



WORLD  
DAB



# **WorldDAB: DAB+ Digital Radio Workshop**

## **DAB+ trial and way forward in Thailand**



**26 April 2017, Bangkok, Thailand**

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**Office of NBTC**



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- Radio Broadcasting Services in Thailand
- National Digital Broadcasting Plan
- History of Digital Radio Trial in Thailand
- Digital Radio Broadcasting Projects
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# National Broadcasting and Telecommunications Commission (NBTC)



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

## **NBTC mandates:**

- ❖ To license and regulate the operation of TV and radio broadcasting, radio communication, and telecommunications
- ❖ To promote free and fair competition in the industry
- ❖ To ensure universal telecommunications service is provided
- ❖ To promote research and development in the industry
- ❖ To protect right and liberty of the citizen and consumers from being exploited by the operators
- ❖ To maintain plurality in the provision of broadcasting
- ❖ To protect for the citizen and consumers against unfairness or the infringement of privacy, and against offensive or harmful material

The NRA  
Organization Act of  
2010\*

Telecommunications  
Act of 2001

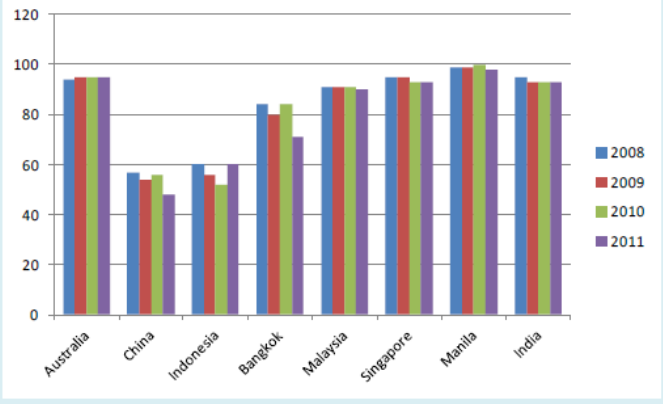
Broadcasting Act of  
2008

Radio  
Communications  
Act of 1955 3



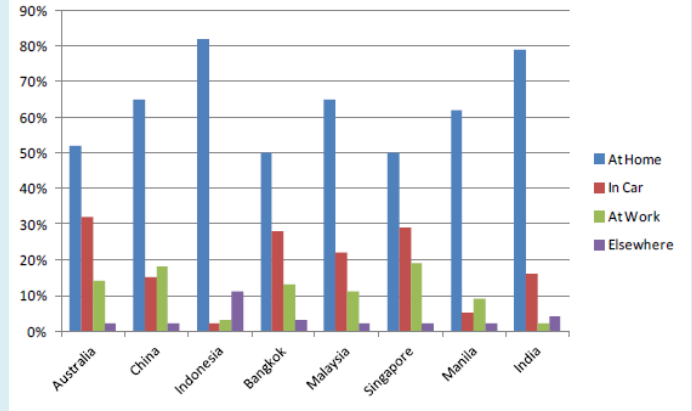
# Radio Broadcasting in Thailand: Radio Reach and Advertising Income

Radio Reach as percentage of Population



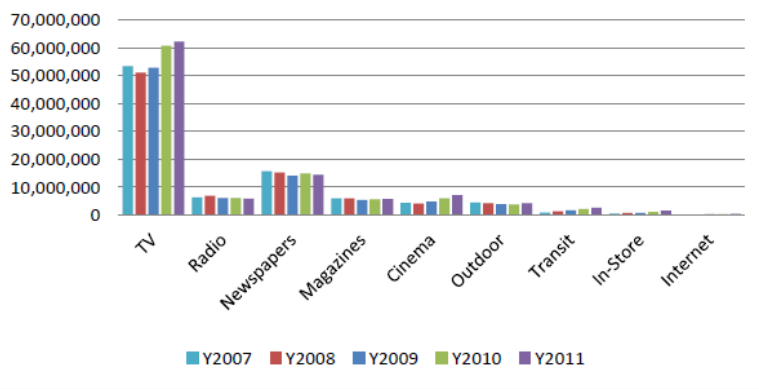
Source: AC Nielsen

Place of Radio Listening



Source: AC Nielsen

Media Advertising income(Baht)



Source: NBTC

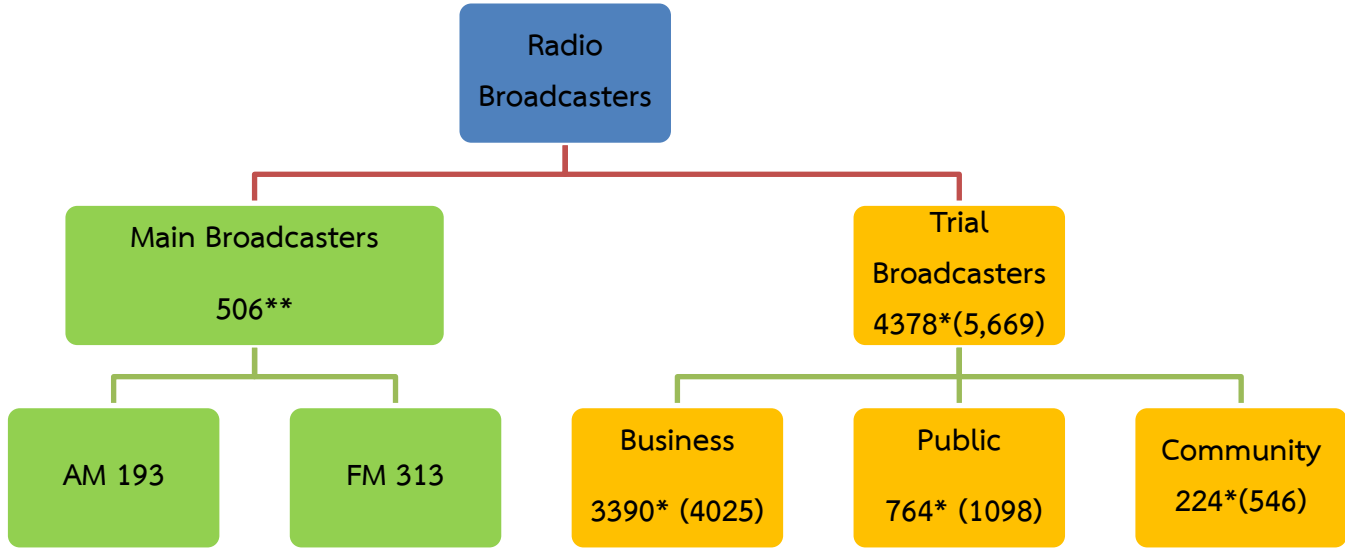
Annual Forecasted advertising Revenues (Baht)

