



**ITU/NBTC Conference on Digital Broadcasting
NBTC works done on Digital Radio
12 December 2017, Bangkok, Thailand**

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Office of NBTC, Thailand**

Contents

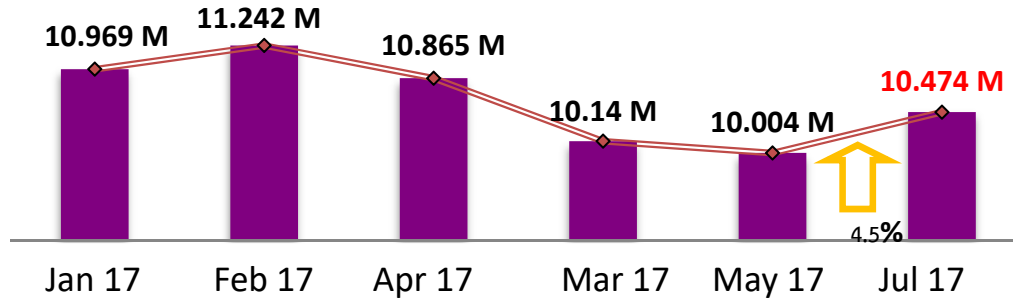


- Radio Broadcasting Services in Thailand
- National Digital Broadcasting Plan
- History of Digital Radio Trial in Thailand
- Digital Radio Broadcasting Projects
- DAB+ trial and way forward in Thailand

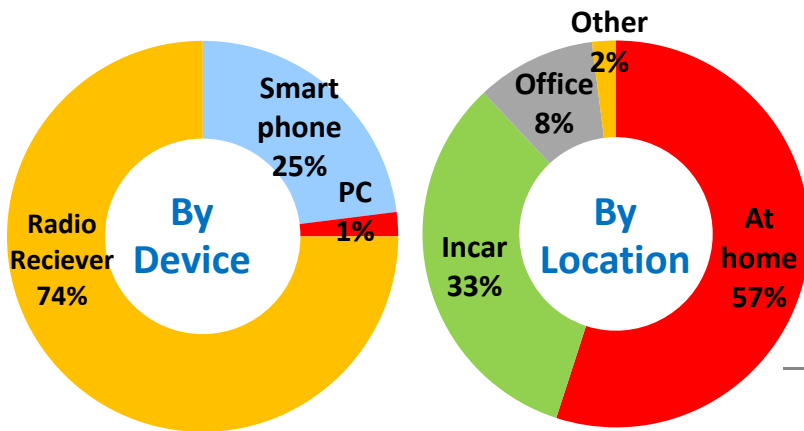
Radio Broadcasting in Thailand: Radio Consumption



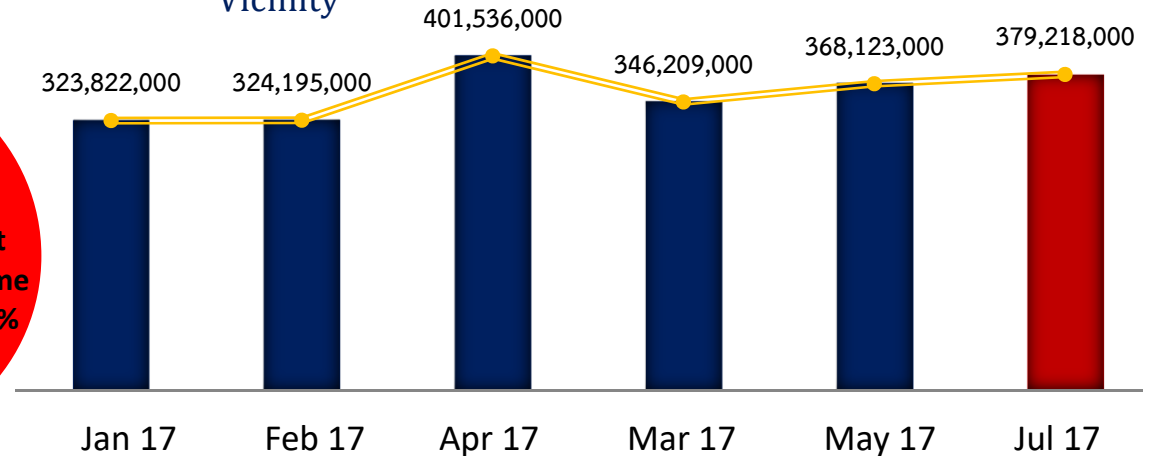
Radio Reach by Population : BKK and Vicinity



