



สำนักงานคณะกรรมการกิจการกระจายเสียง กิจการโทรทัศน์ และกิจการโทรคมนาคม (สำนักงาน กสทช.)
Office of the National Broadcasting and Telecommunications Commission (NBTC)

Spectrum for Television Broadcasting and IMT 700 MHz in Thailand



Supatrasit Suansook

21 August 2017

Broadcasting Technology and Engineering Bureau

Office of the NBTC



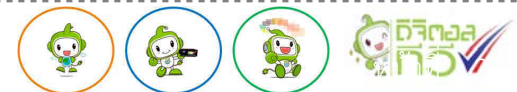
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Topics



- ▶ **Digital Terrestrial Television in Thailand : Overview**
- ▶ **Frequency Planning and Frequency Utilization for Analogue and Digital Terrestrial Television in Thailand**
- ▶ **Steps to Release 470 MHz for Digital TV and 700 MHz for IMT in Thailand**
- ▶ **Challenges**



Digital Terrestrial Television in Thailand: Overview



Current Digital TV Networks



4 Network Operators operating 5 Digital TV Networks



Public Relation Department (PRD)
1 network license (Multiplex#1)



Royal Thai Army Radio and Television
2 network licenses (Multiplex#2 and #5)



MCOT
1 network license (Multiplex#3)



Thai PBS
1 network license (Multiplex#4)

DVB[®] T2

FFT size	16k extended
Guard Interval	19/128
Modulation	64-QAM
Code rate	3/5
Bit Rate	21.93 Mbps

1 Network = 1 Multiplex = Using 1 Radio Frequency per area





Current Status of Multiplexes and TV Programs

MUX 1
(Public Relation Dept.)

SD	SD	SD
SD	SD	SD
HD		
EMM HD 2		

MUX 2
(Royal Thai Army)

TNN 16	23	true4U 24
7 HD 35		
one HD 31		
RTU HD 1		

MUX 3
(MCOT)

SD	SD	10
MCOT Family 14	SPRING NEWS 19	VOICEtv 21
Inu3 TV HD 32		
MCOT HD 30		

MUX 4
(Thai PBS)

SD	SD	SD
3 FAMILY 13	8 27	3 SD 28
3 HD 33		
Thai PBS HD 3		

MUX 5
(Royal Thai Army)

new)tv 18	BRIGHT 20	Nation 22
G-MM 25	NOW 26	MONO 29
AMARIN TV HD 34		
PPTV HD 36		

Current: 26 TV Program being broadcasted in DTT Platform (by 5 MUXs) as of March 2016

- 22 Commercial Programs *
- 4 Public Programs

Target: 48 TV Program (6 MUXs)

- 24 Commercial Programs
- 12 Public Programs
- 12 Community Programs

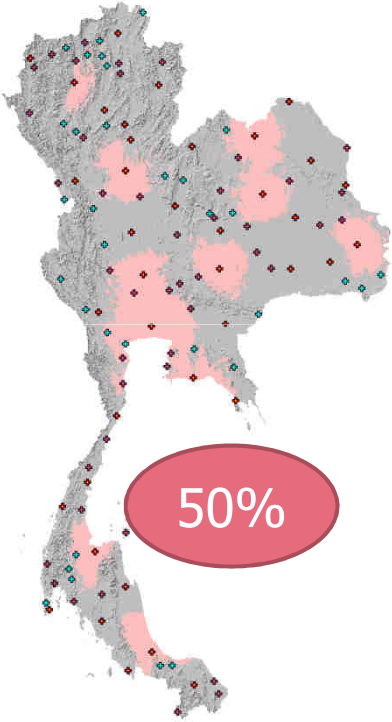
* 2 Commercial Program Licenses were withdrawn.