Annual revenues (in M \$)	2013	2014	2015	2016	2017	CAGR
Internet advertising	24	31	39	47	56	23.59%
Out of Home advertising	260	281	304	325	346	7.41%
Radio advertising	216	225	234	240	246	3.30%
TV advertising	2322	2540	2697	2921	3131	7.76%

Source: OECD

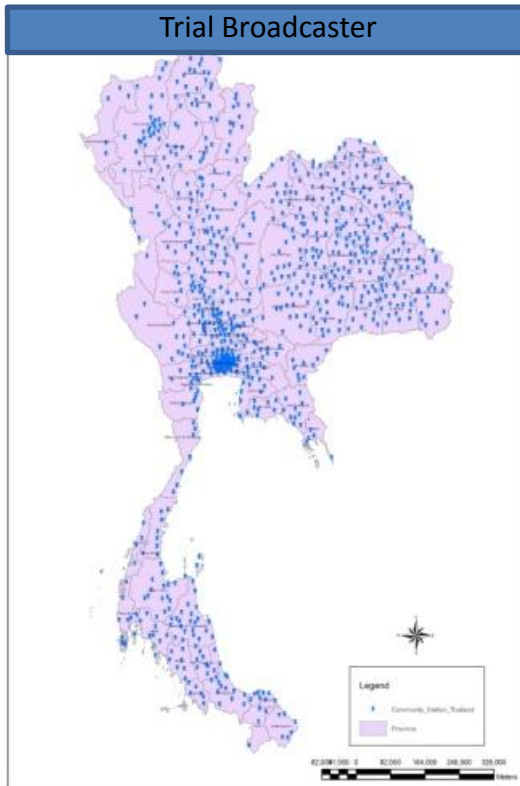


# Radio Broadcasting Landscapes in Thailand : Incumbent Radio Broadcasters



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

\* Currently on-Air: as of 25Apr2017



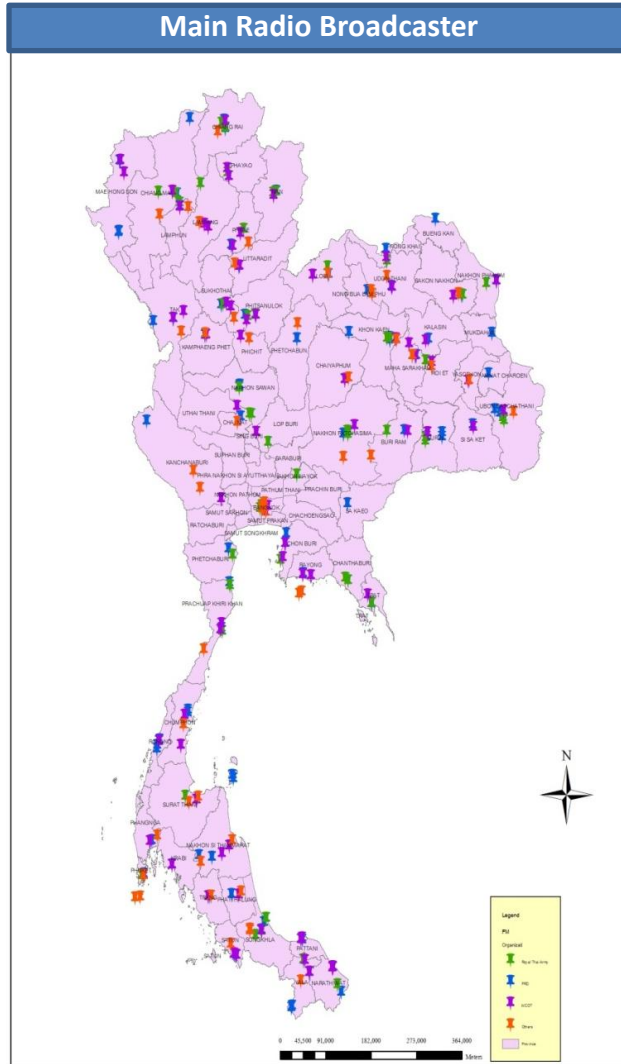
### Current Thai National Frequency Plan

- 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 :

