



A Consultative Document

**DRAFT FRAMEWORK FOR DIGITAL
TERRESTRIAL TELEVISION
BROADCASTING IN TRINIDAD AND
TOBAGO**

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1 Introduction

The National Policy on Broadcast and the Broadcasting Industry seeks to create an environment for the development of a fully modernized and dynamic broadcasting sector and the contribution to the economic, social and cultural development of the nation. In the continuing development of the broadcasting sector into a fully modernized and dynamic industry with a fair and competitive market, the public will be afforded a range of broadcasting services in a fully regulated environment.

Broadcasting is a key component of the information and communications infrastructure. Similarly, its operations are guided by a strong public interest requirement. Given the uniqueness of broadcasting and the importance of the service it provides, broadcasters have a special obligation to serve the needs and interests of their communities, one that has historically distinguished them from telecommunications service providers.

Digital broadcasting uses digital rather than analogue waveforms to carry broadcasts over assigned radio frequency bands. Sound and pictures are processed electronically and converted into digital format. This format is then transmitted as a bit stream and reconverted by appropriate receivers or set-top boxes into sound and TV programmes. This results in improved reception quality, allows more programme channels and promotes efficient use of the spectrum

Caribbean nations along with the wider world should be undergoing major changes in the area of television broadcasting with the movement from analog to digital. Many countries have either begun switching over or are developing a blueprint for the move. For some countries, like the United States of America, the change has already taken place while for others the process is only now beginning. Only countries in Europe and Africa have a mandate by the ITU¹ for switchover by June 2015. As a result, there will

¹ International Telecommunications Union - the United Nations specialized agency for information and communication technologies (ICTs)

no longer be protection of analog 'Free To Air' television broadcasting services by the ITU after 2015.

In the interest of harmonization and capitalizing on the benefits of going digital, the rest of the world have taken the initiative to ensure switchover on or before this date. In Trinidad and Tobago the body responsible for broadcasting regulation, the Telecommunications Authority of Trinidad and Tobago (TATT), is addressing this important move through an authorization process called Digital Terrestrial Television (DTT) broadcasting and has prepared a national policy for the switchover. In keeping with this, Trinidad and Tobago will be required to adopt a DTT broadcasting standard and define a date by which all analog broadcasting will be switched over to digital. In this regard the Authority has developed a Framework identifying and addressing the key issues in facilitating DTT broadcasting in this country.

1.1 Background and Sector Review

The broadcasting industry in this country, in particular 'Free To Air' FM Radio Broadcasting, is highly competitive. Already 33 concessions have been granted for an associated 37 FM radio broadcasting station licences. Of these radio stations 31 are national, 5 major territorial and 1 minor territorial. In addition, there are 9 'Free-To-Air' television broadcasters, of which 6 are national and 3 are major territorial.

Cable systems are still largely analogue, although digital transmission is developing as seen in the national network by service provider, Columbus Communications Trinidad Ltd (CCTL). Competition has also been introduced in the subscription broadcasting (cable TV) market since 2005, via a first-come, first-served application process for any entity interested in providing public domestic fixed (wired) networks and/or services. Entities wishing to provide television broadcasting services without the use of broadcast spectrum or transmitting stations can do so by applying for a concession to provide such services through the cable TV network providers.

With the regularization of existing providers and the introduction of new providers, there are currently 9 companies authorised to provide subscription broadcasting services, 8 of which are authorised to provide wired cable TV networks and services and 1 to provide satellite direct to home TV services. On the Authority's recommendation, Type 5 concessions were also granted to 1 broadcaster to provide television services via wired cable TV networks.

The Authority completed a competitive authorisation process for additional National, Major Territorial and Minor Territorial Television Broadcasters. This was accomplished via an RFP issued in September 2007 which allowed at maximum 7 new FTA television broadcasters. In February 2008, two concessions were granted for one National and one Major Territorial 'Free To Air' television broadcasters who are currently operating.

A detail of all broadcasters described above is presented in Annex I.

1.2 Objectives

Digital Terrestrial Television broadcasting and analog to digital switchover (DSO) are terms used in this document and are interrelated. DSO is the process whereby existing analog television broadcasters switch to digital broadcast transmissions. DTT is the overall authorization of broadcasters both existing and new for digital broadcasting and therefore includes DSO.

The objectives of this consultative document are to:

1. Identify the key issues (and impact) surrounding the introduction of digital terrestrial broadcasting to Trinidad and Tobago which include:
 - Policy and regulatory considerations
 - Impact on broadcasters
 - Impact on Consumers

2. Recommend an effective and efficient approach for transition to digital broadcasting in addition to the standards for DTT broadcasting services which include:
 - Service Provision and Concept of signal distributor
 - Approaches to digital migration
 - DTT broadcasting network and configurations
 - DTT broadcasting standards
 - Spectrum considerations in migrating to digital broadcasting
3. Highlight the role (and impact) of the various key stakeholders in the analog to digital migration process
4. Recommend a transition timeframe and key milestones for analogue to digital switch-over.

1.3 Modification to Document

As the television broadcasting sector evolves, the need may arise to revise and update the authorisation process that should apply to the sector and as such, this document will be modified as the Authority deems appropriate. The document's maintenance history will be modified accordingly.

1.4 The Consultation Process

The Authority published the first draft of this document (version 0.1) and invited the comments and recommendations from key stakeholders in the industry. The first consultation period ended on September 30th 2010. The Authority received comments from the following parties:

- Trinidad and Tobago Publishers and Broadcasters Association (TTPBA)
- Telecommunications Services of Trinidad and Tobago (TSTT)

Framework for Digital Terrestrial Television Broadcasting in Trinidad and Tobago

- Independent Cable Network of Trinidad and Tobago (ICNTT)
- Columbus Communications Trinidad Limited (CCTL)
- Green Dot Limited
- CNC3
- CCN TV6

The Authority published a revised draft *Framework for Digital Terrestrial Television Broadcasting in Trinidad and Tobago* (version 0.2) which took into consideration the comments and recommendations received in the first consultation round. A Decision on Recommendations (DOR) Matrix was included at Annex VI of the document, and provides all the comments and recommendations received in the first consultation round and the Authority's decisions in respect of those.

The second consultation period ended on September 23rd 2011. The Authority received no comments from the stakeholders in the second round of consultation.

Both rounds of consultation were conducted in accordance with the Authority's *Procedures for Consultation in the Telecommunications Sector of Trinidad and Tobago*.

2 Key Issues in Digital Terrestrial Broadcasting

A key resource required for the provision of terrestrial broadcasting services is RF spectrum and which is recognized as a scarce national resource. The assignment to a licensee neither confers ownership nor an absolute right to a particular radio frequency. Since digital technology makes it possible for one frequency channel to accommodate more than one programme channel, it is in the public interest to ensure that the radio spectrum is used efficiently.

In the case of digital broadcasting, this is achieved by creating separate market segments for signal distribution providers, broadcasters and content providers. In this regard, an investor does not have to be assigned a frequency and/or develop infrastructure before becoming a broadcaster. The Authority currently allows entities to own and operate transmission facilities for service provision as a broadcaster.

2.1 Benefits of Digital Broadcasting

The benefits of migrating from analogue to digital terrestrial broadcasting include:

- additional services such as interactive services, closed-captioning, and electronic programme guides (EPG);
- higher video and audio quality (HDTV);
- greater spectrum efficiency due to associated digital coding techniques;
- digital dividend (where it is a benefit sought in other countries, in Trinidad BWA process)
- accommodation of more programme channels in one RF channel (VHF/UHF frequency);
- reinvigorating broadcasting by improving programming and reception capabilities which reduces problems such as ghosting and interference.

Annex I provides a more detailed listing of the advantages and disadvantages associated with DTT broadcasting.

2.2 Providing Digital Broadcasting Services

The stages through which broadcasting services are typically provided is illustrated below. The relevant issues surrounding the migration of analog to digital TV are summarized in processes 3 through 6.

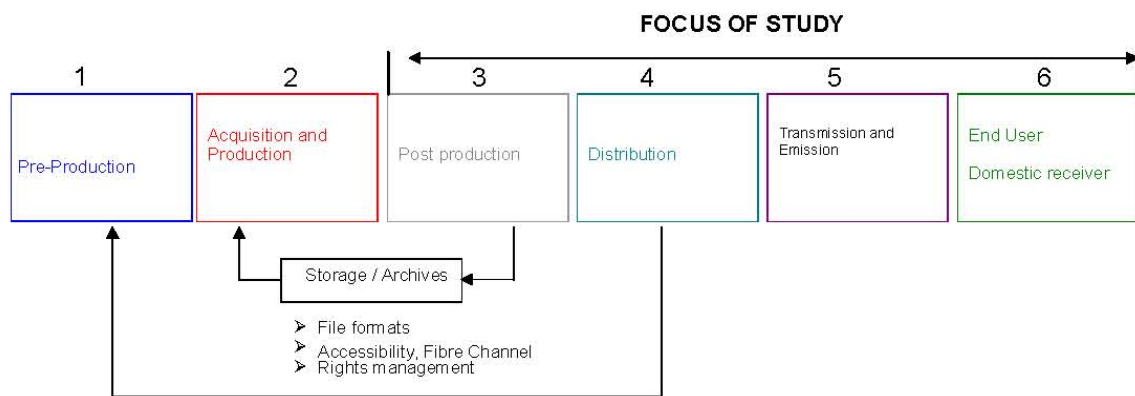


Figure 1 – Processes involved in providing broadcasting services

Source: Southern African Digital Broadcasting Association (SADIBA)

- **Stage 1- Pre-Production**
Researchers, producers and commissioning editors use computer based systems to initiate the program cycle. Advanced scheduling and offline preparation is done on standard information processing equipment. Most video archive material is in an analogue format at present
- **Stage 2 - Acquisition and Production**
The production process uses a wide variety of analogue and digital equipment, usually manually controlled in real time, with varying degrees of automated assistance. It is basically an analogue process
- **Stage 3 - Post-Production**
At present most post-production is already in digital
- **Stage 4 - Distribution**

The majority of video distribution is done in this region uses the North American analog video standard – NTSC

- Stage 5 - Transmission and Emission

The ‘Free To Air’ television broadcasters provide their analog service via the North American NTSC transmission standard.

- Stage 6 – End User Domestic Receiver

For analog television service, viewers only require the use of an indoor/outdoor antenna and a TV set. In migrating to digital TV, the viewer may change the television set to one that has a digital receiver/tuner circuit or use a set-top-box (STB) with the current TV set.

2.3 Coverage Requirements and Spectrum Allocation under Analog FTA

The topography of Trinidad and Tobago is unique, varying between mountain ranges and flood plains. With the majority of the country’s population situated on plains and foothills, broadcasters have taken advantage of the elevation provided by the mountain ranges to achieve coverage. As a result of this, there has been limited build out of sites for broadcast transmitters (2 primary sites in Trinidad and 1 primary site in Tobago). In addition to this, with the current number and expected increase in broadcasters, the crowding at the existing transmitter sites will influence the conditions and quantity of new licensed channels.

Tobago faces many challenges with respect to the offering of broadcasting services. Even though there are five (5) National ‘Free To Air’ television broadcasters, various areas in Tobago do not have adequate coverage or even receive services at all. A key contributing factor to this challenge is the topography of Tobago, which consists of a central mountain range spanning the length of the island. Most of the population of Tobago resides at the foothills and in valleys.

Unlike Trinidad where a single main transmitter site may feed the majority of the population, broadcasters must configure transmitters such that there is coverage into

valleys on either side of the ridge. Use of multiple transmitter sites utilizing frequency re-use and directional coverage patterns is a means of ensuring that Tobago is adequately provided with broadcasting services. It is to be noted that there is a higher cost associated with this method due to the infrastructure and equipment associated with each transmitter station.

The Authority has carefully analyzed the coverage provided by existing broadcasters. Utilizing the present coverage, transmitter site configurations and propagation models developed, one main transmit channel (VHF) may provide 50% – 90% population coverage. Increasing this figure may be achieved utilizing additional UHF channels in a frequency reuse configuration to fill under-served areas or dead-spots.

In order to ensure that the currently authorized television service providers are able to meet their coverage requirements based on their concession type, the Authority has assigned channels to the various concessionaires as follows:

- National – 3 channels (1 VHF, 2 UHF)
- Major Territorial – 2 channels (UHF)
- Minor Territorial – 2 channels (UHF)
- Niche – 1 channel (UHF)

2.4 Revocation of Allocated Frequencies

Digital television is planned in the same frequency bands used by analogue television. Therefore, full introduction of digital television broadcasting services, will necessitate an eventual switch-off of the existing analogue television broadcasting services in the UHF/VHF Frequency Bands. One of the main benefits of implementing the digital switchover for television is the additional spectrum that will be freed up that may be used for other non-broadcasting services. This additional spectrum is called the digital dividend.

As seen in other countries where the analog to digital switchover process has commenced and may have completed, digital dividend was placed as a high objective for early switchover. Trinidad and Tobago has in another way taken the initiative to capitalize on some available digital dividend in the upper UHF television band.

In the frequency allocations within the Authority's Spectrum Plan for the Accommodation of Broadband Wireless Access (BWA) Services, UHF channels 52 – 69 were reallocated to other services such as Multi-Channel Video Distribution and IP Services. This spectrum was made available to service providers through an auction process. The benefits achieved included revenues generated from licensing spectrum, increased service provision to the country, increase competition in the market.

Statement on Revocation of Analog Broadcasting Frequencies and Digital Dividend:

The Authority proposes to allocate spectrum revoked from 'Free To Air' analog broadcasters to the provision of DTT broadcasting services . All available spectrum through this process shall be primarily used for expanding capacity of DTT service providers and may be considered for BWA and other services on a secondary basis. This shall be prescribed in the Migration Strategy and Implementation Plan for Digital Terrestrial Television Broadcasting Services in Trinidad and Tobago and shall be consistent with the TTFAT.

2.5 Continuity of Service to the Public

As the traditional 'Free To Air' analog broadcasters migrate to digital, there is the concern of ensuring that that public is not adversely affected by having discontinued viewing of television. There are three modes in which DTT broadcasting services may be provisioned:

- 1) service as 'Free To Air' – in this mode the public will enjoy television broadcasting services in the same way as in the days of analog TV except that the relevant STB or digital receiver (TV) will be required that conforms to the DTT standard.

- 2) service as free Conditional Access (CA) – the public does not pay for viewing of programs but is required to have a STB or digital receiver (TV) capable of decoding the encrypted signal.
- 3) service as Subscription (pay Conditional Access) – the traditional analog broadcasters programs will be required to be accessible to the consumer without an associated cost when using a STB or digital receiver (TV) capable of decoding the encrypted signal.

In each of the modes described above, the Authority shall ensure that FTA broadcasters received prior to digital switch on shall continue to be accessed without restriction during the phases of switchover.

Statement on Rights and Obligations under ‘Free To Air’:

The Authority proposes to ensure that:

- *There is no disruption in service to the public during ‘digital switch on’ and ‘analog switch off’ for the transmission of programs from traditional analog broadcasters who have migrated to digital.*
- *The Authority proposes to ensure that conditions under the following clauses of the concession (the “must carry” obligation) is upheld for analog ‘Free To Air’ TV broadcasters who transistion to DTT broadcasting:*

B.18 “A concessionaire who operates a public domestic fixed telecommunications network which is used for the provision of television broadcasting services shall ensure that all national and major territorial free to air television broadcasting channels are carried on its network”

D.10 “A provider of subscription television broadcasting services who operates a public domestic fixed telecommunications network that is used for the provision of this broadcasting service shall ensure that all national and major territorial free to air television broadcasting channels are carried on its network”

2.6 Public Broadcasting Services

The *National Policy on Broadcast and the Broadcasting Industry* specifies the Government's intention to contribute to the developmental dimension of the broadcasting industry through the Public Broadcasting Service (PBS). The policy therefore prescribes the reservation of spectrum in the FM band plan for the provision of public broadcasting services.

However, the Authority recognizes that many countries (e.g. the United States, Canada, Pakistan, United Kingdom, Australia, New Zealand, Hong Kong) also implement television Public Broadcasting Services in order to promote the airing of educational, cultural, public affairs and historical programmes or documentaries that may be considered to be less saleable to the mass market.

The Authority recognizes the need for a similar public broadcasting television service in Trinidad and Tobago which can also be used to promote the development of local programming content. The Authority has therefore reserved 1VHF and 2 UHF channels for the provision of an analog National Public Broadcasting Service in Trinidad and Tobago.

The Authority has placed a moratorium on the authorization of a Public Broadcasting Service Provider until such time as the terms and conditions for the relevant concession has been established in consultation with the Government, the public and other key stakeholders.

2.7 Environmental Concerns

Given the global activity of analog to digital migration, the consumer electronics market faces yet another change. As the end user equipment is developed and deployed, older and less suitable equipment will have to be replaced and/or discarded. This presents a two

fold problem for countries that do not have an electronics manufacturing industry. The first being outdated analog equipment being shipped out in major quantities from countries implementing digital switchover to countries dependent on the import of electronic equipment, commonly referred to as dumping. Mindful of the influence that this process will have on the reducing cost of analog TV sets, proper regulations relating to specifications and standards of the relevant consumer equipment (STB and TV) and disposal of e-waste will be required.

The second comes in a form internal to each country where the lack of understanding may cause consumers to discard analogue equipment such as TVs and VCRs. This may not only generate a crisis in waste disposal but cause environmental hazards. This too is referred to as dumping but in the physical sense.

Statement on Environmental Concerns and Protection:

The Authority proposes to establish the relevant policies and regulations to ensure that there are standards for end user equipment required for DTT broadcastings so as to reduce the possibility of uncertified equipment in this country. The Authority shall collaborate with other agencies such as the Trinidad and Tobago Bureau of Standards (TTBS), the Environmental Management Agency (EMA) and the Solid Waste Management Company Ltd (SWMCOL) to ensure that a solution to the issues discussed in this document.

2.8 Impact on Broadcasters

Rollout of a new broadcasting system or even more so changing from an analog to digital requires the planning and dedication of the service provider. This may not be regarded as an easy task as there are several components that will have to be addressed in order to ensure success. The components discussed below presents several constraints which broadcasters may face which include financial, technical, resource and time.

The following are provided as an overview of the key areas involved in providing digital broadcasting services:

- Content – broadcasters may be faced with the challenge of changing formats or multiple content conversions during purchase and selling of content to and from suppliers from countries with different digital broadcasting standards.
- Archiving – as with content production and content play-out systems, the archives storage technology would have to adapt to match the requirements and may involve upgrading or replacing of equipment.
- Multicasting – broadcasters may have additional technical constraints for signal distribution for both analogue and digital transmitters over the transition period.
- Marketing – broadcasters may have to plan a marketing budget in order to inform and educate audiences on the switchover to digital broadcasting. There may have an associated cost impact in re-branding and regaining a market presence.
- Training – broadcasters may have to embark on intensive training programmes for staff to operate and maintain digital broadcast equipment and systems.
- Equipment – capital budgets would have to planned in advance to cater for the purchase of digital broadcast equipment and systems.
- Resource Allocation – due to the work required in the various areas discussed above, broadcasters may have to carefully plan for human resources and time invested especially given the constraints of a firm switchover date.

2.9 Impact on Consumers

It is important to ensure that there are strategies to disseminate relevant information to consumers regarding the requirements and benefits of migration to digital broadcasting. In the context of digital broadcasting, the challenge will not be in convincing the public on the need for televisions and radios but rather appropriate technology to receive digital programming. This could be televisions and radios that can receive digital programmes or set top boxes to change the digital broadcasts into analogue format. One of the major

challenges in digital switchover is to raise awareness on migration and ensure consumer buy-in.

It should be noted that consumers will not be required to discard their analogue television sets but will need to obtain set top boxes in order to receive digital broadcasting transmissions. However, it must be understood that in order to benefit from the superior picture quality, a digital ready TV set will be required. After the switch-off, consumers with an analog TV and no STB will not be able to receive digital 'Free To Air' television signals.

Globally the issue of STB costs and its impact on the lower income groups in the society is one that required the intervention of government. One of the more direct approaches taken to ensure that this group is ready for analog to digital switchover is by introducing a subsidy for STBs. A subsidy can be provided in various ways such as direct payouts, coupons, tax reduction or incentives and rebates. Regardless of the method chosen it should not be one that is onerous and an administrative burden.

Funding has been discussed in various countries with the view of utilizing the Universal Service Funds (USF). At present under Section 28 of the Act, universal service, inclusive of universal service funding, is limited to the provision of telecommunications services. However the Authority has recognized the contributing role the broadcasting sector plays towards the development of an ICT enabled society. As such the Authority has recommended to the Government of Trinidad and Tobago (GoRTT) legislative revisions to the Act that includes broadcasting services as part of universal service.

The task of identifying how many people require and qualify for a subsidy may be carried out using the poverty index and digital divide survey which may determine the target groups.

Statement on Impact to Consumers:

The Authority will consider the matter of a subsidy and an appropriate recommendation will be made at the appropriate time.

2.9.1 Consumer Education

Public understanding and acceptance are crucial to the success of the migration from analogue to digital broadcasting, therefore a comprehensive public education campaign will be required. The content of consumer education must include but not be limited to:

- the difference between analogue and digital services
- service availability (type of service, channels that can be received)
- set top boxes and receivers' availability (type of receivers, estimated cost)
- changes to existing home connection set-up (aerial configuration, connection with other equipments)
- the period of migration
- switch-over dates
- policy issues
- financial implications
- quality of service
- reception problems
- coverage
- recording alternatives
- environmental impacts and guidelines for proper disposal of unwanted devices

The public may contact various stakeholders such as the Consumer Affairs Division of the Government, the Authority, broadcasters and electronic suppliers for information pertaining to the points above. Each point will have a clear channel for source, output and dissemination and shall be further identified in the Consumer Education, Awareness and Protection Plan.

