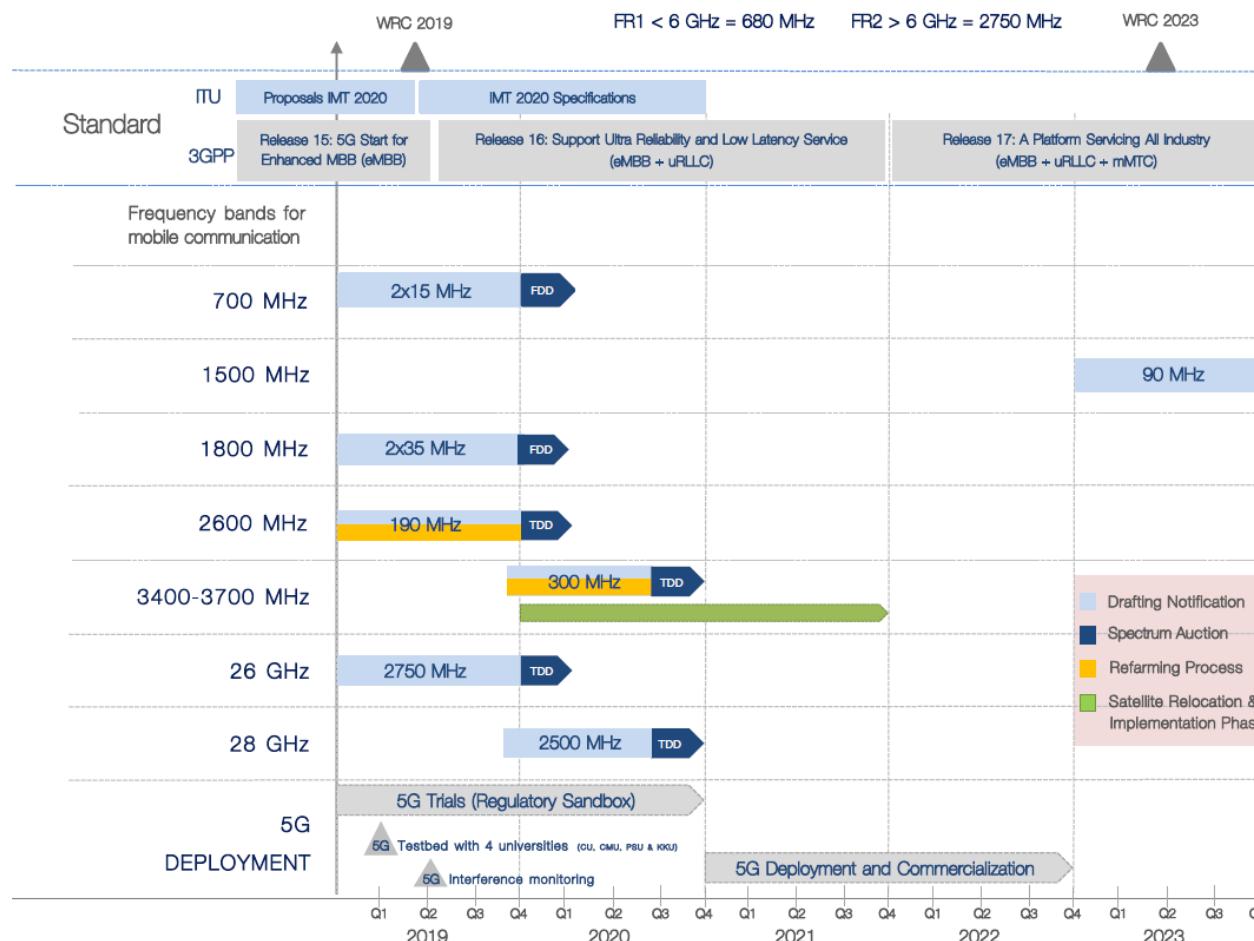
+ JTC Coordination



- + Spectrum Roadmap for Mobile Communication in Thailand
- + Spectrum Recall
- + Regulatory Sandbox
- + 2020 Multiband Auction



Spectrum Roadmap for Mobile Communication in Thailand (5-year plan)





Spectrum Recall for IMT

700 MHz

- Refarming 700 MHz from Digital TV
- Analogue switch-off by 2020
- Relocation of the frequency for wireless microphone
(2 x 30 MHz available by October 2020
2 x 15 MHz available by April 2021)

2600 MHz

- Refarming 2600-2690 MHz from Fixed Service
- IMT implementation planned for July 2020



- Thailand 4.0
- 5G Implementation
- IoT (Internet of Things)

+ Regulatory Sandbox



- Area based regulatory sandbox
- Loosen regulation during the R&D phase and pre-commercial stage to allow more flexibility in implementing emerging technologies in confined areas
- Manageable interference cases
- Maximum spectrum license of 2 years
- Currently, two universities (Chulalongkorn and Kasetsart) had been granted sandbox licenses



2020 Multiband Auction

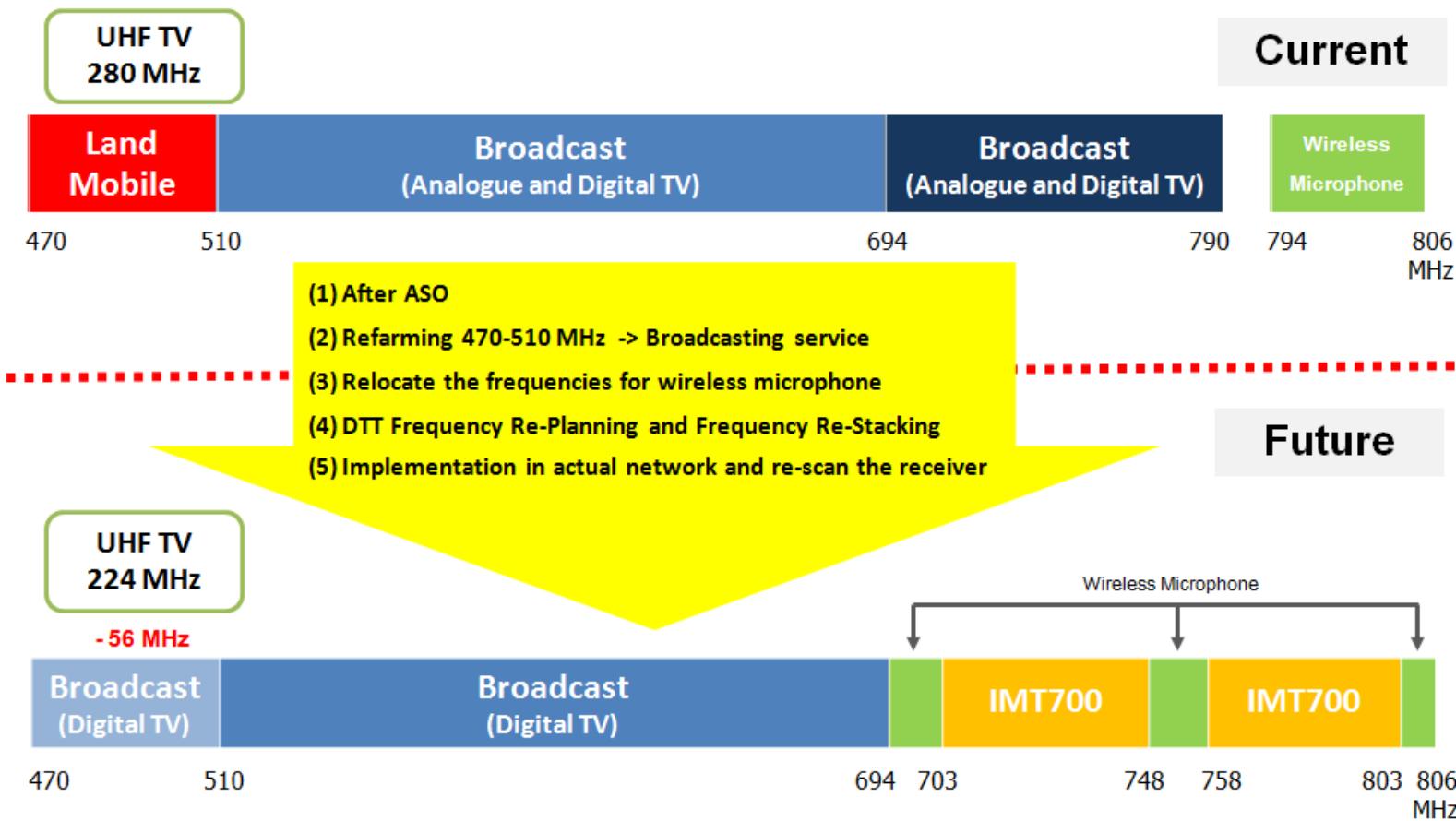
- Auction 700 MHz, 1800 MHz, 2.6 GHz and 26 GHz for IMT
(Total available spectrum: 2.99 GHz)
- National licenses
- Auction date is set for February 16, 2020
- Using Sequential Clock Auction



- + Frequency Refarm for DTTB
- + Digital Radio in Thailand



Steps to Release 470 MHz for Digital TV and 700 MHz for IMT in Thailand





Tentative Timeline to Release 700 MHz

Process	Tentative Timeframe	2019			2020			2021			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Analogue Switch Off	March 2020										
Frequency re-farming of 470-510 MHz	Q4 2019										
Relocation of the Frequency for wireless microphone	March 2012										
DTT Frequency re-planning	Q4 2019										
Implementation in DTT networks	2020										
Availability of 700 MHz of IMT	2x30 MHz by October 2020										
	2x15 MHz by April 2020										



Planning and Implementation

Frequency Plan

- NBTC Notification on DTTB Frequency Plan (to release 700 MHz) has been published in the Government Gazette on 25 November 2019.

Compensation for 700 MHz Reframing

- Rules and regulations for compensation was published.
- Subcommittee had approved the budget for 4 DTTB network operators to release 700 MHz.

Implementation Plan

- The implementation plan has been approved by NBTC.
- 700 MHz Reframing process to be completed by 30 September 2020.



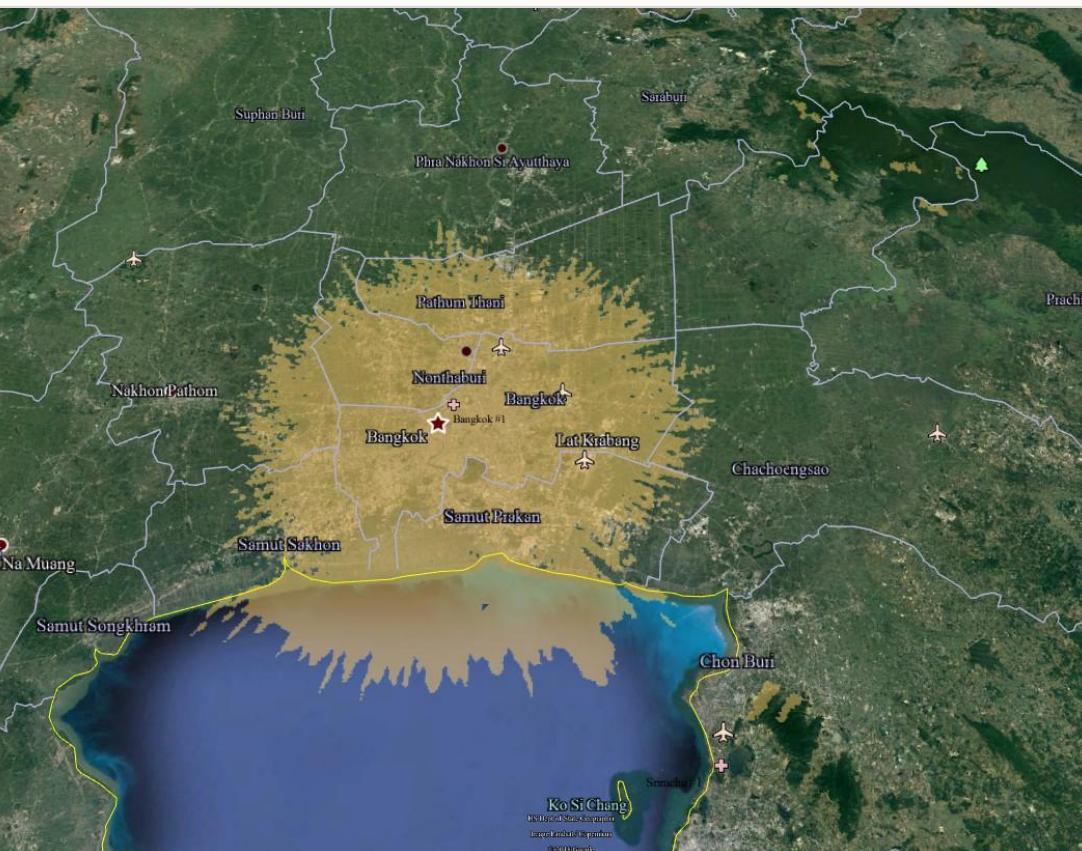
Digital Radio in Thailand (1/2)



The NBTC Frequency Plan for trial digital radio permits the use of 174 – 230 MHz for trial digital radio. The Plan includes 10 trial stations located in Bangkok, Chiang Mai, Chonburi (Pattaya and Sriracha), Khon Kaen, Nakhon Ratchasima, Nakhon Sri Thammarat, Phuket, Prachuap Khiri Khan and Songkhla.



Digital Radio in Thailand (2/2)



The first and the only one digital radio station, based on DAB+ technology, has been implemented in Bangkok since April 2019. It covers approximately 19.62% of total population and 0.88% of total area for portable indoor reception.

Thank you

Spectrum Management Bureau
87 Phaholyothin Rd.,
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NBTC



Interference Signal in the 850 MHz Band along Thailand-Myanmar Common Border



Content

- Cellular Interference
 - UMTS 850 MHz and CDMA 850 MHz
- Non-Cellular Interference
 - UMTS 850 MHz and Narrowband

The logo consists of the letters "CAT" in a white, sans-serif font, enclosed within a solid orange circle.