## Main Radio Broadcasters



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



# 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)

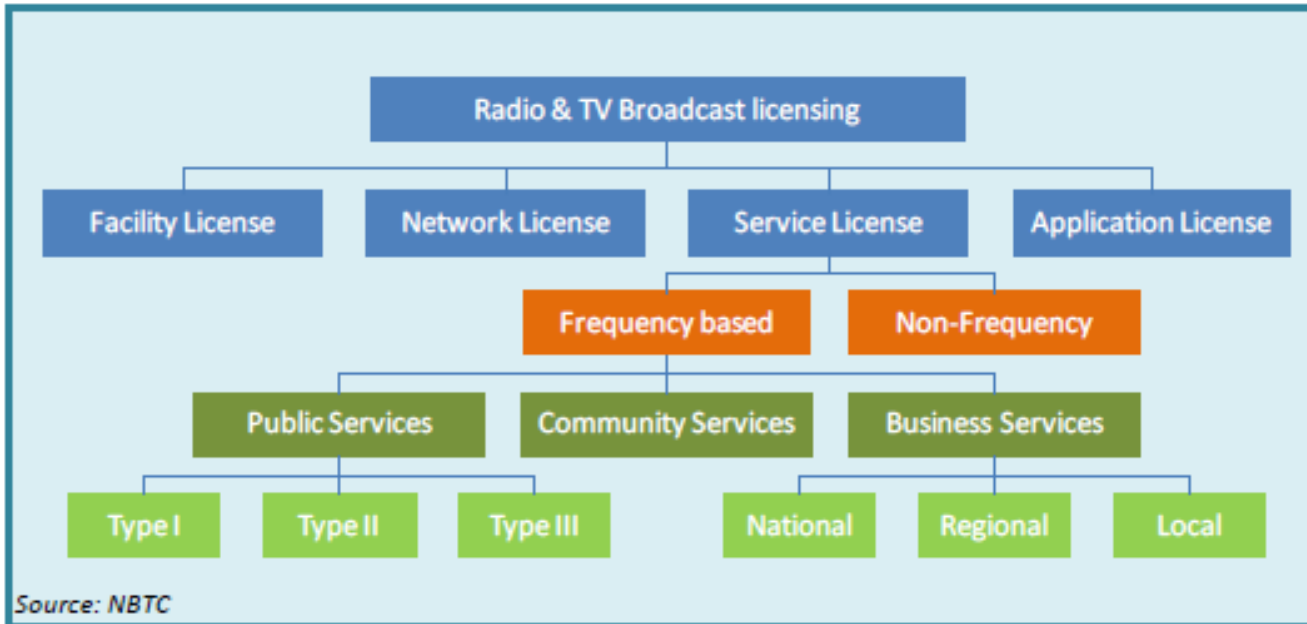


The first Thailand Broadcasting Master Plan (2012-2016, extended )  
Strategy No. 6 Transition from Analog to Digital Broadcasting

Thailand Digital Economy and Society Development Plan(2016-2018)  
Strategy 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: 4 Layers



Broadcasting Right

Spectrum Right

Operation Right

## 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/ WorldDAB/MCOT, 4 channels in Bangkok



- ❖ Objective : technical testing ,drive test signal measurement
  - ❖ Frequency: VHF Band III Channel 12D (228.304-229.84 MHz), transmitter site was located at MCOT-Bangkok
- 
- ❖ DRM
    - ❖ May 2004 (B.E 2547), the first digital radio broadcasting testing in ASEAN with collaboration of DRM/NBT/ABU (1 month trial)



# NBTC Digital Radio Broadcasting Projects

## ❖ NBTC/ ITU 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”
- ❖ DAB+ Deployment Strategies
- ❖ Practical Guideline for Digital Radio Trial in Thailand

<https://broadcast.nbtc.go.th/data/academic/file/600300000002.pdf>



- ❖ Develop Broadcasting Indicator s
- ❖ 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 is WorldDAB member since 2014



# Digital Radio Technologies System Choices

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

*Source: ITU Project*

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

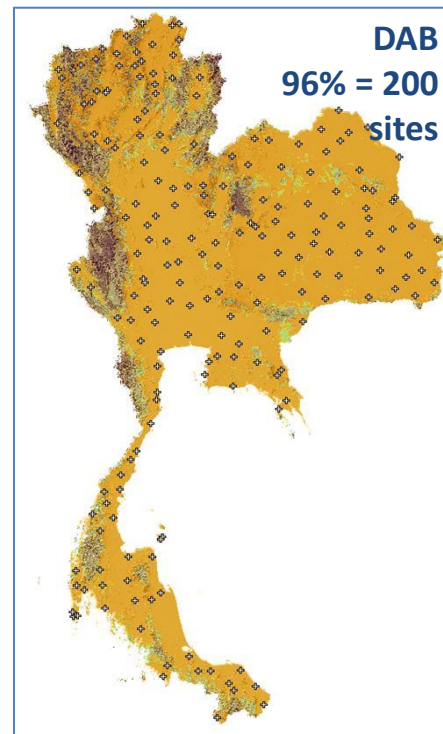
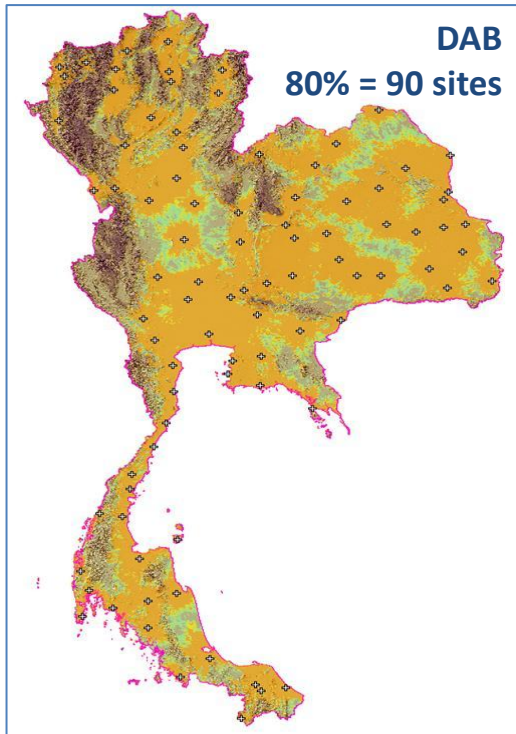
Aspect	UK	Norway	Australia	Switzerland
<b>Regulator</b>	Ofcom	NMA	ACMA	OFCOM
<b>Spectrum license holders</b>	Multiplex operator (e.g. Digital One), broadcasters and broadcaster consortiums	Multiplex and transmission provider (e.g. Norkring), broadcasters and broadcaster consortiums	Broadcasters through JVC Multiplex operators	OFCOM holds the spectrum license and issues Broadcast licenses to deliver content via multiplexes
<b>License period (years)</b>	12	NA	15	NA
<b>License application process</b>	Beauty contest	Applications for new multiplexes through the NMA	Regional licencing is under review	Applications for new multiplexes through the OFCOM
<b>Access fees</b>	Set by multiplex operator	Set by multiplex operator	Set by JVC under ACCC guidelines	Set by multiplex / transmission provider
<b>ASO</b>	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