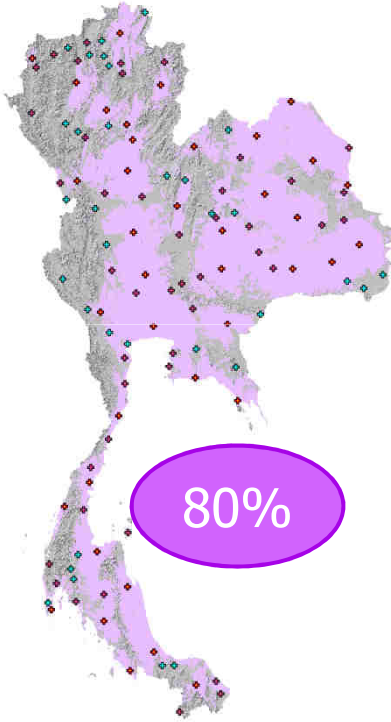
Digital TV Coverage and Rollout Plan

Phase 1 (Apr'13 – Jun'14)



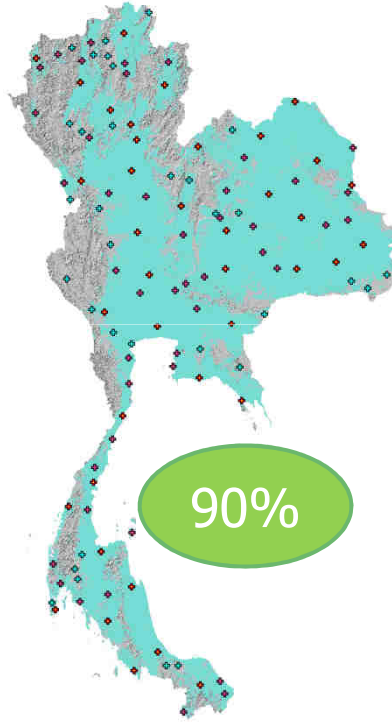
11 main sites
1 additional sites

Phase 2 (Jun'14 – Jun'15)



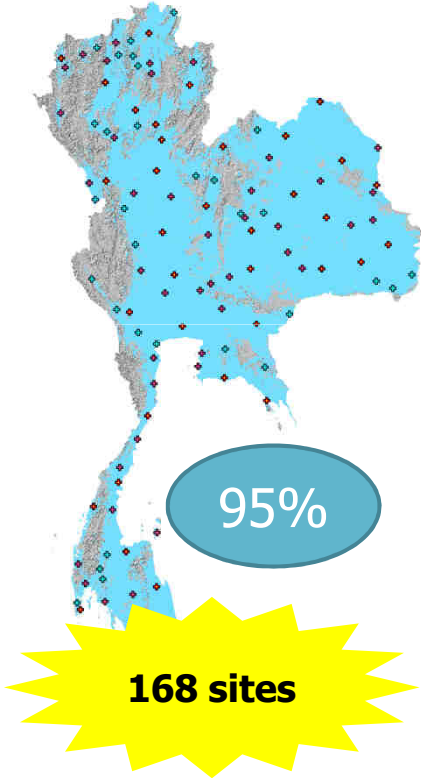
28 main sites
7 additional sites

Phase 3 (Jun'15 – Jun'16)



0 main sites
37 additional sites

Phase 4 (Jun'16 – Jun'17)