CAT

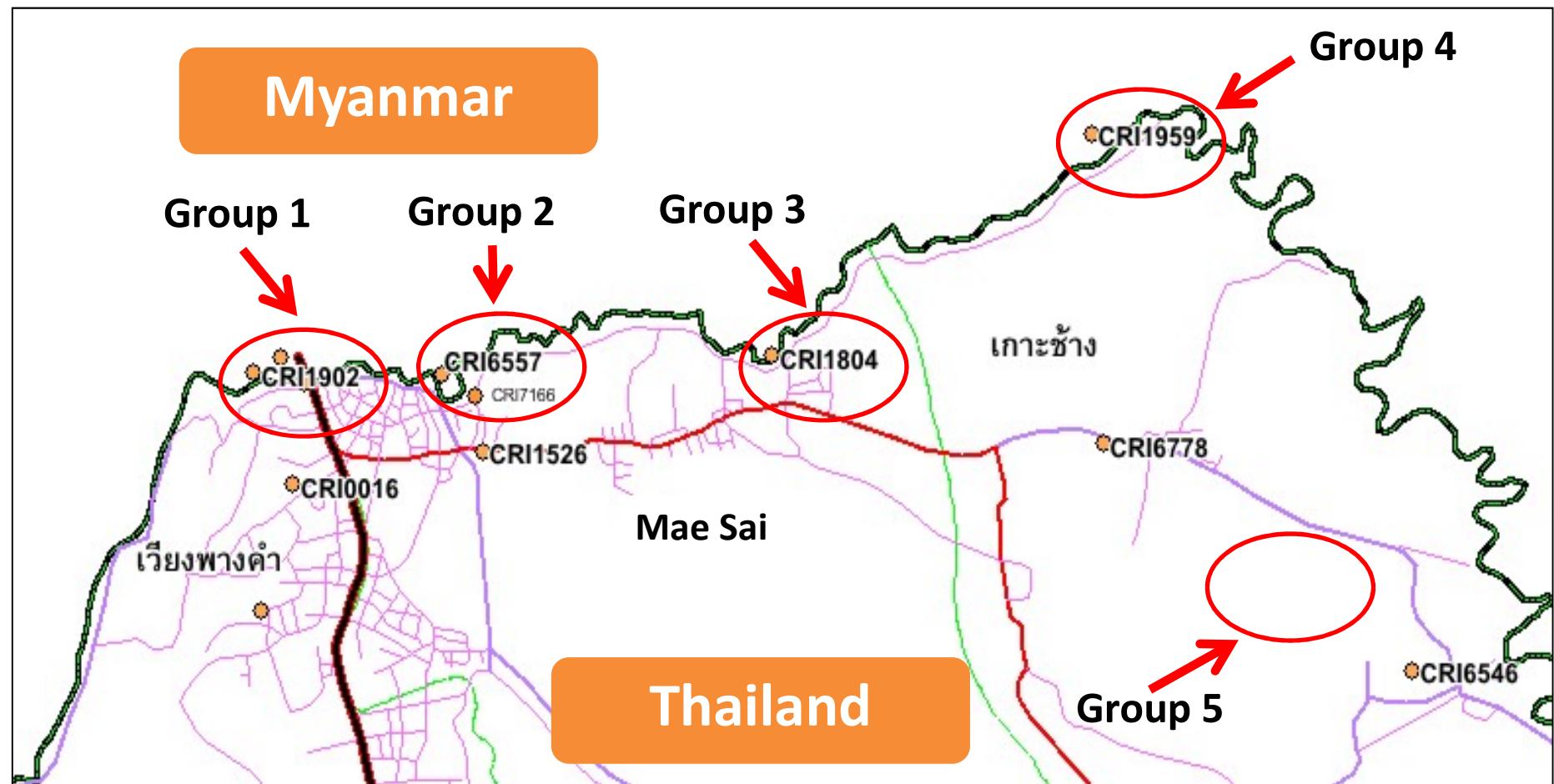
Content

- **Cellular Interference**
 - UMTS 850 MHz and CDMA 850 MHz
- Non-Cellular Interference
 - UMTS 850 MHz and Narrowband



CAT

Cellular Interference

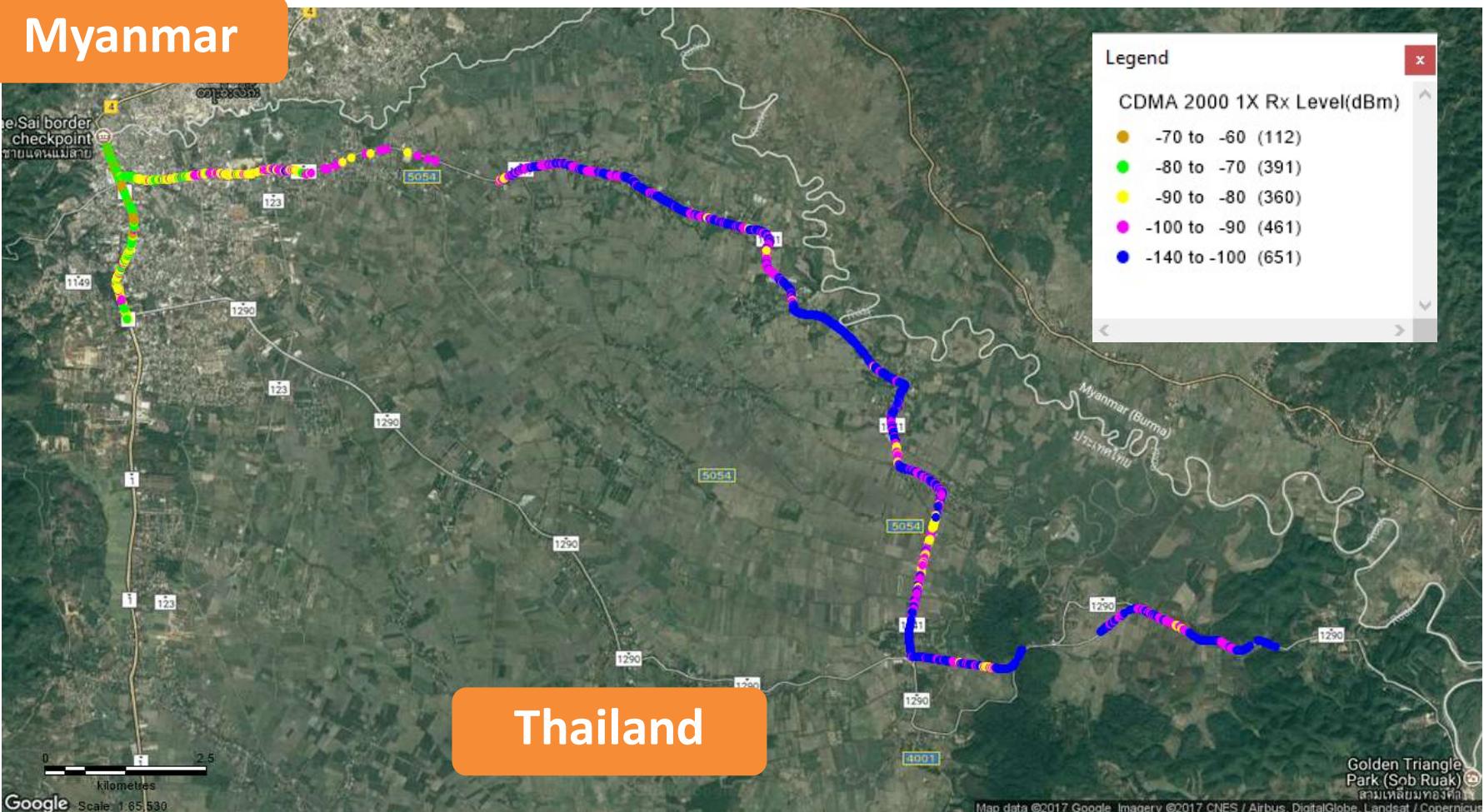


Problem Area : Mae Sai and Chiang Saen District in Chiang Rai Province

CAT

Cellular Interference

Myanmar



Thailand

CDMA 850 from Myanmar Coverage Plot too High on Mae Sai, Chiang Saen



Cellular Interference

cdma2000/1xEV-DO Scanner Top N View:1								
Top N: Default TopN Pool - Count: 6 - sorted: yes - Mode: Average - Time: 2.0s - Hyst: 2.0dB								
Top N List								
I #	Rank	Frequency	C..	Offset	MeasID	EcIo(dB)	RSCP(dB...)	P Total(...)
1	1	873.450 MHz (Channel 1#1)	C2K	357	0	-2.71	-61.68	-58.97
3	3	877.230 MHz (Channel 1#2)	C2K	357	0	-10.86	-75.09	-64.23
4	4	877.230 MHz (Channel 1#2)	C2K	21	1	-13.49	-77.72	-64.23
2	2	875.970 MHz (Channel 1#3)	C2K	357	0	-4.44	-64.51	-60.07
6	6	873.450 MHz (Channel 1#1)	C2K	21	1	-19.00	-77.97	-58.97
5	5	875.970 MHz (Channel 1#3)	C2K	21	1	-15.75	-75.82	-60.07

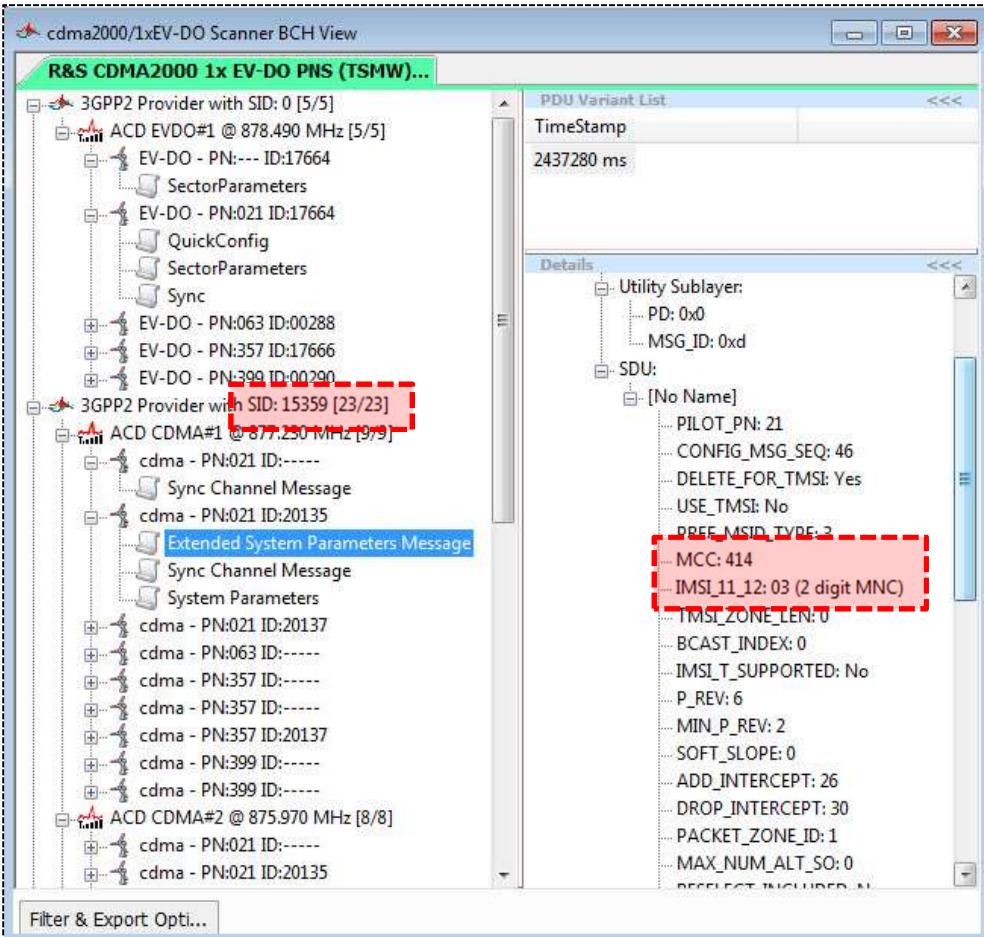
CDMA 850 MHZ Channel found :

- 1. Ch. No.155 (873.450 MHz)**
- 2. Ch. No.199 (875.970 MHz)**
- 3. Ch. No.241 (877.230 MHz)**

Result from Universal Radio Network Analyzer

The logo consists of the letters "CAT" in a bold, white, sans-serif font, enclosed within a circular border that is orange on top and grey at the bottom.

Cellular Interference



Operator information and Parameter Message Decoder

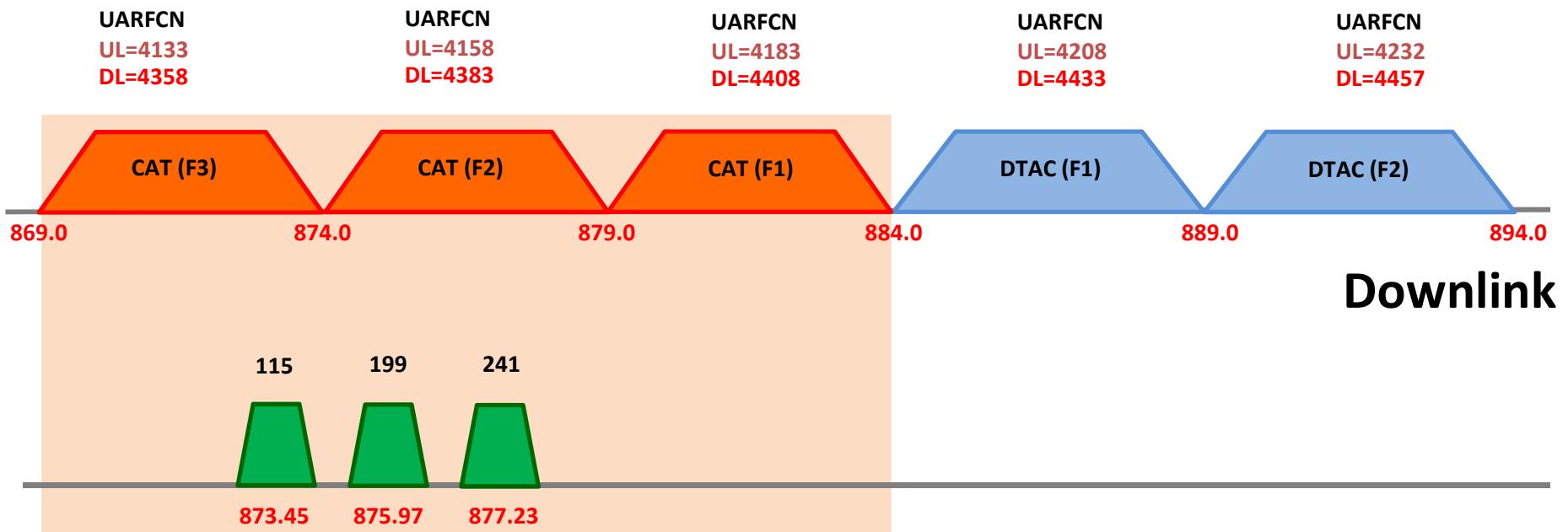
1. Mobile Country Code :
MCC 414
2. Mobile Network Code :
MNC 03
3. SID 15359

Result from Universal Radio Network Analyzer



Cellular Interference

UMTS 850 MHz (Thailand)



CDMA 850 MHz (Myanmar)

Summary of Interference Effect in the 850 MHz Band along Thailand-Myanmar Common Border

CAT

Cellular Interference

Technical Proposal

Myanmar CDMA operator to perform as shown below

- Antenna re-orientation**
- Antenna down-tilt**
- BTS Power Reduction of site sectors to direction toward the border area.**

The logo consists of the letters "CAT" in a white, sans-serif font, enclosed within a thick orange circle.