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



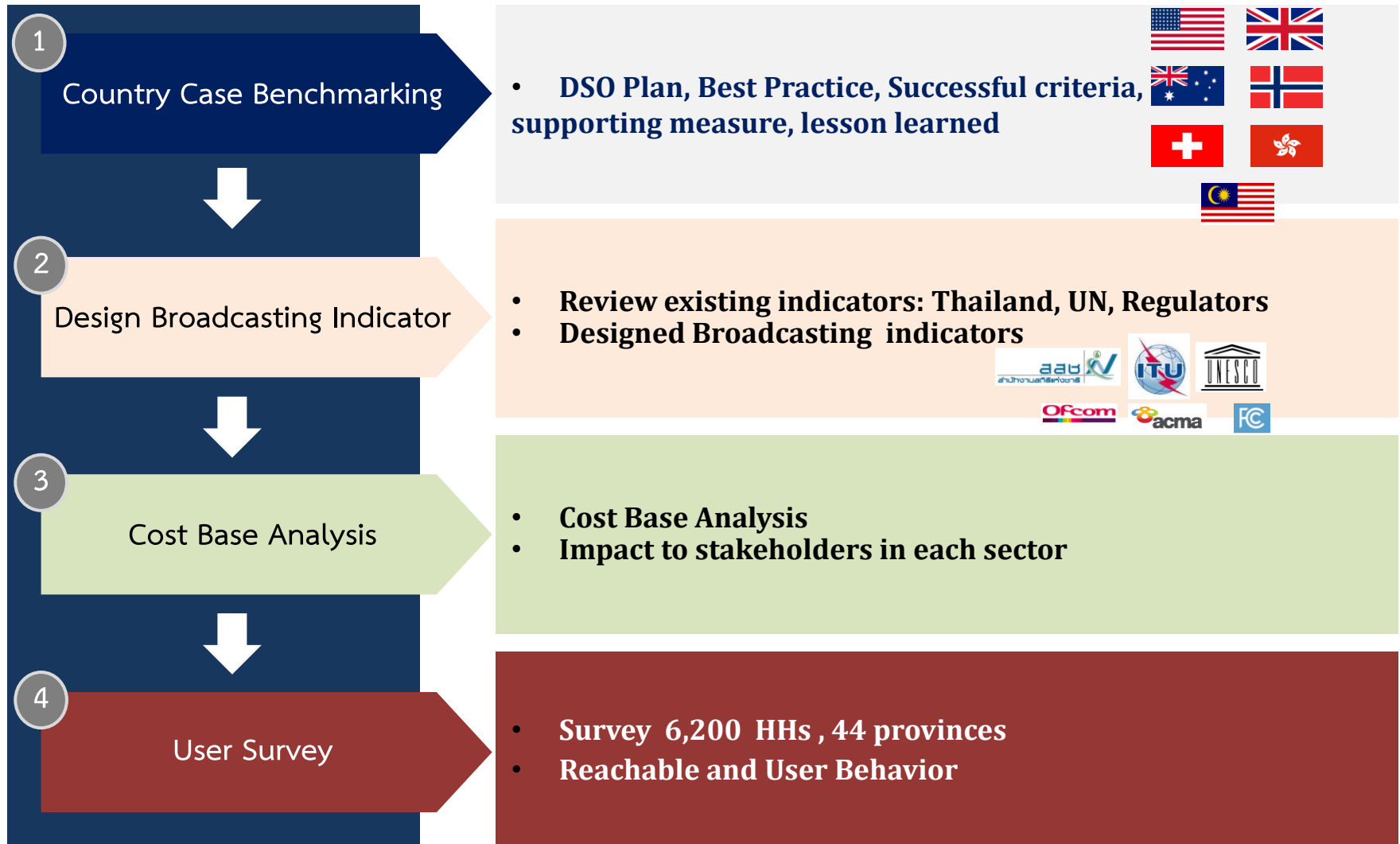
-> Set initial deployment target low (80%)



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



# Develop Broadcasting Indicators and User Survey





# Develop Broadcasting Indicator and User Survey

## Cost Base Analysis- Option

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



# 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%
<b>Impact to GDP and Government Revenue</b>					
<b>GDP</b>	28,000	36,000	21,000	31,000 <sup>๑</sup>	31,000
Receiver	19,400	20,400	17,000	20,000	20,000
Network Deployment	2,660	4,600	1,000	3,000	3,000
Multiply Investment	6,240	11,000	3,000	8,000	8,000
<b>Gov Rev</b>	1,870	1,700	670	1,900	2,100
Corporate tax	700	760	470	820	730
Revenue from Spectrum Auction	420	200	10	345	470
Revenue from Fees	750	740	190	735	860