Listening Radio behavior by Device and Location



Annual advertising Revenues (Baht) : BKK and Vicinity



Source: Nielsen

Radio Broadcasting in Thailand: Media Advertising Expense Spending

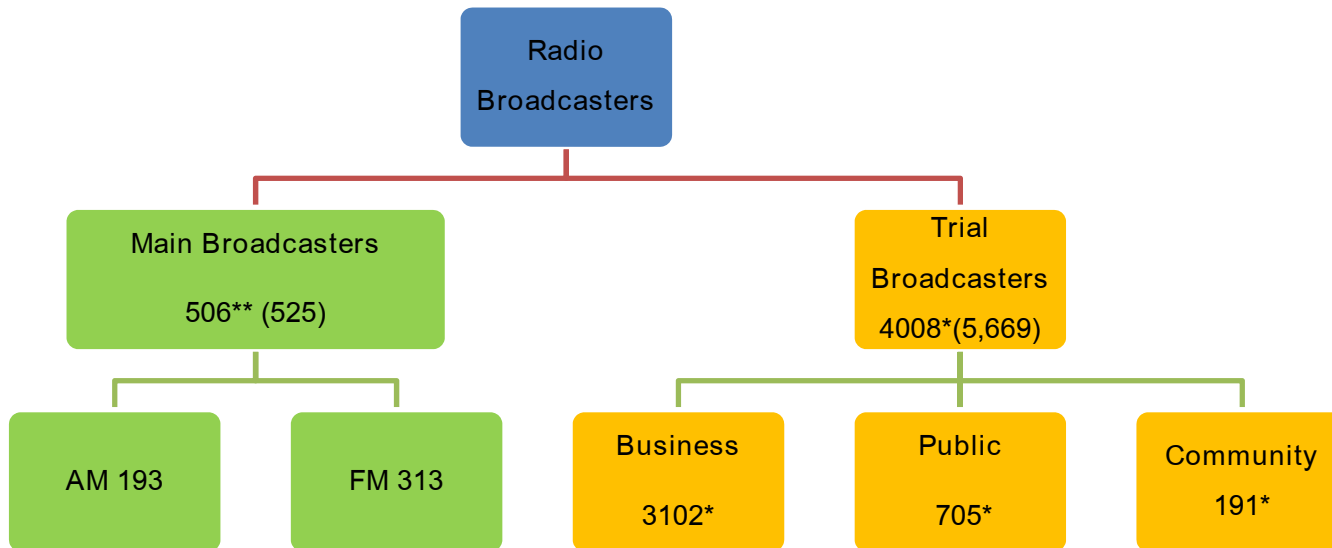


Media	2015	2016	%Change
Terrestrial	78,457	67,492	-14%
Cable/Satellite TV	6,055	3,495	-42%
Radio	5,675	5,262	-7%
Newspaper	12,323	9,843	-20%
Magazine	4,268	2,929	-31%
Cinema	5,133	5,445	6%
Outdoor	4,190	5,665	35%
Transit	4,486	5,311	18%
In store	645	700	9%
Internet	1,058	1,731	64%

Unit: Million Baht
Source: Nielsen

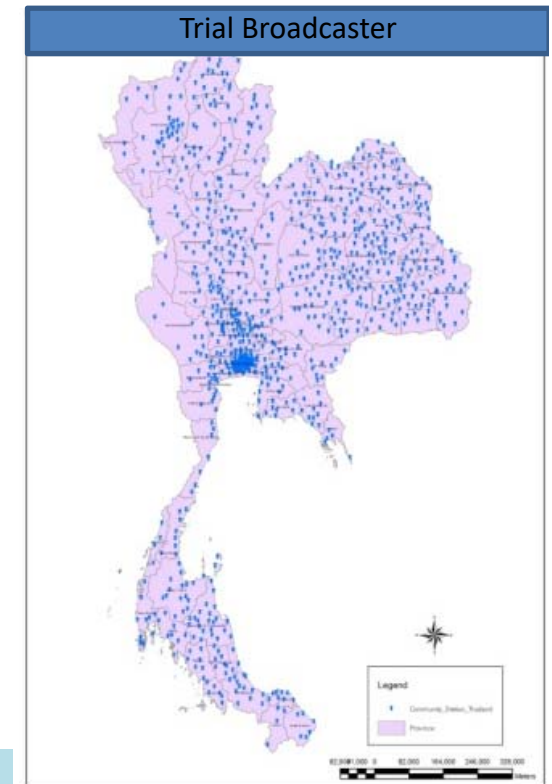
Source: Nielsen

Radio Broadcasting Landscapes in Thailand : Incumbent Radio Broadcasters



* **Extended right to use radio frequency for 5 years

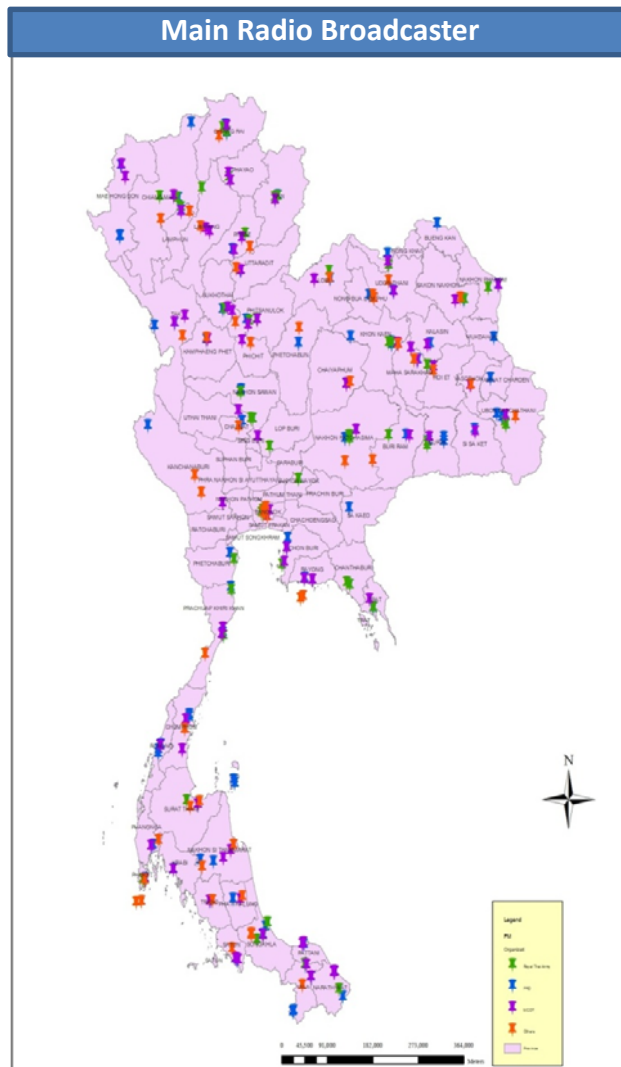
* Currently on-Air: as of Oct 2017



Current Thai National Frequency Plan

- LF Band (AM Long Wave) – 30 to 300 kHz;
- MF Band (AM Medium Wave) – 300 to 3000 kHz;
- HF Band (AM Short Wave) – 3 to 30 MHz;
- VHF Band I (Television Band I) - 47 to 68 MHz ;
- VHF Band II (FM Radio Band) – 87 to 108 MHz;
- VHF Band III (Television Band III) – 174 to 230 MHz; (currently used for ATV)
- UHF Band IV and V (Television Band IV and V) – 470 to 854 MHz
- UHF L-Band – 1452 to 1492 MHz.