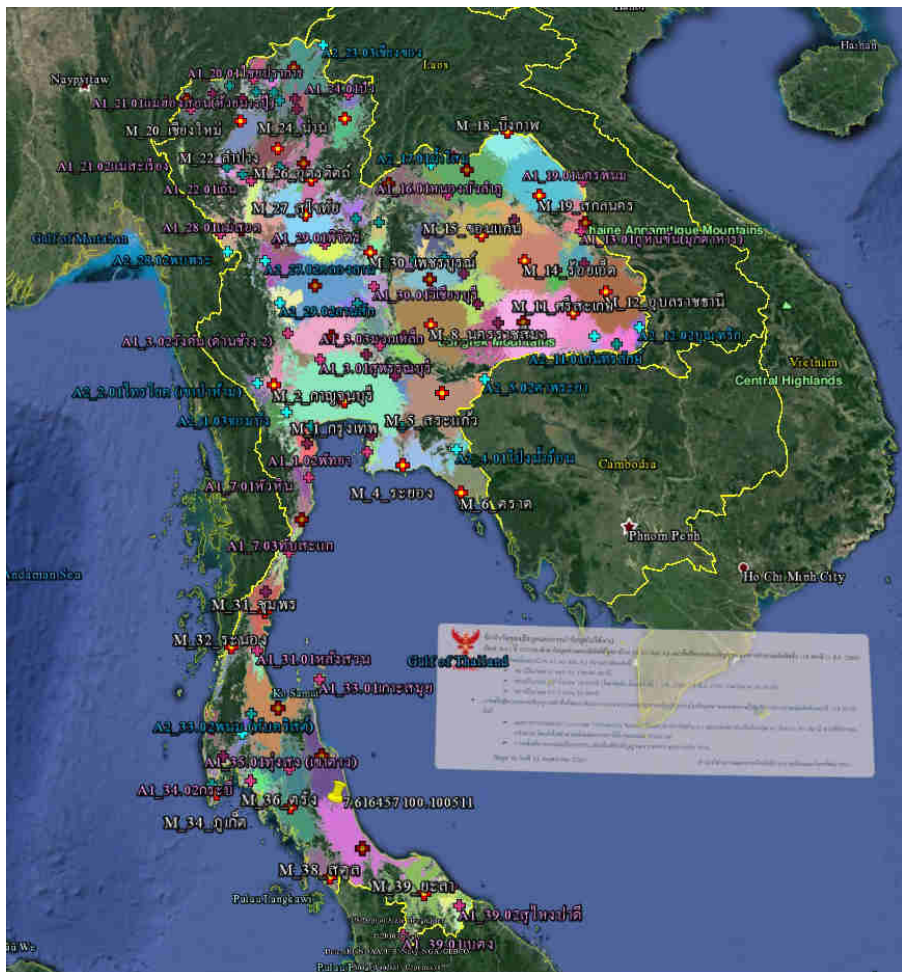
0 main sites
84 additional sites



Frequency Planning and Frequency Utilization for Analogue and Digital Terrestrial Television in Thailand



DTT Coverage in Thailand from 39 main sites and 129 additional sites



- Frequency Range : UHF 510 – 790 MHz
- Bandwidth : 8 MHz
- Frequency Channel : Channel 26 - 60
- Service Area : 39 service areas
- 5 MUXs (5 frequency channels) per Service Area
- MUX#6 will be available after Analog Switched-Off
- MUX#6 is reserved for community services
- Infrastructure sharing between all MUXs



Results from the frequency planning and coverage prediction tools



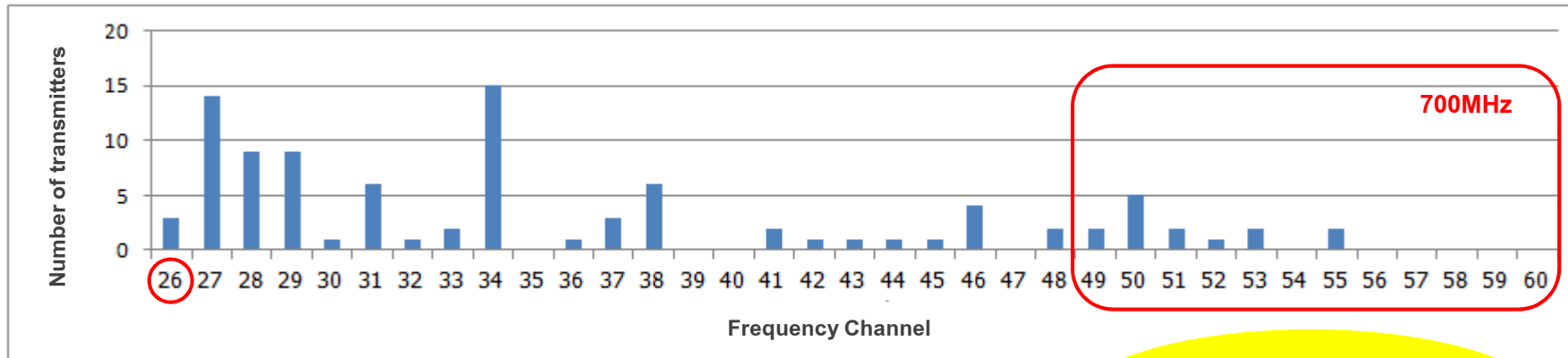
Frequency Planning Tools for Digital Terrestrial Television



