

Standard Radio System Plan

**REQUIREMENTS FOR DIGITAL  
TERRESTRIAL TELEVISION (including  
digital terrestrial sound) (DTT) SERVICE  
OPERATING IN THE FREQUENCY BANDS  
174 MHz to 230 MHz AND 470 MHz TO 742  
MHz**

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**Suruhanjaya Komunikasi dan Multimedia Malaysia**

***Malaysian Communications and Multimedia Commission***

63000 Cyberjaya, Selangor Darul Ehsan, Malaysia.

Tel : +60 3 8688 8000 Fax : +60 3 8688 1005 Website: <http://www.mcmc.gov.my>

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**1.0 GLOSSARY**

- 1.1 The terms used in this document may be found in the document SRSP Glossary which can be downloaded from the Commission website. ([http://www.mcmc.gov.my/what\\_we\\_do/spectrum/srsp.asp](http://www.mcmc.gov.my/what_we_do/spectrum/srsp.asp))

**REQUIREMENTS FOR DIGITAL TERRESTRIAL TELEVISION (including DIGITAL TERRESTRIAL SOUND) (DTT) SERVICE OPERATING IN THE FREQUENCY BANDS FROM 174 MHz TO 230 MHz AND 470 MHz TO 742 MHz**

**2.0 INTENT**

- 2.1 This Standard Radio System Plan (SRSP) states the requirements for the utilization of the frequency bands 174 MHz to 230 MHz and 470 MHz to 742 MHz for **Digital Terrestrial Television (including digital terrestrial sound) (DTT)** in Malaysia.
- 2.2 DTT systems deploy digital technology instead of the conventional analogue technology for the delivery of terrestrial free to air or subscription television services. The intended services of DTT in Malaysia may include the following:
- High Definition Television (HDTV)
  - Multi-channel Enhanced Digital Television (EDTV)
  - Multi-channel Standard Digital Television (SDTV)
  - Small screen digital format for handheld devices
  - Broadband high speed data and Multi-media services
  - Stationary, portable or mobile reception including handheld devices
  - Interactive information via Return Channel Terrestrial (or RCT) or other alternative return channels
  - Terrestrial Sound Broadcasting services
- 2.3 This SRSP is formulated to facilitate the introduction of DTT and provides a systematic migration plan for existing services using the frequency bands 174MHz to 230MHz and 470MHz to 742MHz. The re-farming of parts of the bands made available after migration for future services will be subject to a different SRSP.
- 2.4 In general, this SRSP is designed to provide information on the minimum requirements in the use of the frequency bands as described in the Spectrum Plan (see **Appendix A**). It provides information on technical characteristics of radio systems, channelling of frequencies, coordination initiatives in order to maximise the utilisation, minimise interference and optimise the usage of the band.

**3.0 GENERAL**

- 3.1 Technical characteristics of equipment used in DTT systems shall conform to all applicable Malaysian standards, related recommendations of International Telecommunications Union (ITU) and its Radio Regulations as agreed and adopted by Malaysia.
- 3.2 All DTT installations must comply with safety rules as defined by applicable standards.
- 3.3 The equipment used shall be certified under the Communications and Multimedia (Technical Standards) Regulations 2000.
- 3.4 In preparing the DTT plan to accommodate the new services, the following key considerations have been taken by the Commission:
  - 3.4.1 ITU-R Allocations for Broadcasting in Region 3;
  - 3.4.2 Radio Regional Conference with regard to Broadcasting matters;
  - 3.4.3 Spectrum Usage at Malaysian Common Border areas as well as common agreed planning principles;
  - 3.4.4 Cost and availability of technical and consumer equipment for various spectrum bands;
  - 3.4.5 Efficient use of Spectrum;
  - 3.4.6 Protection to existing services;
  - 3.4.7 Analogue Television (TV) migration, migration period and cost; and
  - 3.4.8 Sharing and migration with others primary services.
- 3.5 The allocation and allotment of these frequency bands and this SRSP are subject to review from time to time for more efficient utilisation and management of spectrum, or for the improvement of the services offered by such systems.
- 3.6 Notwithstanding the fact that a DTT system may satisfy the minimum requirements of this SRSP at the time of authorisation, the Commission may require adjustments to be made to the system or DTT plan whenever there is possible interference is caused or may be caused or because of any other factors.

### **Current broadcast TV environment**

- 3.7 Existing television services in Malaysia comprise of terrestrial and satellite broadcasting services. These services include subscription broadcasting and other related services which are provided to the viewers. The different means of transmission and issues in the different frequency bands, are as describe below:
  - 3.7.1 Terrestrial Free to Air Television Services

The existing terrestrial free-to-air television services are analogue television services based on the PAL-B (7MHz) and PAL-G (8 MHz).

These free to air services are operated in VHF Band I (47-68 MHz), VHF Band III (174-230 MHz) and UHF band IV & V (470-798 MHz).