Radio Broadcasting in Thailand : Radio Broadcasters



	Number of Frequency Assignments				Total
	Bangkok Area		Regional		
	AM	FM	AM	FM	
The Bureau of the Royal House		1			1
PRD	5	6	52	82	145
MCOT	2	7		53	62
Ministry of Defence	1	1	1		3
Royal Thai Armed Forces	1	2	6	5	14
Royal Thai Army	12	12	66	37	127
Royal Thai Navy	1	3	6	11	21
Royal Thai Air Force	3	1	15	17	36
Royal Thai Police	2	1	5	36	44
Ministry of Foreign Affairs	1				1
Ministry of Agriculture	1				1
Ministry of Education	1	2			3
Office of Higher Education Commission		1		6	7
NBTC	2	2	4	4	12
The Met Department	1			5	6
Department of Fisheries				3	3
Marine Department				1	1
Bangkok	1				1
Parliament	1	1		14	16
Kasetsart University	1		3		4
Thammasat University	1				1

National Digital Broadcasting Plan: Broadcasting Master Plan and Digital Economy Plan



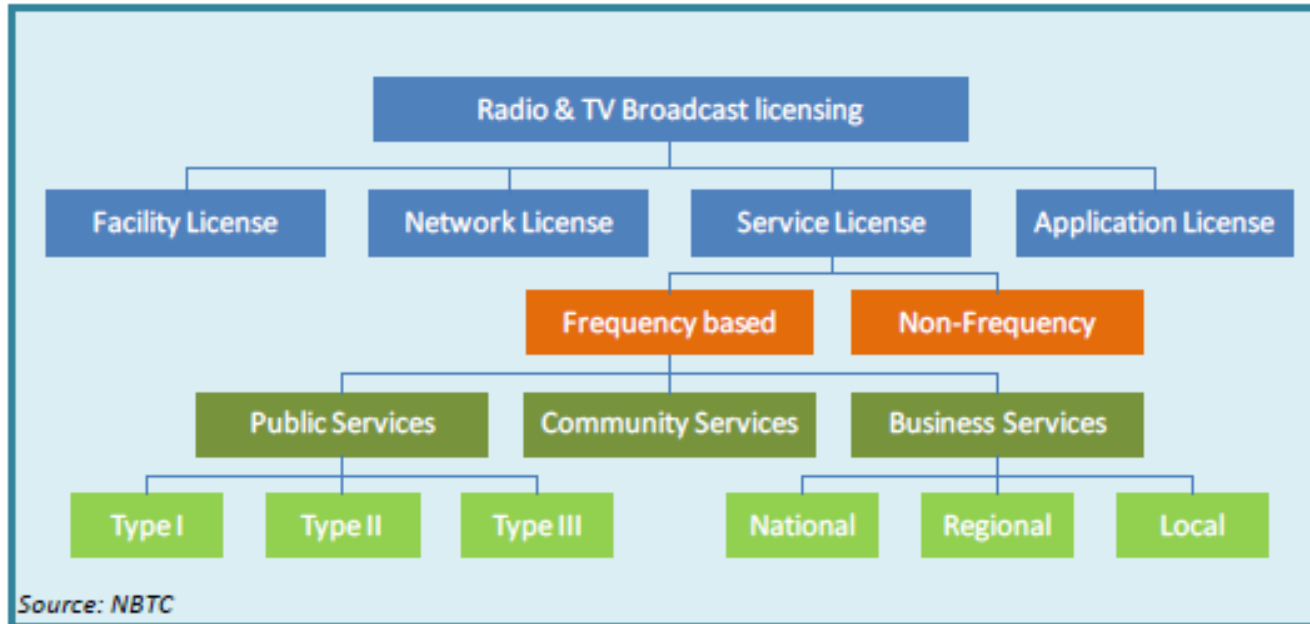
Act on Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunication Service, B.E. 2553 (2010)



The first Thailand Broadcasting Master Plan (2012-2016, extended)
Strategic No. 6 Transition from Analog to Digital Broadcasting

Thailand Digital Economy and Society Development Plan(2016-2018)
Strategic No. 1 Develop digital infrastructure
Goal: Deployment Digital TV and Digital Radio broadcasting cover nationwide,
providing digital radio broadcasting services with in 3 years

Radio Broadcasting Licensing Framework



Public Broadcasting Service

Type one: for the promotion of knowledge, education, religions, arts, and culture, science, technology and environment, agriculture and other occupational extension, health, sanitation, sports or enhancement of quality of life of the people

Type Two: for national security or public safety

Type three: for dissemination of news and information to promote better understanding between the government and general public, Parliament and the people, dissemination of news and information which may promote distribution and provision of education to the people in democratic regime of government with the King as Head of the state, provision of news and information services beneficial for the disabled, underprivileged persons or interested groups who conduct non-for-profit activities or provision of news and information for other public benefits.