Frequency Usage in UHF band for Television Broadcasting in Thailand

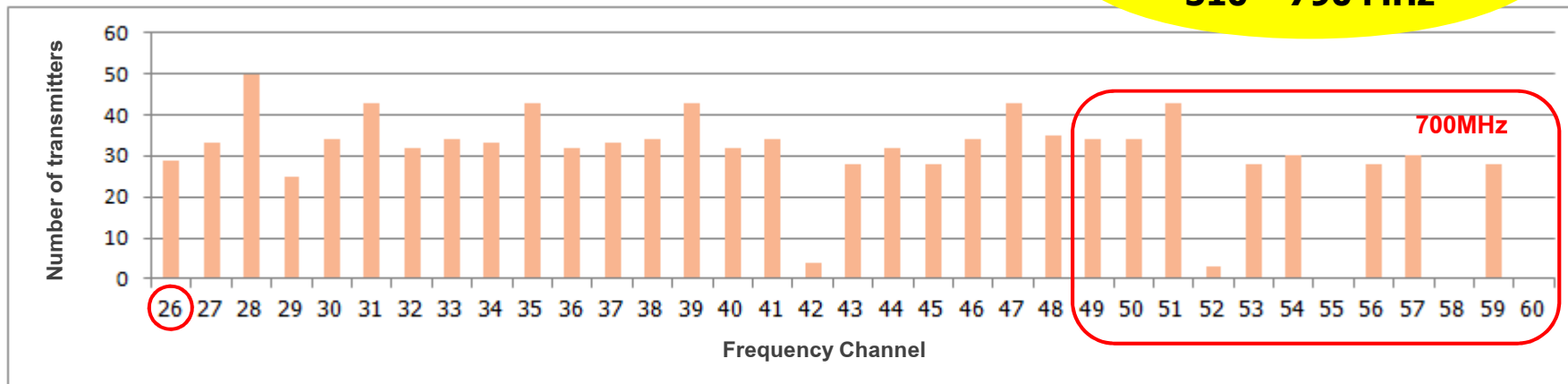


Analogue Television



**Current UHF TV Band
in Thailand :
510 – 790 MHz**

Digital Television for 6 MUXs



In Thailand, the band 470 – 510 MHz (Channel 21 – 25) is used for telecom service. So, it is necessary to use the band 700 MHz for digital terrestrial television, especially during the transition period.