A well prepared consumer education programme is the key to any switchover plan and lessons from early switchover activities in other regions underline the importance of the following approaches in consumer communications:

- a) Use of existing analogue services to communicate the benefits of new digital services is an extremely powerful mechanism. It is to be noted that the sale of digital receivers can be enhanced using promotions during analogue broadcasts.
- b) Communication through broadcast media should be complemented with corresponding written information at the point of sale. Best practice shows that communication at retail level should always lead with services.
- c) Industry and trade must support the market education program by providing consumers with information on how to use and derive maximum value from the new equipment. This requires both broadcasters and manufacturers to establish hotlines and other touch-points to handle consumer enquiries.

At the initial stages of switchover and rollout of digital services, Government must play a key role in consumer education and public awareness. Programmes designed to achieve any of the approaches discussed above can be realized through Government related information dissemination such as Government Information Services (GIS) and air time on broadcast stations.

In looking at the global trend of analog to digital switchover, there has been a direct responsibility of the Government in ensuring that the public is properly educated. The cost associated with such processes is a burden that the not only the Government but also key stakeholders should bear. This arises from the fact that analog to digital switchover is policy geared towards an important step in the development of the broadcasting sector in this country. Any initiative by the Government in public awareness does not preclude any consumer educational programmes that the broadcaster may wish to implement in the delivery of services.

The process flow for selection of the appropriate DTV equipment depending on the broadcasting service provided is illustrated below:

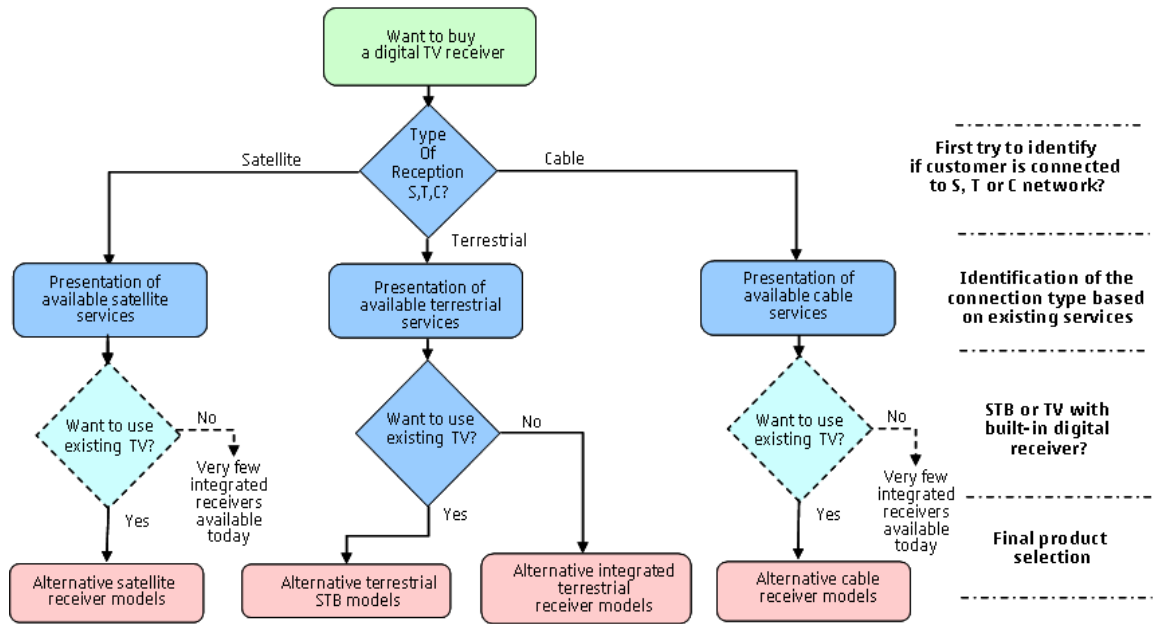


Figure 2 - Flowchart to assist DTV equipment selection

Consumer education must also emphasize the benefits to the consumer. Consumer education should involve broadcasters, retailers and other players in the broadcasting industry in order to yield the expected benefits and improve usability and accessibility to digital broadcasting.

2.9.2 Consumer Protection

The priorities in the migration process must revolve around the consumers who are likely to be the most affected. The decisions of consumers will affect success of the migration. The consumer education plan must prioritize consumer protection to guard against exploitation through unfair market practices.

Consumer protection will therefore be a priority area; key aspects include:

- Provision of adequate time for change: The proposed migration period must be adequate and the new medium attractive enough to encourage people to buy the appropriate digital equipment. This will also increase the up-take rate. Consumers who do not wish to abandon their analogue receivers immediately will have set

top boxes which will allow them to receive digital signals on the analogue receivers.

- Relevant Regulations: As the government puts in place measures to end analogue broadcasting, it will be necessary to make regulations that ensure consumers are protected. Such regulations will contain intervention mechanisms for complaints raised by consumers; and enforcement and consequences for those found flouting the regulations.
- Addressing Consumer Concerns: Consumers need to be informed that switchover is definite and be given adequate notice in order to make informed purchasing decisions.

2.9.3 Vulnerable Groups

The demands of the vulnerable groups need to be evaluated and addressed in the migration strategy. For instance, people with disabilities often face more challenges in using new technologies and their special needs are often forgotten. Some of the challenges they face range from visual, hearing and dexterity, and therefore efforts must be directed to:

- Creating awareness and understanding nationally;
- Identifying products suitable for the vulnerable groups, particularly those with disabilities; and
- Ensure the accessibility of ancillary services and their availability on the digital television platform.

Statement on Consumer Education, Awareness and Protection:

The Authority proposes to establish a Consumer Education, Awareness and Protection Plan which shall ensure the the public is fully appraised of the key issues related to analog to digital switchover. Implementation of this plan shall be a collaborative effort between the relevant stakeholders, Government and the Authority. The role and

responsibilities of each party shall be identified in the Consumer Education, Awareness and Protection Plan.

3 Service Provision and Signal Distribution

3.1 Concept of Signal Distributors

Signal distribution is the process whereby the output of a broadcasting service is taken from the studio and conveyed to any target area by means of a telecommunication system. It involves construction, operation and maintenance of transmission infrastructure.

Terrestrial broadcasting predominantly in Europe, Africa and Asia has evolved with broadcasters developing separate individual transmission infrastructure. This is at variance with the best practices in the industry where common infrastructure is used to provide transmission services to broadcasters. This is done through a common carrier company which makes its infrastructure available for hire for communication transmission services. This entity is commonly referred to as a “Multiplexer” and is a common signal distributor which adheres to the relevant licensing and regulatory conditions as would a regular analog broadcaster. This arrangement ensures optimal utilization of national resources and spurs rapid growth of new value added services.

3.2 Introduction of Common Signal Distribution

Broadcasters have invested heavily in infrastructure to distribute their signal. The investment in a transmitting station includes access roads, electricity, buildings, security, air conditioning, generators, tower/mast with common transmitting antennas, and satellite uplink and receiving facilities. Costs are also associated with employment of staff to manage and maintain facilities in the field.

However, with the introduction of a signal distributor, the broadcaster will concentrate on content development and will no longer be involved in site acquisition, signal

distribution, infrastructure development and operation. While broadcasters will incur additional costs during the simulcast period, it is expected that after the switch-off of analogue there will be no more costs incurred for analogue transmission.

A signal distributor is beneficial for the following reasons:

- Lower transmission costs per broadcaster;
- Better efficiency in spectrum management;
- Lower set up costs for new broadcasters;
- Reduced environmental impact;
- Lower receiving equipment costs to the consumer, for example, one common receiving aerial;
- Uniform coverage of the broadcast signal; and
- Less signal interference.

3.3 The Challenges of Signal Distribution

The functions of a signal distributor are currently carried out by the existing analog broadcasters where they own and operate the transmission facilities. In the realm of a broadcasters switch from analog to digital, there may be high setup costs for infrastructure. This may provide a limiting factor on the number of broadcasters willing to become signal distributors. Furthermore, the scarcity of spectrum in the VHF and UHF bands will not only determine the number of new entrants in this digital market but will also provide a limitation on the capacity of each network. The spectrum allocations, assignment principles and the number of signal distributors allowed for authorization will be detailed in the Migration Strategy and Implementation Plan for Digital Terrestrial Television Broadcasting Services.

3.4 Obligations of Signal Distributors

The Authority proposes the following obligations on signal distributors:

- i. Provide services to broadcasters on an equitable, reasonable, non-preferential and non-discriminatory basis.
- ii. Adhere to licence conditions as provided by the Authority.
- iii. Provide quality delivery of broadcasting services in accordance with the Quality of Service (QoS) standards set by the Authority.
- iv. Ensure that the digital transmission coverage is in accordance with the concession and licence requirements.
- v. Inform the Authority of all modifications to the network.

Statement on Common Signal Distribution:

The Authority proposes to authorize entities as signal distributors in accordance within the Authorization Framework for the deployment of DTT network and services. These signal distributors shall comply with the obligations which includes:

- *Provide services to broadcasters on an equitable, reasonable, non-preferential and non-discriminatory basis;*
- *Adhere to licence conditions as provided by the Authority;*
- *Provide quality delivery of broadcasting services in accordance with the standards set by the Authority;*
- *Ensure that the digital transmission coverage is in accordance with the concession and licence requirements;*
- *Pursuant to the concession, inform the Authority of all modifications to the network.*

4 Approaches for the Migration to Digital Television Broadcasting

Broadcasting greatly impacts on economic, social and political aspects in society. It affects content production, transmission and reception, policy makers, broadcasters and ultimately consumers. The analog to digital transition should cause minimal disruption to viewers necessitating a cautious and gradual execution of the migration plan.

There are two possible approaches to the transition to digital broadcasting:

- ✓ Market driven – technological transition which involves the progressive replacement of analogue technology with digital technology; and governed completely by market forces for entrance and survivability.
- ✓ Policy driven – transition guided by established processes and plans that have been agreed upon by all stakeholders with the goal of ensuring a firm implementation. This approach is primarily focused on free-to-air terrestrial broadcasting services.

It is imperative to set a transition timeframe that mitigates the effects of the costs, develops attractive service to derive demand, and overcomes resistance from the public and industry players who may see risks in the changes in the broadcasting sector.

Although there is a global trend for analog to digital switchover, it is the responsibility of each country to determine the path of growth for broadcasting services. This country has the option to continue as a predominately analogue terrestrial network. Satellite technology or wireless cable TV (MMDS) may then be used for expansion of service. The consequence however, is that Trinidad and Tobago will not be able to claim protection or resolution (at the international level) for matters of interference and cross border coordination. .

The lifespan of this method could be extended to a further 10 years before technology obsolescence would force broadcasters and audiences to migrate to digital broadcasting.

The perils facing broadcasters would be high cost per viewer budgets to meet coverage obligations through expansion of the existing analogue transmitter network. Thus digital broadcasting would eventually be thrust upon the country of which the consequences would be the absence of proper planning.

In light of the above and in compliance with ITU global mandate for analog to digital switchover, an approach must be adopted. The following subsections discuss the various options within each approach.

4.1 Market Driven Approach to Migration

This approach introduces digital broadcasting with market forces shaping entry and existence. This has been the method used for the introduction of analog broadcasting services in this country to date. In this case the Government is to primarily facilitate the introduction of new digital television services and the granting of licenses. This could prove attractive to any broadcaster seeking to provide digital TV services. This approach would therefore not be directed by strong drivers to influence the shape of digital broadcasting.

4.2 Policy Driven Approach to Migration

This approach has been predominantly adopted to ensure compliance with ITU mandate. Establishing a policy will therefore guide the migration process and ensure that firm switchover is achieved. Procedures and standards are detailed and contributed to properly managing the switchover process. Within this approach there are three options which are discussed below:

Option One – Introduce Staged Digital Broadcasting

A managed approach also induces economies of scale benefits, the most obvious of which is the driving down of costs through greater market penetration. Subsidised

receiver equipment for consumers could be used as an incentive and catalyst for this approach.

This option creates an opportunity for the future licensing of both analog and digital broadcasters. The Authority has completed a process which may be considered as the first component of this option. Two concessions were granted for additional 'Free To Air' television broadcasters and although not under any mandate, these broadcasters have chosen to provide analog broadcasting services.

The second part of the option may utilize the available spectrum in the upper UHF band (channels 40 – 50) for simulcasting. These channels will be selectively distributed to existing analog broadcasters to deploy digital transmission infrastructure. This option identifies certain broadcasters first with a plan to later expand to the rest of broadcasters, as frequencies become available. Such a migration plan should obviously bear the interests of the existing analogue broadcasters in mind.

Therefore protection of existing analogue services in terms of interference levels would be of the utmost importance. This method would be feasible even for the allocation of spectrum in the event of scarcity. The drawback to this option is the unequal playing field created for certain broadcaster in having services deployed ahead of others. Crucial market penetration can be achieved by those in the first phases of switchover which would lead to an unfair advantage in capturing revenue.

Option Two – Introduce Digital Broadcasting with Restrictions on New Analog Broadcasters

The Authority would impose a moratorium on future analogue roll-out as well as announce an early and fixed switch off date for analogue. This option makes use of all the available VHF/UHF channels for simulcasting and creates a feasible path towards switchover. Although not an approach that is spectrum efficient, broadcasters can rely on the market being a fair and competitive one.

As discussed, broadcasters have a challenge of providing coverage given the topography of this country and the limited transmitter sites available. Allowing each broadcaster to simulcast on additional RF channels worsens the overcrowding at antenna sites resulting in increased possibility of interference.

Option Three – Introduce Digital Broadcasting Using a Combination of Delivery Platforms

Similar to option two, the Authority would impose a moratorium on analogue roll-out as well as announce an early and fixed switch off date for analogue. The introduction of DTT broadcasting will be via the authorization of signal distributors utilizing the spectrum allocated for this process as identified in the Migration Strategy and Implementation Plan for Digital Terrestrial Television Broadcasting Services. This will provide the fastest adoption of digital broadcasting services as new entrants geared toward DTT broadcasting will introduce the technology driving the market into uptake of services.

Deployment of a common DTT transmission platform (signal distributors) will offer a valuable opportunity for the introduction of digital TV services in this country. It should be noted that as analog to digital television migration is realized so does the benefits such as additional services, higher quality and released spectrum for other services. These digital platforms or signal distributors require the same licensing and regulatory conditions as the regular analog broadcaster.

Existing analog broadcasters will be given the opportunity to become a signal distributor owning and operating the transmission facilities. In addition, if not becoming a signal distributor the analog broadcaster may only provide services through an already established signal distributor. This creates the opportunity to focus on content production while meeting coverage obligations will now become the responsibility of the signal distributors.

This option has the features of being the most spectrum efficient approach also giving existing analog broadcasters the fastest and most feasible path towards digital transmission. A fair and competitive market is created which fosters development of more content providers, value added services and enhanced quality of service delivery.

Statement on Approach for Analog to Digital Migration:

The Authority proposes to use a policy driven approach using option three as discussed in Section 4.2 for the introduction of DTT broadcasting services. This approach shall require a moratorium be placed on analog terrestrial TV roll-out as well as the establishment of an early and fixed switch off date. The introduction DTT broadcasting shall involve the authorization of signal distributors owning and operating the transmission facilities and broadcasters seeking to provide services.

4.3 Broadcaster Network Configurations

In principle digital terrestrial television broadcasting can be achieved in two ways:

- multiple frequency networks (MFN) which allow the same programme to be carried by individual transmitters using different frequencies.
- single frequency networks (SFN) in which coverage is provided by multiple transmitters operating on the same frequency and carrying the same programmes.

The network configurations for digital terrestrial broadcasting services can be implemented as MFN, SFN or as mixed networks consisting of both. The type of network implemented depends on the availability of frequencies, the type of coverage required, topography and the number of broadcasters / signal distributors to be provided.

4.3.1 Current Infrastructure Environment

Historically, broadcasting in Trinidad and Tobago has been a straightforward process. Once broadcasters were assigned a frequency, they would develop their own

infrastructure for hosting their transmission systems. Alternatively, they would enter into co-location agreements with broadcasters having existing infrastructure. Through this infrastructure, they would deliver programmes to their audience. It is common to find several towers or masts within the same designated site housing different broadcasters.

Due to the constraints of topography there has been limited build-out of sites for broadcast transmitters in Trinidad and Tobago. There are two primary sites in Trinidad and one primary site in Tobago. The expected increase in broadcasters may result in overcrowding at the existing transmitter sites (antenna farms) resulting in the development of new sites.

The development of new sites creates several challenges to broadcasters such as land acquisition, construction of access roads, electrical power etc.

Additionally, congestion at these antenna farms has created concerns regarding interference to all broadcasting services. Broadcasters at these sites use analog broadcasting techniques for both FM and TV and are likely to experience interference as a result of co-location and crowding.

4.3.2 Multiple Frequency Network (MFN)

This network configuration has been adopted for existing analog TV broadcasting as identified in the channel assignment principles in Section 2.3 and the constraints that required such an approach.

Each transmitter uses a different frequency channel (Cx), acting independently and having its own coverage area. Re-use of channels is possible given sufficient geographical separation. In providing coverage utilizing this mode of operation, the consumer now has to determine the best received signal or channel in a particular service area. This can potentially lead to confusion and misconception for the consumer in relation to the station name and identified TV channel(s).

Consistent with the Fee Structure and The Telecommunications (Fees) Regulations 2006, any broadcaster utilizing more than one frequency must pay for use of that spectrum. This approach would therefore result in higher fees for providing a TV broadcasting service when compared to a network using one frequency as in single frequency network (SFN) discussed in this document.

A typical configuration for a MFN is shown below identifying how coverage is achieved utilizing multiple frequencies and its re-use.

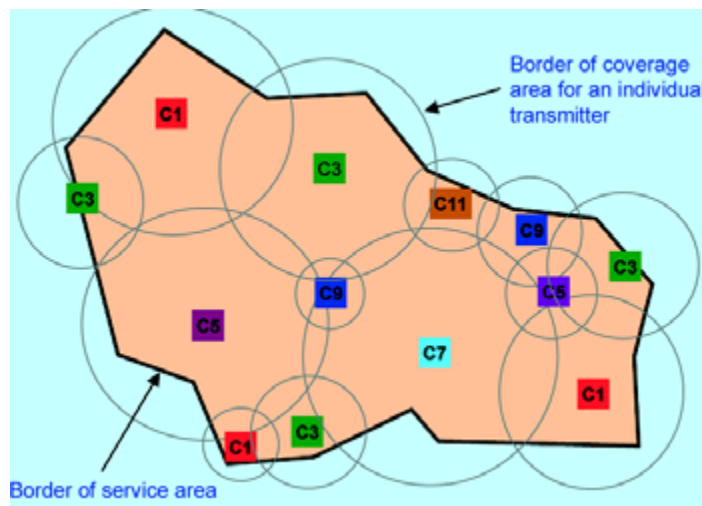


Figure 3 – MFN Network Showing Coverage and Spectrum Assignment

4.3.3 Single Frequency Network (SFN)

Analogue FM and AM radio broadcast networks as well as digital broadcast networks can operate in this manner. Analog television transmission has proven to be more difficult, since the SFN results in “ghosting²” due to echoes of the same signal. A simplified form of SFN can be achieved by a low power co-channel repeater, booster or broadcast translator, which is utilized as gap filler transmitter.

² In television, a ghost is an unwanted image on the screen, appearing superimposed on the desired image. In a more specific sense, a ghost is a replica of the desired image appearing fainter and offset in position with respect to the primary image.

The aim of SFNs is efficient utilization of the radio spectrum, allowing a higher number of radio and TV programs/broadcasters in comparison to traditional MFN transmission. A SFN may also increase the coverage area and decrease the outage probability in comparison to a MFN, since the total received signal strength may increase to positions midway between the transmitters.

In a SFN, all transmitters and are usually synchronized using GPS or a signal from the main station or network as a reference clock.

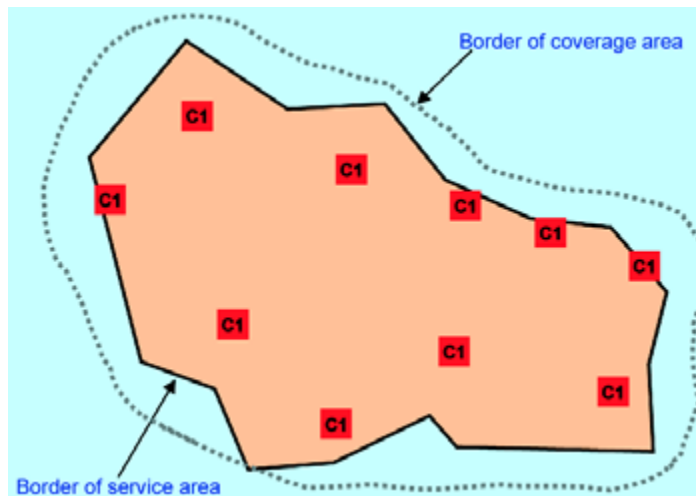


Figure 4 – SFN Network Showing Spectrum Allotment

There are two distinct schemes for the management and licensing of spectrum for the rollout of transmission networks. The first is an assignment approach where each planned transmitter together with its characteristic properties is specified and licensed under these properties. The second is an allotment approach where the planned service areas together with a set of general network implementation rules are developed by the network provider. Assignments and allotments describe the same planning objects in different ways, and they can be transformed into one another.

An example can be taken from the current licensing environment that the Authority has established in its Authorization Framework. A FM broadcast station is granted a licence with a specified frequency, location and transmitting parameters in which to operate. In contrast a cellular network operator is licensed a range of frequencies and the design and

implementation is then developed for network rollout and may vary or be modified to meet network requirements.

Statement on DTT Network Design and Implementation:

Consistent with the Authority's role to promote efficient use of the radio frequency spectrum, the Authority proposes to mandate the implementation of single frequency network (SFN) configurations for the provision of digital terrestrial television services in Trinidad and Tobago.