# Develop Broadcasting Indicator and User Survey

## Cost Base Analysis- Result



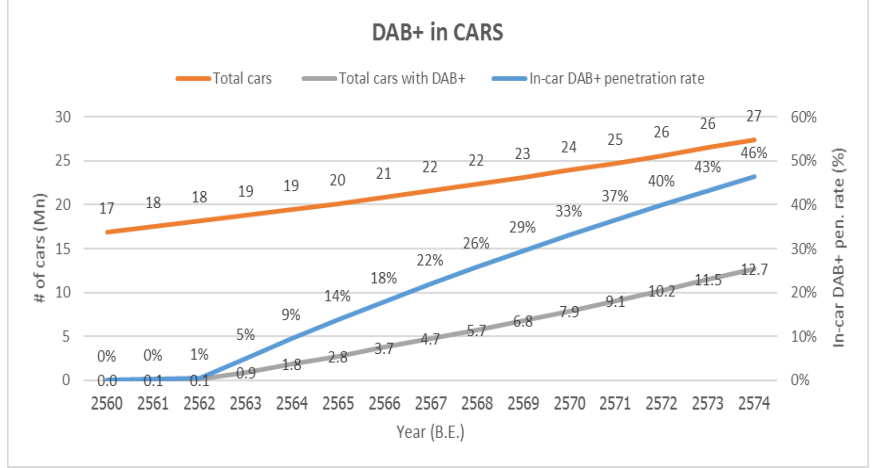
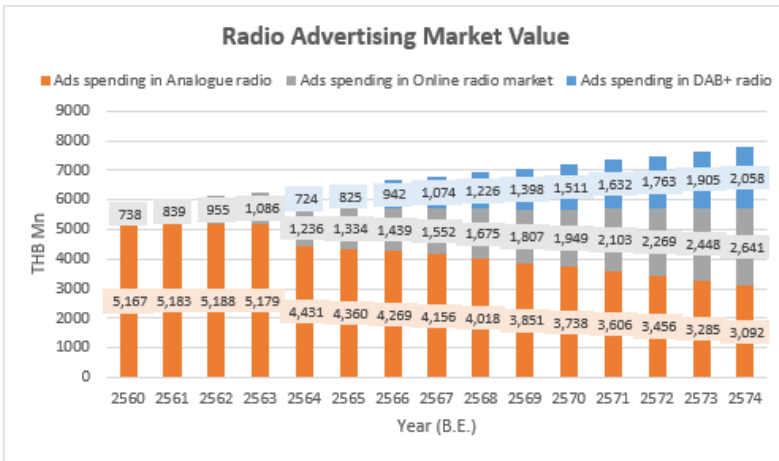
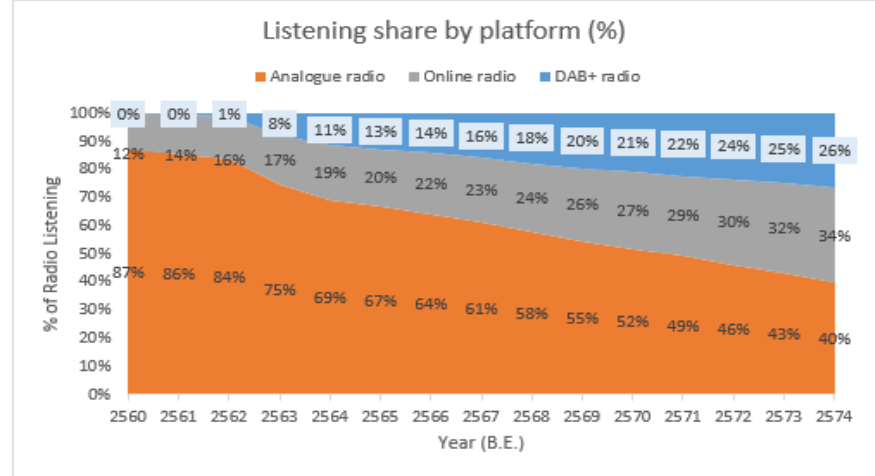
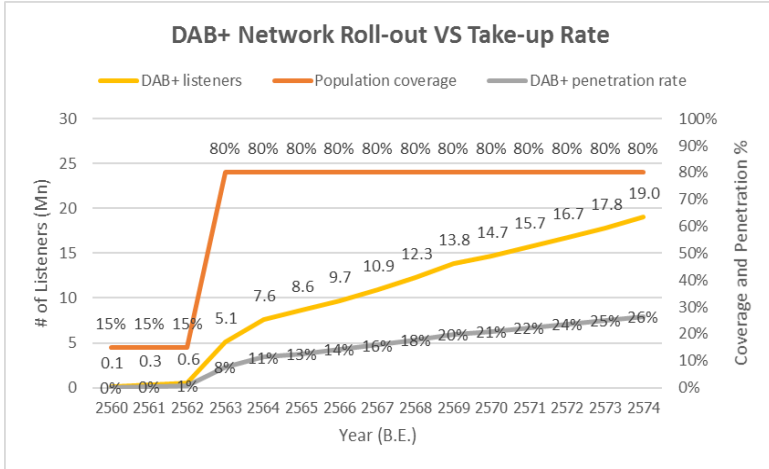
Summary Analysis Result (B.E. 2560-2574) Unit, million Baht	Case 1 2N+1L 80%	Case 2 2N+1L 80%	Case 3 2N+0L 80%	Case 4 2N+2L 80%	Case 5 2N+2L 80%
<b>NPV</b>					
NPV Project	115	-1,481	-252	-457	-545
NPV Nation Broadcasters	98	51	3	51	114
NPV Local Broadcasters	0.04	-2	-	0.9	-0.9
<b>Network Investment Cost</b>					
Network Investment	3,906	7,859	2,194	5,023	5,023
<b>Digital Radio industry</b>					
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



