Digital Terrestrial Television in Thailand: Technical Aspects



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Introduction

In Thailand, the National Broadcasting and Telecommunications Commission (NBTC) is playing an important role in promoting and implementing the transition from analogue to digital terrestrial television. In 2012, the transition roadmap was developed and DVB-T2 was selected as a national standard for digital terrestrial television (DTT). The technical specifications for DTT transmission, DTT receivers, as well as the first frequency plan were then developed. In 2013, NBTC and broadcasters conducted a field trial for DTT in Bangkok area to fine tune a suitable parameter set - a key driver to the new frequency plan, aiming for a coverage target as stipulated in the roadmap. Since then, NBTC has been reviewing and updating relevant technical specifications and the frequency plan, as well as developing DTT technical guidelines.

Key Technologies and Technical Parameters for DVB-T2

The key technologies and requirements for digital terrestrial television are as follows;

Table 1:

Key technologies and requirements for DTT in Thailand

Items	Specifications/Requirements
DTTB Transmission	DVB-T2
Resolution	 SD and HD SD – Standard Definition (576i) HD – High Definition (1080i or 720p)
Video Compression	MPEG-4 AVC/H.264 (supports subtitling system)
Audio Compression	MPEG-4 HE AACv2 • Stereo is minimum requirement
Conditional Access	No conditional access (free-to-air)
Number of Multiplexes	6
Number of Programmes	48

In 2013, a field trial was conducted in Bangkok Metropolitan Area to determine a suitable parameter set. The parameter set was selected considering a trade-off between signal robustness and available bitrates.

 Robustness: ability to plan a network to meet the coverage requirement of 95% households with fixed rooftop reception, plus portable indoor reception in major municipalities. Bitrates: ablity to deliver 48 digital TV programmes (at least 10 HD programmes and 38 SD programmes) with 6 multiplexes.

Table 2 shows the DVB-T2 parameter set for Thailand. This parameter set is mandatory for network operators because the parameters provide certain characteristics, critical to frequency planning.

Table 2:

DVB-T2 parameter set for Thailand (Mandatory)

Values
16k extended
19/128
64-QAM
3/5

The above parameter set can provide approximately 22 Mbps/ multiplex, therefore, NBTC developed four possible options for multiplex composition:

- Option 1: 12 SD services (available for the multiplex for community services only)
- Option 2: 1 HD and 9 SD services
- Option 3: 2 HD and 6 SD services (being used in 4 multiplexes)
- Option 4: 3 HD and 3 SD services (being used in 1 multiplex)

Capacity Management

In 2014-2015, the NBTC established a working group to develop technical guidelines for digital terrestrial television. In addition to the mandatory parameter set, these technical guidelines provide recommendations to network operators to use certain parameters and to manage the multiplex capacity in accordance with the chosen multiplex option, as shown in Figure 1 and Table 3.



Table 3:

Recommended Parameters and Multiplex Capacity Management

DVB-T2 Parameters: 16k ext., GI 19/128, PP2, 64-QAM, CR 3/5, L1Post:QPSK) Time Interleave Depth = 81.71 ms.	Total	Bit Rate	21.930	Mbps
ITEMS	Option 1	Option 2	Option 3	Option 4
Number of HD Channels	0	1	2	3
Number of SD Channels	12	9	6	3
TOTAL CHANNELS	12	10	8	6
BIT RATE	(kbps)			
Video Bit Rate (Pool Bit Rate with Statistical Multiplexing) • SD Bit Rate (min-max) = 0.75-2.5 Mbps • HD Bit Rate (min-max) = 2-7 Mbps	18400	18700	19000	19000
Audio Bit Rate (70 kbps per one stereo, 2 tracks per channel)	1680	1400	1120	840
Audio Description (35 kbps per one stereo, 1 track per channel)	420	350	280	210
Subtitles (100 kbps per channel)	1200	1000	800	600
SI (EIT) or EPG	300	300	300	300
SI (PMT) (25.75 kbps per channel)	309	257.5	206	154.5
SI (others) = 64 kbps	64	64	64	64
TOTAL PAYLOAD	22373	22071.5	21770	21168.5
Reserved for SSU and others	-443*	-141.5*	160	761.5

* The negative values imply that it is not feasible to provide all supplementary services (i.e. audio description, subtitle, SSU) at the same time.