4.4 DTT Broadcasting Standards

Digital Terrestrial Television (DTT) is the implementation of digital technology to provide more channels, when using Standard Definition Television (SDTV) and better quality of picture High Definition Television (HDTV). The main technology standards used are Digital Video Broadcasting (DVB-T and DVB-T2) in Europe, Advanced Television Systems Committee (ATSC) in North America and Integrated Services Digital Broadcasting (ISDB-T) in Japan.

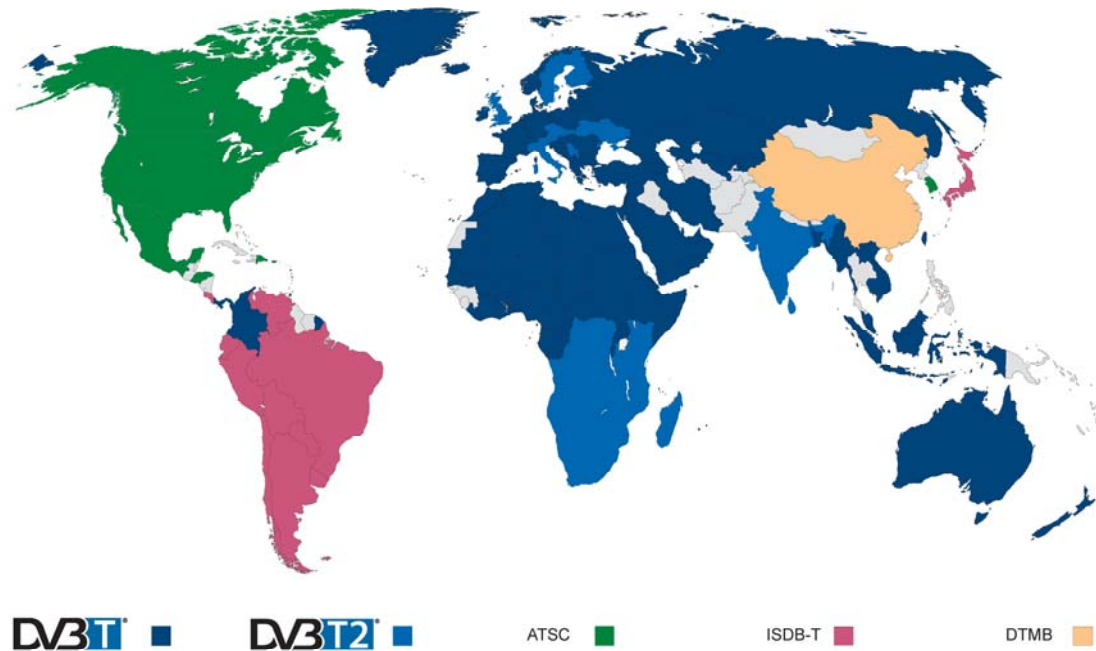


Figure 5 –Worldwide deployment of DTT technologies (as of April 2011)

Source: The Digital Video Broadcasting Project (DVB) www.dvb.org

The Regional Radiocommunications Conference in 2006 (RRC-06)³ adopted the DVB-T standard for digital terrestrial television broadcasting for Region 1 countries. To date there has been no adoption or recommendation by the ITU for a Region 2 DTT standard. This is as a result of the low need or priority required for cross border coordination as was seen necessary for Region 1 countries.

Region 2 countries which include the Caribbean islands, North, Central and South America, are permitted to adopt any DTT standard. Trinidad and Tobago is listed under the classification of Region 2 by the ITU. In addition to the absence of a recommendation by ITU for a DTT standard for Region 2, there has been no standardization for DTT in the Caribbean by the regional radiocommunications body – CITEL.

³ The Regional Radio Conference 2006 (RRC-06) is the conclusion of a major spectrum re-planning exercise for frequency plan for digital broadcasting in bands III (174-230 MHz) and IV/V (470-862 MHz) for 120 countries in Europe, Africa and the Middle East as shown in Appendix V. The RRC-06 culminated in the drawing up of a new spectrum plan for these bands, which is now referred to as GE-06, which stands for Geneva 2006. This plan, which is meant to facilitate the move from analogue to digital broadcasting of TV and radio, replaces the previous Stockholm Plan, which was drawn up in 1961 - these plans are meant to last over the very long-term.

Annex III and IV provides an overview of the migration timeframes for various countries and the deployment of DTT technology around the world. The most predominant standard is DVB which is seen to be adopted by 135 countries in comparison to 8 with ATSC and 11 with ISDB.

The European-standardized DVB standard has portions relating to terrestrial, satellite, cable, MDS, and even disk and Internet. The North American ATSC is almost exclusively written from the terrestrial perspective, although there are revisions by the ATSC Committee on specifications for handheld and data casting. While the ATSC system has been criticized as being complicated and expensive to implement and use, both broadcasting and receiving equipment are now comparable in cost with that of DVB.

Caribbean countries that have chosen a DTT standard are identified in the table below:

COUNTRY	DTT TECHNOLOGY		
	DVB	ATSC	ISDB
Anguilla (United Kingdom)			
Antigua and Barbuda			
Aruba (Netherlands)			
Bahamas			
Barbados			
Bermuda (United Kingdom)	√		
British Virgin Islands (United Kingdom)			
Cayman Islands (United Kingdom)			
Cuba			
Dominica			
Dominican Republic		√	
Grenada			
Guadeloupe (France)	√		
Haiti			
Jamaica			
Martinique (France)	√		
Montserrat (United Kingdom)			
Netherlands Antilles (Netherlands)			
Puerto Rico (United States)		√	
Saint Kitts and Nevis			
Saint Lucia			
Saint Vincent and the Grenadines			
Trinidad and Tobago			
Turks and Caicos Islands (United Kingdom)			
United States Virgin Islands (United States)			

Table 1 – DTT standards adopted in the Caribbean (as of April 2011)

It is to be noted that adoption of a DTT standard for some of the Caribbean countries has been influenced by its relational dependency on former territory owners as seen in Martinique, Puerto Rico and others as identified in the table above.

While most of the Caribbean countries have not identified their DTT standard, it is crucial that Trinidad and Tobago establish the standard to be adopted in order to meet the

ITU deadline of 2015 and overcome public related issues as discussed further in this document.

Statement on DTT Standard:

The Authority is conducting research and shall make a recommendation on the appropriate DTT standard for Trinidad and Tobago. This research will be undertaken through the establishment of a DTT Technical Working Group. The standard shall be applied to service providers in the allocated spectrum for Broadcasting Services as identified in the TTFAT and detailed in Section 4.10.1 of this document.

4.4.1 Comparison of Digital Picture Quality

Digital television supports many different picture formats defined by the combination of size, aspect ratio (width to height ratio) and interlacing. With DTT broadcasting, the range of formats can be broadly divided into two categories: High-definition television (HDTV) and Standard definition television (SDTV). These terms by themselves are not very precise, and many subtle intermediate cases exist.

HDTV uses different formats, amongst which includes the most popular 1280×720 pixels and 1920×1080 pixels in progressive scan mode (720p or 1080p) and both utilizes a 16:9 aspect ratio. HDTV cannot be transmitted over current analog channels.

SDTV by comparison, may use one of several different formats taking the form of various aspect ratios depending on the technology used in the country of broadcast. For 4:3 aspect-ratio broadcasts, the 640×480 format is used in NTSC countries, while 720×576 is used in PAL countries. For 16:9 broadcasts, the 704×480 format is used in NTSC countries, while 720×576 is used in PAL countries.

The figure below shows a comparison of the video quality and picture size of digital broadcast signals. SDTV picture quality is shown by the areas marked in red and yellow while HDTV is represented by the areas coloured green (720p) and purple (1080p).

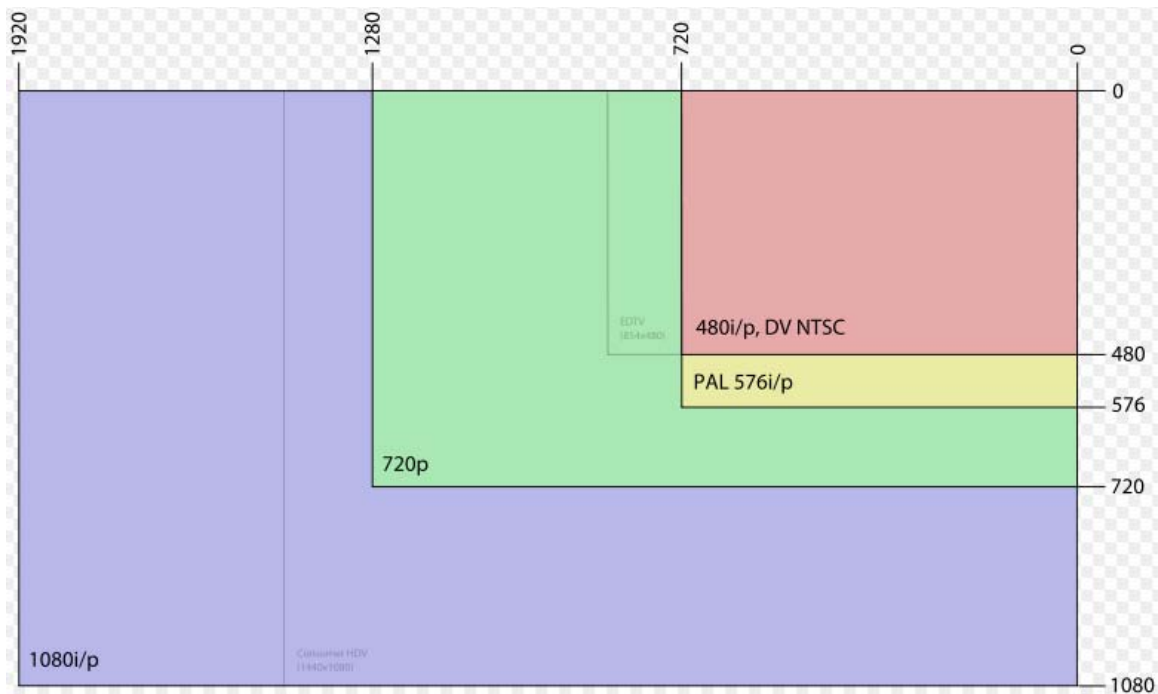


Figure 7 – Comparison of Digital Picture Quality

4.4.2 Video Standards for Digital TV

There are many factors to consider when selecting the codec in a digital video system. The most important ones are the visual quality requirements for the application, the environment (speed, latency and error characteristics) of the transmission channel or storage media and the format of the source content. Also highly important are the desired resolution, target bitrates, color depth, the number of frames per second and whether the content and/or display are progressive or interlaced.

There have been two primary standards organizations driving the definition of video codec. The ITU is focused on telecommunication applications and has created the H.26x standards for low bit rate video telephony. These include H.261, H.262, H.263 and H.264. The International Standards Organization (ISO) is more focused on consumer applications and has defined the MPEG standards for compressing moving pictures.

MPEG standards include MPEG-1, MPEG-2 and MPEG-4. Figure 6 below illustrates the history of video codec standardization.

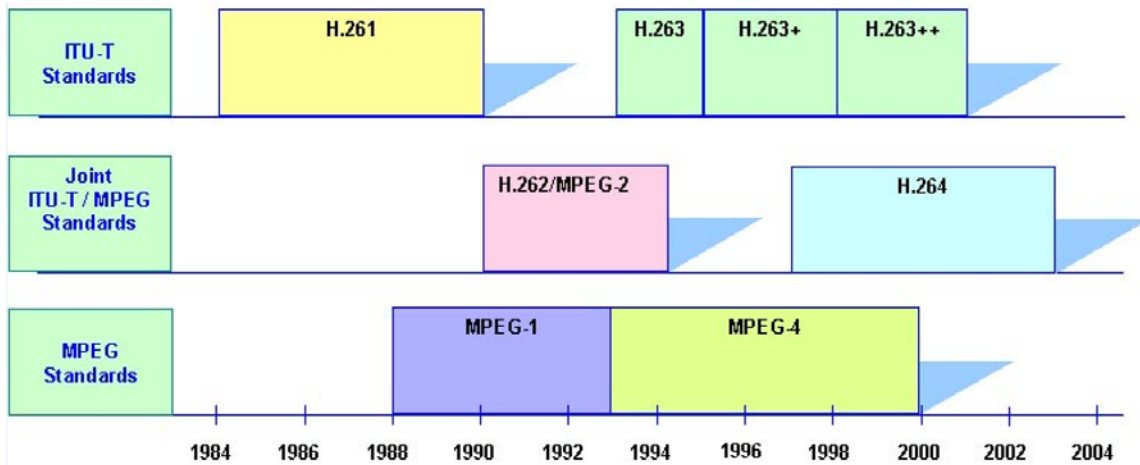


Figure 6 – Chronological progression of Video Coding Standards for Digital TV

Standards have been critical for the widespread adoption of codec technology. Consumers find products based on standards affordable because of economies of scale. The broadcast industry is willing to invest on standards given their assurance of interoperability between vendors of consumer electronics. Content providers are attracted to standards given the long life and broad demand their content would see. While almost all video standards are targeted for a few specific applications, they are often used to advantage in other applications when they are well suited.

Statement on Video Broadcast Standards for DTT:

The Authority proposes to adopt the following minimum technical standards in relation to digital terrestrial television broadcasting:

- *MPEG4 (the Authority may revise this specification at the appropriate time);*
- *Video picture aspect ratio of 16:9;*
- *SDTV picture quality during digital switch-on, with a view of moving to HDTV picture quality after analog switch-off.*

HDTV shall not be prescribed for the digital migration process, but should be a commercial decision made by individual operators subject to the availability of capacity of the multi-channel environment on the DTT transmission networks.

4.5 Digital Mobile Television

Digital Mobile Television is a new television broadcasting service, where the content is broadcast or streamed to mobile phones or other portable devices, but not to traditional television sets.

There are currently three main technology families for delivering broadcast content to mobile phones or other portable devices:

- In-band cellular broadcast techniques;
- Terrestrial digital broadcast networks and their extensions such as DVB-H which is generally considered as part of the DVB-T standard which has fixed, mobile and portable reception modes; and
- Hybrid satellite/terrestrial systems

4.6 Other Broadcasting Technologies

Market forces will be left to determine the uptake of other broadcasting technologies such as digital satellite broadcasting, IPTV and Cable. In view of the simultaneous introduction of digital transmission and signal distribution, broadcasters will be encouraged to take advantage and be accommodated within the common infrastructure.

Cable networks have less capacity than satellite transmission but significantly more than terrestrial. A clear advantage of the cable transmission is that it can provide an integrated return channel via cable modem, thus enabling broadband Internet access alongside digital broadcasting.

In many countries the moderate capacity is still controlled by regulation that takes into account must-carry considerations. Switchover of the cable networks in many countries is thus linked to the terrestrial switchover.

As a means of differentiating their products, each operator in the Pay TV market offered a different bundle of channels as part of their basic package. However customers were required to subscribe to a basic package before subscribing to any other package, including premium packages, offered by the operator.

As at December 2009, the total number of subscriptions to pay TV services stood at approximately 179.6 thousand, an increase of 16.6 thousand subscriptions or a 10.2 per cent increase when compared to December 2008. Of the total number of pay TV subscriptions, analogue subscriptions represented 67.3 thousand or 37.5 per cent, whilst digital subscriptions contributed 112.3 thousand or 62.5 per cent...

Statement on DTT Network Design and Implementation:

The Authority proposes to continue to facilitate and encourage the distribution of digital TV services over broadband / high capacity networks. This is seen today in the existing subscription based television service providers switching to digital platforms in order to provide digital TV services. It is expected that this will accelerate the digital TV adoption by complementing the digital terrestrial coverage and to foster the development of new converging services.

4.7 End User Equipment

Availability of digital receiving apparatus at affordable prices is crucial to early uptake of digital broadcasting technology by the mass market. Pricing of this receiving equipment could be the biggest single obstacle or enabler to introduction of digital broadcasting in

this country. As with most technologies and services, its rollout is highly dependent on the availability of the CPE (STB and digital ready television sets).

It is to be noted that in Central and South America and the Caribbean, the significant portion of end user equipment is sourced from North America and Asia. This has been the trend as they are the major electronic market manufacturers for this region. It has been widely observed that Asia produces equipment at a lower cost compared to electronic manufacturers in North America, Europe and of lately Africa.

Digital broadcasting systems can be operated in three basic modes:

- i. Free To Air – services do not cater for any encryption system and typically any set top box that complies with the chosen DTT standard should be able to receive the signal. The advantage of such set top boxes is that they reduce the barrier to entry. The disadvantage is that broadcasters have no control over the viewer base, will not know exactly how many viewers are watching and it only offers limited value added services. In order to ensure that the market is not flooded with low quality equipment, it is proposed that set top boxes should be subject to some form of quality control. A minimum standard for the equipment will have to be set.
- ii. Free Conditional Access – set top boxes provide the option of implementing conditional access. The basis of this option is that viewers will have to acquire a set top box as well as a smart card to be able to watch the programmes at no additional cost. Although more expensive initially, this option offers broadcasters full control over their viewers as well as the introduction of advanced value added services.
- iii. Subscription (pay Conditional Access) – fully encrypted services can be used to ensure monthly payments for programmes viewed. This is a subscription model and full control of subscribers is provided. Once one provides full encryption services on a DTT platform, the same platform can be used for free-access as well as FTA services. Activation of Conditional Access for fully encrypted services

would require the same support infrastructure as in free access systems with the addition of subscriber management systems.

A recommended minimum specification receiver should be adopted to allow for the reception and decoding of DTT television services. A digital to analogue converter which conforms to this minimum receiver specification can be used when migrating from analogue to digital. The cost of such a converter would decrease as a high demand for the units will meet economies of scale production. Standardized interoperable system parameters create mass markets for terminals, which reduce cost and speed up penetration of the digital devices.

Statement on End User Equipment:

The Authority proposes to mandate minimum specifications for digital terrestrial television end user equipment and CPE in relation to the DTT broadcast standard adopted. These specifications shall be prescribed in the document “Migration Strategy and Implementation Plan for Digital Terrestrial Television Broadcasting Services in Trinidad and Tobago”.

4.8 Interactive Services

Amount of interactivity in TV programs is growing continuously. Interactivity is an important way to widen service offering in the digital TV environment. So far in most cases an ordinary fixed line telephone or PTSN networks has been used as a return path for interactive television. Most interactive applications do not require a high data rate for a return path which makes the normal telephone line ideal. The disadvantage of using the telephone line is that the user would be unable to make or receive calls. A possible solution then would be to install a second PSTN line or use either an ISDN or ADSL facility

There is increasing use of SMS (Short Message Service) in cellular phones, and broadband via ADSL, cable modem or cellular 3G technologies. When the elements

supporting the interactivity are built inside the terminal device, services become easier to use and wider consumer segments will be reached.

Real interactivity between an interactive service provider and a digital TV terminal device needs both 2-way connection and an application running in the terminal, for which a special software (middleware) containing application programming interfaces (API) are needed. Virtual (local) interactivity can be also offered without return path like by offering teletext type services.

In 2002 ETSI developed a standard (EN 301958) for an interaction channel (return channel) for DVB-T. The standard specifies the channel coding/modulation and the medium access control protocol and is called the Return Channel Terrestrial (RCT).

The DVB-T and DVB-RCT systems form a two-way system, which share the same frequency bands. Thus it is possible to benefit from common features in regard to the RF devices and parameters (antenna, combiner, propagation conditions, etc.). The DVB-RCT system, the Forward Interaction path and the Return Interactive path are implemented in the same radio frequency bands i.e. VHF/UHF Bands. The RCT system is suited to work in other frequency bands preferably adjacent to broadcasting.

The Return Interaction Channel can be located in any free segment of an RF channel, taking in account existing analog television assignments and future allocations for DTT broadcasting.

It is to be noted that if a broadcaster is to provide interactive and data services in the content stream of a broadcasting service, then this would constitute a telecommunications service. Therefore in addition to holding a broadcasting service concession, the relevant telecommunications network and/or service concession would be required, in accordance with the Authorization Framework and Telecommunication Act, 2001.

Statement on DTT Interactive Services:

The Authority proposes to only authorize interactive services that uses spectrum within the 6MHz bandwidth of each VHF/UHF channel for its return path. After analogue switch-off when sufficient broadcast spectrum becomes available through the digital dividend, then interactive services which require additional spectrum may be considered.

4.9 Spectrum Allocations for Television Broadcasting Services

The table below summarizes the spectrum plan used in ITU-R Region 2 countries for 'Free-To-Air' television services:

Band	Channel No.	Operating Frequency Range
Lower VHF	2 – 6	54 – 88 MHz
Upper VHF	7 – 13	174 – 216 MHz
UHF	14 – 83	470 – 806 MHz

Table 2 – Spectrum Plan for ITU-R Region 2 countries

The television broadcasting sector of Trinidad and Tobago is developing in the same manner as the sectors of our ITU Region 2 neighbours in North America. The band plans and standards previously adopted in Trinidad and Tobago as well as the equipment used in deploying broadcasting stations originate from the North American region. One of the major evolutions in television broadcasting in North America is the reallocation of television channels 52 - 69, i.e. 698 - 806 MHz to fixed and mobile services.

In the USA, channels 52 - 59, i.e. 698 - 746 MHz have been allocated to commercial fixed and mobile services to support the development of new services, such as broadband Internet access and subscription broadcasting services. This frequency range is titled the Lower 700 MHz band. The remaining channels 60 - 69, i.e. 746 - 806 MHz have been allocated to

public health and safety services, fixed and mobile services. This frequency range is titled the Upper 700 MHz band. Channels 63, 64, 68 and 69 have been allocated to public health and safety, and the remaining channels 60 - 62, 65 - 67 have been allocated for fixed and mobile services.

