REPUBLIC OF INDONESIA

Roadmap for the transition from ANALOGUE TO DIGITAL TERRESTRIAL TELEVISION BROADCASTING IN THE REPUBLIC OF INDONESIA

Report

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Telecommunication Development Sector

Roadmap for the transition from analogue to digital terrestrial television broadcasting in the Republic of Indonesia

November 2013

The roadmap for the transition from analogue to digital terrestrial television in Indonesia has been prepared in the framework of the ITU digital broadcasting project. This project has the objective to assist Asia-Pacific countries in making a national roadmap to shift smoothly from analogue to DTTB, and has been jointly developed by ITU expert Peter Chu and the National Roadmap Team (NRT). The ITU would like to thank the NRT and all the support offered by the Ministry of Communication and Information Technology (MCIT).

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Executive summary

The roadmap for transition from analogue to digital television in Indonesia has been prepared by the Indonesia National Roadmap Team (NRT). ITU assisted in the synchronization of the Indonesia roadmap and the *ITU Guidelines for Transition from Analogue to Digital Broadcasting*[1] (hereinafter ITU Guidelines).

Scope of the roadmap

The roadmap for transition from analogue to digital television in Indonesia covers the short term digital switch-over (DSO) and long term DSO objectives and the activities managed by the NRT. The roadmap does not include:

- The introduction of mobile TV, because frequency channels in VHF and UHF bands are exhausted by current terrestrial TV broadcasting services. Mobile TV is treated as one of the long term DSO objectives.
- The introduction of digital radio.

The Indonesia television market is characterized by a large number of national public, commercial and non-commercial TV services and a wide choice of TV platforms (analogue and digital cable, satellite TV). The TV market in Indonesia is mainly free-to-air terrestrial with 419 broadcasters[2] currently in operation.

The aim of the roadmap is indicated by the DSO objectives. In the deliberations process in the first NRT meeting, the NRT divided the DSO objectives into short- and long-term objectives as summarized in Table 1.

Table 1: Summary of DSO objectives

No	Objective	Short term (1 year after analogue switch-off)	Long term (5-10 years after analogue switch-off)
1	The migration from analogue broadcasting to digital broadcasting should be implemented in stages. The deployment is scheduled by service zone, province and service areas.	Under study	Under study
2	Issue digital terrestrial television broad-casting (DTTB) licences consist of: • content providers; • multiplex operators.	Further DTTB licences will be issued in condition of frequency spectrum availability and result of market study.	NIL
3	Policy for the provision of set-top boxes (STBs) for free-to-air (FTA) DTTB reception includes menus in Bahasa Indonesia, early warning system (EWS), etc.	NIL	NIL
4	Better picture quality	HDTV quality up to the market depending on nationwide multiplex availability.	e.g. 3D TV up to the market

[1] www.itu.int/en/itu-d/technology/documents/broadcasting/adguidelines_oct12.pdf

[2] The 419 TV broadcasters are formed by 1 nationwide public TV broadcaster, 297 commercial TV broadcasters, 8 local public TV broadcasters and 113 community TV broadcasters (data 2012).

No	Objective	Short term (1 year after analogue switch-off)	Long term (5-10 years after analogue switch-off)
5	Make efficiency-oriented structure of the broadcasting industry to increase business opportunities, economic, social, and cultural communities	Review after ASO	NIL
6	Review of DTTB frequency plan refers to ITU Guidelines.	The outcome of frequency plan will be used to plan the digital dividend.	Determine more DTT licences and/or other digital services, e.g. MTV depending on market study
7	Digital dividend	Reallocation of possible freed-up channel in VHF Band III (174-223 MHz) for DAB services subject to market study.	Reallocation of possible freed-up channel in UHF (694-806 MHz) to introduce other radio communication services.

Source: Production based on information and discussion with NRT of Indonesia

The duration of the transition process from analogue to digital television has been ordered in the Ministerial Decree No.: 22/PER/M.KOMIFFO/11/2011, which covers the implementation of digital terrestrial TV broadcasting and implementation of simulcast. The implementation schedule for digital terrestrial television broadcasting for free-to-air service is highlighted below:

- Q4/2011: Issued DTTB policy development;
- Q2/2012: The DTTB licence policy and regulation is ready for application;
- Q3/2012 to Q4/2017: Implementation stage of DTTB network and simulcast for 15 zones. The period of simulcast in each zone is detailed in Appendix I of the Ministerial Decree No.: 22/PER/M.KOMIFFO/11/2011, and
- Q1/2018: ASO completed.

It is estimated that the transition period will take around six to seven years for consumers to convert.

The definition of DTTB licence model B in the ITU Guidelines is modified to model B1[3] in order to reflect the local TV market structure in Indonesia. The DTTB licences include content providers and multiplex operators.

The input and output documents of the phases of the roadmap related to licensing model B1 (see Table 2 and 3).

[3] Model B1: The spectrum rights are assigned to the multiplex operator responsible for content distribution and this entity can decide the allocation of the available capacity to individual broadcasters. In this model, the multiplex operator is selected from current terrestrial free-to-air (FTA) television broadcasters in a separate assignment procedure, by means of a "beauty contest" approach. The private multiplex operator is permitted to carry one and an additional two programmes from its own group, i.e. total three programmes including programmes from the same multiplex. The remaining multiplex capacity must carry existing analogue content in digital format from the commercial terrestrial FTA television broadcasters and/or new content provider subject to approval from the regulator.

Table 2: Input and output documents of the roadmap for the regulator under licence model B1

Roadmap phase	Input document	Output document
Phase 1: DTTB policy development for the regulator	• International agreement • Existing national telecom broadcast and media acts • Existing policy document and objectives	• Digital terrestrial television broadcasting policy • Initial frequency plan
Phase 2: ASO planning for the regulator	• Digital terrestrial television broadcasting policy	• Analogue switch-off plan
Phase 3: Licensing policy and regulation for the regulator	• Analogue switch-off plan • Digital terrestrial television broadcasting policy	• National coordinated frequency plan • Internationally coordinated frequency plan • License terms and conditions • License procedure and planning
Phase 4: Licensing administration for the regulator	• Licensing procedure and planning • Notification to the regulator from contents distributor	• Ministry of Communication and Information Technology (MCIT) issues official approval for the transmitter station compliant with licence terms and condition • Notification to ITU-R • Station N record in the Master International Frequency Register (MIFR) by ITU

Source: NRT

Table 3: Input and output documents of the roadmap for the operator under licence model B1

Roadmap phase	Input document	Output document
Phase 1: Preparation for the operator	• Licence procedure	• Licence application • Service proposition, business plan and network plan
Phase2: Planning for the operator	• License procedure • Service proposition, business plan and network plan	• DTTB network implementation plan
Phase 3: Implementation for the operator	• DTTB Network implementation plan	• End-user support and communication plan • Coverage presentation • Notification to regulator • Order to put DTTB site in operation
Phase 4: ASO for the operator	• Analogue switch-off plan • DTTB Network implementation plan	• Notification to the regulator • Order to put revised DTTB site in operation

Source: NRT

The decisions taken, partly taken and not yet taken on key topics and choices regarding Phases 1 to 4 of the roadmap for the regulator and operators and the activities required to prepare the decisions are indicated in Annexes 1 to 6.

Recommendations

In order to implement the roadmap for the smooth transition from analogue to DTTB, it is recommended to take note of the following critical topics:

1.	Tailor-made affordable set-top box	Seek technical cooperation with the DVB Project[4] to determine the early warning system (EWS) specification to be part of the future revised DVB-T2 standard, and organize technical coordination events and workshops if necessary with the support from DVB Project in order to speed up the EWS feature to be included in the DVB-T2 standard.
2.	Public communication to the stakeholder	The websites of the ASO organizer, network operators and broadcasters have to provide up-to-date information and guidelines to help the public to solve DTTB reception problems.
3.	Create new digital content	Based on the finalized net bit rate proposed by multiplex operators, it is suggested that the number of spare broadcasting slots in each service zone is evaluated. In accordance with the bit rate distribution model, the NRT can indicate how many spare broadcasting slots are open to the market for new content providers to encourage new digital content. Provision of new digital content during the DTTB migration has been proved to successfully impact on DTT take-up rate referring to the case of DTTB deployment in Hong Kong, China.
4.	Reception issues	The DTTB reception performance in service zone 4 should be better than analogue reception because all existing analogue content can be provided by six multiplex operators instead of 22 individual content providers. The DVB-T2 parameters proposed by each multiplex operator are different. The compatibility of STBs has to be evaluated before or during the test broadcasting period.
5.	Ensure DTTB deployment schedule	The actual DTTB deployment period depends on early completion of the DVB-T2 transmission network and the migration progress undertaken by the broadcasting programme operators. Effective monitoring of the migration progress is crucial.
6.	Ensure simulcast schedule	It is crucial to manage and monitor possible interference from co-channels and/or adjacent channels during the transition from temporary to permanent DTTB channels, as delays due to interference issues will shorten the time allotted to the simulcast schedule.

[4] www.dvb.org

7.	Ensure multiplex operators correctly implement an early warning system (EWS)	An early warning system without education, planning and rapid action is sub-optimal. The operators have to fulfil and satisfy the requirement of EWS regulation for FTA fixed DTTB. They should also provide the technical system to support the EWS.
8.	Evaluate and monitor DTTB implementation	Some critical topics need to be concerned including: a) Transmission network performance; b) DTTB Reception performance; c) Execution of DTT Frequency assignment; d) Analogue FTA services during simulcast period; and e) Implementation of DTTB.
9.	Single frequency network (SFN)/ multi frequency network (MFN) design must reflect the radio frequency allocation	In order to meet the strict requirement defined by MCIT, the operator designs the MFN network should use tailor made transmission antenna pattern to control the radiation signal to the target service area and minimize the signal strength to the location of test / measurement defined by MCIT. If the SFN coverage designs with large overlapping with other SFN stations, once the loss of synchronization of SFN in any one of the transmitting stations, non-sync signal becomes an interference signal, and the SFN coverage in overlapping service areas may collapse. Hence, the overlapping service area becomes a key consideration as one of the SFN coverage design issues.
10.	Environmental impact during transition to DTTB	During the digital television transition, removal of superfluous analogue TV equipment will generate environmental issues. The ASO planning should take this into account to propose the appropriate remedial measures. ITU will discuss this topic in an planned ITU-R meeting and it is expected that a report will be available in 2013.

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1 Introduction

ITU has published a set of guidelines covering the transition from analogue to digital terrestrial television broadcasting[5]. These guidelines provide assistance to member countries to help smoothly migrate from analogue to digital terrestrial television broadcasting. In a further effort to help countries to switch over to digital broadcasting ITU has selected countries to help draft a national roadmap for this digital switch-over (DSO) process. Indonesia is one of the beneficiary countries for further assistance.

The roadmap for transition from analogue to digital terrestrial television broadcasting in Indonesia has been jointly developed by ITU expert Peter Chu and the National Roadmap Team (NRT)[6]. The NRT is chaired by Mr Rudy Lumanto, Ministry of Communication and Information Technology (MCIT). The participants of the regulatory working team formed in 2010 under MCIT are listed below:

- Mrs Woro Indah Widiastuti (Director for Special Telecommunication)
- Mrs Agnes Widiyanti (Director of Broadcasting)
- Mr Titon Dutono (Director of Spectrum Management)
- Mr Anang Latif (Deputy Director for Infrastructure Development)
- Mr Indra Siswoyo (Section Head for Economic Analysis of Infrastructure)
- Mr Andi Zulkifli (Sub Directorate of Staff Development Infrastructure)
- Mr Yudhistira Prayoga (Spectrum Management)
- Mrs Lily Rustandi (Technical Advisor)

The Indonesia TV market, with an estimated 50 million TV households in 2012[7], is mainly a terrestrial TV FTA market with a very high number of analogue terrestrial TV programme services provided by 419 broadcasters. There is a wide choice of TV delivery platforms; analogue terrestrial TV, digital satellite TV, analogue and digital cable TV.

Currently, Indonesia's gross domestic product (GDP) per capita was in the range of USD 2500 - 2900.[8] This relatively low GDP figure and the very competitive TV market mark one of the great challenges for the digital switch-over (DSO) process. DSO can only succeed if the costs for the government, the broadcasters and the viewers are kept low. The government can achieve more efficient use of the frequency spectrum and may allocate part of the broadcasting band to other communication services.

ITU assistance to Indonesia consisted of four key activities:

1. Preparation and first country visit to collect information.
2. Prepare a draft roadmap report.
3. Present and discuss the draft roadmap report.
4. Draft the final roadmap report.

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5 ITU Guidelines for the transition from analogue to digital broadcasting, regional project, Asia-Pacific, 2012, www.itu.int/en/ITU-D/Technology/Documents/Broadcasting/ADGuidelines_Oct12.pdf

6 NRT or The Regulatory Working Team is formed by Ministry Decree Number 56 IKEP/M.KOMINFO/2/2011 About Team Development of Regulatory Organization of Digital Television Broadcast.

7 Source: http://the-marketeers.com/archives/pasar-pay-tv-belum-capai-5-dari-total-tvhh.html

8 BPS-Statistics Indonesia, http://sirusa.bps.go.id/index.php?r=indikator/view&id=74

The expert visited Indonesia from 1 to 11 December 2012 and from 14 to 18 January 2013. During the first visit the expert together with the National Roadmap Team (NRT) prepared:

1. an analysis of the TV market and regulatory situation;
2. an overview of short term and long term digital switch-over objectives;
3. an evaluation of the top ten most critical key topics;
4. an inventory of decisions taken (or partly taken) regarding key objectives and choices with respect to the ITU Guidelines functional building blocks.

After the first visit the expert prepared a draft roadmap report. During the second visit the draft roadmap report and the contributions made by the NRT were discussed and evaluated.

The current broadcasting situation and digital switch-over (DSO) objectives will be addressed and presented in Section 2. Section 3 shows the draft national roadmap for achieving the DSO objectives. Section 4 considers the top ten key topics.

Annexes 1 to 6 show in detail the decisions taken, partly taken and not yet taken on the key topics and choices regarding the DSO process in Indonesia. The activities required to prepare the decisions that are still pending are also indicated.

2 Current broadcasting situation in Indonesia

2.1 Geographic and population

Indonesia lies between latitudes 11°S and 6°N, and longitudes 95°E and 141°E. It consists of 17 508 islands, about 6 000 of which are inhabited. These are scattered over both sides of the equator.

Figure 1 shows administrative divisions of Indonesia consisting of 35 provinces. The provinces are subdivided into regencies and cities, which are further subdivided into districts, and again into village groupings. The provinces and their capitals are listed by region shown in Table 4 below.

Figure 1: Republic of Indonesia province map[9]

Source: http://en.wikipedia.org/wiki/Indonesia

Table 4: Indonesian provinces and their capitals listed by region

Sumatra • Aceh • North Sumatra • West Sumatra • Riau • Riau Islands • Jambi (city) • South Sumatra • Bangka-Belitung • Bengkulu (city) • Lampung	**Java** • Special Capital Territory of Jakarta • Banten • West Java • Central Java • Yogyakarta Special Region • Yogyakarta (city) • East Java	**Lesser Sunda Islands** • Bali • West Nusa Tenggara • East Nusa Tenggara
Kalimantan • West Kalimantan • Central Kalimantan • South Kalimantan • East Kalimantan • North Kalimantan	**Sulawesi** • North Sulawesi • Gorontalo (city) • Central Sulawesi • West Sulawesi • South Sulawesi • South East Sulawesi	**Maluku Islands** • Maluku • North Maluku
Western New Guinea • West Papua • Papua		

Source: http://en.wikipedia.org/wiki/Indonesia

According to 2010 data from Central Bureau of Statistics, Republic of Indonesia, the total population is 237 641 326[10] and total number of households is 61 164 600, and the average household size is 3.9[11].

9 The designations employed and presentation of material in this publication, including maps, do not imply the expression of any opinion whatsoever on the part of ITU concerning the legal status of any country, territory, city or area, or concerning the delimitations of its frontiers or boundaries.

10 http://bps.go.id/tab_sub/view.php?kat=1&tabel=1&daftar=1&id_subyek=12&notab=1

Great Jakarta, the official metropolitan area, known as Jabodetabek (a name formed by combining the initial syllables of Jakarta, Bogor, Depok, Tangerang and Bekasi) has a population of 28 019 545 based on the 2010 Census (see Table 5).

Table 5: Population of Great Jakarta

Administrative division	Area (km²)	Population (2010 Census)	Population density (/km²)
DKI Jakarta	664	9 588 198	14 464
Bogor Municipality, W.J.	109	952 406	8 737
Bekasi Municipality, W.J.	210	2 378 211	9 905
Tangerang Municipality, B.	164	1 797 715	9 342
South Tangerang Municipality, B.	151	1 303 569	8 646
Bogor Regency, W.J.	2 664	4 779 578	1 791
Tangerang Regency, B.	960	2 838 621	2 958
Bekasi Regency, W.J.	1 270	2 629 551	2 071
Depok Municipality, W.J.	200	1 751 696	7 053
Jabodetabek Region	6 392	28 019 545	4 383.53

W.J. = West Java province B. = Banten province
Source: Central Bureau of Statistics provincial data.

The Java region holds more than 64 per cent of the total population, see Table 6 below.

Table 6: Population of Java region

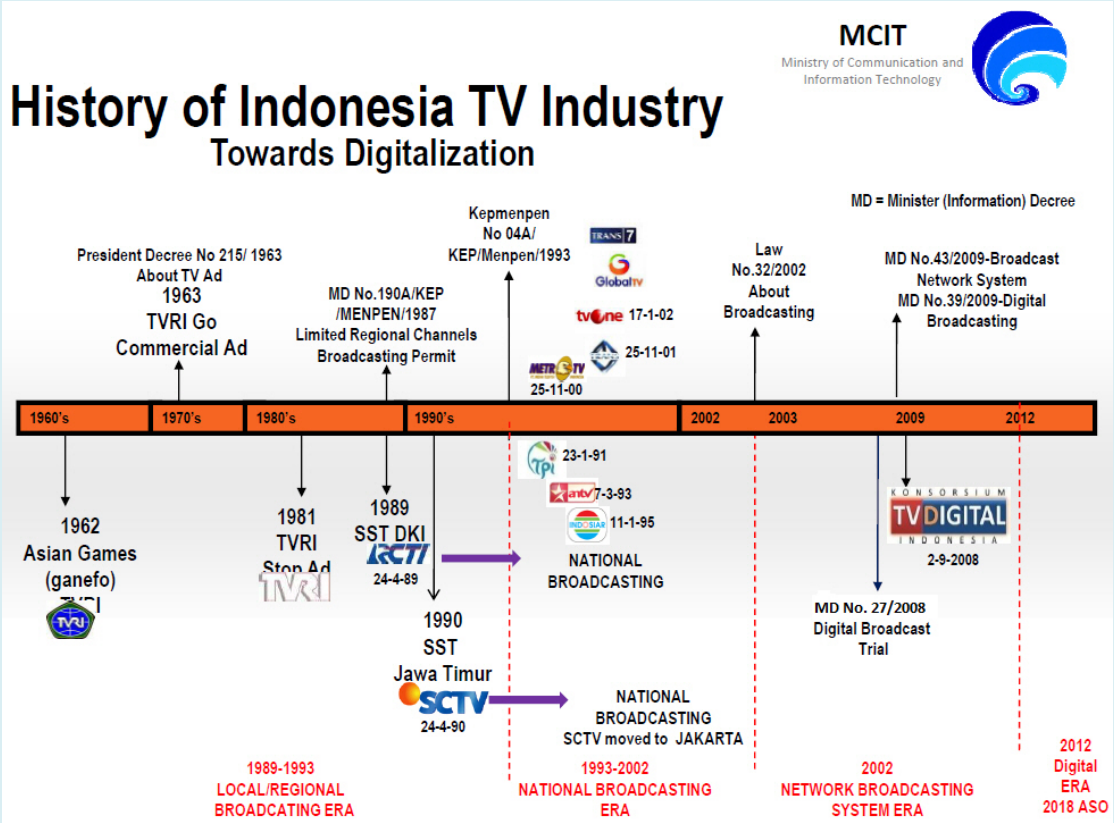
Province	Population	Census data
Jabodetabek	28 019 545	Nov 2011
Banten	10 644 030	2010
West Java	43 053 732	2010
Central Java	30 380 687	2010
Yogyakarta	3 452 390	2010
East Java	37 476 011	2010
Total	**153 026 395**	**(64.4% to total population)**
Source: Central Bureau of Statistics provincial data.		

2.2 Market structure of analogue TV services

Figure 2 illustrates the history of the Indonesia TV Industry.

[11] http://webbeta.bps.go.id/eng/flip/flip11/index3.php

Figure 2: History of Indonesia TV industry toward digitalization



Source: NRT

- The first television station in Indonesia, Televisi Republik Indonesia (TVRI), made its first live broadcast of the opening ceremony of the 14th Asia Games from Gelora Bung Karno on 24 August 1962. Advertisement was introduced to TVRI on 1 March 1963 to cope with the increasing broadcast hours.
- On 24 August 1989, the second television station in Indonesia, Rajawali Citra Televisi Indonesia (RCTI) was inaugurated.
- On 24 August 1990, the third television station, Surya Citra Televisi, SCTV was inaugurated.
- On 23 January 1991, PT Cipta Televisi Pendidikan Indonesia (TPI) started its broadcast of educational programmes with some advertisements. TPI shared channels, facilities and operators with TVRI.
- In October 1992, the Department of Information issued licences for six companies to establish private television companies. Of all these six television companies, only PT Indosiar Visual Mandiri and PT Cakrawala Andalas Televisi were able to broadcast continuously.
- On 28 February 1993, PT Cakrawala Andalas Televisi started its first broadcast in Jakarta. PT Cakrawala Andalas Televisi, owned by the Salim Group, started its first broadcast on 11 January 1995.
- In October 1999, five television broadcasting companies passed the selection from fourteen applicants and received broadcast licences. These companies are: Trans TV (PT Televisi Transformasi Indonesia), MetroTV (Group Media Indonesia), Global TV (PT Global Informasi Bermutu), Lativi (PT Lativi Media Karya), and TV7 (PT Duta Visual Nusantara Tivi Tujuh).
- In 2005, TVRI officially changed its status to that of a public broadcasting institution.

Current Indonesia TV and radio broadcasters are shown in Table 7.

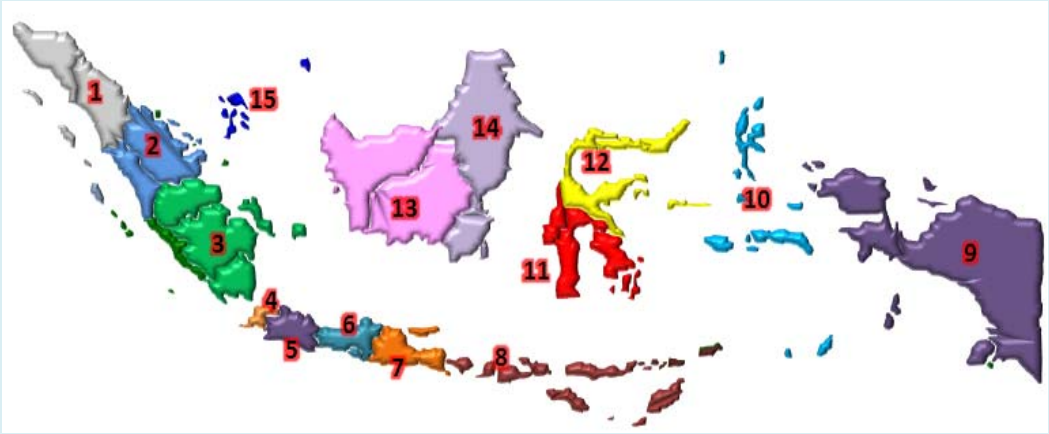
Table 7: Indonesian TV and radio broadcasting

Nationwide Public TV Network (TVRI) • Established since 1962 • 405 transmission stations • 28 regional stations	Nationwide Public Radio Network (RRI) • Established since 1945 • 62 regional stations • 11 Overseas representatives
Commercial TV • 297 terrestrial fee-to-air broadcasters • 13 Pay TV through satellite • 2 Pay TV through terrestrial • 118 Pay TV through cable • 1 IPTV operator	Commercial radio • 1 184 private radio broadcasters
Non-commercial TV • 8 Local public TV broadcasters • 113 Community TV broadcasters	Non-commercial radio • 33 Local public radio broadcasters • 71 Community radio broadcasters

Source: Broadcasting Industry Outlook in Indonesia, Jakarta, 26 September 2012, MCIT.

The analogue terrestrial television broadcasting free-to-air services are divided in 15 zones. Each zone consists of a number of provinces. Figure 3 and Table 8 show the 15 service zones, province and services areas.

Figure 3: Free-to-air terrestrial television broadcasting service zone map



Source: Broadcasting Industry Outlook in Indonesia, Jakarta, 26 September 2012, MCIT.

Table 8: 15 service zones, provinces, and services areas

NO	ZONE	PROVINCE	AREAS OF SERVICE
1	ZONE 1	ACEH ([1]DEM 3) NORTH SUMATRA (DEM 2)	13 12
2	ZONE 2	WEST SUMATRA (DEM 3) RIAU (DEM 3)	9 11
3	ZONE 3	BENGKULU (DEM 3) SOUTH SUMATRA (DEM 3) LAMPUNG (DEM 3) BANGKA BELITUNG (DEM 3)	3 8 8 3

NO	ZONE	PROVINCE	AREAS OF SERVICE
4	ZONE 4	JAKARTA BANTEN (DEM 2)	1 3
5	ZONE 5	WEST JAVA (DEM 1)	11
6	ZONE 6	CENTRAL JAVA (DEM 1) JOGJAKARTA (DEM 2)	7 1
7	ZONE 7	EAST JAVA (DEM 1)	10
8	ZONE 8	BALI (DEM 3) NUSA EAST WEST ([2]DEKM 4) EAST NUSA (DEKM 4)	2 4 13
9	ZONE 9	PAPUA (DEKM 5) WEST PAPUA (DEKM 4)	9 3
10	ZONE 10	MALUKU (DEM 3) MALUKU NORTH (DEKM 4)	5 2
11	ZONE 11	SULAWESI WEST (DEKM 4) SULAWESI SOUTH (DEM 3) SULAWESI SOUTHEAST (DEKM 4)	2 11 8
12	ZONE 12	SULAWESI CENTRAL (DEKM 4) GORONTALO (DEKM 4) SULAWESI NORTH (DEM 3)	8 2 5
13	ZONE 13	KALIMANTAN WEST (DEM 3) KALIMANTAN CENTRAL (DEM 3)	9 6
14	ZONE 14	East Kalimantan (DEM 2) SOUTH KALIMANTAN (DEKM 4)	11 6
15	ZONE 15	RIAU ISLANDS (DEM 2)	2

[1] DEM = Economically developed region
[2] DEKM = Economically less developed region

Source: Appendix I in Ministerial Decree No.: 22/PER/M.KOMINFO/11/2011.

Table 9 indicates broadcaster in zone 4 that includes Jakarta and Banten provinces with 1 and 3 service areas respectively, and which totals 22 TV broadcasters providing free-to-air TV services.

Table 9: TV broadcasters in zone 4

No	Broadcaster Name		UHF Channel	E.R.P. (kW)
1	RAJAWALI CITRA TELEVISI INDONESIA, PT	RCTI	43	3156.3
2	LPP TELEVISI REPUBLIK INDONESIA	TVRI	39	2891.0
3	TELEVISI TRANSFORMASI INDONESIA,PT	Trans TV	29	2307.2
4	GLOBAL INFORMASI BERMUTU, PT	Global TV	51	2153.2
5	DUTA VISUAL NUSANTARA TIVI TUJUH, PT	Trans 7	49	1897.4
6	ELSHINTA JAKARTA TELEVISI, PT	Elshinta	35	1850.6
7	SURYA CITRA TELEVISI, PT	SCTV	45	1730.4
8	LATIVI MEDIA KARYA, PT	tvOne	53	1671.4
9	MEDIA TELEVISI INDONESIA,PT	Metro TV	57	1409.2
10	CAKRAWALA ANDALAS TELEVISI, PT	AnTV	47	1180.5
11	TELEVISI ANAK SPACE TOON, PT	SpaceToon	27	614.1
12	OMNI INTIVISION, PT	OChannel	33	528.7
13	DUTA ANUGERAH INDAH, PT	DAAI TV	59	305.6
14	METROPOLITAN TELEVISINDO, PT	BChannel	23	304.9
15	CIPTA TELEVISI PENDIDIKAN INDONESIA, PT	MNC TV	37	224.5
16	KOMANDO MEDIA TELEVISI, PT	Kompas TV	28	121.1

No	Broadcaster Name		UHF Channel	E.R.P. (kW)
17	INDOSIAR VISUAL MANDIRI, PT	Indosiar	41	97.8
18	BANTEN MEDIA GLOBAL TELEVISI, PT	Banten TV	22	76.8
19	DANAPATI ABINAYA INVESTAMA, PT	JakTV	55	61.0
20	CIPTA MEGASWARA TELEVISI, PT	MegaVision	25	38.4
21	VISI CITRA MITRA MULIA. PT	TVMiTRA	30	9.7
22	NUSANTARA TELEVISI, PT	TVN	61	6.1

Total population in zone 4 is 23 746 143 as shown in Table 10 below.

Table 10: Population distribution in service area of zone 4

No.	Area Name	Coverage by population	Serviced by
1	Jakarta	20 932 434	All broadcasters
2	Pandeglang	795 778	ANTV only
3	Malimping	245 819	TVRI only
4	Cilegon	1 772 112	RCTI and SCTV
Source: SCTV via. MCIT			

The results of the Nielsen audience measurement conducted in Indonesia in week 47 of 2012 in Jakarta, Surabaya, Bandungas areas are shown in Table 11. An example of number of viewers per week data from 11 broadcasters within the zone 4 is show in Table 12.

Table 11: Service areas for TV rating measurement

Area Name	Household
Jakarta	11 556 000
Surabaya	3 430 000
Bandung	834 000
Total	15 820 000
Source: MCIT	

Table 12: TV broadcasters with audience measurement rating

No.	Broadcaster name	[1] Rating	[2] Million per week
1	RCTI	[3]16	9.6
2	SCTV	15	9.0
3	Trans 7	12.4	7.5
4	MNC TV	12	7.2
5	IVM	10.5	6.3
6	Trans TV	10.2	6.1
7	ANTV	6.7	4.0
8	GTV	6.2	3.7
9	TV One	4.1	2.5
10	Metro TV	1.8	1.1

No.	Broadcaster name	[1] Rating	[2] Million per week
11	TVRI	[3]0.9	0.5

Notes:

[1] Audience measurement areas include Jakarta, Surabaya and Bandung.

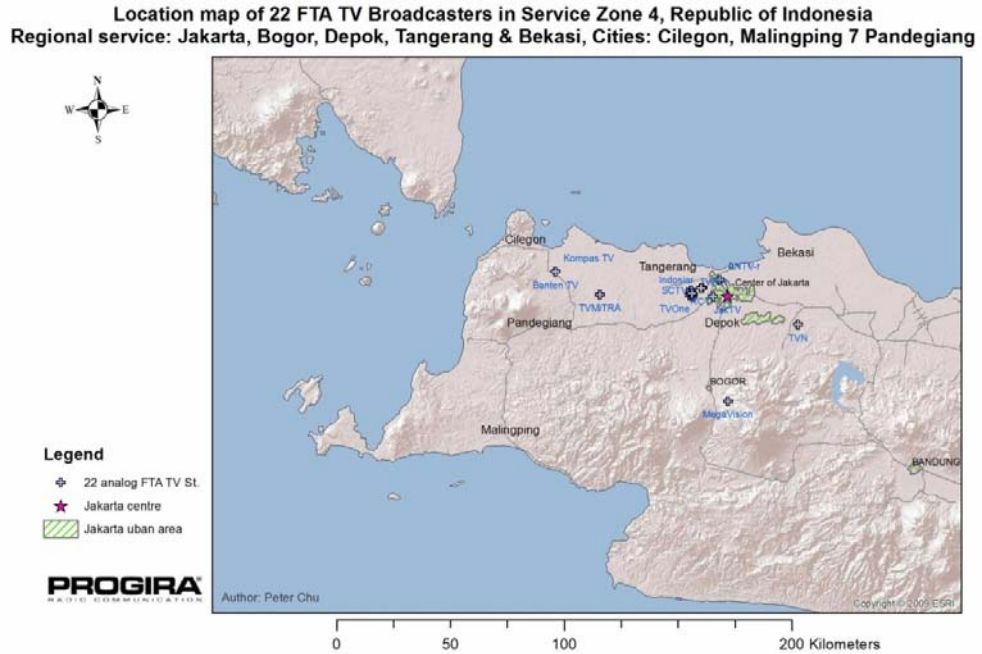
[2] Household of the audience measurement areas is 15 820 000. Household size in Jakarta is 3.8 in 2010, i.e. million per week = (Rating/100) x (15 820 000 x 3.8).

[3] TVRI (national public broadcaster) has the largest coverage by population. According to audience measurement in week 47/2012, RCTI TV has the largest big city, e.g. Jakarta, Surabaya and Bandung, ratings.

Source: Production based on information and discussion with NRT of Indonesia.

Figure 4 is antenna tower location map of 22 FTA television broadcasters in service zone 4.

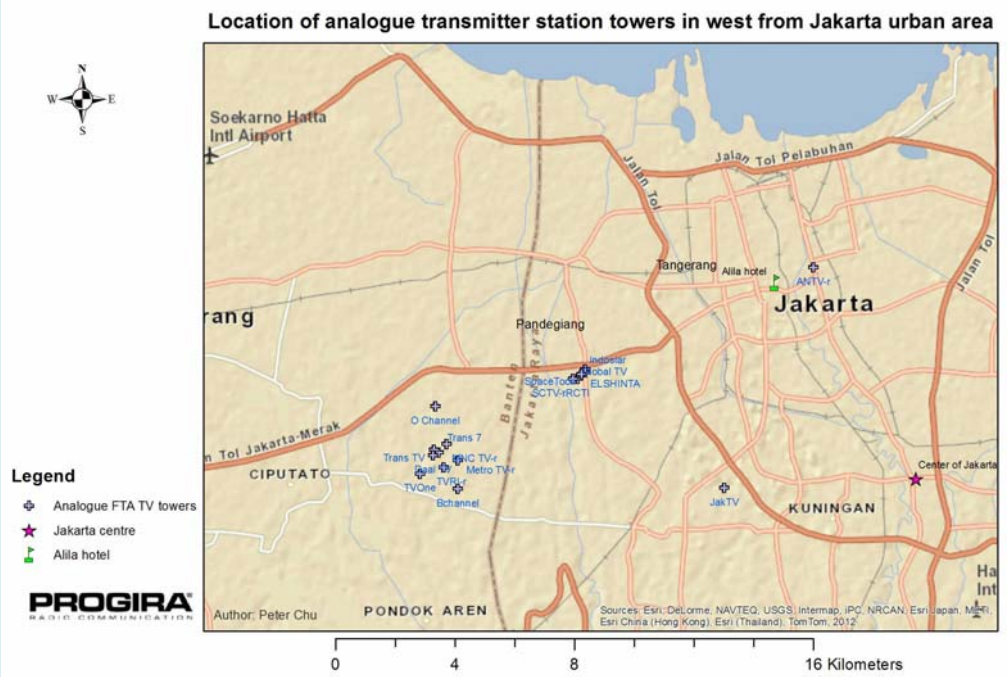
Figure 4: Location map of all transmitter stations in service zone 4



Source: NRT/ITU

Figure 5 illustrates that most of the towers are close to Jakarta.

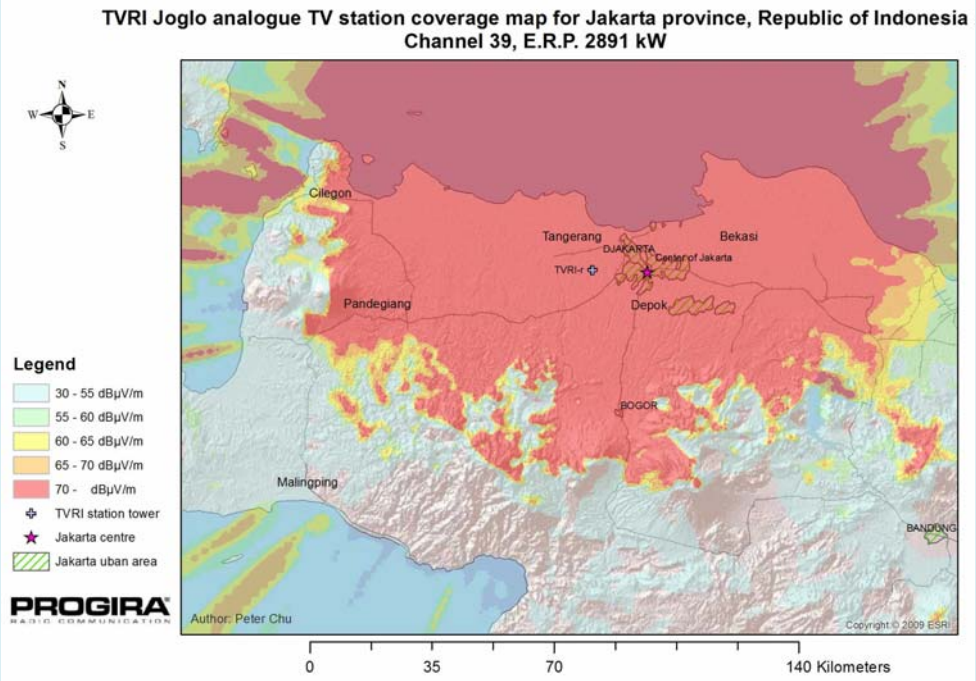
Figure 5: Transmitter stations close to Jakarta



Source: NRT/ITU

Figure 6 shows an analogue TV coverage map simulation for the TVRI Joglo transmitter station that provides good coverage for regional service areas including Jakarta, Bogor, Depok, Tangerang and Bekasi and city in Pandeglang.

Figure 6: Coverage map of TVRI Joglo analogue transmitter station



Source: NRT/ITU

2.3 Digitalization in Indonesia

Starting in 2007; a DTTB steering committee and working group were established and have been working on DTV issues and their progress is illustrated in Figure 7.

Figure 7: Digitalization progress in Indonesia

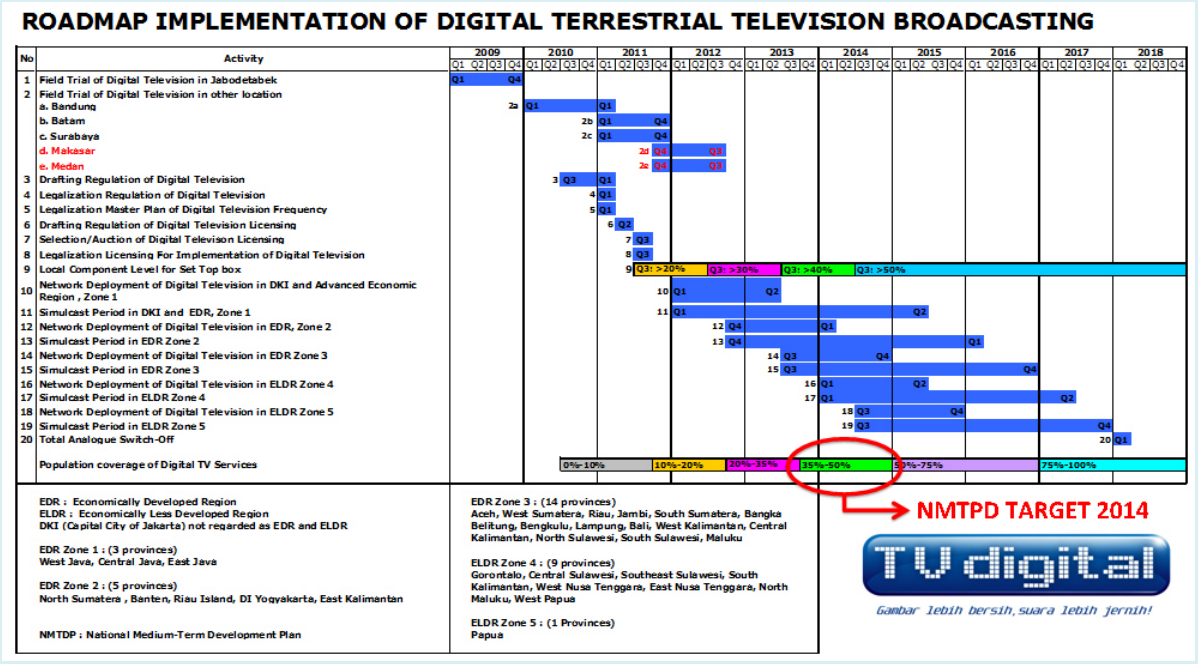
Source: NRT

In accordance to the Ministerial Decree No.: 17/2012, the Establishment of Implementation of Broadcasting Multiplexing issued on 12 July 2012 by the Ministry of Communication and Information Technology, the selection of multiplex operators quoted below:

> "*The government has undertaken an exhaustive review of the multiplexing broadcasting on FTA fixed DTTB including public consultation done as one of the considerations in the policy-making process.*
>
> *In addition it has also conducted a series of intensive discussions involving elements of the Ministry of Communication and Information Technology with the relevant stakeholders including the Indonesian Broadcasting Commission, the Local Government, Public Broadcasting Institution TVRI, the Association of Indonesian Private TV (ATVSI), the Association Local TV Indonesia (ATVLI), Association of Indonesian TV Network (ATVJI), the broadcasting industry, academia, non-governmental organizations and the wider community.*
>
> *The government adopted a policy of FTA fixed DTTB based on the following principles:*
>
> 1. *Assurance to get information for the public;*
> 2. *The rights of broadcasting organizations in conducting business activities remain secured broadcasting, and*
> 3. *Efficient usage of the radio frequency spectrum.*
>
> *Based on the principles mentioned above, the Government took the following polices:*
>
> 1. *Set the DVB-T2 standard for FTA fixed DTTB in Indonesia.*
> 2. *Set the regulation for MUX operator (LPPPM) for FTA fixed DTTB.*
> 3. *Set period of transition from analogue to digital TV broadcasting (simulcast) beginning in 2012 until the end of 2017 and the period of Analog Switch-Off (ASO) in 2018.*
> 4. *Announce a business opportunity for multiplexing broadcasting on digital terrestrial television broadcasting fixed reception free-to-air based on Service Zone.*
> 5. *Make the selection for MUX operator (LPPPM).*"

The selection method is based on the principle of benefit, fair and transparent by using the beauty contest. Phase 1 for the selection of MUX operator (LPPPM) is service zone 4 (DKI Jakarta and Banten), 5 (West Java), 6 (Central Java and Jogjakarta), 7 (East Java) and 15 (Riau Islands). The progress on DTTB technical trials, regulatory issues on DTTB licence, implementation planning and target on DTTB coverage, etc. had been completed and announced. Ministry of Communication and Information Technology (MCIT) presents the roadmap of DTTB in Figure 8. Highlight of the said roadmap is shown in Figure 9.