➤ History of Digital Radio Trial in Thailand



❖ DAB+ Trial

- ❖ Mar 2013, DAB+ trial with collaboration NBTC/ITU/ WorldDMB/MCOT, 4 channels in Bangkok



- ❖ Objective : technical testing ,drive test signal measurement
 - ❖ Frequency: VHF Band III Channel 12D (228.304 – 229.840 MHz), transmitter site located at MCOT-Bangkok
-
- ❖ DRM
 - ❖ May 2004 (B.E 2547), the first digital radion testing in ASEAN with collaboration of DRM/NBT/ABU (1 months trial)

NBTC/ITU Digital Broadcasting Project: Digital Radio



NBTC/ ITU joint Project on Roadmap Development for Digital Terrestrial Radio Roll-out in Thailand

- ❖ Digital Radio Roadmap in Thailand
- ❖ Digital Radio Services Requirement
- ❖ DAB+ Network Architecture and Cost Model
- ❖ International Benchmarks for DAB+ Digital Radio Deployment (UK, Norway, Switzerland, Australia)
- ❖ Deployment Strategies for Digital Radio Services in Thailand
- ❖ Practical Guideline for Digital Radio Trial in Thailand
- ❖ Practical Guideline for Digital Radio Auction in Thailand

Capacity Building: Workshop/Conference, focus group NBTC/ITU Workshop 'Roadmap for introduction of Digital Terrestrial Radio Service in Thailand.



NBTC/ITU Workshop on Roadmap for Introduction of Digital Terrestrial Radio Services in Thailand



<http://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Pages/Events/2014/December-DR-Thailand/home.aspx>
<https://broadcast.nbtc.go.th/data/academic/file/580100000002.pdf>

Digital Radio Transmission standard



Technology/ System	Radio	VDO/ Image	Radio On Mobile Devices	On Mobile phones/ Devices	Frequency Band
DMB (DAB, DAB+)	Yes	Yes	Yes	Yes	VHF III
DRM (DRM30, DRM+)	Yes	Yes	Yes	Yes	LF, MF, Shortwave, FM, VHF
T-DMB	Yes	Yes	Yes	Yes	VHF III
ISDB-T_{SB}	Yes	-	Yes	Yes	TV bands
ISDB-T_{MM}	Yes	Yes	Yes	Yes	VHF III, etc.
HD-Radio (IBOC)	Yes	-	Yes	-	MF, FM

Source: ITU Project

DAB+ (ITU-R
BS.1114-8)
System A

VHF BandIII:
174-230 MHz

4 transmission standards for VHF Band III (DAB+, DRM, ISDB-T, T-DMB):

- ISDB-T & T-DMB radio services are part of TV multiplex
- Thailand has opted for DVB-T2 → ISDB-T/T-DMB no option → only DAB+ and DRM are options → only for DAB+ receivers are widely available

NBTC/ITU Project on Digital Radio : International Benchmarking



Benchmarking 4 Countries: UK, Norway, Switzerland, Australia
For support development on Digital radio deployment strategies,
regulatory framework

International Benchmarks for DAB+ Digital Radio Deployment

- Broadcasting Landscape
- Licensing Frameworks →
- Operating and Funding Models
- Business driver and incentives
- Marketing
- Support Organization

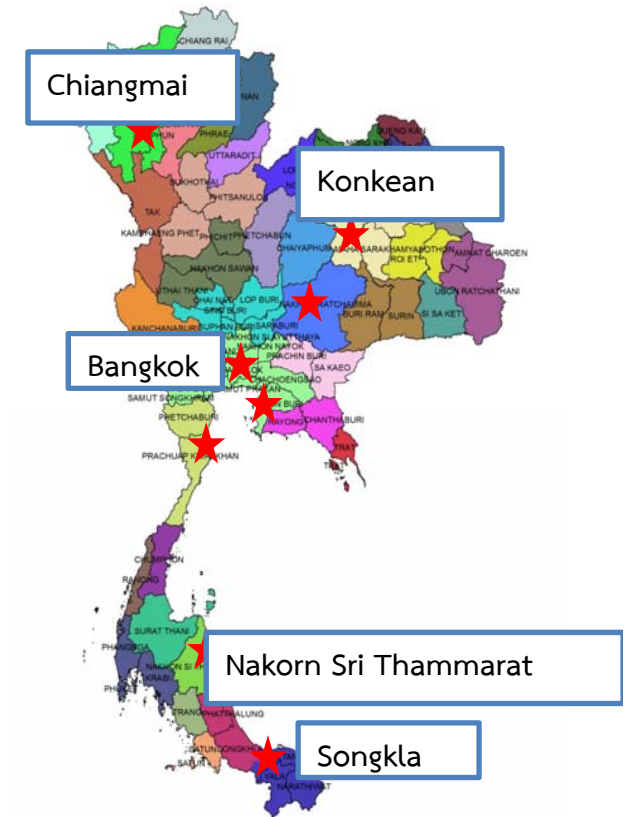
Aspect	UK	Norway	Australia	Switzerland
Regulator	Ofcom	NMA	ACMA	OFCOM
Spectrum license holders	Multiplex operator (e.g. Digital One), broadcasters and broadcaster consortiums	Multiplex and transmission provider (e.g. Norkring), broadcasters and broadcaster consortiums	Broadcasters through JVC Multiplex operators	OFCOM holds the spectrum license and issues Broadcast licenses to deliver content via multiplexes
License period (years)	12	NA	15	NA
License application process	Beauty contest	Applications for new multiplexes through the NMA	Regional licencing is under review	Applications for new multiplexes through the OFCOM
Access fees	Set by multiplex operator	Set by multiplex operator	Set by JVC under ACCC guidelines	Set by multiplex / transmission provider
ASO	Decision expected in 2016-17	Planned for 2017	No plans	Phased approach from 2020 to 2024

#Project NBTC/ITU Roadmap for the Introduction of Digital Terrestrial Radio Service in Thailand