In Canada, only channels 63, 64, 68 and 69 have been allocated to public health and safety services, due to the high occupancy of licensees on the television UHF channels 52 - 59, while the remainder of channels from 60 - 67 have been allocated for fixed and Mobile services. It is envisaged that the advancements in digital television broadcasting will reduce the number of 'Free to Air' television broadcasting channels, thus allowing further reallocation of the television UHF channels to other radiocommunication services.

4.9.1 Spectrum Plan for Terrestrial Television Broadcasting

Subsequent to an analysis of:

- Frequency allocations and footnotes in the *Trinidad and Tobago Frequency Allocation Table (TTFAT)*;
- The Authority's Frequency Assignment Register Records; and
- Frequency Allocations within the Authority's *Spectrum Plan for the Accommodation of BWA Services*;

the frequency ranges which can be considered for the accommodation of 'Free To Air' television services are identified in Table 3 below.

Channel No.	Frequency Range	Licensing Status
2 – 6	54 – 88 MHz	Available for the accommodation of 'Free To Air' Television Services
7 – 13	174 – 216 MHz	Available for the accommodation of 'Free To Air' Television Services
14 – 51	470 – 698 MHz	Available for the accommodation of 'Free To Air' Television Services

52 – 59	698 – 746 MHz	Identified for the accommodation of BWA services (lower 700 MHz band)
60 – 69	746 – 806 MHz	Identified for the accommodation of BWA services (upper 700 MHz band)
70 – 83	806 – 890 MHz	Not allocated for broadcasting services. In accordance with FAT footnote TT19; allocation is made for future services such as aeronautical mobile service on a primary basis.

Table 3 – VHF and UHF Spectrum Allocations in Trinidad and Tobago

Statement on Spectrum Assignments for DDT broadcasting services:

The Authority proposes to license digital terrestrial television broadcasters in the frequency bands 54 – 88 MHz, 174 – 216 MHz and 470 – 698 MHz. This shall be consistent with the frequency bands allocated for Broadcasting Services in the TTFAT.

Non-broadcasting services shall not be introduced in the frequency bands identified above until analogue to digital migration has completed.

5 Analog to Digital Migration Process

The migration to digital can be divided into three distinct phases:

- 1) Digital Switch-on - the introduction of digital broadcasting services involving the development of the digital broadcasting infrastructure including introduction of a signal distributor, availability of set-top boxes and/or integrated digital receivers.
- 2) Simulcast Period - in order to ensure that television viewers without digital ready TV sets or set-top boxes are not deprived of services, analogue and digital will have to be broadcast in tandem for some period i.e. the 'simulcast' period.
- 3) Analogue Switch-off - termination of analogue transmission which assumes the completion of the switchover process, so that it will not occur, before almost all households can receive digital signals and have digital receivers.

Various activities will be necessary during the three phases of migration. Consumer awareness, in particular, is a cross-cutting issue which will be undertaken in all phases.

5.1 Migration Timeframe

Taking into consideration the three phases identified above, a migration timeframe is drawn out to achieve a successful analog to digital switchover. This timeframe is a practical one with itemized milestones for each significant step in the process.

Framework for Digital Terrestrial Television Broadcasting in Trinidad and Tobago

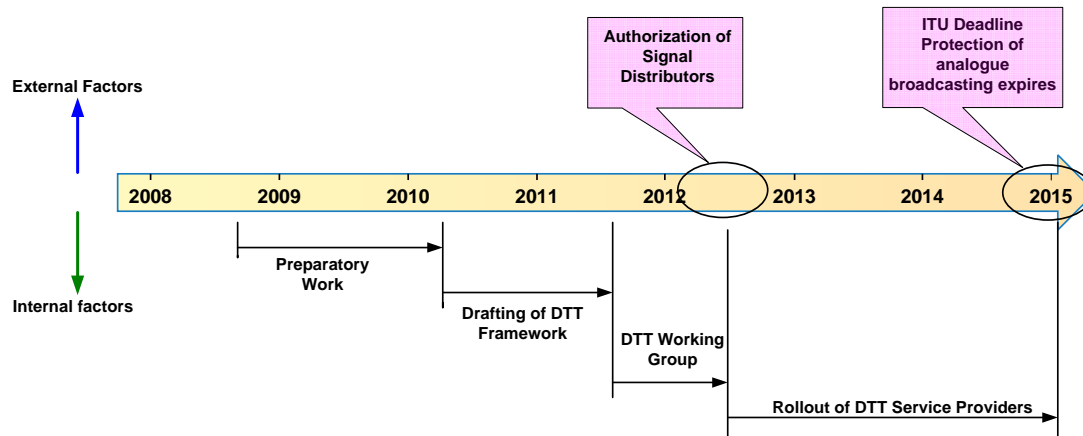


Figure 9 – Migration Timeframe showing Switch-on, Simulcast and Switch-off

Key to the entire process of analog to digital switchover is a Migration Strategy and Implementation Plan, which shall comprise:

- Spectrum plan for accommodation of existing and new broadcasters.
- Authorization process for the introduction of DTT broadcasters and DTV service providers.
- Technical requirements, equipment and standards related to the provision of DTT broadcasting services.
- Other regulatory requirements as necessary.
- Any other requirements from stakeholders and the public to achieve a successful analog to digital switchover.

Preparatory work in 2008 has resulted in the creation of a Framework for Digital Terrestrial Television Broadcasting Services which identifies the issues surrounding analog to digital switchover and the recommended way forward. Consultation on this Framework with relevant stakeholders was completed in 1st quarter 10/11 with an expected finalization and approval by the Authority at the 4th quarter 10/11. This is required as part of the entire migration process to ensure early buy-in and harmonizing amongst existing and future service providers.

Further to the Framework, a Migration Strategy and Implementation Plan for Digital Terrestrial Television Broadcasting Services in Trinidad and Tobago will be developed

and approved by the Authority for the implementation of digital switchover. This is scheduled to be completed within the same timeframe stated above.

It is expected that the process for rollout of DTT services commence during mid 2011 – 2012 by the authorization of signal distributors. From this point onwards both analog and digital TV services will be experienced in the simulcasting phase. It is proposed that the migration of all analog TV broadcasting services will be completed at the end of 2015 which will mark the end of switch-off.

The migration timeframe and milestone dates have been derived taking into consideration:

- 1) Switch-off dates as announced by other countries (ANNEX II).
- 2) Availability of digital TV sets and STBs as a result of digital TV switch-on implemented by countries with electronic manufacturing markets.
- 3) Readiness of existing analog TV broadcasters in this country to migrate.
- 4) Entities willing to deploy DTT networks i.e. signal distributors

It is to be noted that approval of the Framework for DTT Broadcasting Service, will signal the end of any future authorization of analog terrestrial television broadcasting services.

Statement on Analog to Digital Switchover Timeframe:

The Authority proposes to establish the analog switch-off date as December 2015. The Authority shall no longer authorize any future analog terrestrial television broadcasting services from digital switch on or from approval of the framework as indicated above.

6 GLOSSARY

Act	Telecommunications Act 2001, and as amended in 2004
AM	Amplitude Modulation
ATSC	Advance Television Standards Committee
CA	Conditional Access
CAS	Conditional Access System
CAM	Conditional Access Module
CPE	Customer Premise Equipment
DR	Digital Radio
DRM	Digital Radio Mondiale
DSO	Digital Switch Over (analog to digital)
DTT	Digital Terrestrial Television
DTV	Digital Television
DVB	Digital Video Broadcasting
DVB-H	Digital Video Broadcasting - Handheld
DVB-T	Digital video broadcasting – Terrestrial
EDTV	Enhanced Definition Television
EPG	Electronic Programming Guide
FM	Frequency Modulation
FTA	Free To Air
GE06	Geneva 2006 Agreement
GE75	Geneva 1975 Agreement
GE84	Geneva 1984 Agreement
GE89	Geneva 1989 Agreement
HDTV	High Definition Television
IBOC	In-Band On-Channel
ITU	International Telecommunications Union
ICT	Information & Communication Technology
ISDB	Integrated Services Digital Broadcasting
ISDB	Integrated Services Digital Broadcasting

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KHz	Kilo Hertz
MHz	Mega Hertz
MFN	Multiple Frequency Network
MW	Medium Wave
RRC-06	Regional Radiocommunication Conference (2006)
SDTV	Standard Definition Television
SFN	Single Frequency Network
STB	Set Top Box
SW	Short Wave
T-DAB	Digital Audio Broadcasting – Terrestrial
TV	Television
UHF	Ultra High Frequency
USF	Universal Service Fund
VHF	Very High Frequency

ANNEX I: List of Broadcasters in Trinidad and Tobago

‘Free To Air’ FM Radio Broadcasting Services

	Frequency / MHz	Licensee	Geographic Class
1	90.1	KMP Music Group	Major Territorial
2	90.5	Central Radio FM90 Ltd.	Major Territorial
3	91.1	Caribbean New Media Group (CNMG)	National
4	91.5	Caribbean Broadcasting Systems and Services Ltd.	National
5	91.9	TriniBashment Ltd.	National
6	92.3	Side Walk Radio	Major Territorial
7	92.7	Kaiso Productions Limited	National
8	93.5	Radio Five Limited	National
9	94.1	Superior's Infinite Productions Limited	National
10	94.7	VL Communications	National
11	95.1	Guardian Media Ltd (Formerly Trinidad Publishing Company Ltd)	National
12	95.5	CITADEL Ltd.	National
13	96.1	Trinidad and Tobago Radio Network Ltd.	National
14	96.7	Q Corporation	National
15	97.1	Telemedia Limited (CL Communications)	National
16	97.5	Upward Trend Entertainment	National
17	98.1	Family Focus Broadcasting Network	National
18	98.7	BBC	National
19	99.1	CNMG	National
20	99.5	21st Century Arts and Entertainment Ltd.	National
21	100.1	CNMG	National
22	100.5	Wonderland Entertainment Limited	Major Territorial
23	101.1	Mohan Jaikaran	National
24	101.7	Heritage Communications Limited	National

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25	102.1	Radio Vision Limited	National
26	102.7	Central Broadcasting Services Ltd.	National
27	103.1	Winifred Aleong Broadcasting Company Ltd.	Major Territorial
28	103.5	United Cinemas Limited	National
29	104.1	Radio News Network	National
30	104.7	PBCT Limited	National
31	105.1	Guardian Media Ltd (Formerly Trinidad Publishing Company Ltd)	National
32	105.5	Parliament of the Republic of Trinidad and Tobago	National
33	106.1	Guardian Media Ltd (Formerly Trinidad Publishing Company Ltd)	National
34	106.5		National
35	106.7	Toco Foundation (TTCAN)	Niche & Minor Territorial
36	107.1	Inner City Broadcasting	National
37	107.7	Marcel Mahabir	National

‘Free To Air’ AM Radio Broadcasting Services

	Frequency / kHz	Concessionaire	Geographic Class
1	730	Guardian Media Ltd (Formerly Trinidad Publishing Company Ltd)	National

‘Free To Air’ Television Broadcasting Services

	VHF/UHF Channel	Licensee	Geographic Class
1	9, 13, 20	Caribbean New Media Group (CNMG)	National
2	6, 18, 19	CCN Television Ltd.	National
3	35, 37, 39	World Indian Network Television (Mohan Jaikaran)	National
4	12, 14, 22	Guardian Media Limited (Formerly Trinidad Publishing Company Limited (CNC3)	National
5	11, 26, 29	Parliament of the Republic of Trinidad and Tobago	National
6	23	Gayelle Ltd.	Major Territorial

7	25	Advance Community Television Network Ltd.	Major Territorial
8	31, 33	Synergy Entertainment Company Limited	Major Territorial

Wired Cable Television Network and Services

	Services	Concessionaire	Geographic Class
1	Cable TV, Data, Voice	Columbus Communications Trinidad Limited (CCTL)	National
2	Cable TV	Telecommunication Services of Trinidad and Tobago (TSTT)	National
3	Cable TV	Green Dot Limited	National
4	Cable TV	Independent Cable Network of Trinidad and Tobago (ICNTT)	Major Territorial
5	Cable TV	TRICO Industries Ltd.	Minor Territorial
6	Cable TV	RVR International Ltd.	Niche (Rio Claro / New Grant / Princess Town)
7	Cable TV	Network Technologies Limited (Transferred from Computer Technologies and Services Limited)	Niche (Mayaro / Guayaguayare)
8	Cable TV	Airlink	Niche (Princess Town and Environs)

Cable Television Broadcasting Services using an existing Network

- 1) IETV

Satellite Television Broadcasting Services

- 1) DirecTV

ANNEX II: Advantages and Disadvantages of Digital Broadcasting

Advantages

Broadcaster	Audience	Government
<p>1. Efficient use of spectrum through increased content offering over comparative bandwidth capacity used for analogue transmission leading to cost efficiencies over the long term.</p> <p>2. Universal service target comparatively easier to achieve.</p> <p>3. New opportunities: Broadcasters would be able to offer multimedia and ecommerce services via digital broadcasting transmission</p> <p>4. Chain Logic i.e. digitizing the full broadcast content chain is inevitable and desirable.</p> <p>5. By rolling-out DTT instead of analogue, access to 5 or more services can be provided whilst analogue would require a separate network for each service</p>	<p>1. Audiences have a greater variety of programming to choose from</p> <p>2. Audiences may also access value-added services or multimedia content. Therefore audiences would be able to access additional interactive services e.g. TV guides, news and information, educational content and games, shopping and travel services and pay per view movies / documentaries / sport coverage</p> <p>3. New services such as messaging, teleconferences, programmable VCR, (PVR) profiles, advertising, web surfing, t-commerce, etc. would become part of the wider data offerings giving users a greater opportunity to select video and data programming.</p>	<p>1. Digital broadcasting would present huge social gains for government especially where the technology could be used for distance education. Eventually government would be shifting audiences to an information society.</p> <p>2. DTT can cost effectively deliver a multiple of information services in addition to entertainment services. e.g. Email, Internet etc. These services will in future form part of a universal service</p>

Framework for Digital Terrestrial Television Broadcasting in Trinidad and Tobago

	<ul style="list-style-type: none">4. Content enhancements for people with disabilities.5. Simple installation and operation. No dish antenna required.6. Better quality of pictures	
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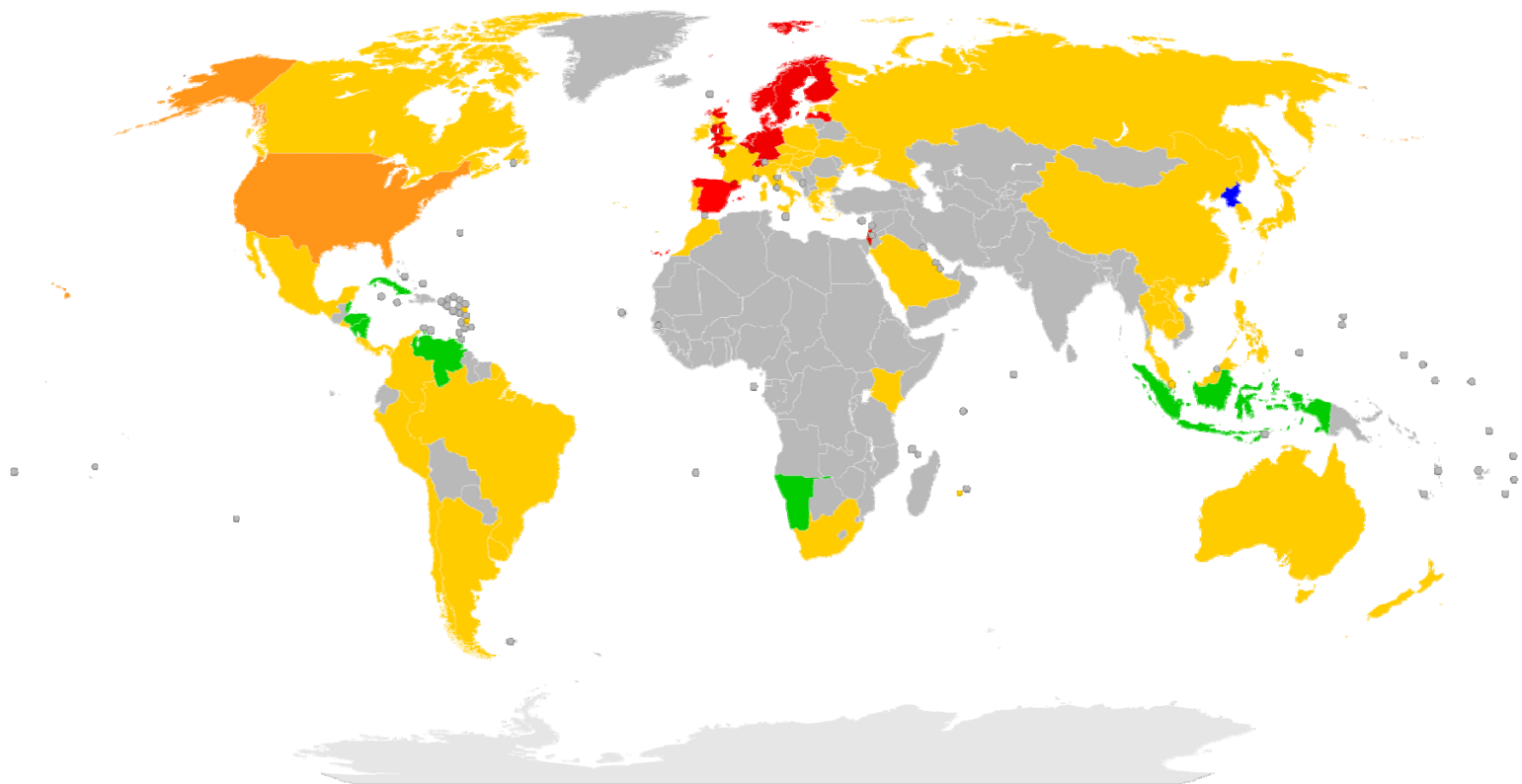
Source: Southern African Digital Broadcasting Association (SADIBA)

Disadvantages

Broadcaster	Audience	Government
<p>1. Digitisation is capital intensive. Therefore the high cost of equipment in addition to recent capital investments in analogue technologies will pose financial strain to broadcasters.</p> <p>2. Both analogue and digital services must be maintained for a long period unless a forced migration policy is followed. This implies that the broadcaster would have to pay for multicasting.</p> <p>3. If market adoption to new technology is slow, this could hamper broadcasters business plans as well as project timeframes for switchover.</p> <p>4. Cost to the viewer will increase. In addition the cost per viewer will increase</p>	<p>1. High cost of receiver sets and equipment would be a barrier.</p> <p>2. A poor audience take-up has a negative influence on the success of digital broadcasting.</p> <p>3. No perceived advantages from the general public for the additional cost. Therefore the public awareness campaign is likely to be costly due to the quality of awareness as well as the length of the awareness campaign.</p>	<p>1. Spectrum would not be freed up immediately due to the need for transition. Therefore government would not be able to optimise frequency allocations nor auction off spare capacity to reap financial benefit from frequency re-use.</p>

Source: Southern African Digital Broadcasting Association (SADIBA)







ANNEX III: Migration Timeframes for Various Countries



Source: ITU GSR 2010 Discussion Paper

Framework for Digital Terrestrial Television Broadcasting in Trinidad and Tobago

Legend:

-  Transition completed, all analog signals terminated
-  Transition completed for full power stations, not yet completed for low power stations
-  Transition in progress, broadcasting both analog and digital signals
-  Transition not yet started, broadcasting analog signals only
-  Does not intend to transition, broadcasting analog signals only
-  No information available

ANNEX IV: DTT Technology Deployment

DVB-T or T2	ATSC	ISDB-T	DMB-T	STATUS UNDECIDED
Albania	Canada	Argentina	China	Afghanistan
Algeria	Dominican Republic	Bolivia	Hong Kong	American Samoa
Andorra	El Salvador	Brazil	Macau	Antigua and Barbuda
Angola	Honduras	Chile		Aruba
Armenia	Mexico	Costa Rica		Bahamas
Australia	Puerto Rico	Ecuador		Barbados
Austria	South Korea	Japan		Belize
Azerbaijan	United States	Paraguay		Bhutan
Bahrain		Peru		Cayman Islands
Bangladesh		Uruguay		Cuba
Belarus		Venezuela		Dominica
Belgium				Dubai
Benin				East Timor
Bermuda				Equatorial Guinea
Bosnia and Herzegovina				Federated States of Micronesia
Botswana				Fiji
Brunei				Grenada
Bulgaria				Guam
Burkina Faso				Guatemala
Burundi				Guinea
Cambodia				Guinea-Bissau

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DVB-T or T2	ATSC	ISDB-T	DMB-T	STATUS UNDECIDED
Cameroon				Guyana
Cape Verde				Haiti
Central African Republic				Iraq
Chad				Jamaica
Colombia				Kiribati
Comoros				Maldives
Côte d'Ivoire				Marshall Islands
Croatia				Mongolia
Cyprus				Nepal
Czech Republic				Netherlands Antilles
Dem. Rep. of Congo				Nicaragua
Denmark				North Korea
Djibouti				Northern Mariana Islands
Egypt				Pakistan
Eritrea				Palestinian territories
Estonia				Papua New Guinea
Ethiopia				Saint Kitts and Nevis
Faroe Islands				Saint Lucia
Finland				Saint Vincent and the Grenadines
France				Samoa
French Guiana				São Tomé and Príncipe
French Polynesia				Sierra Leone
Gabon				Solomon Islands
Gambia				Somaliland
Georgia				Suriname

