



Digital Radio Planning in Thailand

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The National Broadcasting and Telecommunications Commission (NBTC)

Outline



- **1. Why Does Thailand Need Digital Radio?**

- **2. What Should Be Considered in Planning Digital Radio?**

- **3. Digital Radio Planning**



1. Why Does Thailand Need Digital Radio?



Why Does Thailand Need Digital Radio?

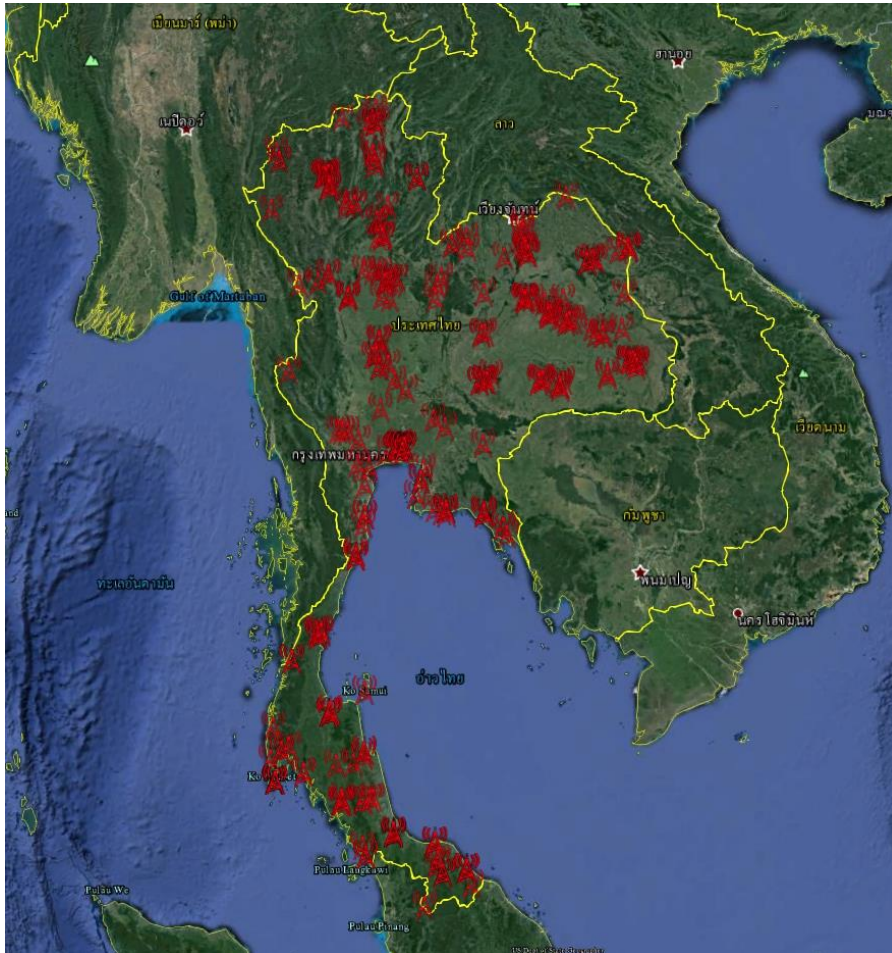
- **High demand for broadcasting services with 6,093 trial license applicants in 2012. (Submission after 2012 is not permitted)**
- **VHF Band II (87.5 MHz – 108.0 MHz) is heavily used by FM broadcasting stations with approximately 5,000 stations currently operating in the band (313 main stations and 4,317 trial FM stations).**
- **Continuing aeronautical interference in the Band 108 MHz – 137 MHz due to spurious emission from FM stations during 2005 and present.**