# Develop Broadcasting Indicator and User Survey

## Cost Base Analysis- Result

### Case1 2N+1L, 80%: Forecast Trend of Digital Radio Industry in Thailand



# Develop Broadcasting Indicator and User Survey

## Survey Result



Indicator	Survey Result
1. จำนวนครัวเรือนที่มีเครื่องรับสัญญาณวิทยุ (Number of Households with Radio)	11,087,024
2. จำนวนเครื่องรับสัญญาณวิทยุต่อครัวเรือน (Number of Radios per Household)	0.75
3. ร้อยละของครัวเรือนที่มีเครื่องรับสัญญาณวิทยุ (% of Households with Radio)	52.0
4. จำนวนเครื่องรับสัญญาณวิทยุต่อครัวเรือน (Number of Radios per Household)	0.75

Indicator	Survey Result
1. ร้อยละของประชากรอายุ 6 ปีขึ้นไปที่ฟังวิทยุ (% of population aged 6+ who listen to radio)	46.27
2. ร้อยละของประชากรอายุ 6 ปีขึ้นไปที่ฟังวิทยุทุกสัปดาห์ (% of population aged 6+ who listen to radio weekly)	31.74
3. จำนวนนาทีของการรับฟังวิทยุโดยเฉลี่ยต่อสัปดาห์* (Average Time Spent Listening to Radio)	669
4. จำนวนนาทีโดยเฉลี่ยต่อสัปดาห์ของการรับฟังวิทยุกระจายเสียงในแต่ละช่วงเวลา* (Average Time Spent Listening to Radio by day part)	06.01 - 09.00 น. = 594 09.01 - 15.00 น. = 773 15.01 - 19.00 น. = 654 19.01 - 00.00 น. = 634 00.01 - 06.00 น. = 682
5. ร้อยละของการรับฟังวิทยุ จำแนกตามสถานที่รับฟัง* (% of Radio Listening by Place)	1. ที่อยู่อาศัย Home = 78.9 2. รถยนต์ส่วนบุคคล Private Car = 52.9 3. รถสาธารณะ/ขนส่งมวลชน Public Transport 6.6 4. ที่ทำงาน Office = 25.9 5. สถานที่อื่นๆ Other= 3.5



# Digital Radio Capacity Building

## Organized a series of workshops, conferences, focus groups



### Site Visits/ Individual meeting with broadcasters

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



### Focus Group with stakeholders

<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/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](http://www.nbtc.go.th) ,  
<https://broadcast.nbtc.go.th/academic/?type=NTYwNTAwMDAwMDAw>



## Way forward:

### 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 reference to ITU-R BS.1660-7 (10/2015))
  - ❖ 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 getting approval from NBTC panel meeting and then NBTC will proceed for public consultation.
  
- ❖ Project: DAB+ trial in Thailand
- ❖ 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





# Testing Indicators and User Survey



## Survey Result

❖ 39% of radio listener willing to pay digital radio receiver

Result from survey showing that the most interesting advantage of digital radio services 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

# Way forward: DAB+ Digital Radio Trial plan



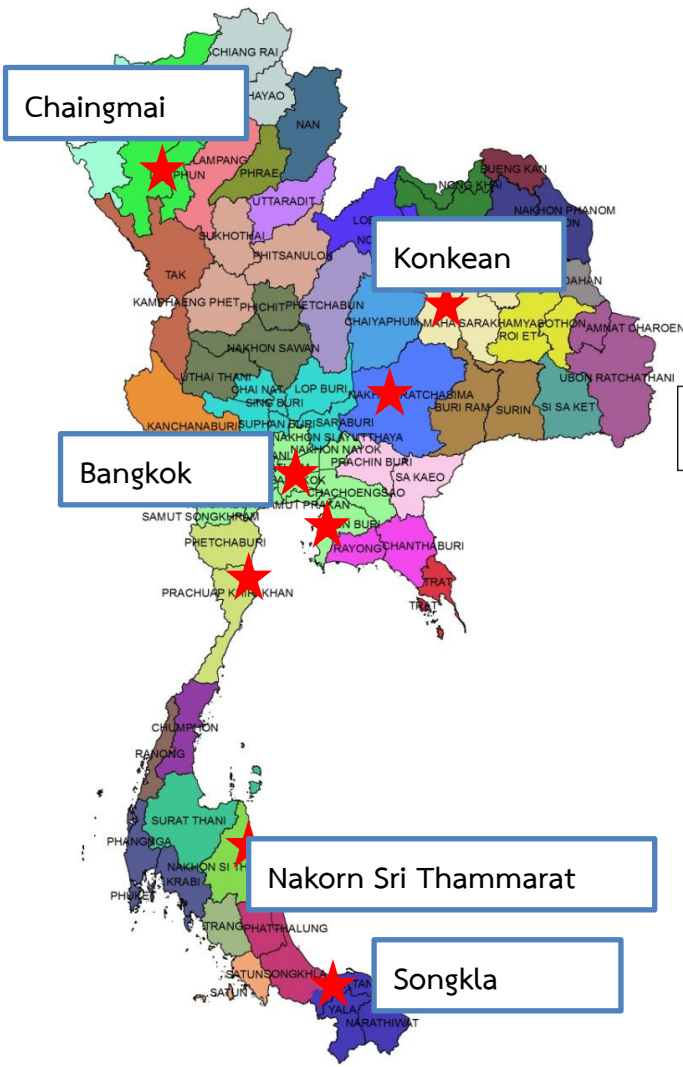
Item			
ATV channels	5-11	5-11	5-11
# Sites	8 <sup>1</sup>	8	5
MUX	1-3 <sup>2</sup>	1-3	1-3
SFN	SFN applied <sup>4</sup>	SFN applied	NA
ATV protection	√	X	√
ATV coverage provided	√	√	√
Pop coverage (3 MUX)	9,123,000 <sup>6</sup> (14%)	17,422,000 <sup>7</sup> (27%)	8,431,000 <sup>8</sup> (13%)
Pop coverage (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