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DVB-T or T2	ATSC	ISDB-T	DMB-T	STATUS UNDECIDED
Germany				Tajikistan
Ghana				Tonga
Greece				Trinidad and Tobago
Greenland				Turkmenistan
Guadeloupe				U.S. Virgin Islands
Hungary				Vanuatu
Iceland				Western Sahara
India				
Indonesia				
Iran				
Ireland				
Israel				
Italy				
Jordan				
Kazakhstan				
Kenya				
Kuwait				
Kyrgyzstan				
Laos				
Latvia				
Lebanon				
Lesotho				
Liberia				
Libya				
Lithuania				

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DVB-T or T2	ATSC	ISDB-T	DMB-T	STATUS UNDECIDED
Luxembourg				
Madagascar				
Malawi				
Malaysia				
Mali				
Malta				
Martinique				
Mauritania				
Mauritius				
Mayotte				
Moldova				
Montenegro				
Morocco				
Mozambique				
Myanmar				
Namibia				
Netherlands				
New Caledonia				
New Zealand				
Niger				
Nigeria				
Norway				
Oman				
Panama				
Poland				

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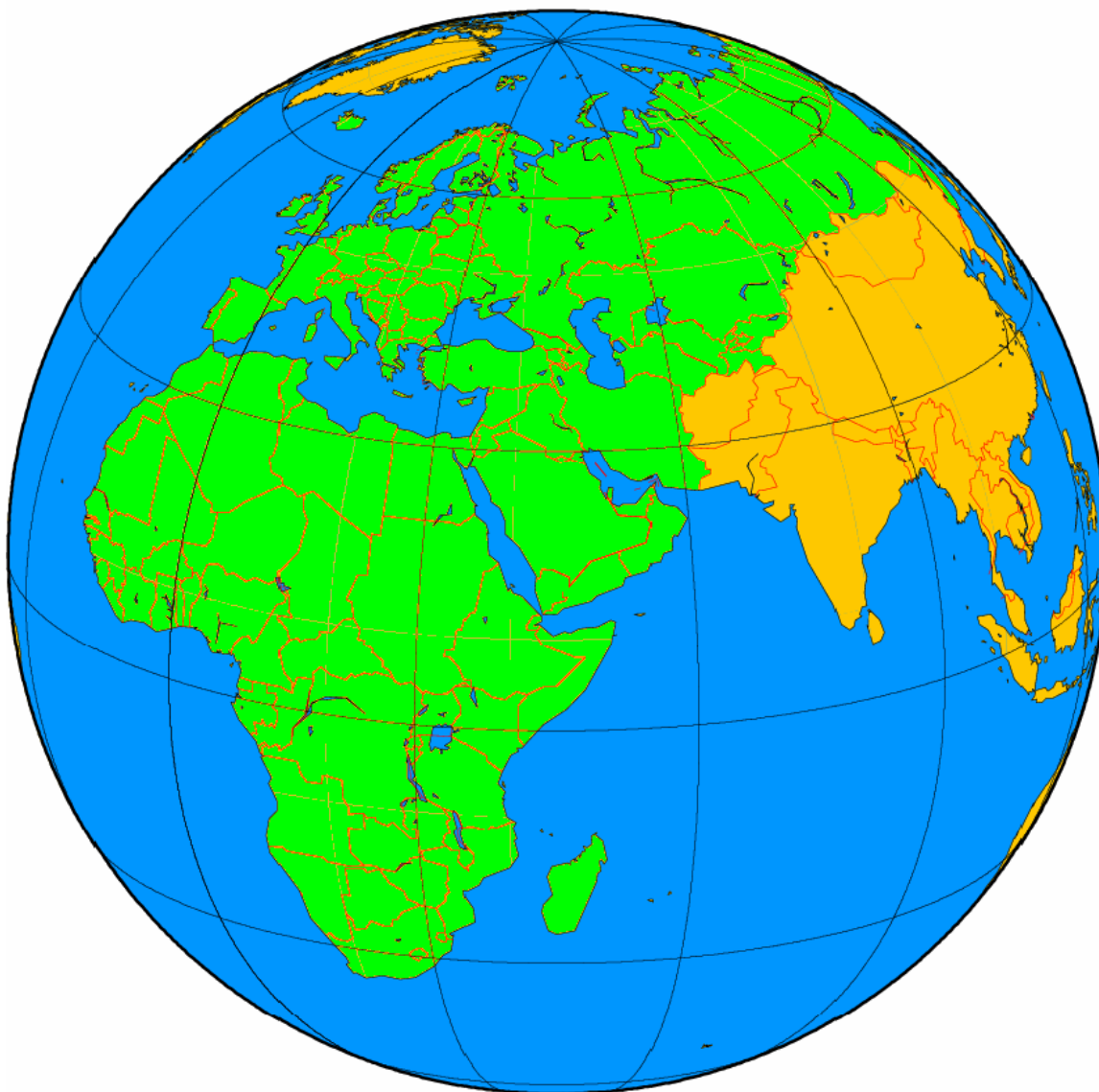
DVB-T or T2	ATSC	ISDB-T	DMB-T	STATUS UNDECIDED
Portugal				
Qatar				
Republic of Macedonia				
Republic of the Congo				
Réunion				
Romania				
Russia				
Rwanda				
Saudi Arabia				
Senegal				
Serbia				
Seychelles				
Singapore				
Slovakia				
Slovenia				
Somalia				
South Africa				
Spain				
Sri Lanka				
Sudan				
Swaziland				
Sweden				
Switzerland				
Syria				
Taiwan				

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DVB-T or T2	ATSC	ISDB-T	DMB-T	STATUS UNDECIDED
Tanzania				
Thailand				
Togo				
Tunisia				
Turkey				
Uganda				
Ukraine				
United Arab Emirates				
United Kingdom				
Uzbekistan				
Vietnam				
Yemen				
Zambia				
Zimbabwe				
135	8	11	3	53

Source: The Digital Video Broadcasting Project (DVB) www.dvb.org

ANNEX V: RRC-06 Planning Area



Source: Digital Switchover & RRC-06 - Technical Department European Broadcasting Union

ANNEX VI: Decisions on Recommendations Matrix

The following summarises the comments and recommendations received from stakeholders on the first draft of this document (dated September 30th 2010), and the decisions made by TATT as incorporated in this revised document (dated July 30th 2011).

Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
General				
	CCTL	CCTL welcomes the opportunity to provide input to the Draft Framework For Digital Terrestrial Television Broadcasting in Trinidad and Tobago. We recognize that the development of the framework is critical to defining the migration path for the switch over from analog to digital transmission in 'Free To Air' broadcasting.		Comment noted.
	TSTT	TSTT welcomes the opportunity to provide comment and make recommendations on the issues outlined in the Authority's consultation document entitled "Draft Framework for Digital Terrestrial Television Broadcasting" and provides these hereafter for the Authority's consideration.		Comment noted.

⁴ Regional regulatory or Governmental agencies, Existing service and/ or network provider and affiliates, Potential service and/ or network providers and affiliates, Service/ Network Provider Associations/ Clubs/ Groups, General Public

Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
	TSTT	<p>TSTT expresses its disappointment that the Authority should offer for consultation sixteen statements of policy in this technical document with the proviso that the details of the plan and its implementation are to be found in an upcoming policy document that is to be authored by the Authority. Respondents to this consultation are entitled to the details underlying the Authority's policy positioning and the workings of proposed scheme for digital switch-over to facilitate completeness in their response. The authority has in effect asked respondents to engage in a consultation on their positions while providing only the most superficial outlines of their intent.</p> <p>Further, TSTT is of the view that the relatively high level treatment afforded the substantive people and commercial issues (e.g. the subsidization of set-top boxes to vulnerable groups, the readiness of broadcasters, etc.) in a switch-over from analog to digital broadcasting makes light of the logistical and financial/commercial challenges presented by an endeavour of this nature. Notwithstanding the Authority's</p>		<p>This Framework is policy document. The underlying technical details for DTT will be laid in the document "Migration Plan and Implementation Strategy" and will be drafted with recommendations from the DTT Technical Working Group comprised of member from the major stakeholders in this process.</p>

Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
		<p>outline of its intent, it is the aforementioned factors that will determine the success and timely switchover from analog to digital terrestrial broadcasting.</p> <p>Upon review, it appears that a clear position as to the standards for adoption has not been achieved. The appears to be some confusion in Section 4.9 with respect to the standard for adoption since the Authority enters into discussion of features that are clearly associated with the DVB-T format having stated an intent to adopt the ATSC standard for transmission.</p> <p>TSTT takes the view that a decision as to the standard for transmission must be made and communicated at the earliest possible opportunity to facilitate commercial decisions in the period to the 2015 deadline.</p>		<p>Section 4.5 (now Section 4.4) provided information as a matter of discussion and education on the predominant DTT standards. The policy statement in Section 4.5 (now Section 4.4) has been revised to” The Authority is conducting research and shall make a recommendation on the appropriate DTT standard for Trinidad and Tobago. This research will be undertaken through the establishment of a DTT Technical Working Group”.</p>

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Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
	TTPBA	<p>The 'tone' of the document does not suggest that this is a document for consultation but rather, a prescription for how and when the move to digital will be made. The document takes the form of an order from TATT, the justification for which is that broadcasters use a scarce national resource: the spectrum.</p> <p>It now appears that mountain tops that encourage RF propagation are to be considered a national resource. It would appear that no consideration has been given to whether we, as broadcasters can afford it.</p>	<p>We suggest that if this framework as presented by TATT is implemented in its present form, all National television broadcasters will be forced</p>	<p>The Authority recognizes the great role and impact on broadcasters in analog to digital switchover (DSO). The Authority has taken a policy driven approach to ensure DSO in an efficient and timely manner and as such drafted this document which prescribes the approach and method through which this will be achieved.</p> <p>Consultation with the stakeholders, which include the broadcasters, is seen as a crucial process in completing the necessary policies. The Authority therefore held stakeholder consultation with the broadcasters and will continue as such to ensure that existing broadcasters are successful in the transition to digital.</p> <p>Although broadcasters will have to lease capacity or "rent a channel" through the concept of a signal distributor, the benefits of such a scheme is discussed in Section 3.2 of the document. A signal distributor will</p>

Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
		The customer (viewer), that TATT has been charged to protect, is not considered.	to transfer to the cable where they will each rent a channel and shut down their own national broadcast. That this is likely to happen when we go digital is probably true, but the present prescription will guarantee it. And of course, there, with the move to cable, will go national coverage and television for everyone.	<p>provide broadcasting services terrestrially and not over “cable” and therefore the Authority in its authorization of signal distributors will ensure that a national network is implemented so that national coverage is achieved.</p> <p>The implementation of a digital national network is the role of the signal distributor and the cost therefore is not made on the ‘Free To Air’ broadcasters. The financial and technical impact to broadcasters will be addressed as consultations with broadcasters continue. The consumer is also a stakeholder and plays a role in DSO and as such the Authority will ensure the proper steps are taken to protect the “viewer”. This has been identified in Section 2.9 of the document with the intention of a Consumer Education, Awareness and Protection Plan.</p>

Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
		<p>The TTPBA is concerned that there is only one purpose to this move and that is to serve the ITU.</p> <p>No consideration has been given to the fact that all local television stations are commercial and depend on customers and, at present, we make bold to say: no National local television broadcaster now makes a profit.</p> <p>There is no mention in the document of market forces (customers). For a broadcaster to operate he must make a profit.</p>		<p>The introduction of DTT and achieving DSO not only serves the ITU but provides benefits to the sector, broadcaster and viewer as discussed in Section 2.1 of the document.</p>
	TTPBA	<p>“Many more television channels will become available.”</p> <p>We also agree that this is true. BUT the current broadcasters do not make money.</p>		<p>The Authority is mindful of the competitive market in broadcasting and the challenge of the remaining viable in the market. The introduction of digital terrestrial television seeks to re-invigorate broadcasting through the introduction of higher quality of service and additional services such as interactive services.</p>

Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
		More channel availability does not necessarily mean more broadcasters. If that were so, we should be able to license many more broadcasters in the now analogue unfilled available spectrum.		Although there are channels available in the VHF/UHF spectrum for broadcasting, the Authority placed a moratorium on licensing of analog "Free To Air" in its anticipation and expectation of implementing DTT.
	TTPBA	<p>What is the actual cost of going digital? A National television station built in analogue is likely to cost \$50,000,000. The same station in digital will cost upward of \$250,000,000. Currently no national television station makes money. How can they be asked to spend another \$250,000,000? Some have not paid down their original investment.</p> <p>We find extremely unreasonable the requirement that the station must operate simultaneously, both digital and analogue stations, for several years. While they can reduce their capital expenditure by using a signal distributor, the broadcasters would still have to buy and rent equipment.</p>		<p>The cost of implementing a DTT network and transmitting digitally is borne unto the signal distributor and not each of the 'Free To Air' broadcasters.</p> <p>A station will not operate an analog and digital network simultaneously. During the phase of simulcasting, the existing 'Free To Air' broadcaster will continue to provide an analog service while the signal distributor provides the same content digitally. The Authority is mindful that even though implementation of a digital national</p>

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Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
		<p>We are very concerned that TATT seems to have the power to ban the import of analogue television receivers. Who has given TATT the power to ban the broadcaster and, more so, the public, from doing so?</p>		<p>network is not a direct expenditure to the 'Free to Air' broadcasters; they will however to incur some cost in DSO.</p> <p>The Authority is seeking to ensure that the relevant consumer equipment (STB and TV) is of a standard and quality that ensures the public the benefits of digital TV. As such, the Authority will establish specifications and standards of these equipment that allows for proper service reception and delivery. It is not the intention of the Authority to ban imports, but through the Consumer Education Awareness and Protection Plan, the retailer and consumer will be able to make the right choice in equipment for DTT.</p>

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Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
	TTPBA	<p>Digital Broadcasters and Cable</p> <p>It is the opinion of all National broadcasters interviewed that if TATT's prescription is followed; they are likely to abandon all their free over the air broadcasts and, instead, rent a channel from the existing cable television service.</p> <p>Even though the broadcasters will not be entitled to 'must carry' on the cable, they will find it less expensive to rent a cable channel than generate their own broadcast.</p> <p>It will also be possible for them to use TSTT's service and the Internet.</p> <p>Communicating with their customers by means other than 'through the air' will mean that they also save the charges for spectrum.</p>		<p>This model holds as similar to wired cable TV in the model of DTT, 'Free To Air' broadcasters will be allowed the option of leasing capacity or "renting" a channel on a signal distributor's network.</p> <p>The Authority agrees that it will be less expensive for broadcasters to lease capacity on a signal distributor than "generate their own broadcast" using separate transmitter facilities.</p> <p>Consistent with the policy statement in Section 4.7 of the document, the Authority will continue to facilitate and encourage the distribution of digital TV services over broadband / high capacity networks.</p> <p>One of the benefits envisaged by the Authority as a result of DSO is that each broadcaster will no longer pay</p>

Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
		Those who do not have cable because they cannot afford it will be unable to receive local television stations. Aren't TATT's coverage requirement supposed to ensure that everyone has access to television and radio?		<p>licence fees for broadcast spectrum as this is only made by the spectrum user i.e. the signal distributor.</p> <p>The comment made does not hold as the authorization of a national DTT network i.e. a signal distributor will allow for local television stations and the coverage requirement will ensure that everyone has access to such service.</p>

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Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
	TTPBA	<p>Why are we against digital television? The broadcasters are not against digital television. It has to come and it will. We are against having TATT prescribe when and how without any regard to the cost of doing so, either to the broadcaster or the viewer. Does anyone at TATT have broadcast experience or has anyone attempted to find out what the market wants or needs? We do not know anyone in Trinidad & Tobago who can comment with authority on this matter of digital television transition and certainly the broadcasters are just starting to feel their way, but this is not a consultative document.</p>	<p>We would like consideration to be given to allowing the market to decide on when and to some extent how. Yes, we do need to choose a system but when we employ it must be left to each existing broadcaster.</p> <p>What and when the viewer buys should be left to him/her.</p> <p>Digital is imminent but it should come at a speed the market determines; not TATT or the ITU, to avoid the risk of bankrupting all existing broadcasters. If this were to happen the market would be left to</p>	<p>In consideration of the impact of DTT, the local market, regional and international trends, the Authority has taken a policy driven approach to ensure DSO in an efficient and timely manner.</p> <p>The viewer will be afforded the choice in broadcasting service as well as the type of equipment (STB and TV). This will be realised with a successful Consumer Education, Awareness and Protection Plan.</p> <p>The Authority recognises that the impact of going digital bears a cost to the broadcaster and the viewer. However, the benefits of DTT is best realised sooner than later when the adoption of the digital TV is evolving at an international level.</p>

Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
			<p>FLOW and TSTT with no television for those who cannot afford cable.</p> <p>We would like TATT to give real consideration to the cost to the broadcaster or the viewer of going digital.</p> <p>Before any decision is made to go digital, research should be done to determine what the market wants or needs or if going digital right now is feasible.</p> <p>Efforts should be made to stay in analogue as long as possible until it has been determined that the market can afford to go digital.</p> <p>We submit that prices for digital equipment will come down: a 27" receiver</p>	<p>The Authority is seeking to ensure that the necessary research and consultation is conducted through a DTT Technical Working Group consisting of the relevant stakeholders. One of the objectives will be to recommend milestone dates in all phases of DSO taking into consideration the ability (both technically and financially) of broadcasters and viewer in switching to digital.</p> <p>The Authority does not agree with the recommendation of "stay in analogue as long as possible". As stated in this document, DSO will be achieved through an orderly approach of authorizing DTT.</p>

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Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
			<p>was TT\$15,000 eight years ago. Today that same receiver is TT\$3,500.</p> <p>There should be no ban on the importation of analogue receivers. Retailers and consumers should be allowed to choose what they want to purchase, even if it's 'foreign used'.</p> <p>Broadcasters should be allowed to import foreign used broadcast television equipment, studio and transmission if that better suits his budget and that is what he wishes to do, especially as such equipment will be very inexpensive when the USA goes digital.</p>	<p>The Authority does not intend to ban imports as such. Standards for consumer equipment will be established and both the retailer and consumer will be educated on making the right choice in such equipment.</p> <p>An individual broadcaster will not have to buy digital transmission equipment as a signal distributor will be responsible for coverage in the digital domain.</p>

Framework for Digital Terrestrial Television Broadcasting in Trinidad and Tobago

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			<p>Consumers should be made aware that when we do go digital they will be able to receive transmission on an analogue received once they have a set top box.</p> <p>While we agree that those frequencies that are liberated can be used for other services that will enrich the media environment, we suggest that this can be done now without going digital.</p> <p>We suggest that the coverage rule be re-visited. If not, many stations may seek to be reclassified as Major Territorial. Allow the market to decide where and how each market (location) is addressed. This would immediately</p>	<p>The Authority agrees with the statement, and it is correct that consumers will be able to receive broadcasting services on an analog TV once a STB is used.</p> <p>The Authority has already made available via auction spectrum in the upper UHF band which is considered as digital dividend for the provision of Broadband Wireless Access (BWA) Services such as Multi-Channel Video Distribution and IP Services.</p> <p>Broadcasters are reminded that the provision of a national service was requested by choice and solely as that type of concession. Therefore it is the broadcaster's responsibility to ensure compliance to those obligations in the concession as it relates to coverage. The Authority recognises that providing coverage in Trinidad and</p>

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			<p>make more locations suitable as broadcast antenna sites instead of everyone wanting the highest sites in order to meet their coverage requirements. We strongly suggest that the present coverage requirements are too strict and should be modified to read that populated areas be serviced with Radio and Television (not all radio and all television stations) and that 95% of the population must have access to radio and television. (See details under "Coverage" above.)</p> <p>With regard to a Public Service Broadcast, we suggest that this be operated as is done in the United States of America where it is funded by the</p>	<p>Tobago has challenges due to the topography of both islands. The Authority does not agree with the recommended modification to the coverage rule.</p> <p>It is the responsibility of the Authority to ensure that the public is afforded a choice in services and therefore if an entity chooses to be a national broadcaster, that means anyone from the public should be able to receive that service.</p> <p>The establishment of a Public Service Broadcast (PBS) is addressed in another document currently being drafted.</p>

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			public.	
	ICNTT	<p>ICNTT appreciates the opportunity to comment on the proposal. Further ICNTT would like to congratulate TATT as the first regulatory authority in the English speaking Caribbean to forge ahead in this area of discourse. ICNTT is encouraged and in support of a move to digital broadcasting in both the television and radio sub segments of the broadcasting sector. In this regard ICNTT looks forward to the opportunity for further discussion on the migration of Free-to-Air (FTA) radio broadcasters to a Digital Terrestrial Transmission model of operation. However, it is noted that much of the major points for consideration are generally deferred to the "Migration Plan" document which has yet to be published. ICNTT eagerly awaits the publication of this plan as it is hoped that much of the concerns raised at this point would be adequately addressed therein.</p> <p>Further, there is a lack of market information (that is not considerably dated) given the</p>		<p>Comment Noted.</p> <p>In the revision of this document, the market information in Section 1.1 has</p>

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		level of expedited investment that is being obliged on both FTA and subscription broadcasters, particularly in a period of (anecdotal) falling advertising revenues.		been revised.
Section 1				
1 Introduction	TTPBA	<p>“There is a global requirement to have analogue switched to digital. This has been mandated by the ITU with a timeframe switch over by 2015.”</p> <p>What exactly does that mean? Are we legally bound to do so? If we are signatories to ITU does that preclude us from acting in our best interest? Have we no choice in this matter? If we can liberate the frequencies ITU wants without going digital by 2014, are we allowed to do that? Do we have some control over our own affairs?</p>	The broadcasters are not saying that digital quality is not better and spectrum will not become available, we only ask, “Are we legally committed by virtue of our belonging to the ITU?” For example if Haiti or St. Kitts belong to the ITU, are they also obligated to go digital?	<p>Trinidad and Tobago (as part of region 2) is not legally bound to complete analog to digital switchover by 2015. However, as a signatory to ITU conventions and in keeping with the global trend (including developments in Region 2) Trinidad and Tobago recognizes that as part of the orderly development of the broadcasting sector, digitalization should take place sooner rather than later.</p> <p>The statement has been reworded to “Caribbean nations along with the wider world should be undergoing major changes in the area of television broadcasting with the movement from analog to digital. Many countries have either begun switching over or are developing a blueprint for the move. For some countries, like the United</p>