Figure 8: Roadmap of digital terrestrial TV broadcasting in Indonesia



Note: The other locations in Makasar and Medan are not included in the field trial of digital television.

Source: NRT

Figure 9: Digitalization progress summary and update in Indonesia

- **DTTB trial period ***
  - ❑2009 Q1 - Q4: Digital TV Field Trial in Greater Jakarta
  - ❑2010 Q1 - 2012 Q3: Digital TV Field Trial in another locations including Bandung, Batam, Surabaya, Makasar and Medan

  * Makasar and Medan are not included in the field trial finally.

  *The DTTB trial was undertaken by TVRI and KTDI (Consortium of commercial broadcasters)
- **Regulatory and DTTB license period: Q3 2010 to Q3 2011**
  1. Regulatory Restructuring Digital TV
  2. Designation of Maintenance Regulations Digital TV
  3. Determination Master Plan Frequency Digital TV
  4. Compilation of Digital TV Licensing Regulations
  5. Selection of Digital TV Licensing
  6. Fixing Permissions Coordinator Digital TV
- **DTTB switch-on and deployment with simulcast are implemented by means of phases for 15 service zones in period Q1 2012 to Q4**
- **Target of Set-top box penetration period: Q3 2011 to end 2018**

  Q3 2011 to Q2 2012: > 20%

  Q3 2012 to Q2 2013: > 30%

  Q3 2013 to Q2 2014: > 40%

  Q3 2014 to Q4 2018: > 50%
- **Range of Digital TV Services (population)**

  0-10% (Q3 2010 - Q3 2011)

  10-20% (Q4 2011 - Q3 2012)

  20-35% (Q4 2012 - Q3 2013)

  35-50% (Q4 2013 - Q4 2014)

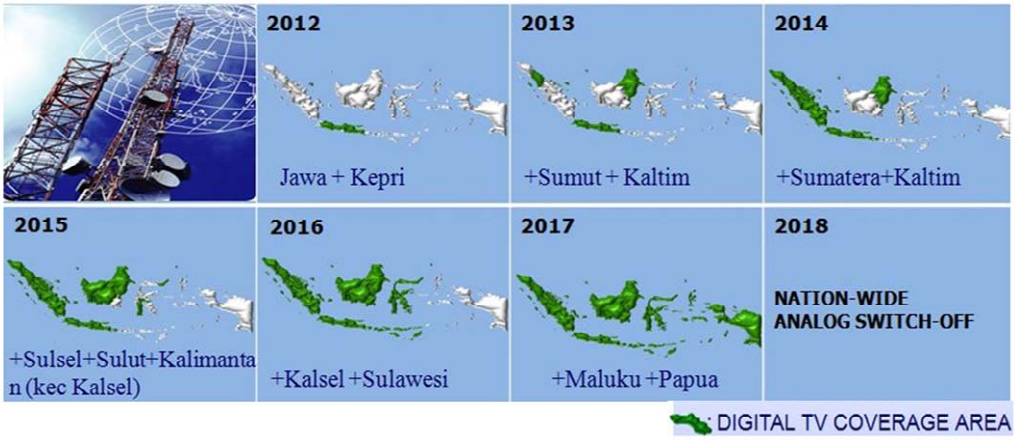
  50-75% (Q1 2015 - Q4 2016)

  75-100% (Q1 2017 - Q4 2018)

Digital Switch-On in 2012 in Service Zone 4

Nationwide Analogue Switch-Off in Q1 2018

Remark: the population percentage during the trial period is included.



Source: NRT

As a result of the DTTB multiplex operator selection (beauty contest) six DTTB multiplex operators have been awarded.

Table 13: Award DTTB multiplex operator in zone 4

MUX Number	1	2	3	4	5	6
Zone 4: MUX operator	TVRI	BSTV	tvOne	Metro TV	SCTV	Trans TV
Zone 5: MUX operator	TVRI	ANTV	Indosiar	Metro TV	RCTI	Trans TV
Zone 6: MUX operator	TVRI	Global	Indosiar	tvOne	Metro TV	Trans TV
Zone 7: MUX operator	TVRI	ANTV	Global TV	Metro TV	SCTV	Trans TV
Zone 15: MUX operator	TVRI	RCTI	SCTV	Trans TV		

Notes:

(1) Service zone 4 (DKI Jakarta and Banten), 5 (West Java), 6 (Central Java and Jogjakarta), 7 (East Java) and 15 (Riau Islands)

Source: MCIT

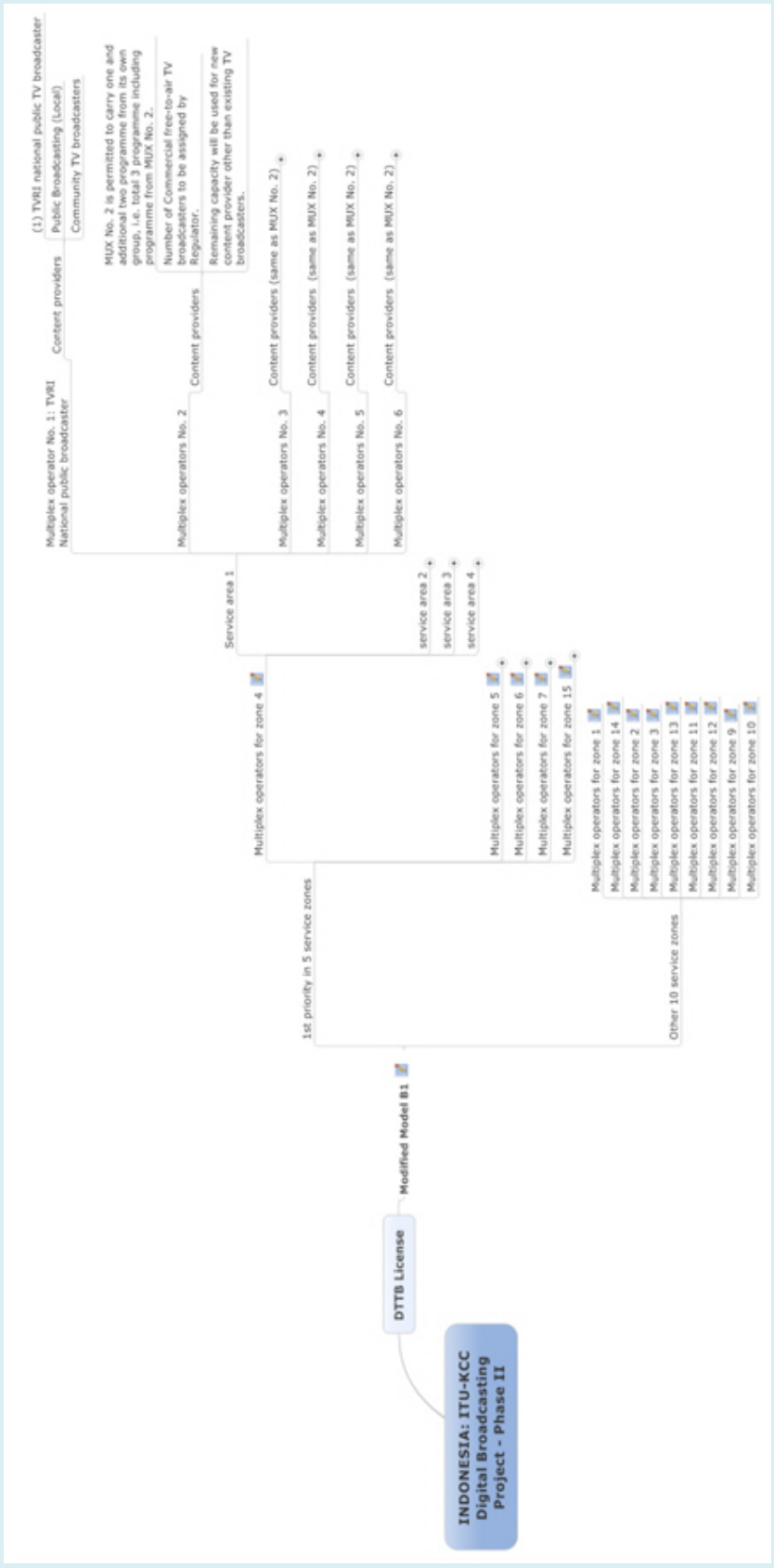
The DTTB multiplex operator licence will be issued in 15 service zones. The modified DTTB licence model B framework is shown in Figure 11.

The public broadcaster TVRI currently uses UHF channel 42 providing DTT transmission from the Joglo transmitter station (see Figure 10). The existing DVB-T 10 kW transmitter shares the existing analogue transmitting antenna system installed on top of a 300 m high steel tower providing DVB-T E.R.P. 261 kW. TVRI plans to convert DVB-T to DVB-T2 in 2013.

Figure 10: TVRI Joglo transmission station

Source: ITU

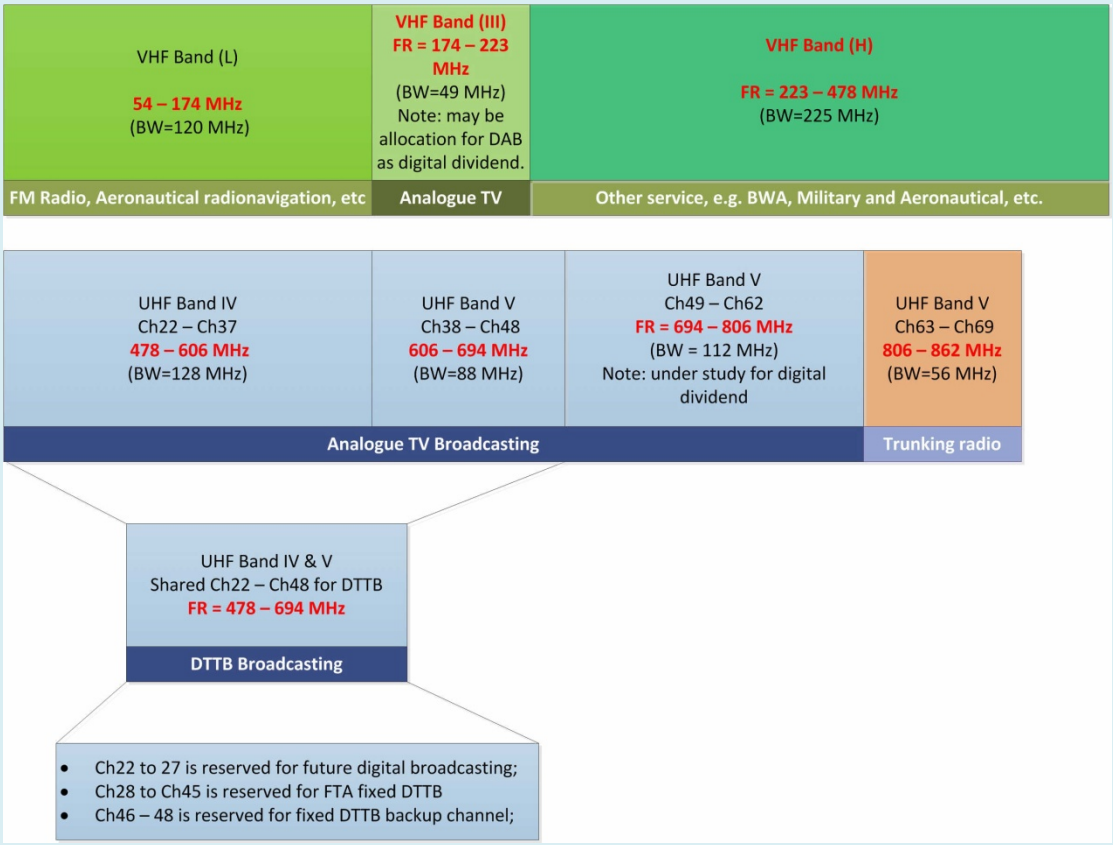
Figure 11: Modified DTTB licence model B framework



Source: NRT

The existing free-to-air analogue terrestrial television broadcasting uses spectrum in VHF 174-223 MHz and UHF 478-806 MHz. In accordance with Ministerial Decree No.: 23/PER/M.KOMINFO/11/2011, the UHF spectrum from 478 to 694 will be shared for DTTB broadcasting. After ASO completion, the VHF band from 174 to 223 may be used for DAB, and UHF band from 694 to 806 is under study for the digital dividend. Figure 12 illustrates channel allocation in Indonesia.

Figure 12: Allocation of VHF and UHF spectrum in Indonesia for analogue TV and DTTB



Source: Production based on information and discussion with MCIT, Indonesia.

2.4 Regulatory framework

The policy and regulatory environment related to television broadcasting is listed in Table 14.

Table 14: Regulatory framework in Indonesia

Relevant legislation	Arrange/Covers	Regulatory body	Assigned rights
Law No. 32/2002	Law Number 24 1997 on broadcasting deemed not fit anymore, so need to be removed and formed the new law on broadcasting	The President of the Republic of Indonesia	Law on Broadcasting
Ministerial Decree No: 27 /P/M.KOMINFO/8/2008	Field trials implementation of digital television broadcast	Ministry of Communication and Information Technology	DTTB field trials
Ministerial Decree No. 43/2009	Broadcast network system	Ministry of Communication and Information Technology	DTTB broadcast

Relevant legislation	Arrange/Covers	Regulatory body	Assigned rights
Ministerial Decree 39/PER/M.KOMINFQ/10/2009	Digital broadcasting framework for the implementation of basic FTA fixed digital terrestrial broadcasting television	Ministry of Communication and Information Technology	Implementation of DTTB
Ministerial Decree No: 22/PER/M.KOMINFO/11/2011	The implementation of FTA fixed digital terrestrial television broadcasting	Ministry of Communication and Information Technology	Implementation of DTTB
Ministerial Decree No: 23/PER/M.KOMINFO/11/2011	Masterplan of FTA fixed radio frequency for digital terrestrial television broadcasting on Band 478-694 MHz	Ministry of Communication and Information Technology	Radio frequency master plan
Ministerial Decree No: 5/PER/M.KOMINFO/2/2012	Standard for FTA fixed digital terrestrial television broadcasting	Ministry of Communication and Information Technology	DTTB standard
Ministerial Decree No: 95/KEP/M.KOMINFO/02/2012	Business opportunity of multiplexing implementation for FTA fixed digital terrestrial television broadcasting in service zone 4 (DKI Jakarta and Banten), 5 (West Java), 6 (Central Java and Jogjakarta), 7 (East Java) and 15 (Riau Islands)	Ministry of Communication and Information Technology	DTTB multiplex
Ministerial Decree No: 121/KEP/M.KOMINFO/02/2012	Selection team of broadcasting institution for multiplexing implementation on FTA fixed digital terrestrial television broadcasting	Ministry of Communication and Information Technology	DTTB multiplex
Ministerial Decree No: 17/PER/M.KOMINFO/06/2012	The implementation of determining the multiplex	Ministry of Communication and Information Technology	DTTB multiplex
Appendix selection regulation of the Ministerial Decree No.: 17/PER/M.KOMINFO/06/2012	The establishment of implementation of broadcasting MUX	Ministry of Communication and Information Technology	DTTB multiplex
Ministerial Decree No: 18/PER/M.KOMINFO/06/2012	Procedures for calculating leasing tariff of broadcast slot on multiplexing implementation	Ministry of Communication and Information Technology	DTTB Leasing tariff
Ministerial Decree No: 22/PER/M.KOMINFO/07/2012	The usage of radio spectrum Band 478-694 MHz on service zone IV, service zone V, service zone VI, service zone VII and service zone XV for transition of digital terrestrial television broadcasting	Ministry of Communication and Information Technology	Usage of Radio spectrum band for DTTB
Ministerial Decree No: 36 of 2012 on The Technical requirement for Digital TV broadcasting transmitter equipment in compliance with DVB-T2 standard	Technical requirement for equipment and television transmitter broadcast standard-based digital DVB-T2	Ministry of Communication and Information Technology	Technical requirement for DVB-T2 transmitter
Ministerial No: 35 of 2012 on The Technical Requirements for Digital TV	Technical requirement for equipment and receiver (Set-top box) television broadcast	Ministry of Communication and Information Technology	Technical requirement for DVB-T2 Set-top

Relevant legislation	Arrange/Covers	Regulatory body	Assigned rights
Broadcasting Receiver Equipment (Set-top Box) in compliance with DVB-T2 standard	standard-based digital DVB-T2		box
Broadcasting commission No. 01/P/KPI/03/2012	Broadcasting code of conduct	Indonesian Broadcasting Commission Center	Code of conduct
Indonesia broadcasting commission regulation No. 02/P/KPI/03/2012	Program standard press	Indonesian Broadcasting Commission Center	Program standard

With regard to the transition to digital television broadcasting, the following is noted:

1. The migration to digital terrestrial television broadcasting in Republic of Indonesia is in progress. Ministerial Decrees have been published since 2011. The selection of DTTB multiplex operators for service zones including 4, 5, 6, 7 and 15 have been completed in Q3 2012.
2. DVB-T2 has been selected as the DTB standard in Indonesia. The DTTB licence model B1 is practical for the local TV market structure. The DTTB frequency plan can support six DTTB multiplex operators in each area of service under the province of the concerned service zone. Based on DVB-T2 bit rate 37 Mbit/s per multiplex, three SDTV and five SDTV can be assigned for LPPPM and LPPPS respectively to meet the simulcast requirement. The remaining bit rate can be considered to provide new digital content, e.g. HDTV by other content providers (see Table 34).
3. In order to speed up completion of DTTB deployment and meet the ASO target by phases in each service zone, the transmission network design principle for the six multiplex operators is based on existing analogue transmission infrastructure to be shared, i.e. individual tower at different locations and the antenna system is allowed to setup the DVB-T2 transmission network.
4. The switch-on of DTTB was started in Q4 2013. The simulcast for 15 service zones in Indonesia aims to be completed in 4Q 2017. The nationwide ASO is target to be ready in Q1 2018.

2.5 Digital switch-over objectives

2.5.1 DTTB short- and long-term objectives

After discussion with the NRT members, the digital switch-over (DSO) objectives for digital terrestrial television broadcasting are presented in Table 15.

Table 15: DTTB DSO objectives

No	Objective	Short term (1 year after analogue switch-off)	Long term (5-10 years after analogue switch-off)
1	The migration from analogue broadcasting to digital broadcasting should be implemented in stages. The deployment is scheduled by service zone, province and service areas. *Target timeline for deployment, simulcast and ASO* Digital TV switch-on in Q1 2012	under study	under study

No	Objective	Short term (1 year after analogue switch-off)	Long term (5-10 years after analogue switch-off)
	• DTTB deployment in 15 service zones (SE). The period is listed below. Q1 2012 to Q1 2014: SE 4 ,6 and 15 Q1 2012 to Q2 2013: SE 5 and 7 Q4 2012 to Q1 2014: SE 14 and 1a Q3 2013 to Q4 2014: SE 2, 3, 8a, 10a, 11a, 12a, 13 and 1b Q1 2014 to Q2 2015: SE 8b, 9a, 10b, 11b, 12b and 14 Q3 2014 to Q4 2015: SE 9b • Simulcast period approached by zone in period from Q1 2012 to Q4 2017; quoted source from Appendix I in MD No. 22/PER/M.KOMINFO/11/2011 • Range of Digital TV Services by population: 0-10% (Q3 2010 - Q3 2011) 10-20% (Q4 2011 - Q3 2012) 20-35% (Q4 2012 - Q3 2013) 35-50% (Q4 2013 - Q4 2014) 50-75% (Q1 2015 - Q4 2016) 75-100% (Q1 2017 - Q4 2018) • Nationwide Analogue Switch-Off targeted in Q4 2017		
2	Issue DTTB licences consist of • Content providers; • Multiplex operators	Further DTTB licences will be issued in condition of frequency spectrum availability and result of Market study.	NIL
3	Policy in provision of STBs for Free-to-air DTTB reception: • Minimum 20% of local content and increased gradually to at least 50% within a period of five years; • Digital standardization: Mandatory features includes menus in Bahasa Indonesia, early warning system, MPEG4/DVB-T2 and /HD. Optional features include equipped with data communication (internet) communication and programme rating measurement; • Requirement of ready digital label. (mandatory) • Require to comply with any technical provisions regarding the legislation in Indonesia.	NIL	NIL
4	Better picture quality	HDTV quality up to the market depending on nationwide multiplex availability.	e.g. 3D TV up to the market
5	Make efficiency-oriented structure of the broadcasting industry to increase business opportunities, economic, social, and cultural communities	review after ASO	NIL

No	Objective	Short term (1 year after analogue switch-off)	Long term (5-10 years after analogue switch-off)
6	Review of DTTB frequency plan refers to ITU Guidelines.	The outcome of frequency plan will be used to plan the digital dividend.	Determine more DTT licences and/or other digital services, e.g. MTV depended on market study
7	Digital dividend	Reallocation of possible freed-up channel in VHF Band III (174-223 MHz) which may be assigned for DAB services subject to market study.	Reallocation of possible freed-up channel in UHF (694-806 MHz) to introduce other radio communication services.

Source: Production based on information and discussion with NRT of Indonesia.

With reference to the DTTB DSO objectives, some observations are given below:

1. DSO objective 1:

   The migration plan for the DVB-T2 deployment period: the simulcast period in each service zone is determined and published. The ASO date could be decided after reviewing the actual completion of full DTTB coverage in the service zone. From the experience of ASO in other countries, there will be lots of obstacles for ASO, it is better to consider implementing ASO in less populated areas early to obtain experience, and then implement ASO in metropolitan areas later. In view of the huge service zones in Republic of Indonesia, it is practical to review the individual ASO progress in Q1 2018 and determine the date for nationwide ASO.

2. DSO objective 2:

   The DTTB licence model B1 is well-suited to the local TV market structure and can shorten the deployment period using existing infrastructure to set-up the DTTB transmission network. On the other hand, the multiplex operator design principle, using individual site and antenna to set-up the transmission network may face problems in transmission performance and reception in the same service area.

3. DSO objective 3:

   The current DVB-T2 STB has to support the early warning system (EWS) in accordance with prevailing regulations.

4. DSO objective 4:

   Before ASO, the limited spare broadcasting slot in multiplexing from the six multiplex operators may not be good enough to attract the TV market stakeholders to produce better digital picture quality content if the net bit rates of each DVB-T2 multiplex is to be solely determined by the MUX operator.

5. DSO objective 5:

   The DTTB frequency plan under different scenarios is best conducted earlier before nationwide ASO because ASO will be implemented by phases in difference service zones. For example, the

ASO completion in service zone 4, 5, 6 and 7 may be a good time to have more DTTB multiplexs available for the TV market stakeholder to apply.

6. DSO objectives 6 and 7

   The frequency planning and digital dividend is closely related. The ITU document, Digital dividend: Insights for Spectrum decisions, August 2012 provide informative information about these topics.

2.5.2 MTV objectives

For the long term, NRT holds the view that MTV should be considered after analogue switch-off and is subject to a market driven approach. MTV networks are not part of this report.

2.5.3 Digital radio objectives

NRT holds the view that digital radio will be reviewed after analogue switch-off. The VHF Band I and III (54 – 223 MHz) can be released after ASO and assigned for digital radio. This report does not include the digital radio.

3 National roadmap

After having determined the aim of the roadmap as described in Section 2, this Section will describe the roadmap itself. Section 3.1 starts with an introduction on the concept of a roadmap, followed by the description of the construction of the roadmap in Section 3.2. In Section 3.3, the selected functional building blocks of the Indonesia roadmap are shown. Section 3.4 describes each of the phases of the Indonesia roadmap.

3.1 Roadmap concept

A roadmap is a management forecasting tool and targets the implementation of strategy and related project planning.

A roadmap matches short-term and long-term goals and indicates the main activities needed to meet these goals. Developing a roadmap has three major uses:

1. It helps to reach consensus on the requirements and solutions for transition to DTTB.
2. It provides a mechanism to help forecast the key milestones for the transition to DTTB.
3. It provides a framework to help plan and coordinate the steps needed for transition to DTTB.

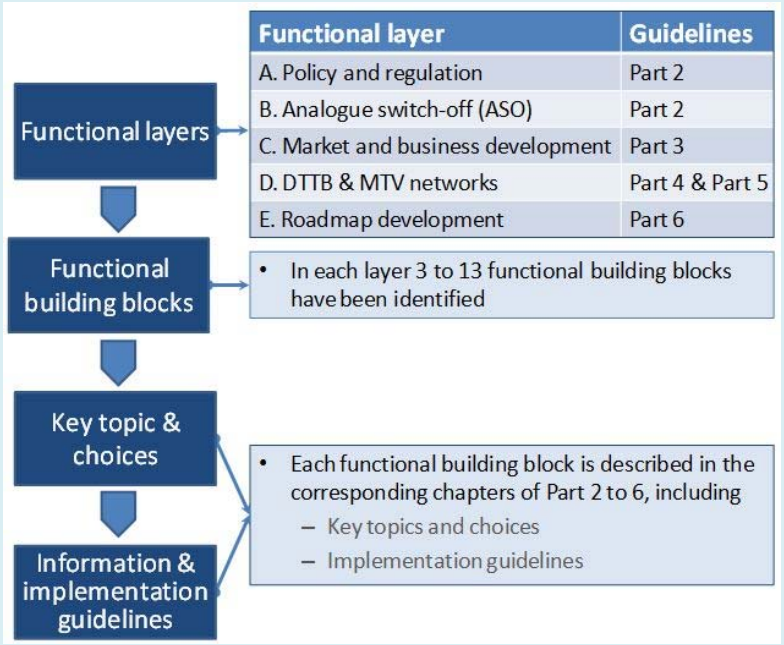
A roadmap consists of various phases, normally related to preparation, development and implementation of the strategy. A roadmap is often presented in the form of layers and bars, together with milestones on a time scale.

3.2 Roadmap construction

Part 6 of the ITU Guidelines for transition to digital television describes a method for developing a roadmap, and a set of generic roadmaps regarding the whole process of transition to DTTB (and an introduction to MTV is also given). The methodology described in Part 6 of the ITU Guidelines will be followed in the development of the Indonesia roadmap.

Figure 13 illustrates the functional framework consisting of five layers.

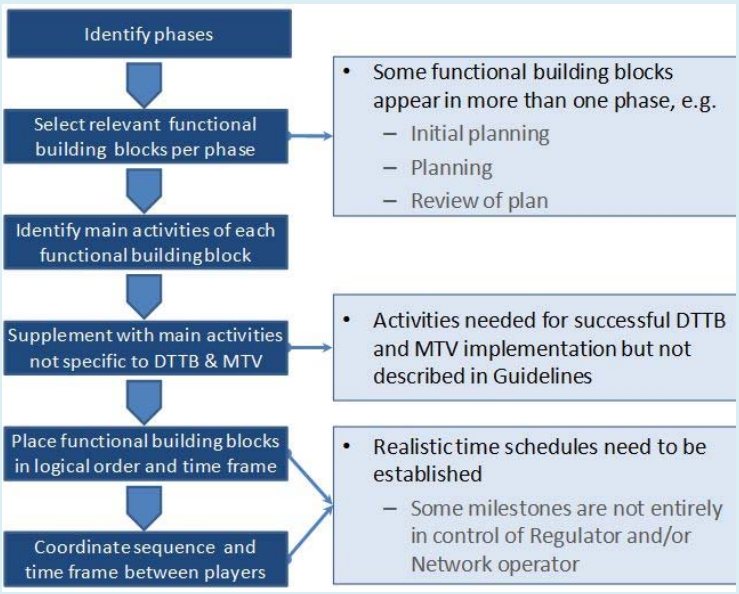
Figure 13: Functional framework



Source: Adapted from ITU Guidelines.

Each layer consists of a number of functional building blocks. In each functional building block key topics and choices have been identified. The roadmap is constructed by defining the phases and by placing the relevant functional blocks in each phase in a logical order and in a time frame. For each of the functional building blocks the decisions already taken and the main activities to resolve not yet decided key topics and choices are identified. Figure 14 illustrates the construction process from identifying phases to the coordination of sequence and time frames between players.

Figure 14: Roadmap construction process



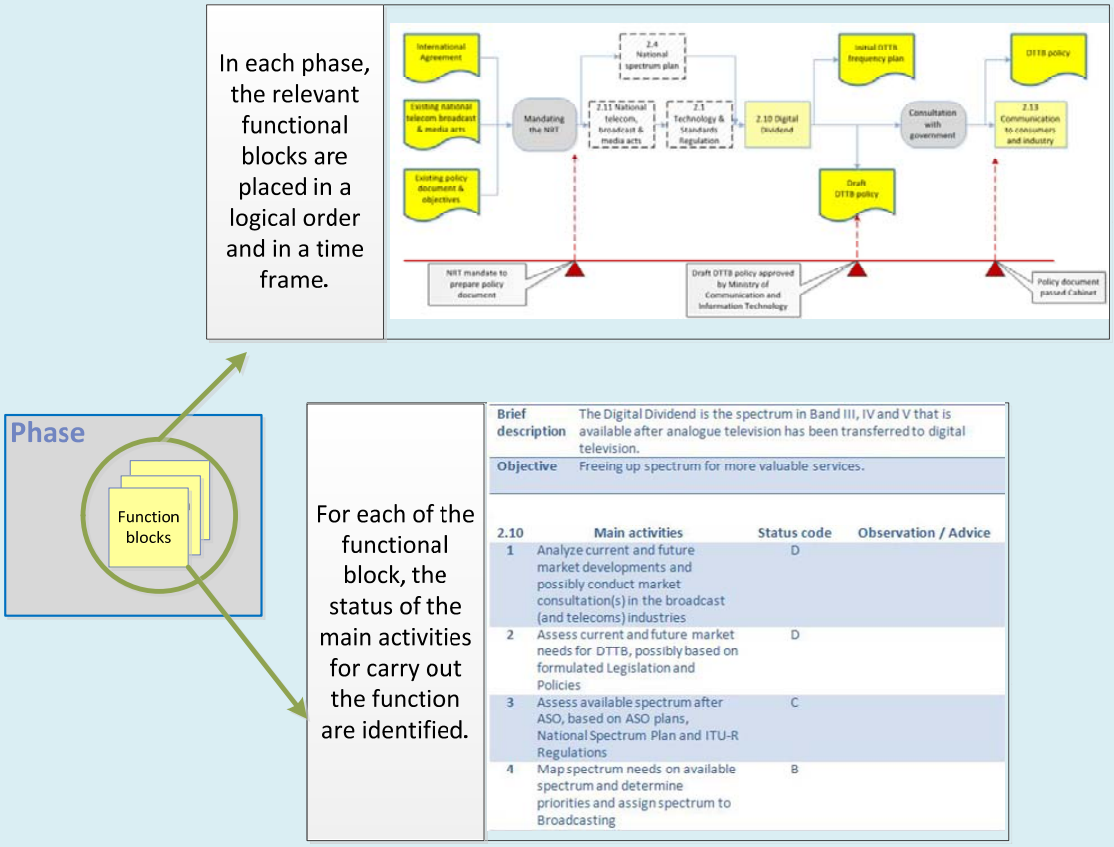
Source: Adapted from ITU Guidelines.

The result is a roadmap that consists of three levels:

1. Phases of the roadmap are noted with the selected functional building blocks per phase.
2. For each phase, the functional building blocks are placed in a logical order and time frame.
3. For each functional building block in a phase, the status on key topics and choices and the main activities to be carried out are indicated.

The roadmap structure is illustrated in Figure 15.

Figure 15: Roadmap structure



Source: Adapted from ITU Guidelines.

3.3 Functional building blocks relevant to the Indonesia situation

Of the five functional layers shown in Figure 13, layer E is "roadmap development" and hence covered by this report. The other functional layers A (policy and regulation), B (ASO), C (market and business development) and D (DTTB and MTV networks) contain in total 38 functional building blocks (see Figure 16 for the regulator and operator roadmaps). Most of the functional building blocks have been completed or are in progress. Out of the 38 functional building blocks, NRT indicates six blocks for the regulator and one block for the operator. In this report, the term 'regulator' refers to the National Roadmap Team (NRT) and Ministry of Communication and Information Technology (MCIT) and 'operator' refers to the content provider and DTTB multiplex operator.

The roadmap covers:

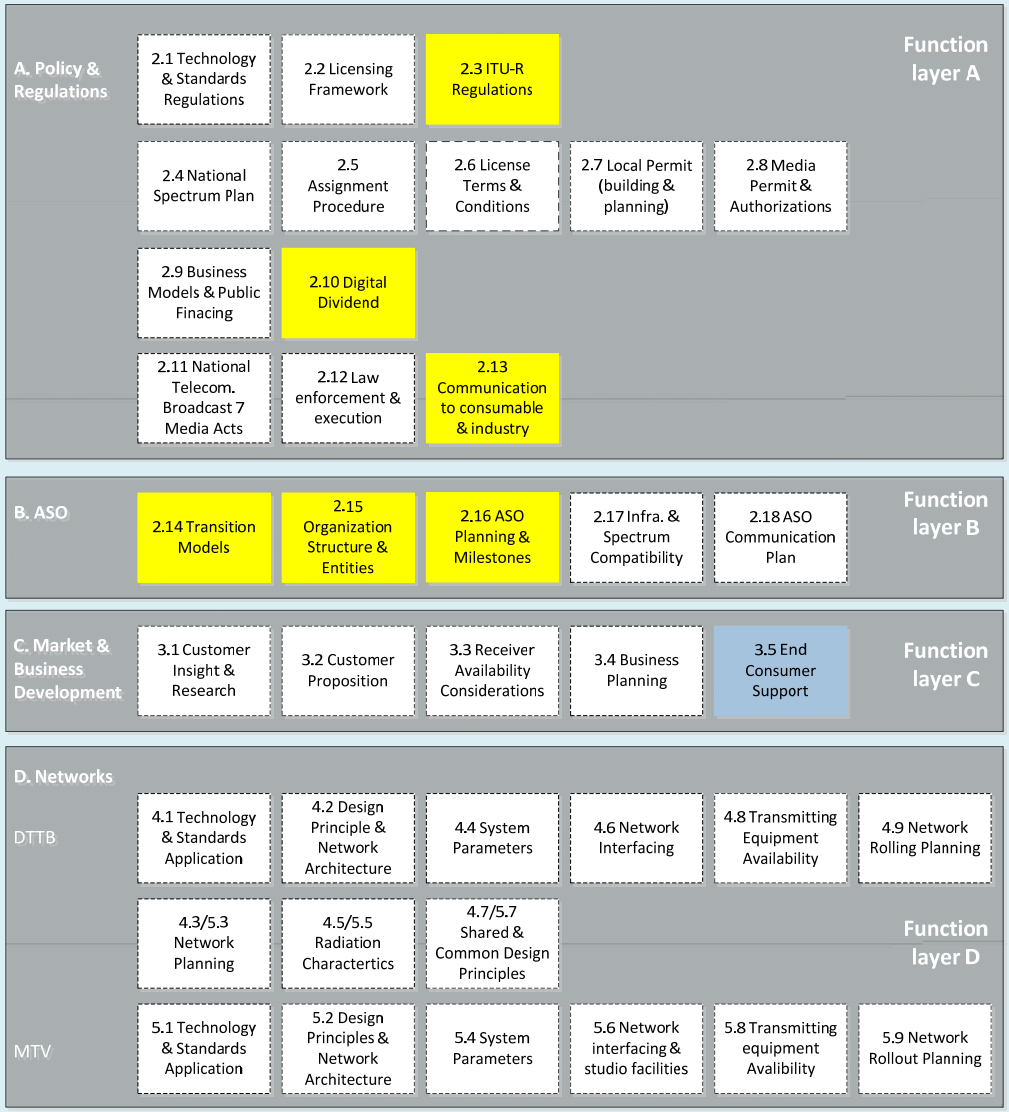
- the short-term DSO objectives (up to one year after ASO) as defined in Table 15; and
- activities managed by the regulator and operator.

Figure 16 shows three types of functional building block:

1. **White blocks with dashed frame:** These blocks indicate partial or fully completed and/or it does not apply to the local free-to-air terrestrial television market structure.
2. **Yellow blocks without frame:** These blocks indicate involvement of the NRT and will be managed by the regulator.
3. **Blue blocks without frame:** These blocks indicate involvement of the NRT and will be managed by the operator.

Figure 16: Selected functional building blocks in the Indonesia roadmap for regulators and operators

Indonesia NRT indicates interest on the functional building blocks for the regulator and operator



Note 1: Yellow blocks (Regulator) and blue blocks (Operator): These blocks are interest by NRT.
Note 2: White blocks with dashed frame: NTR indicates that these blocks are not interest because most of it are decided and completed.

Source: Adapted from ITU Guidelines and discussion with NRT of Indonesia

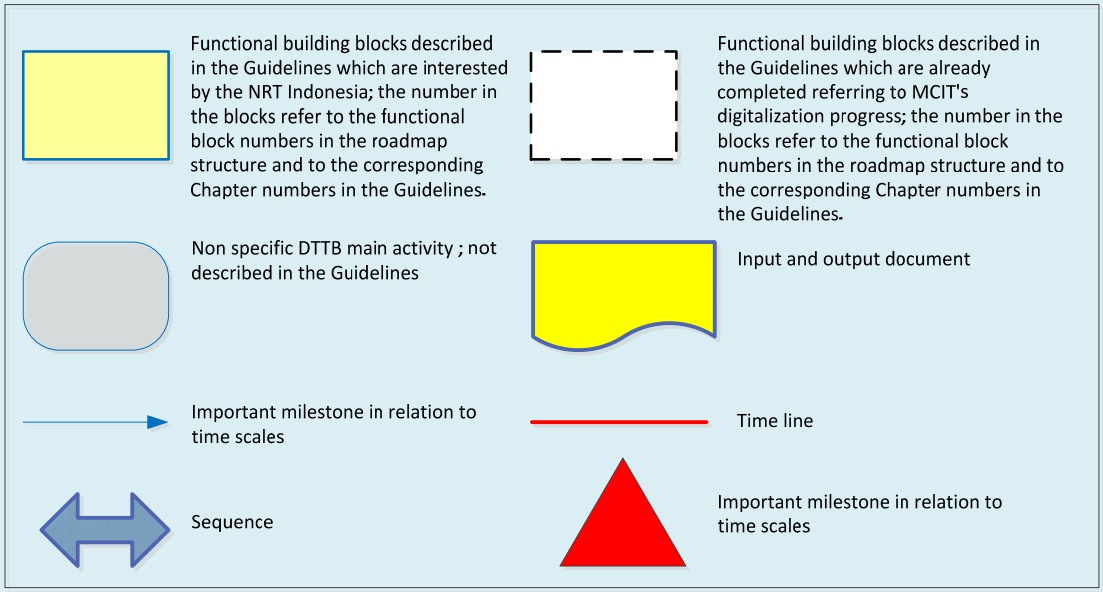
3.4 Description of the Indonesia roadmap

In this section the overall roadmap for Indonesia is outlined. The roadmap is segmented into several phases. After presenting the roadmap outline (subsection 3.4.1), each phase is discussed (subsections 3.4.2 to 3.4.9).

The detailed activities and considerations for each phase and its associated functional building blocks are included in Annexes 1 – 6 of this report.