DAB+ Digital Radio Trial plan



Item			
ATV channels	5-11	5-11	5-11
# Sites	8 ¹	8	5
MUX	1-3 ²	1-3	1-3
SFN	SFN applied ⁴	SFN applied	NA
ATV protection	√	X	√
ATV coverage provided	√	√	√
Pop coverage (3 MUX)	9,123,000 ⁶ (14%)	17,422,000 ⁷ (27%)	8,431,000 ⁸ (13%)
Pop coverage (2 MUX)	10,712,000 (16%)	17,965,000 (28%)	9,873,000 (15%)
Pop coverage (1 MUX)	11,894,000 (18%)	18,560,000 (29%)	10,624,000 (16%)
Total ERP / #TX (3 MUX)	88 kW / 23	240 kW / 24	61 kW / 15
Range ERP	0.1 - 10 kW	10 kW	0.1 - 10 kW

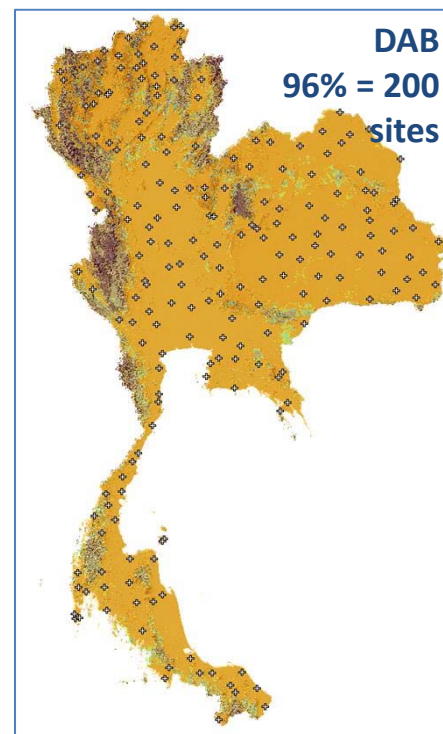
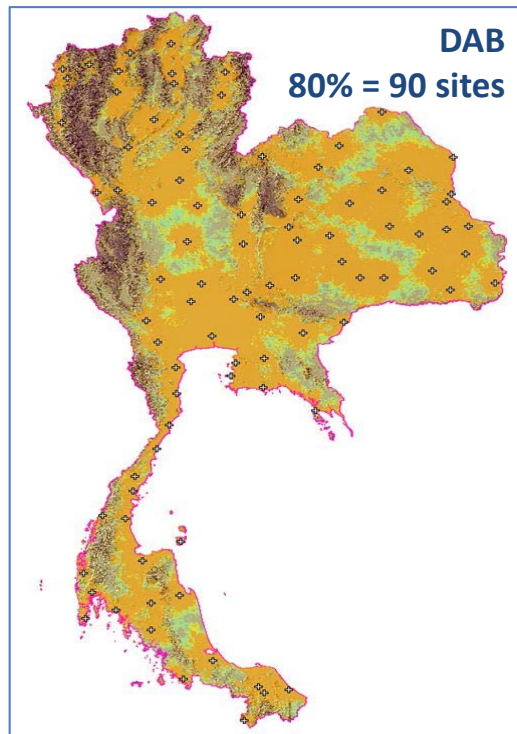


Infrastructure sharing
Multiplexers, Distribution, Towers,
Transmitters, Antennas

Digital Radio Broadcasting plan in Thailand: Coverage Target and Network Investment Cost



-> Set initial deployment target low (80%)