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				States of America, the change has already taken place. For others the process is only now beginning. Although only countries in Europe and Africa have a mandate by the ITU for switchover by June 2015, in the interest of harmonization and capitalizing on the benefits of going digital, the rest of the world has taken the initiative to ensure switchover on or before this date.”
1 Introduction	TTPBA	<p>“The quality the viewer experiences will be improved and many more channels and services will become available.”</p> <p>We agree that this is true. We also believe there are other things to be considered. The quality of the present analogue signal is quite good enough for television enjoyment; more so on cable, and could be made even better with proper attention to receive antennas.</p> <p>At present, we have a television system that, in spite of its being analogue, works, even though it does not make money.</p>	We are not saying that we should not be as progressive as New York or London. We are simply saying that we should implement only what we can afford, and right now all the television broadcasters would go under if they were forced to go digital.	<p>As previously stated, the cost of implementing a DTT network and transmitting digitally is borne by signal distributor and not each of the ‘Free To Air’ broadcasters i.e. individual broadcasters will not have to buy digital transmission equipment as a signal distributor will be responsible for coverage in the digital domain.</p> <p>It is noted that in most cases the existing broadcasters’ equipment would be nearing the end of useful life by 2015. Therefore broadcasters would have to incur additional expenditure in</p>

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				replacing such equipment. Instead broadcasters will be required to lease capacity on a signal distributor's network.
1 Introduction	CCNTV6	Broadcasting is severely threatened by the emerging technologies in every market in the word. People are spending a lower proportion of their time passively receiving television and radio broadcasts and proportionately more of their time on the internet, interfacing via mobile platforms and using IPTV, VOD and Pay TV.	TATT needs to move away from the premise that 'broadcasting' is a public interest matter. It no longer is so.	<p>As technology evolves and converges there are emerging ways in which content is delivered to the public or targeted audiences. The traditional methods of broadcasting such as 'Free To Air' radio/TV, cable and satellite are being augmented with service delivery over other medium such as the internet.</p> <p>In any method in which content is "broadcasted" to the public, there is an aspect of public interest. This is seen in viewership to content such as local news and also at times of disaster where the public relies on broadcasting services for information.</p>

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Section 2				
2.1 Benefits of Digital Broadcasting	GDL	The Authority seems to have not emphasized the most important benefit of going digital, although mentioned in a very wide scope in “additional interactive services”, it does not do it much justice. By going digital, the TV will become open to an infinite number of services, ranging from social networking, chat rooms, to email and video conferencing. Specific information channels, TV portals, shopping services, networked gaming. It will start the emergence of TV and internet. For example, HBBTV (Hybrid-Broadband Television) is a new standard that has recently been approved, it is based on the MHP standard, but it standardizes the way a hybrid box will use the internet channel for interactive services. We have already started to see services and applications being rolled out on this standard.	No specific recommendation except to point out that the Authority needs to look a lot deeper into the benefits of going Digital and we recommend to look into what is going on into Europe as they are more advanced in the Digital arena - things like HBBTV, Project canvas etc.	The Authority agrees with this comment and the increased recognition to the benefits of going digital.

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2.3 Coverage Requirements and Spectrum Allocation under Analog FTA	TTPBA	<p>Coverage</p> <p>The difficulty in achieving full coverage is caused by the topography of Trinidad and Tobago.</p> <p>We wish to suggest that the coverage rule be re-visited. If not, many stations may seek to be re-classified as Major Territorial, and therefore have no need to service Tobago. Allow the market to decide where and how each market (location) is addressed. This would immediately make more locations suitable as broadcast antenna sites instead of everyone wanting the highest sites in order to meet their coverage requirements.</p> <p>The following sites already have access and power: Red Hill - Laventille, Mount St. Benedict, San Fernando Hill, Issa Nicholas Building – Independence Square. Where Tobago Windward Coast is concerned, (Parlatuvier, Castara) maybe TATT can invest in erecting a site for the common use of broadcasters to ensure that these areas are at least serviced by some broadcasters.</p> <p>All parts of Trinidad are currently serviced by Radio and Television and that includes Matelot. Not every radio and television</p>		<p>The issue of coverage has been addressed in previous comments regarding the same. Notwithstanding this, the Authority will seek to ensure that any signal distributor shall provide and maintain the coverage required under a national licence.</p>

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		<p>station is present in every part of the island but every part of the island is serviced by Radio and Television.</p> <p>In Tobago, there are sixty thousand people and we make bold to say that maybe fiftyeight thousand are serviced by Radio and Television and the other two thousand receive no Radio or Television service. This two thousand live in the Parlatuvier and Castara areas. This, we suggest, is where the complaints of no service come from.</p> <p>We record the above because it is made to sound that the broadcasters are doing a poor job with respect to coverage and should spend millions of dollars to implement a technology in order to satisfy the one hundred percent requirement of the National licence.</p> <p>In Tobago, there are at least six radio transmitters belonging to National broadcasters; this to service sixty thousand people. Even Charlotteville is serviced with Radio and Television.</p> <p>Broadcasters did, in many cases, sign on for National licences and the terms of that</p>		<p>The Authority does not agree with the comment “we were not aware that</p>

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		licence was 100% coverage. But, we were not aware that secondary frequencies were not to be awarded and that the terms of the licence would be enforced to the nth degree.		<p>secondary frequencies were not to be awarded and that the terms of the licence would be enforced to the nth degree” as analog TV broadcasters do hold licences with more than one frequency or channel. If this comment is made in relation to FM Radio, the Authority made aware to each broadcaster that only one FM frequency will be granted for the provision of the service. This is consistent with minute No. 1821 of June 24, 2004 where Cabinet approved:</p> <ul style="list-style-type: none"> the radio broadcast FM Band Plan in the 88 MHz – 108MHz frequency band the discontinuation of channel assignments for use as repeater frequencies <p>Enforcement of a broadcaster’s coverage obligation is part of the Authority’s responsibility in protecting the consumer and public by ensuring service delivery at a national level, when so authorized.</p>

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		<p>Much confusion existed at licence time and to establish this we point to the irregularity of issuing a concession in the absence of a Broadcast Code as mandated by the Act.</p> <p>It is, therefore, completely impractical and unrealistic to insist that broadcasters employ digital synchronous technology costing what will be millions of dollars to satisfy every part of Trinidad and Tobago with signal because that is what your licence requires. We strongly suggest that the present coverage requirements are too strict and should be modified to read that populated areas be serviced with Radio and Television (not all radio and all television stations) and that 95% of the population must have access to radio and television. Windward Tobago is a special case and should be dealt with separately.</p>		<p>The comment “irregularity of issuing a concession in the absence of a Broadcast Code” does not impact on a broadcaster fulfilling coverage obligations. The Broadcast Code applies to the content of a broadcaster and not to the technical requirement of providing a signal.</p>

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2.4 Revocation of Allocated Frequencies	TSTT	<p>Statement on the Revocation of Analog Broadcasting Frequencies and Digital Dividend:</p> <p>TSTT takes note of the Authority's statement of policy which reallocates freed spectrum to the Accommodation of Broadband Wireless Access and has no objection to the Authority's stated intent. TSTT advises, however, that Section 2.4 of the document states that: "In the frequency allocations within the Authority's Spectrum Plan for the Accommodation of Broadband Wireless Access (BWA) Services, UHF channels 52-69 were reallocated to non-broadcast services" and advises further that the license held by TSTT for the use of UHF 52-59 (698-746 MHz) specifies that the spectrum may be used for "Multi-Channel Video Distribution and IP Services" and this designation is carried throughout the authority's spectrum plan published in September 2008.</p> <p>The Authority's Spectrum Plan (2008) has also specified that: "the radio communication services allocated to this band are</p>	<p>The language of Section 2.4 of the document should be amended to be consistent with the Authority's Spectrum Plan and licenses issued. Channels 52-69 should be recognized in the document as designated for "Multi-Channel Video Distribution and IP Services" which may include, inter alia, Fixed Mobile Broadcast Services in accordance with the Authority's published Spectrum Plan.</p>	<p>The Authority agrees with this comment.</p> <p>The document was revised and the statement in Section 2.4 was reworded to "In the frequency allocations within the Authority's Spectrum Plan for the Accommodation of Broadband Wireless Access (BWA) Services, UHF channels 52 – 69 were reallocated to other services such as Multi-Channel Video Distribution and IP Services".</p>

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		<p>Broadcasting Services on a primary basis and Fixed and Mobile Services on a co-secondary basis, which follows from the ITU Region 2 Table of Frequency Allocations. Also, there is a TT footnote that sub-allocates 698 – 746 MHz for Fixed Services. As a result, the frequency range 698 – 746 MHz can be allocated to BWA services”.</p> <p>We note further that this position is analogous to the policy positions of the US Federal Communications Commission and Canadian regulatory authorities in which spectrum in the range 698-763 MHz is typically designated for use in Fixed Mobile Broadcasting Services. It appears, therefore, that the language used in the paragraphs preceding the Authority’s policy statement is at variance with the license issued for the spectrum and the Authority’s published plan for the spectrum.</p>		

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2.5 Continuity of Service to the Public	TSTT	<p>Statement on the Right and Obligations under "Free to Air":</p> <p>The spectrum over which content is broadcast is limited and TSTT agrees in principle that the existing national and regional broadcasting channels must be carried at least until digital switchover is completed. In light of the trend towards an expansion in the number of national and major territorial broadcasting channels, TSTT is of the view that TATT should consider placing a quantifiable limit or other criteria to restrict the number of channels that broadcasters are mandated to carry post-switch over. TSTT remains agreeable to the principles under which broadcasters must carry government or public broadcasting channels on a mandatory basis but seeks the option of broadcasting other national channels on subscription basis subject to market demand factors.</p>	TATT should consider placing a quantifiable limit or other criteria to restrict the number of channels that must be carried post-switch over.	<p>The Authority agrees with this comment.</p> <p>It should be recognised that the Authority has placed a moratorium on the licensing of additional analog 'Free To Air' television broadcasters. As such, the number of broadcasters required to be carried by must carry will be fixed. At present there are 6 national and 3 major territorial 'Free To Air' analog broadcasters.</p>

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2.5 Continuity of Service to the Public	ICNTT	<p>This policy position has an associated impact on the network architecture of the concessionaires targeted, despite them not being FTA broadcasters. This concessionaire obligations targets CATV/ subscription broadcast operators who may not utilize spectrum from TATT but would require the installation of encoding/ decoding equipment at their network's Head End to facilitate the insertion of the FTA signal into the network distribution architecture.</p> <p>The proposed migration of FTA NTSC signals to FTA ATSC signals requires the investment in equipment on the part of the PDFTN to facilitate the receipt of the broadcast signal before insertion can take place.</p> <p>In considering the impact on the signal input architecture, for ICNTT, where there is a dedicated link to some broadcasters this will require the acquisition and installation of equipment both the at the sender's location and at the ICNTT head end for the encryption/ decryption of both NTSC and ATSC signals during the migration period. Where ICNTT acquires the signal from FTA reception, there will need to be equipment</p>	<p>ICNTT notes the satellite television broadcasters are not asked to share these burdensome costs as they are explicitly excluded from the Concession obligations cited.</p> <p>ICNTT suggests TATT reconsider whether these considerable costs should be borne by the PDFTN concessionaires in an aggressive timeframe (within 2 years according to the schedule outlined) with no recourse or assistance from the Authority.</p> <p>ICNTT suggests that TATT make provision for the continued availability</p>	<p>Satellite television broadcasters are one type of subscription broadcast operator and as such do have the requirement of must carry under the relevant concession obligation. DirecTV, the only authorized satellite TV service provider, currently provides the local 'Free To Air' television broadcasts in their service offering.</p> <p>It will be the responsibility of the broadcaster to provide the PDFTN operator with content in the relevant analog or digital format during the digital switch-on and simulcast phases of DSO.</p> <p>The Authority will not permit 'Free To Air' broadcasters to provide their content in analog (NTSC) format after</p>

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		<p>installation only at the Head End. Ultimately this requires significant investment on the part of the PDFTN concessionaire.</p> <p>In considering the impact on signal distribution architecture, this will require the further installation of ATSC encryption equipment at the input to the distribution network or the roll-out of significant terminal equipment to customers.</p> <p>As discussed later on, a review of international experiences in jurisdictions ranging from the US, UK and Japan illustrates protracted transition periods of over ten years, whereas TATT is demanding transition in two to four years.</p> <p>This intense investment requirement to maintain the cited obligation seems onerous.</p>	<p>of signal to PDFTN in the appropriate NTSC format for a period beyond the 2014 deadline for “analogue turn off.”</p> <p>Alternatively it is suggested that TATT propose some mechanism to assist PDFTN concessionaires in achieving this apparently imbalanced obligation.</p>	switch-off.

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2.5 Continuity of Service to the Public	GDL	<p>The continuity of service when going Digital is not as simple as described in the document. It is not just a case of broadcasting a digital signal in parallel to the current analogue broadcast. It has to be carefully planned, coordinated and managed. First STB will be needed and then the configuration of the STB and TV will need to be planned. You cannot allow broadcasters to broadcast a digital signal in an allocated frequency. Unlike analogue, in the digital domain, the signal is actually interacting with the STB and as such it is possible for one broadcaster to interfere with the signal of the other broadcaster even if they are on different RF channels. This has to be managed centrally and cannot be left to the broadcasters.</p> <p>CAS is mentioned however, to gain the best benefit of going digital we strongly recommend the boxes have some form of CAS/CAM interface, otherwise it will act as a barrier for viewers to take on additional subscription based services or they will need to replace the STB's.</p>	No recommendations on this point.	<p>Comment Noted.</p> <p>This matter will be addressed in the DTT Technical Working Group.</p>

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2.6 Public Broadcasting Services	TTPBA	<p>Public Service Broadcaster</p> <p>The TTPBA would like to suggest that we already have a PBS service in the CNMG stations, Channel 4 and the Parliament channel.</p> <p>The document talks of PBS television in the USA. Please be reminded that this is supported by the public, not government. This is as it should be. The public want it, so they pay for it.</p> <p>We suggest that this is the way to go instead of a government deciding it should exist and should be provided by a broadcaster at his cost.</p> <p>Why would TATT be allowed to reserve 1 UHF and 2 UHF channels for an analogue Public Broadcasting Service when everyone else is being forced to go digital? (Page 15)</p>		<p>Comment noted.</p> <p>The establishment of a Public Service Broadcast (PBS) is addressed in another document currently being drafted.</p> <p>At the time of drafting this document, the concept of a PBS was within the rollout of analog TV broadcasting services. A reservation of VHF/UHF spectrum was therefore made consistent with frequency assignment principle for a national TV service. As stated in this document “The Authority has placed a moratorium on the authorization of a Public Broadcasting Service Provider until such time as the terms and conditions for the relevant concession has been established in consultation with the Government, the public and other key stakeholders”. It is expected that the implementation of a PBS will fall within the timeline of digital switch-over and will be introduced as a digital service on a signal distributor.</p>

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2.7 Environmental Concerns	TTPBA	<p>Import of Analogue Equipment</p> <p>The top paragraph on Page 16 seems to be a ban on the importation of analogue equipment? Is this a correct interpretation? The use of the pejorative word 'dumping' seems to indicate that analogue receivers will no longer be allowed into Trinidad & Tobago.</p> <p>As an example, we import foreign used tyres and cars. If the USA wants to dump perfectly good television receivers on Trinidad & Tobago at very attractive prices, why should we not take them?</p> <p>It is not only manufacturers who would want to dump but individuals in the USA who are changing perfectly good analogue television receivers for digital.</p> <p>These analogue receivers will be able to receive digital broadcast by simply adding a set top box.</p> <p>TATT has said that to get the full benefit of digital, you must have a digital television, but what was not said is that an analogue television with a digital transmission and a set top box will 'show' a better picture than what we currently have.</p>		<p>Section 2.7 does not refer to any ban on importation of analog equipment and therefore the interpretation in the comment is incorrect. If reference is made to the sentence in Section 2.7 stating "proper regulations relating to controls on shipments and disposal of e-waste will be required", then this refers to the Authority seeking to ensure that the relevant consumer equipment (STB and TV) is of a standard and quality that ensures the public the benefits of digital TV. As such, the Authority will establish specifications and standards of these equipment that allows for proper service reception and delivery. It is not the intention of the Authority to ban imports, but through the Consumer Education Awareness and Protection Plan, the retailer and consumer will be able to make the right choice in equipment for DTT.</p> <p>The sentence is reworded so as to remove any misconception of creating a ban on imports to "proper regulations</p>

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		<p>Can TATT regulate what the consumer has available to him to purchase, more so when it is very reasonably priced? We suggest not. The public has a right to all the information but the final decision is still the right of the individual.</p> <p>Will government subsidise set top boxes and digital ready receivers?</p>		<p>relating to specifications and standards of the relevant consumer equipment (STB and TV) and disposal of e-waste will be required “.</p> <p>The policy statement in Section 2.9 of the document has been revised to “The Authority will consider the matter of a subsidy and an appropriate recommendation will be made at the appropriate time.”</p>

Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
2.7 Environmental Concerns	GDL	Although collaboration with other agencies sounds like a good idea, any recommendation that is not already supported will not be adhered to. There are already international standards set by the larger markets that dictate the standards of the boxes. The STB will be manufactured to meet those standards, the manufacturers will not manufacture to a requirement specific to Trinidad and Tobago, the market is far too small for this. However we do not see this to be an issue, as boxes are designed to meet the strictest standards for the more developed American and European markets.	No recommendation on this point	Comments noted.
2.7 Environmental Concerns	TSTT	Statement on Environmental Concerns: TSTT has no objection in principle to the Authority's Statement on Environmental Concerns and its intention to establish regulations and policies to ensure that there are standards for end-user equipment but sounds a caution against implementing a process of inspection, testing and certification by local bodies or other procedures that may introduce undue delay in the switch over process. TSTT	TATT should authorize the use of equipment that is certified by the standards bodies for use in Trinidad and Tobago.	Comment noted. The Authority is seeking to ensure that the relevant consumer equipment (STB and TV) is of a standard and quality that ensures the public the benefits of digital TV. As such, the Authority will establish specifications and standards of these equipment that allows for proper service reception and delivery.

Document Sub-Section	Submission Made By: Stakeholder Category ⁴	Comments Received	Recommendations Made	TATT's Decisions
		recommends that TATT should authorize equipment that is certified by designated standards bodies and that only authorized equipment should be used in the network.		
2.8 Impact on Broadcasters	GDL	<p>“content” – There may be misunderstanding on either the authors understand or my interpretation. No special formats will be required at the content purchase/sale stage to accommodate digital broadcasting. Ideally the content is held in SDI (baseband in 4:2:2) domain. From there it is moved to the required format for transportation/quality. Most of the content is already dealt with in the digital domain using MPEG-2/4 compression.</p> <p>“Archiving” – as above, there will be no change in this process/stage</p> <p>“Multicasting” – this will not be an option, it is not feasible to use the same broadcast equipment. Depending on the demarcation points, broadcasters may need something as minimum as an encoder all the way up to full broadcast headend with exciters, amplifiers and possibly antenna.</p>		Comments noted.

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2.8 Impact on Broadcasters	ICNTT	As discussed later on, (pg. 20 of the document “Government must play a key role in consumer education and public awareness”), as this change is being brought about by policy fiat of TATT. Accordingly, the burden of marketing the benefits of the transition should be borne primarily by TATT in conjunction with necessary support for terminal equipment transitions for the economically marginalized. Such provisions are made with regard to Universality in the telecommunications segment but not yet afforded the subscription broadcaster segment.		<p>Comments noted.</p> <p>The Authority will engage in a Consumer Education, Awareness and Protection campaign.</p> <p>Currently broadcasting services are not covered under the Universality Framework.</p>
2.8 Impact on Broadcasters	CCNTV6	Broadcasters are not profitable and those who are turning a profit are not meeting their cost of capital. The financial situation of the FTA broadcasters is precarious.		<p>Comment noted.</p> <p>The Authority is mindful of the competitive market in broadcasting and the challenge of the remaining viable in the market. The introduction of digital terrestrial television seeks to re-invigorate broadcasting through the introduction of higher quality of service and additional services such as interactive services.</p>

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2.9 Impact on Consumers	TSTT	<p>Statement on Consumer Education, Awareness and Protection:</p> <p>TSTT views consumer education as a critical input to the successful phase-out of analog transmission and migration to digital broadcasting. TSTT believes that the education process should commence at the earliest phases of the digital switchover project to allow consumers time to appreciate the benefits of digital transmission and understands the implications of not taking necessary steps to be ready for digital transmission.</p>	The education programme should begin at the earliest phases of digital switch-over to allow consumers time to appreciate the benefits of digital transmission and understand the implications of not taking necessary steps to be ready for digital transmission.	Comment noted.
2.9 Impact on Consumers	TSTT	<p>Statement on Impact to Consumers:</p> <p>Today, analog TV users have access to Free to air TV services and require no subscriptions. Upon conversion to digital, there is expected to be inertia from consumers and a heavier cost burden on them to replace analog TVs with digital sets.</p> <p>The language of the policy statement in the box suggests that a policy decision not to subsidize set-top boxes based on the fact that the cost of set-top boxes has declined</p>	TATT should review its statement indicating a decision not to subsidize set-top boxes in Trinidad and Tobago.	The policy statement in Section 2.9 of the document has been revised to “The Authority will consider the matter of a subsidy and an appropriate recommendation will be made at the appropriate time.”