Current FM Stations

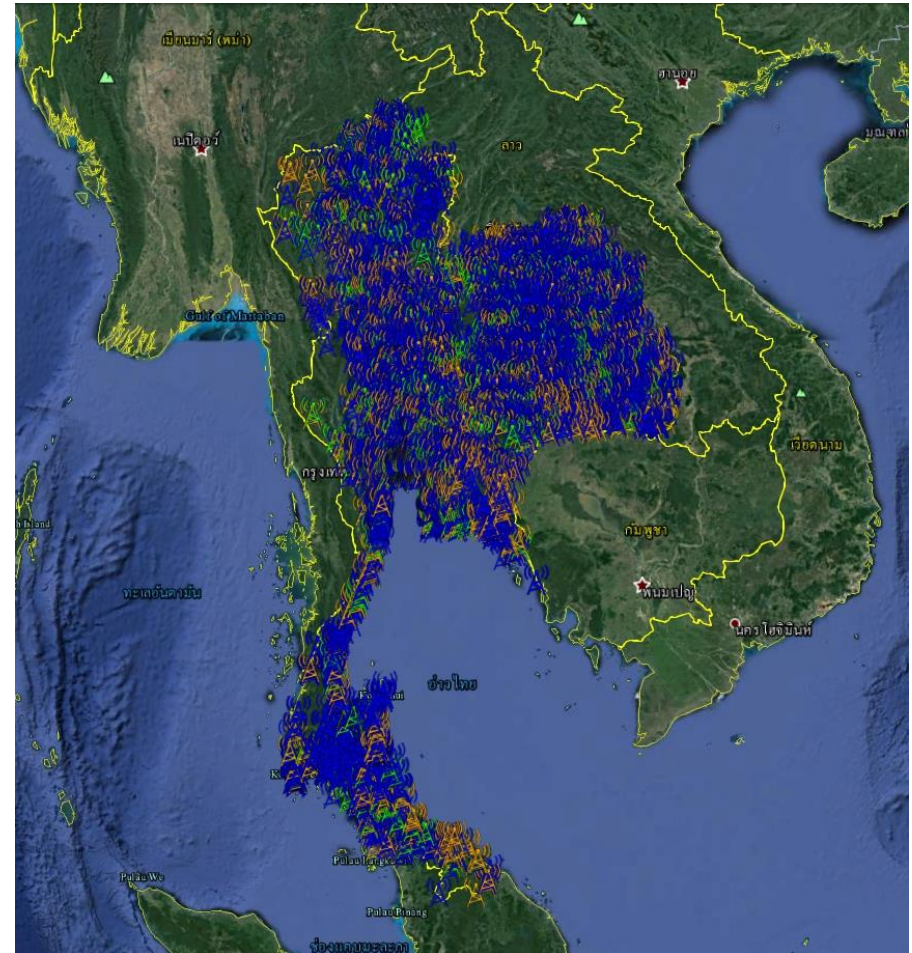


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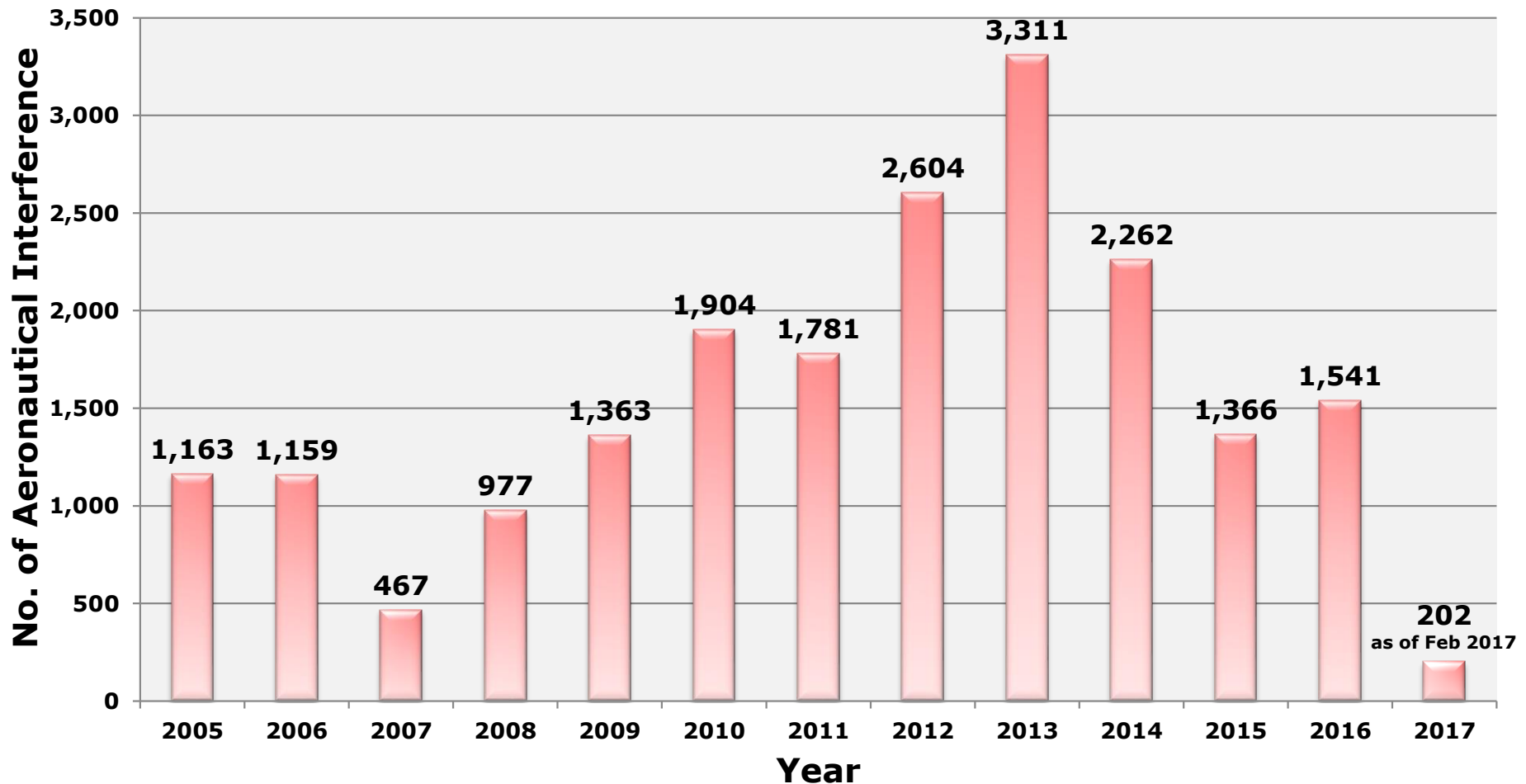
313 Main FM Stations



4,317 Trial FM Stations



Aeronautical Interference





2. What Should Be Considered in Planning Digital Radio?

What Should Be Considered in Planning Digital Radio?



- **Candidate frequency bands and its congestion level**

e.g. LF, MF, HF, VHF Band I, VHF Band II, VHF Band III, VHF Band IV/V, UHF-L Band, etc.

- **Candidate technologies**

e.g. Digital Radio Mondiale (DRM), Digital Audio Broadcasting (DAB) and HD Radio/IBOC (In-Band On-Channel).

- **Any other services currently operated in the potential candidate bands.**

- **1-Stage or 2-Stage Implementation (Trial planning for specific regions or nationwide planning)**



Candidate Frequency Bands

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Frequency Band	Current Usage	Status
MF Band 526.5-1606.5 kHz	Broadcasting service (AM Radio)	193 AM stations operating nationwide
VHF Band I 47 to 68 MHz	Fixed, Mobile and Broadcasting Services (Analogue Television)	Heavily used by Fixed and Mobile Services
VHF Band II 87.5 MHz - 108 MHz	Broadcasting service (FM Radio)	313 main FM stations and 4,317 trial FM stations operating nationwide
VHF Band III 174 to 230 MHz	Broadcasting service (Analogue Television)	Switch off target will not be later than 2023 and compatibility criteria between ATV and digital radio is also available.
VHF Band IV/V 470 to 790 MHz	Fixed, Mobile, Broadcasting Services (Analogue and Digital Television)	470 MHz – 510 MHz is heavily used by Fixed Service until 2020. 698 MHz– 806 MHz is reserved for IMT.
UHF L-Band 1,452 to 1,492 MHz	Fixed, Mobile, Broadcasting and Broadcasting-satellite Services	1,427 MHz – 1,518 MHz is reserved for IMT.