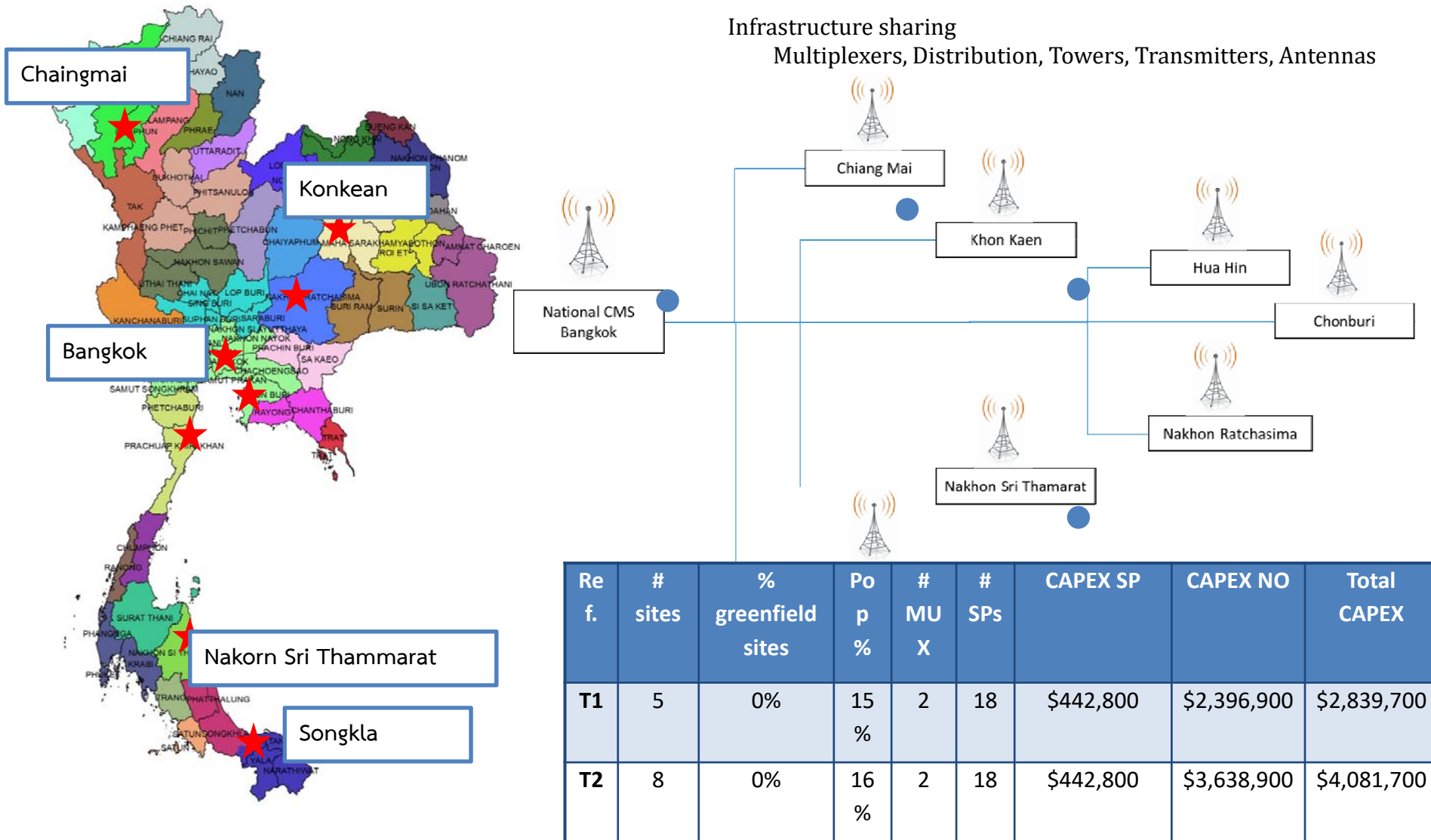


Ref.	# sites	% greenfield sites	Pop %	# M UX (N+L)	# Services (64kbps)	Total CAPEX
N1	200	15%	95%	2+0	36+0	\$84,702,880
N2	90	0%	80%	2+0	36+0	\$37,973,880
NL1	200	15%	95%	2+1	36+702	\$146,869,070
NL2	90	0%	80%	2+1	36+702	\$74,290,070

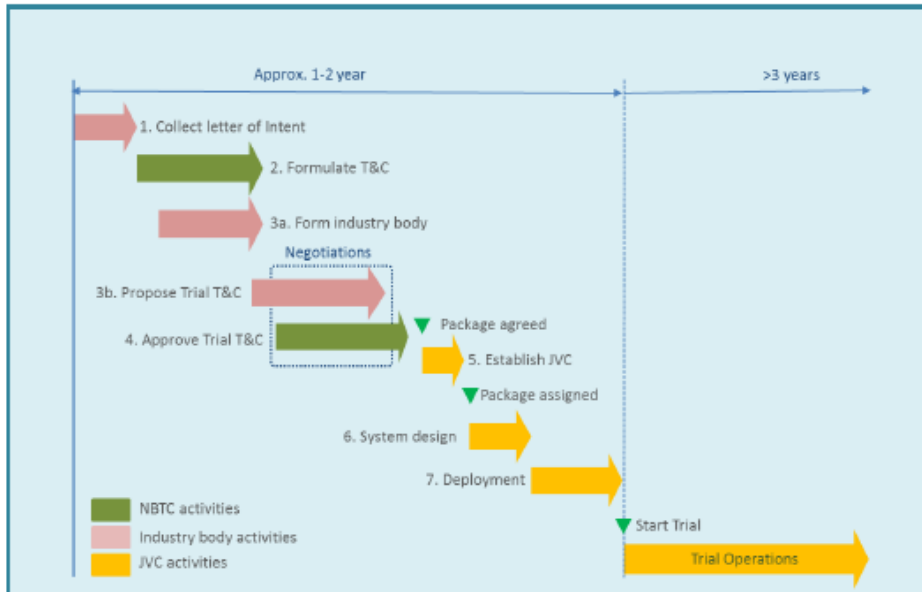
Way forward: DAB+ Digital Radio Trial plan



Infrastructure sharing
Multiplexers, Distribution, Towers, Transmitters, Antennas



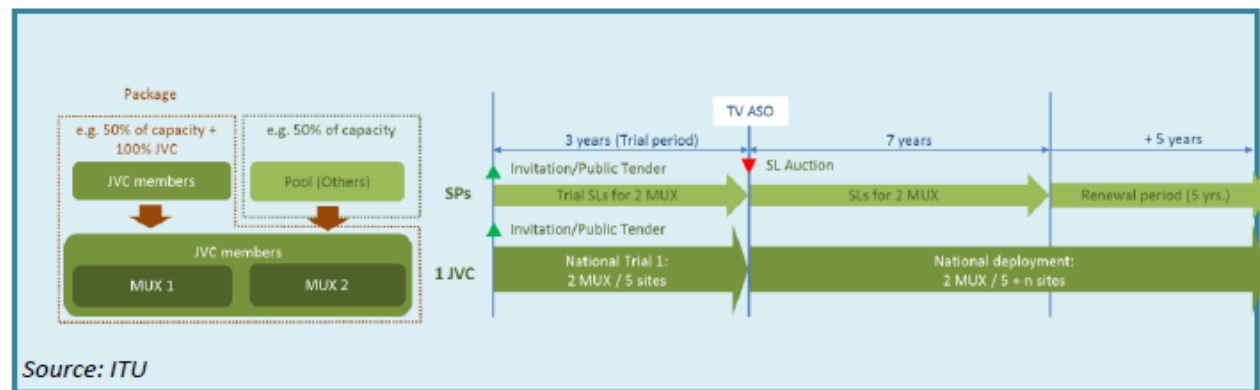
Way forward : Digital Radio Broadcasting in Thailand



Source: ITU

FIGURE 9: TIMELINE OF ESTABLISHING THE INDUSTRY

- ❖ Coordinating with Marketing, technical, political activity on behalf of broadcasters
- ❖ Listener engagement measurement, Receiver and retailer support, automotive support



Source: ITU

FIGURE 6: SUMMARY OF THE RECOMMENDED DAB DEPLOYMENT STRATEGY AND POLICY

Other NBTC Digital Radio Broadcasting Projects



- ❖ Develop Broadcasting Indicator
- ❖ User Survey on Radio Broadcasting: Reachable, User Behavior
- ❖ Cost Base Analysis (CBA) for Digital Radio Deployment in Thailand
- ❖ Capacity Building on Digital Radio Technologies and Implementation