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

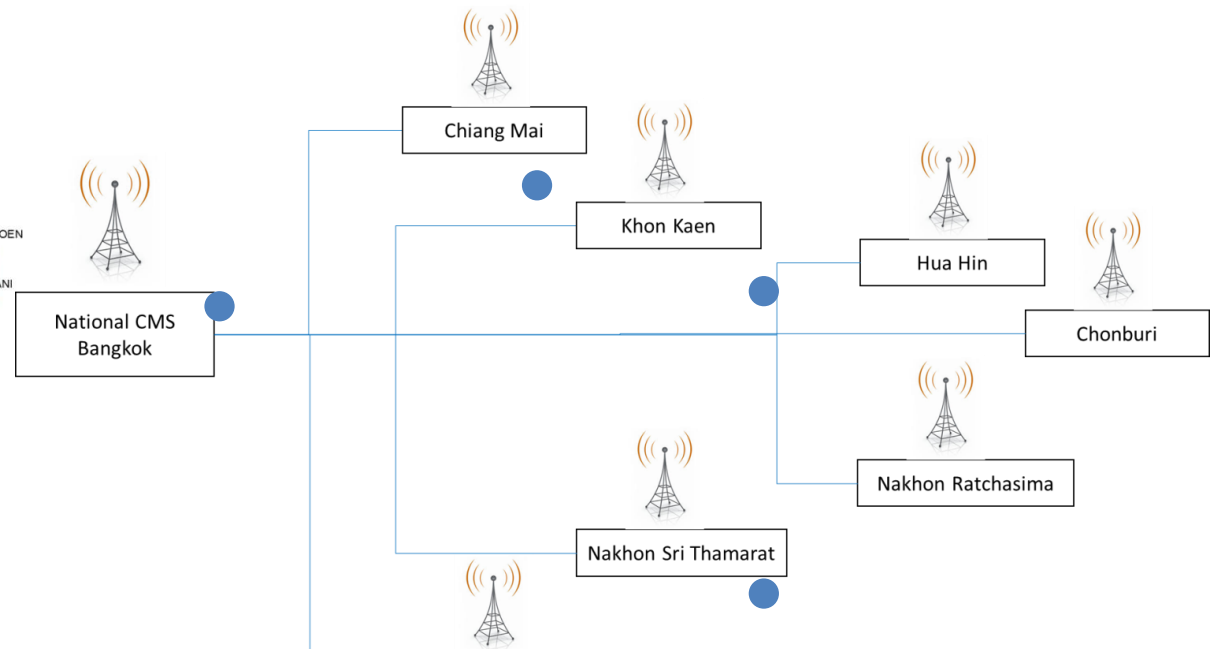




# Way forward: DAB+ Digital Radio Trial plan



Infrastructure sharing  
Multiplexers, Distribution, Towers, Transmitters, Antennas



Re f.	# sites	% greenfield sites	Pop %	# MU X	# SPs	CAPEX SP	CAPEX NO	Total CAPEX
T1	5	0%	15 %	2	18	\$442,800	\$2,396,900	\$2,839,700
T2	8	0%	16 %	2	18	\$442,800	\$3,638,900	\$4,081,700