There are currently 6 terrestrial TV stations that are providing analogue free-to-air TV service. They are TV3, NTV7, 8 TV, CH 9 (four Private stations) and RTM1 and RTM2 (two Government stations) which transmits TV programmes nationwide.

#### 3.7.1.1 Band I (Frequency Range from 47 MHz to 68 MHz)

In December 1963, monochrome TV (PAL-B system with 625 line system) service was introduced in Malaysia. The service was provided by *Radio dan Televisyen Malaysia* (RTM) using Band I.

In the early 70s, analogue free to air television services were extended nationwide using the VHF Band I as it provided very good service area coverage. A large number of transmitters were allotted VHF channels 2 to 4 during that period. However in the late 90s, under a frequency channel re-allocation exercise, these transmitters were allocated higher frequency channels when they were due for replacement due to aging.

As of today, there are 7 remaining transmitters (with more than 15 years in service) in 6 different locations which are still using VHF Band I. Most of these transmitters are owned by RTM. Under the re-allocation program, all transmitters shall ceased operation by **31 December 2009**. Frequencies in Band IV & V will be made available for the re-allocation of Band I transmitters. VHF Band I is expected to be re-farmed for other services after the date.

Details of transmitter locations and the proposed channel replacements for Band I are as shown in **Appendix B**.

#### 3.7.1.2 Band III (Frequency range from 174 MHz to 230 MHz)

Colour TV transmission was introduced by RTM in 1978 using the PAL-B system with 625 line system, followed by TV3 station operating in VHF Band III. To date, this band which have very limited channels to be assigned to the stations are fully occupied. Details of the channelling plan for Band III is shown in **Appendix C**.

#### 3.7.1.3 Band IV & V (Frequency range from 470 MHz to 806 MHz)

The introduction of free to air TV services using PAL – G system operating in the UHF frequency band started in the year 1995. This arises from the need for more frequency channels with more private stations being licensed as well as coverage expansion needs of existing TV stations.

### 3.7.2 Direct-To-Home Satellite TV Service

The existing Direct-To-Home Satellite TV service uses the Fixed Satellite Service as the transmission platform. It is a subscription broadcasting TV service introduced in 1996 by ASTRO and it deploys the DVB-S digital transmission technology in the 12 GHz band.

### 3.7.3 Integrated Receiver Decoder (IRD)

The IRD is the interface between a Direct-To-Home receiving satellite dish and a terrestrial TV broadcast receiver (TV set). Radio Frequency (RF) channel 39 is allocated for nationwide IRD, except in Langkawi (Kedah), which is allocated RF channel 38 and Lawas (Sarawak), which is allocated RF channel 40 respectively.

### 3.7.4 Broadband TV

The broadband TV service in Malaysia is a subscription broadcasting service introduced of late using fiber cable/ADSL. A total of 20 program channels are offered under FineTV, a video on demand (VoD) subscription service.

### 3.7.5 Terrestrial digital subscription TV

This service was introduced in 2004 using IP datacasting over UHF Band V. It is provided by MiTV and offers multichannel subscription TV. It operates currently in the Klang Valley.

MiTV has at end 2006 announced its decision to migrate to the standard DVB-T (with MPEG4) platform by end 2007.

### 3.7.6 Mobile TV

Mobile TV is also being offered by some of the cellular providers. It is a subscription service via GSM/UMTS cellular network. Mobile broadcast TV over DTT are being trial and can offer free as well as subscription TV services.

## **The Digital Dividend**

- 3.8 Most services in communications and multimedia have gone digital. Digital technology is now available for use in TV broadcasting and has reached a high level of maturity. For analogue TV service, going digital does have benefit and value for everyone. Among them are:
- 3.8.1 digital picture quality;
  - 3.8.2 option to transmit at higher definition;
  - 3.8.3 mobile TV applications;
  - 3.8.4 supplementary data services and interactivity to enhance viewer's experience; and
  - 3.8.5 more programming/programme channels can be carried in the same bandwidth;
  - 3.8.6 Multiple language option is available in DTT and subjected to availability of content.
- 3.9 Due to the spectrum efficient digital transmission, migrating the current analogue free to air TV services to digital would mean freeing up the spectrum resource for more TV programmes (free-to-air or subscription service), high definition TV and other services.
- 3.10 Achieving an early completion of the migration of analogue free to air TV to digital is a major challenge as it involves all TV viewers, transmission distribution network and the TV stations. A reasonable timeframe set aside for analogue TV service closure has been set for year 2015. All affected parties need to take note of the timeline so that the public can continue to receive uninterrupted TV programmes.
- 3.11 The drive to digital broadcasting is also set in motion by the MyICMS 886 strategy. It has targeted among others the following related to digital TV service:
- 3.11.1 digital multimedia broadcasting and mobile TV services; and
  - 3.11.2 product design and manufacturing of digital multimedia set top boxes;
- as important infrastructure and growth areas in the period 2006 to 2010.
- 3.12 As can be noted from the above, that there are digital dividend for all stakeholders to migrate to digital.