The following subsections contain a number of figures. Figure 17 describes the symbols used in these figures.

Figure 17: Symbols used in roadmap figures



Source: Adapted from ITU Guidelines.

3.4.1 Overall roadmap

As discussed in the first NRT meeting, Indonesia has planned to switch-off all analogue terrestrial television services by the first quarter of 2018 (deadline for complete ASO nationwide). With reference to the functional building block 2.2 licence framework in the ITU Guidelines, NRT prefers to modify model B to model B1 in order to suit the local TV market structure in Indonesia:

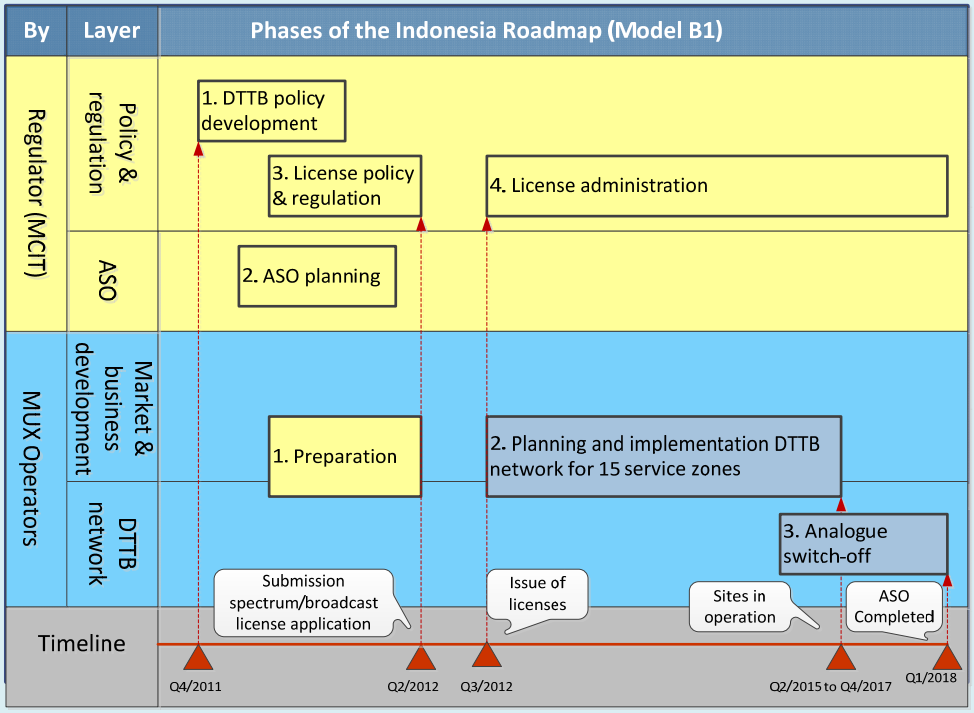
> **Model B1:** The spectrum rights are assigned to the multiplex operator[12] which is responsible for content distribution and this entity can decide the allocation of the available capacity to individual broadcaster(s). In this model, the multiplex operator is selected from current terrestrial free-to-air (FTA) television broadcasters in a separate assignment procedure, by means of beauty contest approach. The private multiplex operator is permitted to carry one and an additional two programmes from its own group, i.e. a total of three programmes including programmes from the same multiplex. The remaining multiplex capacity must carry existing analogue content in digital

[12] The multiplex operator includes Institute Broadcasting Public TVRI and Institute Broadcasting Private as stated in Article 5 of Part Three Broadcasting multiplexing Organizers in The Implementation of FTA fixed DTTB, MD No: 22/PER/M.KOMINFO/11/2011.

format from the commercial terrestrial FTA television broadcasters and/or new content provider subject to approval from the regulator.

Due to the current TV broadcasting market and availability of frequency spectrum for DTTB migration, NRT prefers to use modified DTTB licence model B1 for DTTB services. Figure 18 illustrates the top level Indonesia roadmap under model B1.

Figure 18: Top level roadmap for Indonesia based on DTTB licence model B1

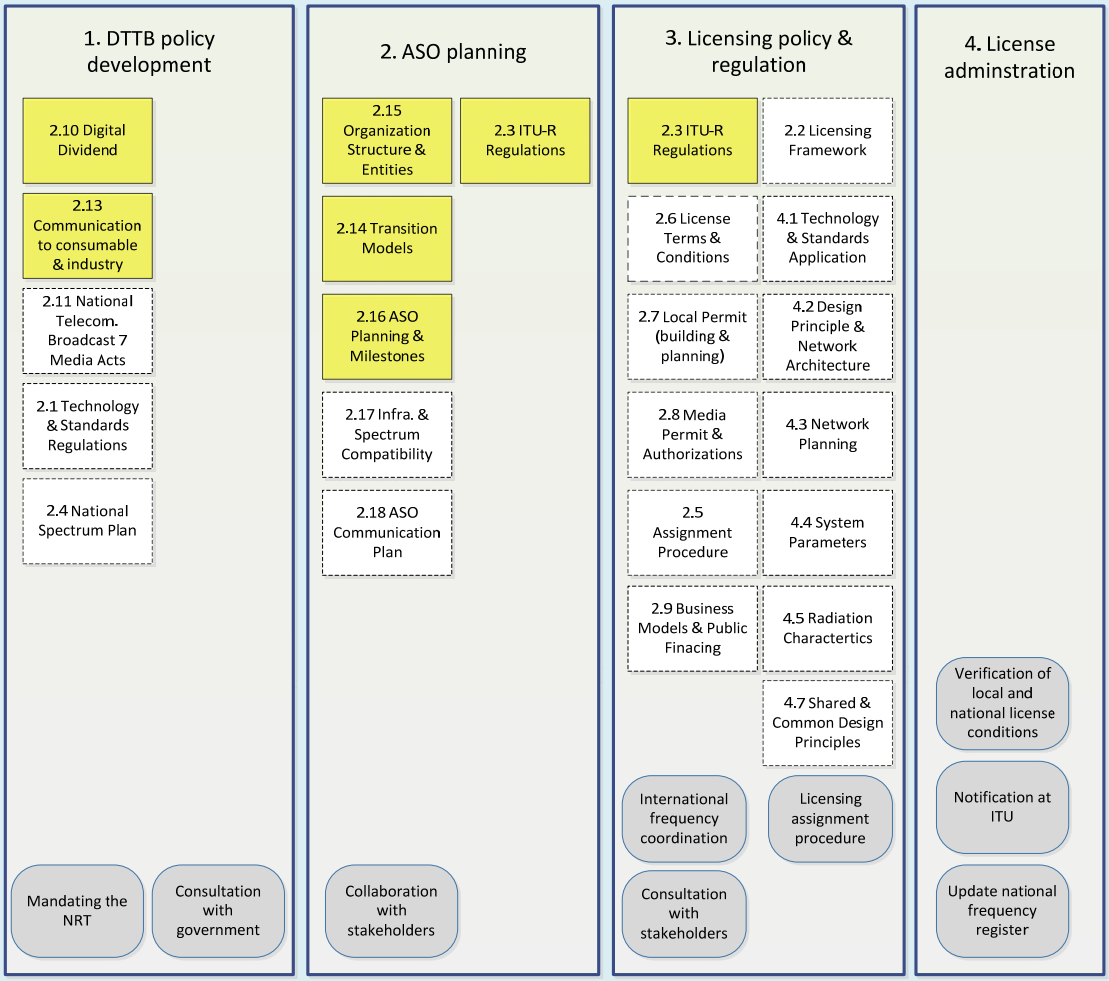


Source: NRT/ITU

Functional blocks in each phase

Figure 19 shows the functional building blocks to be included in the Indonesia roadmap based on DTTB licence model B1 and which have been selected by the NRT. Please note that the yellow / blue blocks and white blocks with dashed frame are described in the chapters of the ITU Guidelines with corresponding numbering. The grey blocks are not described in the ITU Guidelines. These blocks represent activities that are not specific to the introduction of digital terrestrial television broadcasting services.

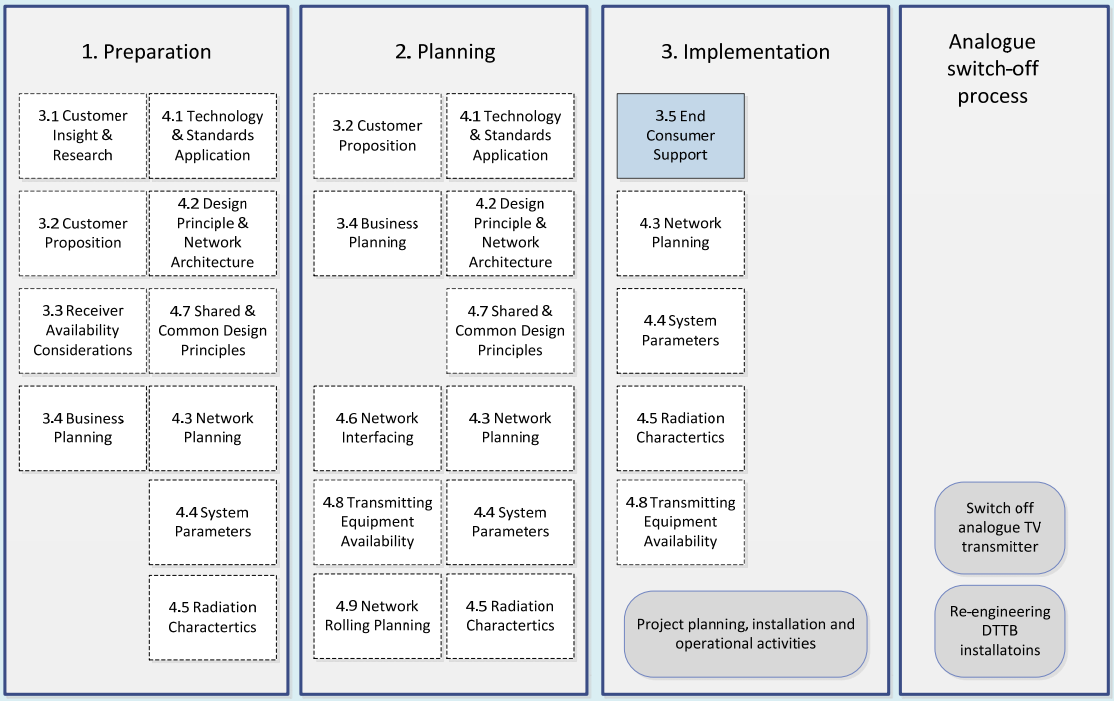
Figure 19: Functional blocks in each phase for the regulator based on DTTB licence model B1



Source: Adapted from ITU Guidelines

Figure 20 shows the functional building blocks to be included for the operator.

Figure 20: Functional blocks in each phase for operators based on DTTB licence model B1



Source: Adapted from ITU Guidelines.

3.4.2 Phase 1 DTTB policy development for the regulator

Phase 1 of DTTB policy development in Indonesia has already been completed.

Inputs

The key inputs for this phase include, Law of the Republic of Indonesia Number 32 Year 2002 about broadcasting, Ministerial Decree (MD) No: 27/P/M.KOMINFO/8/2008 on field trials implementation of DTTB and MD 39/PER/M.KOMINFQ/10/2009 on the Basic Framework for the Implementation of FTA DTTB.

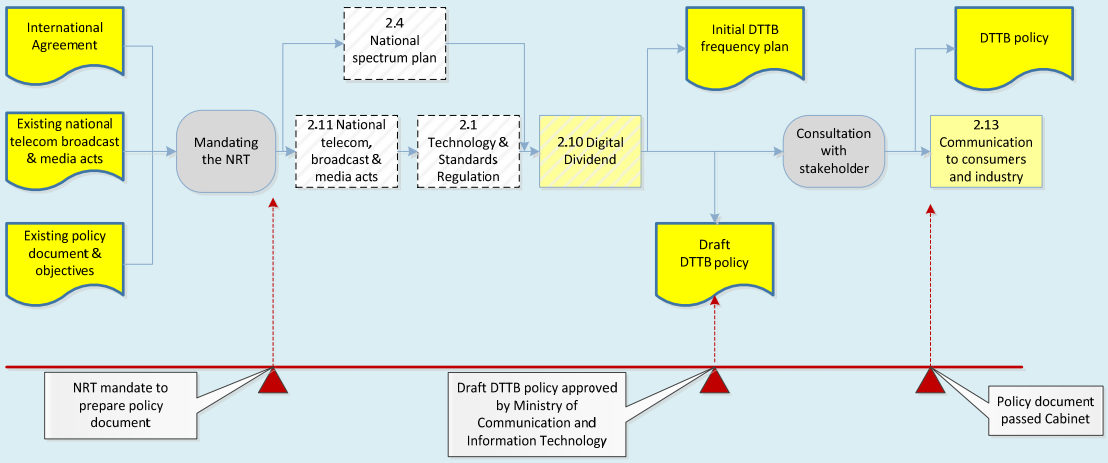
Outputs

The key output of the DTTB policy development Phase 1 is already completed; Ministerial Decree (MD) No: 22/PER/M.KOMINFO/11/2011 on the Implementation of DTTB for free-to-air, Broadcasting commission regulation No. 01/P/KPI/03/2012 on Broadcasting code of conduct, and Broadcasting commission regulation No. 02/P/KPI/03/2012 on Program Standards Press.

Roadmap

The roadmap of the DTTB policy development in Phase 1 for the regulator and the associated functional building blocks is shown in Figure 21. The decisions taken, partly taken and not yet taken on the key topic and choices regarding Phase 1 of the roadmap and the activities are indicated in Annex 1 of this report.

Figure 21: DTTB policy development Phase 1 of the roadmap for the regulator



Source: Adapted from ITU Guidelines

As can be derived from Figure 21, the following steps (i.e. functional building blocks and non-DTTB specific activities) are included in Phase 1 of the roadmap for the regulator:

1. Mandating the NRT: The DTTB steering committee and working group was established in 2007. The NRT or Regulatory Working Team was formed later by Ministry Decree Number 56 IKEP/M.KOMINFO/2/2011 on Regulatory Team of FTA fixed DTTB.
2. Determining the current available spectrum for DTTB (functional building blocks 2.4): As a result of DTTB frequency planning, MCIT allocated DTTB channels for six multiplexs in UHF band 478-694 MHz. Detail refers to Ministerial Decree No: 23/PER/M.KOMINFO/11/2011 on Masterplan of Radio Frequency for DTTB on Band 478-694 MHz.
3. Checking compliancy with current legislation and identifying required changes (functional building block 2.11): MCIT had carried out evaluation and concluded the required changes on current legislation. Table 14 in this report provides a summary of the regulatory framework in Indonesia.
4. Selecting the transmission standard (function building block 2.1): DTTB standard in Indonesia is DVB-T2 refers to Ministerial Decree No: 5/PER/M.KOMINFO/2/20012 issued on 2 February 2012.
5. Deciding the digital dividend (functional building block 2.10): At this phase, it should be decided what digital dividend will become available for other services than digital terrestrial television broadcasting services as specified in the short- and long–term digital switch-over (DSO) objectives (see Table 15). Concerning the question of how to allocate the digital dividend resulting from the spectrum freed up by the transition of analogue television services to digital terrestrial television broadcasting services, ITU has published a report[13] that explains the digital dividend process.
6. Determining the first customer proposition (functional building block 3.2): Because the DTTB multiplex operator must carry analogue content from existing FTA fixed terrestrial television broadcasters as part of the ASO plan. The lease rates to use the slot of DTTB multiplex has to follow the calculation procedure which is detailed in the Ministerial Decree No: 18/PER/M.KOMINFO/06/2012 issued by MCIT on 1 June 2012.

[13] ITU report: Digital Dividend: Insights for spectrum decisions, August 2012, www.itu.int/ITU-D/tech/digital_broadcasting/Reports/DigitalDividend.pdf

7. Consultation with stakeholder: After completion of the consultation process, a DTTB policy document, MD No.: 22/PER/M.KOMINFO/11/2011 on implementation of DTTB was issued by MCIT.
8. Informing the public and communication to consumers and industry (functional building block 2.13): Subsection 2.13.3 of the ITU Guidelines provides guidance on government-led communications to end-consumers and industry.

3.4.3 Phase 2 ASO policy planning for the regulator

Phase 2 of ASO policy planning in Indonesia has already been completed. As shown in Figure 22, the second phase of the roadmap is the ASO planning stage for the regulator.

Inputs

The key input for this phase is the government DTTB policy document.

Outputs

The main output for the ASO planning phase is the ASO plan.

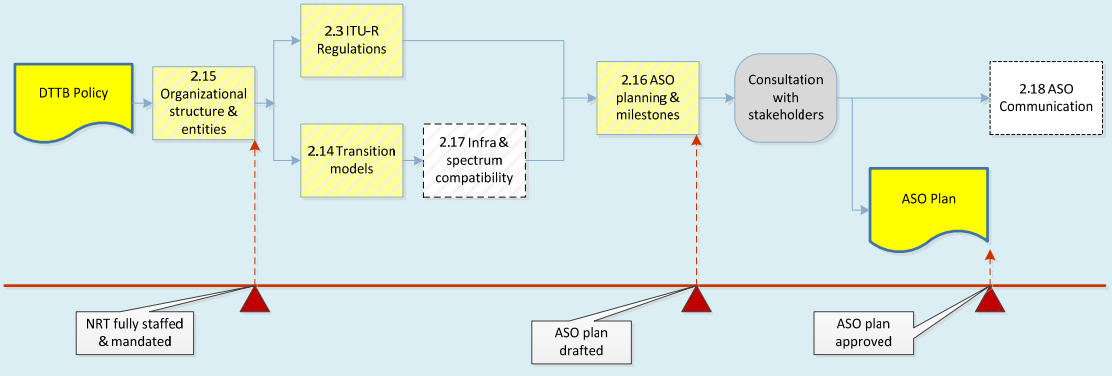
The ASO plan describes in detail the transition process from analogue to digital. The applied ASO transition model (see functional building block 2.14) in Indonesia is simulcast of current terrestrial FTA television programmes under model B1, including details about which services can be received, under what conditions (i.e. the reception conditions), and in what areas. This includes the ASO planning and milestones (see functional building block 2.16). This plan describes when the customer proposition (see functional building block 3.2) will be made available and how this proposition will be provided. As indicated in the ITU Guidelines, this plan comprises several work streams or result paths, including:

- communications (further detailed in functional building block 2.18 ASO communication);
- device producers and delivery;
- network plan and rollout (includes DTTB service delivery details);
- consumer and market monitoring;
- regulation and licensing (further detailed in Phase 3 of the roadmap), and
- financial and installation support.

Roadmap

The roadmap of the ASO planning phase and the associated functional building blocks are shown in Figure 22. The decisions taken, partly taken and not yet taken on the key topic and choices regarding Phase 2 of the roadmap are indicated in Annex 2 of this report.

Figure 22: ASO planning Phase 2 of the roadmap for the regulator



Source: Adapted from ITU Guidelines.

As shown in Figure 22, the steps concluded in the second phase of the roadmap are:

1. Establishing the organizational structure and participating entities (see functional building block 2.15): The participating parties and their responsibilities in the ASO planning process might be sensitive in policy and needs a strong collaboration prior to approval. In this step also the reporting structure and escalation procedures should be clarified so that the NRT can officially and efficiently operate and manage the ASO process.
2. Determining an initial transition model (see functional building block 2.14): In Phase 1 of the roadmap a first understanding of the available spectrum was established. In Phase 2, the NRT decided to recommend ASO with simulcast to meet the current situation of the TV broadcasting market in Indonesia. Subsection 2.14.4 provides the ITU implementation guidelines on the ASO transition models decision.
3. Determining the Infrastructure and spectrum compatibility (see functional building block 2.17): This situation of infrastructure and spectrum incompatibility is likely to occur in the ASO process and should be addressed in the network planning prior to actual execution of the ASO process. Incompatibility can happen in both the transmitter infrastructure as well as in the available spectrum. The main incompatibility issues may include a) Infrastructure or network facilities; b) Spectrum, i.e. in (a limited) geographical area the digital and analogue frequencies cannot coexist. Subsection 2.17.2 ITU implementation guidelines provide guidance to resolve the problems of infrastructure and spectrum incompatibility.
4. Drafting ASO planning and milestones (see functional building block 2.16): The NRT has decided the target timeline of ASO. The Appendix I in MD No.:22/PER/M.KOMINFO/11/2011 provides details of period of simulcast in 15 service zones.
5. Collaboration with stakeholders formed by government and industries: This might include many consultation sessions, extensive lobbying and several revisions. Sufficient time should be planned for these activities.
6. Finalization of ASO Plan and detailing the ASO communication plan (see functional building block 2.18): After having the ASO Plan approved by the Government, the ASO Plan can be finalized for the selected scenario. This ASO Plan will act as the working document for the NRT which will be continuously revised and updated. It will also include the ASO planning on the basis of which the ASO implementation can commence. As discussed previously, one work stream or result path of the ASO planning includes the ASO Communication. Following the guidance provided in the Guidelines (functional building block 2.18) a detailed strategy for informing/supporting the viewers and industry parties can be developed.

3.4.4 Phase 3 licensing policy for regulation

The objective of Phase 3 of the Indonesia roadmap for the regulator is to have the required DTTB licences defined and the associated licensing procedures and planning published. Phase 3 licensing policy for regulation in Indonesia was prepared for application in the second quarter of 2012.

Inputs

The input data for this phase are the DTTB policy document resulting from the first phase of the roadmap and the ASO plan resulting from the second phase of the roadmap. As shown in the top level Indonesia roadmap, Phase 3 starts in parallel with the execution of Phase 1 and 2. For example, the NRT could start working on the activities in Phase 3 before the DTTB policy document and ASO plan have passed from government. Such an approach might entail some later changes/revisions of the resulting documents.

Outputs

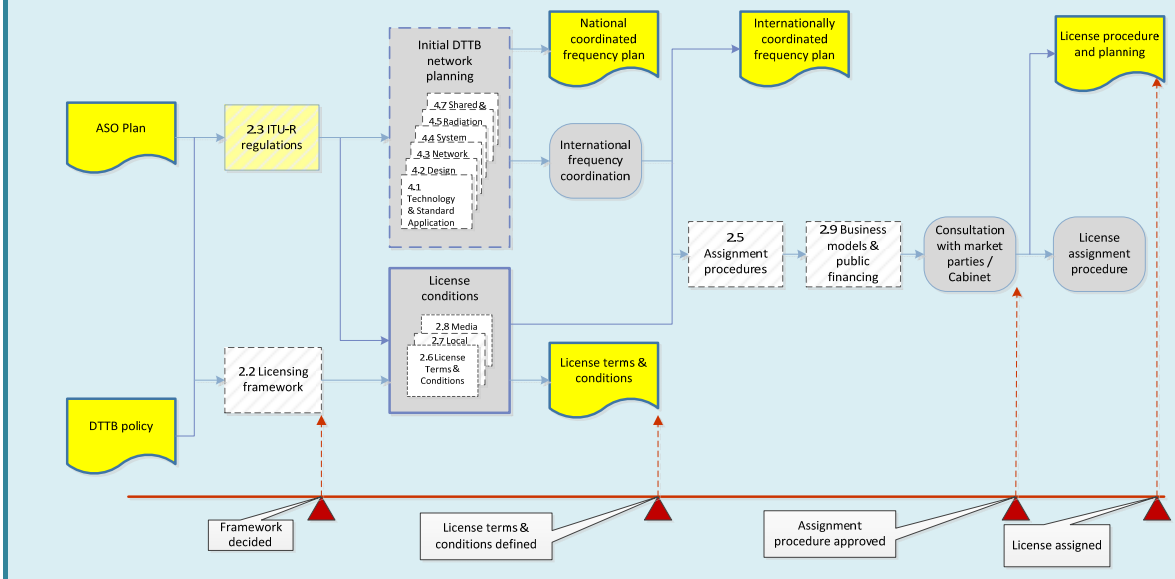
The third phase has the following output documents:

1. A nationally coordinated frequency plan: see appendix III in Ministerial Decree (MD) No.: 23/PER/M.KOMINFO/11/2011 providing detailed MFN frequency assignment for the regional services under 15 service zones.
2. An internationally coordinated frequency plan: because of geographic of the provincial service zone Islands Riau in Indonesia, bilateral coordination is required with Singapore and Malaysia. These administrative procedures may not be part of the critical path in the ASO planning.
3. The DTTB licence terms and conditions: see MD No: 17/PER/M.KOMINFO/06/2012 on the establishment of implementation of broadcasting multiplexing and MD No: 121/KEP/M.KOMINFO/02/2012 *Selection Team of Broadcasting Institution for Multiplexing Implementation on FTA fixed DTTB* provides details of DTTB licence conditions and terms.
4. Licence procedure and planning: see document selection in appendix of Minister of Communication and Information Number 17 Year 2012, date 1 June 2012.

Roadmap

The roadmap of the licensing policy and regulation phase and the associated functional building blocks is shown in Figure 23. The decisions taken, partly taken and not yet taken on key topics and choices regarding Phase 3 of the roadmap and the activities are indicated in Annex 3.

Figure 23: Licensing policy and regulation Phase 3 of the roadmap for the regulator



Source: Adapted from ITU Guidelines

As can be observed from Figure 23, the functional building blocks and non-DTTB specific activities included in Phase 3 of the roadmap are:

1. Initial DTTB network planning (see functional building blocks 4.1 – 4.7): After having agreed the ASO plan and completed the initial DTTB service planning, a detailed network planning can be drafted by the multiplex operator.

2. Coordinating the required spectrum with national and international users: Based on the initial DTTB planning, stipulating the exact spectrum use, the DTTB frequencies can be coordinated with other spectrum users. Coordination has been carried out at a national and international level. At a national level this is carried out by matching the detailed DTTB spectrum plan with the National Spectrum Plan (NSP) or reversely the NSP should be aligned with this detailed spectrum plan. For example, this might entail changing frequencies in the detailed planning and/or changing existing digital spectrum rights. When discussed with neighbouring countries, spectrum usage should be coordinated too. However these activities do not have to be part of the ASO plan critical path.
3. Determining the licensing framework (see the functional building blocks 2.2): The NRT prefers to use model B1 in order to suit the local TV market structure in Indonesia. The DTTB licence model B1 refers to 3.4.1 of this report.
4. Licence conditions (see functional building blocks 2.6, 2.7 and 2.8): The licence conditions can be defined with reference to the guidance as provided in these functional building blocks. The document selection in appendix of Ministerial Decree No: 17/PER/M.KOMINFO/06/2012 on the implementation of determining the multiplex, date 1 June 2012 provides the details.
5. Consultation with stakeholders: Before actually deciding the licensing regime (to include licensing framework, conditions and procedures), the MCIT has organized consultation with stakeholders to check the validity and market support for its plans. After consultation with stakeholders, the MCIT can issue and officially publish the Ministerial Decrees.

3.4.5 Phase 4 licence administration for the regulator

The objective of the licence administration phase is to check compliancy with the issued licence, to update the National Frequency Register and to notify ITU of any new DTTB station put into operation. These notifications are also important for the MCIT to commence its task of verifying compliancy with the terms and conditions of the relevant DTTB multiplex operators.

The same procedure also applies for changing the station characteristics (e.g. when restrictions on the digital transmissions have been lifted after switching off analogue transmitter stations) and when taking stations out of operation. In the latter situation no approval will be issued by the MCIT. However, as indicated before, the NRT will have to approve the switching off of analogue television transmitters.

Inputs

The input data for this phase is the notifications from the relevant DTTB multiplex operators to the MCIT.

Outputs

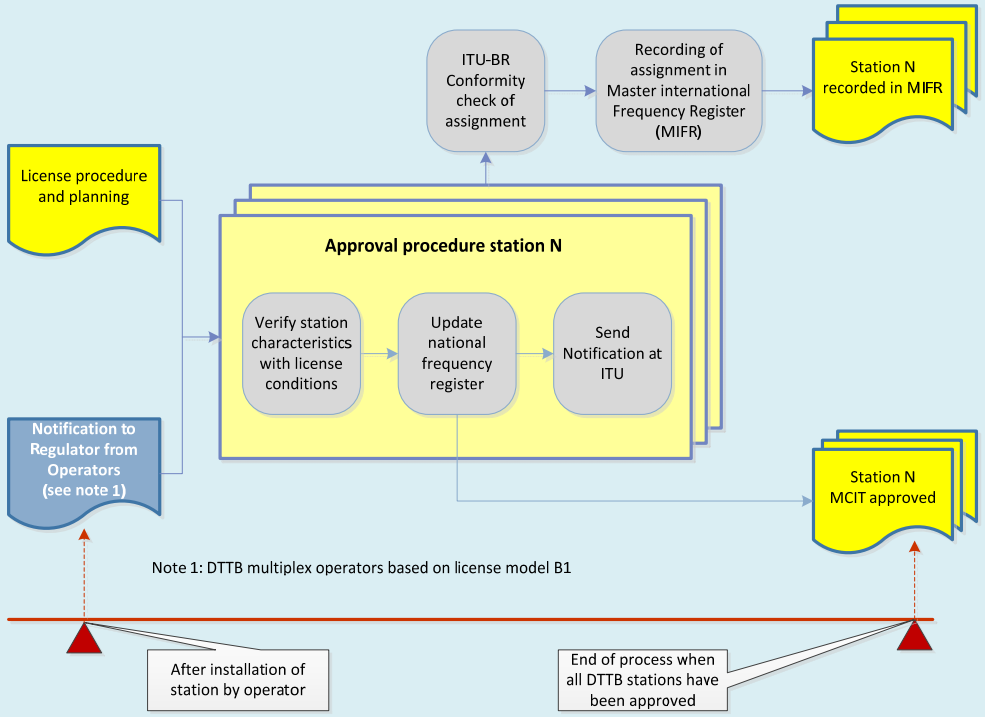
The phase will have two outputs:

a. Approval by MCIT of the stations: After having checked whether the transmitter station is compliant with the DTTB spectrum licence terms and conditions the MCIT will issue an official approval.
b. Recording of the assignment (i.e. station) in the Master International Frequency Register (MIFR) by ITU.

Roadmap

The roadmap of the licence administration phase and the associated activities are shown in Figure 24.

Figure 24: Licensing administration Phase 4 of the roadmap for the regulator



Source: Adapted from ITU Guidelines

As can be observed from Figure 24, the following are included in Phase 4 of the roadmap for the regulator.

1. Verification of station characteristics with licence conditions: After licences have been granted and the operator has informed the regulator that a station is in operation, the regulator should verify if the station operates in accordance with the licence conditions, including:
   - station characteristics;
   - roll-out obligations;
   - media permits;
   - local permits.
2. Update national frequency register at MCIT for each station after obtaining approval.
3. Send notification to ITU: Recording of the assignment (i.e. station) in the Master International Frequency Register (MIFR). In turn the MCIT may notify ITU (i.e. ITU Radiocommunication Bureau) of the new DTTB station taken into operation. The ITU will check the station's conformity and will record the station/assignment in the MIFR.

3.4.6 Phase 1 preparation for the operator

The preparatory phase 1 starts when the regulator is preparing the licensing policy and regulation. The aim of the preparations in Phase 1 is to apply successfully for a DTTB licence.

Inputs

The input for this phase is the licence procedure from the licensing policy and regulation Phase 3 of the roadmap for the regulator. The DTTB licence will be assigned to the DTTB operator under licence model B1.

Outputs

The output of the preparation in Phase 1 of the roadmap for the operator includes:

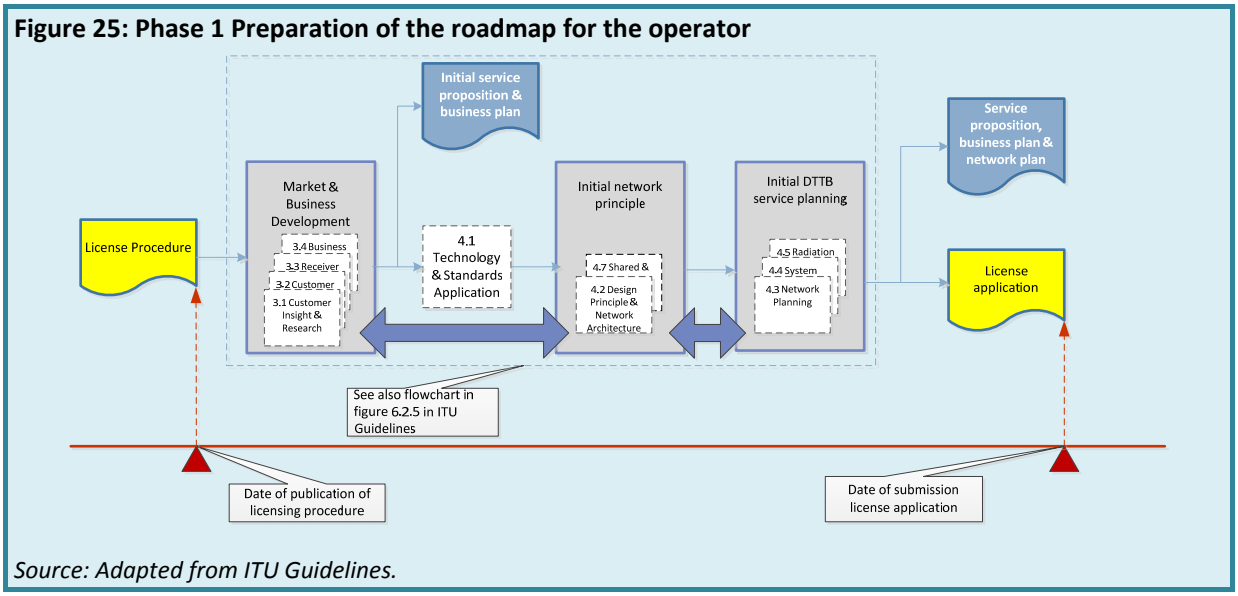
a) licence application document;

b) service proposition, business plan and network plan.

Roadmap

The roadmap of the preparation in phase 1 for the operator and the associated functional building blocks are shown in Figure 25. The decisions taken, partly taken and not yet taken on key topics and choices regarding Phase 1 of the roadmap and the associated activities are indicated in Annex 4.

Figure 25: Phase 1 Preparation of the roadmap for the operator



Source: Adapted from ITU Guidelines.

As can be observed from the Figure 25, the following steps (i.e. functional building blocks and non-DTTB specific activities) are included in Phase 1 preparation of the roadmap for the operator.

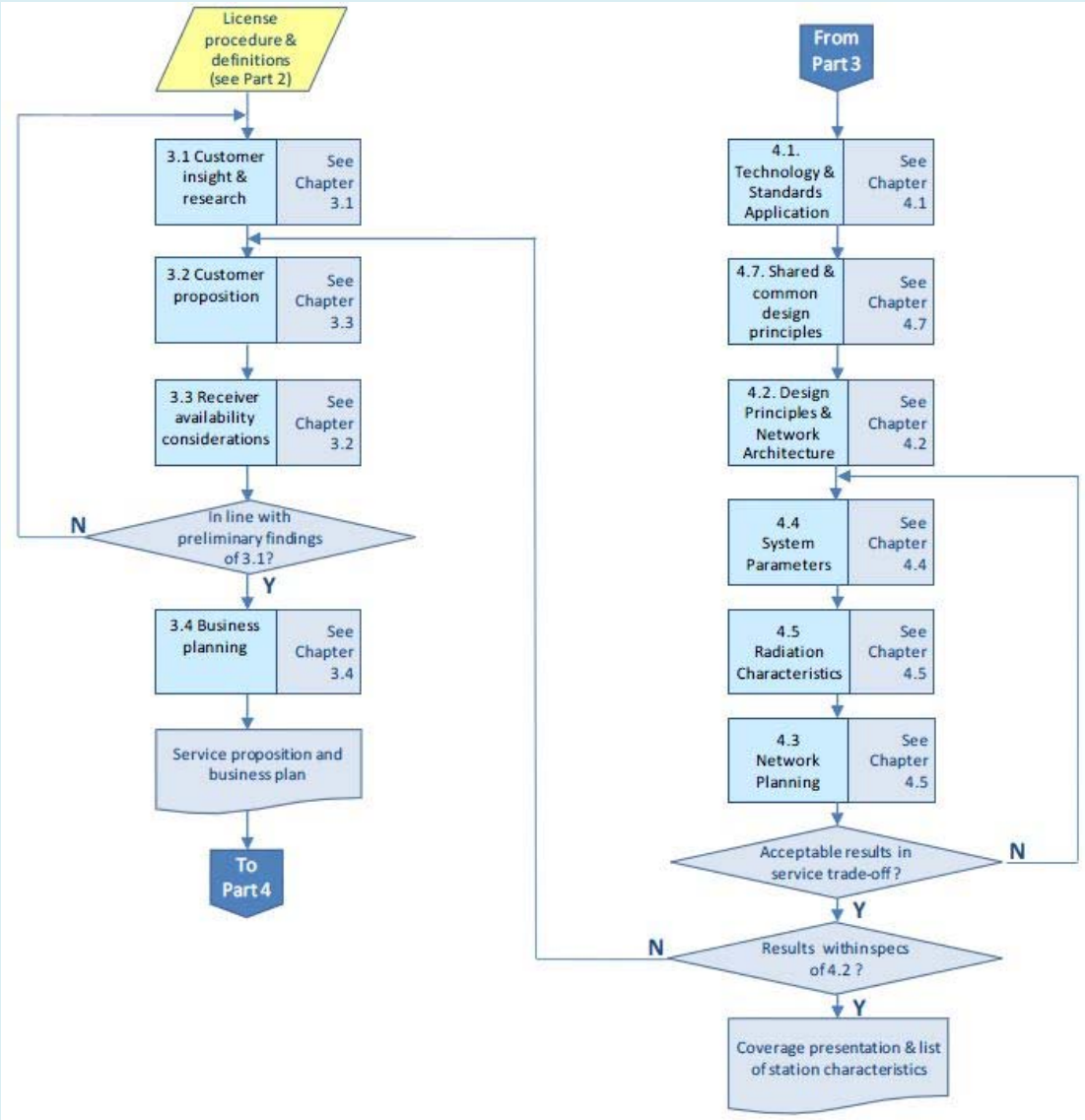
1. Market and business development: Four functional building blocks 3.1 (customer insight and research), 3.2 (customer proposition), 3.3 (receiver availability consideration) and 3.4 (business planning) deal with key business issues and choices that the operator faces when planning the commercial launch in terms of a common DTTB transmission platform with multiplex services. It includes a set of business activities and tools for defining the DTTB service proposition and associated business case and plan, taking into account identified demand drivers, service barriers, financial feasibility and more specifically receiver availability and customer support issues. In accordance with the DTTB licence terms and conditions, e.g. the multiplex operator is permitted to carry one programme and an additional two programmes from its own group, i.e. total 3 programmes including programmes from the same multiplex. Some terrestrial FTA television broadcasters will be assigned by the regulator. Multiplex operator revenues will come from the content of other private broadcasting institutions paying a monthly fee in accordance with Ministerial Decree No: 18/PER/M.KOMINFO/06/2012 on procedures for calculating leasing tariff of Broadcast Slot on Multiplexing Implementation.

2. Technology and Standard Application: In accordance with Ministerial Decree No: 5/PER/M.KOMINFO/2/2012 on Standard of FTA fixed DTTB, DVB-T2 is selected for Indonesia; the multiplex operator will use the selected DTTB standard to construct the DTTB MFN and SFN transmission network in Indonesia. The functional building block 4.1 provides guidance on compress system, specification on TV and HDTV, etc. One of the important technical issues is to determine the best required bit rate to satisfy the simulcast of current analogue TV programmes from broadcasters which do not have their own DTTB transmission network due to limitation in

the DTTB multiplex before ASO. The choice of the video bit rate for a large number of TV programmes is a trade-off between picture quality and multiplex capacity. The trade-off can only be made after multiplex composition (see ITU Guidelines section 4.2.5 of the functional building block 4.2) and network planning (see functional building blocks 4.3 network planning) has been considered. In order to achieve an acceptable picture quality using MPEG4, ≥ 4 Mbit/s is recommended for flat screen and ≥ 3 Mbit/s is recommended for CRT screen. Details refer to table 4.1.1 in functional building block 4.1 Technology and Standards.

3. Initial network principle: In Phase 3 for licensing policy and regulation roadmap for the regulator, MCIT needs to undertake initial network planning for functional building blocks including 4.1, 4.2, 4.3, 4.4 and 4.5 but excluding 4.7 (shared and common design principles) for which the ITU Guidelines provide useful information. It is to be noted that the local TV market structure in Indonesia allows the selected multiplex operator to share use of their existing infrastructure to construct the DTTB transmission network. The operator in Phase 1 preparation is also needed to undertake preparation tasks for the functional building block 4.2 (design principles and network architecture).
4. Initial DTTB service planning: The operator is responsible to undertake preparation tasks for functional building blocks 4.3 (performance network planning), 4.4 (determining system parameters) and 4.5 (assessing radiation characteristics). In the preparatory phase not all station characteristics are known in detail, nor is it necessary to achieve a detailed initial network plan. The purpose is:
   - to verify business plan and customer proposition, and
   - to be able to react with MCIT proposals and the studies carried out by the regulator during Phase 3 roadmap of licensing policy and regulation.
5. The functional blocks 3.1 to 3.4 include some iteration as shown on the left hand side of the flowchart in Figure 26. The activities indicated above result in an initial customer proposition and business plan to have sufficient information for a successful licence application.