CAT

Content

- Cellular Interference
 - UMTS 850 MHz and CDMA 850 MHz
- Non-Cellular Interference
 - UMTS 850 MHz and Narrowband

The logo consists of the letters "CAT" in a white, sans-serif font, enclosed within a thick orange circle.

CAT

Thailand-Myanmar Joint Test Measurement

Tachileik, Myanmar, 6-8 October 2019

Conclusion :

**“ Narrowband signal interference was found in
4 points and CAT will seek for further information
to solve that case. ”**

CAT Test Measurement

Mae Sai, Chiang Rai, 24-27 December 2019

Conclusion : Shown on the next page.



Non-Cellular Interference

Test Point on Doi Wao Temple, Mae Sai, Chiang Rai



Point 1-1 Antenna direction 5 degree to Tachileik

CAT

Non-Cellular Interference



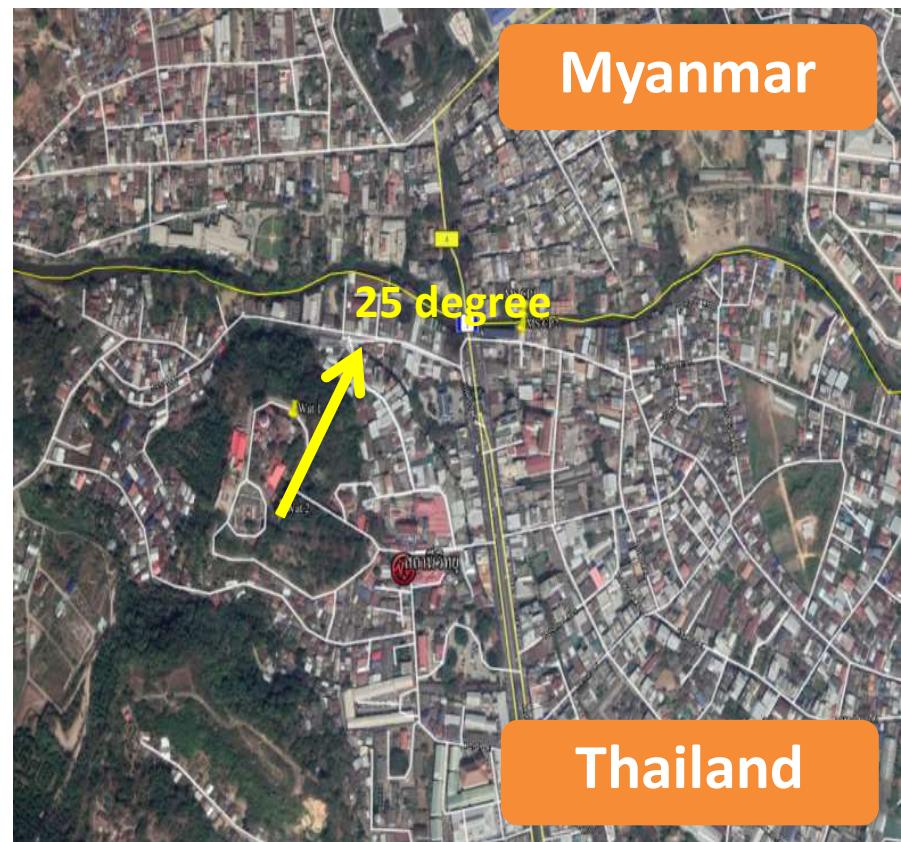
Result 1-1 :
Antenna direction
5 degree to Tachileik
was found narrowband
828.9 MHz
with -69 dBm.

Point 1-1 Antenna direction 5 degree to Tachileik

CAT

Non-Cellular Interference

Test Point on Doi Wao Temple, Mae Sai, Chiang Rai



Point 1-2 Antenna direction 25 degree to Tachileik

CAT

Non-Cellular Interference



Result Point 1-2 :
Antenna direction
25 degree to Tachileik
was found narrowband
839 MHz
with -79 dBm.

CAT

Point 1-2 Antenna direction 25 degree to Tachileik

Non-Cellular Interference

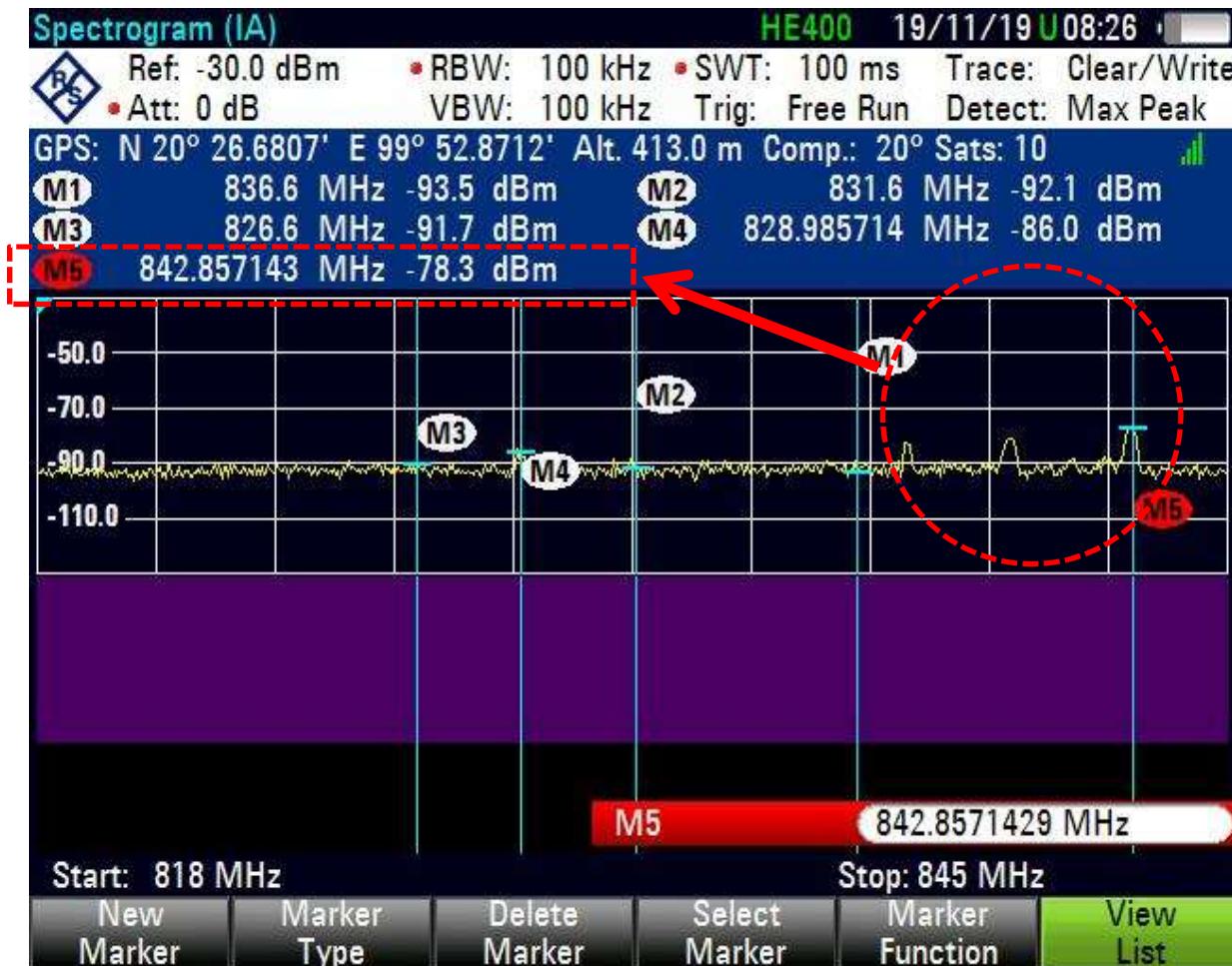
Test Point on Mae Sai Complex, Mae Sai, Chiang Rai



Point 2-1 Antenna direction 340 degree to Tachileik

CAT

Non-Cellular Interference

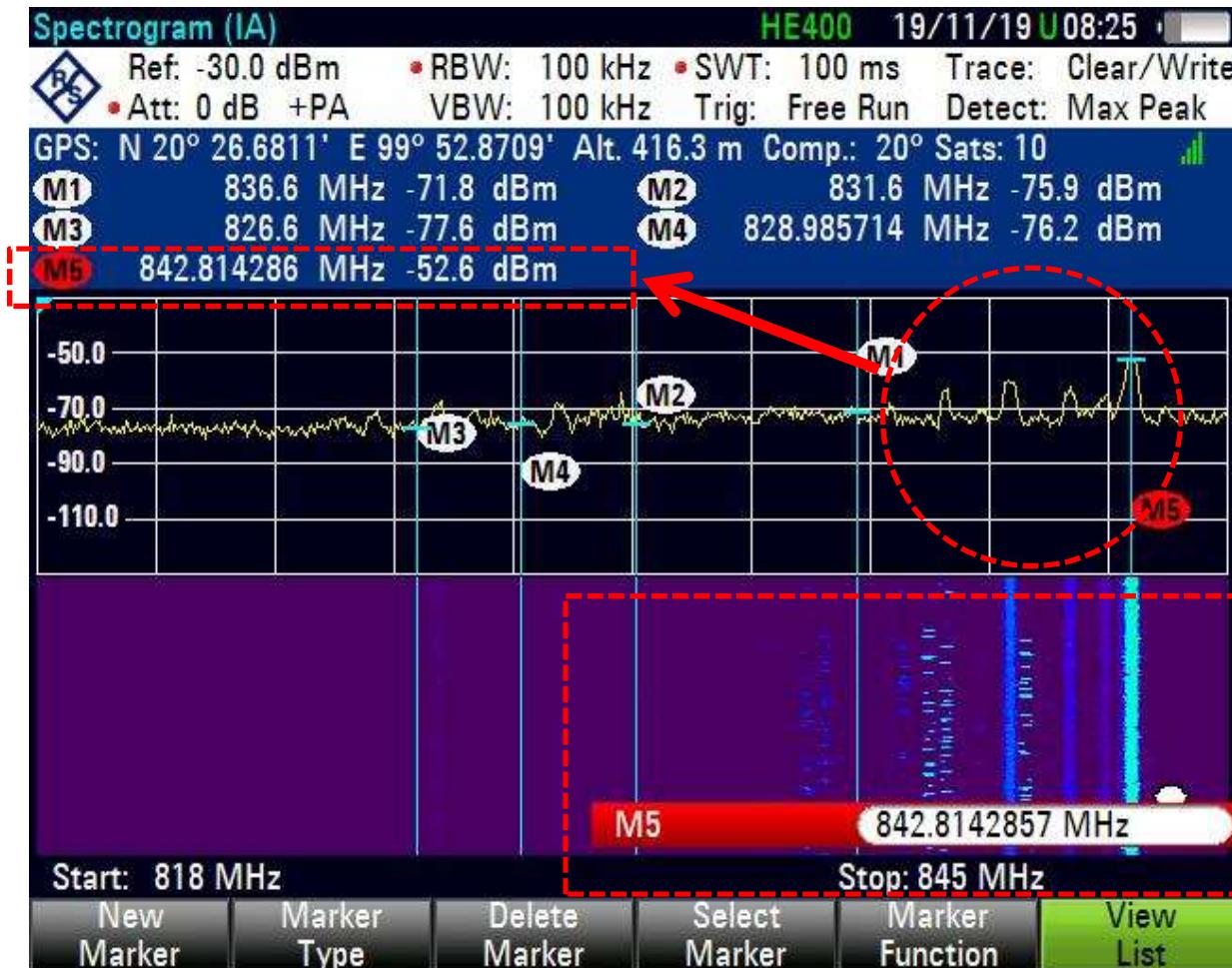


Result Point 2-1 :
Antenna direction
340 degree to Tachileik
was found narrowband
838, 840, 842 MHz
with strong interference
signal.

Point 2-1 Antenna direction 340 degree to Tachileik

CAT

Non-Cellular Interference



Result Point 2-1 :
Antenna direction
340 degree to Tachileik
was found narrowband
838, 840, 842 MHz
with strong interference
signal.