#### **Key Characteristics of the DTT service**

- 3.13 The Commission has conducted a Public Inquiry on the determination of a standard for DTT in Malaysia in August 2006. Subsequent to this process, a report on the Public Inquiry was published in October 2006 and a Commission Determination on the Mandatory Standard for Free To Air Digital Terrestrial



Television Broadcasting No. 2 of 2006 (Commission Determination) was issued in November 2006. The documents are available at [www.mcmc.gov.my](http://www.mcmc.gov.my). The Commission Determination set forth the adoption of DVB-T standard for the roll out of the DTT service.

- 3.14 The DTT service described here in this document, adopts the ITU-R Recommendation ITU-R BS.1114-5 [Terrestrial Digital Audio Broadcasting] corresponds to the T-DAB which is designated as “Digital System A” particularly used in Band III and ITU-R Recommendation ITU-R BT.1306-3 [Terrestrial Digital Video Broadcasting] corresponds to the DTT system, which is designated as “System B” particularly used in band IV and V for the DVB-T system. The technical specifications for the both System A and B are described in detail in **Appendix D**. It is to be noted that the Commission Determination currently addresses DTT (System B).
- 3.15 Besides being more spectrally efficient, DTT is also capable of providing more functions in order to deliver good quality television pictures and multi-channel sound. The DTT service deploys digital broadcast technology to deliver one to two High Definition TV (HDTV) channels and multiple Enhanced Digital TV (EDTV) or Standard Digital TV (SDTV) channels with 7 / 8 MHz bandwidth as compared to a conventional analogue TV channel. Broadband data and multi-media services can also be combined with television programming within a DTT RF channel. DTT can also support interactive services via Return Channel Terrestrial (or RCT) or other alternative return channels.
- 3.16 A RF channel used for analogue TV transmission normally carries only a single analogue television programme from a TV station. On the other hand, a DTT transmission occupying the same RF channel as the analogue transmission is capable of carrying multiple programme channels and thus may be shared by different TV stations by means of a multiplexer. The total transmission data rate available for DTT transmission using the MPEG2 – based DVB-T transport stream coming out of the multiplexer may range from 5 MBit/s up to 30 MBit/s depending on the required service area coverage, type and quality of reception to be achieved. Since a standard TV programme only need a fraction of the total available bandwidth, multiplexers are necessary to facilitate and maximise the sharing or use of the DTT frequency channel (see Exhibit 1).

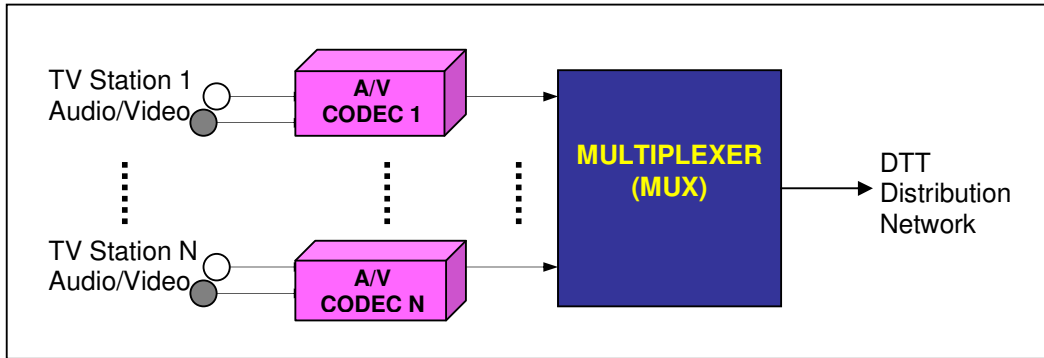


Exhibit 1: Multiplex sharing by a number of TV stations

- 3.17 Further development of compression techniques and standardisation may be considered in the Malaysian DVB-T standard. Improvements in terms of compression technology have provided a much more efficient bandwidth utilisation leading to more programme channels or higher definition programme per DTT RF channel.
- 3.18 DTT reception equipment may come in many forms. For TV – programme reception including accompanying data services, set-top boxes (and using existing analogue TV set) or integrated digital receivers are available. Receivers for digital audio broadcasting and associated data via DVB-T for stationary or mobile reception will resemble equipment in use today. Because of the flexibility of DTT service configurations, handheld ‘PDA-like’ data receivers, USB receivers, hybrid personal mobile/cellular radio equipment and other forms of integration, configuration or combination are possible.
- 3.19 The DVB-T standard provides flexibility in number of carriers and its modulation standard allowing applications for fixed, portable or mobile in Multi Frequency Network (MFN) as well as the capability in optimising spectrum usage for Single Frequency Network (SFN) applications.
- 3.20 DVB-T uses COFDM (coded orthogonal frequency division modulation) modulation. COFDM has thousands of closely spaced carriers with overlapping sidebands, so that the spectrum of a COFDM signal looks like white noise. The flat spectrum characteristics of COFDM almost up to the edge of the channel, is one factor that makes DVB-T more efficient in its use of the spectrum resource. In all of traditional modulation systems, the sideband energy falls off in strength toward the edge of the channels.
- 3.21 There are two/three options in the carriers (i.e. 2k, 8k or 4k) that may be deployed for DVB-T transmission. The choice of carriers will affect the transmission capacity of DVB-T.