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		<p>globally and may not be a major concern in Trinidad and Tobago. A proposition of this type is required to be backed by empirical research.</p> <p>For example, the UK Office of Communications (Ofcom) commissioned research in the form of its Digital Progress Report in March 2006. Ofcom further completed and published a consumer audit to assess the impact on consumers on July 2006.</p> <p>In some of the pioneering countries where digital switchover is being implemented, governments have offered subsidies to users in respect of set-top boxes to analog users. Vulnerable groups and, in particular, the elderly and disabled persons have been the beneficiary of these subsidies. Further, from a purely economic standpoint, carefully crafted subsidy programmes can be used as a signal or incentive to specific consumer groupings or particularly resistant segments of the population, to speed the adoption of digital ready equipment.</p>		

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		To the Authority's credit, the discussion in Section 2.9 seems to acknowledge these facts but the language of the policy statement uttered in the Box on page 19 conveys a position that is at variance with any consideration being given to subsidization of set-top boxes. TSTT gives due recognition to the jurisdictional and legislative impediments that may be involved in funding such a measure, but is of the view that subsidization of set-top boxes is a useful tool in ensuring universal access and is worthy of further research and consideration by the Authority.		
2.9 Impact on Consumers	ICNTT	<p>First, it is noted that the question of funding is limited to the FTA broadcaster primarily. While they have a legitimate concern as the stakeholder primarily impacted by the proposal, subscription broadcasters are also subject to onerous capital outlays due to concession obligations B18 and D10.</p> <p>Secondly, the proposals cited were part of a consultative exercise initiated by the Ministry of Public Administration in 2009 that has yet been completed. The outcomes of the consultation, including responses to concerns raised by participants have never</p>	TATT should identify alternative sources of financial support to offer to affected broadcasters, including the subscription broadcasters negatively impacted by concession obligations B18 and D10.	<p>At present broadcasting services are not included in Universality and therefore cannot access the Universal Service Fund (USF).</p> <p>The Authority will consider the matter and will make a recommendation at the appropriate time.</p>

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		<p>been circulated to industry participants. Given the change in administration and the associated possibility of a change in policy, there is little comfort available at this time which would suggest the inclusion of subscription broadcasting under the purview of Universality (or price regulation as therein suggested).</p> <p>Accordingly, ICNTT is obliged to consider that Section 28 of the Act has limited applicability to “the public telecommunications services in respect of which the requirement of universal service shall apply”.</p>		
2.9 Impact on Consumers	ICNTT	This Policy position seems to be made without adequate assessment of the current economic statistics.	Given the rigour undertaken to identify “economically marginalized groups” in establishing the Universality regime, ICNTT recommends that a similar review be undertaken to validate whether this would be an appropriate position, given the truncated timeframe of	The issue of universality has been addressed in comment above.

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			implementation.	
2.9 Impact on Consumers	CCNTV6	The inclusion of broadcasting with the ambit of Universal Service Obligations and contributing to Universal Service Funds.	<p>TATT withdraws its recommendation to Government to revise the legislation to have broadcasting included as part of any universal service funding obligation.</p> <p>The cost of consumer education should be borne entirely by TATT and/or the Government, since the move to DTT will be an imposition on broadcasters and not driven by market or commercial considerations.</p>	<p>At present broadcasting services are not included in Universality and therefore cannot access the Universal Service Fund (USF).</p> <p>The Authority will consider the matter and will make a recommendation at the appropriate time.</p> <p>The Authority will engage in a Consumer Education, Awareness and Protection campaign.</p>

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2.9 Impact on Customers	CCTL	<p>CCTL takes note of the comment that TATT has recommended to the Government of Trinidad and Tobago that the Telecommunications Act be amended to include broadcasting services as part of universal service. CCTL notes this development with some concern. While this is not yet a live issue, we believe it is important to present a view on it since it is mentioned in this document.</p> <p>The concept of universal service (US) or universal access (UA) has traditionally been related to telecommunications services. This became necessary in the context of market liberalization and the development of competition, as a means of ensuring that citizens, especially the economically challenged are not deprived of basic telecommunications services. On this basis we do not believe that US/UA should be extended to broadcasting services. Further given the different market development context, the application of any US / UA concepts in the broadcasting sector would of necessity be based on a totally different premise and policy goals, as</p>	<p>Universal service should not be extended to broadcasting services. Before contemplating any changes to the Telecommunication Act to extend universal service to include the broadcasting sector, appropriate consultation should be done on the issue.</p>	<p>At present broadcasting services are not included in Universality and therefore cannot access the Universal Service Fund (USF).</p> <p>The Authority will consider the matter and will make a recommendation at the appropriate time.</p>

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		<p>compared to telecommunications services. We therefore believe that in the interest of transparency and in getting a rich and diverse set of views, this issue should be consulted on before any consideration is given to extending universal service into the broadcasting space.</p> <p>Even within the context of technology and market convergence the broadcasting space has a diverse group of service providers, radio, free to air television, cable television and content providers. At a minimum, there would need to be a clear policy premise for US / UA in the broadcasting sector, plus very clear definitions as to what would constitute universal access service in this sector.</p> <p>There is also the issue of illegal operators in the cable television market space. CCTL would be very concerned that adding a further cost element to its offering that would put it at a further competitive disadvantage to an illegal operator who would not be contributing to a universal service fund.</p>		<p>On the matter of illegal operators, the Authority will continue to ensure that all telecommunication and broadcasting service providers comply with the provisions of the Act and are duly authorized.</p>

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2.9 Impact on Consumers	GDL	The picture quality will not be dependant on a digital ready TV. The picture quality depends on the compression and encoding. The only difference between using a STB and digital TV is that the Digital TV has the digital demodulator and decoders built inside the TV instead of the STB.		Comments noted.
2.9.2 Consumer Protection	GDL	Last line ends at “to buy new...” but does not continue, what is the authority suggesting will need to be purchased?		The line referred to in Section 2.9.2 does continue onto the following page and states “to buy new digital equipment”. This is reworded to “to buy the appropriate digital equipment”.
2.9.2 Consumer Protection	ICNTT	It is unclear exactly what malfeasance is envisioned that will require protection for the consumer.	TATT should clarify exactly what areas are to be covered by the regulations referenced, and the socio-economic ends that the application of these regulations will impact.	The Authority’s mandate is to protect the consumer and public at large. Reference can be made to the Consumer Rights and Obligations Policy document published on the Authority’s website.
Section 3				
3 Service Provision and	TTPBA	Service Providers		The Authority has revised the policy statement in Section 4.2 and removed

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Signal Distribution		<p>Why has TATT decided that only existing broadcasters can become Service Providers? Why do we need Service Providers i.e. providing transmission facilities for broadcasting (tower, power, transmitter, antennas etc.)?</p> <p>Is it so that existing broadcasters can 'give up' their transmission sites which TATT consider a National Resource, resulting in many new broadcasters being able to get going and allowing them to concentrate on content?</p> <p>The TTPBA is in complete disagreement that any what the Service Provider charges the broadcaster should be determined by TATT. The Service Provider would have invested in order to offer such services. The Service Provider is the one to determine his price, not TATT.</p> <p>Broadcasters currently share towers, room space, electricity, and access to transmitter sites but we do so of our own volition and we charge what the market allows. TATT is not involved.</p>		<p>the recommendation of only allowing the existing 'Free To Air' television broadcasters to become signal distributors. The Authority will seek to allow any entity to become a signal distributor. This process will be prescribed in an "Authorization Framework for Signal Distributors".</p> <p>It is not the intention of the Authority to determine the price at which the signal distributor charges the broadcaster for leasing capacity/channel on the network. It is expected that this be a private commercial arrangement with charges based on cost, in which the signal distributor offers capacity on an equitable, reasonable, non-preferential and non-discriminatory basis. Any anti-competitive and discriminatory behaviour will be investigated by the</p>

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		<p>If a broadcaster currently has several tenants in his tower and transmitter room and he is required by TATT to give up his site because he does not wish to become a Service Provider, will TATT pay the broadcaster for loss of revenue occasioned by his having to cancel my existing contract with other broadcasters, and to have to now pay a service provider?</p> <p>If the broadcasters are forced to share the National Resource hilltop location, shouldn't the same be applied to the use of B Mobile and Digicel towers and sites, the nationally owned TSTT lines and, of course, the cable of FLOW, which is the only cable that can be run on the poles of T&TEC, a government owned company? According to this document, T&TEC poles are also a nationally owned resource.</p> <p>Has TATT calculated the cost of a broadcaster becoming a Service Provider? If so, would you be good enough to share this information which us so we can better understand what is being asked of the broadcasters.</p>		<p>Authority.</p> <p>The relevant cost of establishing a signal distributor network will be researched by the DTT Technical Working Group.</p>

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3 Service Provision and Signal Distribution	TTPBA	<p>Loss of Product Equity</p> <p>If TATT's plans come to fruition, existing broadcasters will eventually have to change their channel of broadcast, for example, Channel 6 may become Channel 30. That means the broadcaster will lose all the equity he has built up for Channel 6 and must start again in building brand equity. The money the broadcaster has spent for the last twenty years promoting Channel 6 News is to be lost.</p> <p>Will the Broadcaster be allowed to keep its present channels or will all broadcasters be reassigned new channel for DTT?</p> <p>We suggest that if free to air service is to be maintained it would seem that the State would have to compensate broadcasters for loss of their investment in equipment.</p>		<p>Comment noted.</p> <p>The Authority in its authorization of signal distributors will seek to have current channel assignments maintained.</p> <p>The Authority will consider the matter and will make a recommendation at the appropriate time.</p>

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3 Service Provision and Signal Distribution	ICNTT	<p>ICNTT is unclear as to what TATT is trying to achieve with this section.</p> <p>If TATT is trying to identify a niche role for which it would like to see market entry, it has not provided a preliminary business case that is attractive to the prospective investor. The document cites (later on) that there are some 151,000 subscription broadcasters. This effectively removes that number of subscriber terminals from the FTA marketplace, but does not thereafter inform the reader of the number of terminals that are primarily FTA and therefore be considered the base market for the Signal Distributor. Further, ICNTT is unclear on what TATT is expecting of the Signal Distributor in terms of infrastructure roll-out. In the context of FTA broadcasting, is TATT suggesting the establishment of independent firms that control the antennae farms? Alternatively is TATT considering the introduction of firms that are the only digital FTA broadcasters? Both alternatives have considerable implications upon which the document is relatively silent. In the first instance, ICNTT would like</p>	<p>TATT should provide more appreciation of the cost and revenue drivers to better present the investment case as specific for a jurisdiction the size of Trinidad and Tobago. For either model identified, TATT needs to clearly answer the following questions:</p> <ul style="list-style-type: none"> • How many Signal Distributors are targeted for simultaneous operations within Trinidad and Tobago? • Will each Signal Distributor be given regions in which they are the only provider of such services? • How are Signal Distributors to be identified? 	<p>The DTT Technical Working Group will make recommendations to inform “Authorization Framework for Signal Distributors”. This document will also make a recommendation for the number of signal distributors and minimum spectrum required for sustained viability in the market. In addition the proposed document will recommend the licensing process for authorizing signal distributors. All Signal distributors will be authorized to provide a national network.</p>

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		<p>clarity on what would be significantly different from the current situation. As discussed in the paper, there are only two major broadcast centres in Trinidad and one in Tobago, yet there are over thirty-three (33) broadcast concessionaires. The paper goes on to outline that the existing situation involved widespread collocation of antenna transmitters on the existing towers at these broadcast centres. If the first model is indeed the Signal Distributor model envisioned, how is this different from the current state? If there is no significant variance in models, TATT has not really outlined how are the problems associated with this approach (frequency mixing and resultant inter-modulation products) mitigated? If a significant difference can be identified, there are still significant questions that are not addressed in the paper. TATT has yet to explain how many Signal Distributors are preferred to operate within the geographic space of each of the islands of Trinidad and Tobago, and further, TATT has yet to outline how prospective Signal Distributors are to be selected to enter the marketplace. These discussions are</p>	<p>TATT needs to be a bit clearer on how the Signal Distributor model works so that the market can readily source competitively priced terminal equipment for users.</p> <p>TATT must consider this plan carefully in the context of the regulatory framework enforced by the Telecommunications Act (2001) as amended.</p>	<p>The concept of a signal distributor is discussed in Section 3 of this document. This model is similar to that of a wired cable TV operator in which a national terrestrial network is deployed and anyone wishing to provide a television broadcasting service will lease capacity or channels on the signal distributor network. The signal distributor will be responsible for maintaining transmission facilities and ensuring coverage obligations are met and will be required to pay spectrum licence fees and a concession fee. The broadcaster will now focus on content generation and will incur a concession fee.</p> <p>Comment noted.</p>

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		<p>fundamental in the ensuring that a monopolistic model is not established in any geographic market, a key focus of limited supplier regulation.</p> <p>In the second instance, where it can be adduced that TATT sees the FTA Signal Distributor as the only person that transmits signal over spectrum, while carrying multiple content providers' transmitter feeds encoded through some spread spectrum technique that is decoded by the receiver, there are financial and legal considerations of the domestic regulatory framework that are not addressed. First, ICNTT does not see the advantage of reducing the number of persons obligated to remit spectrum licence to TATT annually with its concomitant reduction in TATT's revenue stream – unless there is the intent to increase the spectrum fees associated with DTT FTA broadcasting.</p> <p>Second, TATT has not outlined the size of a DTT FTA broadcast channel. While it suggests 6MHz, there should be clarity to better understand how TATT envisages this system working.</p> <p>Third, in this model the Signal Distributor becomes the party to whom the concession</p>	<p>TATT needs to better identify whether they have the regulatory power under the current Act to oversee the new model proposed for the broadcast service provider market segment.</p>	<p>The Authority has already made recommendations for appropriate amendments to the Act to accommodate signal distributors. Amendments to existing Authorization Frameworks will be made.</p>

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		<p>obligation resides. Existing broadcasters would all become content suppliers – a party over which TATT has no regulatory oversight. As a consequence, the obligations of these parties to TATT vis-à-vis the Broadcast Code can only be enforced indirectly through the Signal Distributor. As discussed above, there is also the concomitant impact of reduced concessionaire fees to TATT as the revenue and profits of the (now broadcaster) then content provider would no longer be the basis of concession licensing of these parties as indeed, they would no longer be concessionaires!</p> <p>Fourth, in this model, the Signal Distributor becomes tantamount to a resource reseller, where the resource which is resold is an encoded slot in a spread spectrum waveform. This would be something akin to an interconnection must-carry obligation in the telecommunications space. While it is clear that the regulatory power to oversee the antenna farm approach among broadcasters is adequately provided for by Section 26 of the Act and the Access to Facilities Regulations, it is not clear whether TATT</p>		

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		has the statutory oversight to regulate (and ensure parity in) the operations of a broadcast network provider reselling services to a broadcast service provider. Section 25 of the Act provides TATT with the statutory oversight of telecommunications network and service providers – powers for which there is no equivalent relating to broadcast service providers. Without appropriate powers of oversight, TATT will not be in a position to effect its intention that “...signal distributors shall comply with [licence] obligations...”		
3 Service Provision and Signal Distribution	TSTT	<p>Statement on Common Signal Distribution:</p> <p>TSTT cautions that the relationship between signal distributor and broadcaster should be solely based on the market/business driven, commercial agreements between the two parties and not mandated by TATT. Further, it appears that the business model that the Authority seeks to impose on the Broadcasting market may lead to the creation of a small number of specialized signal distributors with potential to exert considerable monopoly power either acting</p>	<p>The relationship between signal distributors and broadcasters should be based on the business driven, commercial agreement between the two parties and not mandated by TATT.</p> <p>The Authority should carefully consider the measures that will govern the behaviour of signal distributors to avoid the</p>	<p>It is not the intention of the Authority to determine the price at which the signal distributor charges the broadcaster for leasing capacity/channel on the network. It is expected that this be a private commercial arrangement in which the signal distributor offers capacity on an equitable, reasonable, non-preferential and non-discriminatory basis. Any perceived anti-competitive and discriminative behaviour will be investigated by the Authority.</p>

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		individually or jointly with their peers. The authority should there carefully consider the measures that will govern the behaviour of these signal distributors.	distortions in the market that are associated with the exercise of monopoly power.	
3. Service Provision and Signal Distribution	CCNTV6	The common signal distributor provider model as articulated and proposed will have serious implications for incumbent broadcasters.	TATT needs to first allow the broadcasters to discuss and work through how this model might be implemented so that incumbents are not undermined and then engage with broadcasters on the basis of an agreed position among them on limiting entry to signal distribution.	<p>The Authority is seeking to ensure that the necessary research and consultation is conducted through a DTT Technical Working Group consisting of the relevant stakeholders.</p> <p>Consultation with the stakeholders, which include the broadcasters, is seen as a crucial process in completing the necessary policies. The Authority therefore held stakeholder consultation with the broadcasters and will continue as such to ensure that existing broadcasters are successful in the transition to digital.</p>

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Section 4				
4 Approaches for the Migration to Digital Television Broadcasting	TSTT	<p>Statement on Approach for Analog to Digital Migration:</p> <p>As mentioned herein, TSTT has no objection to the establishment of signal distributors. We, however, take issue with the Authority's intent to restrict the opportunity to become a signal distributor to existing analog free-to-air broadcasters. The issue arises with the size of the investment that is required to develop a network with adequate coverage and delivering an adequate quality of service. Yet another consideration arises from the relatively short time frame during which a potential signal distributor is expected to establish a suitable network for authorization as a signal provider, roll-out service and the switch-off of analog transmission. TSTT therefore suggests that the Authority should broaden its band of eligibility so as to ensure that interested market actors with existing networks capable of achieving the required coverage and quality of service can be authorized as signal distributors.</p>	TSTT suggests that the authority should broaden its band of eligibility so as to ensure that interested market actors with existing networks capable of achieving the required coverage and quality of service can be authorized as signal distributors.	The Authority has revised the policy statement in Section 4.2 and removed the recommendation of only allowing the existing 'Free To Air' television broadcasters to become signal distributors. The Authority will seek to allow any entity to become a signal distributor. This process will be prescribed in the "Authorization Framework for Signal Distributors".

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4 Approaches for the Migration to Digital Television Broadcasting	CCNTV6	<p>TATT's putative advantages for the broadcasters are illusory. Efficient use of spectrum is not a broadcaster's primary concern. Offering new services (multimedia, e-commerce) pushes the broadcasters out of his market space into market spaces already teaming with life especially on the Internet.</p> <p>TATT is seeking to comply with what it describes as the ITU 'mandate' or 'global mandate' for the digital switchover by 2015.</p>	It would be helpful if TATT can provide the reference for this ITU mandate as we have been unable to locate it, though it is known that the European Union (EU) has a fixed a date of 2015.	<p>Trinidad and Tobago (as part of region 2) is not legally bound to complete analog to digital switchover by 2015. However, as a signatory to ITU conventions and in keeping with the global trend (including developments in Region 2) Trinidad and Tobago recognizes that as part of the orderly development of the broadcasting sector, digitalization should take place sooner rather than later.</p> <p>The statement has been reworded to "Caribbean nations along with the wider world should be undergoing major changes in the area of television broadcasting with the movement from analog to digital. Many countries have either begun switching over or are developing a blueprint for the move. For some countries, like the United States of America, the change has already taken place. For others the process is only now beginning. Although only countries in Europe and Africa have a mandate by the ITU for switchover by June 2015, in the interest</p>

Framework for Digital Terrestrial Television Broadcasting in Trinidad and Tobago

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		<p>Advocating a policy driven approach and rejecting a market driven approach, in order to comply with an unexplained ITU 'mandate' is unsatisfactory.</p> <p>The timetable is quite unrealistic.</p>		<p>of harmonization and capitalizing on the benefits of going digital, the rest of the world has taken the initiative to ensure switchover on or before this date.”</p> <p>In consideration of the impact of DTT, the local market, regional and international trends, the Authority has Authority has taken a policy driven approach to ensure DSO in an efficient and timely manner.</p>

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4 Approaches for the Migration to Digital Television Broadcasting	GDL	<p>Throughout this section and the actual migration plan there seems to be a slight disconnect in a solid plan. It appears more technical understanding at the lower level is required to ensure the correct options are evaluated. You cannot have a full market driven approach, it needs to be policy driven with a central manager/operator. In the digital domain the content is no longer isolated and needs to be managed centrally otherwise it will be exposed to high number of conflicts. There has to be central management of the EPG data as well as the PSI/SI tables. More importantly the PID's need to be managed so there are no conflicts and the LCN have to be controlled, otherwise you can have two services conflicting with each other even if they are on different RF channels.</p> <p>I assume you are talking in the theoretical domain, as it definitely is not practical.</p>		Section 4.1 and 4.2 provides an understanding of the two approaches regarded in DSO. The Authority in its policy statement has recommended a policy driven approach. The Authority agrees with the comments and will consider opening of authorization to entities outside of broadcasters for central manager/operator.

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4.2 Policy Driven Approach to Migration	ICNTT	<p>Pg 29 Option 1 "...The Authority has completed a process which may be considered as the first component of this option. Two concessions were granted for additional 'Free To Air' television broadcasters and although not under any mandate, these broadcasters have chosen to provide analog broadcasting services."</p> <p>This statement reinforces ICNTT's position stated above that, in the context of the current regime and without prior statements of intent or incentives to suggest such intent, the aggressive timeframe for migration with its associated capital cost implications may be onerous on parties in the FTA and subscription broadcast segments.</p>	<p>TATT should consider within its Migration Strategy provisions to assist with the intense cost implications of this migration. Such may include:</p> <ul style="list-style-type: none"> • Access to some discretionary Fund; • Concession Fees rebates or • Some other mechanism to reduce the cost burden of this transition. 	<p>At present broadcasting services are not included in Universality and therefore cannot access the Universal Service Fund (USF).</p> <p>The Authority will consider the matter and will make a recommendation at the appropriate time.</p>
4.2 Policy Driven Approach to Migration	ICNTT	<p>"...[The] channels will be selectively distributed to existing analog broadcasters to deploy digital transmission infrastructure. This option identifies certain broadcasters first with a plan to later expand to the rest of broadcasters, as frequencies become available."</p> <p>Should the approach to migration be revisited and this option reconsidered, as discussed above, ICNTT would require</p>		Comment noted.