Candidate Technologies

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Technology	Frequency Band	Standard
DRM 30	LF, MF, HF	ITU-R BS. 1514-2
DRM+	VHF Band I, Band II, Band III	ITU-R BS. 1114-8 System G
DAB	VHF Band III UHF L-Band (1.5 GHz)	ITU-R BS. 1114-8 System A
DAB+	VHF Band III UHF L-Band (1.5 GHz)	ITU-R BS. 1114-8 System A
IBOC	MF	ITU-R BS. 1514-2
IBOC	VHF Band II	ITU-R BS. 1114-8 System C
ISDB-TSB	VHF Band III 2.6 GHz	ITU-R BS. 1114-8 System F

Potential Frequency Band and Technology for Thailand



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Frequency Band	Technology
VHF Band III (174 – 230 MHz)	DAB+

DAB+

Digital Audio Broadcasting



Current Service in VHF Band III



- ❑ **Current service being operated in VHF Band III is analogue television, which needs to be protected from being interfered by digital radio until its contract or concession ends.**
- ❑ **Compatibility criteria between analogue television and digital radio is needed for sharing this frequency band (VHF Band III).**
- ❑ **Current analogue television specifications are as follows:**

Analogue television in VHF Band III

System	Pal-B
Frequency Channels	<ul style="list-style-type: none">❑ Channel 5 – 12 (Nationwide) Group I: Channel 5, 7, 9 and 11 Group II: Channel 6, 8, 10 and 12❑ Channel 6, 7, 9, and 12 (Border Area between Thailand and Malaysia)



3. Digital Radio Planning



Digital Radio Planning

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DAB+ Parameters

Frequency Band	VHF Band III (174-230 MHz)
Technology	DAB+ Mode I
Reception Type	Portable Indoor
Protection Level	3A
Code Rate	1/2
C/N Value	12 dB (Rayleigh Channel)
Number of Channels	8 Channels (Channels 5 – 12)
Channel Bandwidth	7 MHz
Number of Blocks/Channel	4 Block (Blocks A, B, C, D)
Bandwidth/Block	1.536 MHz
Total Capacity/MUX	1152 kbps
Capacity/Program	64 – 128 kbps
Number of Programs/MUX	9 – 18 Programs
Effective Radiated Power	Between 1-10 kW



Planning Strategies

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❑ **2-stage Implementation for DAB Roll Out Plan**

1. DAB+ in the Trial Phase

- 8 sites in major cities i.e. Bangkok, Chiangmai, Chonburi, Prajuabkirikhan (Hua Hin), Khonkaen, Nakhonratchasima, Nakhonsrithammarat and Songkhla
- In Thailand - Malaysia border area (Songkhla): Channel 6,7, 9 and 12 will be used.
- In the rest of Thailand: Channel 5 - 12 will be used.
- Reception: Portable indoor
- Planning criteria: Protection of analogue television in VHF Band III
- Facility sharing (co-sitting) between DAB+ and existing analogue television.

2. DAB+ in the Final Phase

- Single frequency network (SFN) for national services and Multi-frequency network (MFN) for local services



DAB+ in the Trial Phase

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Compatibility Aspects

- ❑ **DAB+ needs to be co-sited with analogue television in the same area (if any) in order to reduce potential interference between services.**
- ❑ **The combined nuisance field strength of DAB+ cannot exceed the usable field strength of analogue television.**
- ❑ **If the combined nuisance field strength of DAB+ exceeds the usable field strength of analogue television, then the household loss needs to be less than 1,000 per analogue television coverage area.**