- 3.22 Receivers equipped to receive 8k carriers can also receive 2k but receivers equipped only for 2k cannot receive 8k transmissions. It is therefore necessary for a decision to be made about the number of carriers to be used. In general, 2k receivers cost less but 2k transmissions cannot be used in wide area Single Frequency Network (SFN nation-wide) and provides lesser bandwidth/capacity. However in new DTT implementation 2k is no longer the preferred choice. The approach in DTT network implementation is to use the higher carriers if the transmission environment permits. Thus, receivers should be equipped with the 8k capability to facilitate flexibility in the DTT network implementation.
- 3.23 The coded part of the COFDM refers to the forward error correction (FEC) code used to protect the data transmission from errors during transit from TV stations to digital receivers when some portions of the received channel spectrum may be corrupted by multi path or interference effects. The code allows the DVB-T receiver to correct the errors. The FEC techniques used by DVB-T are:
- 3.23.1 Randomising;
  - 3.23.2 Reed Solomon coding;
  - 3.23.3 Interleaving; and
  - 3.23.4 Convolution coding.
- The choice of any one of the above four types of coding to be use in a DTT implementation is subjected to the Malaysian DVB-T standard.
- 3.24 DVB-T provides five different rate variants (i.e. 1/2 or 2/3 or 3/4 or 5/6 or 7/8) which may be deployed in the transmission. Each rate has a different error correction versus carrier to noise capability and the more rugged rates trade superior ruggedness for net data transmission throughput.
- 3.25 DVB-T provides choice of three modulation schemes:
- 3.25.1 Quadrature Phase Shift Key (QPSK);
  - 3.25.2 16 QAM (4 state Quadrature Amplitude Modulation); and
  - 3.25.3 64 QAM (64 state Quadrature Amplitude Modulation).
- 3.26 In general, different schemes of DVB-T modulation will result in different transmission capacity and robustness in transmission, and this will limit the number or type of programmes that can be transmitted in one RF channel. However, there are few other factors such as bandwidth size (7 or 8 MHz), the number of carriers, the FEC adopted that will also affect the available transmission capacity in a given environment. A brief estimation with regard to the DTT system variant and capacity is shown in **Appendix E**.

- 3.27 It should also be noted that the choice of the different types of DVB-T modulations (which is one of the main elements in a DVB-T system variant) will result in a different service area coverage size in a given area. A comparison of service area coverage for different types of DVB-T system variant is shown in **Appendix F**.

### **Concept on DTT service implementation in Malaysia**

- 3.28 The concept of DTT implementation may be described in the diagram as shown in Exhibit 2. The Network Facilities Provider (NFP) owns or provides the DTT transmitters (TX) and links and the Network Service Provider (NSP) the multiplex (MUX) and manages the bandwidth to provide to the TV stations (who are Content Applications Service Providers (CASP)). The Applications Service Provider (ASP) may introduce supplementary data services such as messaging service. For interactivity, the return channel may be via PSTN, Internet, Cellular or RCT.
- 3.29 Due to economies of scale in the Malaysian market, it is envisaged that the NFP and NSP may be one common integrated infrastructure provider in order to maximise operational efficiency such as infrastructure sharing, bandwidth sharing, and possibly use of common platform for customer management. A multi-channel CASP broadcaster may opt to access a MUX of its own from the one common infrastructure provider.