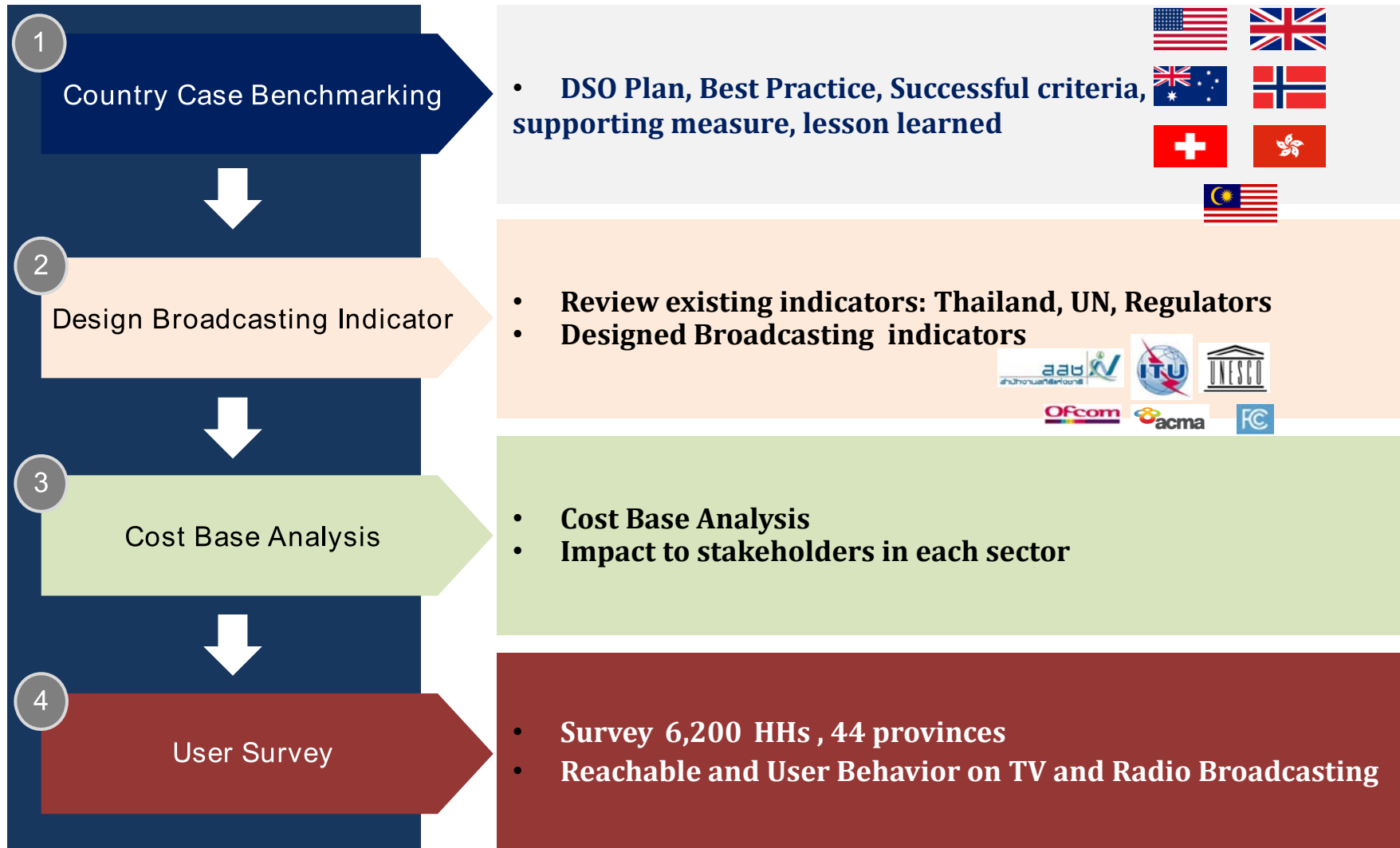
NBTC: WorldDAB member since 2014

Y2017

- ❖ Project: DAB+ trial in Thailand (Depend on Frequency Plan for Trial)
- ❖ Guideline Digital Radio for Broadcaster, People
- ❖ Review draft of Radio Broadcasting Policy paper : Radio broadcasting development Plan for Thailand
- ❖ Policy paper : Technology, frequency management, spectrum licensing, broadcasting service licensing, digital radio trial
- ❖ Regulatory Impact Assessment (RIA)
- ❖ Economic and Social Impact
- ❖ Radio Broadcasting roadmap



Project: Develop Broadcasting Indicators and User Survey



Project: Develop Broadcasting Indicator sand User Survey Cost Base Analysis- Option



Case 1 (2N+1L 80%)	<ul style="list-style-type: none">• National 36 ch , Public : Commercial 50:50• Local 18 ch in each area , Public : Commercial: Community 30:50:20
Case 2 (2N+1L 95%)	<ul style="list-style-type: none">• National 36 ch , Public : Commercial 50:50• Local 18 ch in each area , Public : Commercial: Community 30:50:20
Case 3 (2N+0L 80%)	<ul style="list-style-type: none">• National 36 ch , Public : Commercial 50:50
Case 4 (2N+2L 80%)	<ul style="list-style-type: none">• National 36 ch , Public : Commercial 25:75• Local 36 ch in each area , Public : Commercial: Community 25:25:50
Case 5 (2N+2L 80%)	<ul style="list-style-type: none">• National 36 ch , Public : Commercial 50:50• Local 18 ch in each area , Public : Commercial: Community 25:25:50

✓ Impact to GDP and Government Revenue
✓ NPV
✓ Network Investment
✓ Digital Radio Industry

Project: Develop Broadcasting Indicator and User Survey Cost Base Analysis- Result