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

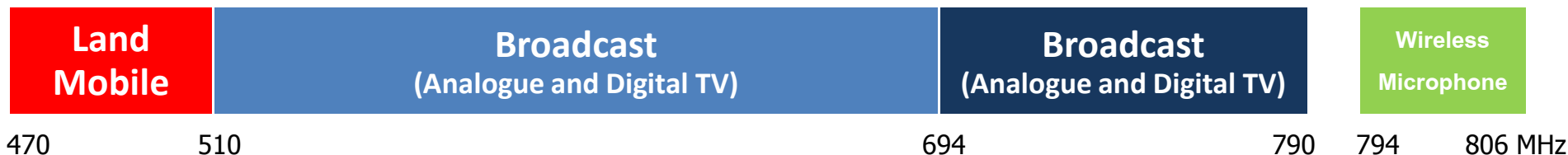


Steps to Release 470 MHz for Digital TV and 700 MHz for IMT in Thailand



Current

**UHF TV
280 MHz**



- (1) After ASO : Existing ATV Broadcasters and Concession
- (2) Refarming 470-510 MHz -> Broadcasting service
- (3) Relocate the frequencies for wireless microphone
- (4) DTT Frequency Re-Planning and Frequency Re-Stacking
- (5) Implementation in actual network and re-scan the receiver