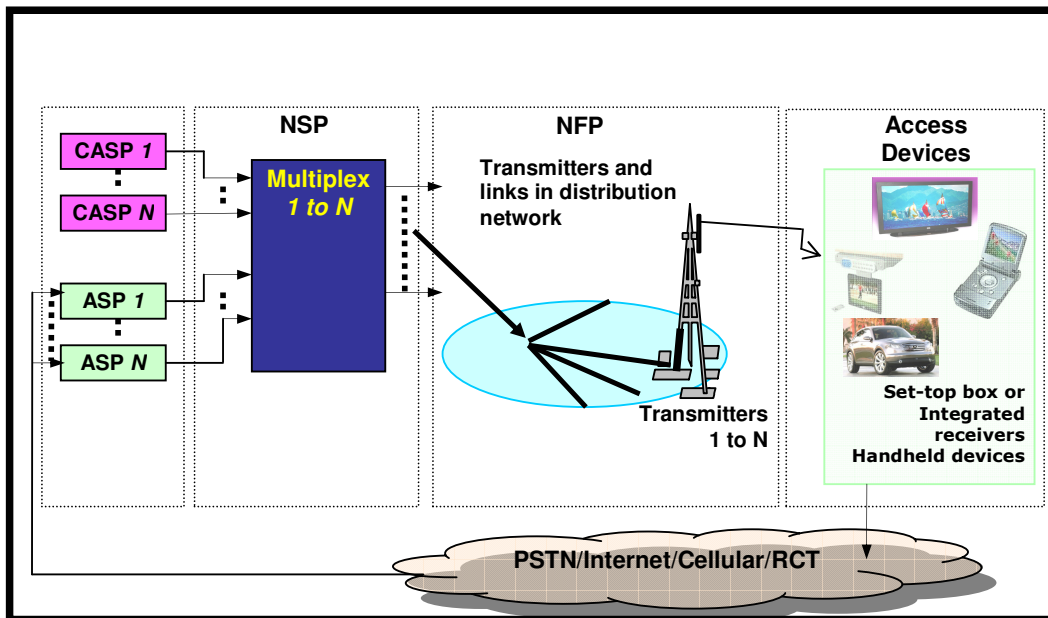


Exhibit 2: Concept of DTT Implementation in Malaysia

- 3.30 Necessary bandwidth will be made available to all current Free to Air TV stations so that they may broadcast their analogue TV programmes on the DTT platform as well as via their existing analogue transmission. This is also known as the simulcast period.
- 3.31 Due to the reservation of spectrum to facilitate DTT roll out, no new analogue TV station will be introduced using the analogue transmission platform.
- 3.32 Analogue TV broadcast shall cease its transmission by **31 December 2015**.
- 3.33 Migration of existing free to air TV to DTT is the first priority. Thus adequate bandwidth needed to be reserved or provided to ensure its success. From a viewers' acceptance survey conducted by the consultant engaged by the Government of Malaysia in 2002 of the Malaysian public it was noted that another 10 new channels would attract the 73% of the public to switch over to digital. This factor among others (carriage of digital sound programme channels and enhanced TV formats) needs to be considered when carrying out the migration plan. It is envisaged that any available bandwidth after fully considering the free to air migration, may be used or allocated for launching new programmes/stations or services.

#### **4.0 CHANNELLING PLAN**

- 4.1 This SRSP defines the frequency bands 174 MHz to 230 MHz (VHF Band III) and 470 MHz to 742 MHz (UHF Band IV and V) providing a total bandwidth of 328 MHz for DTT (including digital terrestrial sound) systems. The frequency bands of 174 MHz to 230 MHz and 470 MHz to 742 MHz are divided into RF channels as shown in **Appendix C**.
- 4.2 The current availability of spectrum for DTT in Band III, IV and V are different due to the current analogue usage/assignment. Therefore, it is recommended that in the initial phase of DTT implementation, the available spectrum for DTT in Band III is to be reserved for System A (T-DSB) until the year 2015 rather than System B (DVB-T). Only a part (sub block) of the available RF channel may be used for System A due to availability of spectrum in the Band III.
- 4.3 Notwithstanding paragraph 4.2 above, System B (DVB-T) may be considered in Band III if subsequent technology, analysis and test prove not to cause interference to the existing analogue TV service. Band IV and V are to be used for System B (DVB-T) service.

- 4.4 Detail channelling plan and proposed RF channels to be used for DTT (including digital terrestrial sound) in Band III, IV and V is shown in **Appendix C**.
- 4.5 It is to be noted that the use of the frequency bands 174 MHz to 230 MHz and 470 MHz to 798 MHz is currently shared by all CASP (Individual) license holder (providing subscription and free to air) having apparatus assignment. With the rapid growth of technology and the variety of applications in the broadcasting services and alternative platforms for TV content delivery, it is envisaged that the allocated spectrum is able to cater for future demands.

## 5.0 REQUIREMENTS FOR USAGE OF SPECTRUM

- 5.1 This SRSP covers the minimum key characteristics considered necessary in order to make the best use of the available frequencies.
- 5.2 In some cases, a DTT service conforming to the requirements of this SRSP may require modifications if any interference is caused to other assigned radio stations or systems.
- 5.3 The allocation of spectrum and shared services within these bands can be found in the Spectrum Plan and an extract of it is as shown in **Appendix A**.
- 5.4 It is to be noted that broadcasting service does not have exclusive use to these bands as stated in the Spectrum Plan. In the VHF and UHF bands, the following primary allocations as existed are as follows:
- 5.4.1 Band III (VHF) : 174 MHz to 230 MHz
- 5.4.1.1 the fixed service in the band 174 MHz to 230 MHz;  
- Currently not allocated.
- 5.4.1.2 the mobile service in the band 174 MHz to 230 MHz;  
- Currently not allocated.
- 5.4.1.3 the aeronautical radionavigation service in the band 223 MHz to 230 MHz.  
- Department of Civil Aviation Malaysia (DCA) was assigned frequency 229 MHz and 230 MHz (using 25 kHz bandwidth) for their control tower operation at Kuala Lumpur International Airport (KLIA). These 2 frequencies are in the frequency channel 12 of broadcast VHF Band III.
- 5.4.2 Band IV and V (UHF): 470 MHz to 798 MHz.
- 5.4.2.1 the fixed service in the band 470-798 MHz;  
- Currently not allocated.
- 5.4.2.2 the mobile service in the band 470-798 MHz;

- A few channels in the band 478 MHz to 498 were assigned to public land mobile operators (mostly are from System Trunk Radio Operator).
- Frequency 477 MHz to 478 MHz is allocated to Land Mobile Services and Short Range Communications Devices such as Personal Radio Service (PRS).