# Way forward: Trial Options

## Option1

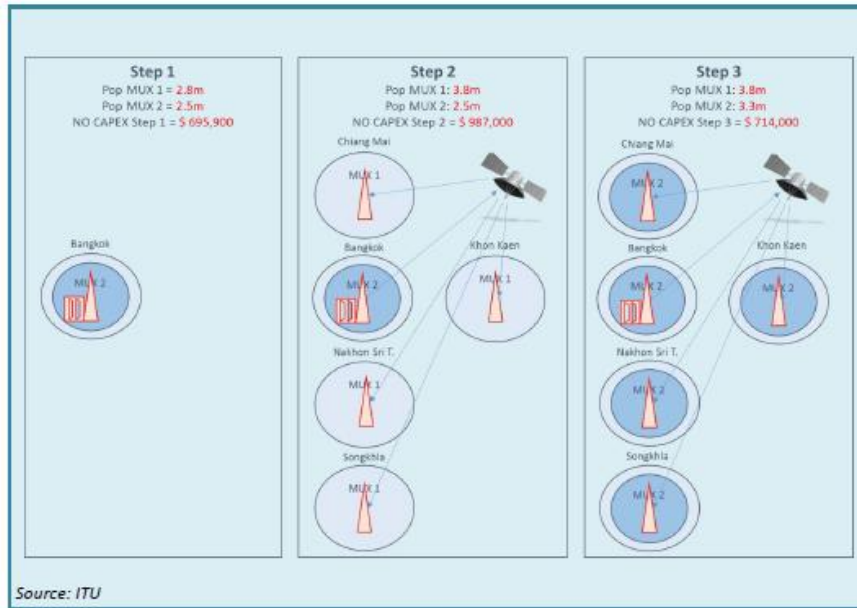


FIGURE 1: TRIAL DEPLOYMENT VARIANT 1

## Option2

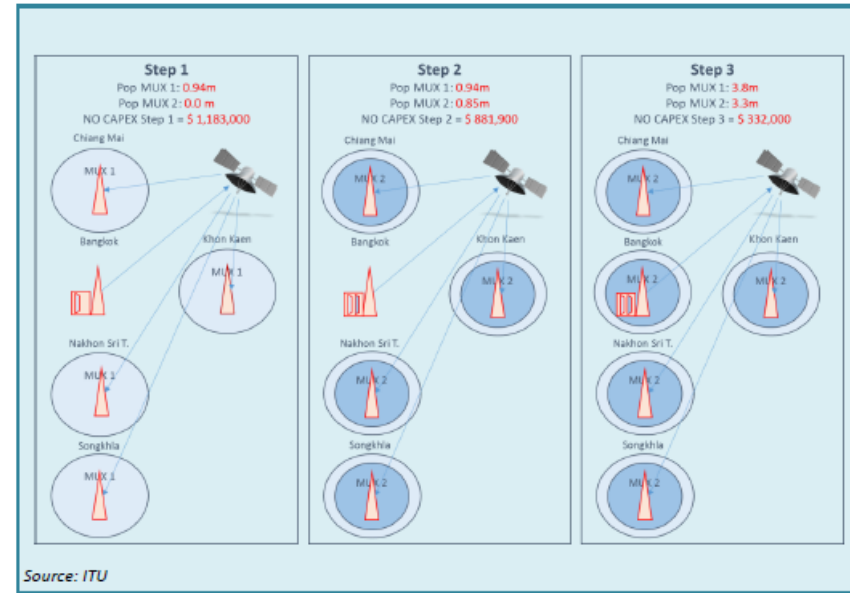
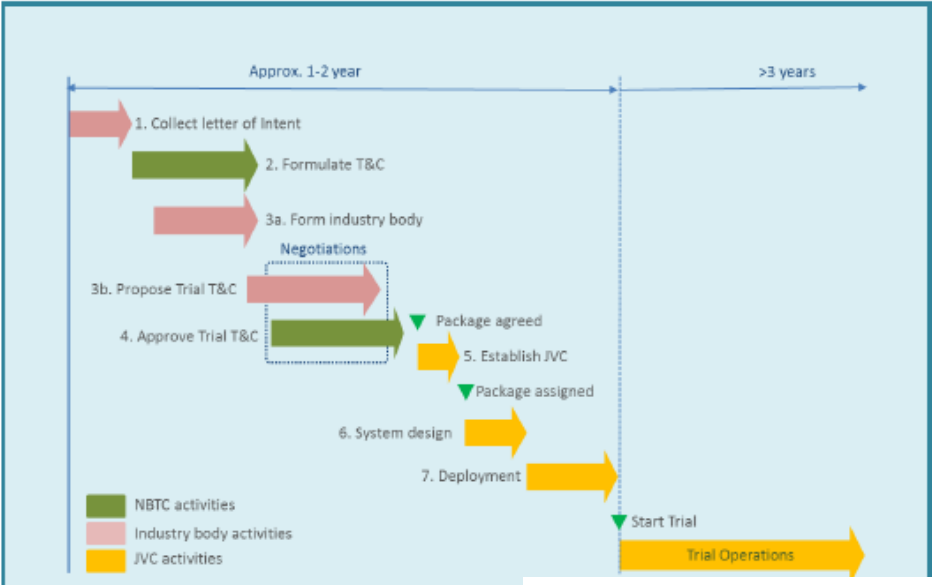


FIGURE 2: TRIAL DEPLOYMENT VARIANT 2

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



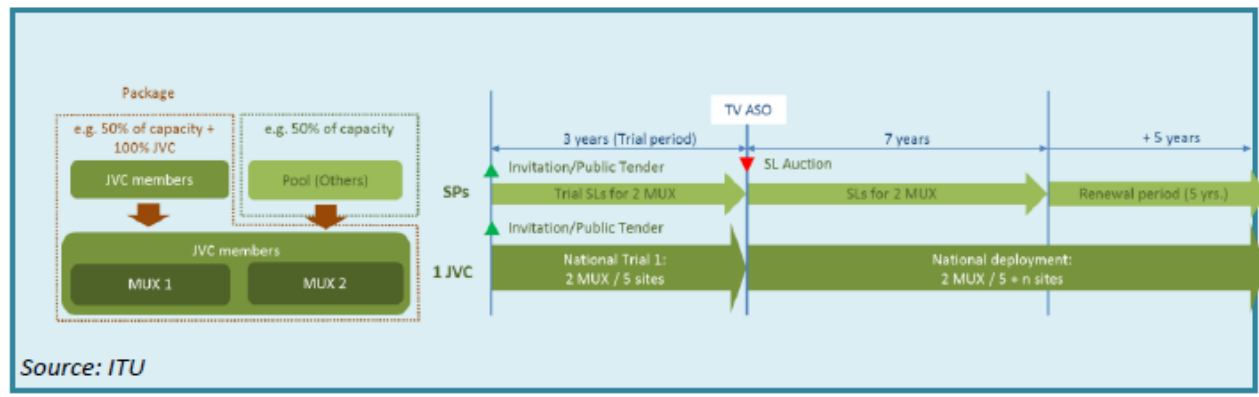
# Way forward : Digital Radio Broadcasting in Thailand



Source: ITU

FIGURE 9: TIMELINE OF ESTABLISHING THE INDU

- ❖ 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



# Thank You



<http://www.nbtc.go.th/>  
[orasri.sr@nbtc.go.th](mailto:orasri.sr@nbtc.go.th), [orasri.sr@hotmail.com](mailto:orasri.sr@hotmail.com)