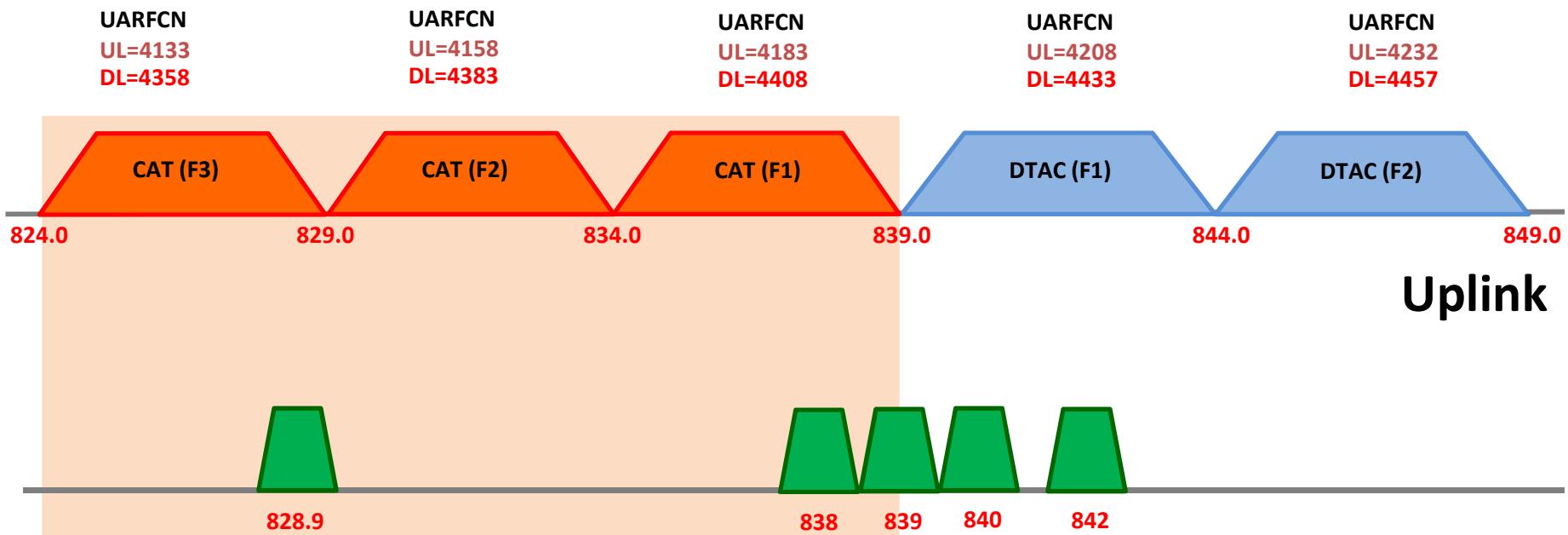
Remark :
Open AMP

Point 2-1 Antenna direction 340 degree to Tachileik



Non-Cellular Interference

UMTS 850 MHz (Thailand)



Narrowband (Myanmar)

Summary of Interference Effect in the 850 MHz Band along Thailand-Myanmar Common Border

CAT

Non-Cellular Interference

Proposal

CAT would be grateful if PTD could investigate interference source in Tachileik, Myanmar.





THANK YOU

850/900 interference update

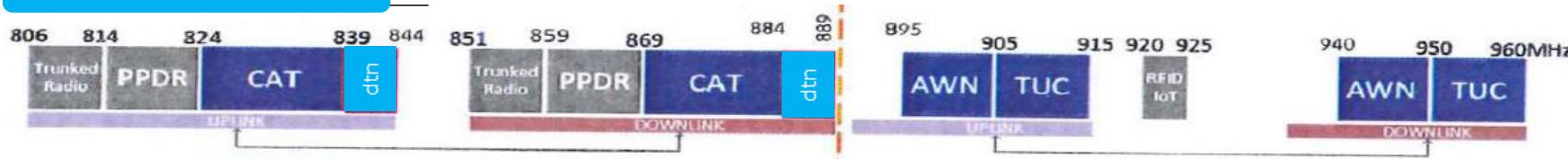
JTC-3 Myanmar-Thailand meeting

Jan 14th ; 2020



Update : 850/900 for DTAC/DTN after the end of concession and new licensee era

Dec 15th ,2018– end of 2020



Year 2021 onwards



Engineering Exploration

- 2019Q2: DTN did some engineering techniques, but the result is not that satisfied
- 2019Q2-Q3: Then, DTN engineering team had done filter experiments to keep spectrum into sharp right position, anyway the result was not that satisfied
- 2019Q3-Q4: Therefore, we plan for DTN900 swap project in those borders area which will completely solve reverse duplex case

Solution : Replace HSPA850 by 900 deployment

- Low band Spectrum is **crucial for DTN**, we have HSPA850 only 2*5MHz
- HSPA850 is not allowed to expand, the only way to expand is to **deploy DTN's HSPA900 and turn off existing HSPA850** ("850->900")
- 850 -> 900 need **CAT to implement filter** at CAT HSPA850 transmitters
- CAT and DTN has been submitted filter deployment plan to NBTC since Oct 2019
- CAT and NBTC are under discussing for filter cost subsidy from NBTC
- According to CAT filter deployment plan in year 2020
 - Mae Sai [Chiangrai] **(Q1)**
 - Mae Sod [TAK] **(Q1)**
 - Koh Song [Ranong] **(Q2)**
 - Three Pagodas [Kanchanaburi] **(Q1)**
- Technically, DTN can replace HSPA850 by 900 MHz only after CAT implemented filter at HSPA850 transmitters
- **DTN will match 850->900 implementation in the same quarter**



Thank You



Coordination Parameters
for 900, 1800 and 2100 MHz
at
Hpayarthonesu
and
Three Pagodas Pass



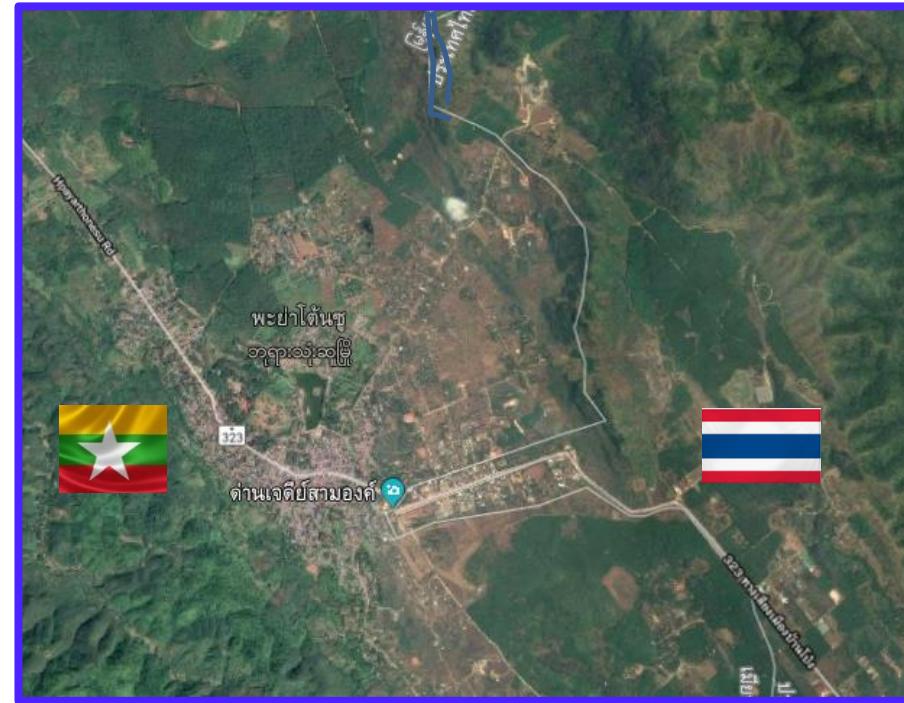
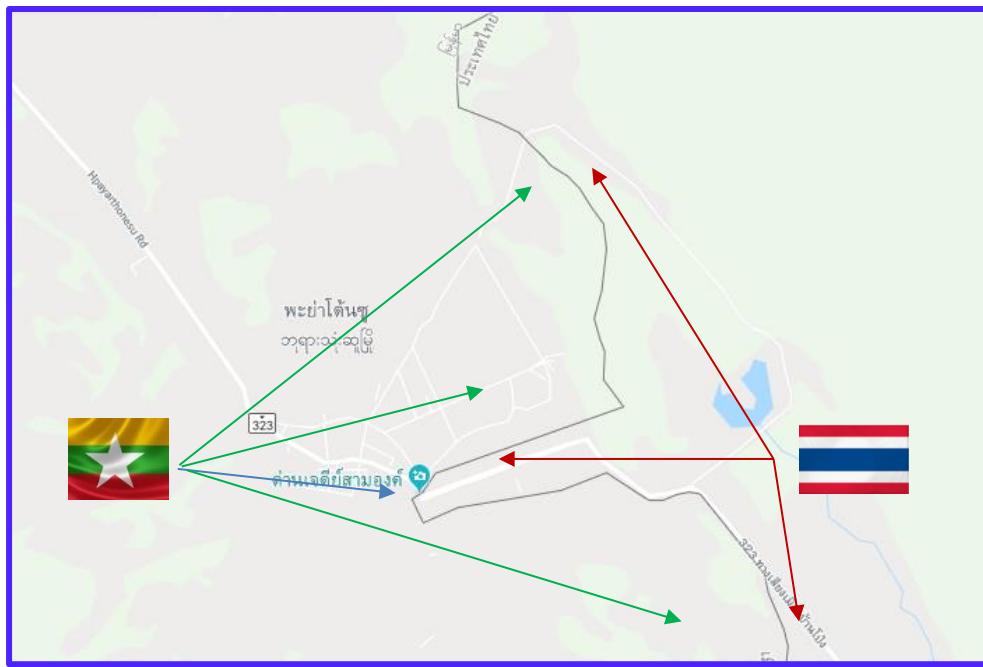
Content

- Recap from JTC-2 Meeting
- Proposed coordination parameters for 900, 1800 and 2100 MHz at Hpayarthonesu and Three Pagodas Pass area

Content

- Recap from JTC-2 Meeting
- Proposed coordination parameters for 900, 1800 and 2100 MHz at Hpayarthonesu and Three Pagodas Pass area

The border line at Hpayarthonesu and Three Pagodas Pass area



New reference line proposed by Myanmar for signal level coordination [JTC-2]

Concerning Hpayarthonesu - Three Pagodas border area, Myanmar mobile operators proposed new reference lines to replace actual border line @ (0) km. As shown in the map below, white lines are proposed to serve as (0) km for Thai mobile operators whereas red line is proposed to serve as (0) km for Myanmar mobile operators. No change of threshold values is proposed.

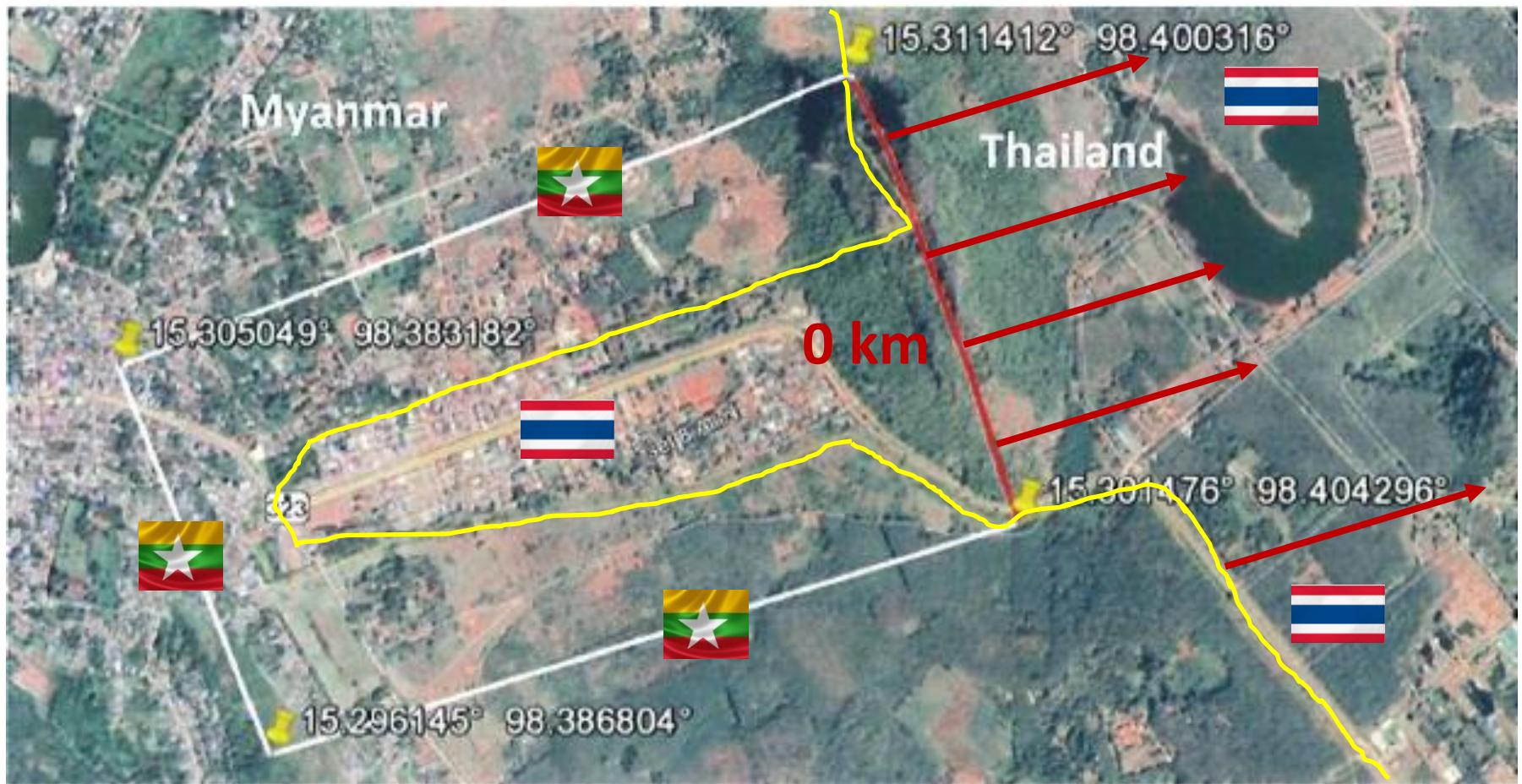
Thai mobile operators agreed to consider this proposal and to give feedback at least 2 months before JTC-3. Both Myanmar and Thai mobile operators aim to finalize a suitable solution at JTC-3 Meeting.