5.4.2.3 the radionavigation service in the band 585-610 MHz;

- Department of Civil Aviation Malaysia (DCA) was assigned frequency 607 MHz (using 8000 kHz bandwidth) for their radar system located at Bukit Chinchin (in Selangor). This frequency is in RF channel 38 of Band V.

It is also to be noted that, security devices, inbuilding RF cable TV distribution and wireless microphone devices are allowed to operate in the broadcasting Band III, Band IV and Band V on a secondary basis. The use of the wireless microphone device and security device shall not be afforded protection from any interference.

- 5.5 In the phases of implementation of DTT (see section 7), the protection criteria for the compatibility analysis of other primary services with broadcasting services shall be used during the coordination process in respect to the new or modified assignments/allotments. With regard to other services, sharing between broadcasting and other services is subject to the relevant provisions of the ITU Radio Regulations (RR).
- 5.6 Following on the above, protection criteria for other primary services is shown in **Appendix G**. This includes some generic information as well as default values for field strengths to be protected, protection ratios (PR) as a function of frequency separation, and receiving antenna heights for some typical systems. **Appendix G** also provides protection criteria for other primary services interfered with by DTT (including digital terrestrial sound) service.
- 5.7 DTT transmitters shall radiate only as much power as is necessary to ensure a satisfactory service within the targeted service area.
- 5.8 In order to secure the necessary frequency channels for digital broadcasting in the congested frequency environment in Malaysia, changes to analogue RF channels may be unavoidable. One of the key challenges in establishing the DTT channel plan is to minimize the changes to the analogue RF channels.
- 5.9 Details of the current apparatus assignments for terrestrial television transmission nationwide are shown in **Appendix H**.
- 5.10 As part of this DTT planning exercise, an in-depth study using software propagation prediction tools has been undertaken by the Commission to

prepare the proposed allotment plan for the broadcast bands to accommodate the proposed DTT services within the current environment. The study involves software simulation of the various radio planning configurations using ITU propagation modelling in the current environment.

- 5.11 The DTT service will be required to operate in a number of different environments and configurations in Malaysia and these includes:

- 5.11.1 Continuous operation for nation wide coverage (SFN nation-wide);
- 5.11.2 Multiple Frequency Network for nation-wide coverage (MFN nation-wide);
- 5.11.3 Regional Single Frequency Network (Regional-SFN);
- 5.11.4 Localized Single Frequency Network (Local-SFN);
- 5.11.5 Adjacent channels to existing services; and
- 5.11.6 Transmissions in conjunction with bordering countries.

- 5.12 The DTT planning configurations may be grouped according to the reception mode and frequency band. The reception modes have been grouped as follows:

- 5.12.1 Fixed reception;
- 5.12.2 Portable outdoor reception and lower coverage quality portable indoor reception;
- 5.12.3 Higher coverage quality for portable indoor reception. and
- 5.12.4 Mobile reception (vehicle and handheld)

Comparison of service area coverage for different types of reception modes received from the same transmitter locations and system variants are shown in **Appendix I**.

- 5.13 To facilitate DTT planning, consideration of the four reference networks (RNs) as recommended in the ITU Recommendations have been taken in order to cover the different implementation requirements for DTT networks.

- 5.13.1 Reference network 1 (large service-area SFN);
- 5.13.2 Reference network 2 (small service area SFN, dense SFN);
- 5.13.3 Reference network 3 (small service area SFN for urban environment); and
- 5.13.4 Reference network 4 (semi-closed small service area SFN).

- 5.14 Additional explanations with regard to the DTT technical planning parameters such as the Reference Planning Configuration (RPC), Reference Networks (RN), combinations of system variants and capacity of each DVB-T system are shown in **Appendix J and K** respectively.



