

FREQUENCY PLANNING ON RADIO BROADCASTING (DIGITAL RADIO & FM RADIO) IN THAILAND

Uttachai Manmontri

Broadcasting Technology and Engineering Bureau (Jointly worked with Jan Doeven, Hakim Ebdelli and Peter Wallop under NBTC-ITU project)

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1. APPROACH TO FREQUENCY PLANNING FOR FM Radio

2. APPROACH TO FREQUENCY PLANNING FOR DIGITAL RADIO















□ Is there any problem on using frequency for FM?

• VHF Band II (87.0 MHz – 108.0 MHz) is heavily used by FM stations with more than 5,000 stations currently operating in the band. (both main stations and trial stations)

FREQUENCY PLANNING FOR FM

APPROACH TO

- High demand for broadcasting services with 6,093 trial license applicants in 2012. (Submission after 2012 is not permitted until now)
- Continuing aeronautical interference in the Band 108 MHz 137 MHz due to intermodulation from FM stations from 2005 to present.



Do all FM stations in Thailand have equal right to use the frequency?

	Main Station	Trial Station
Frequency Plan	NBTC Notification on Frequency Plan for FM Broadcasting Service	NBTC Notification on Criteria on Permission of FM Trial Broadcasting Service
License Period	Until April 2020	1 year trial license
Condition to operate the station	-	Not interfere Main Station
Effective Radiated Power	As appeared in the Notification (Up to 20 kW in each polarization)	Not specified but the transmitter power must not exceed 500W
Antenna Height	As appeared in the Notification (Up to 150 m)	Not exceed 60 m



Technical Parameters for FM Main Station			
Frequency Rage	87 - 108 MHz		
No. of Frequency Channel	82 (87.5, 87.75,, 107.75 MHz) + 1 (99.1 MHz)		
Frequency Deviation	75 kHz		
Pre-emphasis	50 us		
Stereo Transmission	Pilot-tone System@ 19 kHz		
Reception Type	Mobile Stereophonic Reception		
Minimum Field Strength	57 dBµV/m @1.50 m		
Protection Ratio	Steady Interference 45.0 dB@0 kHz/2.0 dB@250 kHz Tropospheric Interference 37.0 dB@0 kHz/2.0 dB@250 kHz		
Total Effective Radiated Power	0.6 kW – 40 kW		





APPROACH TO FREQUENCY PLANNING FOR DIGITAL RADIO



FREQUENCY PLANNING FOR DIGITAL RADIO

□ What Should be Considered for Digital Radio Planning?

Candidate frequency band 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 operating in the potential candidate bands.
- 1-Step or 2-Step Implementation (trial planning for specific regions or nationwide planning)

FREQUENCY PLANNING FOR DIGITAL RADIO

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 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.

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

APPROACH TO FREQUENCY PLANNING FOR DIGITAL RADIO

Frequency Band	Technology	Standard	DAB +
VHF Band III (174 MHz – 230 MHz)	DAB+	• ITU-R BS. 1114-9: Systems for terrestrial digital sound broadcasting to vehicular, portable and fixed receivers in the frequency range 30 MHz - 3 000 MHz (System A).	
		• ETSI EN 302 401 (2017-01): Radio Broadcasting Systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers.	
			In our DAR+ Receiver



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Receiver



Current Use of VHF Band III (174 MHz -230 MHz)

□ Current service 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:

Analog Television (ATV) in Thailand			
System	Pal-B		
Channel	 5 – 12 (Nationwide) Group A: 5, 7, 9 and 11 Group B: 6, 8, 10 and 12 6, 7, 9 and 12 (coordination zone only) 		