Figure 26: Flowchart for developing the service proposition and initial network plan



Note: Part 4 means DTTB network; Part 3 means market and business development

Source: Adapted from ITU Guidelines

3.4.7 Phase 2 Planning for the operator

The planning phase for the multiple operators was started in 2012 on the date of issue of the DTTB licence, and the network implementation plan for five service zones (4, 5, 6, 7 and 15) has been completed. This plan describes station characteristics and a time schedule for implementation.

Inputs

The planning phase starts when the licence has been issued. Licence conditions and the service proposition, business plan and initial network plan, resulting from Phase 1, are the input data for phase 2.

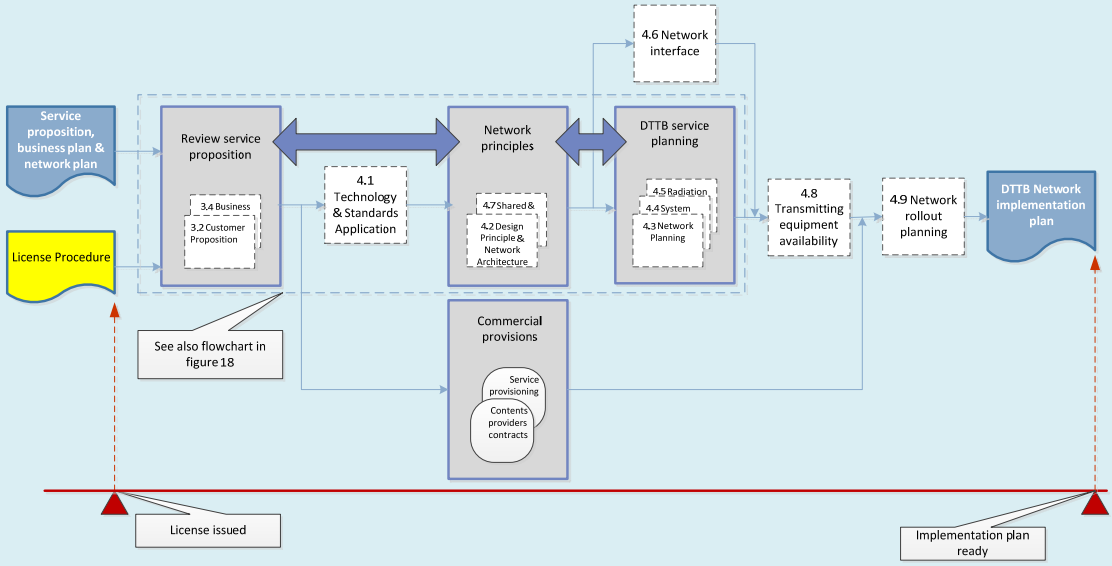
Outputs

The output document of Phase 2 of the roadmap for the operator is the DTTB network implementation plan.

Roadmap

The roadmap of the planning in Phase 2 for the operator and the associated functional building blocks is shown in Figure 27. The decisions taken, partly taken and not yet taken on the key topic and choices regarding Phase 2 of the roadmap and the activities are indicated in Annex 5.

Figure 27: Phase 2 planning of the roadmap for the operator



Source: Adapted from ITU Guidelines.

As can be observed from Figure 27, the following steps (i.e. functional building blocks and non-DTTB specific activities) are included in Phase 2 planning of the roadmap for the multiplex operator.

1. Review service proposition: Depending on the licence conditions, customer proposition and business plan (functional block 3.2 and 3.4 respectively) may need to be reviewed, by carrying out appropriate activities.
2. Commercial provisions: After review of customer proposition and business plan, the network operator will start the following commercial activities:
   - service provisioning, and
   - contracting content providers with current private broadcasting institutions.
3. In parallel with the commercial activities, the initial technical choices will be reviewed and defined in more detail by carrying out appropriate activities related to functional blocks:
   - 4.1 Technology and standards application
   - 4.2 Design principles and network architecture
   - 4.7 Shared and common design principles

   The multiplex operator will carry out planning in accordance with the selection of the DTT standard and compression standard as specified in the Ministerial Decree No: 5/PER/M.KOMINFO/2/2012 on Standard of Digital Terrestrial Television Broadcasting for free-to-air and technical requirements for equipment and receiver (Set-to box) television broadcast standard based on DVB-T2 as specified by MCIT.

Because of local television market structure, the six awarded multiplex operators prefer to design their own DTTB transmission network independently and will share existing infrastructure of existing analogue transmission network operated by them.

4. DTTB service planning: Following the review of technical choices the DTTB service planning will be reviewed and defined in more detail by carrying out the activities related to functional blocks:
   - 4.3 Network planning
   - 4.4 System parameters
   - 4.5 Radiation characteristics
5. Network interfacing: In parallel to service planning, the activities related to functional block 4.6 (network interfacing) will be carried out.
6. Transmitter equipment availability: When the optimum network plan has been achieved and network interfaces have been specified, transmitting equipment availability will be considered and network rollout be planned by carrying out the activities related to functional blocks:
   - 4.8 Transmitting equipment availability
   - 4.9 Network roll out planning

3.4.8 Phase 3 Implementation of the operator

The implementation phase is the follow up of the planning phase and ends when all DTTB transmitters are operational. The six awarded multiplex operators are undergoing the DTTB transmission network infrastructure development in accordance with their implementation plan and commitment to DTTB licence terms and conditions. The first batch DTTB services for five service zones will be implemented in period from 2012 to 2014.

Inputs

The implementation phase of the DTTB network starts when the network implementation plan, resulting from Phase 2 of the roadmap has been adopted. A number of DTTB stations contained in this plan probably have temporal restrictions, necessary to protect analogue TV during transition.

Outputs

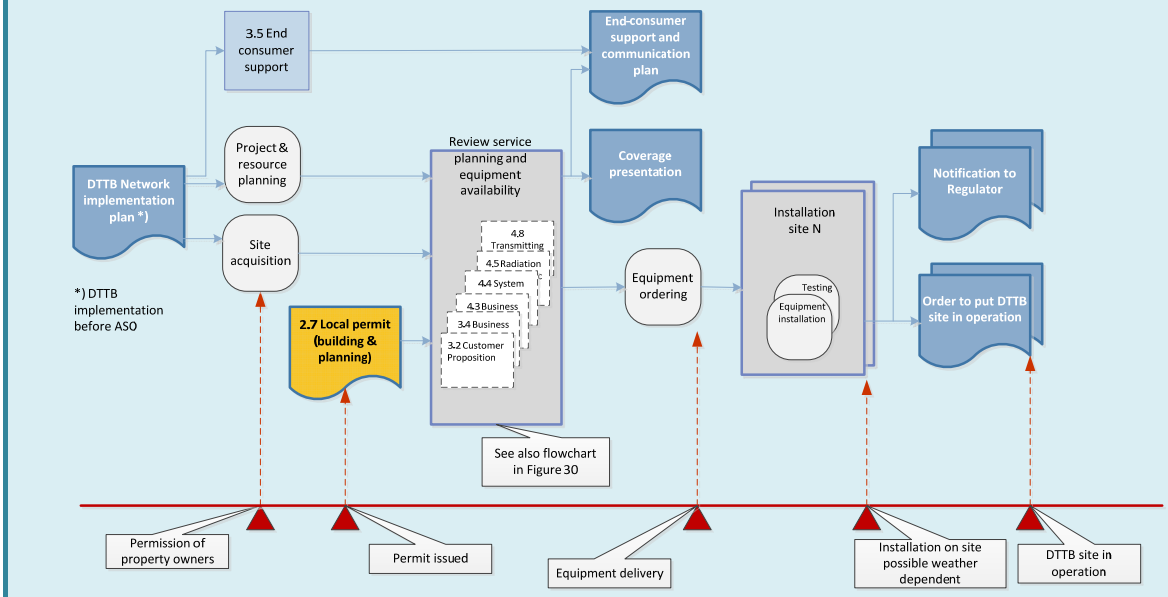
The output documents of this Phase 3 of the roadmap for the operator are:

- end-consumer support and communication plan;
- coverage presentation;
- notification to the regulator;
- order to put DTTB site in operation.

Roadmap

The roadmap of the implementation in Phase 3 for the operator and the associated functional building blocks is shown in Figure 28. The decisions taken, partly taken and not yet taken on the key topic and choices regarding Phase 3 of the roadmap and the activities are indicated in Annex 6.

Figure 28: Phase 3 implementation of the roadmap for operator



Source: Adapted from ITU Guidelines.

As can be observed from Figure 28, the following steps (i.e. functional building blocks and non-DTTB specific activities) are included in the Phase 3 implementation of the roadmap for the operator.

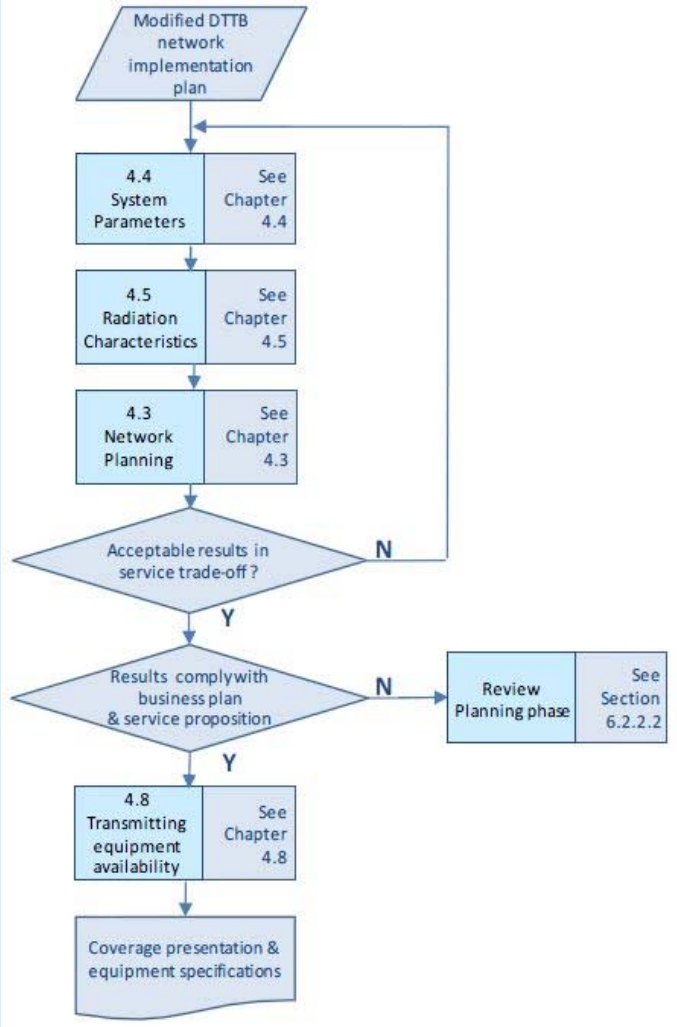
1. Project and resource planning and site acquisition: On the basis of the DTTB network implementation plan, project and resources planning and site acquisition will start and existing building expansion and alternation as well as planning permits need to be acquired.
2. Review of service planning and transmission equipment availability: In carrying out the above mentioned activities, modifications to the network implementation plan may have to be accepted. For instance site acquisition may not be successful; or a new site may be realized at a different location than assumed in the DTTB network implementation plan. It may also happen that in the detailed project planning, antenna heights or diagrams are specified differently than originally assumed. In such cases, service planning and equipment availability needs to be reviewed by carrying out the appropriate activities relating to the following functional blocks:
   - 4.3 Network planning
   - 4.4 System parameters
   - 4.5 Radiation characteristics
   - 4.8 Transmitting equipment availability

   This includes several iterative steps as shown in the flowchart for reviewing service planning and transmitting equipment availability, sees Figure 29.

   If the results of the review of the service planning do not comply with the customer proposition or business plan, the planning phase should be reviewed. When the optimum set of station characteristics has been obtained, the equipment specifications will be reviewed and detailed coverage presentations will be made. The latter will be used for communication to public and content providers to show reception possibilities in the various implementation stages.
3. Equipment ordering: On the basis of the equipment specifications, equipment tender procedures will be initiated. After comparing several offers, suppliers will be selected and equipment ordered.

4. End-consumer support: Before a site is brought into use, the end-consumers in the related coverage area should be informed about the new digital services and the necessary receiving equipment by addressing functional block 3.5 (End-consumer support).
5. Installation: When the equipment has been delivered, installation of transmitting equipment starts, followed by site acceptance tests. During the installation stage it could happen that, for unexpected reasons, stations cannot be installed as planned. In that case, the DTTB implementation plan may need to be reviewed in order to provide information on the consequences of the changes and to prepare amended coverage presentations. The installation work should be planned in such a way that the transmitters can be put into operation at the agreed date, taking into account that some sites may be inaccessible during certain periods of the year. When installation of a station has been completed, the regulator will be notified that the station will be put into operation in accordance with the licence terms and conditions.

Figure 29: Flowchart for reviewing service planning and transmitting equipment availability



Source: Adapted from ITU Guidelines.

3.4.9 Phase 4 Analogue switch-off process

The time schedule of the analogue switch-off phase is given by the ASO plan of the regulator. Engineering work on DTTB sites is likely to continue after analogue switch-off.

Inputs

The analogue switch-off phase starts during the transition period in accordance with the ASO planning and milestone documents. The DTTB station characteristics during and after simulcasting are contained in the DTTB network implementation plan resulting from Phase 2 of the roadmap.

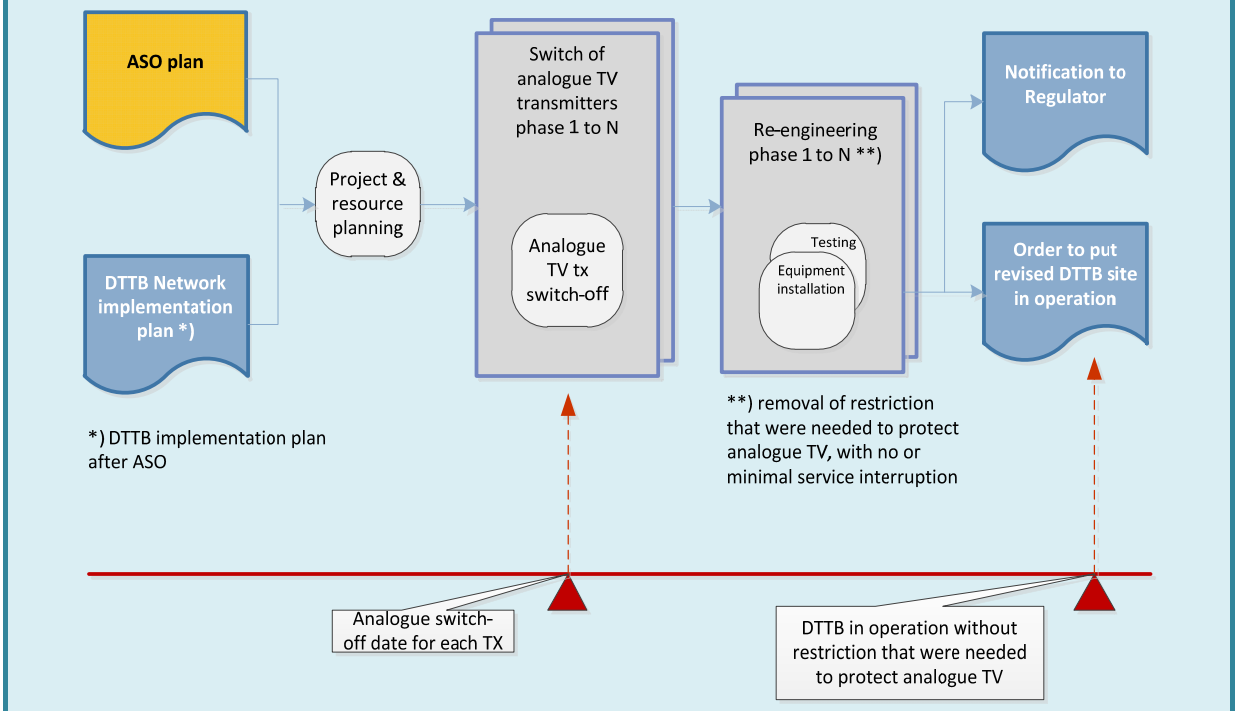
Outputs

1. In the process of analogue TV transmitter switch-off and re-engineering the DTTB transmission network during the Phase 1 to N period, the operators will notify the progress to the regulator in accordance with the DTTB licence regulation.
2. The MCIT will issue an order to the multiplex operator allowing the revised DTTB site in operation in accordance to the re-engineering plan, i.e. removal of restrictions that were needed to protect analogue TV with no or minimal service interruption.

Roadmap

The roadmap of the analogue switch-off in Phase 4 for the operator and the associated functional building blocks is shown in Figure 30.

Figure 30: Phase 4 analogue switch-off of the roadmap for the operator



Source: Adapted from ITU Guidelines

As can be observed from Figure 30, the following steps are included in Phase 4 analogue switch-off of the roadmap for the operator.

1. Project and resource planning and analogue switch-off: Switching-off analogue TV transmitters will be carried out in accordance with the ASO planning provided by the regulator.
2. Re-engineering: After switch-off, re-engineering of the sites begins. These activities may consist of three parts:

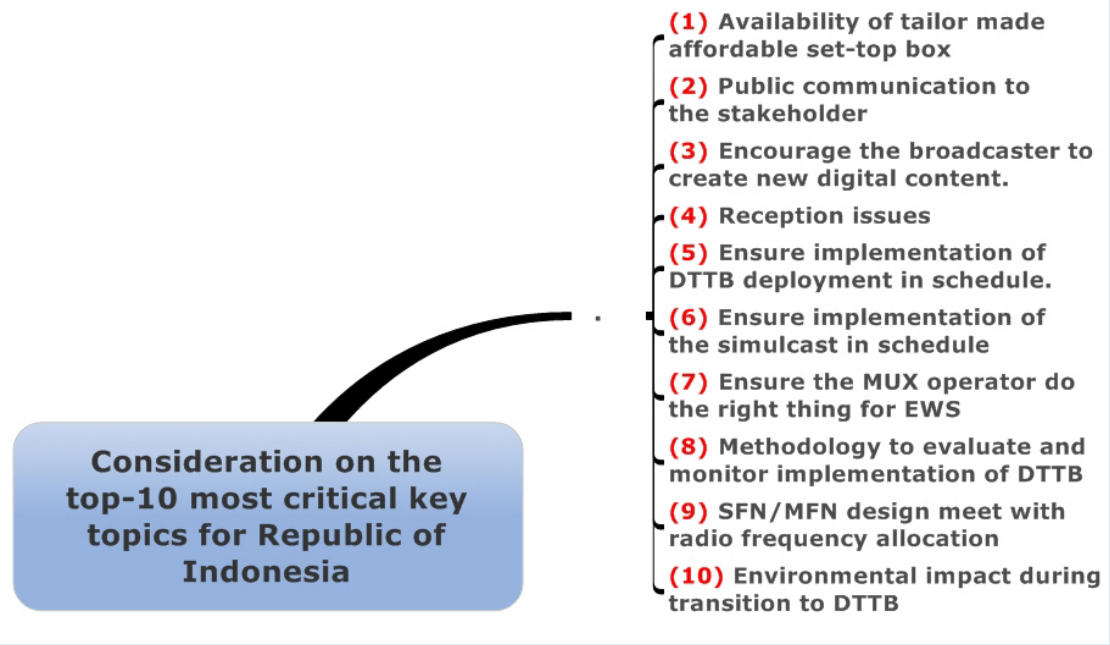
- Removal of superfluous analogue TV equipment that will generate environmental issues during digital television transition, e.g. unused analogue TV receivers and some obsolete receivers are simply dumped in landfills where they represent a source of toxic metals such as lead and lesser amounts of materials such as barium, cadmium and chromium. The ASO planning should take this issue into account to propose the appropriate remedial measures.
- Modification of radiation characteristics in order to remove restrictions that were needed to protect analogue TV.
- Installation of additional DTTB transmitters that are licensed after analogue switch-off.

Normally it is required to carry out these activities with minimal interruptions of the DTTB services. When the re-engineering work has been completed, the regulator will be notified that the station has been modified in accordance with the licence terms and condition specified for the situation after analogue switch-off.

4 Consideration on the top ten most critical key topics

In the NRT workshop, the top ten most critical key topics and choices were discussed and are shown in Figure 31, although priority will be given to those on the ASO planning critical path. Some of the top ten most critical key topics and choices do not necessarily correspond to the complete scope as addressed in the functional building blocks of the ITU Guidelines.

Figure 31: Top-10 most critical key topics and choices



Source: Based on discussion with NRT of Indonesia

4.1 Availability of tailor made affordable set-top box

The set-top box (STB) specification has been set by a standardization team coordinated by MCIT. Consultation for deciding the specification has been carried out with stakeholders in the TV industry and

also involved the Agency for the Assessment and Application of Technology (BPPT)[14], the Meteorology, Climate and Geophysics Agency (BMKG)[15] and the National Agency for Disaster Management (BNPB)[16].

In accordance with the Ministerial Decree No: 35 of 2012 concerning technical requirements for equipment and receivers (set-top box), DVB-T2 was chosen for Jakarta on 20 November 2012 by the Communication and Information Minister of the Republic of Indonesia. The DVB-T2 set-top box is expected to be manufactured and assembled in the territory of Indonesia. The DVB-T2 STB testing is to be carried out by the established accreditation test centre of the Directorate General of Resources and Equipment Posts and Information Agency. The testing equipment and receiver (STB) shall conform to the technical requirements as set out in the Appendix of the Ministerial Decree No. 35 regulation.

The local content portion (LCP) of the receiver (set-top box) will be at least 20 per cent and gradually within a period of five years will be increased to at least to 50 per cent.

Some of the technical requirements highlighted below refer to Chapter II of the Ministerial Decree No. 35 of 2012.

General: *Input voltage: 100-240 VAC single-phase*
Input Frequency: 50 Hz
Power consumption: ≤10 watts
Protection: fuse
Temperature range: 0-40 ° C
Humidity range: 10 - 90 per cent

a. *Tuner*

- *Tuning Frequency Range: 478-694 MHz*
- *Demodulation: COFDM*
- *Channel Bandwidth: 8 MHz*
- *Transmission Mode: 1K, 2K, 4K, 8K, 16K, 32K*
- *Guard Interval: ¼, 19/256, 1/8, 19/128, 1/16, 1/32, 1/128*
- *Forward Error Correction (FEC): ½, 3/5, 2/3, ¾, 4/5, 5/6*
- *Constellation: QPSK, 16QAM, 64QAM, 256QAM*
- *Input signal level: -70 dBm up to -25 dBm (38 dBµV to 83 dBµV)*
- *Antenna Input: 75 Ohms*

b. *De-multiplexer*

- *De-multiplexing: Profile MPEG-2 Transport Stream*

c. *Video Decoding*

- *Video Decoder: MPEG-4 AVC (H.264)*
- *Video Aspect Ratio: 4: 3; 16: 9*
- *Source Video Resolution: 720 x 576 TV; HDTV 1920/1080p*

d. *Video Output minimal*

- *Video format: PAL*
- *Output level: 1 Vp-p (75 Ohm)*

[14] BPPT - www.bppt.go.id/

[15] BMKG - www.bmkg.go.id/BMKG_Pusat/Depan.bmkg

[16] BNPB - www.bnpb.go.id/

e. *Audio Decoding*
- *Audio mode: single / dual / stereo*
- *Audio Decoding: MPEG 1 Layer I and II (minimal) / AAC*
- *Sample Rate: 32/44.1 / 48 kHz*
- *Frequency Response: 20 Hz - 20 kHz*
- *Output Level: 300 mV RMS*

f. *Menu and EPG*
- *Menu and EPG Language: Indonesian*
- *EPG Length: 7 days*

g. *Input / Output Connector*
- *RF input connector: IEC 169-2 female; 75 Ohm*
- *RF output connector: IEC 169-2 male 75 Ohm*
- *Composite video out: RCA - phone socket 75 Ohm*
- *Analogue audio out: RCA - phone socket ≤ 10 k Ohm*
- *HDMI output: HDMI*
- *USB: USB*

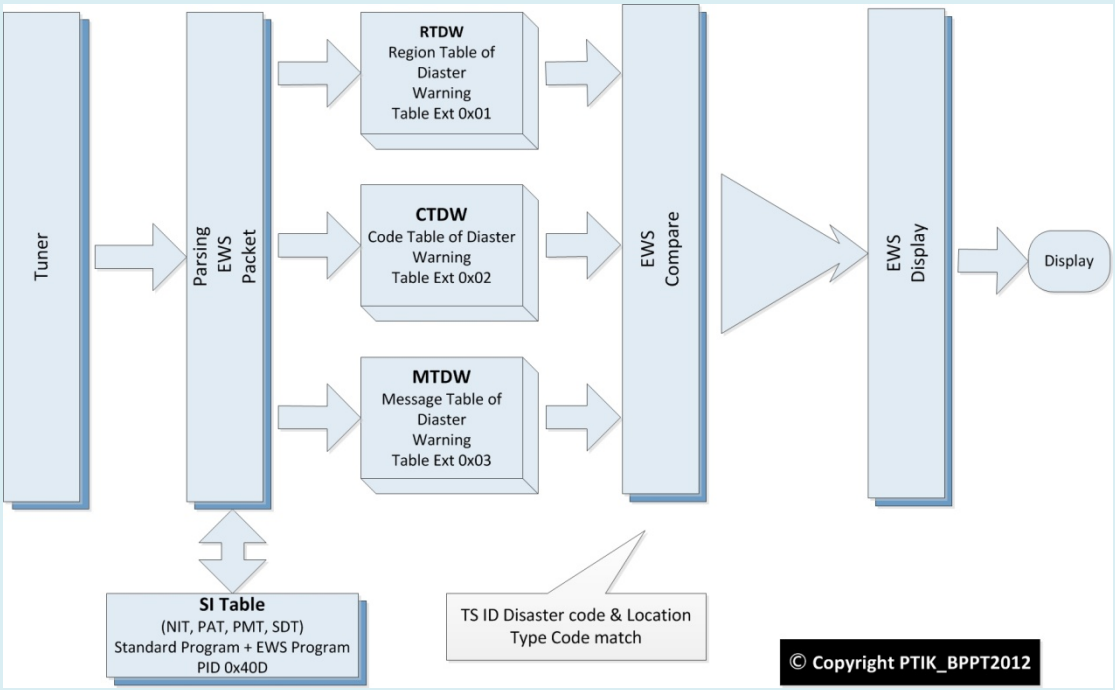
h. *Requirements of additional features*
- *Parental control*
- *EWS (early warning system)*
- *Buzzer for EWS*

Early warning system (EWS)

1. *Set Top Box (STB) should be able to support the features of early warning system (EWS), with the following conditions:*
   a. *System broadcast receiver / Set Top Box should have a menu to enter and save the code location where the system broadcast receiver / STB is;*
   b. *System broadcast receiver / Set Top Box should be able to process the content that has PID for EWS set by the Ministry of Communication and Information. Processing content referred to in Annex II;*
   c. *System broadcast receiver / Set Top Box should be able to display the message EWS on television screen in accordance with the results of processing of content information in point 2 above. Display posts referred EWS listed in Appendix II, and*
   d. *System broadcast receiver / Set Top Box must be equipped speaker systems and EWS buzzer.*

2. *Feature of EWS:*

Figure 32: EWS system diagram for DVB-T2 STB developed by Indonesia



Source: MD No.: 35 OF 2012 on TECHNICAL REQUIREMENTS FOR EQUIPMENT AND RECEIVER (SET TOP BOX).

Image processing EWS content on STB

STB EWS information filters process by performing the Sub Filter System Service Information, in the form of Private EWS Section Table, see Table 16.

EWS tables should be able to accommodate the information that will be informed in text format should be submitted include the following:

- *Authority sender disaster information*
- *Types of disaster*
- *When a disaster*
- *Position the disaster*
- *Characteristics of the disaster*
- *Message or description of disaster*
- *Status of disaster*
- *The locations of potentially affected*

Table 16 is disaster symbol with following features:

- *For each symbol as seen in the table above a minimum frame size of 108 x 108 pixels or depending on the capabilities of the STB layer and adjusted to the size of the TV.*
- *length_disaster_code is the description length from char_disaster_code.*
- *char_disaster_code is a disaster code descriptions.*
- *length_disaster_position is the description length from char_disaster_position.*

Table 16: Disaster symbol of EWS developed by Indonesia

No	Warning	Simbol	Kode warning (Heksa)
1	Gempa Bumi		0x01
2	Tsunami		0x02
3	Letusan Gunung Berapi		0x03
4	Gerakan Tanah		0x04
5	Banjir		0x05
6	Kekeringan		0x06
7	Kebakaran Hutan dan Lahan		0x07
8	Erosi		0x08
9	Kebakaran Gedung dan Pemukiman		0x09
10	Gelombang Ekstrim dan Abrasi		0x0A
11	Cuaca Ekstrim		0x0B
12	Kegagalan Teknologi		0x0C
13	Epidemi dan Wabah Penyakit		0x0D
14	Konflik Sosial		0x0E
15	Cadangan		0xFF

Source: MD No.: 35 OF 2012 on TECHNICAL REQUIREMENTS FOR EQUIPMENT AND RECEIVER (SET TOP BOX).

- *char_disaster_position is a description of the position of a disaster.*
- *length_disaster_date a lengthy description of char_disaster_date.*
- *char_disaster_date is a description of the date of the disaster*
- *length_disaster_characteristic a lengthy description of char_disaster_characteristic.*
- *char_disaster_ characteristic is the description characteristics of disaster.*

As shown in the technical requirements mentioned above, the EWS (early warning system) and Buzzer are the requested additional features for the DVB-T2 STB used in Republic of Indonesia. However, the DVB-T2 standard has not yet included EWS and as a result the current DVB-T2 standard set-top box market does not include EWS features.

As defined in Wikipedia[17], an early warning system is a chain of information communication systems comprising sensor, detection, decision, and broker subsystems, in the given order, working in conjunction, forecasting and signalling disturbances adversely affecting the stability of the physical world; and giving sufficient time for the response system to prepare resources and response actions to minimize the impact on the stability of the physical world (Waidyanatha, 2010). EWS features are a high priority for Asian countries (Figure 33) because of the natural disasters of tsunami and earthquakes.

Figure 33: Asian map[18]

Source: http://srttaseancorner.blogspot.hk/2010/03/asean-map.html

The deployment of DVB-T2 in service zone 4 has started and could be fully completed in Q2 2013 and Q1 2014 in Great Jakarta and Banten, respectively. According to MCIT, the tailor made DVB-T2 STB with the new EWS features are unlikely to be available before the end of 2013.

The MUX operators have said that a total of 4 846 418 DVB-T2 STB should be provided for service zone 4 (DKI Jakarta and Banten). The total STB is about 6.6 million for five service zones (Table 17).

[17] http://en.wikipedia.org/wiki/Early_warning_system

[18] The designations employed and presentation of material in this publication, including maps, do not imply the expression of any opinion whatsoever on the part of ITU concerning the legal status of any country, territory, city or area, or concerning the delimitations of its frontiers or boundaries.

Table 17: Commitment to provide STBs from the MUX operator for five service zones

No	Service zone	STB quantity
1	DKI Jakarta and Banten	4 846 418
2	West Java	463 665
3	Central Java and D.I Yogyakarta	535 779
4	East Java	825 197
5	Kepulauan Riau	9 768
	Total	6 680 827
Source: MCIT		

In order to meet the deployment schedule for service zone 4 and considering that zone 4 has had no recorded tsunami because of its geographic location, NRT proposes to use DVB-T2 STB without EWS features in zone 4 and arrange the STB to be upgraded when it is available.

In order to speed up development progress of tailor made STB with EWS feature, the action(s) below should be treated in high priority.

1. Based on the research on DTV with EWS experience in 2007[19], NRT will continue to develop the EWS software cooperated with the potential STB manufactures based on the technical requirements as specified in the Appendix which is an integral part of the of the Ministerial Decree No. 35 regulation. In the meantime, seek technical cooperation with DVB Project, if necessary to determine the EWS specification to be part of the future revised DVB-T2 standard, and
2. Some countries in Asia may also interest on the EWS as part in the DVB-T2 standard. It is helpful to share the requirements by means of organizing technical coordination events and workshops, if necessary with the support from DVB Project in order to speed up the EWS feature to be included in the DVB-T2 standard.

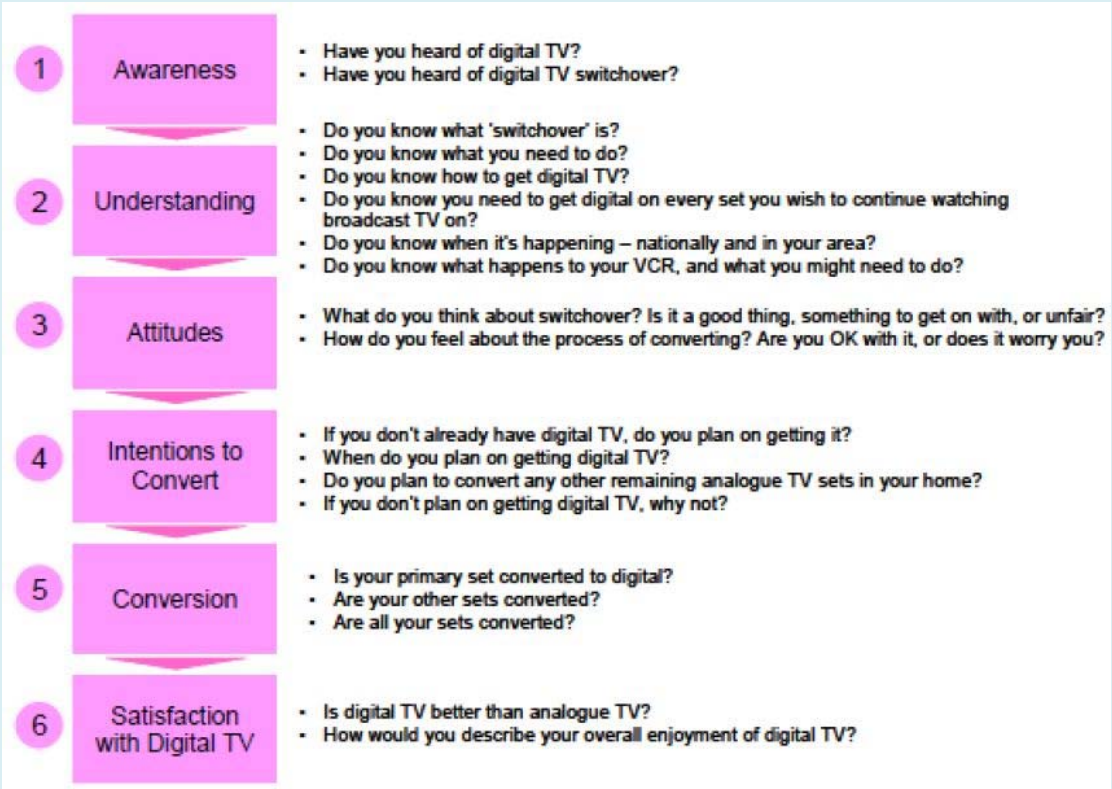
4.2 Public communication to the stakeholder

The period of DVB-T2 deployment, simulcast period and estimated time for analogue switch-off (ASO) in all service zones in the Republic of Indonesia have been well defined by the ASO plan. In connection with the implementation schedule, the communication to public and stakeholders about the ASO planning is very important. For the transition to digital terrestrial television broadcasting from analogue, the ITU Guidelines functional building block 2.18 ASO communication plan provides comprehensive implementation guidelines.

The ASO communication plan includes communication strategy and communication tools. Figure 34 is a typical ASO communication model.

[19] See the digitalization process in Figure 7.

Figure 35: ASO communication model



Source: Adapted from ITU Guidelines.

In a phased ASO approaches, measuring "readiness to convert" should be carefully planned especially in the first service region 4 for which a firm switch-off schedule is shown in Table 27. The experience learned from the first region could be used to review the planned ASO date in rest of the 14 regions.

In the ASO communication strategy, the various target groups should be identified. The ITU Guidelines provide examples on some target groups such as:

1. Viewers, including various sub-groups and cross-sections:
    a. national or by-region (especially for a phased approach);
    b. rural/urban (might have an impact on the communication tools available)
    c. social class, sex and age;
    d. disabled, elderly people and people with special needs;
    e. community centres and facilities (including shopping mall, town halls, libraries, schools, hospitals, etc.);
    f. landlords of multi dwelling units/shared aerials (including flats, student halls and hotels, etc.)
2. Industry, including:
    a. manufacturers of digital receivers (and any related industry associations);
    b. retailers of digital receivers and/or digital television subscriptions (might include next to DTTB, satellite, cable or IPTV pay-tv subscriptions);
    c. certification/labelling institutions (for providing uniform/trustworthy certificates and labels);
    d. local governments (after informing them about ASO and its timetable, they should also be informed about providing necessary local permits);
    e. consumer associations.

For the ASO communication tools at the national level, general information on what will happen and when and how to prepare must be made available to viewers and stakeholders. NRT has adopted a mascot named *SI ARTA TV Digital Indonesia*; see Figure 35 to serve as a guide for viewers and stakeholders in the analogue switch-off process.

Figure 35: Mascot – SI ARTA TV Digital Indonesia

Source: www.tvdigital.kominfo.go.id/

The TV Digital Indonesia website provides comprehensive information about digital switchover materials, including

- development background about TV digital;
- roadmap of TV digital;
- FAQ;
- download area for further information, and
- contacts, etc.

During the deployment period, especially in early 2013, the website should also include,

1. What is new about the progress of DTTB services related to the roadmap of DTTB deployment, simulcast and ASO matters.
2. Digital terrestrial TV coverage and reception database.
3. Labelling scheme for the DVB-T2 receiver that meet the technical requirements.
4. Availability of STB with EWS features announcements on progress, etc.

In addition to the website and advertisements in national (printed) media, call or contact centres are needed to reflect the DTTB migration plan. It is important that information between the websites of the ASO organization, network operators and broadcasting programme operator should be synchronized.

As a result of six MUX operators providing DVB-T2 broadcasting services using independent towers and transmitting antenna system, the signal strength variation will be severe in the relevant service areas. The websites of the ASO organizer (MCIT), MUX operators (LPPPM)[20] and content providers (LPPPS)[21] have to provide the latest information, guidelines and assistance to help the public and stakeholder to solve possible DTTB reception problems during the DTTB migration period.

4.3 Encourage the broadcaster to create new digital content

In order to meet the simulcast requirement as specified in the implementation of FTA fixed digital terrestrial television broadcasting, the MUX operator may have spare broadcasting slots after fulfilling the demand from other content providers. During the digitization process in simulcast, the MUX operator should be able to produce new digital content and provide it through the spare broadcasting slots if it is allowed by regulation.

As mentioned in section 4.5.3 of this report, one DVB-T2 multiplex is able to provide 12 broadcasting slots at least for SDTV. In accordance with the licence terms and conditions, each private MUX operator should have at least nine broadcasting slots[22], which can be rented to or from other broadcasting programme operators in order to meet the simulcast services requirements.

If the licence terms and conditions allow the private MUX operators to provide additional digital programmes either in SDTV or HDTV in the same multiplex, from the business point of view, this may be in the operators' interest to consider it.

After sorting out the number of possible spare broadcasting slots to be made available in each service zone, the spare broadcasting slots can be applied for from the TV market content providers provided that the applicant commits to providing new digital content.

Provision of new digital content during the DTTB migration has been proved to be successful on DTT take-up rates, such as the Implementation Framework for DTTB in Hong Kong, China,[23] and Deployment of DTMB in single frequency network of Hong Kong, China[24], reflecting the priority of ensuring a smooth analogue-to-digital migration of existing terrestrial television services, i.e. simulcast using MFN. This entails investment by the two FTA fixed private broadcasters in building and testing the digital broadcasting network, and launching new television or multimedia services to drive consumers to take-up DTT. In order to increase the DTT take-up rate, in addition to providing simulcast services, the FTA broadcasters provide new digital content in HDTV and SDTV using SFN since the digital switch-on in 2007. One of the FTA broadcasters provides 24 hour HDTV programme contents as their business strategy.

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[20] Multiplex operator, hereinafter referred LPPPM, are institutions that distribute some programmes broadcast via a multiplex device and transmitting device to the public sector in the service zone; MD No: 18/PER/ M.KOMINFO/06/2012.

[21] Content provider, hereinafter referred LPPPS, is the agency that administers the programme broadcast to broadcast to the public in the area of broadcasting services through broadcast channels or slots in the radio frequency channel; MD No: 18/PER/M.KOMINFO/06/2012.

[22] One TV broadcasting slot is based on 3.05 Mbit/s for TV, see Table 31.

[23] www.digitaltv.gov.hk/pdf/DTT.pdf

[24] ITU-R WP6, Document 6A/499-E, 29 April 2011.