- 5.15 Considering the DTT issues highlighted in Section 4 and 5 of this document, a study using software propagation tools was conducted to use the key planning parameters in the existing radio environment. A sample of the study results using some of the available proposed RF channels are provided in **Appendix L**. The study confirmed that RF channels 49 and 51 (Peninsular Malaysia) and RF channels 47 and 51 (Sabah and Sarawak), may be able to operate as SFN networks providing two layers of DTT nationwide. Further, the simulated service area coverage better than the current analogue TV coverage could be achieved based on the DTT parameters that was discussed earlier and some of the important parameters as below:
- 5.15.1 Consideration on current apparatus assignments and closed border agreements;
  - 5.15.2 Analogue service coverage area from current apparatus assignments; and
  - 5.15.3 DTT transmission options based on:
    - 5.15.3.1 System variant (i.e. B2H);
    - 5.15.3.2 Same transmitter location as analogue TV;
    - 5.15.3.3 Using available RF channels SFN (Channel 47, 49 and 51); and
    - 5.15.3.4 Service area coverage for different target audience (fixed and portable (indoor & outdoor antenna)).
- Note that RF channel 49 will also be available for SFN use by 31 March 2008 or earlier. RF channels 57 and 59 (SFN) which is outside from DTT plan may be temporary used until year 2015 for migration as they are fully coordinated and available.
- 5.16 The analysis of the predicted DTT service area coverage as compared to the analogue TV service area coverage using the same transmitter location confirmed that the DTT signal could achieve similar or better service area coverage than analogue TV transmission. To ensure quality of service, the Commission envisaged that actual transmission capacity achievable in the field/actual environment for carriage of TV programmes may be further traded off for transmission robustness. .
- 5.17 Subject to availability and compatibility study, use of other RF channels for SFN or MFN may be considered. List of current apparatus assignment as shown in the **Appendix H** may be used as a basis to identify the RF channels. There are constraints in the use of such RF channels as there are issues of border coordination, harmful interference and impact to viewers.
- 5.18 As a guide, the locations of the broadcast transmitters are shown in **Appendix L**. It is envisaged that it will provide reasonable nationwide coverage and with minimum number of sites.

- 5.19 The comparison of service area coverage for analogue and DTT system is shown in **Appendix M**.

## **6.0 PRINCIPLES OF ASSIGNMENT**

- 6.1 No application for Apparatus Assignment (AA) shall be submitted to the Commission for DTT transmitters in implementing the DTT free to air migration plan unless the Commission issues a notice of invitation for such application.
- 6.2 Authorisation to use the spectrum for the DTT transmitters is by way of AA.
- 6.3 Subject to paragraph 6.1, the paragraphs below contain the eligibility, information and documents to be submitted for the AA application.
- 6.3.1 The eligibility criteria for the service providers is that the applicant, must be a holder of a valid Network Facilities Provider Individual (NFP(I)) licence that provides radiocommunication transmitters and links. Interested applicants are encouraged to form a consortium to facilitate implementation of the common integrated infrastructure approach as proposed in the migration and roll out plan.
- 6.3.2 The applicant shall:
- 6.3.2.1 submit a detailed Business Plan based on the concept described in this SRSP including details of the DTT roll out and analogue TV migration plan acceptable by the Commission;
- 6.3.2.2 upon the approval of the Detailed Business Plan by the Commission, submit application for an AA in accordance with the geographic areas specified in the Detailed Business Plan; and
- 6.3.2.3 prior to the issuance of the AA, provide to the Commission an Irrevocable Bank Guarantee to guarantee performance and compliance with the conditions of the AA and the Detailed Business Plan, payable on demand, either in part or in full, for the amount of RM 1,300,000 (Ringgit Malaysia One Million three hundred thousand) for each channel (7 or 8 MHz) from a licensed financial institution in Malaysia in the form and

substance agreed by the Commission, which shall be valid for the period of the AA.

- 6.3.3 The application for an AA shall be based on the committed roll out plan as specified in the Detailed Business Plan.
- 6.3.4 AA issued to successful applicant shall be subject to further additional conditions specified in **Appendix N**.
- 6.4 Subject to paragraph 6.1, applicants are required to:
  - 6.4.1 Submit AA application for the apparatus on the prescribed AA forms.
- 6.5 The AA for these bands shall be valid for a period of five years or lesser as printed in the AA. AA holders may re-apply for a new assignment at least 60 days before the expiry date.
- 6.6 Issuance of an AA is also subject to successful co-ordination among assigned stations and with neighbouring countries where it applies.

## **7.0 IMPLEMENTATION AND MIGRATION PLAN**

- 7.1 This SRSP shall be effective on the date of issuance of this document.
- 7.2 Notice to existing assignment/users holders:
  - 7.2.1 No new apparatus assignments shall be approved unless they comply with this SRSP.
  - 7.2.2 New apparatus assignments for Broadcasting Service in VHF Band I and analogue TV transmission in VHF Band III will not to be considered;
  - 7.2.3 Existing broadcasting apparatus operating in VHF Band I are required to vacate the band after 31 December 2009;
  - 7.2.4 Existing analogue TV transmission operating in the VHF Band III and UHF Band IV and V may continue their service until the year 2015. However, they shall shut down their analogue transmission after year 2015.
  - 7.2.5 Existing digital broadcasting apparatus operating in RF channel 49 may continue until 31 March 2008. Note that this channel has been

earmarked and reserved for the nationwide SFN network in the digital migration programme.