Current TV Programmes and Multiplex Loading

The auction for commercial TV programmes took place in December 2013 and licenses were given to 24 commercial TV programmes (7 HD programmes and 17 SD programmes). In addition, 3 public TV programmes were permitted to be broadcast in HD format during the simulcast period. In 2015, NBTC granted one additional license to 1 public TV programme (Parliament TV). Nowadays, Thailand has 28 digital TV programmes (10 HD programmes and 18 SD programmes) transmitted by 5 multiplexes. The relationship between TV programmes and current multiplex loading is shown in Figure 2.



Frequency Planning

NBTC collaborated with the International Telecommunications Union (ITU) to conduct a frequency plan for DTT. This project completed the detailed planning for 39 main sites and 132 additional sites in February 2014 and February 2015, respectively. The third edition of the DTT frequency plan was officially published in August 2015. The summary of the DTT frequency plan is shown in Table 4 below:

Table 4:

Summary of DTT Frequency Flam for

No	Items	Description
1	Frequency range	510 – 790 MHz
2	Channel bandwidth	8 MHz (CH26-60)
3	Number of multiplexes	 5 multiplexes before Analogue Switch-Off 6 multiplexes after Analogue Switch-Off The 6th Multiplex is reserved for community TV
4	Number of service areas	39 service areas
5	Number of planned sites	39 main sites and 132 additional sites
6	Coverage target	95% of households (fixed rooftop reception)

NBTC and ITU categorise the station type into 4 types (M, A1, A2, and A3). The description of each type and the coverage of DTT in Thailand are shown in Figure 3.



Figure 3: DTT Coverage in Thailand (after the completion of network rollout) and DTT Station Types

A3 Additional non-existing sites

According to license conditions, the network operators will implement their networks to reach 95% of households within four years. The network deployment schedule was jointly developed by NBTC and network operators. The deployment schedule is shown in Table 5.

Table 5:

DTT Network Deployment Schedule and Current Status

Phase	Duration	Rollout Obligation	Rollout Plan	Status**
1	April 2014 - June 2014	50% Households	11 M sites and 1 A1 site	Completed
2	June 2014 - June 2015	80% Households	+28 M sites and 7 A1 sites	Completed
3	June 2015 – June 2016	90% Households	+37 A1 sites	Ongoing
4	June 2016 – June 2017	95% Households	+38 A2 sites and 49 A3 sites	Reviewing

**As of December 2015.

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regulator with world class standards, having powers and duties to assign the frequencies and to regulate the broadcasting and telecommunications business with regard to utmost public benefit at national and local levels in education, culture, state security and other public interests as well as free and fair competition.

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Conclusion

NBTC has completed several sets of technical regulations and recommendations to ensure the reliability and the performance of the DTT network. Currently, the DTT coverage is able to reach approximately 80% of households, delivering 28 digital TV programmes. In 2017, NBTC expects to have the DTT network covering up to 95% households and delivering 48 digital TV programmes.

In addition to the technical parameters and capacity/frequency planning, NBTC has recently launched a DTT coverage checking application, based on the result of frequency planning, in 3 platforms; Android OS, iOS, and web-based (please visit: http:// dtvservicearea.nbtc.go.th). NBTC also developed an EPG server to facilitate both service providers and network operators in order to prepare centralised EPG information, which can be used for crosscarried EPG. Progress is being made and development is ongoing in the hope that this will lead to improved technical regulations and guidelines for the industry and to benefits for Thai viewers.