Future

**UHF TV
224 MHz**

- 56 MHz

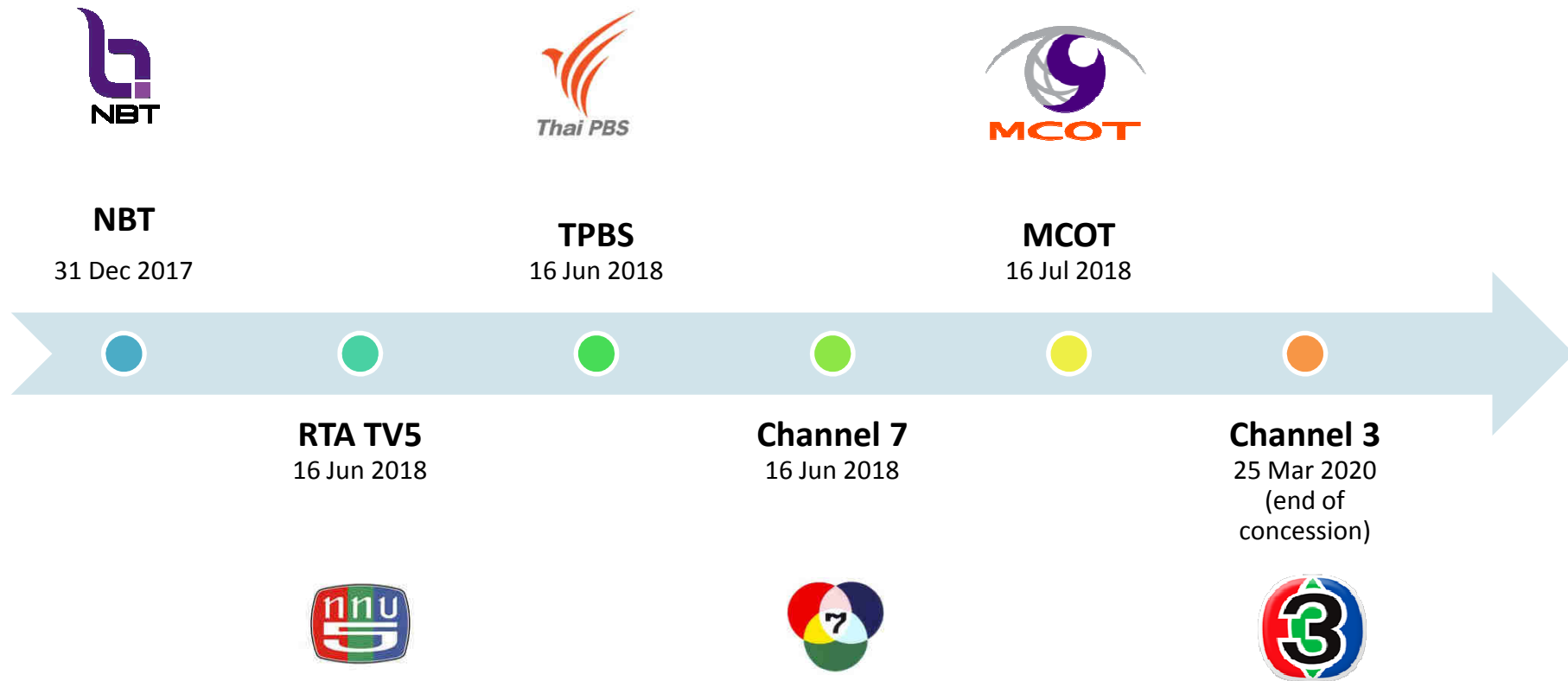




Analogue Switch-Off (ASO) Plan



- There are 6 Analogue TV Broadcasters in Thailand.
- Thailand has started ASO in 2015. Two TPBS Analogue TV Stations had been switched off on December 1, 2015.
- The ASO completion of each Analogue TV Broadcasters is as shown below :



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



Items	2014	2015	2016	2017	2018	2019	2020	2021	2022
Digital Terrestrial Television Rollout (Target is 95% of households in 2017)	50%	80%	90%	95%					
Analogue Switch-Off: ASO (There are 6 analogue tv broadcasters)		TPBS	TPBS	TPBS TV5 CH7 NBT	TPBS TV5 CH7 MCOT		CH3		
Spectrum re-farming for the band 470-510 MHz and re-allocate to broadcasting service									
RF Re-planning for Digital Terrestrial Television in the band 470-698 MHz									
Re-locate the frequencies for wireless microphone									
- Re-tune the frequency at the transmitter site - Communicate to viewers to re-scan their set-top box or TV set - Release 700 MHz for IMT									

According to the concession, BEC (Channel 3) will switch off their analogue television in 2020. However, their ASO plan can be shifted earlier depending on the negotiation and the legal process.



Challenges



Challenges (1)



- ▶ To keep the DTV coverage requirement of 95% households , the frequency planning for 6 MUXs is much more difficult with less frequency channels.
- ▶ ASO cannot be completed before the end of concession, unless both sides reach agreement.
- ▶ DTV receiving antennas (especially the old models in Thailand) were not designed for the frequency range 470-510 MHz.
- ▶ To re-configure or replace the transmitting equipment of DTV :
 - ▶ It will affect to the services. Thus, the broadcasters need to minimize the downtime or provide the redundant system.
 - ▶ There is a cost for broadcasters to do so. The sufficient and reasonable compensation is required. (NBTC is conducting a study to evaluate the compensation for spectrum users in the re-farming process.)
- ▶ To re-scan the STB and iDTV after frequency re-stacking, the DTV viewers might be confused. So, the communication plan has to be well-prepared and jointly implemented by relevant parties.



Challenges (2)



- ▶ Finding the suitable frequency ranges for wireless microphone is very challenging (technical constraints, existing spectrum usage, time to market, and economy of scale). The grace period is required for the wireless microphone makers/users.
- ▶ Potential interference :
 - ▶ IMT vs DTV : Guardband and technical specification (OOB) for IMT UE are needed.
 - ▶ IMT vs Wireless Microphone : NBTC needs to ensure that Wireless Microphone in the band 794 – 803 MHz is no longer exist.
- ▶ Several NBTC Notifications have to be developed and published to facilitate this entire process:
 - ▶ Frequency Relocation Process for 470 – 510 MHz
 - ▶ Frequency Plan for Digital TV in the band 470 – 694 MHz
 - ▶ Criteria for Digital TV Broadcasters to obtain the compensation in the frequency restacking process
 - ▶ Frequency Relocation Process for Wireless Microphone in the band 794 - 806 MHz
 - ▶ Technical Specification for Wireless Microphone in the new frequency bands.
 - ▶ Frequency Plan for IMT 700 MHz
 - ▶ Technical Specification for IMT 700 MHz Base station and User Equipment
 - ▶ Spectrum Licensing Rules for IMT 700 MHz
 - ▶ ... and so on.





ขอบคุณครับ

Thank you

สุภัทรสิทธิ์ สวนสุข

วิศวกรอาวุโส

สำนักวิศวกรรมและเทคโนโลยีกระจายเสียงและโทรทัศน์ (ทส.)

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