- 7.3 Other existing services in the Band III, IV and V:
- 7.3.1 Use of RF channels 38, 39 and 40 for IRD are not be allowed after year 2015. These RF channels will re-allocated to DTT service.
  - 7.3.2 Use of RF channels 12 and 38 by the existing Apparatus Assignment holder for Airport Tower operations and Radar by Aeronautical Service are not allowed after year 2020. No new assignment for **new apparatus** should be approved.
  - 7.3.3 Use of frequency band 478 MHz to 498 MHz by the existing Apparatus Assignment (AA) holders for land mobile service are not be allowed immediately and no new AA for this service shall be issued.
  - 7.3.4 Use of the band 477 MHz to 478 MHz for short range communication devices such as personal radio service is not allowed after year 2020. This band will be re-allocated to DTT service.
  - 7.3.5 Short range security devices, inbuilding RF cable TV distribution and wireless microphone devices are allowed to operate in the broadcasting Band III, Band IV and Band V on a secondary basis (shall not cause interference and cannot claim protection from the primary services).
- 7.4 The migration from existing analogue TV service which currently operates in bands 47 MHz to 68 MHz (Band I), 174 MHz to 230 MHz (Band III), 470 MHz to 582 MHz (Band IV) and 582 MHz to 798 MHz (Band V) to digital terrestrial television will be implemented in three phases (see Exhibit 3):

7.4.1 **Phase I : Year 2007 to 2015**

It is expected that the current analogue TV service will continue to operate until 2015. After 2015, analogue broadcast TV service is to be discontinued. However during the period from now till 2015, analogue TV broadcasting will co-exist along side DTT. DTT will make available bandwidth to carry all current analogue free to air TV stations in addition to any new TV stations that may come on air on digital. This is also known as the simulcast period, where both analogue and digital transmission will be operated together. This period is to allow adequate time for viewers and service providers to move to digital and achieving the required coverage.

It should be noted that this transitional (simulcast) phase must be kept as short as possible for reasons of cost (new network installation and maintaining the old network just to receive same service) and the shortage of frequencies (further digital programs cannot be transmitted until the frequencies used by analogue have been released). It is envisaged that phased analogue TV shutdown may be implemented earlier than 2015 in urban city areas such as Klang Valley.

#### 7.4.2 Phase II: Year 2016 to 2020

With the analogue TV service shutdown in 2015, there is a need to re-allocate the operating DTT channels to its future re-allocated VHF and UHF Bands. This re-allocation exercise will take place over a five year period from 2016 to 2020 and will see the bands 470 to 510MHz being re-allocated for DTT and the bands above 742MHz for Mobile Service. The following is to be noted:

7.4.2.1 The band 470 MHz to 510 MHz which was planned to be allotted to Mobile Service will now not be implemented. This band is now to make way instead for DTT in particular in providing DTT service direct to hand held (DVB-H) user terminals. The reason behind this move is that due to new findings on technical and economic reasons, there is a need to operate a DVB-H network at a lower frequency channel in the UHF band. Therefore, this band 470MHz to 510MHz will now need to be vacated and re-allocated for DTT.

7.4.2.2 Frequency from 742MHz to 798MHz (Channel 55 to 61) will be re-allocated to future Mobile Services. This band was considered by some administrations during the last WRC<sup>1</sup> meeting to be allocated to Mobile Service. Therefore, DTT transmitters are required to move/migrate to the allotted band after the year 2020.

7.4.2.3 System A (DTT) used for digital terrestrial sound broadcasting (T-DSB) service which was reserved a portion of one RF channel in VHF Band III (as shown in **Appendix C**) may also provide DTT service due to availability of spectrum in the same RF channel (1 RF channel containing 4 sub blocks of T-DSB RF channels).

#### 7.4.3 Phase III: Year 2020 onward

It is envisaged that onwards from year 2019, full commercial operation of DTT services in the bands 174MHz to 230MHz and 470 MHz to

1 – Resolution 646 (WRC-03) : Public Protection and Disaster Relief (PPDR) – the frequency bands that has been designated for PPDR are 380–470MHz, 406.1-430MHz, 440-470MHz, 746-806 MHz, 806-869MHz, 806-824/851-869MHz, 4940-4990MHz, and 5850-5925MHz.



coordination distance is continuously being reviewed with our neighbouring countries.

- 8.2 Further, domestic operator to operator coordination is required to coordinate RF planning with the affected parties.
- 8.3 RF planning using software simulation tools is carried out by the Commission to ensure compatibility with existing and planned assignments and if successful only an assignment is issued for the broadcast transmitter apparatus. The integrated RF plan will be maintained by the Commission.
- 8.4 In the event of any interference, the Commission may require affected parties to carry out operator to operator coordination. In the event that the interference remained unresolved after 24 hours, the affected parties may escalate the matter to the Commission for a resolution.

## **9.0 REFERENCES**

- 9.1 MyICMS 886 – Malaysian Information, Communications and Multimedia Services 886 Strategy
- 9.2 ITU-R BS.1114-5 [Terrestrial Audio Broadcasting]
- 9.3 ITU-R BT.1306-3 [Terrestrial Digital Video Broadcasting]
- 9.4 Broadcast Planning Software (ChirplusBC)
- 9.5 Minutes of Malaysian Border Coordination Meeting – FACSMAB, JTC (Malaysia & Thailand) and JCC (Malaysia & Indonesia)
- 9.6 Final Act of Radio Regional Conference 2006
- 9.7 Spectrum Plan Issue November 2006 Edition.

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