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		clarity on how the first movers are selected in such a model.		
4.2 Policy Driven Approach to Migration	ICNTT	<p>Option Two – Introduce Digital Broadcasting with Restrictions on New Analog Broadcasters</p> <p>Should the approach to migration be revisited and this option reconsidered, ICNTT deems this the most equitable model proposed, in the absence of further clarifications discussed above. ICNTT believes that this approach would best support the confluence of policy direction and market forces in determining a way forward.</p>	TATT should consider that as most of the Analog Television Broadcasters (6 of 8 listed in Appendix 1, Table 3) have multiple frequency networks that it is incumbent on them to utilize one of their existing assigned frequencies to initiate the migration. In this way, there will be optimal use of existing spectrum assignments without the need for further utilization of resources.	The Authority has recommended in its policy statement in Section 4.2 of this document a policy driven approach using option three. Only a signal distributor will be allowed to provide a digital transmission network.
4.2 Policy Driven Approach to Migration	ICNTT	<p>Option Three – Introduce Digital Broadcasting Using a Combination of Delivery Platforms</p> <p>While ICNTT agrees in principle to a moratorium on assignment of analog channels and the use of a rationalized approach going forward, it reiterates its concerns highlighted above about the Service</p>	<p>TATT needs to:</p> <ul style="list-style-type: none"> • Identify the proposed market structure • Review its regulatory oversight of such parties • Review its change in regulatory 	<p>The DTT Technical Working Group will make recommendations to inform “Authorization Framework for Signal Distributors”.</p> <p>The Authority’s current framework and policies provide the relevant oversight in the proposed scheme of authorizing signal distributors. This is evident in</p>

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		Delivery Providers discussed above.	oversight of existing broadcasters in the proposed regime	the Authority's "Authorisation Framework for the Telecommunications and Broadcasting Sectors of Trinidad and Tobago" which requires a network operator as well as any broadcaster leasing capacity or renting a channel on a network to hold a concession.
4.2 Policy Driven Approach to Migration	GDL	The use of the upper UHF is a good option. Ideally if adjacent channels can be allocated it will mean that you can reuse the infrastructure and provide a standard coverage across the services, as the propagation characteristics will be very similar (wavelength). You mention some broadcasters deploying ahead of others. It is imperative that the authority fully understands the implications and management of the digital domain. The authority needs to separate the function of the content producers and broadcasters. This has been the case in some countries for the analogue signals, and definitely in the digital domain. Apart from reasons of financial, and a rapid industry development, there are technical reasons/constraints why this has to		Comment noted.

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		be done.		
4.2 Policy Driven Approach to Migration	GDL	Allowing each broadcaster to simulcast on an additional RF channel is not an option. There are major technical issues and also it makes no sense from the planning side.	This will be easier to explain in person, in a sort of an IT workshop.	The Authority will not allow each broadcaster to simulcast on an additional RF channel and has recommended in its policy statement in Section 4.2 of this document a policy driven approach using option three. Only a signal distributor will be allowed to provide a digital transmission network.
4.2 Policy Driven Approach to Migration	GDL	Signal distributors: not only the best option but also the only feasible option. You can have 2/3 signal generators that compete with each other, this will help promote additional services and development and also free up vast amount of resources (capital and human) for the content producers, allowing them to focus on content.		Comment noted.
4.2 Policy Driven Approach to Migration	GDL	In the last sentence you state “only existing analog “FTA” will be given opportunity, again as stated above, this is not an option. It will extremely disadvantageous and problematic to try to do this.	Again a workshop is recommended to explain why.	The Authority has revised the policy statement in Section 4.2 and removed the recommendation of only allowing the existing ‘Free To Air’ television broadcasters to become signal distributors. The Authority will seek to allow any entity to become a signal

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				distributor. This process will be prescribed in the "Authorization Framework for Signal Distributors".
4.3 Broadcaster Network Configurations	GDL	SFN is a superior design. MFN is an option but in the digital domain a SFN is the best option. The UK went with MFN because their design was done in the 80's when SFN was not an option and also due to them having to reuse spectrum for simultaneous broadcast they did not have an option. They are now looking at moving to an SFN. Furthermore other countries may still use MFN design, but the main reason for this is because they share land borders with other countries and need to plan frequency with them, as an island we do not have that problem and hence should go with SFN. SFN will actually help us with coverage penetration especially in Tobago and deep south where land is hilly. It should be mandated to the signal distributors that they need to deploy SFN.		Comment noted.
4.3.1 Current Infrastructure Environment	GDL	Development of sites will be a much smaller issue if signal generators are used.		Comment noted.

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4.3.2 Multiple Frequency Network (MFN)	GDL	No reason to consider MFN, we have enough free spectrum to roll out a full SFN network without having to worry about existing analogue channels in use. Fee structure is a secondary reason for choosing SFN. SFN is a superior design and future proof.		Comment noted.
4.4 Existing Analog Broadcasters Switching to Digital Broadcasting	GDL	“Single broadcaster who chooses to establish a digital broadcasting ... to ensure max number of content”, this cannot work. You need a central signal generator to be responsible for the digital signals. Even if the technical obstacles were ignored, for a single broadcaster it will be an internal business conflict to either provide max coverage (reduce infrastructure cost) vs max modulation/bit rate (smaller coverage and hence more transmission sites).		Comment noted. The document has been revised with Section 4.4 being removed as it was determined irrelevant in the proposed scheme.
4.4 Existing Analog Broadcasters Switching to Digital Broadcasting	GDL	Again, we need to have an IT workshop to explain why you cannot allow independent broadcasters to start broadcasting a digital signal. All broadcasters will need to be mandated to use a signal operator.		Comment noted. The document has been revised with Section 4.4 being removed as it was determined irrelevant in the proposed scheme.

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4.4 Existing Analog Broadcasters Switching to Digital Broadcasting	ICNTT	Statement on Analog Broadcasters Providing DTT Broadcasting Service: TATT is not clear whether it is suggesting the assignment of an additional RF Channel, and TATT is also silent on whether such assignment will be at a cost (market rate, subsidized or free).	ICNTT again submits that where an existing broadcaster operates an MFN, TATT should reconsider if any additional RF channels should be assigned.	Comment noted. The document has been revised with Section 4.4 being removed as it was determined irrelevant in the proposed scheme.
4.4 Existing Analog Broadcasters Switching to Digital Broadcasting	ICNTT	Statement on Analog Broadcasters Providing DTT Broadcasting Service “The option of either retaining the technical activity of transmitting using owned facilities or outsourcing it to signal distributor shall be left to the commercial decision of the individual broadcaster. Any existing analogue terrestrial broadcasting service shall be allowed to choose the digital transmission network (terrestrial, satellite, cable) they wish to migrate too based on their own commercial strategy and economic considerations.”	ICNTT endorses this position.	Comment noted. The document has been revised with Section 4.4 being removed as it was determined irrelevant in the proposed scheme.

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4.5 DTT Broadcasting Standards	TSTT	<p>Statement on the DTT Standard:</p> <p>The Authority has proposed the adoption of standards developed by the American Television Standards Committee (ATSC) and has proposed to apply this standard to service providers in the allocated spectrum for Broadcasting Services as identified in the TTFAT. TSTT takes note that DVB-T is more widely deployed across the globe than ATSC and hence the cost of set-top boxes is expected to be lower.</p> <p>TSTT also advises that ATSC is being deployed primarily in North America for free-to-air (and not subscription-based services) while the Caribbean exhibits operators with both DVB-T and ATSC standard. TSTT believes that DVB-T should be chosen as the standard for subscription-based broadcasting in Trinidad and Tobago for the following reasons: (1) There are off-the-shelf DVB-T set-top boxes with Conditional Access and MPEG-4 capability today; (2) The standard is being consistently improved through extensive research and development; (3) DVB-T set-top boxes available today support the capability of</p>	TSTT recommends the adoption of the DVB-T standard for subscription-based broadcasting services in Trinidad and Tobago.	The policy statement in Section 4.5 (now Section 4.4) has been revised to” The Authority is conducting research and shall make a recommendation on the appropriate DTT standard for Trinidad and Tobago. This research will be undertaken through the establishment of a DTT Technical Working Group”.

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		value added services and authentication; (4) there is at least one TV service provider in Trinidad and Tobago who has deployed broadcast TV using the DVB-T standard; and (5) There are hybrid DVB-T/IPTV set-top boxes available off-the-shelf today.		
4.5 DTT Broadcasting Standards	ICNTT	Statement on DTT Standard: The Authority proposes to adopt the digital terrestrial television broadcasting standard as ATSC	ICNTT endorses this position.	The policy statement in Section 4.5 (now Section 4.4) has been revised to” The Authority is conducting research and shall make a recommendation on the appropriate DTT standard for Trinidad and Tobago. This research will be undertaken through the establishment of a DTT Technical Working Group”.
4.5 DTT Broadcasting Standards	GDL	Further clarification or simplification on the different standards should be made here. At the RF level there are 2 main modulation principles at play. You have the Amplitude modulation and the frequency modulation. ATSC is based on Amplitude and the others ISDB-T, DVB-T and DMB-T are frequency based, more specifically COFDM based. It should be noted that DMB is 99% the same as DVB, the Chinese decided to change a few flags so not to pay royalty fees to the		Comment noted.

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		DVB-T.		
4.5 DTT Broadcasting Standards	GDL	<p>The authority is proposing choosing ATSC, we strongly suggest otherwise. From the document there appears to be a big misconception that both ATSC and DVB-T are similar, and this is not the case. I will list some of the differences, this is not an exhaustive list:</p> <ul style="list-style-type: none"> • ATSC is an extremely old standard slightly enhanced, it makes use of old principles • DVB is the superior technology but due to pride and royalties N America decided not to adopt DVB-T • ATSC can squeeze 19.6Mbits of data into a single 6MHz RF channel. DVB-T is currently doing 36mbits. That is almost 100% more. This is equivalent to twice as many services. • DVB-T is designed for both fixed and mobile, with its FFT options between 2k, 4k and 8k it can easily be adopted. ATSC has no mobile standard/design • DVB-T makes use of COFDM, this makes use of constructive 		<p>Comments noted.</p> <p>The policy statement in Section 4.5 (now Section 4.4) has been revised to” The Authority is conducting research and shall make a recommendation on the appropriate DTT standard for Trinidad and Tobago. This research will be undertaken through the establishment of a DTT Technical Working Group”.</p>

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		<p>interference which is the way all terrestrial based technology is going. It's the same as what WiMAX and LTE are built on.</p> <ul style="list-style-type: none"> • There is a much bigger market for DVB-T and the boxes continue to get cheaper, the ATSC boxes are still more expensive but marginally • DVB standard has an extremely rich middleware standard, and this is one of the most important elements for the future of terrestrial TV. (applications and additional services). • The fact that we are close to N America is irrelevant. In the future TV's will multi standard and able to demodulate ATSC, DVB-T, DMB or ISDB. • The content needs to be remain NTSC which is not an issue, as is clearly demonstrated by Greendot using DVB-T without any issues. • There are pilot projects in America that are using DVB-T. • There is a high chance that ATSC will end up like CDMA where DVB 		

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		<p>will over take as did GSM.</p> <ul style="list-style-type: none"> • DVB-T is much more robust signal requiring a lower SNR or EB/No value • Tobago can definitely benefit from COFDM propagation. • SFN works much better with COFDM • Evaluating between ATSC and DVB-T is not the same as evaluating between NTSC and PAL. We can have DVB-T with the US using ATSC without any issues. • STB are here to stay, this is because they are specialized, low cost and provide a platform for extra services. Trying to embed this into TV's will be both restrictive and costly and hence the market will always opt for a STB. Inbuilt tuners will not add any major benefit for the vast market. • The DVB-T/MPEG standards work very closely together and complement each other. Although you can transport MPEG over ATSC, you are restricted with some features 		

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		and applications/services are not developing as fast as they are on DVB-T.		
4.5.1 Video Standards for Digital TV	GDL	This is all source based encoding stuff. For the purpose of RF (channel based encoding) it makes no difference, but as a policy, we suggest the authority to mandate standardization on H.264 and AACv1/2. This will go in hand with a signal distributor and the cost model. A signal distributor will modulate a 6MHz channel to give say 36Mb of data. A content produces wanted to transmit will need to pay for the data rate it decides to use. If the content producer uses MPEG-2 he may require 3mbits for the SD content, but if he uses H264 only 1.5mbit will be required and hence it will be half the cost. H264 equipment is now in mass production and the cost between the two is marginal, and by the time we are ready to deploy it may be even cheaper.		Comment noted.
4.5.1 Video Standards for Digital TV	GDL	You have stated 720p to be SDTV this is incorrect, 720p and 1080i/p are HDTV. 480 and 576 are the SDTV.		Comment noted. The policy statement in Section 4.5.1 (now Section 4.4.1) has been revised to "SDTV picture quality during digital

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				switch-on, with a view of moving to HDTV picture quality after analog switch-off".
4.5.1 Video Standards for Digital TV	TSTT	<p>Statement on Video Broadcast Standards for DTT:</p> <p>TSTT notes that TATT has mandated SDTV picture quality of the "720p" during digital switch-on. TSTT humbly submits that this statement appears to in error since this particular quality measure of picture quality is consistent with HDTV. Accordingly, TSTT suggests a minimum standard of 480i for SDTV during digital switch-on. TSTT also notes that TATT has prescribed that a minimum of MPEG Part 10 with AAC and Dolby AC3 support to comprise the standard for digital television broadcasting. TSTT wishes to highlight that the ATSC standard prescribes a minimum of MPEG-2 for data compression and believes this prescription to be in error.</p>	In relation to digital terrestrial television broadcasting, TSTT suggests a minimum standard during digital switch-over of: MPEG -2 for data compression; 480i for SDTV picture quality	<p>Comment noted.</p> <p>The policy statement in Section 4.5.1 (now Section 4.4.1) has been revised to "SDTV picture quality during digital switch-on, with a view of moving to HDTV picture quality after analog switch-off".</p>

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4.7 Other Broadcasting Technologies	ICNTT	<p>Statement on DTT Network Design and Implementation:</p> <p>The Authority proposes to continue to facilitate and encourage the distribution of digital TV services over broadband / high capacity networks. This is seen today in the existing subscription based television service providers switching to digital platforms in order to provide digital TV services.</p>	ICNTT endorses this position.	Comment noted.
4.8 End User Equipment	TSTT	<p>Statement on End User Equipment:</p> <p>TSTT has no objection in principle to the proposed policy statement. TSTT, however, cautions against implementing a process of inspection, testing and certification by local bodies that may introduce undue delay in the switch over process. TSTT recommends that TATT should authorize equipment that is certified by designated standards bodies.</p>	TATT should authorize equipment that is certified by designated standards bodies.	<p>Comment noted.</p> <p>The DTT Technical Working Group shall make recommendations for the specifications and standards for equipment and shall be prescribed in the “Migration Strategy and Implementation Plan”. Authorization and certification of equipment will be consistent with the Authority’s Equipment Certification Process.</p>

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4.8 End User Equipment	GDL	Not sure what the authority is trying to say about the EPG, but the EPG information is normally transmitted together and not independently. The STB conform to a standard and look for this information on a specific PID 16 (EIT). You can't have more than one table with ID 16.		<p>Comment noted.</p> <p>The document was revised and the paragraph in Section 4.8 (now Section 4.7) "A receiver system can allow any 'Free To Air' broadcaster from the Electronic Programme Guide (EPG). It may be defined as a simple right of the consumers to have access to all service providers through an EPG. There should be free and equal access to the basic programme guide for all free to air broadcasters" was removed as it was determined irrelevant.</p>
4.8 End User Equipment	GDL	For STB to be CAS neutral you need to have a CAM in there and not any embedded CAS, this is slightly more expensive, not recommended. Some boxes can support multiple CAS systems, but it's not simple.		<p>Comment noted.</p>
4.8 End User Equipment	GDL	Absolutely not. You need to define the standard parameters, and actually encourage different boxes. You will boxes to meet different budgets and also different features. PVR's, hybrid, single/double tuner, email capability, etc. Also as new applications and services come out they will need different		<p>The Authority agrees with this comment.</p> <p>The document was revised and the statement in Section 4.8 (now Section 4.7) "A single STB approach should be promoted for digital services. Due to</p>

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		types of boxes, like integrated WIFI.		the practical constraints of achieving this..." was removed.
4.9 Interactive Services	GDL	No one uses it, there is no equipment and hence not even an option. Also if it was an option the standard does not allow it to be used inside the same 6MHz channel that is used for broadcasting. The modulators use fixed (5, 6, 7, 8) MHz channels and cannot be broken any further. The DVB-RCT actually proposed to use a few KH of spectrum in the white space in the lower VHF band. However it has not taken off and there is nothing on the horizon for now.		Comment noted.

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4.9 Interactive Services	GDL	The digital platform will bring with it the huge possibility of offering other services, such as teletext, shopping, voting, etc. We suggest that the signal operator be given the license to develop and operate the network and the content producers be given the concessions. However it is to be noted that in other countries, the signal operators sell space on the network and anyone wanting to offer any service can purchase the space and offer the service, no special license is required. Similar to you setting up a website to offer a service, you do not need a concession, you can acquire some space on a web server. This should be seriously considered as application of license/concession will seriously hinder the development of the sector. I think differentiation should be given to broadcast content and services. The services should be treated like a service on the internet as in the future that is exactly what will happen. You can already get STB with embedded browsers that allow you to go on to the internet.		Comment noted. Regulation of signal distributors and broadcasters (service providers) shall be consistent with the requirement for concession and licence which is clearly identified and prescribed in the Authority's "Authorisation Framework for the Telecommunications and Broadcasting Sectors of Trinidad and Tobago".
4.9 Interactive	GDL	I am not aware of any terrestrial wireless return paths. To clarify, the industry is going		Comment noted.

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Services		hybrid, in that interactive services are using the internet as the return channel (HBBTV standard). It is more important that the authority regulate the existing ISP more to ensure that they do not hamper the return traffic over their network for terrestrial TV traffic. The authority needs to take a long term view of the spectrum efficiency and bear in mind that currently we have HD TV and more recently 3D TV, which will require more data. There are SHD (super HD) screens coming into the market, more content, more services and all of this will require bandwidth and data. Hence it is imperative that the correct most optimum and future proof channel based encoding technology standard is used and today that is DVB-T.		
4.9 Interactive Services	TSTT	Statement on DTT Interactive Services: In respect of Section 4.9 "Interactive Services" TSTT notes that TATT's discussion centers on the DVB-T standard's property and features and proposes in its final statement to make allowances for spectrum to provide for interactive services under the standard despite the fact that the	TATT should be clear with respect to its intent as to which standard should be adopted. The results of this process should be communicated to the market actors at the earliest phases of the process.	Comment noted. The policy statement in Section 4.5 (now Section 4.4) has been revised to "The Authority is conducting research and shall make a recommendation on the appropriate DTT standard for Trinidad and Tobago. This research will be undertaken through the

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		<p>Authority has suggested the adoption of the ATSC standard.</p> <p>It appears that there is some contradiction vis-à-vis the standard that was proposed for adoption in its policy statement on the DTT standard (p. 40).</p>		establishment of a DTT Technical Working Group”.
4.10.1 Spectrum Plan for Terrestrial Television Broadcasting	TTPBA	<p>‘Free up’ of Frequencies an Advantage of Digital</p> <p>We agree that those frequencies that are liberated can be used for other services that will enrich the media environment. This is what ITU wants.</p> <p>The TTPBA would like to suggest that it is not necessary to go digital in order to restrict the television band and encourage other services. That can be done now, even if we remain analogue.</p> <p>Broadcasters are currently operating at a loss. It is unlikely that you will have an influx of new applications for concessions.</p>		<p>Comment noted.</p> <p>The Authority has already made available via auction spectrum in the upper UHF band which is considered as digital dividend for the provision of Broadband Wireless Access (BWA) Services such as Multi-Channel Video Distribution and IP Services.</p>

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4.5 DTT Broadcasting Standards	TTPBA	<p>ATSC</p> <p>Can TATT explain why this is the system chosen?</p> <p>Does TATT have a proposed composition for the ATSC Stream i.e. is it one HD 2 SD, four SD channels etc?</p> <p>What is the standard for mobile is it ATSC M/H?</p>		<p>The policy statement in Section 4.5 (now Section 4.4) has been revised to” The Authority is conducting research and shall make a recommendation on the appropriate DTT standard for Trinidad and Tobago. This research will be undertaken through the establishment of a DTT Technical Working Group”.</p> <p>The composition of the DTT stream will be prescribed in the document “Migration Plan and Implementation Strategy”.</p>
Section 5				
5.1 Migration Timeframe	TSTT	<p>Statement on Digital Switchover Timeframe:</p> <p>The Authority has indicated in Section 5.1 that the framework document will be completed and published in the 2nd quarter of 2011 and the completion of the migration exercise is expected to be aligned to ITU’s mandate of 2015.</p> <p>TSTT is of the view that the standards for modulation schemes for Trinidad and Tobago (DVB-T vs. ATSC) should be</p>	<p>The standards for modulation schemes for Trinidad and Tobago (DVB-T vs. ATSC) should be published by December 2010 to allow the television service providers to have the infrastructure in place in time to begin the migration process in 2011.</p>	<p>Due to the extensive work involved and consultation process required, the relevant documents to guide and facilitate the completion of DSO is expected to be completed in 2011.</p>

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		published by December 2010 to allow the TV service providers to have the infrastructure in place in time to begin the migration process in 2011.		