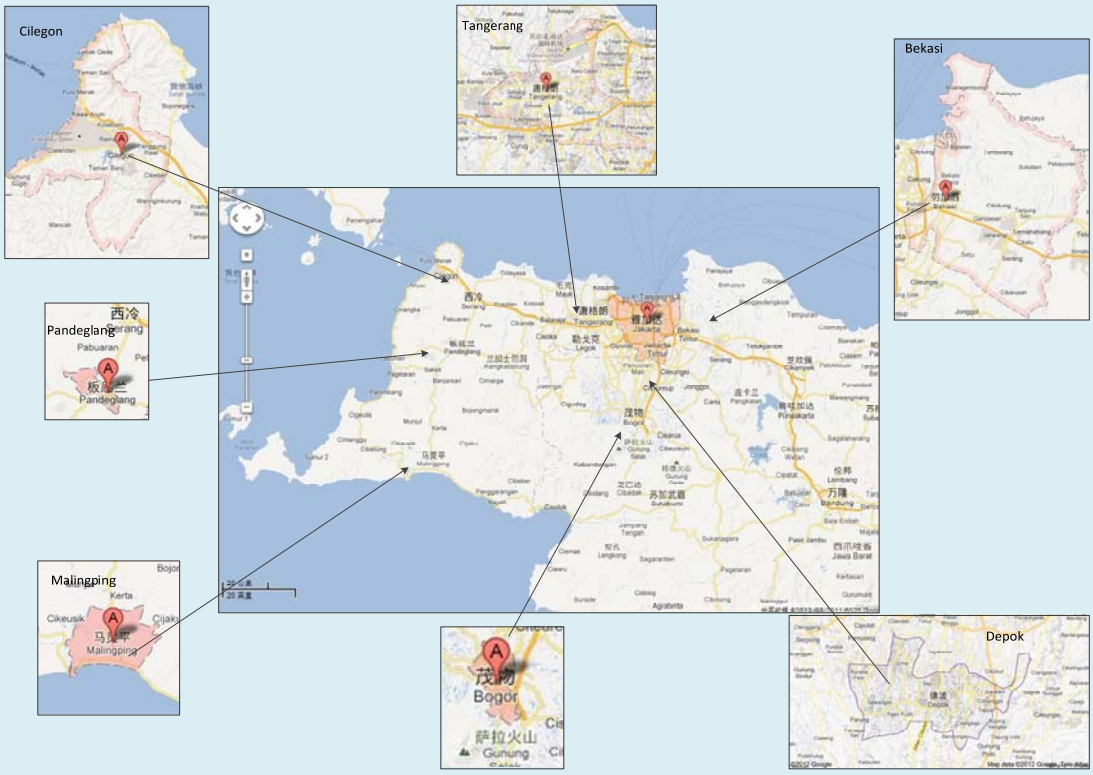
According to the press release[25], after the completion of 20 DTT transmitting stations, as of mid-May 2011, the verified DTT coverage is over 95 per cent of the population. The coverage will be further extended with the launch of nine more MFN/SFN fill-in stations by the end of 2011. Coverage is expected to further extend (about 98 per cent of the population in 2012) and will soon meet the ASO threshold of 99 per cent population coverage in 2013.

As for DTT penetration, the percentage of households which had procured the necessary receivers to watch DTT services stood at about 63 per cent, according to a regular public survey conducted in March 2011 (68.6 per cent as of December 2011). Though the three-year penetration in Hong Kong, China since DTT rollout is quite satisfactory in comparison with overseas experience (for example it took Japan five years and Australia seven to reach a take-up rate of some 60 per cent). Because of new digital content with HDTV quality and satisfactory DTT coverage, the DTT take-up rate in Hong Kong, China has proved to be successful, with new digital content in addition to simulcast during the DTTB migration.

4.4 Reception issues

In accordance to the mapping channel radio frequency for broadcasting fixed DTTB in DVB-T[26] for service zone 4[27], the target service areas for analogue and DTTB are shown in Figure 36.

Figure 36: Service zone 4 -Jakarta province and cities include Cilegon, Malingping and Pandegland



Source: Production based on information provided by NRT of Indonesia.

25 www.info.gov.hk/gia/general/201106/22/P201106220280.htm

26 Ministerial Decree No.: 23/PER/M.KOMINFO/11/2011 about the master plan radio frequency for digital terrestrial television broadcast on radio frequency band 478-694MHz.

27 Service zone 4 includes Jakarta province and cities of Cilegon, Malingping and Pandeglang.

The regional services for Jakarta province include Jarkarta, Bogor, Depok, and Tangerang and Bekasi; while the three cities include Cilegon, Malingping and Pandegland. According to MCIT records, there are total 22 free-to-air (FTA) terrestrial television broadcasters providing television services in service region 4. Most of the TV broadcasters providing FTA TV services are using their own infrastructure, i.e. steel tower and transmitting antenna system. Most of the steel towers are located closely and clustered West of Jakarta centre.

4.4.1 Analogue reception in Jakarta province

Table 18 gives details of 22 Free-to-air (FTA) television broadcasters including channel number, antenna polarization and transmission E.R.P. Figure 37 indicates location of the antenna steel tower owned by individual FTA television broadcasters.

Table 18: 22 FTA TV broadcasters in service zone IV

No	FTA TV broadcaster	Station	Channel No.	Polarization	E.R.P. (kW)
1	RAJAWALI CITRA TELEVISI INDONESIA, PT	RCTI	43	H	3156.3
2	LPP TELEVISI REPUBLIK INDONESIA	TVRI	39	H	2891.0
3	TELEVISI TRANSFORMASI INDONESIA,PT	Trans TV	29	H	2307.2
4	GLOBAL INFORMASI BERMUTU, PT	Global TV	51	H	2153.2
5	DUTA VISUAL NUSANTARA TIVI TUJUH, PT	Trans 7	49	H	1897.4
6	ELSHINTA JAKARTA TELEVISI, PT	ELSHINTA	35	V	1850.6
7	SURYA CITRA TELEVISI, PT	SCTV	45	H	1730.4
8	LATIVI MEDIA KARYA, PT	tvOne	53	H	1671.4
9	MEDIA TELEVISI INDONESIA,PT	Metro TV	57	H	1409.2
10	CAKRAWALA ANDALAS TELEVISI, PT	ANTV	47	H	1180.5
11	TELEVISI ANAK SPACE TOON, PT	SpaceToon	27	H	614.1
12	OMNI INTIVISION, PT	O Channel	33	V	528.7
13	DUTA ANUGERAH INDAH, PT	Daai TV	59	V	305.6
14	METROPOLITAN TELEVISINDO, PT	Bchannel	23	H	304.9
15	CIPTA TELEVISI PENDIDIKAN INDONESIA, PT	MNC TV	37	H	224.5
16	KOMANDO MEDIA TELEVISI, PT	Kompas TV	28	H	121.1
17	INDOSIAR VISUAL MANDIRI, PT	Indosiar	41	H	97.8
18	BANTEN MEDIA GLOBAL TELEVISI, PT	Banten TV	22	V	76.8
19	DANAPATI ABINAYA INVESTAMA, PT	JakTV	55	V	61.0
20	CIPTA MEGASWARA TELEVISI, PT	MegaVision	25	V	38.4
21	VISI CITRA MITRA MULIA. PT	TVMiTRA	30	V	9.7
22	NUSANTARA TELEVISI, PT	TVN	61	V	6.1

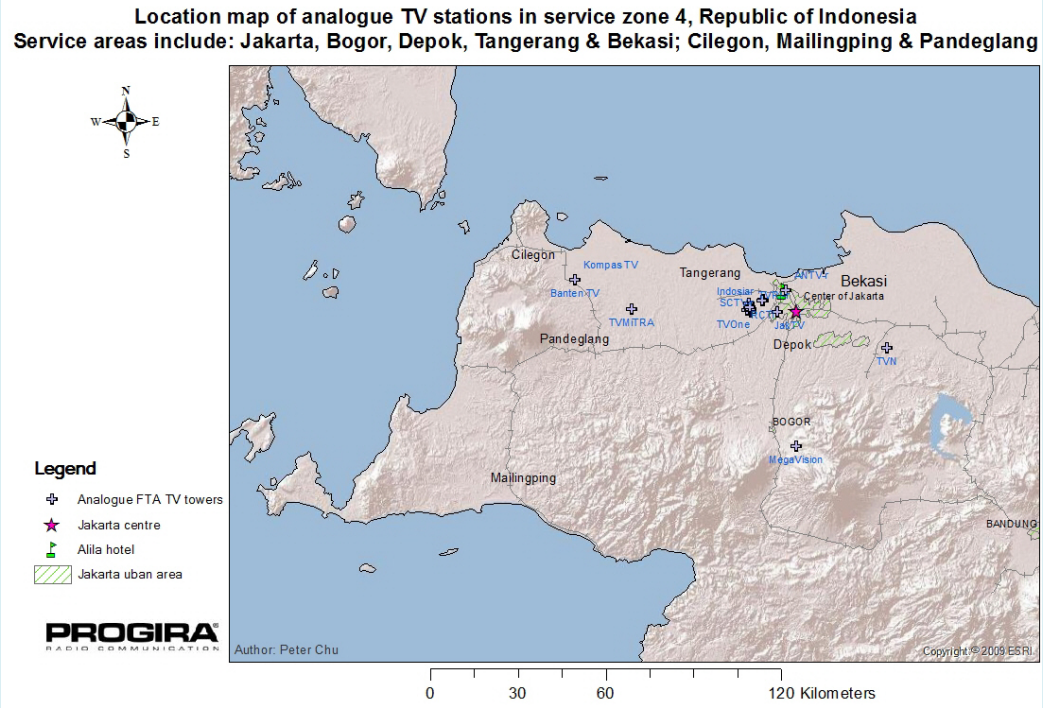
Source: Production based on information provided by NRT of Indonesia.

From Table 18, the following five observations are highlighted:

- The television broadcasting channels are in UHF; 8 in band IV and 14 in band V.
- Transmitting antenna polarization is mixed: 12 in horizontal and 10 in vertical.
- The E.R.P. of 22 FTA television broadcasters is ranged from 6 kW to about 3 000 kW.

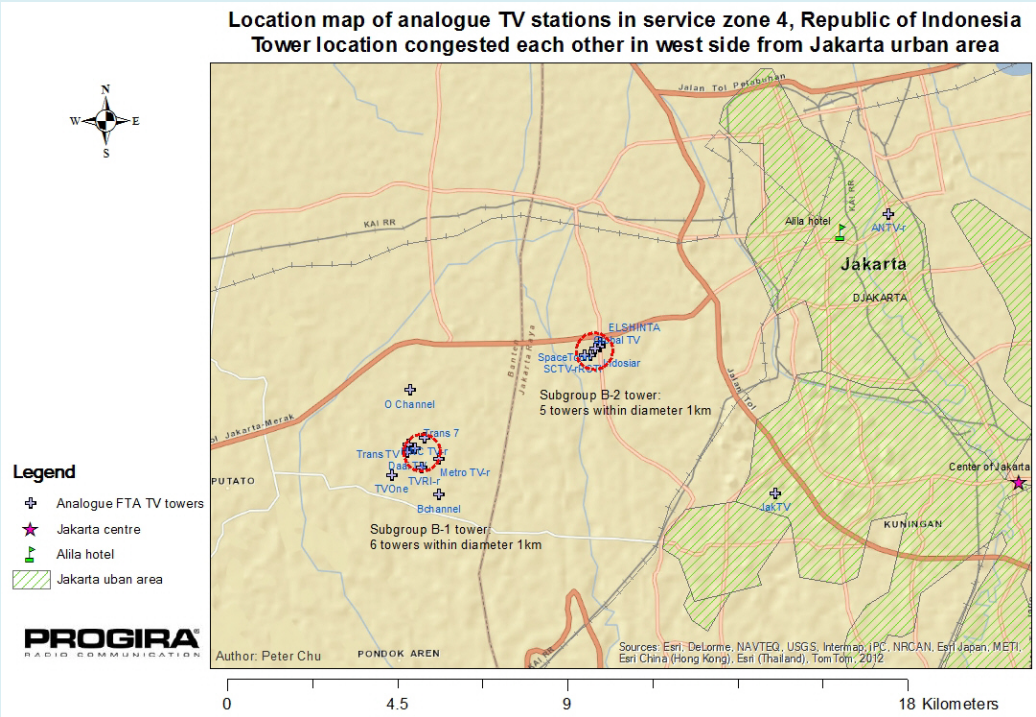
- The distance between Jakarta urban centres to the antenna towers can be classified into group A and group B.
  - four of the 22 station towers in group A are built at distances ranging from 33 km to 76 km, see Figure 37,
  - eighteen towers, group B, are built at distances ranging from 6 to 16 km, see Figure 38, and
  - many towers in group B are built within an area of about 1 km diameter (subgroup B1 and B2), see Figure 38.

Figure 37: Location map of antenna tower in service zone 4



Source: NRT/ITU

Figure 38: Location of Group B antenna towers and its sub-group 1 and 2



Source: NRT/ITU

From hotel Alila Jakarta viewing to West-South, more than ten FTA television antenna towers of group B are visible, see Figure 39.

Figure 39: Towers group can be seen from Alila, Jakarta

Source: Author

Table 19 is the official field strength test/measurement point location in Jakarta province for permanent radio frequency channel - refers to Ministerial Decree No: 22/PER/M.KOMINFO/07/2012. Location of these test points are indicated in Figure 40.

Table 19: Test / measurement points of Jakarta province

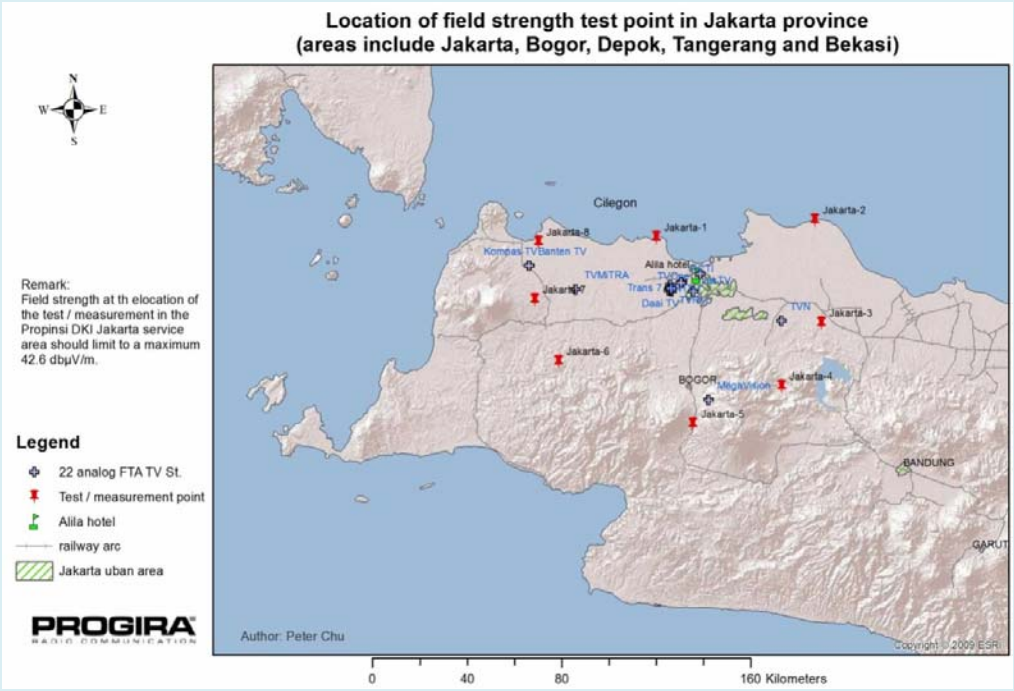
No.	Regional services			Channel number
1	Jakarta, Bogor, Depok, Tangerang, Bekasi			30, 33, 36, 39, 42, 45
Test points regional Services: Blambangan Jakarta, Bogor, Depok, Tangerang, Bekasi				
No	**Name of Test Points**	**Longitude**	**Latitude**	**Location name**
1	Jakarta - 1	106E40 26	06S01 19	Tanjung Pasir
2	Jakarta - 2	107E16 40	05S57 37	Sedari, Pedes
3	Jakarta – 3	107E18 03	06S21 12	Pinayungan, Teluk jambe
4	Jakarta - 4	107E08 50	06S35 37	Pasir Tanjung
5	Jakarta - 5	106E48 28	06S44 09	Ciburuy
6	Jakarta - 6	106E17 49	06S29 32	Sangiang Jaya, Cimarga
7	Jakarta - 7	106E12 29	06S15 18	Cireudeu
8	Jakarta - 8	106E13 26	06S02 12	Sukajaya

Note to the table:

1. With reference to Article 5 in MD 23/PER/M.KOMINFO/11/2011, the field strength at the test points is limited to a maximum 42.6 dBµV/m.

Source: MD 23/PER/M.KOMINFO/11/2011

Figure 40: Field strength test points in Jakarta province



Source: NRT/ITU

Section 2.10 of the Selection Document on MUX operator (LPPPM), regarding frequency channels for digital TV, states that in a service area of a service zone where not all radio frequency channels are available for digital TV, then some LPPPMs will use radio frequency channels in accordance with the master plan (permanent frequency channel), whilst the other LPPPMs will use temporary radio frequency channels issued by the Ministry of Communication and Information Technology. LPPPMs that get temporary radio freqeuency channels will move to permanent radio channels after completion of the migration from analogue to digital service in that area. The government will notify the LPPPM at least six months earlier before moving to the permanent frequency channel.

In C2 of the Appendix in the Selection Document on MUX operator, the mapping radio frequency channel for broadcasting service multiplexing in zone 4 (DKI Jakarta and Banten) is retrieved in Table 20.

Table 20: Permanent and transition channel assignment for service zone 4

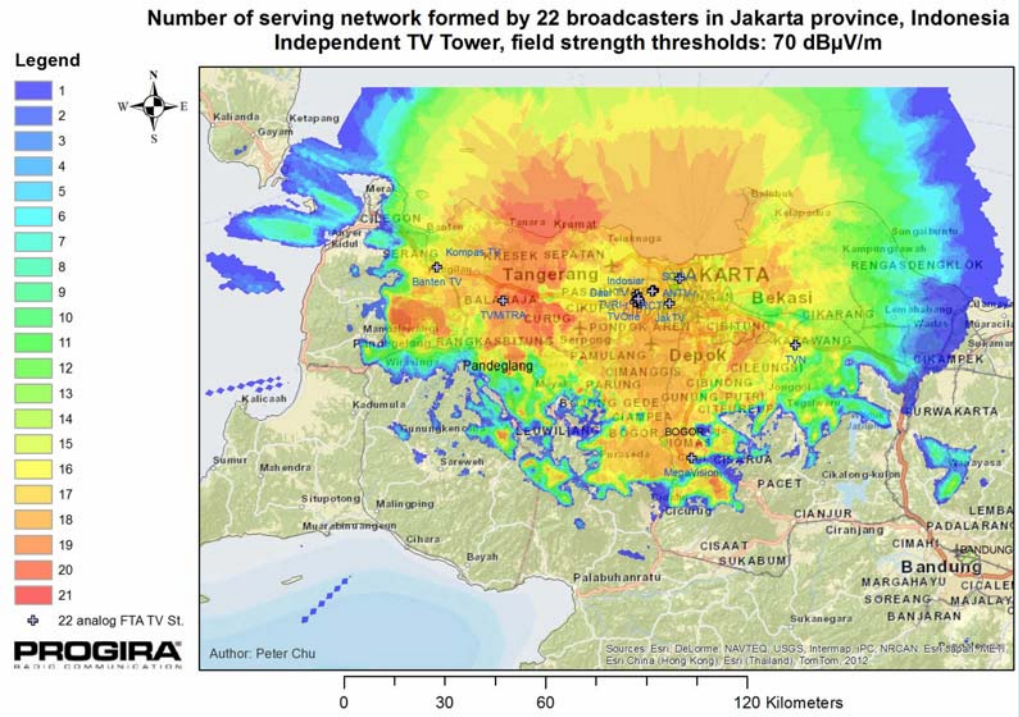
No	Test point	Longitude	Channel radio frequency	
			Permanent	Transition (*)
1	4 (DKI JAKARTA DAN BANTEN)	a. Jakarta, Bogor, Depok, Tangerang and Bekasi	36	32 (30), 34 (33), 40 (39), 44(45)
		b. Cilegon	32, 35, 38, 41 44	-
		c. Malingping	37, 40, 43	27(28), 33 (34)
		d. Pandeglang	32, 35, 38, 41, 44	-

(*): Radio frequency channel will be assigned a permanent transition (the numbers in brackets) after the simulcast period ending in each service area.

Source: Production based on information provided by NRT of Indonesia.

Based on the threshold field strength 70 dBµV/m, the number of analogue networks serving in Jakarta province shows high deviation especially in areas outside the Jakarta province, see Figure 41.

Figure 41: Number of serving analogue network in Jakarta province



Source: NRT/ITU

As seen in Figure 41, the deep blue colour means only one analogue network equal to or above the threshold level. The red colour means at least 21 analogue networks equal to or above the threshold level. The text box below is an example of calculation results for the number of analogue serving networks at test points in Jakarta-1. It is noted that the field strength from four FTA broadcasters (Banten TV, Kompas TV, and TVMiTRA and TVN) out of 22 is below the threshold level, 70 dBµV/m.

Number of serving networks at test point Jakarta-1 (Tanjung Pasir)

Raster: Zone 4 A-Network (Number of serving networks, 70) r
Clutter code: 210
Raster cell value: 18
Created: 2013-01-16 06:38:41

Value	Raster
119.5	RAJAWALI CITRA TELEVISI INDONESIA, PT - RCTI (50% 10m)
118.1	LPP TELEVISI REPUBLIK INDONESIA - TVRI-r (50% 10m)
116.9	GLOBAL INFORMASI BERMUTU, PT - Global TV (50% 10m)
116.2	GLOBAL INFORMASI BERMUTU, PT - SCTV-r (50% 10m)
115.5	CAKRAWALA ANDALAS TELEVISI, PT - ANTV-r (50% 10m)
114.7	TELEVISI TRANSFORMASI INDONESIA,PT - Trans TV (50% 10m)
114.5	ELSHINTA JAKARTA TELEVISI, PT - ELSHINTA (50% 10m)
114.5	DUTA VISUAL NUSANTARA TIVI TUJUH, PT - Trans 7 (50% 10m)
114.4	LATIVI MEDIA KARYA, PT - tvOne (50% 10m)
112.4	MEDIA TELEVISI INDONESIA,PT - Metro TV-r (50% 10m)
111.8	OMNI INTIVISION, PT - O Channel (50% 10m)
106.5	CIPTA TELEVISI PENDIDIKAN INDONESIA, PT - MNC TV-r (50% 10m)
105.3	TELEVISI ANAK SPACE TOON, PT - SpaceToon (50% 10m)
105.3	DUTA ANUGERAH INDAH, PT - Daai TV (50% 10m)
101.0	INDOSIAR VISUAL MANDIRI, PT - Indosiar (50% 10m)
93.5	METROPOLITAN TELEVISINDO, PT - Bchannel (50% 10m)
81.4	DANAPATI ABINAYA INVESTAMA, PT - JakTV (50% 10m)
76.4	CIPTA MEGASWARA TELEVISI, PT - MegaVision (50% 10m)
61.9	BANTEN MEDIA GLOBAL TELEVISI, PT - Banten TV (50% 10m)
60.9	KOMANDO MEDIA TELEVISI, PT - Kompas TV (50% 10m)
58.0	VISI CITRA MITRA MULIA. PT - TVMiTRA (50% 10m)
41.5	NUSANTARA TELEVISI, PT - TVN (50% 10m)

Source: ITU

The predicted field strength calculation result for all test points 1 to 8 is summarized in Table 21 and 22.

Table 21: Number of serving analogue network at test point 1 to 4 from 22 FTA TV broadcasting: Predicted field strength at test points 1 to 4 in Jakarta province

No	Jakarta - 1		Jakarta - 2		Jakarta - 3		Jakarta - 4	
	Tanjung Pasir		Sedari, Pedes		Pinayungan, Teluk jambe		Pasir Tanjung	
	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name
1	119.5	RCTI	97.3	ELSHINTA	84.1	ELSHINTA	71.1	TVN
2	118.1	TVRI	92.3	RCTI	81.2	ANTV	57.7	ELSHINTA
3	116.9	Global TV	91.7	ANTV	79.3	RCTI	56.1	ANTV
4	116.2	SCTV	88	SCTV	77	tvOne	50.7	RCTI
5	115.5	ANTTV	87.8	tvOne	75.1	Trans TV	49	SCTV
6	114.7	Trans 7	87.2	TVRI	75.1	Trans 7	46.7	Global TV
7	114.5	ELSHINTA	86	Indosiar	74.8	TVRI	44.3	Trans TV
8	114.5	Trans 7	86	Global TV	74.3	SCTV	42.1	TVRI
9	114.4	tvOne	85.3	Trans TV	73.5	Global TV	42	Trans 7
10	112.4	Metro TV	84.9	Trans 7	71.5	Metro TV	41.4	O Channel

No	Jakarta - 1		Jakarta - 2		Jakarta - 3		Jakarta - 4	
	Tanjung Pasir		Sedari, Pedes		Pinayungan, Teluk jambe		Pasir Tanjung	
	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name
11	111.8	O Channel	84.2	Metro TV	71.4	O Channel	40.3	Indosiar
12	106.5	MNC TV	80.9	O Channel	71.1	TVN	38.7	tvOne
13	105.3	SpaceToon	76.1	MNC TV	70.3	Indosiar	38.4	Bchannel
14	105.3	Daai TV	71	SpaceToon	62.7	MNC TV	38.3	SpaceTon
15	101	Indosiar	70.4	Daai TV	60	Daai TV	37.7	Metro TV
16	93.5	Bchannel	68.3	MegaVision	58.3	SpaceToon	34.3	JakTV
17	81.4	JakTV	62.8	TVN	49.8	Bchannel	33.1	MNC TV
18	76.4	MegaVision	59.1	Bchannel	45	JakTV	31.7	Daai TV
19	61.9	Banten TV	57.2	JakTV	42.7	MegaVision	17.6	Kompas TV
20	60.9	Kompas TV	34.3	Kompas TV	30.2	Kompas TV	16.6	Banten TV
21	58	TVMiTRA	32.6	Banteen TV	28.5	Banteen TV	11	MegaVision
22	41.5	TVN	23.3	TVMiTRA	20.8	TVMiTRA	8.2	TVMiTRA

Source: Author, production based on information provided by NRT of Indonesia.

Table 22: Number of serving analogue network at test point 5 to 8 from 22 FTA TV broadcasting

Predicted field strength at test points 5 to 8 in Jakarta province

No	Jakarta - 5		Jakarta - 6		Jakarta - 7		Jakarta - 8	
	Ciburuy		Sangiang Jaya, Cimarga		Cireudeu		Sukajaya	
	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name
1	93	MegaVision	73.1	Trans TV	91.8	TVRI	101.2	Kompas
2	75.9	ELSHINTA	69.7	TVRI	89	tvOne	99.9	Banteen
3	75.5	SCTV	68.8	ELSHINTA	88.9	ELSHINTA	87.7	tvOne
4	74.9	ANTV	68.7	RCTI	88.9	Trans TV	87	TVRI
5	74.4	Global TV	66.1	Trans 7	88.7	Metro TV	85.7	ELSHINTA
6	71.8	RCTI	61.5	tvOne	88.3	RCTI	84.5	Trans TV
7	69.3	Metro TV	60.4	Banten TV	87.9	Kompas TV	84.2	RCTI
8	68.1	TVRI	59.8	MNC TV	87.7	Banten TV	83.5	Trans 7
9	67.9	Trans TV	59.7	Kompas TV	87.4	Trans 7	82.1	SCTV
10	65.9	SpaceToon	59.5	Metro TV	85.9	SCTV	80	O Channel
11	65.8	Trans 7	59.4	O Channel	84.9	O Channel	79.8	Metro TV
12	63.7	O Channel	58.3	TVMiTRA	84.6	Global TV	78.5	Global TV
13	63.1	tvOne	58.3	ANTV	79.9	Daai TV	78.3	ANTV
14	61.7	Bchannel	57.7	SCTV	79.5	MNC TV	75.5	MNC TV
15	59.9	MNC TV	56.4	SpaceToon	78.4	ANTV	72.9	Indosiar
16	59.6	Indosiar	56.1	Global TV	77.4	TVMiTRA	70.5	TVMiTRA

No	Jakarta - 5		Jakarta - 6		Jakarta - 7		Jakarta - 8	
	Ciburuy		Sangiang Jaya, Cimarga		Cireudeu		Sukajaya	
	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name
17	58.1	JakTV	55.4	Indosiar	72.8	Indosiar	68.2	Daai TV
18	57.4	Daai TV	55.3	Daai TV	70.7	SpaceToon	63.7	MegaVision
19	29.2	TVN	53.2	Bchannel	70.5	Bchannel	61.4	Bchannel
20	20.4	Banten TV	35	JakTV	51.8	JakTV	59.4	SpaceToon
21	18.7	Kompas TV	33.3	MegaVision	49.9	MegaVision	40.2	JakTV
22	7	TVMiTRA	6.8	TVN	21.3	TVN	21.1	TVN

Source: Author, production based on information provided by NRT of Indonesia

It is noted that severe deviation in the number of networks serving the Jakarta province occurred caused by transmission and reception factors.

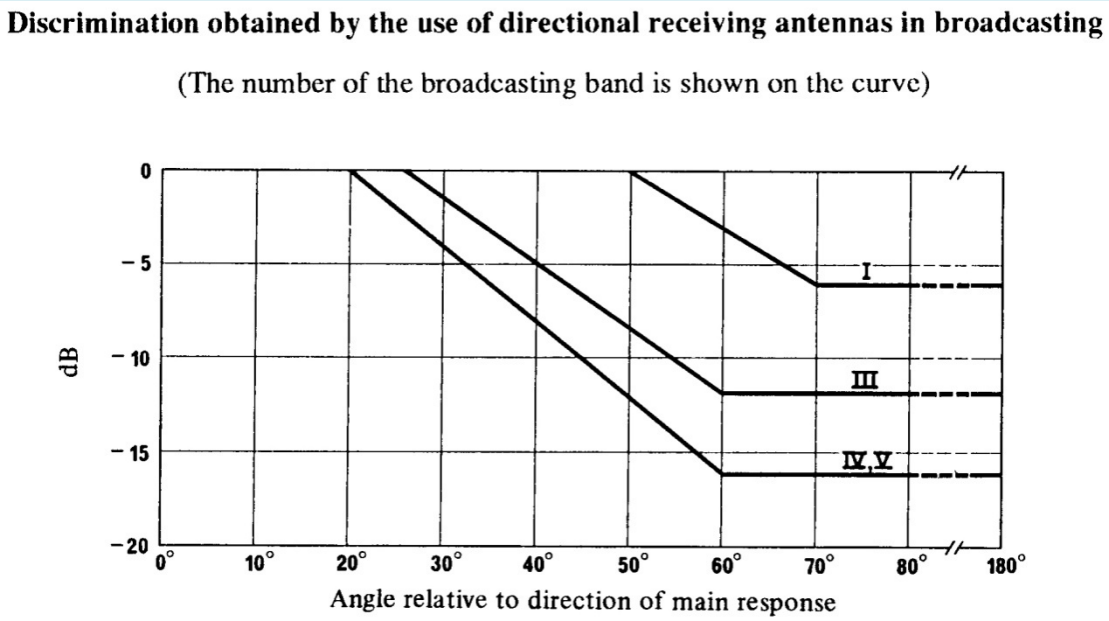
A. Transmission factors:

1. the FTA broadcasters commonly use individual transmitting antenna system and tower;
2. transmission E.R.P. from each FTA broadcaster deviated in range from 6 kW to 3 000 kW;
3. polarization of transmission antenna is mixed with horizontal and vertical;
4. the transmitting antenna height mounted on towers above ground level is in range from 50 metres to 395 metres;
5. distortion of transmitting antenna radiation pattern may occur if many towers are constructed within 500 m diameter.

B. Reception factors:

1. UHF receiving antenna is directional; severe discrimination loss will occur if the angle between two TV towers from a receiving location is ≥ 60 degree, then the discrimination loss is 16 dB in UHF band IV/V (see Figure 42);
2. in order to receive optimized TV signal levels from each FTA broadcaster, the individual TV household has to adjust the receiving antenna direction and height.

Figure 42: Discrimination of receiving antenna



Note 1: It is considered that the discrimination shown will be available at the majority of antenna locations in built-up areas. At clear sites in open country, slightly higher values will be obtained.

Note 2: The curves in Fig. 43 are valid for signals of vertical or horizontal polarization, when both the wanted and the unwanted signals have the same polarization.

Note 3: In the case of orthogonal polarization the combined discrimination provided by directivity and orthogonality cannot be calculated by adding together the separate discrimination values. However, it has been found in practice that a combined discrimination value of 16 dB may be applied for all angles of azimuth in the terrestrial television Bands I to V. This value could be expected to be exceeded at more than 50% of locations).

Source: Adapted from R-REC-BT.419-3.

4.4.2 DTTB reception in Jakarta province

The MUX operator for Jakarta province (service zone 4) refers to DTTB Infrastructure development plan is listed in Table 23.

Table 23: MUX number assignment for 6 MUX operators

DTTB MUX number	MUX-1	MUX-2	MUX-3	MUX-4	MUX-5	MUX-6
MUX operator name[1]	TVRI	BSTV	tvOne	Metro TV	SCTV	Trans TV

Note to the table:

[1] The MUX operator assignment refers to announcement number: 05/TIM-SEL/TVDTT/ZONA-4/07/2012, MCIT

Source: Author, production based on information provided by NRT of Indonesia.

The MFN channel number mapping for Jakarta province is 30, 33, 36, 39, 42 and 45. Table 24 is the assumed MFN MUX operator transmission data which is used to predict the number of serving DTTB network in the Jakarta province area which include capital Jakarta, Bogor, Depok, Tangerang and Bekasi.

Table 24: Transmission data of 6 MUX operators for Jakarta province

MUX No.	1	2			3	4	5	6
MUX operator	TVRI	BSTV			tvOne	Metro TV	SCTV	Trans TV
Location in Jakarta	Joglo	St Moritz	Grand Mall Bekasi	Gajah Mada Plaza	Transmisi ANTV JL.menara	JL. Raya Joglo	Jalan Panjang	JI. Joglo Raya
Antenna height (m)	300	170	50	120	300	310	375	180
Channel	42	36	34 (33)*	32 (30)*	44 (45)*	40 (39)*		
ERP (kW)	261.82	50	1990.5	157.4	38.9	53.83		
Polarization	H	H	H	H	H	H		

(*): Radio frequency channel will be assigned a permanent transition (the numbers in brackets) after the simulcast period ending in each service area.

Source: Author, production based on information provided by NRT of Indonesia.

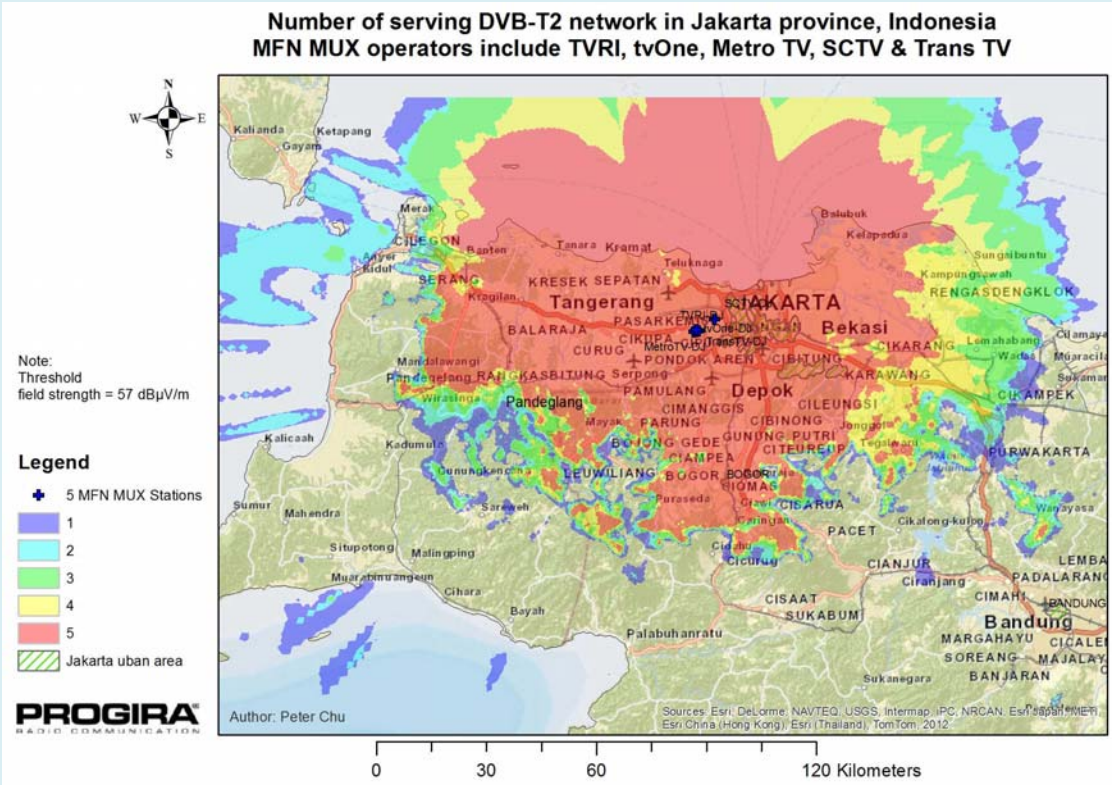
The data in Table 24 assumes the following points:

1. The MUX operators share their existing TX antenna system and tower for DTT transmission network setup.
2. The DTTB E.R.P. of individual multiplex is proposed by relevant MUX operator. MCIT will evaluate it before giving approval.
3. The DTTB TX antenna pattern for the DTTB station is proposed by MUX operator.
4. BSTV provides SFN coverage in Jakarta province. While the other five MUX operators provide MFN coverage in Jakarta province.

Based on the threshold field strength 57 dBµV/m, most of the reception area in Jakarta province provides good results in the number of DVB-T2 serving networks as shown in Figure 43.

In Figure 43, the blue colour means only 1 DVB-T2 network equal to or above the threshold level. The red colour means at least five DVB-T2 MFN networks equal or above the threshold level.

Figure 43: Number of serving DTVB-T2 network in Jakarta province by 5 MFN MUX operators



Source: Author

The text box below is an example of calculation results for the number of DVB-T2 serving networks for tests / measurement test point 7: Jakarta-6 (Sangiang Jaya, Cimarga) with three of five MUX operators: Metro TV, Trans TV and SCTV.

Number of serving DTT networks for test point 7: Jakarta-6 (Sangiang Jaya, Cimarga)

Raster:	5 MFN MUX operators (Number of serving networks, 57)
Position:	-20550 -720050 99.0 (106E1749.721 06S2932.454)
Clutter code:	40
Raster cell value:	2
Created:	2013-01-17 15:46:14

Value	Raster
66.0	Transmisi ANTV JL.menara Jakarta - tvOne-DJ (50% 10m)
59.6	LPP TELEVISI REPUBLIK INDONESIA - TVRI-DJ (50% 10m)
53.9	MEDIA TELEVISI INDONESIA,PT - MetroTV-DJ (50% 10m)
49.7	Jl. Joglo Raya - TransTV-DJ (50% 10m)
49.4	ELSHINTA JAKARTA TELEVISI, PT - SCTV-DJ (50% 10m)

Source: ITU

In accordance with the calculation results, the predicted field strength at test points 1, 2, 3, 5, 6, 7 and 8 is summarized in Table 25.