0 km reference for Thailand is the white line



0 km reference for Myanmar is the red line



Agreed coordination parameters from JTC-2

No	Attribute	Initial Proposal by Myanmar	Initial Proposal by Thailand	Agreement
1	Coordination Zone (N km)	6 km (default) 10 km (Kawthoung-Ranong)	n/a	4 km (default) 6 km (Kawthoung - Ranong) *See note 1.
2	Technology	UMTS / LTE	GSM / UMTS / LTE	GSM / UMTS / LTE
3	Spectrum (MHz)	900, 1800, 2100	900, 1800, 2100	900, 1800, 2100 *See note 2.
4	Scenarios	A and B	A	A (2 threshold values for (0) km and (N) km)
5	Procedure flow for Existing Cells	≤ 120 days	n/a	Agreed as per initial proposal from Myanmar
6	Procedure flow for New & Updated Cells	≤ 180 days	n/a	Agreed NOT to adopt this in JTC-2
7	Preferential Codes (PSC/PCH)	n/a	n/a	Maintain PSC separation as agreed at JTC-1 for certain operators
8	Threshold A Values	<u>Values per Technology</u> UMTS: -85 dBm @ (0) km / -105 dBm @ (N) km LTE: -97 dBm @ (0) km / -117 dBm @ (N) km	<u>Values per Band</u> 900 MHz: -77.6 dBm 1800 MHz: -77.4 dBm 2100 MHz: -78.69 dBm	<u>Values per Technology</u> GSM: -82 dBm @ (0) km / -102 dBm @ (N) km *See note 3. UMTS: -82 dBm @ (0) km / -102 dBm @ (N) km LTE: -94 dBm @ (0) km / -114 dBm @ (N) km

*Note1: Agreement does not cover Hpayarthonesu – Three Pagodas border area. See item 6 for more details.

*Note2: Agreement does not cover 850 MHz band, which is to be coordinated between relevant mobile operators.

*Note3: Different values apply for GSM and LTE in 900 MHz band between Mytel and AWN. See item 9 for more details.



Content

- Recap from JTC-2 Meeting
- Proposed coordination parameters for 900, 1800 and 2100 MHz at Hpayarthonesu and Three Pagodas Pass area

No	Attribute	Proposal	Remarks
1	Reference Line	Agree to new reference lines proposed by Myanmar in JTC-2	White lines
2	Coordination Zone (N km)	4 km	From white lines
3	Technology	GSM/UMTS/LTE	
4	Spectrum (MHz)	900, 1800, 2100 MHz	
5	Scenarios	A (2 threshold values for 0 km and 4 km)	
6	Procedure flow for existing cells	≤ 120 days	
7	Procedure flow for new and updated cells	Not to adopt	
8	Preferential Codes (PSC, PCI)	Maintain PSC and PCI separation as agreed at JTC-1 for certain operators	
9	Threshold A values	Value per technology GSM : -75 dBm @ 0 km and -100 dBm @ 4 km UMTS : -80 dBm @ 0 km and -100 dBm @ 4 km LTE : -85 dBm @ 0 km and -110 dBm @ 4 km	New reference lines proposed by Myanmar in JTC-2 (white lines)



THANK YOU





สำนักงานคณะกรรมการกิจการกระจายเสียง กิจการโทรทัศน์ และกิจการโทรคมนาคมแห่งชาติ

The National Broadcasting and Telecommunications Commission

Band Plan and Coordination Parameters for 2600 MHz Band

Outline

The National Broadcasting and Telecommunications Commission

1. Background
2. Summary of the proposal letter OUR REF: 2007/36944/2562 sent to PTD on 29 November 2019
3. Updates on Thailand's Status of 2600 MHz Band
4. Proposal

1. Background

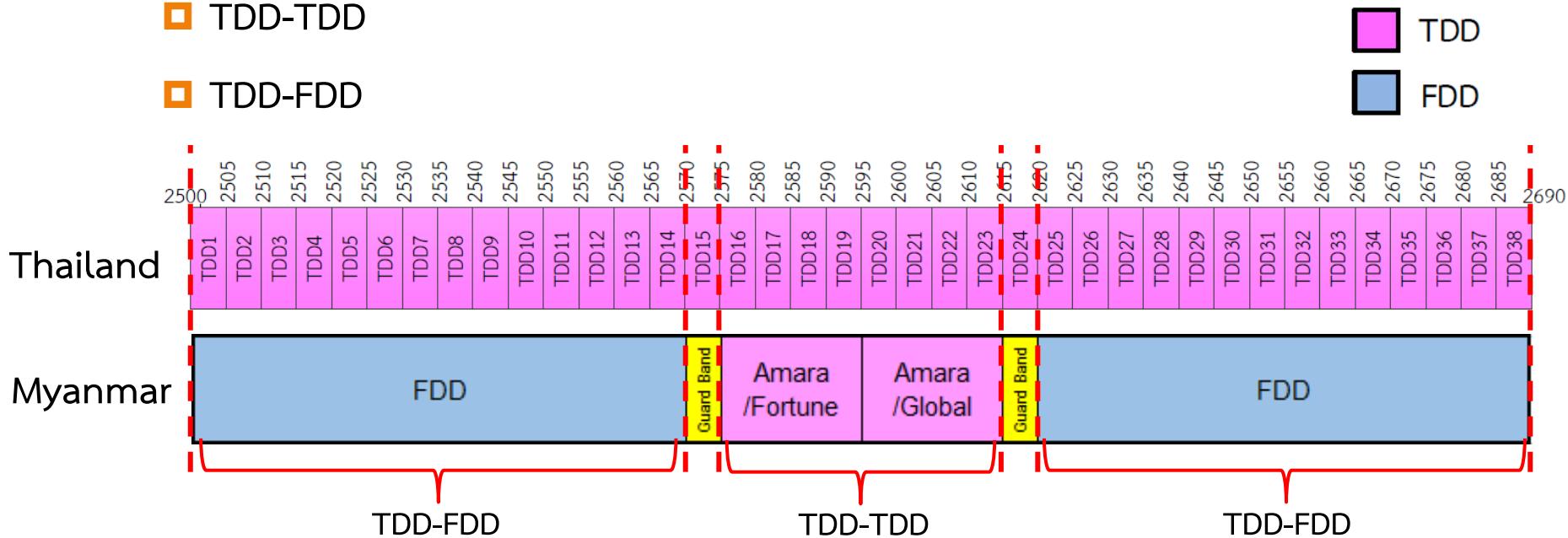
3

The National Broadcasting and Telecommunications Commission

- In JTC-2, Thailand informed Myanmar that
 - NBTC planned to recall spectrum in the band 2600 MHz to be reallocated for IMT (5G)
 - Thailand had plan for auction of nationwide 2600 MHz by 2020
 - Thailand considered updating 2600 MHz band plan from TDD/FDD partitioning into TDD for the whole band
- NBTC sent the proposal letter OUR REF: 2007/36944/2562 to PTD on 29 November 2019 regarding:
 - Thailand's 2600 MHz band plan
 - Coordination parameters and network synchronization methods in 2600 MHz band

2. Proposal Letter Summary: Cases

- If Myanmar maintains the existing band plan (band 7 and band 38), there will be 2 cases for coordination:
 - TDD-TDD
 - TDD-FDD



- However, there will be only TDD-TDD case if Myanmar decides to use band 41 (all TDD)

2. Proposal Letter Summary:



TDD-TDD case (1/3)

5

The National Broadcasting and Telecommunications Commission

- Thailand proposes the coordination parameters as follows
(reference: ECC Rec. (11)05):

Frequency Band (MHz)	Technology	Coordination Parameters	
		Signal Level	Defined distance from the border
2600 (2500-2690 MHz)	LTE/NR (synchronized)	-80.6 dBm/5 MHz measured at 3 m above ground level	0 km
		-96.6 dBm/5 MHz measured at 3 m above ground level	6 km
	LTE/NR (without synchronized)	-114.4 dBm/5 MHz measured at 3 m above ground level	0 km

2. Proposal Letter Summary:



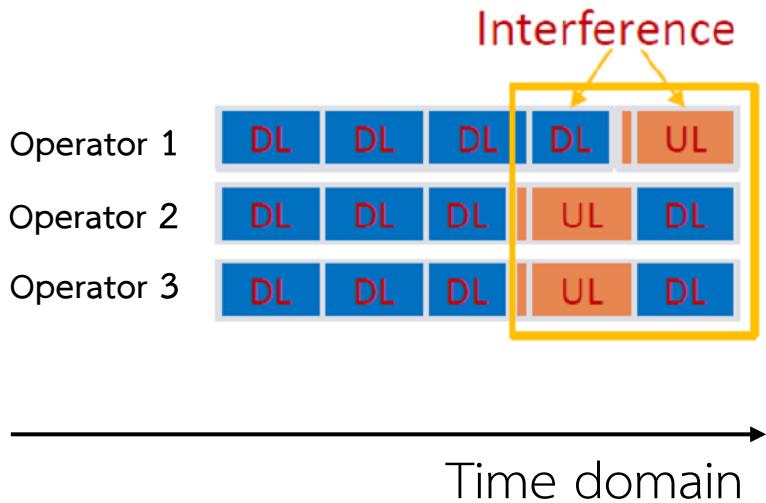
TDD-TDD case (2/3)

6

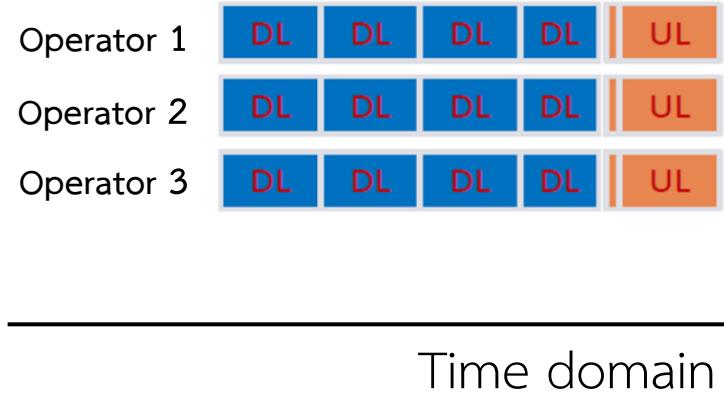
The National Broadcasting and Telecommunications Commission

Network Synchronization

Unsynchronized TDD-TDD



Synchronized TDD-TDD



2. Proposal Letter Summary:

TDD-TDD case (3/3)

7

The National Broadcasting and Telecommunications Commission

- Thailand proposes methods for network synchronization:
 - Synchronize clock signal of base stations along the common border area with the Global Positioning System (GPS) or other systems' signal that can be converted to GPS time scale.
 - Use a common frame structure (TD-LTE Configuration 2)



2. Proposal Letter Summary:

TDD-FDD case

8

The National Broadcasting and Telecommunications Commission



- Since there is no ECC recommendation providing references on coordination parameters for TDD-FDD case yet, Thailand proposes 3 possible options for consideration as follows:

Option	Reference	Coordination Parameters	
		Signal Level	Defined distance from the border
1	Apply the coordination parameters from TDD-TDD case (without synchronized)	-114.4 dBm/5 MHz measured at 3 m above ground level	0 km
2	Example of a multilateral agreement between Austria, Croatia, Hungary and Slovenia	10.5 dB μ V/m/5 MHz (-134.9 dBm/5 MHz) measured at 3 m above ground level	0 km
3	A case study from an operator in China coordinated with Hong Kong	-116 dBm/5 MHz	At interfered base station

2. Proposal Letter Summary: Proposal

- Myanmar is invited to consider the possible coordination parameters and network synchronization methods for TDD-TDD case and, if applicable, the possible coordination parameters for TDD-FDD case.

3. Updates on Thailand's Status of 2600 MHz Band



10

The National Broadcasting and Telecommunications Commission

- Thailand changed the band plan to use all TDD (n41) on 28 December 2019 as follows:



Band plan for IMT-Advanced and IMT-2020

- 2600 MHz band will be auctioned on 16 February 2020
- Office of NBTC will issue a regulation regarding network synchronization methods for Thailand's operators soon

4. Proposal

- The Meeting is invited to take note of the updates on Thailand's status of 2600 MHz band
- Myanmar is invited to consider the proposal in the proposal letter OUR REF: 2007/36944/2562, i.e. to consider the possible coordination parameters and network synchronization methods for TDD-TDD case and, if applicable, the possible coordination parameters for TDD-FDD case

Thank you

Spectrum Management Bureau

The Office of the National Broadcasting and Telecommunications Commission (NBTC)

87 Phaholyothin Rd., Phayathai Bangkok 10400, Thailand

Email: spectrum@nbtc.go.th

(Back up Slides)

$\text{dB}\mu\text{V}/\text{m}/5 \text{ MHz}$ to $\text{dBm}/5 \text{ MHz}$ conversion

$$\square \quad dBm = dB\mu V/m - 20 \log(f) + G - L - 77.2$$

- f: chosen frequency(MHz)
- G: Total system gain (dBi)
- L: Total system loss(dB)

ECC Rec. (11)05

Table 2: Trigger values at a height of 3 m above ground between TDD systems

Non-Preferential frequency usage				Preferential frequency usage
Centre frequencies aligned		Centre frequencies not aligned		Based on bi-or multilateral agreements (Annex 1 paragraph 3)
Synchronised TDD, or DL only		Unsynchronised TDD	Synchronised TDD, or DL only	
Preferential PCI codes	Non-preferential PCI codes	All PCI codes	All PCI codes	
65 dB μ V/m/5 MHz@0 km and 49 dB μ V/m/5 MHz@6 km (paragraph 2)	49 dB μ V/m/5 MHz@0 km (paragraph 2)	30 dB μ V/m/5 MHz@0 km (paragraph 1)	65 dB μ V/m/5 MHz@0 km and 49 dB μ V/m/5 MHz@6 km (paragraph 2)	30 dB μ V/m/5 MHz@0 km (paragraph 1)

@ stands for "at a distance inside the neighbouring country"

For field strength predictions the calculations should be made according to Annex 3. In the case of other channel bandwidth other than 5 MHz, a factor of $10 \times \log_{10} (\text{channel bandwidth}^2 / 5 \text{ MHz})$ should be added to the field strength values.