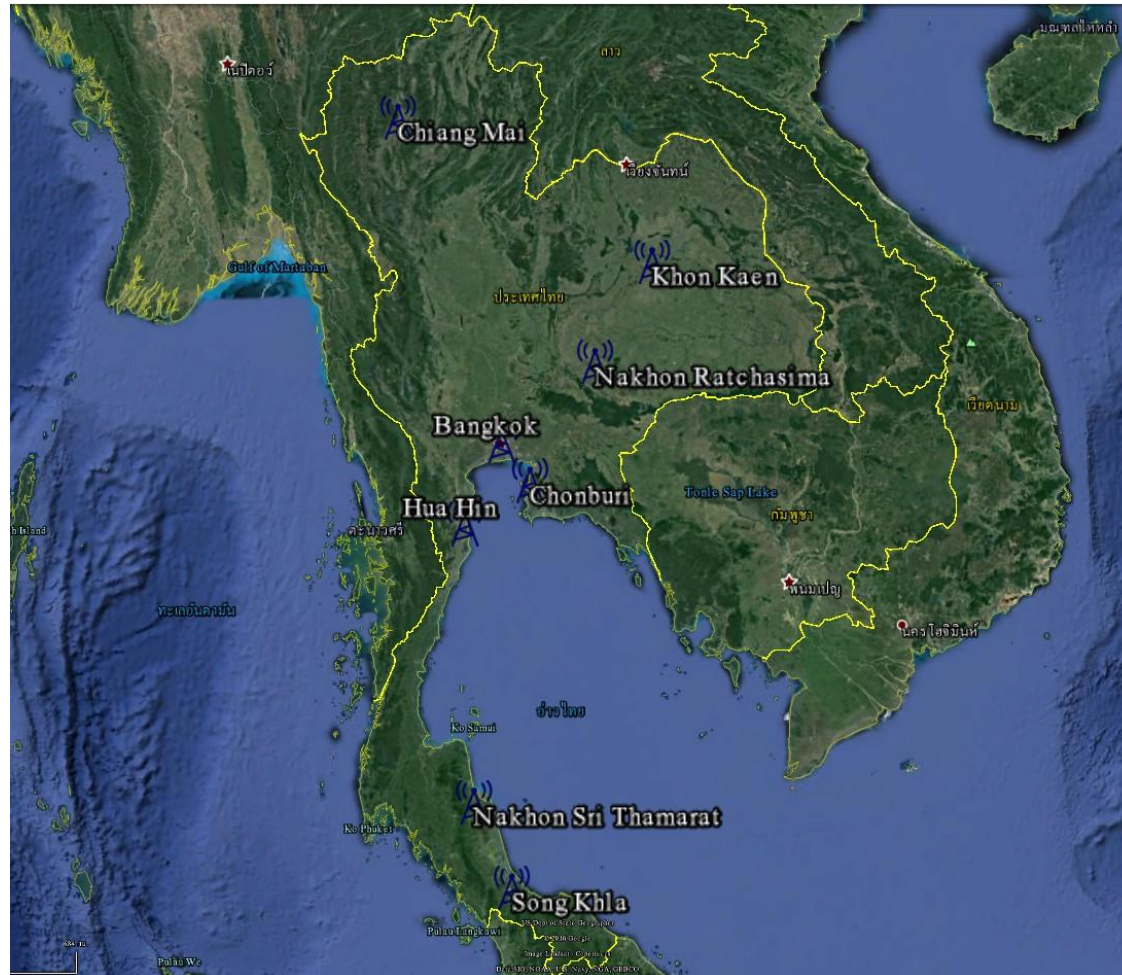


DAB+ in the Trial Phase



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DAB+ sites in 8 Major Cities



DAB+ in the Trial Phase

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DAB+ sites in 8 Major Cities

City	Channel used by analogue television	Available Channel for DAB+	Compatible frequency
Bangkok	5, 7, 9, 11	6, 8, 10, 12	6B, 6C, 10C
Chiangmai	5, 7, 9, 11	6, 8, 10, 12	6C, 8C, 10C
Chonburi	No ATV	5, 6, 7, 8, 9, 10, 11, 12	10B, 10C, 10D
Prajuabkirikhan (Hua Hin)	No ATV	5, 6, 7, 8, 9, 10, 11, 12	6D, 8B, 8C
Khonkaen	5, 7, 9, 11	6, 8, 10, 12	6B, 6C, 10C
Nakhonratchasima	6, 8, 10, 12	5, 7, 9, 11	9C, 11C, 11D
Nakhonsrithammarat	5, 7, 9, 11	6, 8, 10, 12	6C, 8C, 10C
Songkhla (Thailand - Malaysia border area)	6, 8, 10	7, 9	9C, 9D



DAB+ in the Final Phase

- DAB+ in the final phase will employ an SFN for national service and an MFN for local service.**

- The final phase is an ongoing process which will be decided further based on the results obtained from the implementation of the trial phase.**



Thank you

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(NBTC)
Bangkok, Thailand**