Table 25: Number of serving DVB-T2 network at test point 1-3 and 5-8 from five MFN MUX operators

Predicted field strength at test points 5 to 8 in Jakarta province

No	Jakarta - 1		Jakarta - 2		Jakarta - 3	
	Tanjung Pasir		Sedari, Pedes		Pinayungan, Teluk jambe	
	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name
1	108.1	TVRI	77.8	SCTV	72.7	tvOne
2	95.4	SCTV	77.2	TVRI	64.8	TVRI
3	94.3	Trans TV	74.4	tvOne	63.6	SCTV
4	86.1	tvOne	64.2	Metro TV	61.5	Metro TV
5	79	Metro TV	61.2	Trans TV	50.6	Trans TV

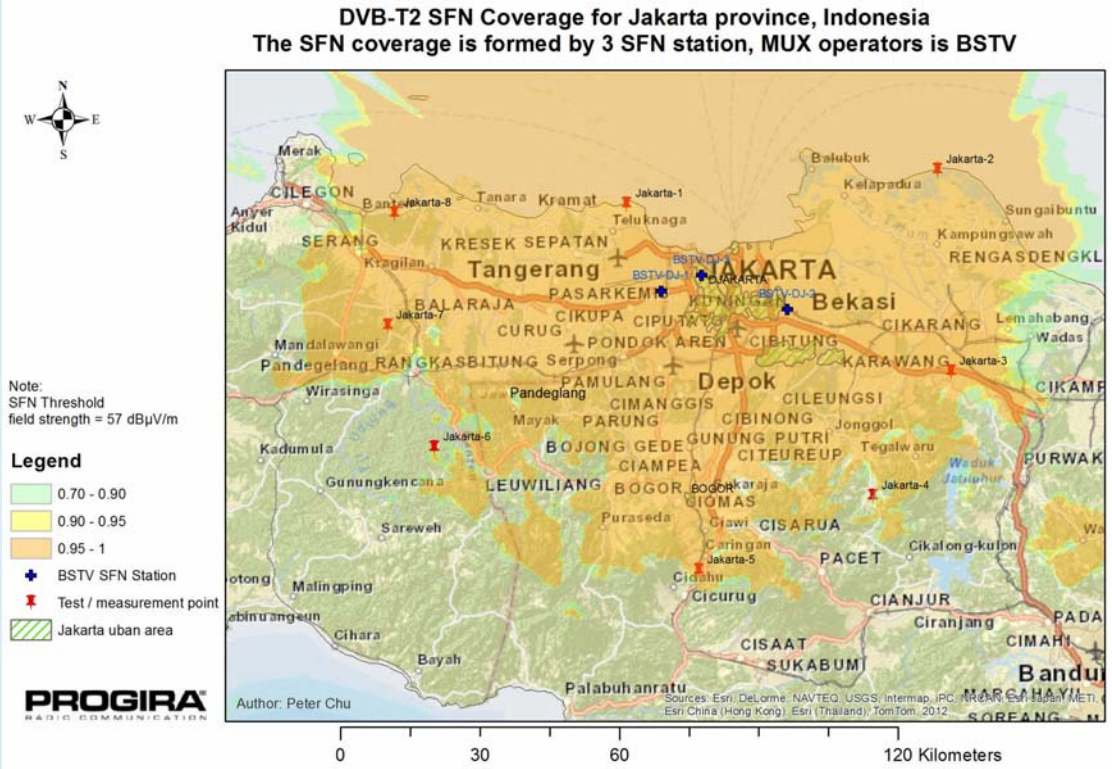
Predicted DVB-T2 field strength at test points 5 to 8 in Jakarta province

	Jakarta - 5		Jakarta - 6		Jakarta - 7		Jakarta - 8	
	Ciburuy		Sangiang Jaya, Cimarga		Cireudeu		Sukajaya	
	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name	dBµV/m	St. Name
1	62.2	Metro TV	66	tvOne	85.8	tvOne	77	TVRI
2	61.3	tvOne	59.6	TVRI	81.8	TVRI	74.8	tvOne
3	58	TVRI	53.9	Metro TV	75.1	Metro TV	65.2	SCTV
4	56.4	SCTV	49.7	TransTV	70.2	SCTV	62.4	Metro TV
5	48.3	Trans TV	49.4	SCTV	69.5	Trans TV	58.2	Trans TV

Source: Author, production based on information provided by NRT of Indonesia.

Among six MUX operators in Jakarta province, only BSTV adopts SFN to provide coverage. The predicted SFN coverage is shown in Figure 44.

Figure 44: DVB-T2 SFN coverage for Jakarta province formed by three SFN stations by MUX operator BSTV



Source: NRT/ITU

The selection of DVB-T2 parameters from the six MUX operator proposals submitted to MCIT are different, see Table 26. The final parameters for each MUX operator may be changed subject to the approval from MCIT.

Table 26: MUX number assignment for six MUX operators

MUX No.	1	2	3	4	5	6
MUX operator	TVRI	BSTV	tvOne	Metro TV	SCTV	Trans TV
Modulation	256QAM	QOFDM	64QAM	64QAM	COFDM	QPSK
FFT Size	32K	32K	32K	8K	32K	32K
Carrier mode	Extended	32K	Extended	Extended	Normal	Extended
Guard interval	1/16	1/32	1/32	1/32	1/32	1/32
Pilot Pattern	PP4	PP4	PP2	PP7	PP4	PP6
Constellation	256QAM	256QAM	64QAM	256QAM	64QAM	QPSK
Code rate	2/3	3/4	4/5	3/5	3/5	3/5
C/N (Rice) dB	20.85	22.92	19.44	14.27	14.84	4.11
C/N (Rayleigh) dB	24.41	27.28	23.98	17.2	17.68	6.29
Net bit rate (Mbit/s)	36.83	42.68	31.67	25.74	25.59	8.74
Note: This data is considered as preliminary data which will be evaluated by MCIT before conducting field monitoring. *Source: NRT.*						

From the proposed parameters shown in Table 26, variation of the net bit rate (Mbit/s) has a range from 8.74 to 42.68. The small net bit rate, 8.74 Mbit/s may not fully meet the licence terms and conditions as it will limit the number of broadcasting slots for simulcast or encourage little new digital content. On the other hand, the MUX operator BSTV selects a very high net bit rate 42.68 Mbit/s which the C/N (Rice) 22.92 dB is too high in comparison with the proposed parameters for TVRI which require only 20.85 dB.

4.5 Encourage scheduled implementation of DTTB deployment

In November 2011, the Communication and Information Minister of the Republic of Indonesia issued Ministerial Decree (MD) No. 22/PER/M.KOMINFO/11/2011 entitles implementation of FTA fixed DTTB, of which Article 14 states:

1. *The multiplexing broadcasting should be readied on-air not later as stated in the Appendix I of MD No. 22 of 2011.*
2. *The multiplexing broadcasting referred to in paragraph (1) shall be done in stages as described in Appendix I to this regulation, which is an integral part of this Regulation.*
3. *The broadcasting service multiplexing on each zone begins with doing simulcast broadcasting until the time of Analogue Switch-Off (ASO) as defined in Appendix I to this regulation.*
4. *Prior to the implementation of the simulcast, MCIT will issue MD for the radio frequency channels assignment to the MUX operators.*
5. *All FTA fixed terrestrial television broadcasters are entitled to broadcast programme after getting the DTTB licence*
6. *Broadcasters who do not get the DTTB MUX operator licence are entitled to get the DTTB content provider licence.*
7. *The current analogue FTA fixed DTTB's licences will be adjusted to FTA fixed DTTB licences after Analogue Switch-Off (ASO).*
8. *The Analogue Switch-Off (ASO) no later than by the end of 2017 for individual province. The National ASO is in Q1 2018.*

4.5.1 Briefing of the DTTB implementation

This subsection gives an overview of the information concerning DTTB implementation found in Appendix I of MD No. 22/PER/M.KOMINFO/11/2011.

Table 27: Implementation plan of multiplex broadcasting for each service zone

NO	Service zone	PROVINCE	PERIOD simulcast	AREAS OF SERVICE
1	ZONE 1	ACEH (1DEM 3)	Q3-2013 to Q4-2016	13
		NORTH SUMATRA (DEM 2)	Q4-2012 to Q1-2016	12
2	ZONE 2	WEST SUMATRA (DEM 3)	Q3-2013 to Q4-2016	9
		RIAU (DEM 3)	Q3-2013 to Q4-2016	11
		JAMBI (DEM 3)	Q3-2013 to Q4-2016	8
3	ZONE 3	BENGKULU (DEM 3)	Q3-2013 to Q4-2016	3
		SOUTH SUMATRA (DEM 3)	Q3-2013 to Q4-2016	8
		LAMPUNG (DEM 3)	Q3-2013 to Q4-2016	8
		BANGKA BELITUNG (DEM 3)	Q3-2013 to Q4-2016	3
4	ZONE 4	JAKARTA	[3]Q1-2012 to [4]Q2-2015	1
		BANTEN (DEM 2)	Q4-2012 to Q1-2016	3

NO	Service zone	PROVINCE	PERIOD simulcast	AREAS OF SERVICE
5	ZONE 5	WEST JAVA (DEM 1)	Q1-2012 to Q2-2015	11
6	ZONE 6	CENTRAL JAVA (DEM 1)	Q1-2012 to Q2-2015	7
		JOGJAKARTA (DEM 2)	Q4-2012 to Q1-2016	1
7	ZONE 7	EAST JAVA (DEM 1)	Q1-2012 to Q2-2015	10
8	ZONE 8	BALI (DEM 3)	[5]Q3-2013 to [6]Q4-2016	2
		NUSA EAST WEST ([2]DEKM 4)	Q1-2014 to Q2-2017	4
		EAST NUSA (DEKM 4)	Q1-2014 to Q2-2017	13
9	ZONE 9	PAPUA (DEKM 5)	Q3-2014 to Q4-2017	9
		WEST PAPUA (DEKM 4)	Q1-2014 to Q2-2017	3
10	ZONE 10	MALUKU (DEM 3)	Q3-2013 to Q4-2016	5
		MALUKU NORTH (DEKM 4)	Q1-2014 to Q2-2017	2
11	ZONE 11	SULAWESI WEST (DEKM 4)	Q1-2014 to Q2-2017	2
		SULAWESI SOUTH (DEM 3)	Q3-2013 to Q4-2016	11
		SULAWESI SOUTHEAST (DEKM 4)	Q1-2014 to Q2-2017	8
12	ZONE 12	SULAWESI CENTRAL (DEKM 4)	Q1-2014 to Q2-2017	8
		GORONTALO (DEKM 4)	Q1-2014 to Q2-2017	2
		SULAWESI NORTH (DEM 3)	Q3-2013 to Q4-2016	5
13	ZONE 13	KALIMANTAN WEST (DEM 3)	Q3-2013 to Q4-2016	9
		KALIMANTAN CENTRAL (DEM 3)	Q3-2013 to Q4-2016	6
14	ZONE 14	East Kalimantan (DEM 2)	Q4-2012 to Q1-2016	11
		SOUTH KALIMANTAN (DEKM 4)	Q1-2014 to Q2-2017	6
15	ZONE 15	RIAU ISLANDS (DEM 2)	Q1-2012 to Q2-2015	2

Notes to the table:

[1] DEM = Economically Developed Region

[2] DEKM = Economically Less Developed Region

[3] Q1: JANUARY - MARCH

[4] Q2: APRIL - JUNE

[5] Q3: JULY - SEPTEMBER

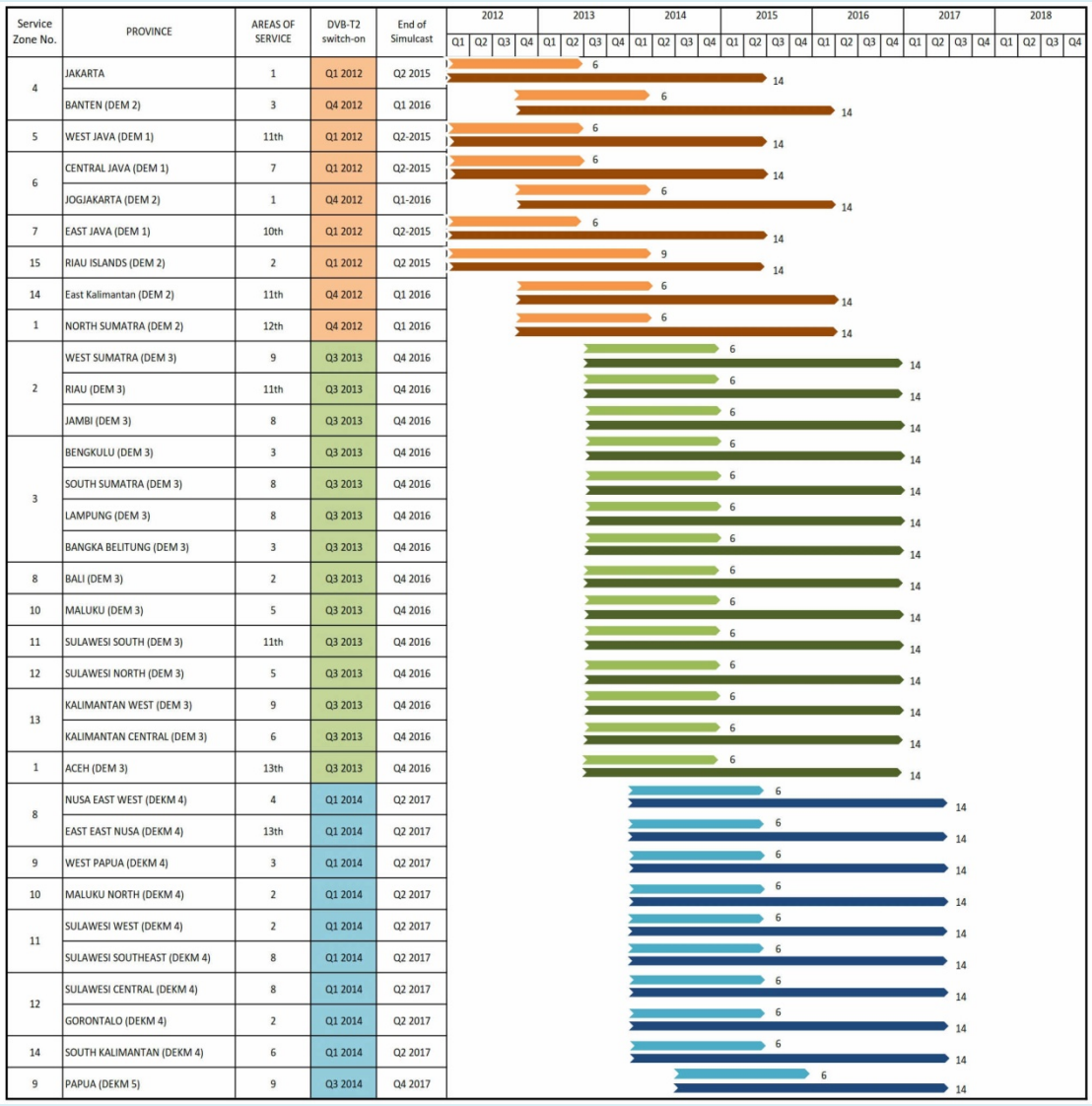
[6] Q4: OCTOBER – DECEMBER

In accordance with Table 27, the planned period of DVB-T2 switch-on and ASO date is summarized in Figure 45. The DVB-T2 switch-on is arranged in three stages for a number of service zones:

- In 2012, Indonesia aims to switch-on DVB-T2 in five service zones (4, 5, 6, 7 and 15) and part of service zones in 1 and 14.
- In 2013, Indonesia aims to switch-on DVB-T2 in three service zones (2, 3 and 13) and part of service zones in 1, 8, 10, 11 and 12.
- In 2014, Indonesia aims to switch-on DVB-T2 in service zones 9 and part of service zones in 8, 10, 11, 12 and 14.

Figure 45: Implementation schedule of DVB-T2 switch-on and end of simulcast in 15 service zones

Service Zone No.	PROVINCE	AREAS OF SERVICE	DVB-T2 switch-on	End of Simulcast
4	JAKARTA	1	Q1 2012	Q2 2015
	BANTEN (DEM 2)	3	Q4 2012	Q1 2016
5	WEST JAVA (DEM 1)	11th	Q1 2012	Q2-2015
6	CENTRAL JAVA (DEM 1)	7	Q1 2012	Q2-2015
	JOGJAKARTA (DEM 2)	1	Q4 2012	Q1-2016
7	EAST JAVA (DEM 1)	10th	Q1 2012	Q2-2015
15	RIAU ISLANDS (DEM 2)	2	Q1 2012	Q2 2015
14	East Kalimantan (DEM 2)	11th	Q4 2012	Q1 2016
1	NORTH SUMATRA (DEM 2)	12th	Q4 2012	Q1 2016
2	WEST SUMATRA (DEM 3)	9	Q3 2013	Q4 2016
	RIAU (DEM 3)	11th	Q3 2013	Q4 2016
	JAMBI (DEM 3)	8	Q3 2013	Q4 2016
3	BENGKULU (DEM 3)	3	Q3 2013	Q4 2016
	SOUTH SUMATRA (DEM 3)	8	Q3 2013	Q4 2016
	LAMPUNG (DEM 3)	8	Q3 2013	Q4 2016
	BANGKA BELITUNG (DEM 3)	3	Q3 2013	Q4 2016
8	BALI (DEM 3)	2	Q3 2013	Q4 2016
10	MALUKU (DEM 3)	5	Q3 2013	Q4 2016
11	SULAWESI SOUTH (DEM 3)	11th	Q3 2013	Q4 2016
12	SULAWESI NORTH (DEM 3)	5	Q3 2013	Q4 2016
13	KALIMANTAN WEST (DEM 3)	9	Q3 2013	Q4 2016
	KALIMANTAN CENTRAL (DEM 3)	6	Q3 2013	Q4 2016
1	ACEH (DEM 3)	13th	Q3 2013	Q4 2016
8	NUSA EAST WEST (DEKM 4)	4	Q1 2014	Q2 2017
	EAST EAST NUSA (DEKM 4)	13th	Q1 2014	Q2 2017
9	WEST PAPUA (DEKM 4)	3	Q1 2014	Q2 2017
10	MALUKU NORTH (DEKM 4)	2	Q1 2014	Q2 2017
11	SULAWESI WEST (DEKM 4)	2	Q1 2014	Q2 2017
	SULAWESI SOUTHEAST (DEKM 4)	8	Q1 2014	Q2 2017
12	SULAWESI CENTRAL (DEKM 4)	8	Q1 2014	Q2 2017
	GORONTALO (DEKM 4)	2	Q1 2014	Q2 2017
14	SOUTH KALIMANTAN (DEKM 4)	6	Q1 2014	Q2 2017
9	PAPUA (DEKM 5)	9	Q3 2014	Q4 2017



Source: NRT

Figure 46 indicates location of the 15 service zones.

Figure 46: 15 service zones in Indonesia

Source: MCIT

As seen in Figure 45, the DVB-T2 broadcasting services switch-on aims to start in Q1 2012 in service zone number 4, 5, 6, 7 and 15 in the first stage. The ASO will take effect after eight quarters starting from completion of DVB-T2 deployment in each zone, and the nationwide ASO is planned for Q1 2018.

The deployment period in service zone 4, 5, 6 and 7 is six quarters. While deployment period in service zone 15 is nine quarters. The simulcast period in each service zone is 14 quarters. The simulcast will be started at deployment of DVB-T2 broadcasting in each service zone. The ASO planning is arranged in service zone approach which is categorized into three stages; the first stage is planned for Q2 2016 at the latest. The second stage is planned for Q4 2016 and the third stage is planned for Q4 2017. Finally, the nationwide ASO objective is to be completed by Q1 2018.

In accordance with MD No. 23/PER/M.KOMINFO/11/2011, when in a service area of a service zone and where not all radio frequency channels are available for digital TV, then some MUX operators will use radio frequency channels in accordance with the permanent channel plan, whilst others will use temporary radio frequency channels assigned by the Ministry of Communication and Information Technology. The MUX operators that get temporary channels will move to permanent channels after the DTTB migration has been completed. The awarded MUX operators for service zone number 4, 5, 6, 7 and 15 are shown in Table 28 to 32.

Table 28: DTTB MUX operator assignment for service zone 4

Service zone 4:	Jakarta and Banten							
	DTTB MUX number and operator name						[1]Channel Number	
	1	2	3	4	5	6		
Service area name:	TVRI	BSTV	tvOne	Metro TV	SCTV	Trans TV	MFN	SFN
Jakarta, Bogor, Depok, Tangerang, Bekasi	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	30, 33, 36, 39, 42, 45	
Cilegon	DTTB	DTTB	DTTB	DTTB	DTTB			29, 32, 35, 38, 41, 44
Pandeglang	DTTB		DTTB	DTTB	DTTB	DTTB		
Malingping	DTTB	DTTB	DTTB		DTTB	DTTB	28, 31, 34, 37, 40, 43	

[1] Some MUX operators may be assigned temporary channels before migration in the area has been completed.

Source: NRT

Table 29: DTTB MUX operator assignment for service zone 15

Service zone 15:	Riau Kepulanuan						
	DTTB MUX number and operator name						[1]MFN Channel No
	1	2	3	4	5	6	
Service area name:	TVRI	RCTI	SCTV	Trans TV			
Batam dan Tanjung Balai	DTTB	DTTB	DTTB	DTTB			40, 42, 44, 46
Tanjung, Pinang	DTTB	DTTB	DTTB				48, 50, 52, 54

[1] Some MUX operators may be assigned temporary channels before migration in the area has been completed.

Source: Production based on information provided by NRT of Indonesia.

Table 30: DTTB MUX operator assignment for service zone 5

Service zone 5:	West Java							
	DTTB MUX number and operator Name						[1]Channel Number	
	1	2	3	4	5	6		
Service area name	TVRI	ANTV	Indosiar	Metro TV	RCTI	Trans TV	MFN	SFN
Bandung, Cimahi, Padalarang and Cianjur	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	29, 32, 35, 38, 41, 44	
Purwakarta and Cikampek	DTTB	DTTB	DTTB	DTTB	DTTB		28, 31, 34, 37, 40, 43	
Sukabumi	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	29, 32, 35, 38, 41, 44	
Pelabuhan Ratu	DTTB	DTTB	DTTB	DTTB	DTTB		29, 32, 35, 38, 41, 44	
Cianjur Selatan	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	30, 33, 36, 39, 42, 45	
Sumedang	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	30, 33, 36, 39, 42, 45	
Cirebon, Indramaya	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB		29, 32, 35, 38, 41, 44
Kuningan	DTTB	DTTB	DTTB	DTTB	DTTB			
Majalengka	DTTB	DTTB	DTTB	DTTB	DTTB			
Garut, Taskik	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB		28, 31, 34, 37, 40, 43
Ciamis	DTTB	DTTB	DTTB	DTTB	DTTB			

[1] Some MUX operators may be assigned temporary channels before migration in the area has been completed.

Source: Production based on information provided by NRT of Indonesia.

Table 31: DTTB MUX operator assignment for service zone 6

Service zone 6:	Central Java						
	DTTB MUX number and operator Name						[1]MFN channel number r
	1	2	3	4	5	6	
Service area name	TVRI	ANTV	Indosiar	Metro TV	RCTI	Trans TV	
Semarang, Kendal, Ungaran, Demak, Jepara and Kudus	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	28, 31, 34, 37, 40 , 43
Pati and Rembang	DTTB	DTTB	DTTB	DTTB	DTTB		29, 32, 35, 38, 41, 44
Brebes, Tegal, Pemalang, dan Pekalongan	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	28, 31, 34, 37, 40 , 43
Purwokerto, Banyumas, Purbalingga, Kebumen, dan Cilacap	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	30, 33, 36, 39, 42, 45
Purworejo	DTTB	DTTB	DTTB	DTTB	DTTB		28, 31, 34, 37, 40 , 43
Magelang, Salatiga, dan Temanggung	DTTB	DTTB	DTTB	DTTB	DTTB		30, 33, 36, 39, 42, 45
Blora dan Cepu	DTTB	DTTB	DTTB	DTTB	DTTB		30, 33, 36, 39, 42, 45
Yogyakarta, Wonosari, Solo, Sleman, dan Wates	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	29, 32, 35, 38, 41, 44

[1] Some MUX operators may be assigned temporary channels before migration in the area has been completed.

Source: Production based on information provided by NRT of Indonesia.

Table 32: DTTB MUX operator assignment for service zone 7

Service zone 7:	East Java						
	DTTB MUX operator name						[1]MFN channel number r
	1	2	3	4	5	6	
Service area name	TVRI	ANTV	Global TV	Metro TV	SCTV	Trans TV	
Surabaya, Lamongan, Gresik, Mojokerto, Pasuruan, dan Bangkalan	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	29, 32, 35, 38, 41 and 44
Malang	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	28, 31, 34, 37, 40 , 43
Kediri, Pare, Kertosono, Jombang, Blitar, Tulungagung, dan Trenggalek	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	30, 33, 36, 39, 42, 45
Madiun, Ngawi, Magetan, dan Ponorogo	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	29, 32, 35, 38, 41 and 44
Jember	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	30, 33, 36, 39, 42, 45
Tuban dan Bojonegoro	DTTB	DTTB	DTTB	DTTB	DTTB		28, 31, 34, 37, 40 , 43

Service zone 7:	East Java						
	DTTB MUX operator name						[1]MFN channel number r
	1	2	3	4	5	6	
Service area name	TVRI	ANTV	Global TV	Metro TV	SCTV	Trans TV	
Banyuwangi	DTTB	DTTB	DTTB	DTTB	DTTB		29, 32, 35, 38, 41 and 44
Pacitan	DTTB	DTTB	DTTB	DTTB	DTTB		28, 31, 34, 37, 40 , 43
Pamekasan dan Sumenep	DTTB	DTTB	DTTB	DTTB	DTTB		30, 33, 36, 39, 42, 45
Situbondo	DTTB	DTTB	DTTB	DTTB	DTTB		28, 31, 34, 37, 40 , 43

[1] Some MUX operators may be assigned temporary channels before migration in the area has been completed.

Source: NRT

4.5.2 Implementation of DTT transmission network

The implementation schedule of DTTB switch-on and required period to complete full DTTB deployment in each service zone is well planned as detailed in Figure 45. Given the high number of FTA terrestrial TV households in service zone 4, 5, 6, 7 and 15, NRT decided to implement DTTB in these service zones first. DTTB MUX operators for these five service zones are already selected in accordance with the DTTB licence terms and conditions procedure[28]. Take service zone 4 as example, it includes four areas of service as detailed in Table 28 above and repeated here for ease of reference.

Service zone 4:	Jakarta and Banten							
	DTTB MUX number and operator name						[1]Channel Number	
	1	2	3	4	5	6		
Service area name:	TVRI	SCTV	BSTV	Trans TV	Metro TV	tvOne	MFN	SFN
Jakarta province: Jakarta, Bogor, Depok, Tangerang, Bekasi	DTTB	DTTB	DTTB	DTTB	DTTB	DTTB	30, 33, 36, 39, 42, 45	
Banten province: Cilegon	DTTB	DTTB	DTTB		DTTB	DTTB		29,32,35,38,41,44
Banten province: Pandeglang	DTTB	DTTB		DTTB	DTTB	DTTB		
Banten province: Malingping	DTTB	DTTB	DTTB	DTTB		DTTB	28, 31, 34, 37, 40, 43	

[1] Some of the MUX operators may be assigned with temporary channel before migration in the area completed.

Source: NRT

[28] MD No: 95/KEP/M.KOMINFO/02/2012 on Business Opportunity of Multiplexing Implementation for FTA fixed DTTB in Service Zone 4 (DKI Jakarta and Banten), 5 (West Java), 6 (Central Java and Jogjakarta), 7 (East Java) and 15 (Riau Islands)., MD No: 17/PER/M.KOMINFO/06/2012 on the Implementation of Determining The Multiplexer and MD No: 18/PER/M.KOMINFO/06/2012 on Procedures for Calculating Leasing Tariff of Broadcast Slot on Multiplexing Implementation.

The location of these service areas is shown in Figure 46. The DTTB MUX operators will provide DVB-T2 broadcasting services in accordance with the DTTB deployment schedule, see Figure 45. The DTTB MUX operators have their own analogue TV transmission network in service zone 4. These MUX operators prefer to share existing analogue TV network infrastructure to construct the DTTB transmission network as a design principle. Common infrastructure is not considered. It is expected that some of the technical assumptions would be used by the MUX operators:

1. Share existing transmission site which is owned by the MUX operator.
2. Share existing antenna tower.
3. Share existing antenna system which Omni radiation pattern is assumed to be used for existing analogue television network.
4. The DTTB E.R.P. is assumed -10dB below existing analogue transmission E.R.P.
5. The DTTB transmission polarization will be same as existing analogue transmitting antenna.
6. The assigned DTTB frequency plan either in MFN or SFN for the areas of service should be ensured free of interference from co-channel and/or adjacent channel analogue TV broadcasting in the same service zones and/or from neighbouring service zones.

Furthermore, the MUX operator has to comply with the technical requirements defined by MCIT, including:

1. The DTTB services have to provide full coverage to the areas of service as specified in the licence terms and conditions.
2. The field strength at the location of the test / measurement in service zone 4 has a limit of, and cannot exceed, 42.6 dBµV.
3. The MUX operators have to ensure that the existing analogue FTA terrestrial television services are free of interference from the new DTTB signal inside and/or neighbouring the service zone 4.
4. The MUX operator has to provide DVB-T2 broadcasting services in either MFN and/or SFN in the areas of service with the assigned DTTB frequency plan as specified by Ministerial Decree No: 23/PER/M.KOMINFO/11/2011.
5. Other technical requirement as specified by MCIT.

4.5.3 Capacity to carry TV in one DTTB MFN/SFN MUX

In accordance to the MD No: 23/PER/M.KOMINFO/11/2011 on Master Plan of Radio Frequency for Digital Terrestrial Television Broadcasting on Band 478-694 MHz, most of the DTTB frequency plan assignment is for MFN operation. In some areas of service, the DTTB frequency plan assignment is for SFN, see Table 28. Based on DVB-T2 parameters for fixed reception under scenario 3a[29], the recommended parameters for limited area SFN are shown in Table 33.

[29] Frequency and Network Planning Aspects of DVB-T2, EBU-TECH 3348, Status: Report, Version 2.0, Geneva April 2012.

Table 33: Scenario 3a - Rooftop reception for limited area SFN

Bandwidth:	8 MHz
FFT size:	32k
Carrier mode:	extended
Scattered Pilot Pattern:	PP4
Guard interval:	1/16 (224 µs)
Modulation:	256-QAM
Code rate:	2/3
C/N (Rice):	20.8 dB
Resulting data rate:	**37.0 Mbit/s**

Source: EBU-TECH 3348

In consideration of data rate compatibility in terms of number of multiplex programme slots, it is reasonable to apply the same parameters in constructing the DVB-T2 transmission network either in MFN or SFN. For the resulting data rate under scenario 3a with 37 Mbit/s, the bit rate distribution model is given in Table 34 below. The LPPPM is the MUX operator and LPPPS-1 is the existing content provider to meet the simulcast requirement. The LPPPS-2 means other content providers may be required to provide new digital content in HDTV and/or other digital broadcasting services subject to approval from MCIT.

Table 34: Bit rate budget and proposed bit rate distribution model

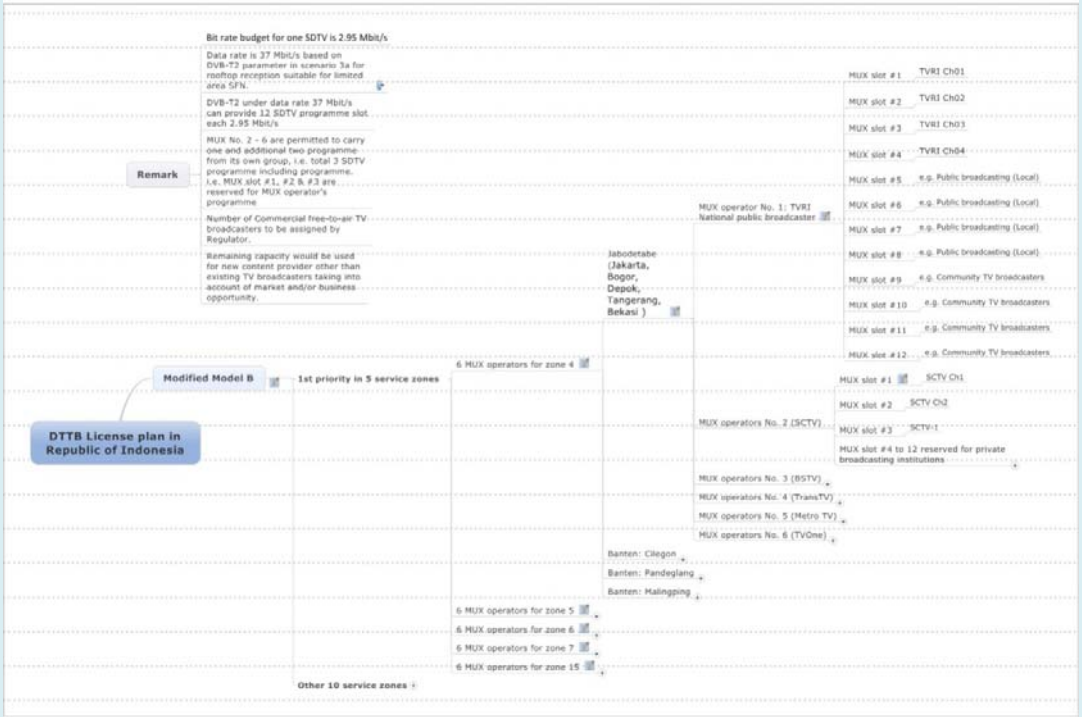
	Bit rate budget for SDTV and HDTV (Mbit/s)			
	SDTV		**HDTV**	
Video + Audio + sub-title:	2.95		4	
EPG for 1 program:	0.1		0.1	
Total bit rate of 1 program:	3.05		4.1	
	Proposed bit rate distribution model			
Net bit rate (Mbit/s):	37	DVB-T2 scenario 3a		
Bit rate distribution:	LPPPM	LPPPS-1	LPPPS-2	Margin
	SDTV	SDTV	HDTV	
Number of program:	3	5	3	
sub-total bit rate (Mbit/s):	9.15	15.25	12.3	0.3

Notes:
1. About 2.7 Mbit/s for SDTV video that includes the subtitle which is about 50 Kb/s per language.
2. Audio forms by one stereo pair or two monos aural: 250 Kbit/s.
3. The 4 Mbit/s for one HDTV is the value refers to experience of FTA broadcaster in Hong Kong, China.
4. Total bit rate of digital content in SDTV and HDTV can be reduced if statistical multiplex is used.
5. Total bit rate (Video+Audio+sub-title) for SDTV and HDTV is subject to performance of the encoder.

Source: Bit rate budget Information provided by a DTTB head-end system integrator.

Because the number of DTTB MUX is limited before ASO, a maximum of six MUX operators can be assigned for the area or province under the same service zone based on Ministerial Decree No: 95/KEP/M.KOMINFO/02/2012[30]. Figure 47 illustrates an example of assignment for six DTTB MUX operators in service zone 4.

Figure 47: DTTB licence assignment for six MUX operators in Republic of Indonesia



Source: NRT

The Article 6 of MD No: 22/PER/M.KOMINFO/11/2011 on the implementation of FTA fixed DTTB states:

> "*1. Public Broadcasting organizing TVRI broadcast channel multiplexing in allocating capacity shall:*
>
> *a. channel broadcast programs of the non-commercial programme such as Local Public Broadcasting service, Community Broadcasting services, etc that are in the zone, and*
>
> *b. channel broadcast programs of Community Broadcasting at least 1 (one) broadcast channels.*
>
> *2. Multiplex operator is permitted to carry one and additional two programmes from its own group, i.e. total 3 programmes including programmes from the same multiplexer. The remaining multiplexer capacity must carry existing analogue content in digital format from the commercial terrestrial FTA television broadcasters and/or new content provider subject to approval from the regulator."*

[30] Business Opportunity of Multiplexing Implementation for FTA fixed DTTB in Service Zone 4 (DKI Jakarta and Banten), 5 (West Java), 6 (Central Java and Jogjakarta), 7 (East Java) and 15 (Riau Islands).

In Table 34 and Figure 47, one DVB-T2 MUX can provide 12 SDTV programme slots. TVRI is the public broadcaster, four programme slots are reserved for the current TVRI programmes. The other eight programme slots can be used to meet requirements as specified in 1a and 1b under Article 6 of MD No: 22/PER/M.KOMINFO/11/2011.

A private broadcaster qualified to be awarded with one DTTB multiplex is permitted to carry one and an additional two programme from its own group: total three TV programmes will be carried in the MUX programme slot 1, 2 and 3. The rest of the programme slots can be used to carry current analogue programme content in digital format from other private broadcasters as specified in item 2 of Article 6[31]. The rest of bit rate can be used for new digital content such as HDTV or other digital broadcasting services. An example of the bit rate distribution model for one DVB-T2 multiplex is shown in Table 34.

4.6 Ensure implementation of simulcast in schedule

The simulcast starts when the DVB-T2 is switched-on in the area of service which is part of the province under the service zone. The simulcast period in the mentioned service zones has been defined in Appendix I of MD No: 22/PER/M.KOMINFO/11/2011 on The Implementation of FTA fixed DTTB.

4.6.1 Briefing on the simulcast plan

In Figure 45, the DVB-T2 deployment period in each area of service is fixed in six quarters assuming that the six MUX operators in that area of service complete the DVB-T2 transmission network on schedule. For example, with service zone 4 in Jakarta province, the completion of DVB-T2 deployment from six MUX operators has to be completed in Q2 2013 then, the ideal period of simulcast counting from Q3 2013 to Q2 2015 would be eight quarters.

In addition to the DVB-T2 transmission network available in matching with the deployment schedule, some key issues are to be noted:

a. The existing private FTA fixed broadcasters that do not get the DTT MUX operator licence, are entitled to get the content provider licence (LPPPS). The LPPPS can rent the broadcasting slot from the MUX operator (LPPPM). The lease tariff for renting the slot is dealt with in the Ministerial Decree No: 18/PER/M.KOMINFO/06/2012.

b. The non-commercial content providers, such as the local public broadcaster and / or the community broadcaster, have to lease the broadcasting slot from the public MUX operator TVRI.

In order to complete simulcast analogue content in digital format from current FTA terrestrial television broadcasters, i.e. local public broadcasters, community broadcasters and private broadcasters through the MUX operators DVB-T2 transmission network, the simulcast period 8 quarters will be shorten. Some critical issues which may affect implementation of simulcast period are covered in following the sections.

4.6.2 DTTB frequency plan assignment for Jakarta province

Appendix I of Ministerial Decree No: 23/PER/M.KOMINFO/11/2011 on Master Plan of Radio Frequency for Digital Terrestrial Television Broadcasting on Band 478-694 MHz assigns MFN channels 30, 33, 36, 39, 42 and 45 for Jakarta province (see Table 19).

The permanent MFN channel number 30, 33, 39 and 45 are found co-channel with existing analogue TV broadcasting from TViTRA, O Channel, TVRI and SCTV respectively (see note 1 in Table 35).

[31] MD No: 22/PER/M.KOMINFO/11/2011.

Table 35: Analogue TV channel vs. MFN MUX channel in Jakarta province

No	Analogue TV operator				DTTB MUX operator		
	Station Name	Ch	ERP H (W)	ERP V(W)	Station Name	*Ch	**ERP H (W)
1	Banten TV	22		76 764			
2	Bchannel	23		304 880			
3	MegaVision	25		38 382			
4	SpaceToon	27	614 115				
5	Kompas TV	28	121 051				
6	Trans TV	29	2 307 225				
7	TVMiTRA	30		9 660	Metro TV	32 (30)	157 400 (-9.5dB)
8	O Channel	33		528 749	tvOne	34 (33)	1 990 536 (+0.8dB)
9	ELSHINTA	35		1 850 589			
		36			BSTV-D	36	50 000
10	MNC TV	37	224 481				
11	TVRI	39	2 891 000		Trans TV-D	40 (39)	53 830 (-16.3dB)
12	Indosiar	41	97 757				
		42			TVRI-D	42	261 820
13	RCTI	43		3 156 312			
14	SCTV	45		1 730 418	SCTV	44 (45)	38 900 (-16.5dB)
15	AnTV	47	1 180 483				
16	Trans 7	49	1 897 366				
17	Global TV	51	2 153 227				
18	tvOne	53	1 671 436				
19	JakTV	55		60 976			
20	Metro TV	57	1 409 191				
21	Daai TV	59		305 604			
22	TVN	61		6 097			

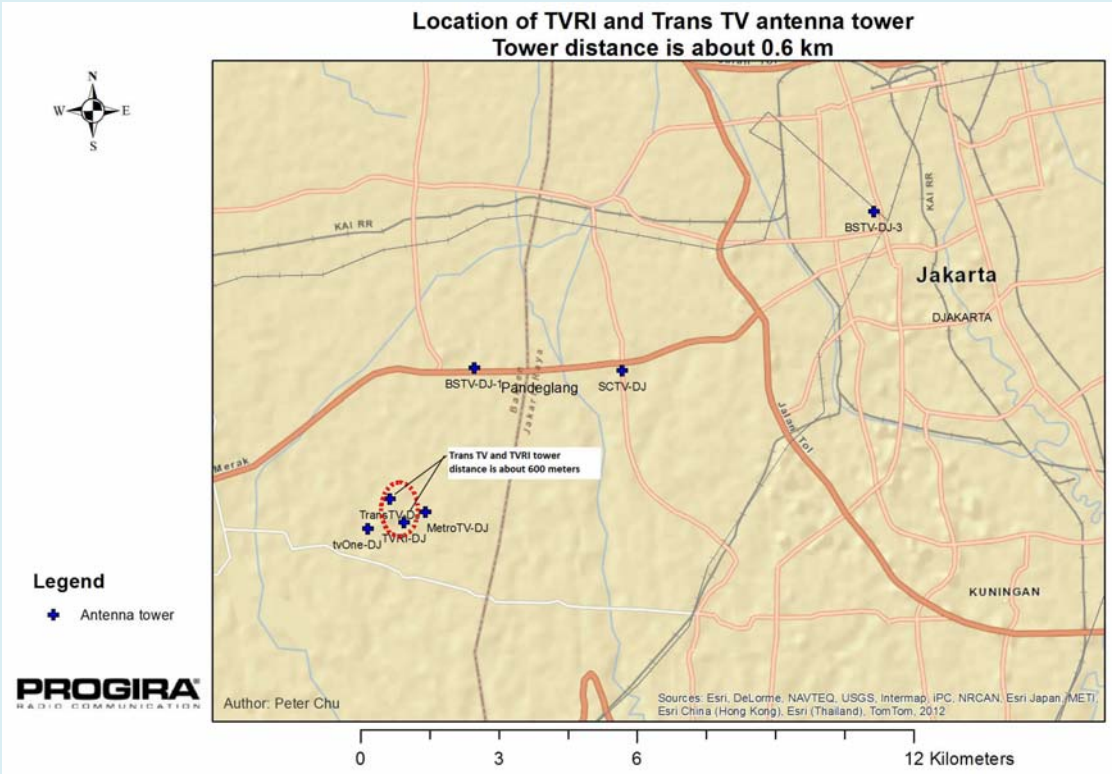
Notes to the table

1. ERP proposal from the six MUX operators is considered as preliminary data which will be evaluated by MCIT before conducting field monitoring.
2. The DTTB E.R.P. of each MUX operator ranges from about 39 kW to 199 kW - a big variation (7.1 dB) for DTTB coverage.
3. Antenna polarization of all MUX operators is horizontal which five MUX operators are same as their existing analogue network. Only the existing RCTI analogue is vertical.
4. The DTTB E.R.P. compared with existing analogue E.R.P. of same operator differs in range from +0.8 to 16.5 dB.
5. For the six DTT MUX operators, BSTV has a DVB-T2 transmission network in SFN, the others are designing MFN.
6. (*): Temporary radio frequency channel will be assigned to the four MUX operators because the permanent channel (numbers in brackets) is co-channel with existing analogue TV broadcasting.
7. (**): The DTTB E.R.P. respective to analogue E.R.P. of same operator is shown in the bracket.