² not occupied bandwidth

Example of multilateral agreement

3.1 Channelling arrangement

The frequency band 2500 MHz – 2690 MHz is divided into three sub-bands. All the sub-bands below may be used as an unpaired band or as a part of a paired band (see also sections 3.2 and 3.3):

- "a"** 2500 – 2570 MHz uplink band of the paired band of "**a**" and "**c**"
- "b"** 2570 – 2620 MHz unpaired band
- "c"** 2620 – 2690 MHz downlink band of the paired band of "**a**" and "**c**"

The assigned blocks shall be in multiple of 5.0 MHz with the first lower block edge starting at the frequency of 2500 MHz.

4.4 Field strength triggers in the case where TDD systems operate in the paired bands "**a**" or "**c**"

a) Base stations of TDD systems either in the uplink band "a**" or in the downlink band "**c**" of the paired band, using all PCI codes given in Annex 1** may only be operated if the mean field strength produced by the cell (all transmitters within the sector) does not exceed the value of 10.5 dB μ V/m/5MHz at a height of 3 m above ground at the borderline.

b) A mobile station of a TDD system, either in the uplink band "a**" or in the downlink band "**c**" of the paired band,** may only be operated if the mean field strength does not exceed the value of 10.5 dB μ V/m/5MHz at a height of 3 m above ground at the borderline.

c) Higher field strength levels may only be applied if Operator Arrangements have been concluded.



สำนักงานคณะกรรมการกิจการกระจายเสียง กิจการโทรทัศน์ และกิจการโทรคมนาคมแห่งชาติ

The National Broadcasting and Telecommunications Commission

Television Broadcasting Service (Thailand)

3rd Joint Technical Committee on Coordination and Assignment of Frequencies along Myanmar – Thailand Common Border Meeting (JTC-3)

January 2020

Broadcasting Technology and Engineering Bureau, Office of NBTC



Topics

The National Broadcasting and Telecommunications Commission

- **Background**
- **700 MHz Refarming Process**
- **New Radio Frequency Plan for DTTB (470 – 694 MHz)**
- **Proposals**



The National Broadcasting and Telecommunications Commission

Background



Background (1)

The National Broadcasting and Telecommunications Commission

At JTC-2

- **Thailand informed the Meeting of the following information:**
 - Technical Overview of DTT in Thailand ;
 - DTT Sites located along Thailand – Myanmar Common Border ;
 - Analogue Switch-Off (ASO) ;
 - The steps to release 470 MHz for Digital TV and 700 MHz for IMT in Thailand ;
 - The key factors to be taken into account during DTTB frequency re-planning process ; and
 - Summary of Agreement between Thailand and Neighboring Countries.
- **Both Myanmar and Thailand agreed to consider and study the following items:**
 - Frequency arrangement;
 - Frequency registration/notification;
 - Frequency coordination distance/zone;
 - Frequency coordination type; and
 - Frequency coordination parameters.



Background (2)

The National Broadcasting and Telecommunications Commission

At JTC-2

- Myanmar informed the Meeting that the information on Television Broadcasting Service and items to be further studied would be shared with the Ministry of Information.
- Both Myanmar and Thailand will further update the information at the next JTC Meeting.



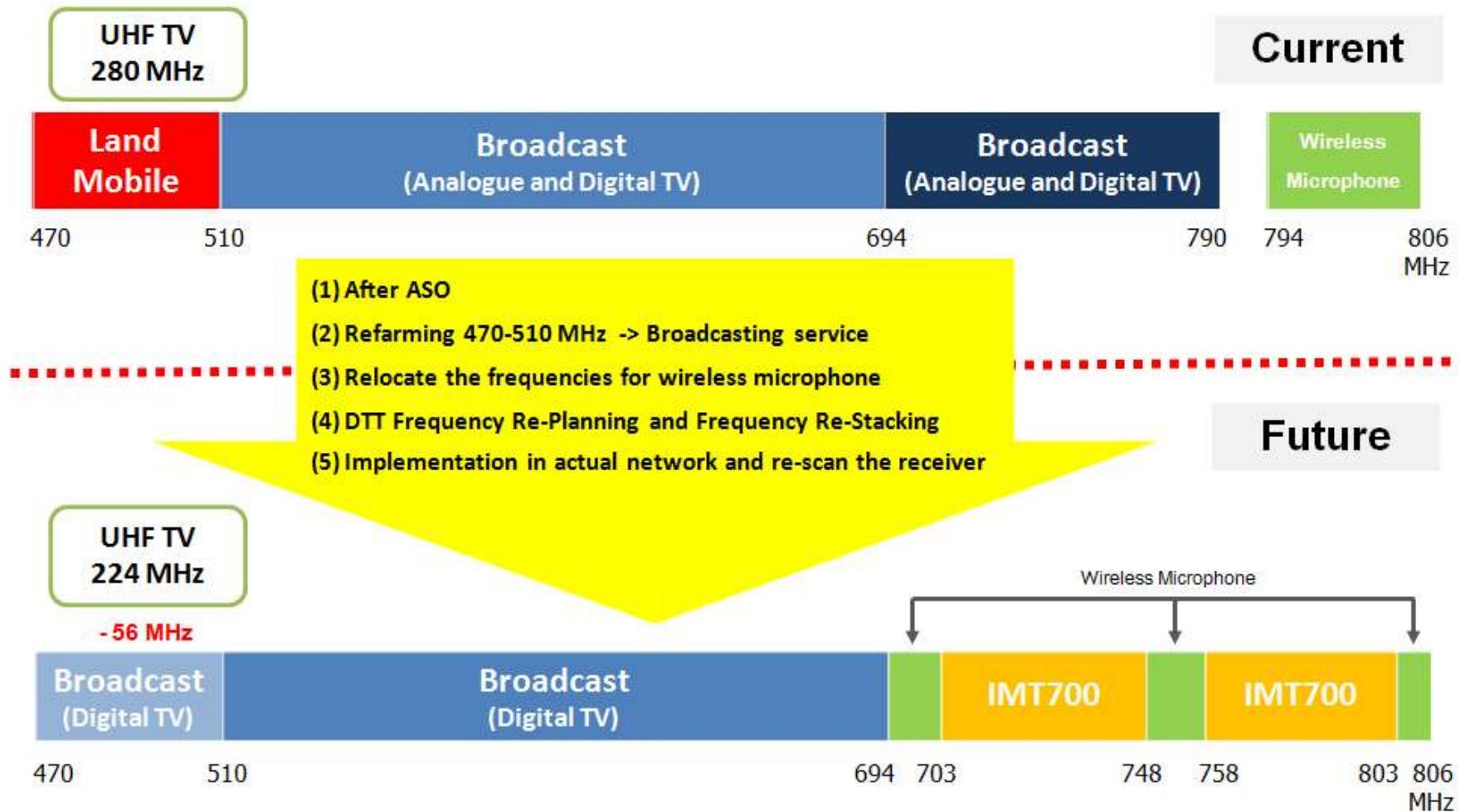
The National Broadcasting and Telecommunications Commission

700 MHz Refarming Process

Steps to Release 470 MHz for Digital TV and 700 MHz for IMT in Thailand



The National Broadcasting and Telecommunications Commission





Tentative Timeline to Release 700 MHz

The National Broadcasting and Telecommunications Commission

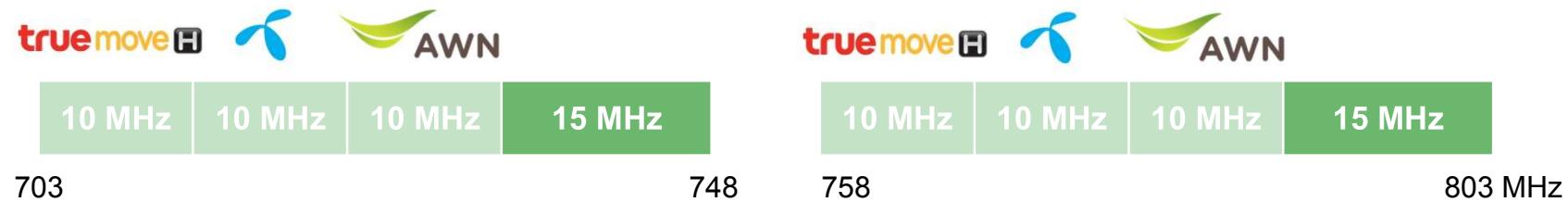
Process	Tentative Timeframe	2019			2020				2021			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Analogue Switch Off	March 2020											
Frequency re-farming of 470-510 MHz	Q4 2019											
Relocation of the Frequency for wireless microphone	March 2021											
DTT Frequency re-planning	Q4 2019											
Implementation in DTT networks	2020											
Availability of 700 MHz of IMT	2x30 MHz by October 2020											
	2x15 MHz by April 2021											



Spectrum Assignment for 700 MHz

The National Broadcasting and Telecommunications Commission

IMT700 Band Plan and Assignment



- The spectrum of 2x30 MHz was assigned to 3 mobile operators (2x10 MHz each) by direct award in June 2019. Tentatively, this spectrum will be available from 1 October 2020.
- The remaining spectrum of 2x15 MHz will be auctioned on 16 February 2020. However, this spectrum will be available from 1 April 2021.



The National Broadcasting and Telecommunications Commission

New Radio Frequency Plan for DTTB (470 – 694 MHz)



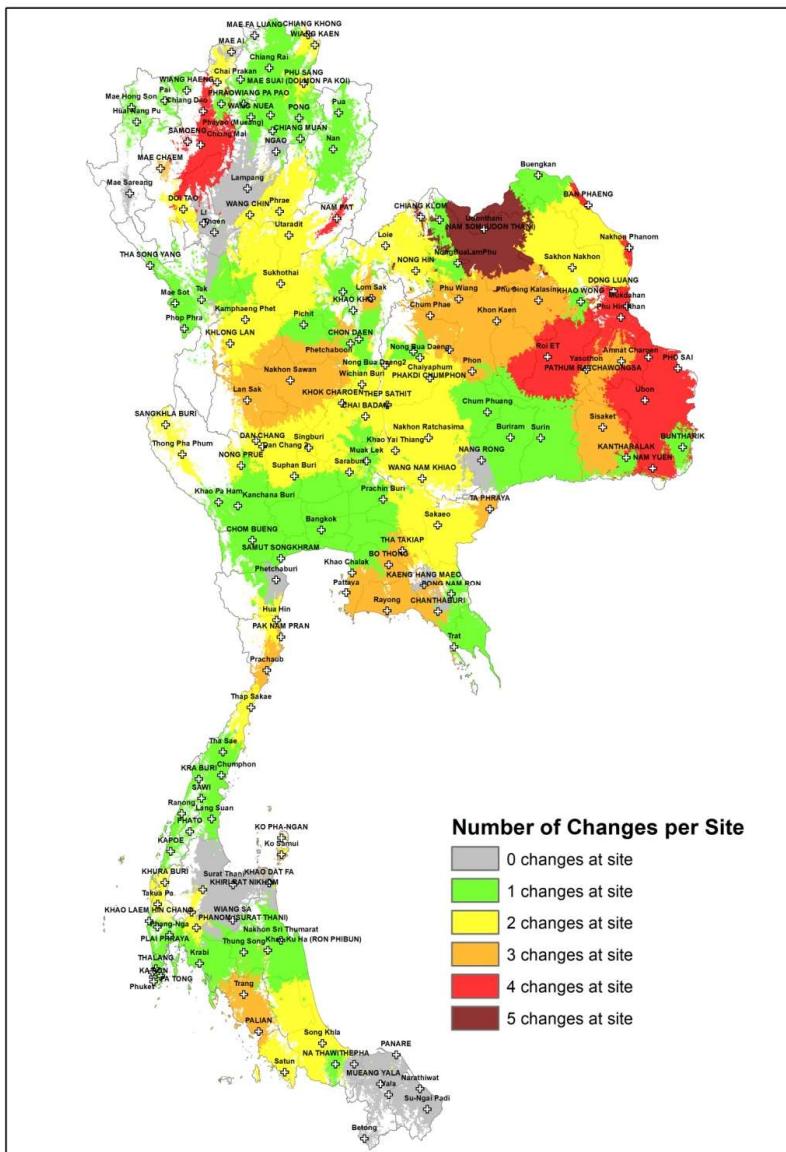
Planning and Implementation

The National Broadcasting and Telecommunications Commission

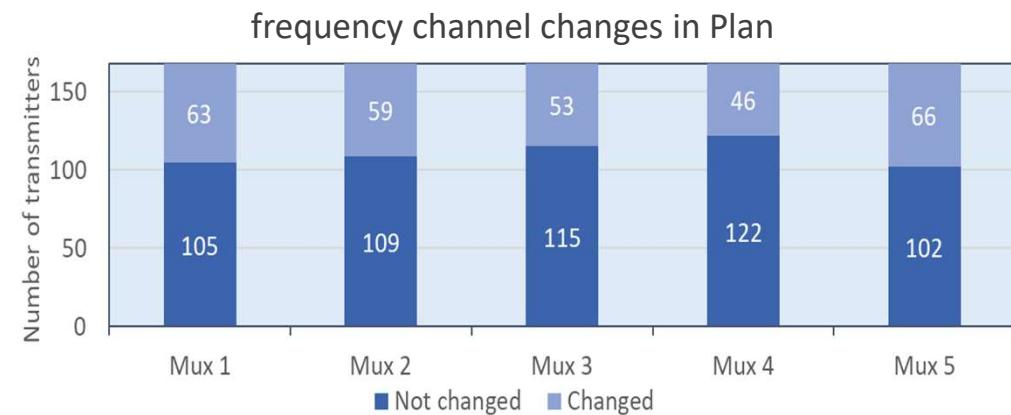
Frequency Plan	Compensation for 700 MHz Reframing	Implementation Plan
<ul style="list-style-type: none">NBTC Notification on DTTB Frequency Plan (to release 700 MHz) has been published in the Government Gazette on 25 November 2019.	<ul style="list-style-type: none">Rules and regulations for compensation was published.Subcommittee had approved the budget for 4 DTTB network operators to release 700 MHz.	<ul style="list-style-type: none">The implementation plan has been approved by NBTC.700 MHz Reframing process to be completed by 30 September 2020.