FREQUENCY PLANNING FOR DIGITAL RADIO

(Trial) Station Name	Assigned Channels for ATV	Available Channels	Potential Frequency Blocks for DAB+
1. Bangkok	5, 7, 9, 11	6, 8, 10, 12	6B, 6C, 10C
2. Chiang Mai	5, 7, 9, 11	6, 8, 10, 12	6C, 8C, 10C
3. Chonburi 3.1 Chonburi (Pattaya) 3.2 Chonburi (Sriracha)	- -	5, 6, 7, 8, 9, 10, 11, 12 5, 6, 7, 8, 9, 10, 11, 12	10B, 10C, 10D 10B, 10C, 10D
4. Prachuap Khiri Khan	-	5, 6, 7, 8, 9, 10, 11, 12	6D, 8B, 8C
5. Khon Kaen	5, 7, 9, 11	6, 8, 10, 12	6B, 6C, 10C
6. Nakhon Ratchsima	6, 8, 10, 12	5, 7, 9, 11	9C, 11C, 11D
7. Nakhon Sri Thamarat	5, 7, 9, 11	6, 8, 10, 12	6C, 8C, 10C
8. Song Khla (Thailand∕Malaysia Coordination Zone)	6, 8, 10	7, 9	9C, 9D



List of Trial DAB+ Stations (8 provinces, 9 sites)

- 1. Bangkok
- 2. Chiang Mai
- Chonburi
 3.1 Chonburi (Pattaya)
 3.2 Chonburi (Sriracha)
- 4. Prachuap Khiri Khan
- 5. Khon Kaen
- 6. Nakhon Ratchasima
- 7. Nakhon Sri Thamarat
- 8. Song Khla

FREQUENCY PLANNING FOR DIGITAL RADIO

Technical Parameters for DAB+

System	DAB+ Mode I
Reception Mode	Portable Indoor Reception
Protection Level	3A
Code Rate	1/2
C/N Value	12 dB (Rayleigh Channel)
Number of Channels	8 Channels (Channels 5 – 12)
Bandwidth/Channel	7 MHz
Number of Blocks/Channel	4 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	0.1 kW - 10 kW





Coverage Area

- Bangkok Station : 6B
- Effective Radiated Power: 1 kW
- Populations 3,285,217 households

Orange	: ≥ 95% of Location		
Yellow	: 90% - 95% of Location		
Green	: 70% - 90% of Location		

Station Name	Mux 1 (Households)	Mux 2 (Households)	Mux 3 (Households)
1. Bangkok (6B, 6C, 10C)	3,285,217 (6B)	4,074,402 (6C)	4,472,701 (10C) (SFN Bangkok/Pattaya/Sriracha)
2. Chiang Mai (6C, 8C, 10C)	379,163 (6C)	376,694 (8C)	373,495 (10C)
 Chonburi 3.1 Pattaya (10B, 10C, 10D) 3.2 Sriracha (10B, 10C, 10D) 	n/a (10B) (SFN Pattaya/Sriracha) 359,271 (10B) (SEN Pattaya/Sriracha)	n/a (10C) (SFN Bangkok/Pattaya/Sriracha) n/a (10C) (SEN Bangkok/Pattaya/Sriracha)	n/a (10D) (SFN Pattaya/Sriracha) 377,175 (10D) (SEN Pattaya/Sriracha)
4. Prachuap Khiri Khan (6D, 8B, 8C)	117,098 (6D)	98,573 (8B)	160,708 (8C)
5. Khon Kaen (6B, 6C, 10C)	197,773 (6B)	318,676 (6C)	316,632 (10C)
6. Nakhon Ratchsima (9C, 11C, 11D)	219,246 (9C)	251,532 (11C)	170,495 (11D)
7. Nakhon Sri Thamarat (6C, 8C, 10C)	85,311 (6C)	83,214 (8C)	87,656 (10C)
8. Song Khla (9C, 9D)	242,680 (9C)	205,919 (9D)	n/a
Total	5,913,116	5,395,302	4,208,767

Remark: Populations are based on the 2015 database obtained from the Department of Provincial Administration with total populations of 24,712,420 households.

Thank you Email: uttachai.m@nbtc.go.th

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