Source: NRT

The data in Table 35 can be used to compare TVRI and Trans TV and conduct analysis of co-channel interference. The tower separation between these two stations is about 600 metres (Figure 48).

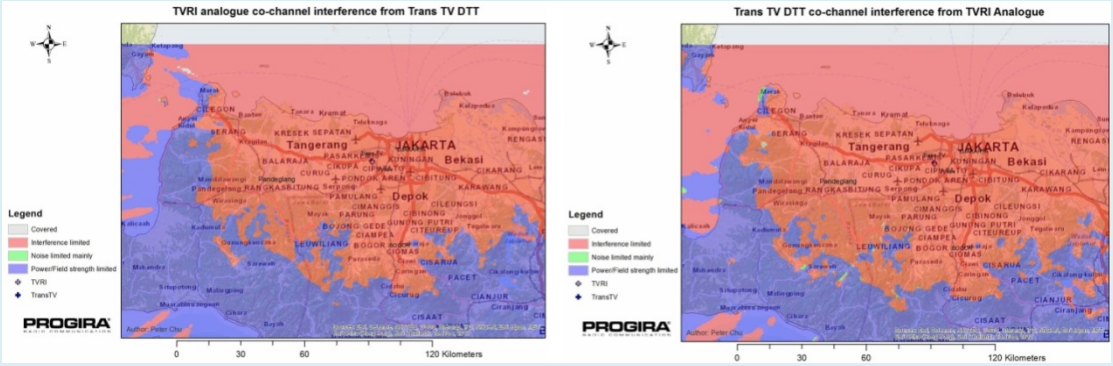
Figure 48: Distance of TVRI tower and Trans TV tower



Source: NRT/ITU

If both TVRI (analogue) and Trans TV (DVB-T2) use channel 39, the TVRI analogue coverage will suffer from co-channel interference from Trans TV DTTB signal. On the other hand, Trans TV DTTB also suffers from co-channel interference from TVRI analogue signal; see Figure 49 for the evaluation results, where red means under limited interference.

Figure 49: Example of co-channel interference between TVRI analogue and Trans TV DTTB



Source: NRT/ITU

In this case, to solve the co-channel interference issue, MCIT assigns temporary channel 40 for the affected operator, Trans TV before the ASO. The MUX operator with the temporary channel will move to a permanent channel after the DTTB migration in the area has been completed. MCIT will notify the MUX operator at least six months before the move.

4.6.3 Field strength at location of the test / measurement points

The MD No: 23/PER/M.KOMINFO/11/2011 on Master Plan of Radio Frequency for DTTB on Band 478-694 MHz defines the field strength at the location of the test / measurement points in each service area limited to a maximum of 42.6 dBµV/m. When Jakarta province in service zone 4 is used as an example, the calculated field strength results exceed the maximum field strength limit 42.6 dBµV/m at the location of the test / measurement points, see Table 36 to 39.

Table 36: Predicted DVB-T2 field strength at test points 1 and 2 in Jakarta province

MUX No	Jakarta - 1				Jakarta - 2			
	Tanjung Pasir				Sedari, Pedes			
	Cal FS (dBµV/m)	Max FS (dBµV/m)	Diff (dB)	St. Name	Cal FS (dBµV/m)	Max FS (dBµV/m)	Diff (dB)	St. Name
1	108.1	42.6	65.5	TVRI	78.1	42.6	35.5	tvOne
2	106.2	42.6	63.6	SCTV	78	42.6	35.4	SCTV
3	105.1	42.6	62.5	tvOne	77.2	42.6	34.6	TVRI
4	105	42.6	62.4	Trans TV	75.4	42.6	32.8	Trans TV
5	102.4	42.6	59.8	Metro TV	74.2	42.6	31.6	Metro TV

Source: NRT

Table 37: Predicted DVB-T2 field strength at test points 3 and 5 in Jakarta province

MUX No	Jakarta - 3				Jakarta - 5			
	Pinayungan, Teluk jambe				Ciburuy			
	Cal FS (dBµV/m)	Max FS (dBµV/m)	Diff (dB)	St. Name	Cal FS (dBµV/m)	Max FS (dBµV/m)	Diff (dB)	St. Name
1	67.5	42.6	24.9	tvOne	65.4	42.6	22.8	SCTV
2	65.9	42.6	23.3	SCTV	59.3	42.6	16.7	Metro TV
3	65.8	42.6	23.2	Trans TV	58	42.6	15.4	TVRI
4	64.8	42.6	22.2	TVRI	56.1	42.6	13.5	Trans TV
5	61.5	42.6	18.9	Metro TV	53.9	42.6	11.3	tvOne

Source: NRT

Table 38: Predicted DVB-T2 field strength at test points 6 and 7 in Jakarta province

MUX No	Jakarta - 6				Jakarta - 7			
	Sangiang Jaya, Cimarga				Cireudeu			
	Cal FS (dBµV/m)	Max FS (dBµV/m)	Diff (dB)	St. Name	Cal FS (dBµV/m)	Max FS (dBµV/m)	Diff (dB)	St. Name
1	61.7	42.6	19.1	TransTV	81.8	42.6	39.2	TVRI
2	59.6	42.6	17	TVRI	79.7	42.6	37.1	tvOne
3	52.4	42.6	9.8	tvOne	78.7	42.6	36.1	Metro TV
4	49.4	42.6	6.8	Metro TV	78	42.6	35.4	Trans TV
5	47.7	42.6	5.1	SCTV	75.8	42.6	33.2	SCTV

Source: NRT

Table 39: Predicted DVB-T2 field strength at test point 8 in Jakarta province

MUX No	Jakarta - 8			
	Sukajaya			
	Cal FS (dBµV/m)	Max FS (dBµV/m)	Diff (dB)	St. Name
1	77.6	42.6	35	tvOne
2	77	42.6	34.4	TVRI
3	74.7	42.6	32.1	Trans TV
4	72.1	42.6	29.5	SCTV
5	69.8	42.6	27.2	Metro TV

Source: NRT

The MUX operator BSTV provides SFN coverage formed by three SFN stations for Jakarta province, see Figure 41. The SFN total probability at location 1 to 8 at test / measurement points is calculated as shown in Table 40. The equivalent field strength at test / measurement points 1 to 5 and 7 to 8 exceed the maximum field strength 42.6 dBµV/m.

Table 40: BSTV SFN total probability at location 1 to 8 of test points

Jakarta test point no.	Jakarta 1	Jakarta 2	Jakarta 3	Jakarta 4	Jakarta 5	Jakarta 6	Jakarta 7	Jakarta 8
SFN total probability	1	1	1	0.744	1	0.258	1	0.994
[1]Emed (dBµV/m)	> 54.3	> 54.3	> 54.3	~ 48.2	> 54.3	NA	> 54.3	> 54.3

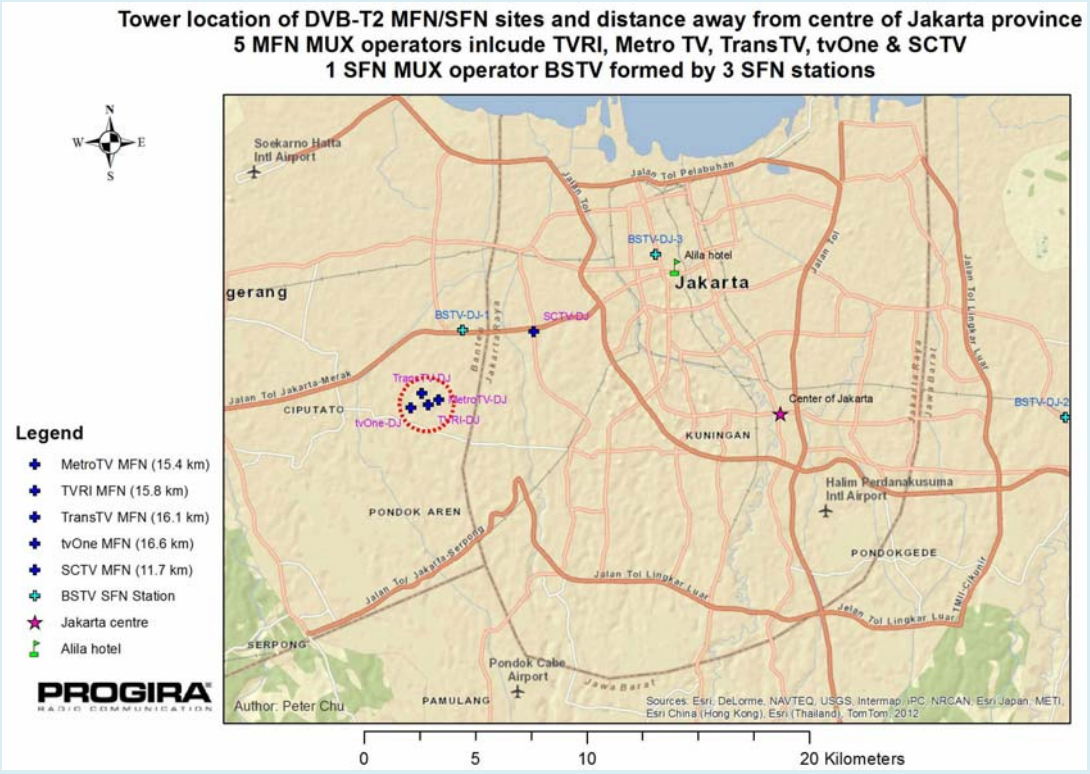
Notes:
1. Minimum median equivalent field strength reception height[2]; 50% time and 50% locations.
2. 10m for fixed reception.

4.6.4 DVB-T2 coverage performance

The common infrastructure design principles for DVB-T2 transmission network in the Republic of Indonesia is not considered because of the local FTA fixed terrestrial television market structure. As a result of the said policy, the awarded MUX operators setup the DVB-T2 transmission network by sharing existing infrastructure, e.g. transmission site and antenna tower of their analogue transmission network in the same areas of service.

As mentioned in section 4.4 of this report, significant difference of analogue TV coverage from 22 broadcasters in service zone 4 caused by individual antenna towers will affect the reception performance in the whole service zone. However, according to the five MUX operator DVB-T2 coverage for Jakarta province, four of the five MFN towers (TVRI, Metro TV, Trans TV and tvOne) are located within 1 km diameter and an average of 16 km west from Jakarta centre. For the other MUX operators, the SCTV MFN tower is about 6 km North-East from the four other MFN MUX operator towers and the distance to Jakarta centre is about 11.7 km, see Figure 50.

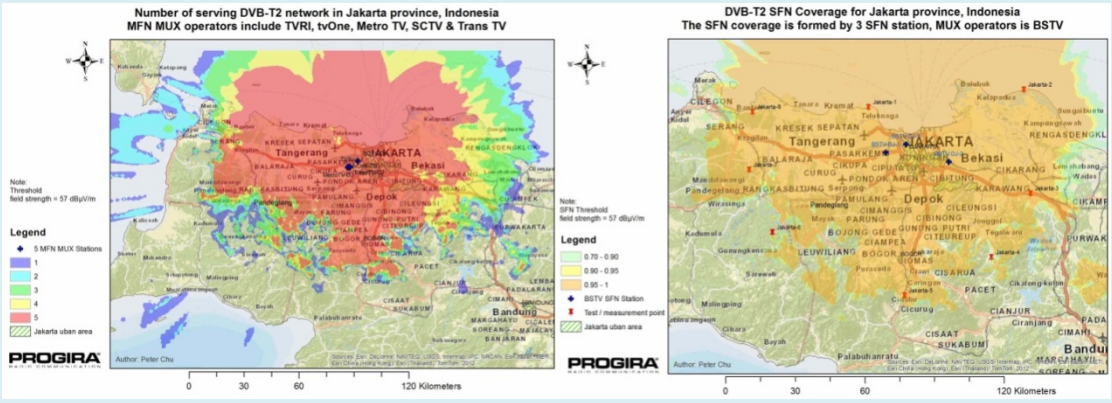
Figure 50: MUX operator tower location in service zone 4, Indonesia



Source: NRT/ITU

The MFN coverage formed by five MUX operators (TVRI, Metro TV, Trans TV, tvOne and SCTV) and SFN coverage provided by MUX operator BSTV are shown in Figure 50. The number of serving DVB-T2 MFN networks is shown on the left and the SFN coverage is shown on the right. The five MFN towers are grouped within an area of 20 km^2 (3.6 km x5.6 km). The MFN coverage performance in terms of number of serving networks can provide five networks in most of the main service areas, including Jakarta, Tangerang, Bekasi, Bogor and Depok. For the SFN formed by three SFN stations, most of the main coverage area has a > 95 per cent probability of SFN coverage. As a result of the analysis, the DVB-T2 coverage provided by six MUX operators has greatly improved the existing analogue coverage.

Figure 51: Predicted DVB-T2 coverage of MFN and SFN in Jakarta province service area

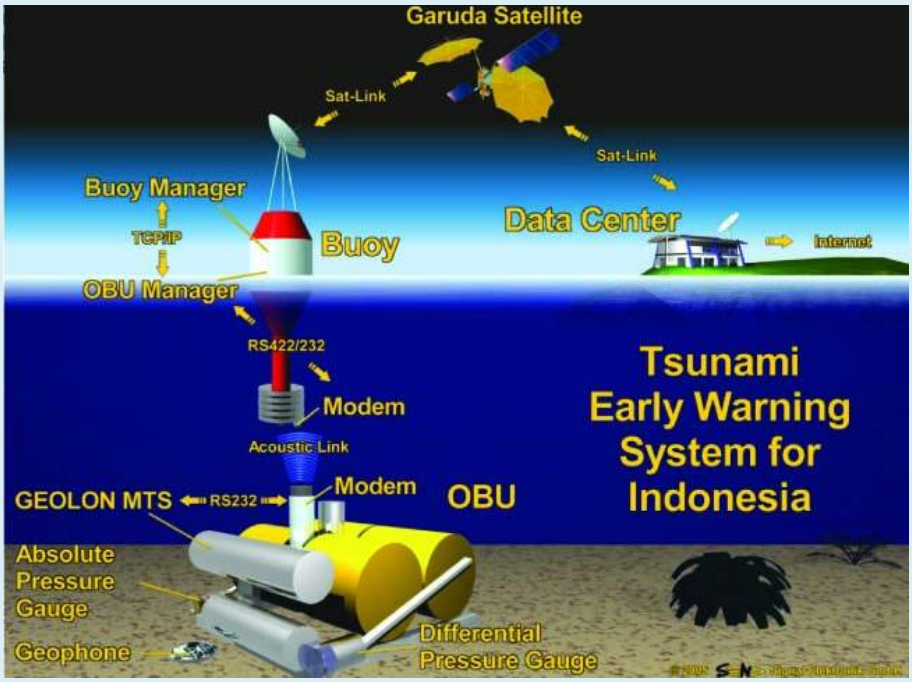


Source: ITU

4.7 Ensure the MUX operator do the right thing for EWS

On 26 December 2004, as a result of an earthquake, devastating floods occurred in many countries in South-East Asia, and Indonesia was one of the affected countries. Since then, the Indonesia Government has decided to put in place a Tsunami early warning system[32], see Figure 52. The system comprises stations at the seafloor, offshore buoys with GPS (Global Positioning System) and land stations (warning centre in Jakarta), communication is made via satellite. In case of a Tsunami the wave will be automatically detected and data will be transmitted to the warning centre within a few seconds or minutes.

Figure 52: Tsunami early warning system



Source: www.send.de

Effective warning is just one of the critical parts of a comprehensive risk management system that includes mitigation, preparedness, response and recovery. One of the delivered media for the early warning system, such as Tsunami and /or earthquake is by means of the DVB-T2 transmission network nationwide.

In addition to the technical requirements defined for the DVB-T2 receiver (set-top box), the telecommunication and free-to-air terrestrial television broadcasting industries play crucial roles in the effective dissemination of warnings. Action to ensure optimal contributions from the DVB-T2 transmission network and telecommunication network should be ensured through the collective efforts of the operators, facilitated by the regulator. Government should also work collaboratively with the electronic broadcasting industry to ensure effective contributions to early warning at national and local levels. An early warning system without education, planning and rapid action is sub-optimal.

The MUX operators have to fulfil and satisfy the requirement of EWS regulation for FTA fixed DTTB and they have to provide technical support for the EWS.

[32] www.send.de

4.8 Methodology to evaluate and monitor implementation of DTTB

In November 2011, the Government of Indonesia published a Regulation of the Minister of Communication and Information (number 22 in 2011) on the Implementation of FTA fixed DTTB instead of MD No. 39/2009. This regulation sets out the business model of digital TV broadcasting, multiplex broadcasting service zones, set-top box, and DTTB implementation of activities in the roadmap that have been and will be carried out between 2012 and 2018 including:

1. implementation of multiplexing selection process (June-July 2012);
2. setting of digital TV licensing regulations;
3. deploying network infrastructure multiplexing digital TV services in each zone;
4. the implementation period simulcast (time when services analogue and digital TV broadcasts done simultaneously);
5. analogue switch-off (turn-off analogue broadcasts and replace them with digital broadcasts).

For the evaluation and monitoring implementation on DTTB, Article 19 of the said Regulation states that:

> *"Minister does the monitoring and evaluation of FTA fixed DTTB implementation comprehensively, and Minister forms a team to do the monitoring and evaluation as referred on paragraph 1.*
>
> *The scope of evaluation and monitoring should include,*
>
> 1. *Transmission network performance*
> 2. *DTTB Reception performance*
> 3. *Execution of DTT Frequency assignment*
> 4. *Analogue FTA terrestrial television services during the simulcast period*
> 5. *Implementation of FTA fixed DTTB"*

4.8.1 Transmission network performance

Before giving approval for formal transmission on each DTTB station, the relevant MUX operators should submit the DVB-T2 transmission acceptance test report to MCIT. The acceptance test report should include,

a. transmitter performance - refer to technical requirement of the regulation;
b. signal coverage performance in the target service area;
c. field strength at the location of test / measurement defined by MCIT.

In addition to the initial broadcasting service approval, the MUX operators should submit an annual return transmission performance report based on records of the transmission interruption reports submitted to MCIT monthly. The outcome of the annual return report is to calculate the service reliability of the DTTB transmission network operated by relevant MUX operator. Some examples of the report format are shown in Table 41, 42 and 43.

Table 41: Example of monthly report format on interruption of services

Ref: No.	Site Name	Date (mm/dd/yy)	Time (hh:mm:ss)	Duration (hh:mm:ss)	Affected program channel	Causes

Source: Production based on similar case adopted in Hong Kong, China.

Table 42: Example of standard of service reliability report format

Serial No. of service interruption	Affected Area	Date/Time From/To	Duration	Affected program channel	Service reliability measured by the standard of availability average over the preceding six months			Causes
					Total hrs of service interruption in past 6 months	Total broadcasting hrs in past 6 months	Total hrs of service interruption in past 6 months	Total broad-casting hrs in past 6 months
xxx	Studio	mm/dd/yy hh:mm:ss hh:mm:ss	0.00.22	xxx	1st month:0 2nd month:0 3rd month:0 4th month:0 5th month:0:00:05 6th month:0 Total:0:00:27	1st month:537 2nd month:477 3rd month:471 4th month:497 5th month:497 6th month:474 Total:2953	99.99975%	Blank picture due to xxxx

Source: Production based on similar case adopted in Hong Kong, China.

Table 43: Example of transmission performance result for each DTT broadcast channel report format

Year 2012	Broadcast channel(s) on which service interruption over occurred			
	Broadcast channel #1		Broadcast channel #2	
	Total broadcasting hour (hh:mm:ss)	Total hour of service interruption (hh:mm:ss)	Total broadcasting hour (hh:mm:ss)	Total hour of service interruption (hh:mm:ss)
January				
February				
…				
December				
Total				

Source: Production based on similar case adopted in Hong Kong, China.

4.8.2 DTTB reception performance

The DVB-T2 fixed reception in terms of signal coverage in the main service area of Jakarta province should provide a good number of serving networks for MFN and 95 per cent probability for SFN. However, some of the current TV households receiving antenna may need to adjust direction and height in order to obtain optimal reception performance. If existing receiving antenna is installed for vertical reception, these antennae should be adjusted for horizontal reception to meet the MUX operator transmitting antenna design. During the simulcast period, the TV household especially individual households may face problems using only one antenna, which may not obtain the best reception performance for both FTA fixed analogue and DTTB services.

The MUX operator should report all reception complaint cases to MCIT monthly and cooperate with the ASO organizer in MCIT to sort out the reception problem and provide assistance to the affected TV household as much as possible.

4.8.3 Execution of DTT frequency assignment

In accordance to Ministerial Decree No: 22/PER/M.KOMINFO/07/2012 on the Usage of Radio Spectrum Band 478-694 MHz on Service Zone IV, Service Zone V, Service Zone VI, Service Zone VII and Service Zone XV for Transition to DTTB, Chapter IV Technical Evaluation indicates that:

1. *In the case of the radio channels for transition to DTTB as listed in the Annex of MD No. 22 of 2012, the Minister may carry out a technical evaluation including:*
   a. *analysis of the availability of the channel;*
   b. *observation, and*
   c. *field measurements.*
2. *Based on technical evaluation results, the technical parameter may be adjusted.*
3. *If after the adjustment of technical parameters the channels are still unavailable for use, the replacement radio channel will be allocated.*

Supervision and control of the implementation of this regulation is conducted by the Director General of Resources and Postal and Information Technology.

4.8.4 Analogue FTA terrestrial television services during simulcast period

During the simulcast period, existing FTA fixed analogue terrestrial television services must be protected. Article 5 in MD No: 23/PER/M.KOMINFO/11/2011 on Master Plan of Radio Frequency for DTTB on Band 478-694 MHz states that any use of radio frequencies for the purpose of FTA fixed DTTB as referred to under Article 3, shall meet the following technical requirements:

a. bandwidth of each DTTB channel is 8 MHz;
b. ratio of protection as contained in Annex II that are an integral part of the regulation;
c. field strength at the location of the test / measurement point in each service area is limited to a maximum 42.6 dBµV/m.

The field strength test/measurement points and location in Jakarta province are shown in Table 19 and Figure 41.

The field strength at the official test / measurement points can be predicted by a radio planning tool to verify that the transmission parameter proposed by the six MUX operators can meet the limited field strength and not exceed 42.6 dBµV/m. If the results do not meet the requirement, the MUX operator should propose remedial measures, e.g. using beam tilt and a tailor-made antenna pattern as well as adjusting E.R.P. to reduce the possible signal level interference for existing FTA fixed terrestrial television analogue services

4.8.5 Implementation of FTA fixed DTTB

Article 6 of MD No: 22/PER/M.KOMINFO/11/2011 on the Implementation of FTA fixed DTTB states:

1. *"The public MUX operator, TVRI has obligation to,*

   Transmit TVRI programme, local public broadcaster programme, and community broadcaster program within TVRI's service zone. Transmit at least 1 community broadcaster programme.

2. *Multiplex operator is permitted to carry one and additional two programmes from its own group, i.e. total 3 programmes including programmes from the same multiplexer. The remaining multiplexer capacity must carry existing analogue content in digital format from the commercial FTA terrestrial television broadcasters and/or new content provider subject to approval from the regulator."*

The content providers are required to migrate to DTTB no later than one year after the multiplex operator has commercially operated in the areas of service. The content providers need to pay lease fees to the MUX operator to transmit their broadcasting programme. For further details see: MD No: 18/PER/M.KOMINFO/06/2012 on Procedures for Calculating Leasing Tariff of Broadcast Slot on Multiplexing Implementation.

There are 22 analogue FTA terrestrial television services in the Jakarta province service area. Six of the 22 broadcasting programme operators (LPPPS) have been selected to operate the FTA fixed DTTB MUX

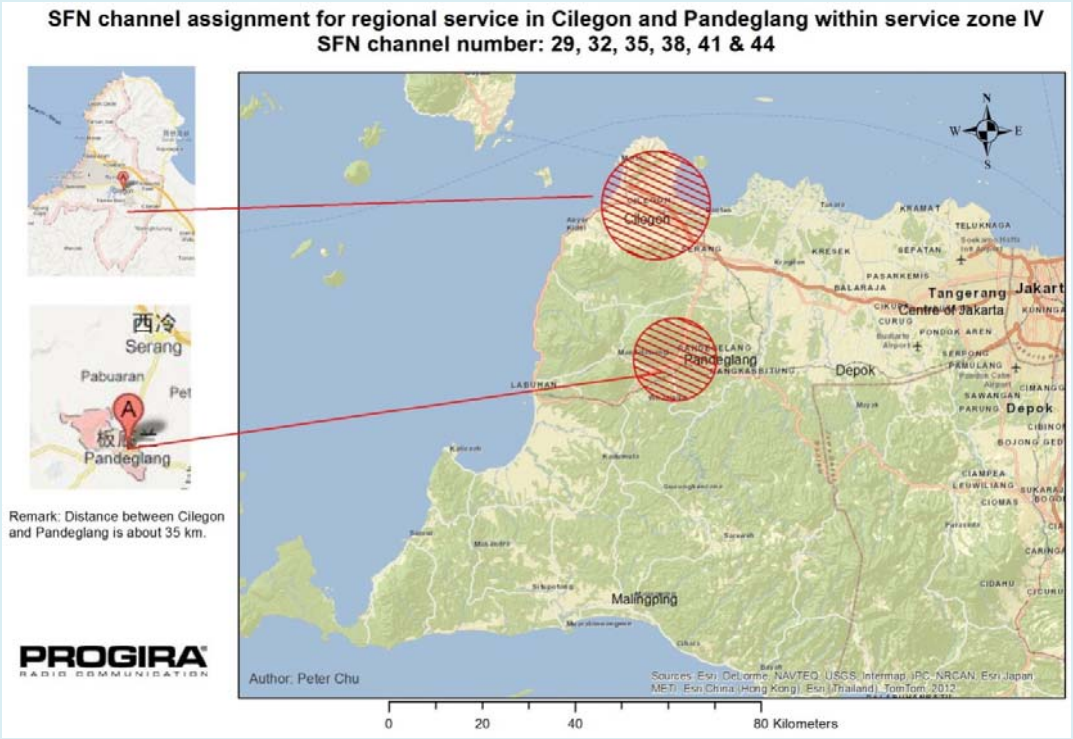
operator licence (LPPPM). The leasing of multiplexing slots to content providers (LPPPS) has to be monitored in accordance with the MD No: 18/PER/M.KOMINFO/06/2012.

4.9 SFN/MFN design with radio frequency allocation

In accordance to MD No: 23/PER/M.KOMINFO/11/2011 on Master Plan of Radio Frequency for DTTB in Band 478-694 MHz, MCIT decides that the DTTB frequency plan is sharing existing UHF band 478-694 MHz which is currently used for analogue terrestrial television broadcasting services in nationwide. According to Appendix I of No: 23/PER/M.KOMINFO/11/2011 (mapping radio channel for broadcasting DVB-T), most of the regional service areas in 15 service zones were assigned with six UHF channels for MFN operation. It is noted that some areas of service within the same service zone are assigned with six UHF channels for SFN operation because these areas of service are separated and isolated by hilly terrain.

Again, taking service zone 4 as an example, UHF channels 29, 32, 35, 38, 41 and 44 are assigned for regional services in cities including Cilegon and Pandeglang (see Figure 53).

Figure 53: SFN channel assignment for regional service in Cilegon and Pandeglang



Source: ITU

As mentioned in section 4.5.3 of this report, the DVB-T2 parameter of scenario 3a is suitable to limit areas of SFN setup, see Table 33. The guard interval of the scenario 3a is 224 µs which support distance 67 km between transmitters in the SFN in case of signal arrival outside the guard interval. The same parameter of DVB-T2 is also suitable for gap-filler setup within the MFN coverage area.

In order to meet the DTT channel allocation plan for SFN and MFN networks, the following technical transmission network design issues should be considered.

4.9.1 Design of MFN transmission network

The MFN transmission network design is similar to the engineering design principle for an analogue transmission network because MFN is designed using different operating channels assigned by the regulator. However, some of the MFN channels are re-used in other areas of service in accordance with the frequency plan undertaken by MCIT. The MUX operator has to design the MFN signal coverage to meet the target coverage specified by the regulator, and has to ensure that the signal strength of the MFN station does not exceed maximum field strength at the location of test / measurement points defined by MCIT.

In order to meet the strict requirements defined by MCIT, the operator should design the MFN network using tailor-made transmitting antenna, horizontal pattern and vertical pattern beam shaping, and beam tilt methods to control the radiation signal to the target service area and minimize the signal strength to the location of test / measurement points defined by MCIT.

4.9.2 Design of SFN transmission network

The SFN transmission network design is different to the MFN because all SFN stations in that area use the same TV channel. Two essential elements of the working criteria for SFN include:

1. synchronization in transmitting frequency with identical signal of all the SFN transmitting stations within the frequency precision accuracy of less than 1 Hz, and
2. to keep arrival time of signals in the service area within the guard interval to prevent the symbol error.

Because of the local TV market structure in the Republic of Indonesia, shared use of existing analogue transmitting antenna systems for DVB-T2 broadcasting is a common design principle of the awarded MUX operators. The advantages include project cost savings and a reduction in the DVB-T2 deployment project time. If Omni antenna is commonly used in the existing analogue transmission network, then the MUX operator is unable to change the radiation pattern to minimize the overlapping area under SFN.

If the SFN coverage has been designed with large overlapping with other SFN stations, and there is a loss of synchronization of SFN in any one of the transmission stations, the non-sync signals become interference signals, and the SFN coverage in overlapping service areas may collapse. Hence, the overlapping service area becomes a key consideration as one of the SFN coverage design issues.

When designing the SFN coverage the following technical points should considered:

1. Minimum disturbance to the digital TV network coverage.
2. Sufficient and reasonable protection ratio D/U $\geqq$ 20dB in major service areas in case of lost synchronization.
3. Transmitting antenna of the various stations in the SFN employs tailor-made antenna system using horizontal and vertical radiation patterns, beam shaping and beam tilt method to achieve the best results in the service areas with matching overlaps and minimum deteriorations as far as possible could be considered as an option.

More information about SFN network design can be found in functional building block 4.3 (network planning) in the ITU Guidelines.

4.10 Environmental impact during transition to DTTB

The digital television transition from analogue TV is a worldwide trend. The primary involvement is the conversion of analogue terrestrial television to digital terrestrial. However, it also involves analogue cable conversion to digital cable, as well as analogue to digital satellite. The Geneva 2006 Agreement sets 17 June 2015 as the date after which countries in Region 1 may use those frequencies currently assigned for analogue television transmission for digital services, without being required to protect the analogue

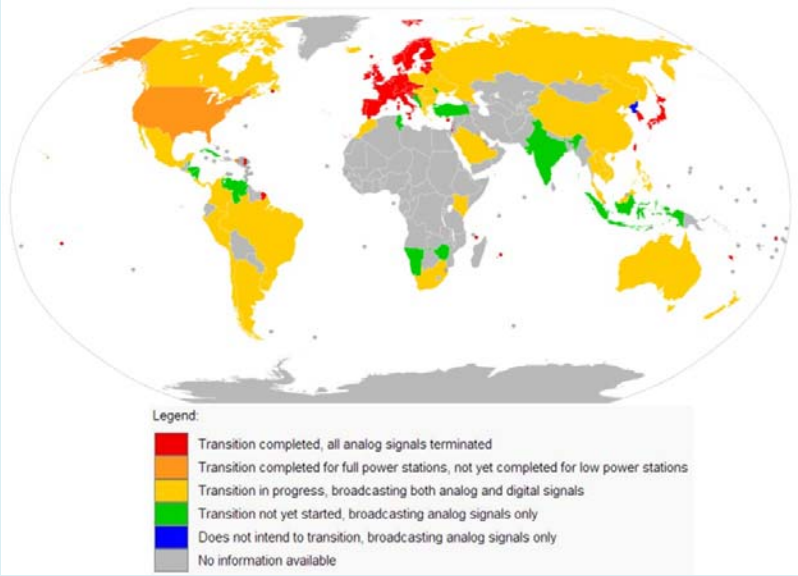
services of neighbouring countries against interference. This date is generally viewed as an internationally mandated analogue switch-off date, at least along national borders. The European Commission has recommended that digital switchover in Region 1 only should be completed by 1 January 2012 - Commission Recommendation 2009/848/EC, of 28.10.2009. However, the deadline for digital switchover in VHF band in some 33 countries is in 2020.

As of 2012, a total of 37 country transitions had been completed. Figure 54[33] illustrates the digital television transition process. The switchover for individual countries varies; in some countries it is being implemented in stages as in India and the United Kingdom, where each region has a separate date to switch off. In others, the whole country switches on one date, such as the Netherlands, which switched off all analogue services on 11 December 2006.

During the transition, superfluous analogue TV equipment needs to be removed which will otherwise generate environmental issues during digital television transition, e.g. unused analogue TV receivers and some obsolete receivers dumped in landfills where they represent a source of toxic metals such as lead and lesser amounts of materials such as barium, cadmium and chromium. The ASO planning should take this issue into account to propose the appropriate remedial measures.

In connection to this topic, ITU will consider with environment impact issues caused by the transition to digital in the ITU-D Rapporteur Group Meetings[34].

Figure 54: Global transition process



Source: http://en.wikipedia.org

5 Recommendations

In accordance with discussions with the Indonesia NRT members during the two country visits, and in order to implement the national roadmap for a smooth transition from analogue to DTTB, it is recommended to take note of the following critical topics.

[33] http://en.wikipedia.org/wiki/Digital_television_transition#Transitions_completed

[34] Rapporteur Group Meeting for Question 24/2: ICT and climate change, 8 April 2013, Geneva, Switzerland, www.itu.int/net3/ITU-D/stg/blkmeetings.aspx?blk=13157

1.	Tailor-made affordable set top-box	In order to speed up development progress of tailor-made STB with the EWS feature, the actions below should be treated as high priority: a. Based on the research on DTV with EWS experience in 2007 in Indonesia, NRT should continue to develop the EWS software and seek technical cooperation with the DVB Project to determine the EWS specification to be part of the future revised DVB-T2 standard. b. Other countries in Asia may also be interested in the EWS as part of the DVB-T2 standard. It is helpful to share the requirements by means of organizing technical coordination events and workshops with the support from DVB Project in order to speed up the EWS feature to be included in the DVB-T2 standard.
2.	Public communication to the stakeholder	The six MUX operators provide DVB-T2 broadcasting services using independent towers and transmitting antenna with different E.R.P. and use different DVB-T2 parameters for network configuration. For each MUX operator's DVB-T2 signal strength variation at same receiving location will occur. The websites of the ASO organizer, network operators and broadcasting programme operators should provide information updates, guidelines to help the public and stakeholders to solve possible DTTB reception problems. Moreover, the public communication should also deal with the matter of DTTB channel replacement from temporary to permanent into account to plan the channel transition.
3.	Create new digital content	Based on the finalized net bit rate proposed by the MUX operators, it is suggested that the number of spare broadcasting slots in each service zone should be evaluated. In accordance with the bit rate distribution model, the NRT will be able to indicate how many spare broadcasting slots can be made available to new content providers to encourage new digital content. Provision of new digital content during the DTTB migration has been proved to have a successful impact on DTT take-up; notably DTTB deployment in Hong Kong, China.
4.	Reception issues	The DTTB reception performance in service zone 4 is better than existing analogue reception because all existing analogue content can be provided by six MUX operators instead of 22 individual content providers. The DVB-T2 parameters proposed by each MUX operator are different. In facing the different parameters, the compatibility of DVB-T2 STB has to be evaluated before or during the test broadcasting period. Following the experience in zone 4, it is recommended to review the pros and cons on existing DTTB network design principles in other zones.
5.	Ensure implementation of DTTB deployment in schedule	The DTTB deployment period in each service zone, will depend on the time needed by existing analogue content operators to migrate to DTTB and will take no longer than one year. Therefore, the actual DTTB deployment period depends on early completion of the DVB-T2 transmission network and the

		migration progress undertaken by the content providers. The effective monitoring of the DTTB migration progress is crucial.
6.	Ensure implementation of simulcast in schedule	Because some of the permanent DTTB channels might have co-channel interference with existing analogue channels in some areas of service, MCIT has arranged for temporary DTTB channels to be used before completion of the ASO in that service area. Co-channel and/or adjacent channel interference during the transition from temporary DTTB channels to permanent DTTB channels needs to be managed and monitored. If the DTTB field strength at location of test / measurement points exceed the maximum field strength level, remedial measures for the network parameter adjustment has to be carried out and the adjustment may involve change of E.R.P., parameters and antenna pattern, etc. These issues have to be solved or full deployment of DTTB, especially in the Jakarta province, will be delayed resulting in a shorter simulcast period.
7.	Ensure MUX operators do the right thing for EWS	One of the delivered media for the early warning system is by means of the DVB-T2 nationwide transmission network. An effective early warning system needs the appropriate education, planning and rapid action. The MUX operators have to fulfil and satisfy the requirement of EWS regulation for FTA fixed DTTB. They must also provide the technical system to support EWS.
8.	Evaluate and monitor DTTB implementation	Some critical topics need to be concerned including: a) transmission network performance, b) DTTB Reception performance, c) execution of DTT Frequency assignment, d) analogue FTA terrestrial television services during simulcast period, and e) implementation of DTTB.
9.	SFN/MFN design meets with the radio frequency allocation	In order to meet the strict requirements defined by MCIT, the operator that designs the MFN network should consider using a tailor-made transmission antenna pattern to control the radiation signal to the target service area and minimize the signal strength at the location of test / measurement points which are determined by MCIT. If the SFN coverage designs with large overlapping with other SFN stations, once the loss of synchronization of SFN in any one of the transmitting stations, a non-sync signal becomes an interference signal, and the SFN coverage in the overlapping service areas may collapse. Hence, the overlapping service area becomes a key consideration as one of the SFN coverage design principles.
10.	Environmental impact during transition to DTTB	During the transition, removal of superfluous analogue TV equipment which will generate environmental issues during digital television transition, e.g. unused analogue TV receivers and some obsolete receivers are simply dumped in landfills where they represent a source of toxic metals such as lead and lesser amounts of materials such as barium, cadmium and chromium. The ASO planning should take this issue into account to propose the appropriate remedial measures.

Annex 1: Functional building blocks related to Phase 1 of the roadmap for the regulator

DTTB Policy development

The selected functional building blocks related to Phase 1 of the roadmap are shown in Figure 19 and are reproduced here.

Section 3.4.2 describes Phase 1 of the roadmap for the regulator.

This Annex gives an overview in the form of tables of the status of each of the selected functional building blocks related to Phase 1 by means of the following codes:

A the activities on key topics and choices that are **already completed;**

B the activities on key topics and choices that are **already decided;**

C the activities on key topics and choices that are **partly decided**;

D the activities on key topics and choices are under consideration and are **not decided**;

E the activities on key topics and choices **need revision**;

NA the activities on key topic and choices are **not applied in the local TV market.**

The selected functional building blocks are presented in the order of the number of the block. This number refers to the corresponding Chapter in the ITU Guidelines, where more information and implementation guidelines can be found.

The grey blocks are not described in the ITU Guidelines and not described in the tables below. These blocks represent activities that are not specific to digital terrestrial television.