Number of Frequency Channel Changes



The National Broadcasting and Telecommunications Commission



168 sites

- 39 main sites
 - 129 additional sites

286 frequency channel changes

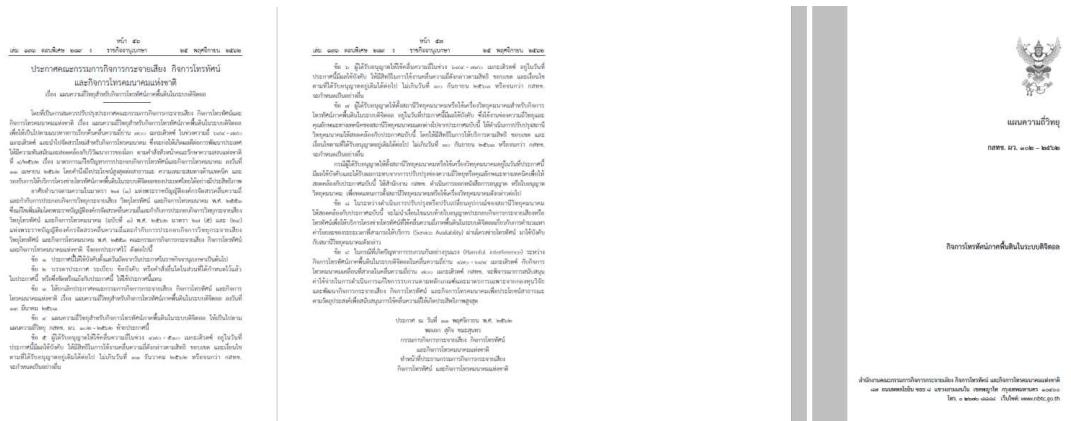
- changes in 286 out of 840 transmitters (34%)
 - changes in 147 out of 168 sites (88%)



New Radio Frequency Plan for DTTB (470 – 694 MHz)

The National Broadcasting and Telecommunications Commission

- NBTC Notification on Radio Frequency Plan for DTTB has been revised to prepare for 700 MHz clearance
 - ▣ Officially published in the Government Gazette since November 25, 2019
 - ▣ Consist of the frequency plan for 39 main sites and 129 additional sites
 - Only change in this New Radio Frequency Plan is “**frequency channel**”
 - Target coverage is 95% of households
 - The location, the antenna characteristic, and the transmitting power are not changed. The only change in this **New Radio Frequency Plan** is “**frequency channel**” of the stations along the common border between Thailand and Myanmar: use frequency channels between 21 - 48.



Overview of New Radio Frequency Plan for DTTB



The National Broadcasting and Telecommunications Commission



- Frequency Range : UHF 470 – 694 MHz
- Bandwidth : 8 MHz
- Frequency Channel : Channel 21-48
- 5 MUXs (5 frequency channels) per area
- Infrastructure sharing between all MUXs



Main Site



Additional Site



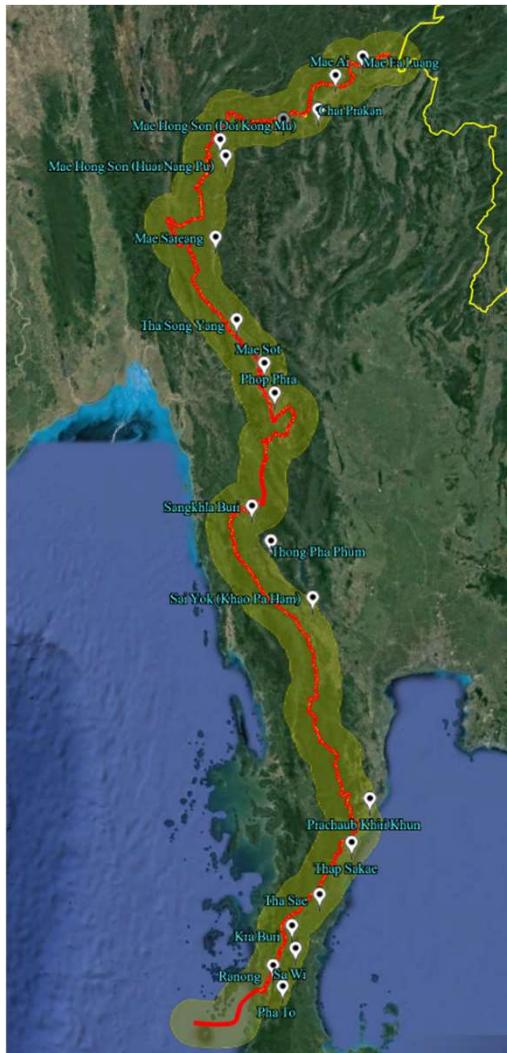
DTTB Coverage is approximately 95.6% of Households

Coverage Area after the deployment of 39 Main sites and 129 Additional sites

DTT Sites located along the Common Border



The National Broadcasting and Telecommunications Commission

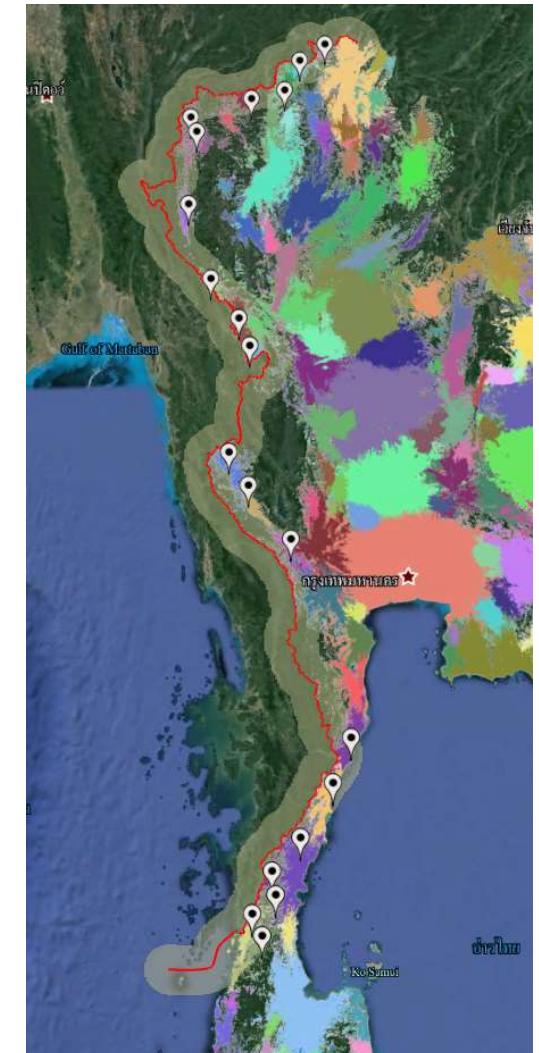


In Thailand, the sites for DTT Network have been divided into 2 categories:

1. Main sites (M)
2. Additional sites (A)

20 DTT Sites are located in the coordination area (30 km from the borderline):

- 3 Main sites
- 17 Additional sites



New Radio Frequency Plan for DTTB at Common Border Areas

(to be implemented in the actual network in 2020)



The National Broadcasting and Telecommunications Commission

No	Name	Type	Long	Lat	ht(m)	#1	#2	#3	#4	#5	Max ERP (kW)
1	Sai Yok (Khao Pa Ham)	A	99.158136	14.125748	80	33	37	41	30	27	0.5
2	Thong Pha Phum	A	98.670663	14.751217	70	38	42	46	34	24	0.5
3	Sangkhla Buri	A	98.444913	15.13977	100	38	42	46	34	24	2
4	Prachaub Khiri Khun	M	99.801300	11.90594	60	46	24	42	34	38	20
5	Thap Sakae	A	99.588250	11.41896	84	29	43	45	48	25	5
6	Chai Prakan	A	99.144830	19.62848	19	32	44	36	26	40	2
7	Wiang Haeng	A	98.724010	19.52128	30	32	44	36	26	40	2
8	Mae Ai	A	99.342276	20.024309	45	47	31	35	28	39	0.5
9	Mae Hong Son (Doi Kong Mu)	M	97.957950	19.29755	64	37	41	27	30	33	1
10	Mae Hong Son (Huai Nang Pu)	A	98.034777	19.1065	50	37	41	27	30	33	1
11	Mae Sareang	A	97.944614	18.169806	82	47	31	35	28	39	1
12	Mae Fa Luang	A	99.667220	20.238833	25	47	31	35	28	39	0.5
13	Mae Sot	A	98.566522	16.732602	100	31	35	39	28	47	5
14	Phop Phra	A	98.695559	16.397134	70	31	35	39	28	47	0.5
15	Tha Song Yang	A	98.225902	17.226641	98	32	44	36	26	40	0.2
16	Tha Sae	A	99.215555	10.835377	98	28	47	31	35	39	0.5
17	Sa Wi	A	98.931172	10.227609	55	28	47	31	35	39	0.5
18	Pha To	A	98.775730	9.793820	52	27	30	37	41	33	0.5
19	Ranong	M	98.669486	10.028664	123	27	30	37	41	33	15
20	Kra Buri	A	98.894400	10.481900	10	28	47	31	35	39	0.5



The National Broadcasting and Telecommunications Commission

Proposals



Proposals

The National Broadcasting and Telecommunications Commission

- The Meeting is invited to take note of the presentation.
- Thailand will further update the information at the next JTC Meeting.
- Myanmar is invited to share the information on DTTB.
- Myanmar is invited to update the status of agreed items proposed by Thailand at JTC-2.



The National Broadcasting and Telecommunications Commission

Thank you



Broadcasting Technology and Engineering Bureau
The Office of the National Broadcasting and Telecommunications Commission (NBTC)



สำนักงานคณะกรรมการกิจการกระจายเสียง กิจการโทรทัศน์ และกิจการโทรคมนาคมแห่งชาติ

The National Broadcasting and Telecommunications Commission

SOUND BROADCASTING SERVICES (THAILAND)

*The 3rd Joint Technical Committee on Coordination and Assignment of Frequencies
along Myanmar-Thailand Common Border Meeting (JTC-3)*

2020

Broadcasting Technology and Engineering Bureau
Office of NBTC



OBJECTIVE AND GOALS

2

The National Broadcasting and Telecommunications Commission

Objective

- To exchange information regarding sound broadcasting services with an emphasis on a current status of FM stations.

Goals

- Frequency registration/notification process for FM stations along the borderline.
- Coordination area and coordination criteria for FM stations



BACKGROUND

3

The National Broadcasting and Telecommunications Commission

- The JTC-2 Meeting agreed that information on sound broadcasting services would be shared by Myanma (Post and Telecommunications Department together with Ministry of Information).
- The JTC-2 Meeting agreed to exchange the contact persons for sound broadcasting services as follows:
 - Thailand: Mr. Uttachai Manmontri (NBTC)
 - Myanma: Mr. Bo Bo Tun (Ministry of Information)
Mr. Oakar Phyo (Posts and Telecommunications Department)



INTRODUCTION

4

The National Broadcasting and Telecommunications Commission

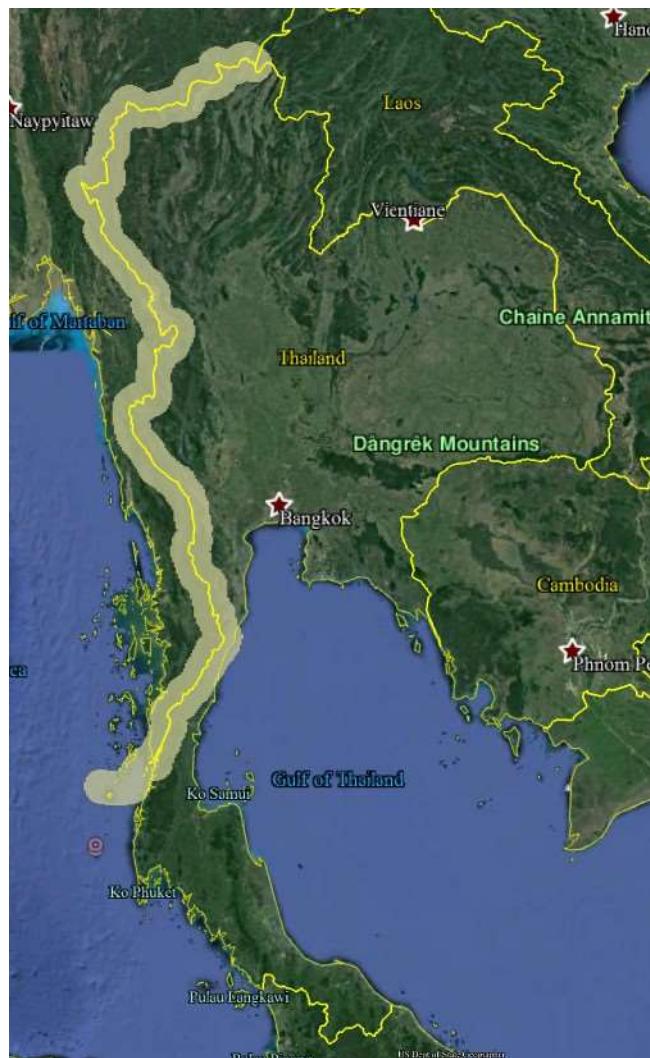
- ❑ FM broadcasting services in Thailand are classified by 2 types of FM stations i.e. Main Station and Trial Station.
- ❑ Main station is a station whose technical characteristics are defined by NBTC Notification on Radio Frequency Plan for FM Broadcasting Service e.g. coordinates, effective radiated power and antenna height. Each station has its own specific technical characteristics, which vary from station to station.
- ❑ Trial station is a station whose technical characteristics are defined by NBTC Notification on Permission Criteria for Trial FM Service e.g. maximum transmitter power (500W) and maximum antenna height (60m).