Summary Analysis Result (B.E. 2560-2574) Unit, million Baht	Case 1 2N+1L 80%	Case 2 2N+1L 80%	Case 3 2N+0L 80%	Case 4 2N+2L 80%	Case 5 2N+2L 80%
Impact to GDP and Government Revenue					
GDP	28,000	36,000	21,000	31,000a	31,000
Receiver	19,400				
Network Deployment	2,660				
Multiply Investment	6,240				
Gov Rev	1,870				
Corporate tax	700				
Revenue from Spectrum Auction	420				
Revenue from Fees	750				
Summary Analysis Result (B.E. 2560-2574) Unit, million Baht					
	Case 1 2N+1L 80%	Case 2 2N+1L 80%	Case 3 2N+0L 80%	Case 4 2N+2L 80%	Case 5 2N+2L 80%
NPV					
NPV Project	115	-1,481	-252	-457	-545
NPV Nation Broadcasters	98	51	3	51	114
NPV Local Broadcasters	0.04	-2	-	0.9	-0.9
Network Investment Cost					
Network Investment	3,906	7,859	2,194	5,023	5,023
Digital Radio industry					
DAB+ take-up rate	0.12%-26%	0.12%-31%	0.12%-17%	0.12%-29%	0.04%-29%
No.DAB+ Listener (2574)	19 million	22.4	12.4	21	21
Advertising Spending	724-2,058 (Y5-15)	851-2,421	698-1,338	724-2,270	724-2,270

Project: Develop Broadcasting Indicator and User Survey

Radio Broadcasting User Survey Result



Radio Broadcasting Indicator	Survey Result
1. Number of Households with Radio	11,087,024
2. Number of Radios per Household	0.75
3. % of Households with Radio	52.0
4. Number of Radios per Household	0.75

Radio Broadcasting Indicator	Survey Result
1. % of population aged 6+ who listen to radio	46.27
2. % of population aged 6+ who listen to radio weekly	31.74
3. Average Time Spent Listening to Radio (mins./week)	669
4. Average Time Spent Listening to Radio by day part	06.01 - 09.00 = 594 09.01 - 15.00 = 773 15.01 - 19.00 = 654 19.01 - 00.00 = 634 00.01 - 06.00 = 682
5. % of Radio Listening by location	1. Home = 78.9 2. Private Car = 52.9 3 Public Transport 6.6 4. Office = 25.9 5 Other= 3.5

Radio User Survey : Digital Radio Willing to Pay



❖ 39% of radio listener willing to pay digital radio receiver, and most interesting advantage of digital radio feature is emergency warning.

Digital Radio Receiver	Market Price unit(Baht)	Willing to Pay (Baht)
Digital Radio Receiver (portable, basic feature) 	800 - 2,500	1,119
Digital Radio Receiver in car (Adapter) 	2,000 - 4,000	2,692
Digital Radio Receiver in car (Basic feature –text scrolling) 	4,000	4,552
Digital Radio Receiver in car (Color Screen, multimedia) 	10,000	11,885
Digital Radio Receiver (portable-small display) 	2,000 - 4,000	2,580
Digital Radio Receiver (portable-color screen Multimedia) 	5,000 up	5,577

Digital Radio Capacity Building

Organized a series of workshops, conferences, focus groups



Focus Group/Site Visits/ Individual meeting with broadcasters and Stakeholders

NBTC/ITU Workshop on Roadmap for Introduction of Digital Terrestrial Radio Services in Thailand

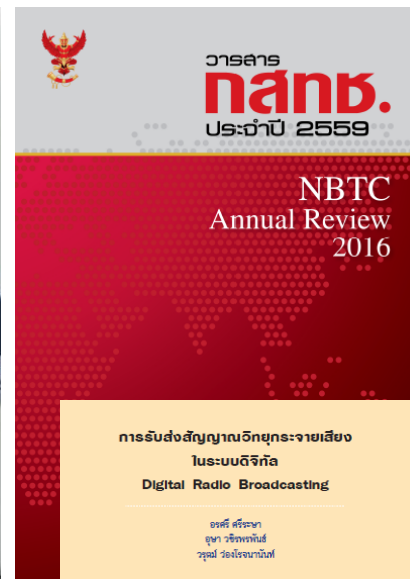


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<https://broadcast.nbtc.go.th/data/academic/file/58010000002.pdf>



Digital Radio Capacity Building

- ❖ Developed Handbook Digital Radio Broadcasting (Technology, Services and Network Global update, country case studies, supporting measures, Acts)
- ❖ NBTC Annual Review 2016: Article “Digital Radio Broadcasting”
- ❖ Organized workshop on Digital Radio Broadcasting for stakeholders in 4 regions across Thailand (400 participants)
- ❖ Published study paper on NBTC website



#Report are available on NBTC website: www.nbtc.go.th ,
<https://broadcast.nbtc.go.th/academic/?type=NTYwNTAwMDAwMDAw>



Digital Radio Broadcasting Trial plan in Thailand

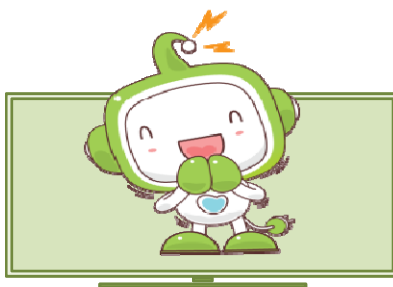
- ❖ Draft Frequency Plan for Digital Radio Broadcasting Trial
 - ❖ Frequency Range: 174-230 MHz
 - ❖ Channel: Ch5-Ch12 (4 blocks per channel with bandwidth 1.536 MHz)
 - ❖ Concern to Analog TV compatibility (ATV protected), cross border frequency coordination, and other conditions defined by NBTC
 - ❖ Draft of Frequency plan for Digital Radio Broadcasting Trial is now process of public consultation.

Y2017

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Thank You



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