2.11 National telecommunication broadcast and media acts

Brief description	**This section addresses the compliancy of the intended policy decisions with the existing and relevant regulatory framework. Very often this regulatory framework comprises national telecommunication, broadcast and media acts. The relevant regulatory framework in Indonesia is given in Table 14 of this report.**
Objective	To be compliant with existing regulations, which might also include regulations on cross and foreign ownership and state aid.

2.11	Main activities	Status code	Observation / Advice
1	Make inventory of current legislation.	A	
2	Map inventory on DTTB introductions and compare with 'best practices'.	A	
3	Identify gaps and draft proposals for additional and/or changes in legislation (based on 'best practices').	A	
4	Determine planning for changes in the law and determine 'must haves' for launching DTTB ASO.	A	

2.1 Technology and standards regulations

Brief description	**In this section the key policy decisions are outlined on adopting or promoting DTTB technology and associated standards.**
Objective	This section deals with the question whether a standard should be prescribed/promoted and for what system/network elements.

2.1	Main activities	Status code	Observation / Advice
1	Carry out market research/surveys to identify industry and consumer needs for standardization.	A	
2	Determine minimum set of receiver Standards for the DTTB market, based on the market developments and the planned licensing procedures, terms and conditions.	A	Specification of STB with EWS features is available refers to the MD No. 35 of 2012. The production of STB with EWS is pending for development of chip and test result.
3	Map on existing standardization policies/rules and determine additional standardization needs.	A	The MD No. 35 of 2012 has defined additional standardization needs.
4	Assess impact on industry and end consumers.	B	The DVB-T2 STB for service zone 4 does not include EWS because it is mentioned in section 4.1 of this report. The future upgrade to EWS will involve impacts on technical and cost issues.

2.1	Main activities	Status code	Observation / Advice
5	Determine receiver requirements and include in frequency licence terms and conditions and/or media permits and authorizations.	A	The awarded multiplex operators commit to provide DVB-T2 STB for the 5 service zones, see Table 17.
6	Determine communication messages, planning, standardization/testing bodies and methods (including logos and labelling).	B	This activity should be treated in high priority as it will affect to the STB deployment in the consumable market.
7	Update the National Radio Frequency Allocation Table (NRFAT) and Legislation.	A	

2.10 Defining digital dividend

Brief description	The digital dividend is the spectrum in Band III, IV and V that is available after analogue television has been transferred to digital television.
Objective	Freeing up spectrum for more valuable services.

2.10	Main activities	Status code	Observation / Advice
1	Analyse current and future market developments and possibly conduct market consultation(s) in the broadcast (and telecoms) industries.	D	
2	Assess current and future market needs for DTTB, possibly based on formulated legislation and policies.	D	
3	Assess available spectrum after ASO, based on ASO plans, National Spectrum Plan and ITU-R Regulations.	C	VHF band 174-223 MHz currently is used for analogue TV may be allocated for DAB. The UHF 694-806 currently allocated for analogue TV is under study for digital dividend.
4	Map spectrum needs on available spectrum and determine priorities and assign spectrum to broadcasting..	B	
5	Possibly draft spectrum re-farming plans and compensation schemes (for network and receiver re-tuning activities), reserve budgets.	A	The proposed permanent DTT channels has co-channel interference problem with existing analogue TV, temporary DTT channels are used for the DTTB deployment. After completion of simulcast, the MUX operators are required to change from temporary channel(s) to permanent channel(s).
6	Update National Spectrum Plan and align licence terms and conditions for DTTB services.	A	

2.4 Update of the national spectrum plan

Brief description	**The National Spectrum Plan reflects the long, medium and short-term planning of the available national spectrum resources for DTTB services in a particular country. It may also include the stipulated assignment procedures for the various services and a national frequency register, including all the assigned licences and licensees.**
Objective	With a National Spectrum Plan the regulator strives to ensure effective and efficient spectrum usage and compliance with international standards. As well as informing market parties on the current and future (intended) use of spectrum.

2.4	Main activities	Status code	Observation / Advice
1	Make an inventory of current spectrum use in the broadcast bands (bands III, IV and V).	A	
2	Register use and provide rules for self-registration.	A	
3	Carry out market analyses and consultations and forecast future spectrum needs.	C	
4	Determine re-farming needs and assess impact on existing and future users (including service and financial impact), possibly reserve budget for re-farming efforts and damages.	D	The transition from a temporary DTT channel to a permanent DTT channel will involve re-framing efforts and interruption on DTTB services during the channel switch-over in simulcast period.
5	Determine publication content, dates and formats for the National Spectrum Plan.	C	
6	Determine budget for spectrum management and administrative fees.	A	

2.13 Communication to end consumers and industry

Brief description	**Providing adequate and timely information ensure and support a rapid service take-up, a profound market development (i.e. content development and receiver supply / availability) and a smooth service transition.**
Objective	Informing the public and the television industry about the changes in the areas of legislation, policies and regulations is a government led task.

2.13	Main activities	Status code	Observation / Advice
1	Make inventory of communication scope	A	
2	Determining the key communication moments and topics.	A	TV Digital Indonesia website provides information on DTTB development in general. In matching with the deployment schedule in 2013, more recent deployment information should be included in this website, including the STB availability and DTTB service deployment schedule, etc.
3	Determine communication tools for each target group/audience.	A	
4	Instruct communication bodies and committees.	C	

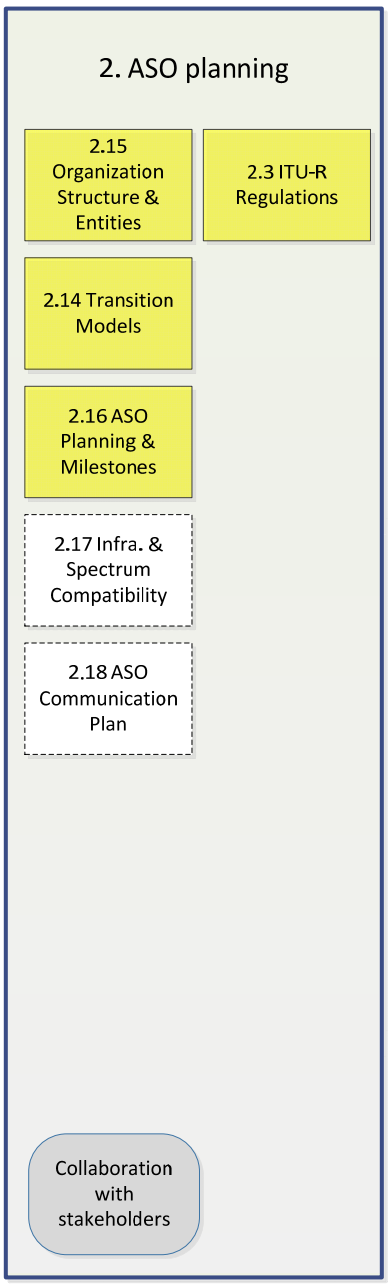
2.12 Law enforcement and execution

Brief description	**Convergence of broadcasting and telecommunication services (e.g. by introducing MTV, or combined DTTB and internet TV services) may initiate the need to review the entities dealing with law enforcement and execution.**
Objective	Provision of activities that are preferably carried out in parallel to the activities related to: 2.1 technology and standard regulations, 2.10 digital dividend and 2.11 national telecommunication, broadcast and media acts, but could also be carried out later. Introduction of DTTB and MTV is not dependent on it but, once introduced, law enforcement and execution in relation to DTTB and MTV will be more effective.

2.12	Main activities	Status code	Observation / Advice
1	Make inventory of current regulatory bodies.	B	
2	Map inventory on DTTB/MTV introductions and compare with 'best practices'.	B	
3	Identify gaps and draft proposals for additional regulatory bodies and/or changing existing bodies (based on 'best practices').	B	
4	Determine planning for either establishing new regulatory bodies or changing existing bodies and determine 'must haves' for launching DTTB/ASO and MTV.	C	

Annex 2: Functional building blocks related to Phase 2 of the roadmap for the regulator

ASO Planning



The selected functional building blocks related to Phase 2 of the roadmap are shown in Figure 19 and are reproduced here.

Section 3.4.3 describes Phase 2 of the roadmap.

This Annex gives an overview in the form of tables of the status of each of the selected functional building blocks related to Phase 2 by means of the following codes:

A the activities on key topic and choices that are **already completed;**

B the activities on key topic and choices that are **already decided;**

C the activities on key topic and choices that are **partly decided**;

D the activities on key topic and choices are under consideration and are **not decided**;

E the activities on key topic and choices **need revision**;

NA the activities on key topic and choices are **not applied in the local TV market.**

The selected functional building blocks are presented in the order of the number of the block. This number refers to the corresponding Chapter in the ITU Guidelines, where more information and implementation guidelines can be found.

2.15 Establishment of organizational structures and entities

Brief description	**The ASO process is a complex and time consuming operation and a special purpose entity (e.g. Task Force, Committee or separate company) may coordinate the overall process and planning. In Indonesia, this task is assigned (not formally yet) to the National DTTB Committee.**
Objective	A coordinated ASO process between all involved parties and stakeholders.

2.15	Main activities	Status code	Observation / Advice
1	Establish overall coordination needs.	A	
2	Form or extend special purpose vehicle, establish clear mandate.	A	
3	Establish budget and communication means (air-time, website, etc.).	A	

ITU-R regulation

Brief description	**ITU-R regulations entail the Radio Regulations (RR) and in particular the table of Frequency Allocations (Region 3) and the relevant provisions of the World Radiocommunication Conference 2007 (WRC-07).**
Objective	In this phase of the roadmap, to identify at a high level the spectrum availability and requirements for DTTB (and other services)

2.3	Main activities	Status code	Observation / Advice
1	Determine applicability and implications of the GE06 Plan on (a) the planned national DTTB services and (b) ASO (possibly indicated in the National Spectrum Plan) and (c) the operational DTTB.	B	NRT will follow up matters mentioned in GE06 which is relevant to Republic of Indonesia.
2	Determine necessary changes to planned licensing procedures, terms and conditions for DTTB services and ASO plans.	B	
3	Determine necessary changes to assigned frequency (and possibly content) licences for operational DTTB.	B	
4	Determine necessary changes/exemptions to the GE06 Plan.	NA	
5	Possibly determine necessary budget for compensations and network retuning activities.	B	NRT decides no compensation to MUX operator and broadcasters

2.14 Defining transition models

Brief description	This section deals with the situation that analogue television broadcasts have to be stopped and the existing analogue services are migrated to a DTTB platform in one coordinated effort, led by the national Government (i.e. the ASO process). This section deals with ASO or transition model in Indonesia.
Objective	Existing analogue services are migrated to a DTTB platform in one coordinated effort and without service interrupts.

2.14	Main activities	Status code	Observation / Advice
1	Check existing legislation and policies for public (and commercial) television service (e.g. FTA) and coverage stipulations (e.g. nationwide coverage).	A	
2	Check ITU-R Regulations and any existing/formulated receiver regulations for impact on ASO.	A	Already has regulation on DTT receiver
3	Carry out market research on ASO affected viewers/listeners. Identify any hidden viewers/listeners (2nd television sets, regional programming, prisons, etc.), Identify impact and risk areas.	B	NRT treats this matter as on-going activity.
4	Analyse and assess complexity and size of network modifications and receiver transitions.	B	Broadcasting commission Indonesia (KPI) to do inspection and watching the programme content
5	Involve and discuss ASO with content aggregators (esp. public broadcaster) and consumer associations.	B	
6	Decide transition model (simulcast period and ASO phasing).	A	Well define the period for DTTB deployment and simulcast as well as include ASO by phase approach.

2.17 Identifying infrastructure and spectrum compatibility

Brief description	This section deal with incompatibility happens in the case of both digital and analogue services in the same geographical area and the digital and analogue frequency cannot coexist.
Objective	Incompatibility can happen in both transmitter infrastructure (e.g. antenna system, equipment space and power/back-up/no break, etc.) and trade off in network design due to spectrum in limited geographical area cannot coexist.

2.17	Main activities	Status code	Observation / Advice
1	Check Legislation, ITU-R Regulations, National Spectrum Plan and establish service priorities and acceptable interferences levels.	A	
2	Assess available antenna space and sites and site/antenna sharing possibilities/options.	B	The common infrastructure design principle is not considered because of local TV market structure.
3	Calculate inference levels, service coverage and check EMC compatibility.	A	Because some of the permanent DTTB channels are co-channel with existing analogue, temporary DTTB channels will be used during the simulcast period.
4	Develop site transition scenarios (including temporary installations and sites).	B	
5	Assess costs, time lines and service impact.	B	

2.16 Setting up ASO planning and milestones

Brief description	Overall ASO planning and its key milestones, managed by the NRT.
Objective	ASO planning respecting the set dates for ASO and providing a progress monitoring

2.16	Main activities	Status code	Observation / Advice
1	Draft comprehensive ASO planning (milestones and activities) and assign tasks and responsibilities (including core project management team).	A	The member of ASO organizer was formed under MCIT.
2	Establish ASO project monitoring framework and reporting structure.	A	

2.16	Main activities	Status code	Observation / Advice
3	Identify ASO project risks and draft risk mitigation plans (including fall back and/or roll back scenarios)	B	Because changing a temporary DTTB channel to a permanent DTTB channel is needed at the end of simulcast, the risk mitigation plan is crucial during the changeover period.

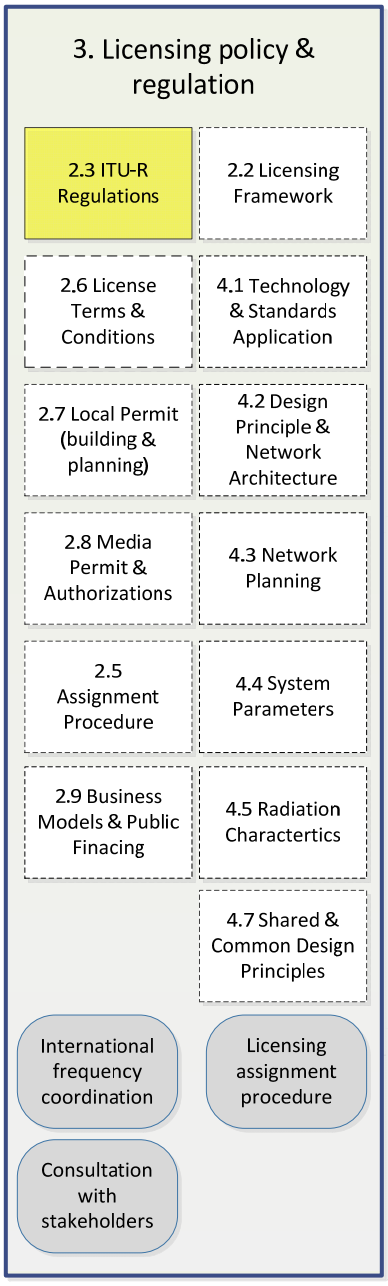
2.18 Drafting ASO communication plan

Brief description	This section focuses on communication to the viewers and other stakeholders in the DTTB value chain.
Objective	To help viewers prepare adequately, the whole broadcast community needs to address all viewers relying on the analogue terrestrial platform using targeted communication tools that can reach out to diverse population segments.

2.18	Main activities	Status code	Observation / Advice
1	Draft communication plan (including target audiences, timing, means, etc.).	A	
2	Continuous alignment with ASO planning	B	The experience obtained in service zone 4 is worthy to be used as reference for alignment with ASO planning for other service zones.
3	Determine and establish compensation schemes and systems, include in communication plan.	B	

Annex 3: Functional building blocks related to Phase 3 of the roadmap for the regulator

Licensing policy and regulation



The selected functional building blocks related to Phase 3 of the roadmap are shown in Figure 19 and are reproduced here.

Section 3.4.4 describes Phase 2 of the roadmap.

This Annex gives an overview in the form of tables of the status of each of the selected functional building blocks related to Phase 3 by means of the following codes:

A the activities on key topics and choices that are **already completed;**

B the activities on key topics and choices that are **already decided;**

C the activities on key topics and choices that are **partly decided**;

D the activities on key topics and choices are under consideration and are **not decided**;

E the activities on key topics and choices **need revision**;

NA the activities on key topics and choices are **not applied in the local TV market.**

The selected functional building blocks are presented in the order of the number of the block. This number refers to the corresponding Chapter in the ITU Guidelines, where more information and implementation guidelines can be found.

2.2 Setting up the licensing framework

Brief description	**For the TV market in Indonesia the DTTB licence model a mixed type is preferred, e.g. model A for replacement licence for CSB; model B for replacement licence for PSB and wireless infrastructure licence.**
Objective	The objective of the licensing framework should be to actually implement the defined policy objectives for the introduction of DTTB, including the analogue switch-Off (ASO).

2.2	Main activities	Status code	Observation / Advice
1	Make inventory of current licensing framework and check applicability for DTTB service introductions.	B	
2	Assess and evaluate different options for licensing DTTB services.	B	In order to meet local TV market structure, the DTTB licence model B mentioned in ITU guidelines has been modified named model B1.
3	Assess compatibility with ASO plans and National Spectrum Plan.	B	
4	Possibly revise current licensing framework and assess impact.	B	
5	Draft planning for licence assignment, framework changes and update National Spectrum Plan (and possibly legislation).	B	DTTB MUX operator licences had been issued for service zone 4, 5, 6, 7 and 15 in 2012. The second selection of MUX operator for other service zones is scheduled to be conducted in 2013.

2.5 Formulation of assignment procedures

Brief description	**Assigning spectrum/broadcast rights for DTTB services and the common instruments and procedures applied.**
Objective	Assign spectrum/broadcast rights to the PSB, commercials broadcasters or any other entity (such as the common multiplex/network operator) in a transparent manner in line with the ASO plan.

2.5	Main activities	Status code	Observation / Advice
1	Consult market (industry players and consumers) on assignment methods and licence terms and conditions.	B	
2	Evaluate results and select assignment method and procedures.	B	Experience in selection of MUX operator for service zone 4, 5, 6, 7 and 15 will be used for other services zone of same activity.

Brief description	Assigning spectrum/broadcast rights for DTTB services and the common instruments and procedures applied.		
3	Draft detailed plans and planning for DTTB assignment procedures.	B	
4	Publish assignment planning and procedures and update National Spectrum Plan (and possibly legislation).	B	

2.6 Formulating licence terms and conditions

Brief description	The licence terms and conditions of the DTTB frequency or spectrum licences.
Objective	Assigning DTTB frequency rights is carried out in conjunction with assigning the other two types of rights as well. The objective is to have all rights covered, in the right balance, between the various licence types.

2.6	Main activities	Status code	Observation / Advice
1	Check relevant paragraphs/ entries in legislation/policies, ASO plans, National Spectrum Plan.	B	
2	Analyse market conditions and assess 'level-playing-field' requirements/provisions.	B	
3	Determine DTTB licence terms and conditions and align with local building permit policies and media permits/authorizations and their planning.	B	
4	Update National Spectrum Plan (and possibly ASO plans).	B	

2.7 Drafting policies for local permits

Brief description	This section addresses the necessary permits and authorizations from local government required to establish and operate broadcast transmitter stations.
Objective	For economics of rolling out transmitter sites, the regulator and local government have an important role in transmitter site build-up and site sharing arrangements, e.g. building permit and site sharing rules are introduced.

2.7	Main activities	Status code	Observation / Advice
1	Check relevant paragraphs/ entries in legislation/policies and Licensing Framework for DTTB service introductions.	B	
2	Determine and align building permit policies with intended DTTB licence terms and conditions.	B	

2.7	Main activities	Status code	Observation / Advice
3	Publish policies for DTTB planning and building permits (may include waivers).	B	
4	Possibly conduct local hearings and/or expert investigations which may result in changes in permitted spectrum usage/transmitter site parameters (and delays).	B	
5	Monitor actual transmitter site operations and check/test emitted radiation.	B	
6	Possibly update National Spectrum Plan.	B	

2.8 Drafting of media permits and authorizations

Brief description	**The right or permission to broadcast television content on a defined broadcast DTTB platform in a designated geographical area and for a specified period. In this section the focus is on granting media/broadcast permits/authorizations for commercial broadcasters (for public broadcasters see Subsection 2.2.3 in the ITU Guidelines).**
Objective	In regulating access to the DTTB platform and/or to determine content composition on the DTTB platforms, the regulator can avoid unwanted broadcasts, promote defined broadcasts or avoid duplication of content.

2.8	Main activities	Status code	Observation / Advice
1	Check existing media legislation, policies and licensing framework.	A	
2	Check technology and standards regulation (receiver regulations) and include in media permits policies.	A	
3	Determine media permits/authorizations and procedures and align with DTTB licence terms and conditions and planning.	A	
4	Publish policies for media permits and authorizations (may include waivers).	A	

2.9 Determining business models and public financing

Brief description	**This section addresses the financing models and sourcing of nationwide public TV Broadcaster and DTTB financing issues.**
Objective	Introduce different sources for funding the nationwide public TV broadcaster services and specify financing issues for DTTB, e.g. financing of digital receivers, the simulcast period and revision of TV licensing fee system, etc.

2.9	Main activities	Status code	Observation / Advice
1	Check existing media legislation, policies and licensing framework.	A	
2	Consult public broadcaster(s) on current/future analogue television, DTTB transmissions	A	
3	Analyse market situation and assess possible market distortions.	D	
4	Define or complete required public service offering on DTTB platform (if not defined in Legislation yet).	D	
5	Align defined public service offering with other DTTB licence terms and conditions and media permits, and their planning.	B	
6	Determine and establish budget for public broadcast service offering and/or subsidizing consumer equipment.	B	Government plan to provide 3 million STB to low income people in accordance to schedule in addition to commitment of STB provided by the MUX operator.

4.1 Technology and standards application

Brief description	Technical comparison of key DTTB standards and the characteristics of associated systems.
Objective	Technical evaluation of DTTB transmission standard and choice of systems for required services

4.1	Main activities	Status code	Observation / Advice
1	Describing tests	B	
2	Evaluation of TV and HDTV specifications (including sound channels) and estimation of required bit rate.	A	
3	Evaluation of standards characteristics with GE06 provisions, business plan and receiver availability.	NA	
4	Evaluation of characteristics of compression systems.	A	
5	Evaluation of conditional access systems.	A	
6	Evaluation of additional systems (including access systems if needed) and estimation of required bit rate.	B	Already decided depending on how many programmes provided.

4.2 Developing design principles and network architecture

Brief description	Implementation priorities and network architecture
Objective	Initial technical description of the main network elements in relation to service quality, coverage, costs and timing requirements, serving as input document for preparing the initial frequency plan and ASO plan.

4.2	Main activities	Status code	Observation / Advice
1	Education and training of technical staff.	B	
2	Evaluation of roll-out options.	B	The roll-out schedule in service zone 4 has been postponed for about three months caused by matters related to administration.
3	Evaluation of type of distribution network.	B	
4	Evaluation of network topology.	A	
5	Drafting multiplex composition plan.	A	
6	Establishing frequency plan per multiplex /network.	A	
7	Drafting transmitting station lay out.	B	

4.3 Performing network planning

Brief description	**Iterative process of achieving optimal coverage and multiplex capacity using several system parameters and varying radiation characteristics. Several network plans are likely to be made (e.g. before and after ASO, for rooftop and indoor reception, with normalized and calculated transmitting antenna characteristics, or for testing different service quality or coverage targets).**
Objective	Basis for verifying service proposition and financing (see functional building blocks 2.9, 3.2 and 3.4).

4.3	Main activities	Status code	Observation / Advice
1	Specification of station characteristics.	A	
2	Coverage analysis.	A	
3	SFN optimization.	F	
4	Performing GE06 (annex 4, section II) conformity check.	NA	
5	Gap-filler planning.	B	
6	Proposing modifications to multiplex composition, network architecture or business plan (as far as necessary).	B	

4.4 Determining system parameters

Brief description	Parameters related to the DTTB transmission standard
Objective	Selecting system parameter by trading-off between coverage, multiplex bit rate and radiation characteristics, serving as input in the initial network planning

4.4	Main activities	Status code	Observation / Advice
1	Evaluation of FFT size to meet DVB-T2.	B	The DVB-T2 system parameters proposed by all MUX operators should meet the DTTB policy requirements, e.g. Net bit rate of the DTTB multiplex should be able to provide simulcast of existing analogue programme content in digital and encourage content provider to create more new digital contents.
2	Evaluation of carrier modulation to meet DVB-T2.	B	
3	Evaluation of code rate to meet DVB-T2.	B	
4	Evaluation of guard interval to meet DVB-T2.	B	

4.5 Assessing radiation characteristics

Brief description	Determination of transmitter power and transmitting antenna gain in order to achieve the required or allowed effective radiated power and configuration of the optimum antenna diagram and polarization.
Objective	Specification of transmitter power, antenna gain and antenna diagram as input for initial network planning.

4.5	Main activities	Status code	Observation / Advice
1	Evaluation of transmitter power, antenna gain and polarization.	B	The network system proposal from the MUX operator should meet the technical requirements in terms of DTTB coverage and control of interference, etc. as specified by MCIT.
2	Evaluation and optimizing antenna diagram.	B	
3	Calculation of antenna power budget.	B	

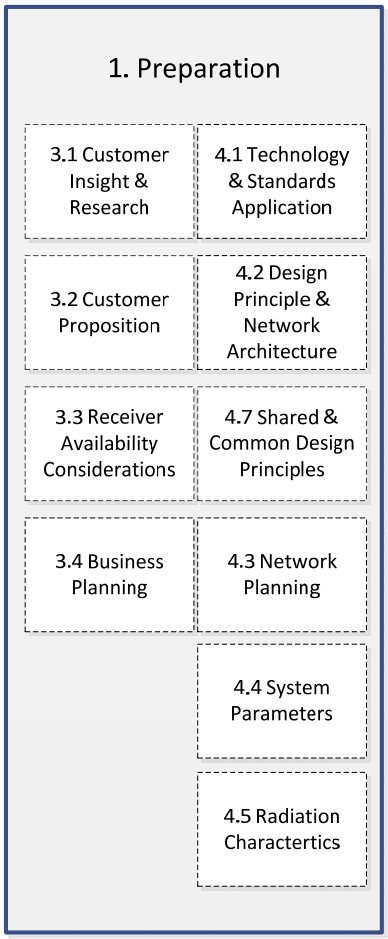
4.7 Deciding shared and common design principles

Brief description	This section consists three parts each containing a sub-part with implementation guidelines, a) application of shared and common design principles; b) Site and antenna sharing; c) multiplex sharing.
Objective	This section provides background information and guidelines on key topics and choices regarding shared and common design principles.

4.7	Main activities	Status code	Observation / Advice
1	Investigate national regulations regarding site sharing.	NA	
2	Determine in principle shared use of DTTB and analogue networks and which elements (sites, antennas, combiner).	NA	
3	Determine in principle on common design and planning of DTTB networks.	NA	
4	Prepare site sharing agreements.	NA	

Annex 4: Functional building blocks related to Phase 1 of the roadmap for operator

Preparation



The selected functional building blocks related to Phase 1 of the roadmap are shown in Figure 20 and are reproduced here.

Section 3.4.6 describes Phase 1 of the roadmap.

This Annex gives an overview in the form of tables of the status of each of the selected functional building blocks related to Phase 1 by means of the following codes:

- A the activities on key topics and choices that are **already completed;**
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3.1 Investigation of customer insight and carrying out market research

Brief description	**Launching a commercial PSB DTTB service, will require the identification of demand drivers (i.e. customer needs), competitive advantages, service uptake projections and possibly market entry barriers in the local market(s).**
Objective	The NRT will have to carry out some form of market research for identifying these demand drivers, competitive advantages and service uptake projections.

3.1	Main activities	Status code	Observation / Advice
1	Determine need, timing and scope for market research.	A	
2	Analyse competitive offerings, substitutes and technology developments.	A	
3	Design and develop preliminary DTTB service propositions.	A	
4	Draft market research plan, staff and budget market research project.	A	
5	Carry out market research and analyse results, translate into DTTB service propositions, if necessary carry out additional market research.	A	

3.2 Defining customer proposition

Brief description	**This section focuses on determining the PSB DTTB competitive advantage and what the related service attributes could look like.**
Objective	Finding the best customer proposition in line with the business plan objectives (see initial DTTB service planning in the second phase).

3.2	Main activities	Status code	Observation / Advice
1	Analyse earlier DTTB service launches and compare with customer research results/local market conditions.	A	
2	Define DTTB service propositions and check feasibility/cost levels with key suppliers, i.e. distributor (broadcast network operator) and content aggregators, content creators.	A	
3	Possibly redefine DTTB service propositions and test in market again, i.e. additional market research.	A	

3.3 Carrying out receiver availability considerations

Brief description	The consideration of the many different DTTB receivers commercially available today.
Objective	For a service provider it is important to draft the receiver's functional requirements based on the defined service proposition(s). Only those requirements supporting the service proposition should be incorporated. These 'must have' requirements might prove to be too expensive for the business case and therefore receiver considerations might result in a revised service proposition.

3.3	Main activities	Status code	Observation / Advice
1	Analyse earlier DTTB service launches, assess local substitutes and technology developments.	A	The DVB-T2 STB without EWS will be provided to service zone 4 and/or other zones as specified by MCIT in matching with the DTTB deployment schedule. It will involve technical issue of future upgrade to version with EWS.
2	Check any prescribed technologies and standards, receiver regulations and analyse market research results.	A	The availability of DVB-T2 STB with EWS features to meet the technical requirements and fulfil the deployment schedule is crucial to the operator.
3	Assess and make inventory of availability and roadmaps of various receiver types/attributes.	A	
4	Check network compatibility and interoperability (radio interfaces and API/applications).	A	
5	Assess and detail ex-factory and retail pricing for various receivers.	A	The cost of DVB-T2 STB with EWS features is critical issue because it is part of the commitment to government.
6	Decide key receivers and their attributes, draft receiver/service roadmap.	A	

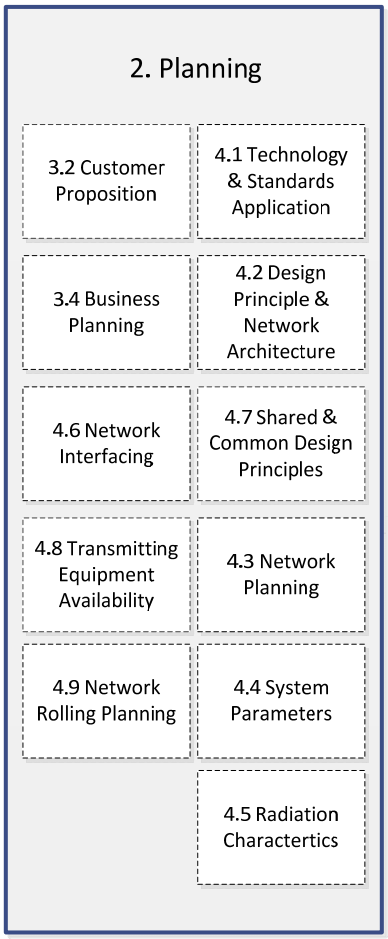
3.4 Performing business planning

Brief description	This section will focus on agreement of business case (budget) for the ASO Plan.
Objective	To have the ASO Plan successfully passing Cabinet

3.4	Main activities	Status code	Observation / Advice
1	Analyse legal/regulatory framework (may include prescribed technologies and standards, assignment procedure, licence terms and conditions, business models and public financing), determine impact and opportunities.	A	
2	Assess market take-up and project revenue streams, based on customer research and proposition.	A	
3	Assess and calculate associated costs (considering concepts of 'total cost of ownership'), project costs ahead.	A	
4	Carry out profitability and sensitivity analysis, draft business plan scenarios.	A	
5	Carry out market research and analyse results, translate into DTTB service propositions, if necessary carry out additional market research.	A	

Annex 5: Functional building blocks related to Phase 2 of the roadmap for operator

Planning



The selected functional building blocks related to Phase 2 of the roadmap are shown in Figure 20 and are reproduced here.

Section 3.4.7 describes Phase 2 of the roadmap.

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NA the activities on key topic and choices are **not applied in local TV market.**

The selected functional building blocks are presented in the order of the number of the block. This number refers to the corresponding Chapter in the ITU Guidelines, where more information and implementation guidelines can be found.

Functional building blocks 3.2, 3.4, 4.1, 4.2, 4.3, 4.4, 4.5 and 4.7 can be found in Phase 1 preparation for network operator.

4.6 Specifying network interfaces

Brief description	Interfaces between parts of the network, the studio and the head-end, the transmitting antenna and the receiver and transmitting equipment and the monitoring centre.
Objective	Defining interfaces with network elements in order to obtain satisfactory service delivery.

4.6	Main activities	Status code	Observation / Advice
1	Drafting interface specifications between studio and multiplex head end.	A	
2	Drafting interface specifications between network monitoring system and transmitting equipment.	A	
3	Describing the radio interface.	A	

4.8 Considering equipment availability

Brief description	This section includes market research and technical specification in relation to activities, a) specification of the transmission equipment in the DTTB implementation plan; b) verifying if the specification can be met on the market, and c) drafting specifications for tending to purchase equipment.
Objective	This section provides background information and guidelines on key topics and choices regarding transmission equipment availability.

4.8	Main activities	Status code	Observation / Advice
1	Carrying out market research.	A	
2	Drafting transmitter specifications.	A	
3	Drafting antenna specifications.	A	
4	Drafting distribution link specifications.	A	
5	Drafting multiplex head end specification.	A	
6	Equipment testing.	A	

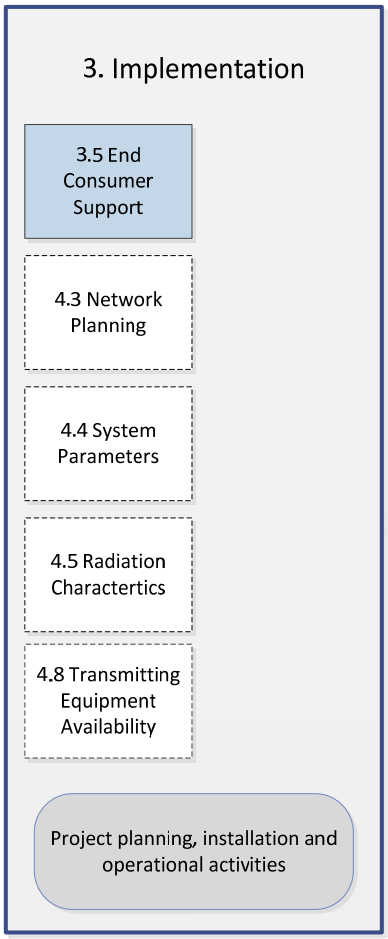
Network roll out planning

Brief description	Implementation plan taking into account coverage priorities, services priorities, ASO, equipment availability and capacity of the network operator
Objective	To provide implementation schedule for the DTTB services within budget and time constraints

4.9	Main activities	Status code	Observation / Advice
1	Describing pilot tests.	A	
2	Roll out planning (e.g. main cities, provincial cities, rural areas), before and after ASO.	A	
3	Agreement with receiver manufacturers to deliver receivers in sufficient quantities, in time.	A	
4	Coverage assessment at each stage of implementation.	A	
5	Setting up communication plan and related provisions (e.g. helpdesk, website).	A	Handing of possible DTTB reception complaint during the DTTB deployment / simulcast period is a crucial activity because the result of assistance to the TV household will affect progress of DTTB penetration.

Annex 6: Functional building blocks related to Phase 3 of the roadmap for operator

Implementation



The selected functional building blocks related to Phase 3 of the roadmap are shown in Figure 20 and are reproduced here.

Section 3.4.8 describes Phase 3 of the roadmap.

This Annex gives an overview in the form of tables of the status of each of the selected functional building blocks related to Phase 3 by means of the following codes:

A the activities on key topics and choices that are **already completed;**

B the activities on key topics and choices that are **already decided;**

C the activities on key topics and choices that are **partly decided**;

D the activities on key topics and choices are under consideration and are **not decided**;

E the activities on key topic and choices **need revision**;

NA the activities on key topics and choices are **not applied in local TV market.**

The selected functional building blocks are presented in the order of the number of the block. This number refers to the corresponding Chapter in the ITU Guidelines, where more information and implementation guidelines can be found.

Function building blocks 4.3, 4.4, 4.5 and 4.8 can be found in Phase 2 planning for network operator.

3.5 Defining end consumer support

Brief description	**The end consumer support comprises normally: 1) subscription management, 2) order management and fulfilment, 3) catalogue management, 4) marketing campaign management, 5) customer services and support, and 6) service provisioning.**
Objective	This section is part of the DTTB service provider's customer relationship management (CRM) process.

3.5	Main activities	Status code	Observation / Advice
1	Check relationships with ASO plan and communication and determine impact.	B	
2	Consult and carry out 'Road shows' for device creators (i.e. manufacturers and retailers), content aggregators.	B	
3	Draft end-consumer support and communication plan and determine means and budget, possibly align business planning.	B	It is crucial to provide assistance to public in software/hardware upgrade for the first batch DVB-T2 STB without EWS feature.

Glossary of abbreviations

16-QAM	16-state Quadrature Amplitude Modulation
64-QAM	64-state Quadrature Amplitude Modulation
ABU	Asia Pacific Broadcasting Unions
ANTV	Cakrawala Andalas Televisi, PT
API	Application Programming Interface
ASO	Analogue Switch-Off
Banten TV	Banten Media Global Televisi, PT
Bchannel	Metropolitan Televisindo, PT
BDT	Telecommunication Development Bureau
BMKG	Meteorology, Climate and Geophysics Agency
BNPB	National Agency for Disaster Management
BPPT	Agency for the Assessment and Application of Technology
BSTV	Banten Sinar Dunia Televisi, PT
C/N	Carrier to Noise ratio
Daai TV	Duta Anugerahindah, PT
dB	Decibel
DEKM	Economically Less Developed Region
DEM	Economically Developed Region
DKI Jakarta	Jakarta province
DSO	Digital Switch-Over
DTTB	Digital Terrestrial Television Broadcasting
DTV	Digital Television
DVB	Digital Video Broadcasting
DVB-T	Digital Video Broadcasting-Terrestrial
DVB-T2	Digital Video Broadcasting -Terrestrial 2nd generation
ELSHINTA	Elshinta Jakarta Televisi, PT
Emed	Median minimum field strength
Emin	Minimum field strength
EPG	Electronic Program Guide
ERP	Effective Radiated Power
EWS	Early Warning System
FCFS	First come, first served
FFT	Fast Fourier Transform
FTA	Free-To-Air
GDP	Gross Domestic Product
GE06	Geneva Agreement 2006
Global TV	GLOBAL INFORMASI BERMUTU, PT
GPS	Global Positioning System

HDTV	High Definition Television
Indosiar	Indosiar Visual Mandiri, PT
IPTV	Internet Protocol Television
ITU	International Telecommunication Union
ITU Guidelines	ITU Guidelines for the Transition from Analogue to Digital Broadcasting
ITU-BDT	International Telecommunication Union - Telecommunication Development Bureau
ITU-R	International Telecommunication Union - Radiocommunication Sector
JakTV	Danapati Abinaya Investama, PT
Kompas TV	Komando Media Televisi, PT
KPI	Commission Broadcasting Indonesia
LCP	Local Content Portion
LPPPM	MUX operator
LPPPS	Content provider licence/licensee
LTE	Long Term Evolution, often marketed as 4G
MCIT	Ministry of Communication and Information Technology
MD	Ministerial Decree
MegaVision	Cipta Megaswara Televisi, PT
Metro TV	Media Televisi Indonesia, PT
MFN	Multi Frequency Network
MIFR	Master International Frequency Register
MNC TV	Cipta Televisi Pendidikan Indonesia, PT
MPEG	Moving Picture Expert Group
MPEG-4 part 10	MPEG-4 AVC/H.264 or Advanced Video Coding
MTV	Mobile Television
MUX	Multiplexer
NA	Not applicable
NGO	Non-government organization
NIL	Nothing
NRT	National Roadmap Team
NSP	National Spectrum Plan
O Channel	Omni Intivision, PT
OA	Other areas
ONP	Open Network Provisioning
PAL	Phase Alternating Line; analogue color TV system
PPP	Public Private Partnership
PSB	Public Service Broadcasting
QPSK	Quadrature Phase Shift Keying
RCTI	Rajawali Citra Televisi Indonesia, PT
RR	Radio Regulations
SCTV	Surya Citra Televisi, PT
SDTV	Standard Definition Television

SFN	Single Frequency Network
SpaceToon	Televisi Anak Space Toon, PT
STB	Set-Top-Box
T-DAB	Terrestrial-Digital Audio Broadcasting
T-DMB	Terrestrial -Digital Multimedia Broadcasting
Trans 7	Duta Visual Nusantara Tivi Tujuh, PT
Trans TV	Televisi Transformasi Indonesia, PT
TVMiTRA	Visi Citra Mitra Mulia, PT
TVN	Nusantara Televisi, PT
tvOne	Lativi Media Karya, PT
TVRI	LPP Televisi Republik Indonesia
TVRO	Televsion Receive Only
UHF	Ultra High Frequencies (frequency range between 300 and 3000 MHz)
VHF	Very High Frequencies (frequency range between 30 and 300 MHz)
WRC-07	World Radiocommunication Conference 2007

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