COORDINATION AREA FOR SOUND BROADCASTING SERVICES

5

The National Broadcasting and Telecommunications Commission



- Coordination area for sound broadcasting services has not yet been defined.
- In this presentation, coordination area is defined as area within 30 km from the borderline, which includes 10 provinces sharing common borderline i.e. Chiang Rai, Chiang Mai, Mae Hong Son, Tak, Kanchanaburi, Ratchaburi, Phetchaburi, Prachuab Khiri Khan, Chumphon and Ranong.

FM STATIONS LOCATED WITHIN 30 km FROM BORDERLINE



6

The National Broadcasting and Telecommunications Commission

Mae Hong Son

Main FM 4

Trial FM 8



Kanchanaburi

Main FM 1

Trial FM 8



Phetchaburi

Main FM 0

Trial 1



Prachuab Khiri Khan

Main FM 4

Trial FM 33



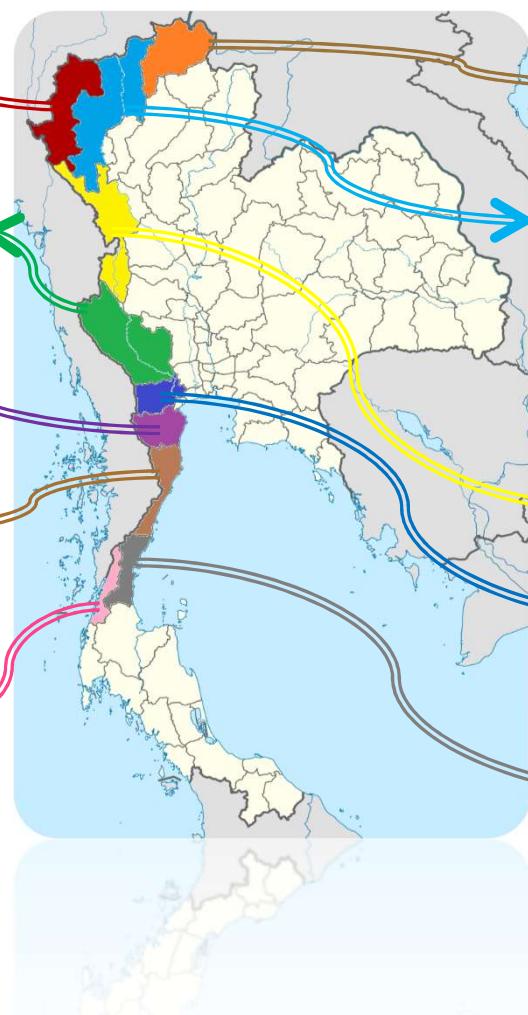
Ranong

Main FM 3

Trial FM 10



The National Broadcasting and Telecommunications Commission



Chiang Rai

Main FM 1

Trial FM 40



Tak

Main FM 1

Trial FM 19



Ratchaburi

Main FM 0

Trial FM 2



Chumphon

Main FM 0

Trial FM 3



MAIN FM STATIONS LOCATED WITHIN 30 km FROM BORDERLINE



7

The National Broadcasting and Telecommunications Commission

No.	Station Name	Lat (N)	Long (E)	Freq. (MHz)	ERP (kW)	Ht (m)
1.	Chiang Rai-5	20.109242	99.886826	100.25	4	120
2.	Chiang Mai-2	19.940712	99.221855	89.25	4	80
3.	Mae Hong Son-1	18.168565	97.944550	90.50	4	50
4.	Mae Hong Son-2	19.106007	98.035717	99.50	4	55
5.	Mae Hong Son-3	19.292893	97.957134	102.00	4	40
6.	Mae Hong Son-4	19.106524	98.034692	104.00	4	60
7.	Tak-4	16.732457	98.566309	103.75	4	102
8.	Kanchanaburi-2	15.139853	98.444931	94.25	4	100
9.	Prachuap Khiri Khan-1	11.835090	99.800775	89.25	3	120
10.	Prachuap Khiri Khan-5	11.830301	99.779749	100.25	2	120
11.	Prachuap Khiri Khan-6	11.835333	99.800833	102.25	3	120
12.	Prachuap Khiri Khan-7	11.908539	99.796559	106.75	4	60
13.	Ranong-1	10.028333	98.670192	100.50	4	48
14.	Ranong-2	10.023910	98.668675	105.75	4	30
15.	Ranong-3	10.023910	98.668675	107.25	3.6	100

Note: Lat (N) is latitude in degree North and Long (E) is Longitude in degree East

Freq. (MHz) is frequency in MHz

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 metre

TRIAL FM STATIONS LOCATED WITHIN 30 km FROM BORDERLINE



8

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No.	Province Name	No. of Trial FM Stations
1.	Chiang Rai	40
2.	Chiang Mai	26
3.	Mae Hong Son	8
4.	Tak	19
5.	Kanchanaburi	8
6.	Ratchaburi	2
7.	Phetchaburi	1
8.	Prachuab Khiri Khan	33
9.	Chumphon	3
10.	Ranong	10
Total		150

Information as of January 17, 2019



PROPOSALS

- The Meeting is invited to take note of the information regarding a current number of both Main and Trial FM stations in Thailand.
- The Meeting is also invited to propose a contact person/persons (if different) from each side for discussion and determination of actions to be taken forward in the next JTC Meeting regarding frequency registration/notification process, coordination area and coordination criteria for sound broadcasting services.



Thank you

**Broadcasting Technology and Engineering Bureau
The Office of the National Broadcasting and
Telecommunications Commission (NBTC)**

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The National Broadcasting and Telecommunications Commission

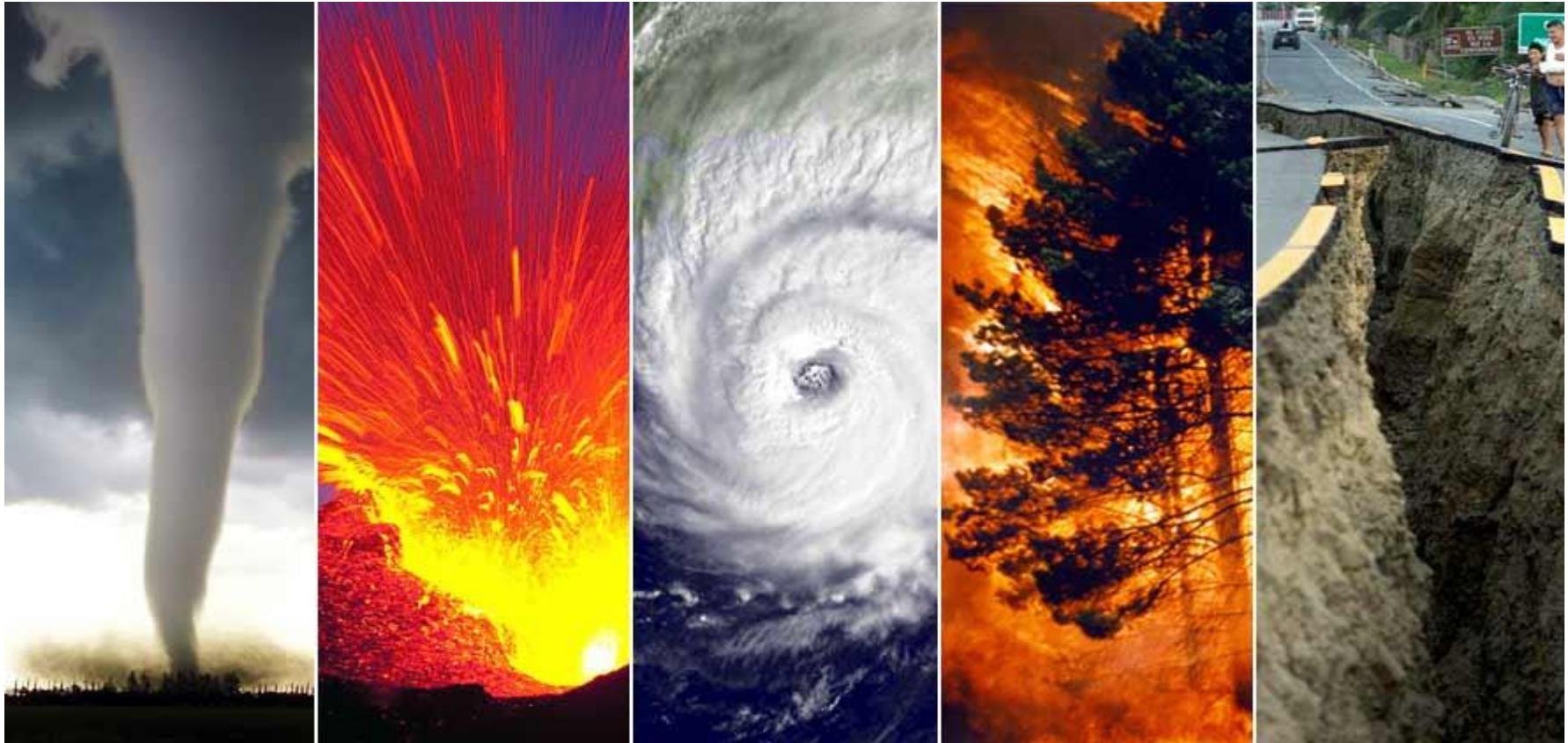
Common Frequency for Thailand-Myanmar for Use during Emergency Situation

Public Protection and Disaster Relief : PPDR



2

The National Broadcasting and Telecommunications Commission



Maintenance of law and order, protection of life and property and emergency situations.

Dealing with a serious disruption of the functioning of society, posing a significant widespread threat to human life, health, property or the environment

Spectrum for Public Protection and Disaster Relief (PPDR) in Thailand

- PPDR Spectrum under International Cooperation Framework
- Thailand's agreements of common frequency with neighboring countries
- Thailand Proposals

PPDR Spectrum under International Cooperation Framework



4

The National Broadcasting and Telecommunications Commission

PPDR Spectrum under United Nations Framework

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

PPDR Spectrum under ASEAN Framework (ATRC-16)

Frequency (MHz)	Bandwidth (kHz)	Usage
3.122, 3.351, 3.815, 3.925, 3.950	2.7	Calling channel
6.314, 6.3147, 6.4501, 6.771		
11.202, 11.217, 11.230		Communication channel
14.270, 14.275, 14.293, 14.303, 14.325		

Thailand's agreements of common frequency with neighboring countries



The National Broadcasting and Telecommunications Commission

Thailand – Lao PDR HF and VHF band

Frequency (MHz)	Bandwidth	Usage
3.341, 3.815, 3.825	3 kHz	Calling channel
6.314, 6.341.7, 6.450.1, 6.771		Communication channel
163.175	25 kHz	Communication channel

Thailand – Cambodia HF VHF and UHF band

Frequency (MHz) HF	Frequency (MHz) VHF and UHF	Bandwidth	Usage
3.341, 3.815, 3.825	158.025	(2.7 kHz For HF) (25 kHz For VHF and UHF)	Calling channel
6.314, 6.31417, 6.4501	458.100		Communication channel
11.202, 11.217	458.175		
14.270, 14.275			

Thailand – Malaysia HF and UHF band

Frequency (MHz) HF	Frequency (MHz) UHF	Bandwidth (KHz)	Usage
3.122, 3.341, 3.815, 3.925, 3.950	440.9750	12.5/25	Calling channel
6.3140, 6.3417, 6.4501, 6.7710	443.9750		Communication channel
11.202, 11.217, 11.230	444.0875		
14.270, 14.275, 14.293, 14.303, 14.325			



Thailand Proposals

The National Broadcasting and Telecommunications Commission

- Thailand would like to invite Myanmar to consider the possibility of establishing common frequency between Thailand - Myanmar for use during emergency situation as follows:

HF Bands (ASEAN framework)

Frequency (MHz)	Bandwidth (kHz)	Usage
3.122, 3.351, 3.815, 3.925, 3.950		
6.314, 6.3147, 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	25	Calling channel/ Communication channel
163.175		
458.100		
458.175		



Thank you

Spectrum Management Bureau, Office of NBTC

<http://spectrum.nbtc.go.th/>

Tel: 0-2670-8888 ext. 2625

Email: spectrum@nbtc.go.th

Backup



The National Broadcasting and Telecommunications Commission

Broadband PPDR Spectrum in Thailand



- Shared use among relevant PPDR organizations
- NBTC allocated frequency bands 814-819/859-864 MHz (2x5 MHz) using FDD mode (Nationwide)
- NBTC may allocate other frequency bands for PPDR according to Resolution 646 (Rev.WRC-15): 400 MHz and 4.9 GHz, depending on needs and requirements

Narrowband PPDR Spectrum in Thailand (1/2)



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- Use for voice and data communication with low data rate
- Shared use among relevant organizations

1) Frequencies for coordination between government agencies

Frequency band / System	Frequency (MHz)	Usage
HF/SSB (Bandwidth ≤ 2.7 kHz)	4.866	Calling and Emergency Communication Channel
	4.869, 7.529, 7.715, 9.916	Communication Channel
VHF/FM (Bandwidth ≤ 12.5 kHz)	137.425/142.425/147.425	Communication Channel (simplex)
	161.200	Calling and Emergency Communication Channel
	166.475/171.475	Communication Channel (simplex)
UHF/FM (Bandwidth ≤ 12.5 kHz)	449.025	Calling and Emergency Communication Channel
	444.025	Communication Channel

Narrowband PPDR Spectrum in Thailand (2/2)



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The National Broadcasting and Telecommunications Commission

2) Frequencies for coordination between government agencies and citizens

Frequency band / System	Frequency (MHz)	Usage
HF/SSB or HF/AM or HF/FM (Bandwidth equal to or less than 10 kHz)	27.155, 27.215	Calling and Emergency Communication Channel (for Maritime stations only)
VHF/FM (Bandwidth equal to or less than 12.5 kHz)	78.5, 145.000, 245.000, 245.5000	Calling and Emergency Communication Channel
	161.200	Calling and Emergency Communication Channel (For organizations that are assigned VHF spectrum only)

3) Frequencies for coordination between government agencies and PPDR private entities

Frequency band / System	Frequency (MHz)	Usage
VHF/FM (Bandwidth equal to or less than 12.5 kHz)	161.225	- Calling and Emergency Communication Channel - Communication Channel